Industrial emissions policy country profile – France

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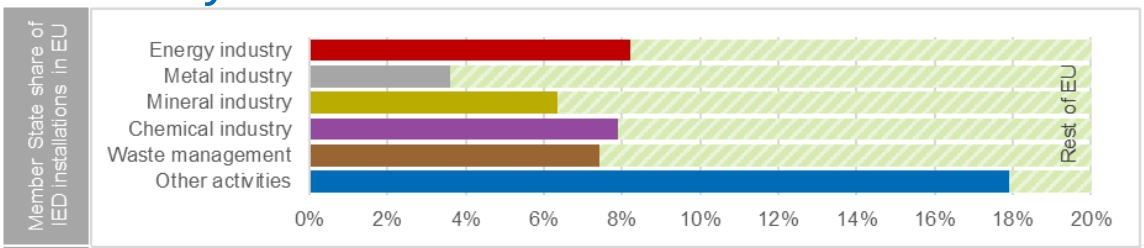
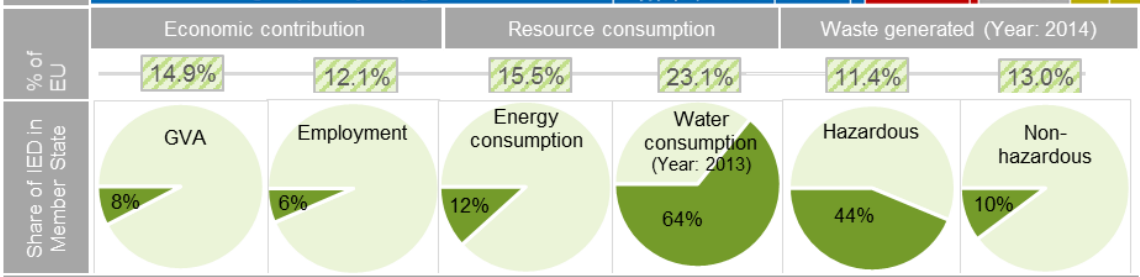
Table of contents

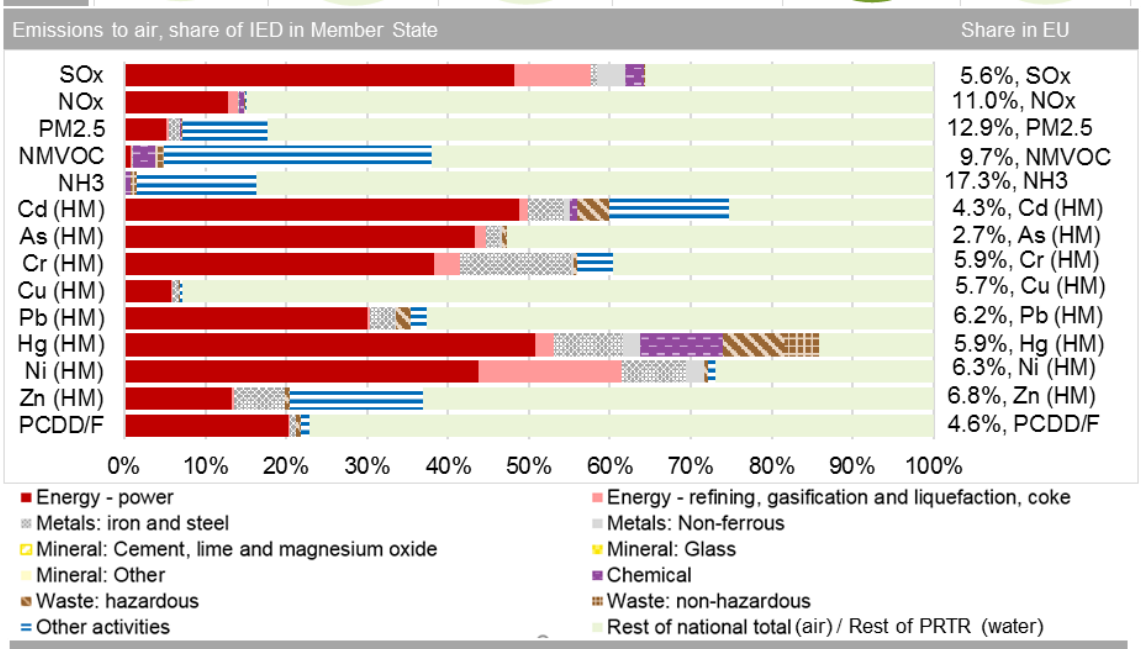
Abbreviations and units

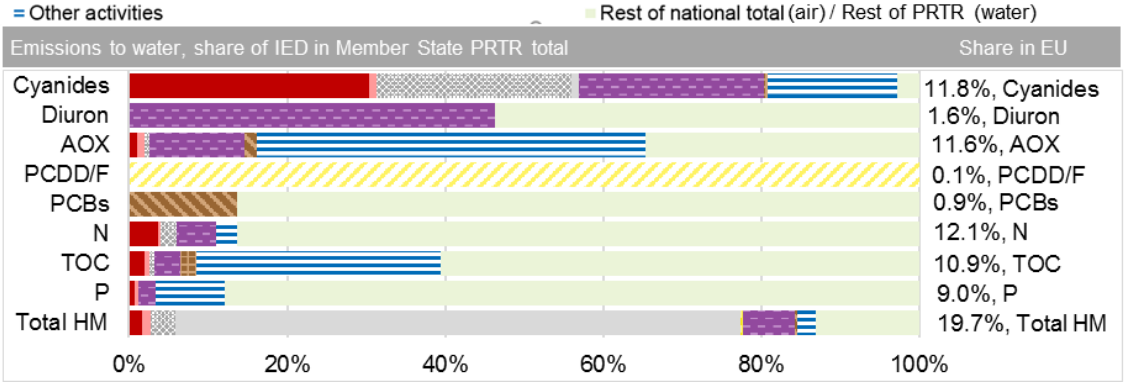
AOX	Adsorbable Organic Halides
As	Arsenic
Cd	Cadmium
CLRTAP	Convention on Long-range Transboundary Air Pollution
CO_2	Carbon Dioxide
Cr	Chromium
Cu	Copper
DG	Directorate-General
EEA	European Environment Agency
E-PRTR	European Pollutant Release and Transfer Register
EU	European Union
EUR	Euros
FR	France
GVA	Gross Value Added
HCBs	Hexachlorobenzenes
Hg	Mercury
HM	Heavy Metals
IED	Industrial Emissions Directive
IPPCD	Integrated Pollution Prevention and Control Directive
kg	Kilogram
ktoe	Kilotonne of oil equivalent
MW	Megawatts
N	Nitrogen
NACE	General Classification of Economic Activities within the European Communities
NH_3	Ammonia
Ni	Nickel
NMVOC	Non-Methane Volatile Organic Compound
NO_x	Oxides of Nitrogen
P	Phosphorus
PAH	Polycyclic Aromatic Hydrocarbon
Pb	Lead
PCBs	Polychlorinated Biphenyls
PCDD	Polychlorinated Dibenzodioxins
PCDF	Polychlorinated Dibenzofurans
PJ	Petajoules
PM	Particulate Matter
SO_x	Oxides of Sulphur
TOC	Total Organic Carbon
Zn	Zinc

Summary of industrial statistics for France









1 Introduction and summary of methodology

1.1 The industrial emissions policy country profiles

Industrial activities play an important role in the economic welfare and development of countries contributing to their economic growth. They can also have a significant impact on their environment. Directive 2010/75/EC on Industrial Emissions (IED) aims to prevent and reduce harmful industrial emissions across the EU while promoting the use of techniques that reduce pollutant emissions and that are energy and resource efficient.

This document is part of a series of industrial emissions policy profiles that provide an overview of industrial activities regulated by the IED for each Member State. This profile covers France.

The profiles show the economic significance of activities regulated by the IED in terms of the number of IED installations, their economic contribution (measured by gross value added and employment), and resources consumed (measured by energy and water consumed) – sections 2 and 3 respectively. The profiles also show the environmental impacts in terms of emissions to air and water (section 0) and waste generated (section 5).

The significance is shown both for the latest year of available data (typically 2015), as well as assessing the trends over time of key metrics. The data shown in the profiles is accompanied by descriptive analysis to bring together the various assessments made and draw out the salient messages. EU data sources used for each metric are described in a separate methodology paper together with their data limitations. The specific data sources used in this profile are summarised in Appendix 1. Each of the sections 2, 3, 4 and 5 consider the gaps in these data sources specific for France and how they have been addressed.

The profile also identifies the impact of industrial sectors or activities in France, within the scope of the IED policy, and the importance and political attention paid to this (section 6).

1.2 Definition of industrial sectors

The approach taken in the country profiles identifies data and trends wherever possible for a set of industrial sectors. However, in the data sources used to develop the profiles, there are several different approaches to sectoral classification. Since the definition of an ‘industrial sector’ differs across data sources, an approach has been taken to try to consistently report ‘sectors’ as much as possible. This has been aligned with the grouping of activities in Annex I of the IED where possible, but in practice the available datasets limit this.

The sectors defined in these profiles are referred to as ‘industrial sectors’. Together these industrial sectors represent activity regulated by the IED, albeit subject to certain limitations as described here. The grouping for the industrial sectors has been chosen to reflect the level of granularity most commonly reported from EU data sources across the different metrics assessed while trying not to lose detail where it is available. The industrial sectors used in the profiles are shown in Table 1. A consistent colour scheme– also illustrated in Table 1 – is used throughout the profile.

Where available, the industrial sectors split out the energy, metal, mineral and waste management sectors into subsectors. Where this split is not possible, we refer to the respective IED sector group, e.g. metal in the case of the IED activities iron and steel and non-ferrous metals. Due to the large number and wide variety of activity within the IED sector ‘other activities’, these have also been grouped as ‘other activities’ in this profile, but split out into constituent industries when they are important sectors in the Member State in their own right, and where data are available.

Table 1: Industrial sectors used in the profiles with their corresponding IED Annex I activities

Industrial sectors used in the profiles		Corresponding IED Annex I activities
Energy industries, split where possible into:	Energy: power	Combustion of fuels (activity 1.1)
	Energy: refining, gasification and liquefaction, coke ovens	Refining, gasification and liquefaction, coke ovens (activities 1.2, 1.3, 1.4)
Production and processing of metals, split where possible into:	Metals: iron and steel	Iron and steel manufacturing (activities 2.1, 2.2, 2.3, 2.4)
	Metals: non-ferrous	Non-ferrous metal production (activity 2.5)
Mineral industry, split where possible into:	Mineral: Cement, lime and magnesium oxide	Production of cement, lime and magnesium oxide (activity 3.1)
	Mineral: Glass	Manufacture of glass (activity 3.3)
	Mineral: Other	Other mineral industries (activities 3.2, 3.4, 3.5)
Chemical industry	Chemical	Chemical industry (activities 4.1, 4.2, 4.3, 4.4, 4.5, 4.6)
Waste management, split where possible into:	Waste: hazardous	Hazardous waste (activities 5.1, 5.2(b), 5.5, 5.6)
	Waste: non-hazardous	Non-hazardous waste (activities 5.2(a), 5.3, 5.4, 6.5, 6.11)
Other activities, split when constituent activities are important:	Other activities	Pulp, paper and wood production (activity 6.1) Pre-treatment or dyeing of textile fibres or textiles (activity 6.2) Tanning of hides and skins (activity 6.3) Food and drink (activity 6.4) Intensive rearing of poultry and pigs (activity 6.6) Surface treatment (activities 2.6, 6.7) Production of carbon (activity 6.8)

Note: No installations operated with IED activity 6.9 in 2015 or before. The limited data available for activity 6.10 means it is excluded from the analysis.

2 Economic significance of industrial sectors

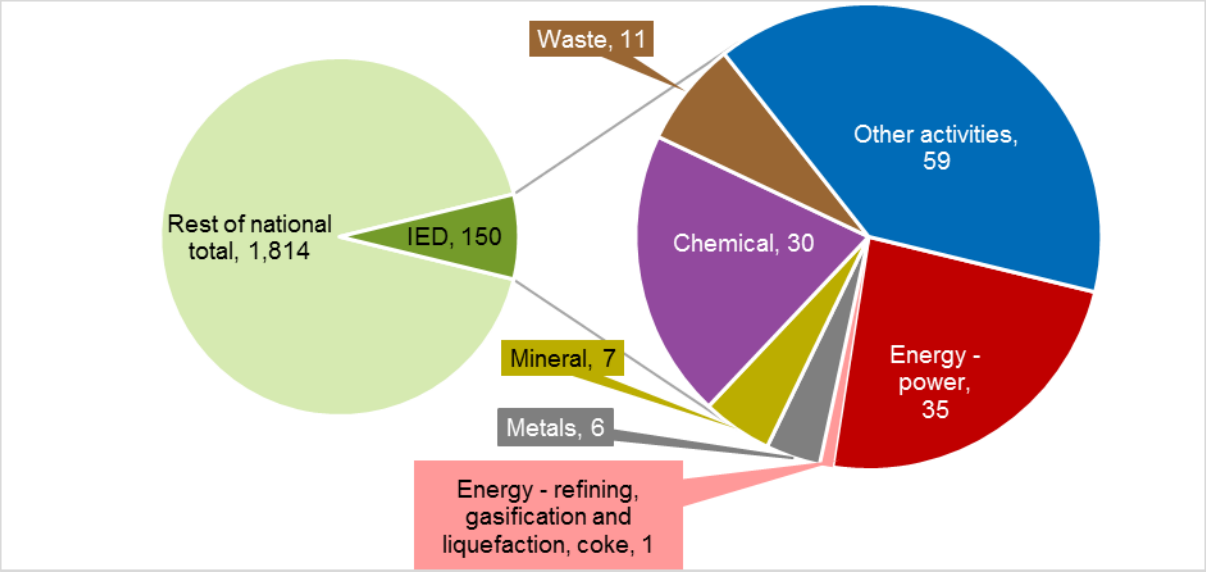
2.1 Economic contribution

The contribution of industrial sectors to France's economy is assessed using the gross value added (GVA) and employment indicators.

Industrial sectors comprise a relatively small share of the total national GVA in France in 2015 (just under 8%) (illustrated in Figure 1). Of this share, the 'other activities' sector accounts for the largest contribution with 39% of total industrial GVA (see Figure 1). Several activities contribute to the GVA of 'other activities: food and drink production with 76% of GVA for 'other activities' (31% of the total industrial GVA), textiles and tanning with 11%, pulp and paper production with 8% and wood production with 5%. The 'other activities' sector is followed by the energy – power sector, which accounts for 23% of the total GVA generated by industrial activities in France in 2015. The third largest sector in France is the chemical sector accounting for 20% of industrial sector GVA.

The relative share of GVA by industrial sector shows a similar snapshot for employment (Figure 2); although the share of employees is greater for the chemicals sector compared to the energy - power sector which generates more GVA. 'Other activities' is the largest sector in employment terms with around half of total industrial sector employment, the majority of which is for food and drink production. No data on employment in the energy - refining, gasification and liquefaction, coke sector is reported but as this is a rather small IED activity with 0.6% of total GVA produced by IED activities this is not a major gap.

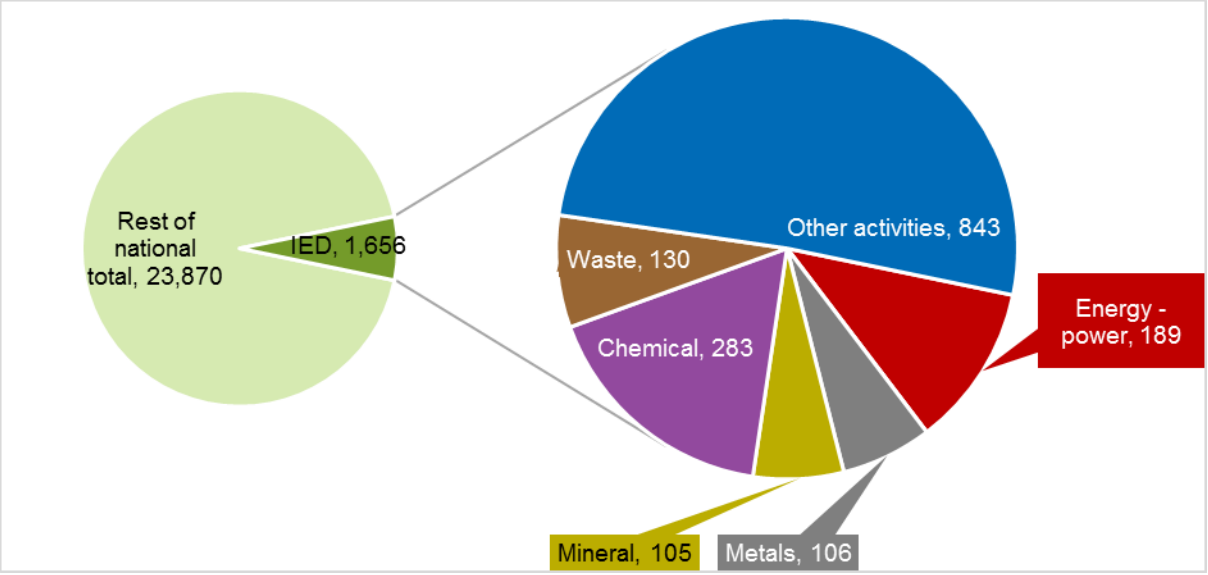
Figure 1: Gross value added of industrial sectors in 2015 (Current prices, billion EUR)



Note: Rest of national total means all NACE activity minus the industrial sectors activity shown here.

Source: Eurostat (2017a)

Figure 2: Employment within industrial sectors in 2015 (thousands, aged 15 to 64 years)



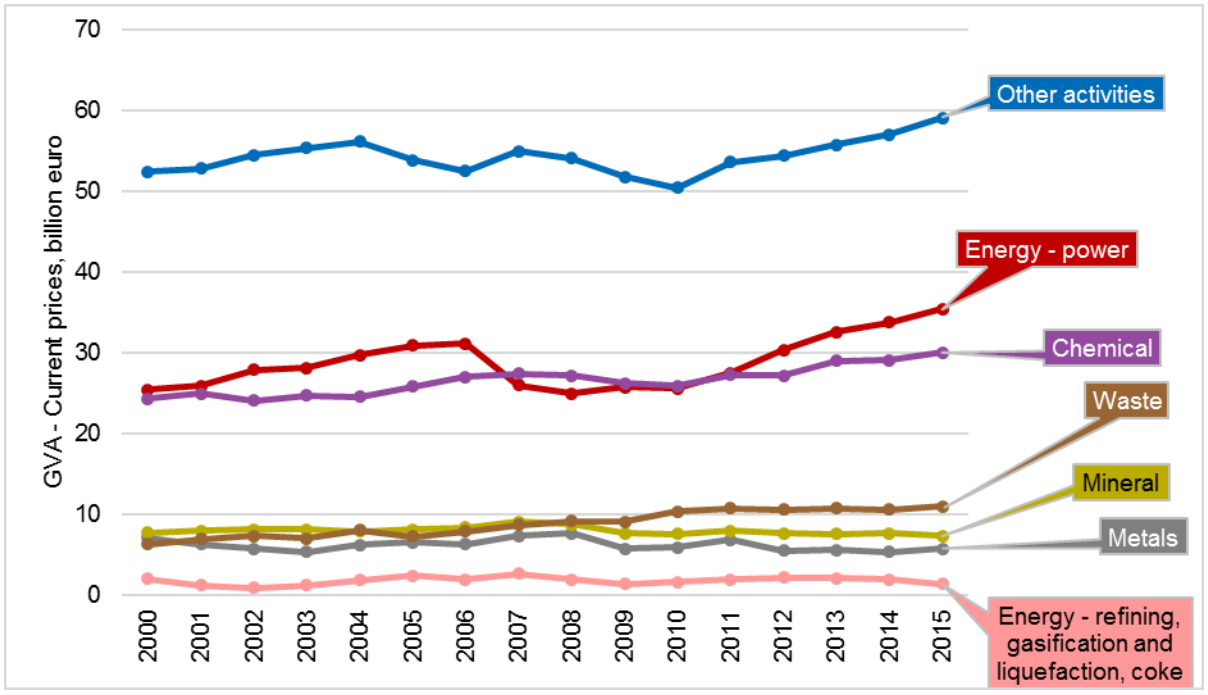
Note: Rest of national total means all NACE activity minus the industrial sectors shown here. No employment data for energy - refining, gasification and liquefaction, coke sector.

Source: Eurostat (2017b)

The main areas of economic growth in France, as measured by growth in GVA from 2000 to 2015 are 'other activities' and energy - power, both continuously increasing since 2010 and 2008, respectively (Figure 3). The chemicals and waste management sectors have also increased their GVA over the time period. For most other sectors GVA has remained relatively stable.

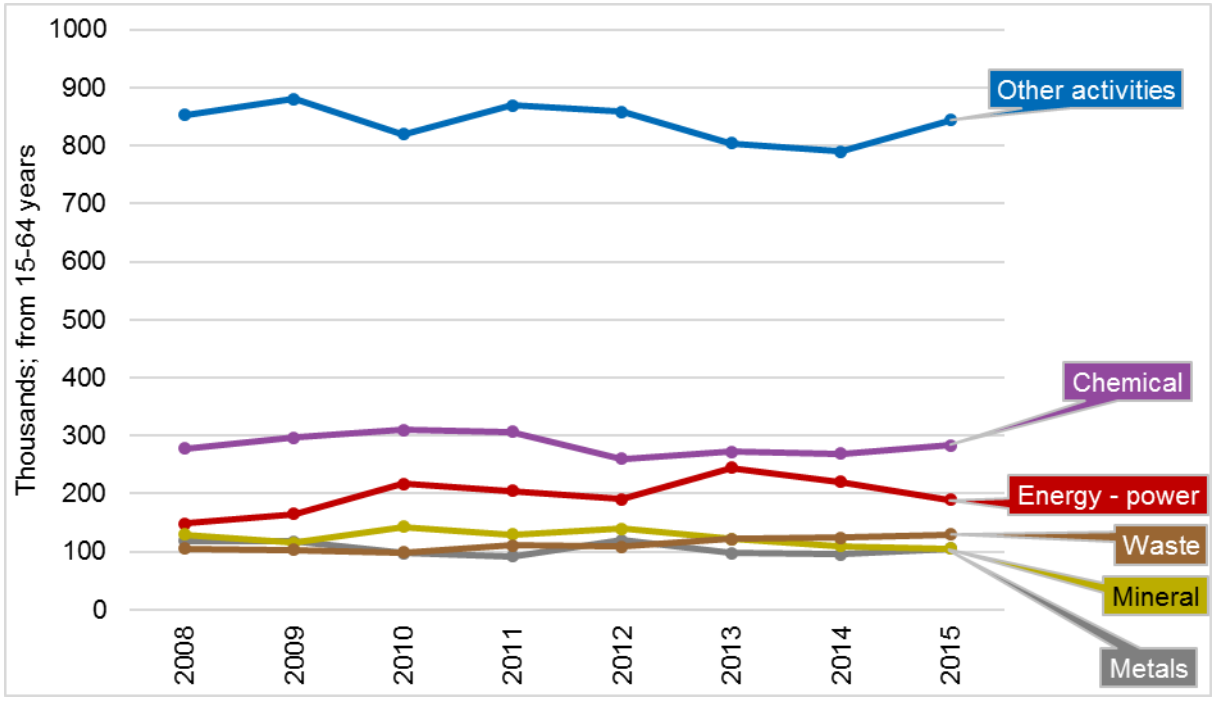
For France employment data is only available from 2008 onwards. This data shows that employment has only increased in three industrial sectors from 2008 to 2015, in energy - power by 21% (although it has been declining recent years), in waste management by 19%, and in the chemical sector by 2% (Figure 4). In all other industrial sectors employment numbers have decreased or remained relatively stable, although the GVA for each sector has experienced an upward trend or remained stable since 2008 (Figure 3). The largest employment decrease is observed for the mineral sector with 24% less employment from 2008 to 2015.

Figure 3: Gross value added of industrial sectors (2000-2015)



Source: Eurostat (2017a)

Figure 4: Employment in industrial sectors (2008-2015)



Note: No employment data for energy - refining, gasification and liquefaction and coke ovens.

Source: Eurostat (2017b)

Limitations

The use of NACE classifications for reporting has generally led to overreporting for both GVA and employment data against each industrial sector compared to a scope strictly limited to the IED. Overreporting is expected to be greatest for the waste management GVA data because it not only includes waste management, but also water supply, sewerage and waste remediation. No data could be included within 'other activities' to reflect the IED activity intensive rearing of poultry or pigs as reporting was not at the appropriate level of NACE classification.

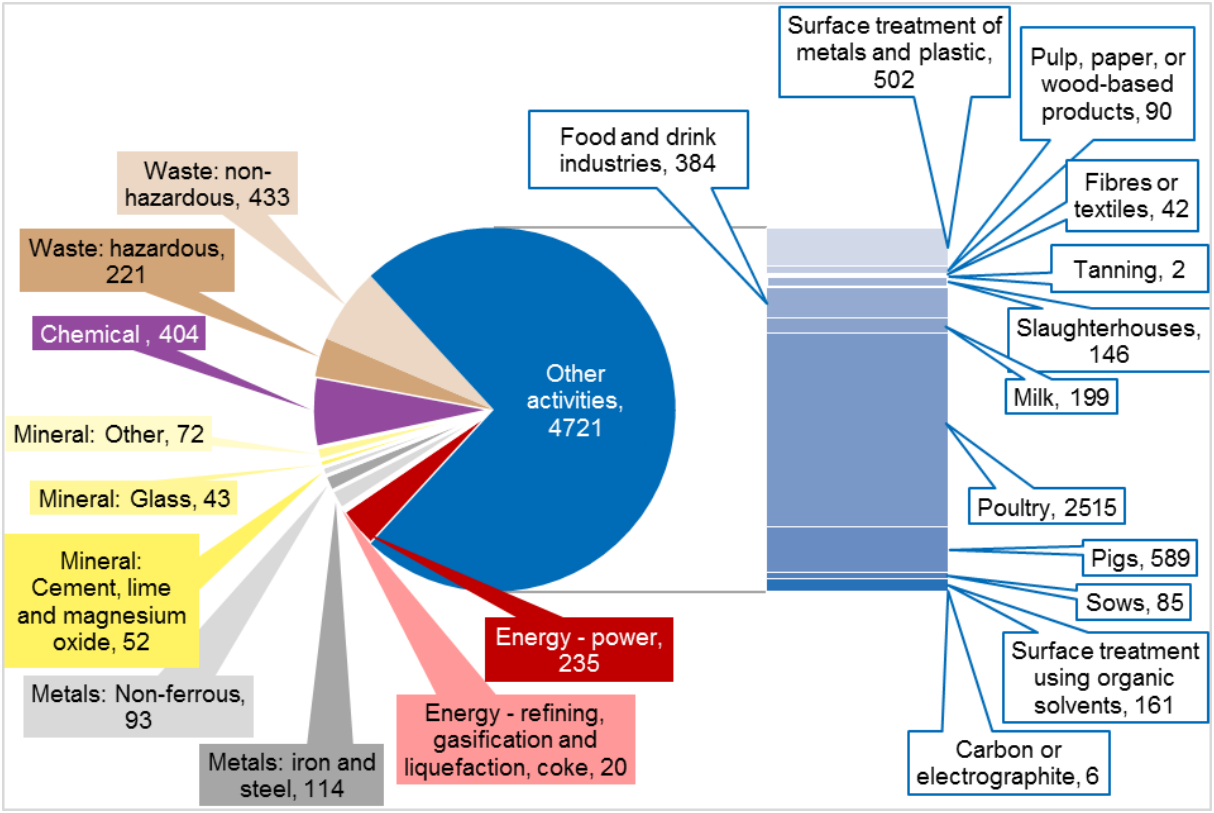
Table 2: Gaps in employment data for France

Missing data	Description	Conclusion and actions taken
No data for energy – refining, gasification and liquefaction, coke sector	No employment data for energy refining (C19 flagged as low reliability by Eurostat)	No action
Limited time series	Employment data were only reported from 2008 onwards	No action

2.2 Number of IED installations

The main industrial sector in France, according to the reported number of permitted IED installations, is the 'other activities' sector (74%) of which the majority are installations for the intensive rearing of poultry or pigs (IED activity 6.6), comprising 50% of total IED installations in 2015 (Figure 5, Table 3). This is followed by the non-hazardous waste management (7%), chemical (6%) and energy - power (4%) sectors.

Figure 5: Number of installations by industrial sector in 2015, with 'other activities' split by IED activity



Source: IPPCD and IED reporting / DG Environment, Personal Communication

Between 2011 and 2015 the reported number of permitted IED installations in the identified industrial sectors declined by 357 (Table 3, Figure 6). The biggest decline in numbers is for intensive rearing of poultry or pigs (with 80 fewer installations reported in 2015 compared to 2011). The other sectors reporting a relatively large number of reductions in the number of permitted IED installations between 2011 and 2015 include the chemical sector (40 installations less in 2015), non-hazardous waste management (47 installations less in 2015) and surface treatment activities within 'other activities' (43 installations less in 2015). The metal sector also reported fewer permitted installations in this time (13 installations less in the iron and steel sector and 11 installations less in the non-ferrous metal sector). The only sector reporting an increase in the number of permitted installations in this timeframe was the energy – refining, gasification and liquefaction and coke sector, which reported one additional permitted IED installation in 2015.

The numbers of installations reported for 2011 in the previous paragraph, and in Table 3 and Figure 6, exclude 162 installations which are listed for France in the dataset as being of unspecified IPPC activity. These installations are not included as it was not possible to identify which sector to attribute them to, or if doing so would be double counting them if they related to associated activities.

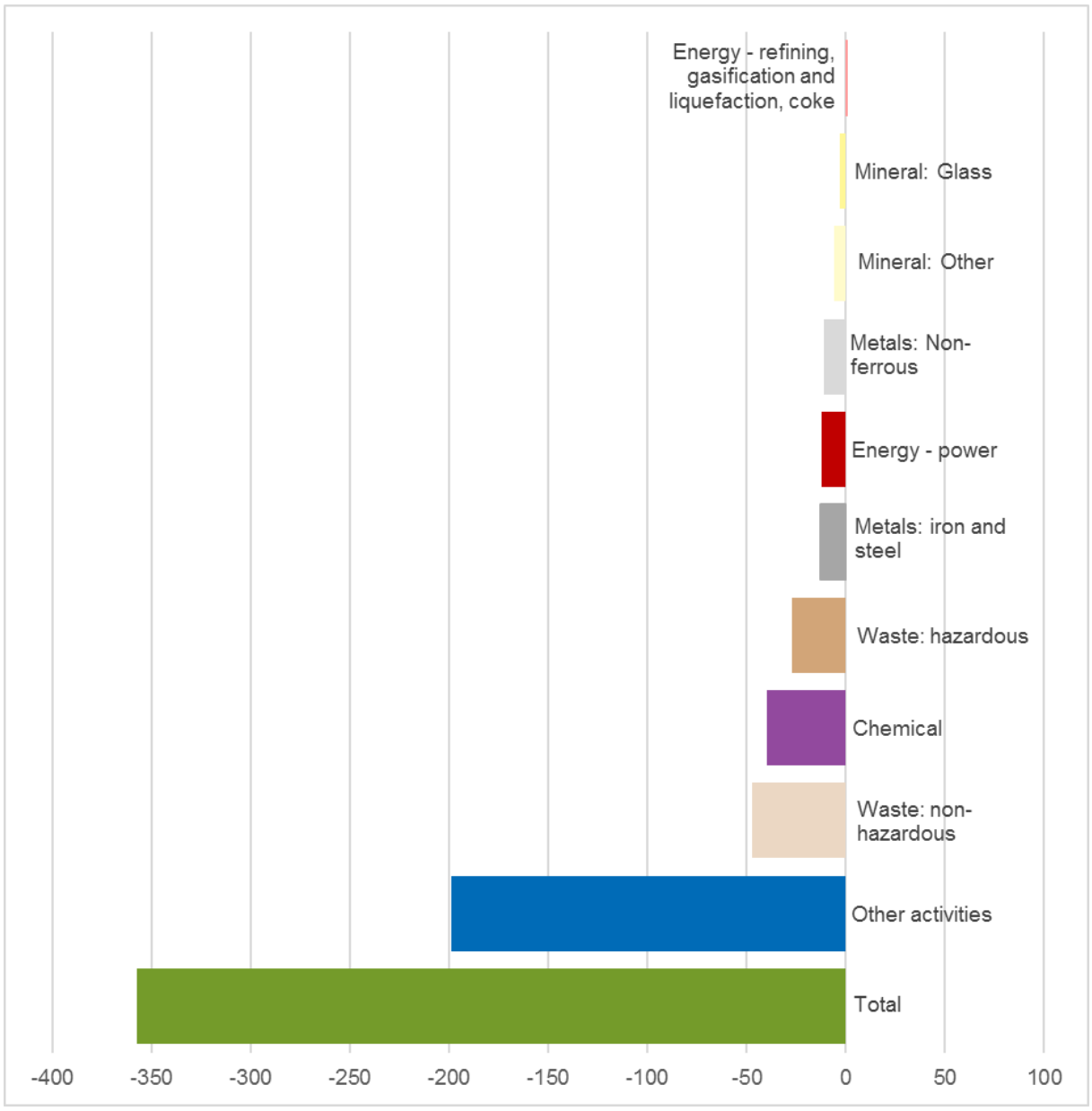
Table 3: Number of installations in 2015 and 2011 by industrial sector, with IED activity detail

Industrial sector, with IED activity detail	2011	2015	Change in number of IED installations 2011 to 2015
Energy: power *(1.1 Combustion of fuels)*	**247**	**235**	**-12**
Energy: refining, gasification and liquefaction, coke ovens	**19**	**20**	**1**
1.2 Refining	15	15	*0*
1.3 Production of coke	2	2	*0*
1.4 Gasification or liquefaction	2	3	*1*
Metals: iron and steel	**127**	**114**	**-13**
2.1 Metal ore	*2*	*1*	*-1*
2.2 Pig iron or steel	*31*	*28*	*-3*
2.3 Processing of ferrous metals	*33*	*28*	*-5*
2.4 Ferrous metals foundries	*61*	*57*	*-4*
Metal: non-ferrous *(2.5 Non-ferrous metals)*	**104**	**93**	**-11**
Mineral: Cement, lime and magnesium oxide *(3.1 Cement, lime and magnesium oxide)*	**52**	**52**	**0**
Mineral: Glass *(3.3 Glass)*	**46**	**43**	**-3**
Mineral: Other	**78**	**72**	**-6**
3.4 Mineral fibres	*10*	*14*	*4*
3.5 Ceramic	*68*	*58*	*-10*
Chemical	**444**	**404**	**-40**
4.1 Organic chemicals	*301*	*281*	*-20*
4.2 Inorganic chemicals	*65*	*52*	*-13*
4.3 Phosphorus-, nitrogen- or potassium-based fertilisers	*7*	*6*	*-1*
4.4 Plant protection products	*15*	*10*	*-5*
4.5 Pharmaceutical products	*38*	*39*	*1*
4.6 Explosives	*18*	*16*	*-2*
Waste: hazardous *(5.1 Disposal / recovery)*	**248**	**221**	**-27**
Waste: non-hazardous	**480**	**433**	**-47**
5.2 co-/ incineration of hazardous and non-hazardous waste	*120*	*125*	*5*
5.3 Disposal of non-hazardous	*59*	*49*	*-10*
5.4 Landfills	*255*	*220*	*-35*
6.5 Disposal of animal carcases	*46*	*39*	*-7*
Other activities	**4,920**	**4,721**	**-199**
6.1 Pulp, paper, or wood-based products	*100*	*90*	*-10*
6.2 Textiles	*56*	*42*	*-14*
6.3 Tanning	*2*	*2*	*0*
6.7 Surface treatment using organic solvents	*178*	*161*	*-17*
2.6 Surface treatment of metals and plastic	*528*	*502*	*-26*
6.4 (a) Slaughterhouses	*152*	*146*	*-6*
6.4 (b) Food and drink	*420*	*384*	*-36*
6.4 (c) Milk	*209*	*199*	*-10*
6.6 (a) Poultry	*2,569*	*2,515*	*-54*
6.6 (b) Pigs	*622*	*589*	*-33*
6.6 (c) Sows	*78*	*85*	*7*
6.8 Production of carbon	*6*	*6*	*0*
Total	**6,765**	**6,408**	**-357**

Note: IED activities are in italics. The IED activity 5.2 (Disposal or recovery of waste in waste incineration plants or in waste co-incineration plants) relates to non-hazardous waste (5.2(a)) and hazardous waste (5.2(b)). Owing to the generally small number of installations reported within this category across the EU, these installations have been categorised as non-hazardous waste management. Data for permitted installations carrying out IED activity 6.11 is not included in the reported data and therefore not included in this table.

Source: IPPCD and IED reporting / DG Environment, Personal Communication

Figure 6: Change in number of installations per industrial sector 2011 to 2015



Note: No change in the number of reported installations permitted for the production of cement, lime and magnesium oxide.

Source: IED reporting / DG Environment, Personal Communication

Limitations

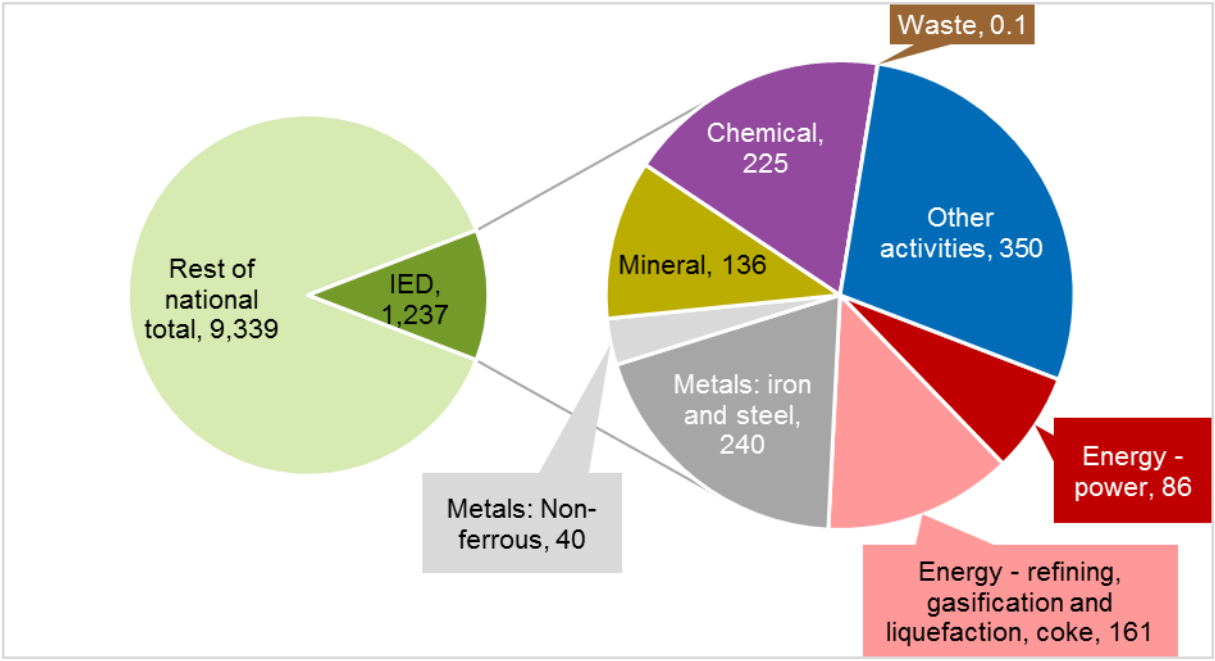
The dataset used to reflect IED activity in Member States has a limited timeseries inherent to the reporting requirement and thus the number of permitted installations is only reported for the years 2011, 2013 and 2015.

3 Resource use in industrial sectors

3.1 Energy consumption

In 2015 France's industrial sectors accounted for just under 12% of the total energy consumption in France. The largest share of industrial energy consumption in France in 2015 was by the 'other activities' (28%), metals - iron and steel (19%), and chemicals (18%) sectors (Figure 7). Considering the number of reported IED permitted installations for waste management (433 installations for non-hazardous waste and 221 for hazardous waste management) it is surprising that the sector reports very low energy consumption in 2015. Data for waste management is only reported for 2014 and 2015 which appears to be contradictory to data reported for 2008 in a French industry panorama (CGDD, 2014). According to this document, in 2008 this sector is placed third to the bottom in terms of overall energy consumption in that year. For the other years no data on energy consumption is reported for waste management (Figure 8).

Figure 7: Energy consumption by industrial sector in 2015 (PJ)

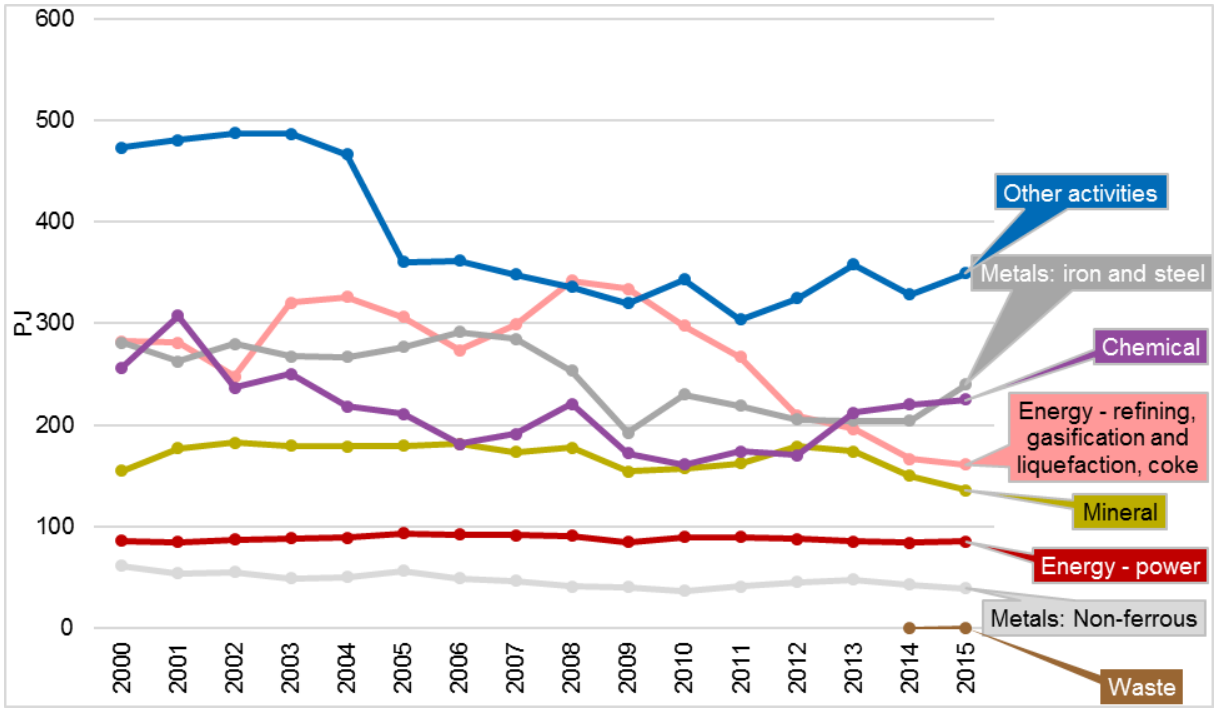


Note: Rest of national total relates to gross inland consumption minus the industrial sectors shown here.

Source: Eurostat (2017c)

The time series in Figure 8 shows that energy consumption of 'other activities', energy – refining, gasification and liquefaction, coke, chemicals and metal – iron and steel industrial sectors has decreased overall between 2000 and 2015, however, with a number of fluctuations and upwards or fairly static trends for the chemical, metals – iron and steel and 'other activities' sectors since 2011 (Figure 8). Energy consumption of the other sectors has remained fairly static over the whole time period.

Figure 8: Energy consumption (in PJ) of industrial sectors (2000-2015)



Note: No energy consumption was reported for waste in 2000-2013. Values were not plotted for the waste management sector in these years to avoid misrepresenting the trend.

Source: Eurostat (2017c)

Limitations

Generally, the use of energy balance indicators is expected to lead to overreporting against IED activities as no thresholds apply to the economic activities reported against (similar to NACE classifications).

The energy consumption data that have been used has only limited coverage of the waste management sector. Data for this sector is therefore expected to be underreported as only one energy balance indicator was identified as relevant to this industrial sector: the energy consumed by gasification plants for biogas. Thus, where no data for the waste management sector is identified, this is rather a limitation that the energy consumption dataset has poor representation of the waste management sector.

Table 4: Gaps in energy consumption data for France

Missing data	Description	Conclusion and actions
Limited data for waste	Waste data only reported for 2014 and 2015. No timeseries available.	Values not plotted for the waste management sector to avoid misrepresenting trend

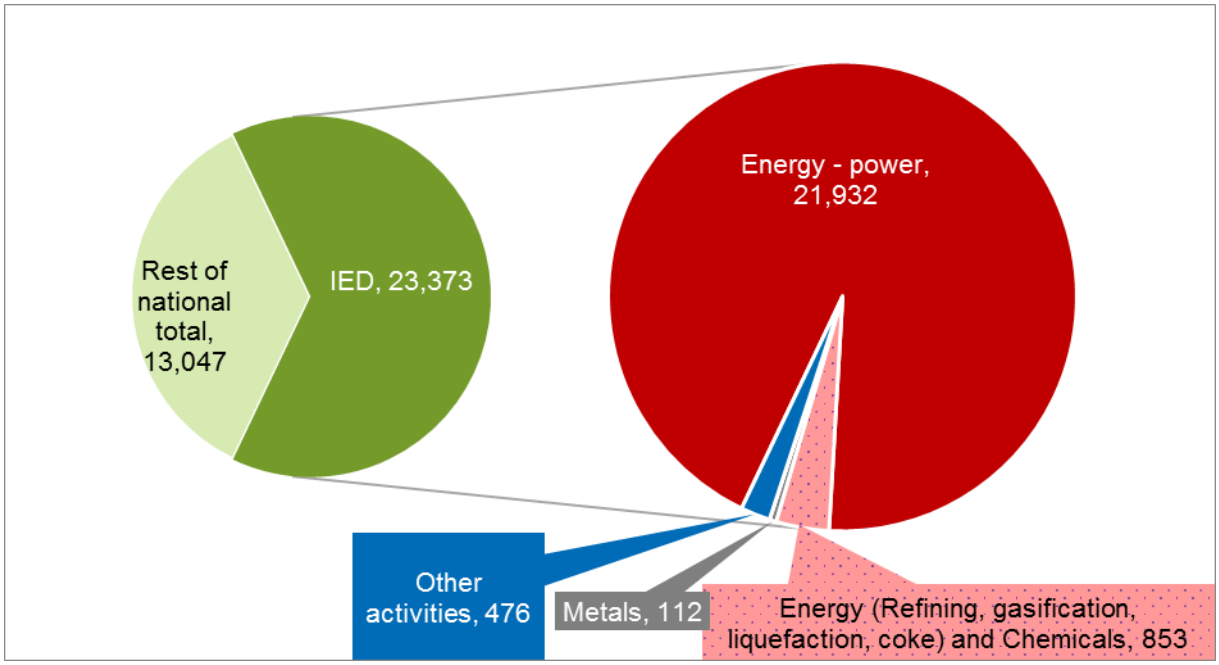
3.2 Water consumption

The data availability to show water consumption by industrial sectors in France is poor. Very limited data is available in Eurostat (2017d) with the latest data reported for 2013. Figure 9 indicates the data available for a limited number of industrial sectors.

In light of the other data presented in this profile, the lack of water consumption data for the chemical sector and very low amounts reported for 'other activities' including intensive rearing of poultry and pigs are considered to be major gaps.

The highest water consumption is reported by the energy - power sector representing 94% of total industry water consumption in France in 2015 (although this is not considered to be representative for France considering the gaps in the available data).

Figure 9: Water consumption (million m^3) for selected industrial sectors (2013)

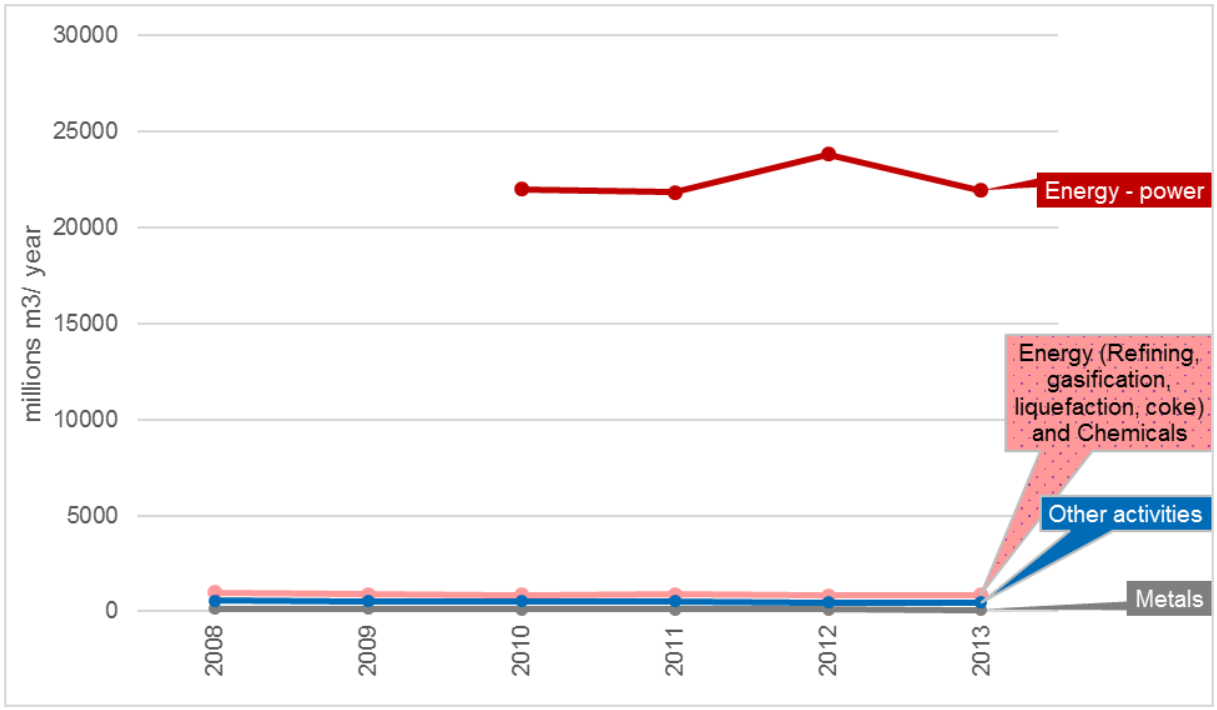


Note: Rest of national total relates to all NACE activity minus industrial sector activity shown here (data for the year 2011). Other activity only relates to food and drinks, textiles, and paper sectors no data for intensive rearing of poultry and pigs. No data for the mineral sectors and waste management sectors.

Sources: Eurostat (2017d)

The data available to demonstrate any trends in water consumption is limited (for sectors and over time); what is available is included in the figure below. For those sectors where data is available consumption appears to have stayed relatively constant.

Figure 10: Water consumption (million m^3) for selected industrial sectors (2008-2013)



Note: No data for the mineral sectors and waste management sectors. No data is reported prior to 2008 for any sector. Zero water consumption was reported for energy – power sector in 2008-2009. Values were not plotted for these years to avoid misrepresenting the trend.

Sources: Eurostat (2017d)

Limitations

Limitations have arisen from the mapping owing to combined reporting of NACE classifications for energy (refining, gasification and liquefaction and coke ovens) and chemicals. Water consumption by the mineral sector is combined with many other NACE activities and could not be used without significant overreporting. An additional category is reported by Eurostat to show water used for cooling; however, the data is also reported within other NACE classifications and so could not be included in the charts without double counting.

Table 5: Data gaps in water consumption data for 2009

Missing data	Description	Conclusion and actions taken
Limited time series	Data reported to Eurostat (2017d) is only available until 2013 and not reported by all sectors.	No action

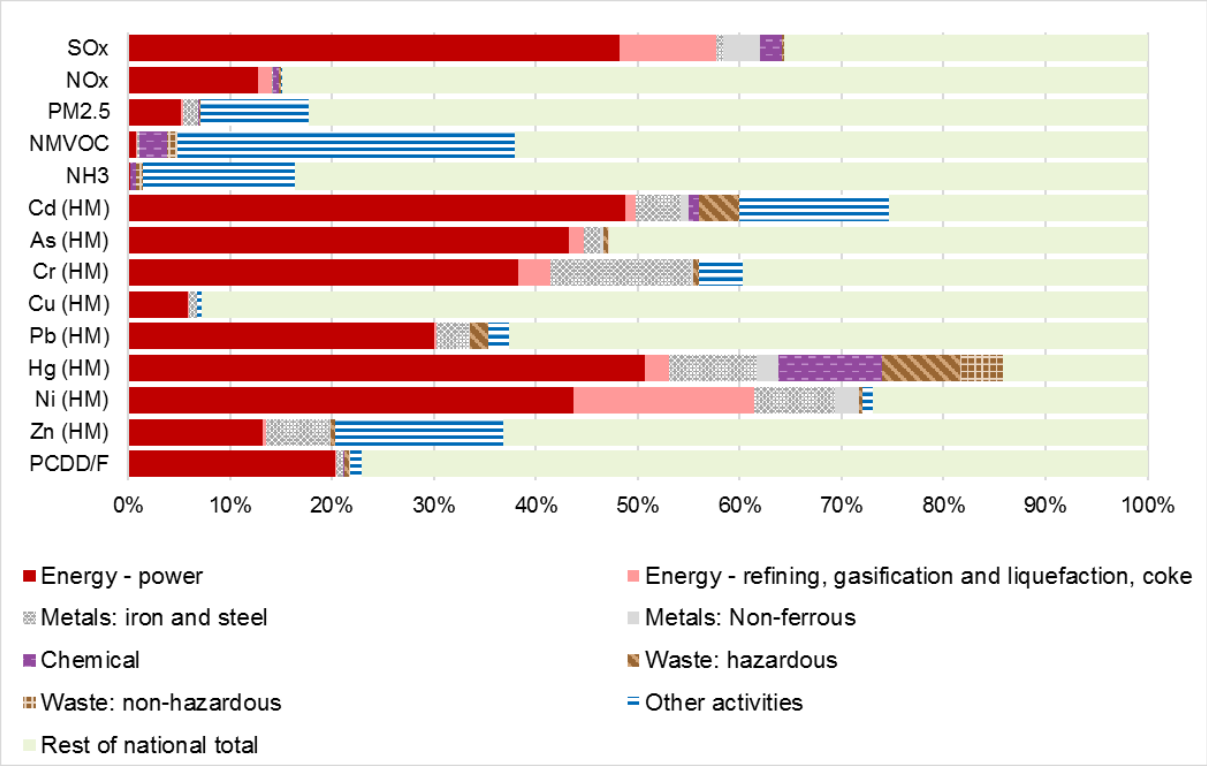
4 Emissions from industrial sectors

4.1 Emissions to air

Data were taken from inventories submitted by Member States under the CLRTAP (EEA, 2017a). For a number of pollutants (NO_x, $PM_{2.5}$, NMVOC, NH_3, As, Cu, Pb, Zn and PCDD/F), industrial sectors are responsible for less than half the emissions of pollutants emitted to air and typically much less than this (Figure 11). Heavy metals appear to be more intensely emitted from industrial sectors compared to the rest of the national total (with over 50% of Cd, Cr, Hg, and Ni emissions emanating from industrial sectors) as well as SO_x.

A number of industrial sectors (in particular, energy – power, energy - refining, gasification and liquefaction, coke and 'other activities') are responsible for the greatest share of emissions to air (Figure 11). Within the 'other activities' sector important emissions to air come from pulp and paper production, wood production and manure management from intensive rearing of poultry or pigs. Despite the reported presence of IED installations, no emissions to air data were reported for the mineral sectors.

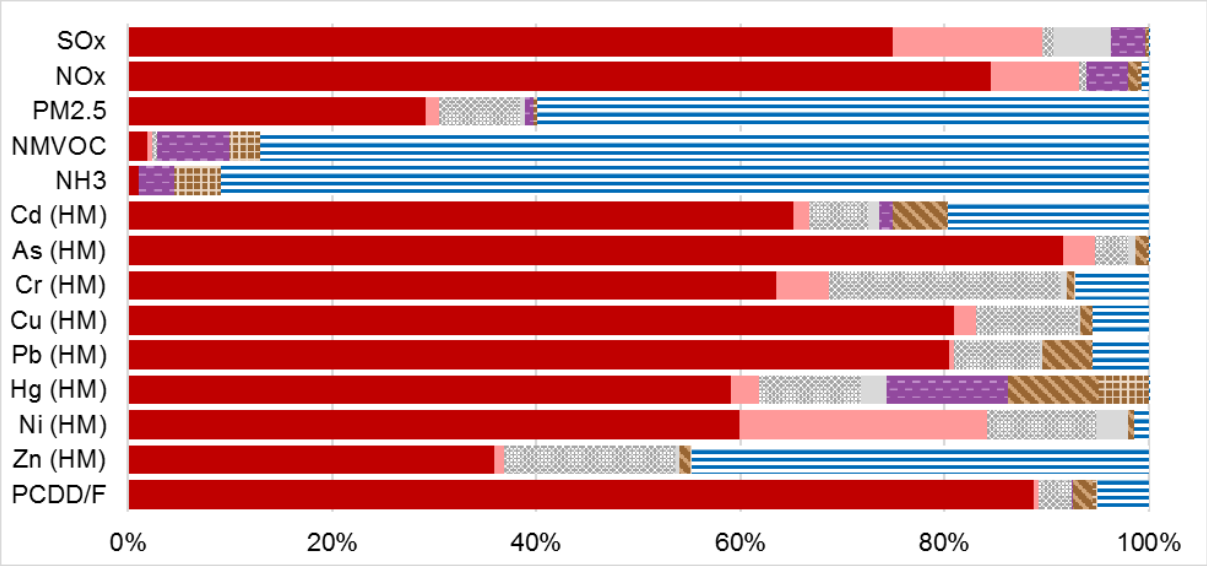
Figure 11: Emissions to air from industrial sectors and rest of national total (2015)



Note: Rest of national total relates to the national total for the entire territory (based on fuel sold) minus the industrial sector emissions shown here. No data reported for the mineral sectors.

Source: EEA (2017a)

Figure 12: Emissions to air from industrial sectors (2015)



Note: The key for this chart is shown in Figure 11.

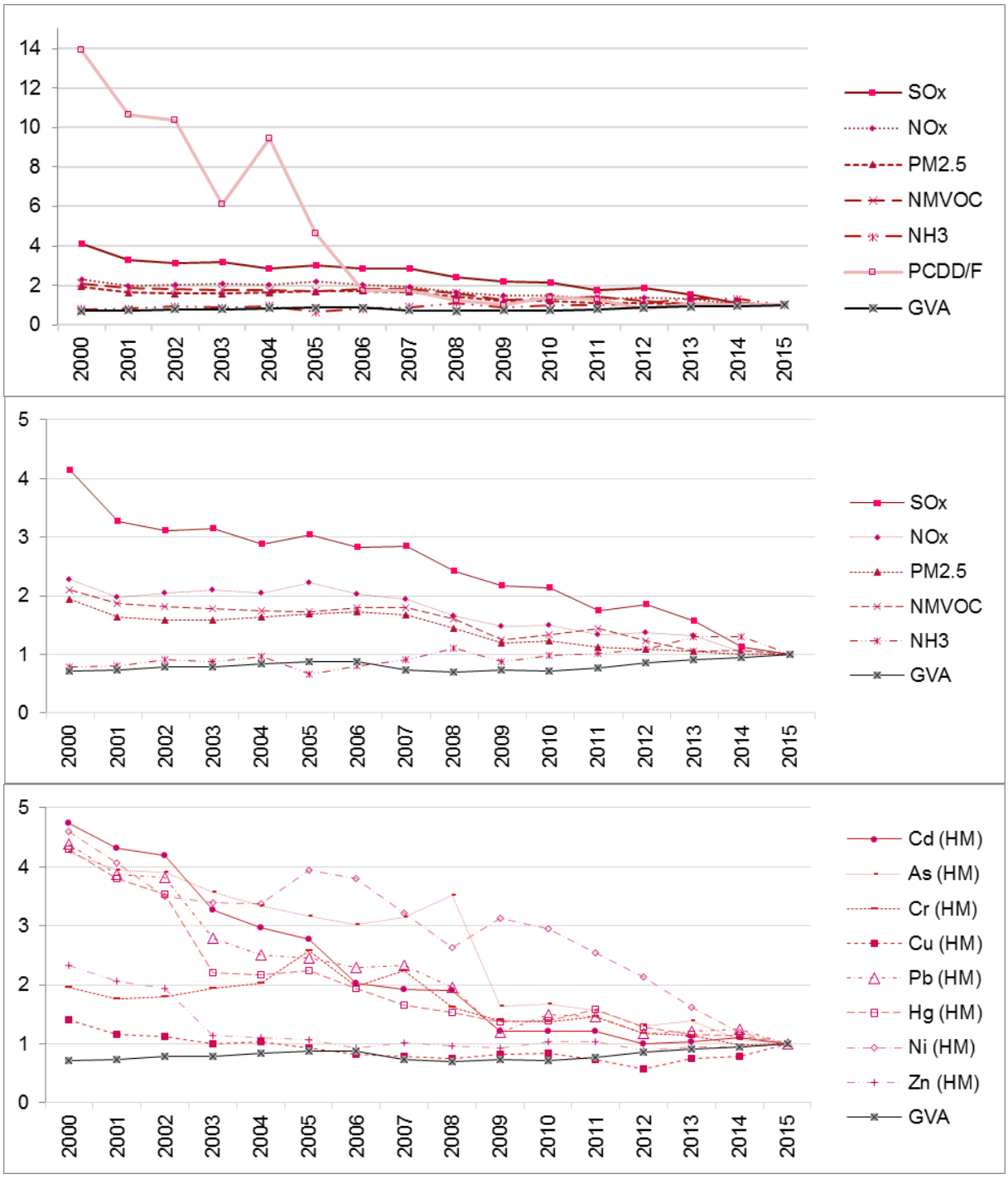
Source: EEA (2017a)

In the following subsections, emissions data are shown in indexed charts by sector. This was done to compare the development of pollutant emissions with the GVA in specific sectors in the time period 2000 to 2015.. For many sectors, a decreasing trend can be especially observed for the time period 2000 to 2009. This decrease, accompanied by a fairly static GVA, may have resulted from the requirements of the IPPC and other related sectoral Directives. No pollutant emissions were reported for the mineral sector. Appendix 2 includes full details on the emissions reported by industrial sector and year.

Energy industry

For the energy - power sector, a constant downward trend for emissions to air for all pollutants can be observed (particularly SO_x Cd, Pb and Hg) between 2000 and 2009; after which there has been a more static trend in emissions. SO_x emissions have continuously decreased over the whole time period 2000 to 2015. PCDD/F emissions have significantly decreased from 2000 to 2009, with a significant drop in 2003. The reductions in SO_x are expected to have resulted from compliance with the Large Combustion Plant Directive which had a significant impact on SO_x emissions across the EU in that time period. The detail for these trends are shown in Figure 13.

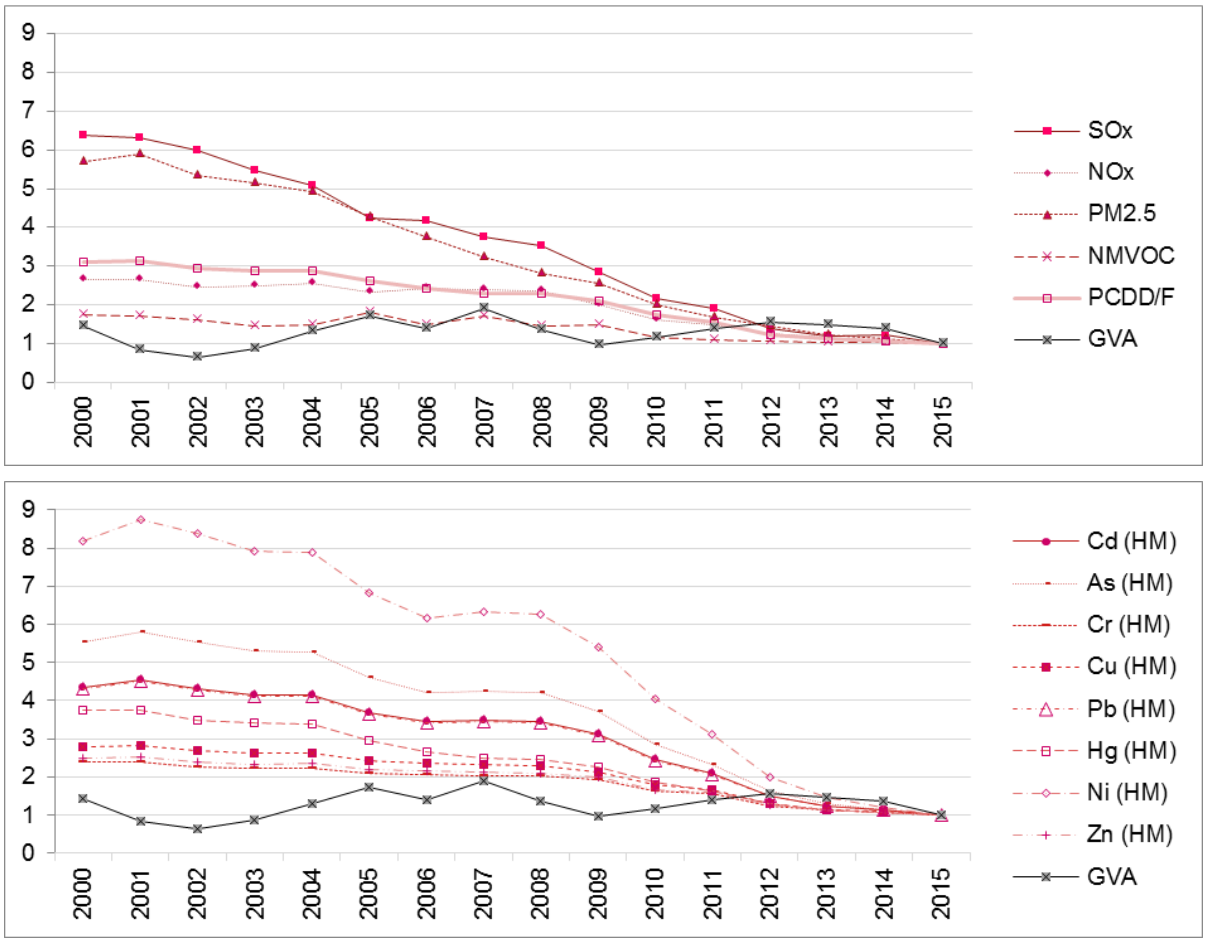
Figure 13: Indexed emissions to air from the energy - power industrial sector (indexed to 2015=1)



Note: The second chart shows pollutants with PCDD/F removed to make the detail for other pollutants more visible compared to the first chart.
Source: EEA (2017a), Eurostat (2017a)

For the energy – refining, gasification and liquefaction, coke sector the largest downward trend between 2000 and 2015 for pollutants is reported for SO_x, $PM_{2.5}$, Ni and As (Figure 14). Overall a constant downward trend of air emissions for all pollutants has been observed in France, in particular up to 2012.

Figure 14: Indexed emissions to air from energy - refining, gasification and liquefaction, coke (energy industrial sector) sector (indexed to 2015=1)



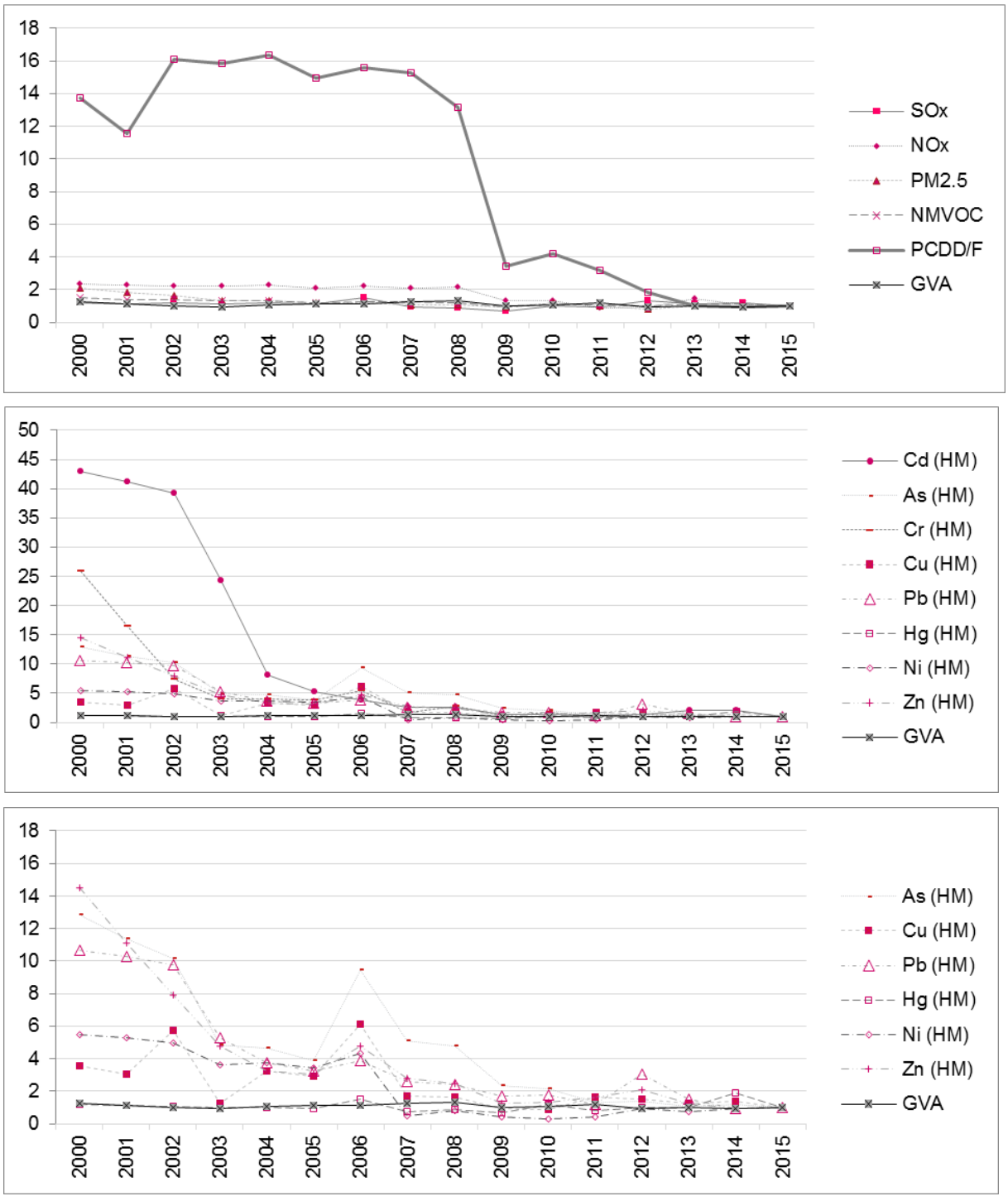
Note: No data for NH_3 reported.

Source: EEA (2017a), Eurostat (2017a)

Metal industry

PCCD/F air emissions from the iron and steel sector have reduced significantly between 2000 and 2009 (from a factor of 14 to 3) with a steep decline between 2008 and 2009 (Figure 15). Other non-heavy metal pollutants such as SO_x, NO_x, $PM_{2.5}$, and NMVOC have remained at relatively similar levels between 2000 and 2015. Figure 15 also illustrates a significant decrease in emissions for Cd and Cr (from factors of 44 and 26 in 2000, respectively). The third chart removes Cd and Cr to better illustrate other heavy metals. These show an overall downward trend between 2000 and 2015 although there are increases for As, Zn, Cu in 2006 followed again by declines thereafter. These increases in 2006 do not appear to be related to an increase of GVA for the same year. GVA for the sector as a whole has remained relatively constant in this time although there was a decrease in the number of permitted installations between 2011 and 2015 (127 total in 2011, 114 in 2015) and there is no information concerning the number of installations prior to 2011.

Figure 15: Indexed emissions to air from iron and steel production (metal industrial sector) (indexed to 2015=1)



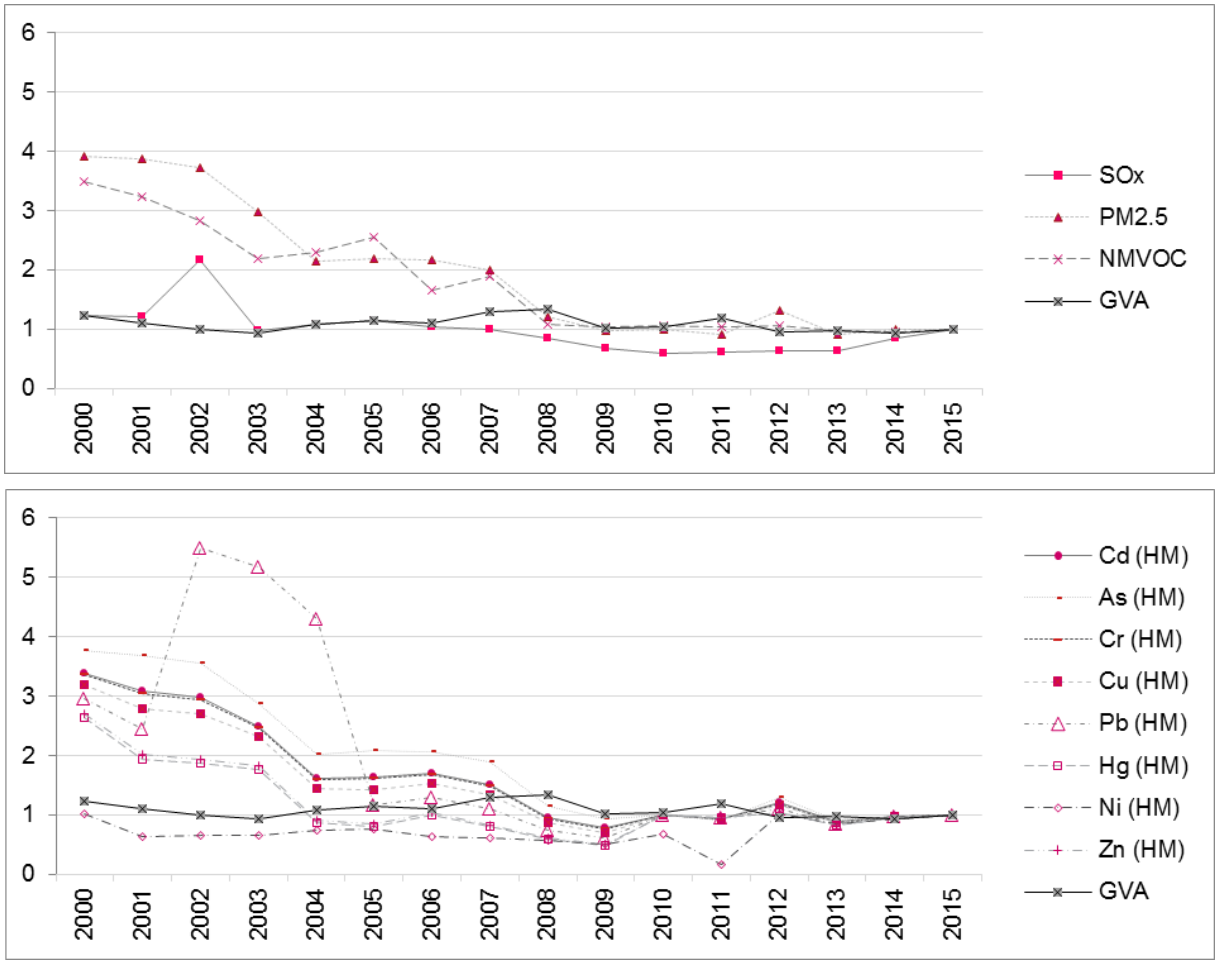
Note: No data for NH_3 reported. The third chart shows pollutants with Cd and Cr removed to make the detail for other heavy metals more visible compared to the second chart.

Source: EEA (2017a), Eurostat (2017a)

Notable reductions of non-heavy metal emissions to air from the non-ferrous metal sector have been observed for $PM_{2.5}$ and NMVOCs from 2000 to 2015 whereas SO_x emissions have remained at similar levels despite some drops in intermediate years (especially between 2010 and 2013) (Figure 16).

Overall for most heavy metals, there has been a downward trend from 2000 until 2009, showing fairly static emissions afterward, except for Pb and Ni. Pb emissions have increased in 2002, remained at a high level until 2004, before dropping to a low level in 2005 where emissions have remained until 2015. Ni emissions have generally been lower than 2015 emissions for most of the time period

Figure 16: Indexed emissions to air from non-ferrous metal production (metal industrial sector) (indexed to 2015=1)



Note: No NO_x, PCDD/F, or NH_3 reported.

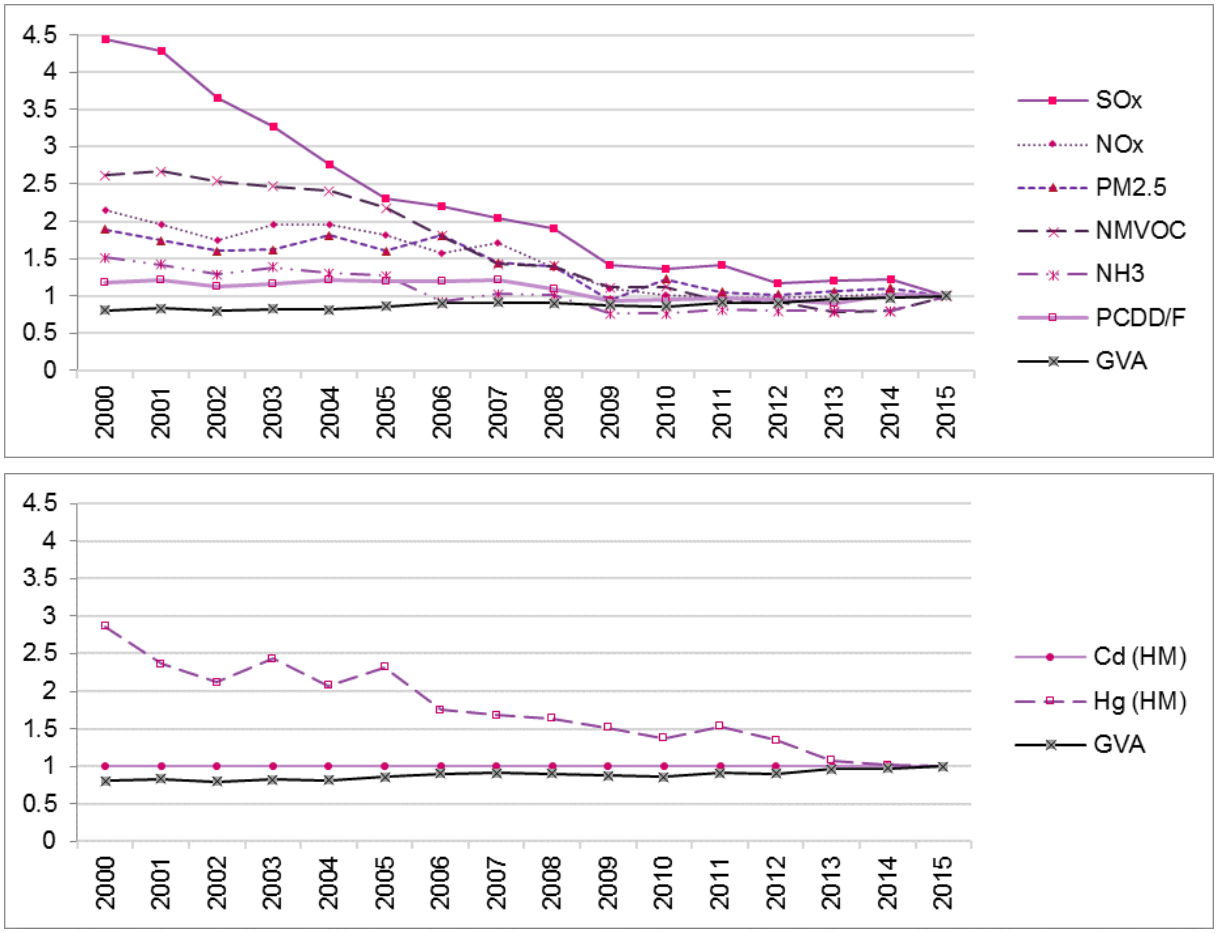
Source: EEA (2017a), Eurostat (2017a)

Chemical industry

In the chemical sector for heavy metals, only emissions of Cd and Hg are reported. Cd emissions remain constant during the period 2000 to 2015 (Figure 17). For Hg, emissions have reduced by almost a factor of 3 in the same period. There seems to be no correlation to the GVA for this sector as it has slightly increased since 2000, although the number of reported IED installations decreased by around 10% between 2011 and 2015. This decline in number of installations could also explain the decline in SO_x emissions since 2011.

Other pollutants have a significant downward trend from 2000 to 2009 and then remained relatively stable until 2015. NH_3 emissions have shown a slight increase in 2015 after relatively low emissions from 2009 onwards.

Figure 17: Indexed emissions to air from the chemical sector (indexed to 2015=1)



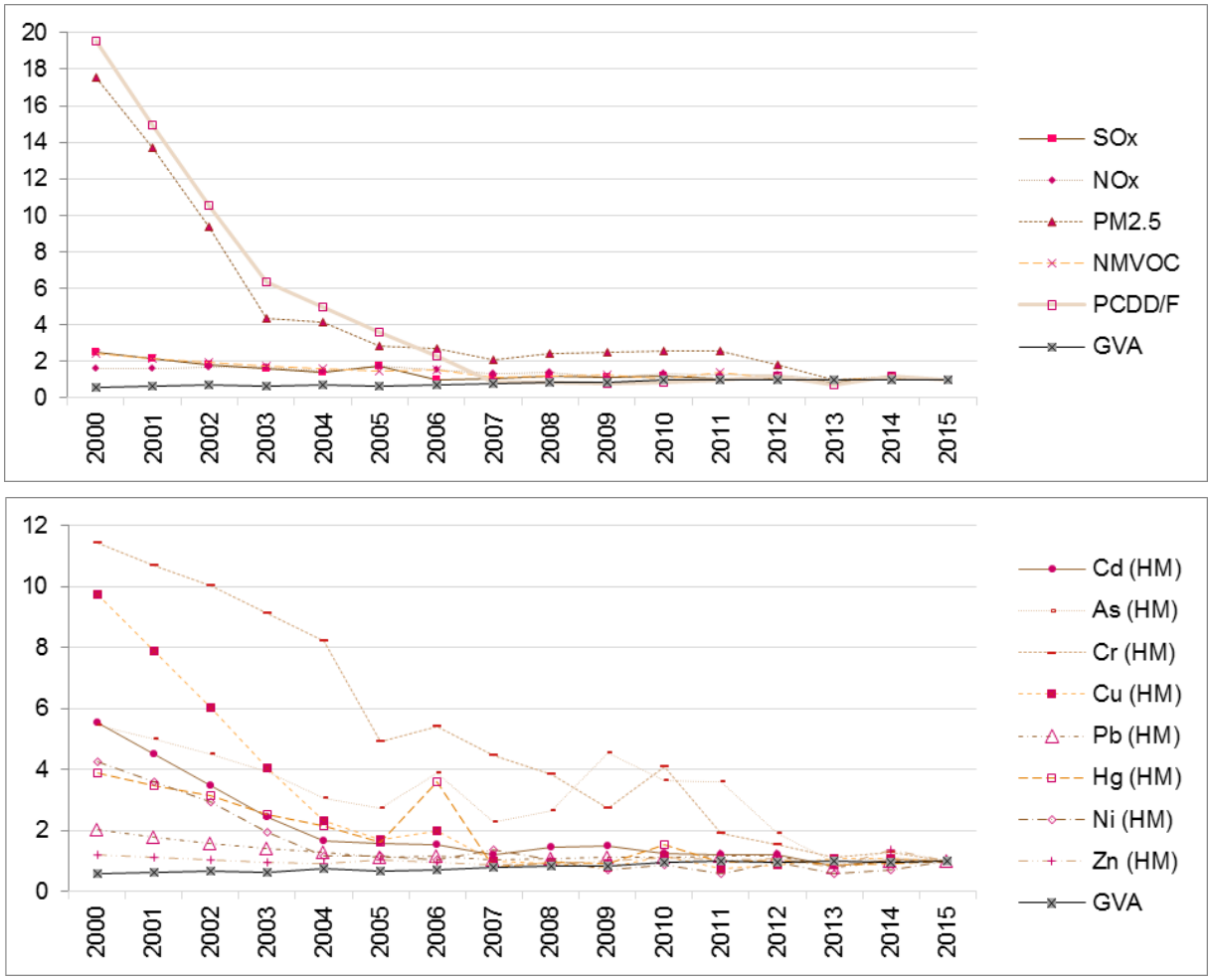
Note: Only Cd and Hg reported for heavy metals.

Source: EEA (2017a), Eurostat (2017a)

Waste management industry

Overall, air emissions of most pollutants from the **hazardous waste management** sector follow a downward trend although some such as SO_x, NO_x, Pb, and Zn have remained at a relatively constant level (Figure 18). The largest decline between 2000 and 2015 is reported for PCDD/F (dropping by a factor of ~20) and NO_x (dropping by a factor of ~18) but also for the heavy metals Cr (dropping by a factor of ~11) and Cu (dropping by a factor of ~10). For some pollutants slight increases for Cr (in 2006 and 2010), As (in 2006, 2009 and 2011), and Hg (in 2006 and 2010) have been reported but overall follow a downward trend again after this until 2015.

Figure 18: Indexed emissions to air from hazardous waste (waste management industrial sector) (indexed to 2015=1)



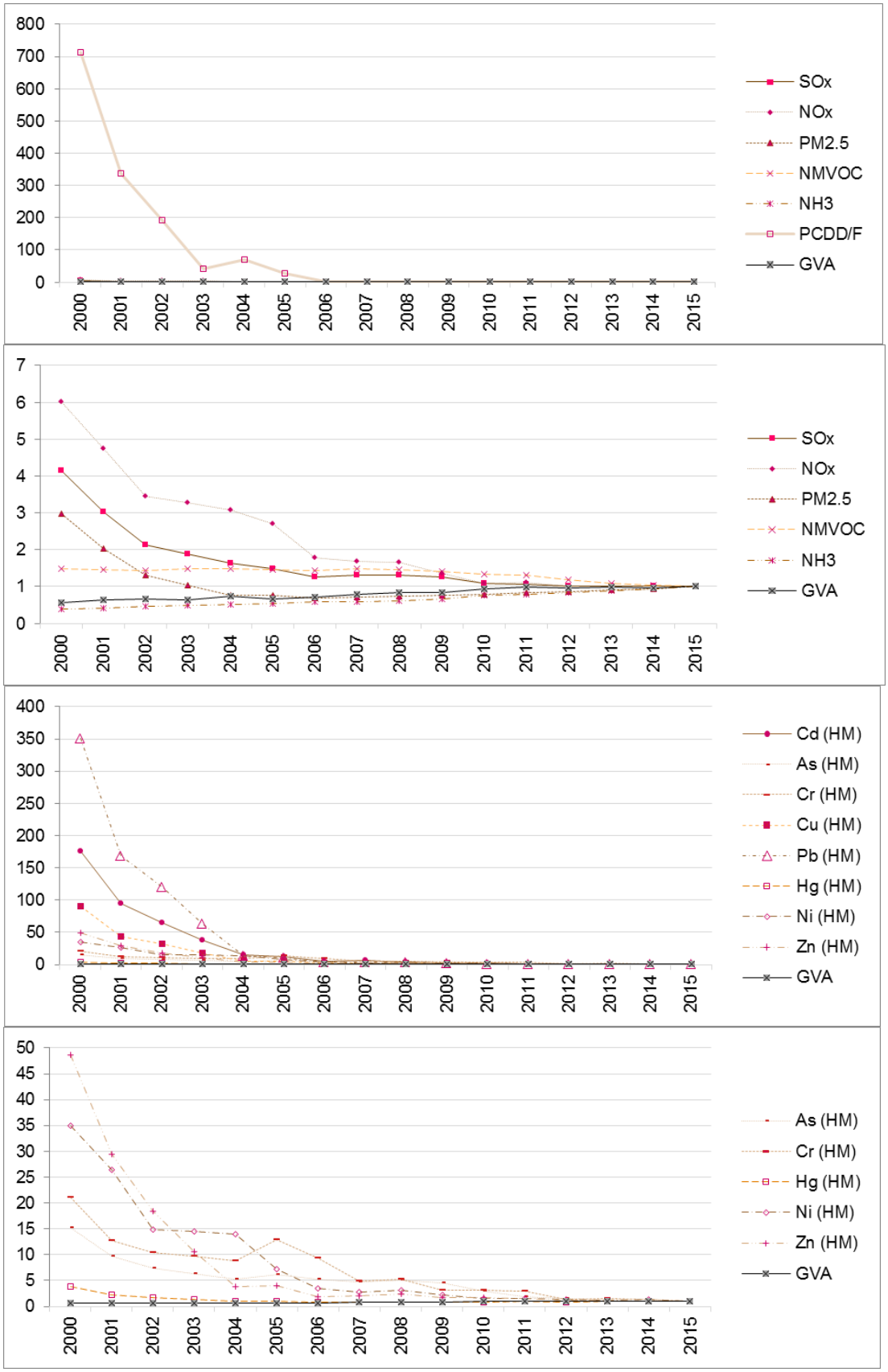
Note: No data for NH_3 reported.

Source: EEA (2017a), Eurostat (2017a)

The most notable decline in emissions of non-heavy metal pollutants within the **non-hazardous waste** management sector are for PCDD/F dropping by a factor of ~700 from 2000 to 2005. Since then they have remained at almost the same level until 2015 (Figure 19). The downward trend is also noticeable for other pollutants from 2000 onwards such as SO_x, and $PM_{2.5}$. Only NH_3 air emissions from the non-hazardous waste management sector have increased (almost doubled) since 2000.

For heavy metals the largest decline in emissions from 2000 to 2015 is reported for Pb (by a factor of 350) followed by Cd with a factor of 180. In addition, emissions of other heavy metals such as Cr, Zn, and Ni have also significantly declined between 2000 and 2007.

Figure 19: Indexed emissions to air from non-hazardous waste (indexed to 2015=1)

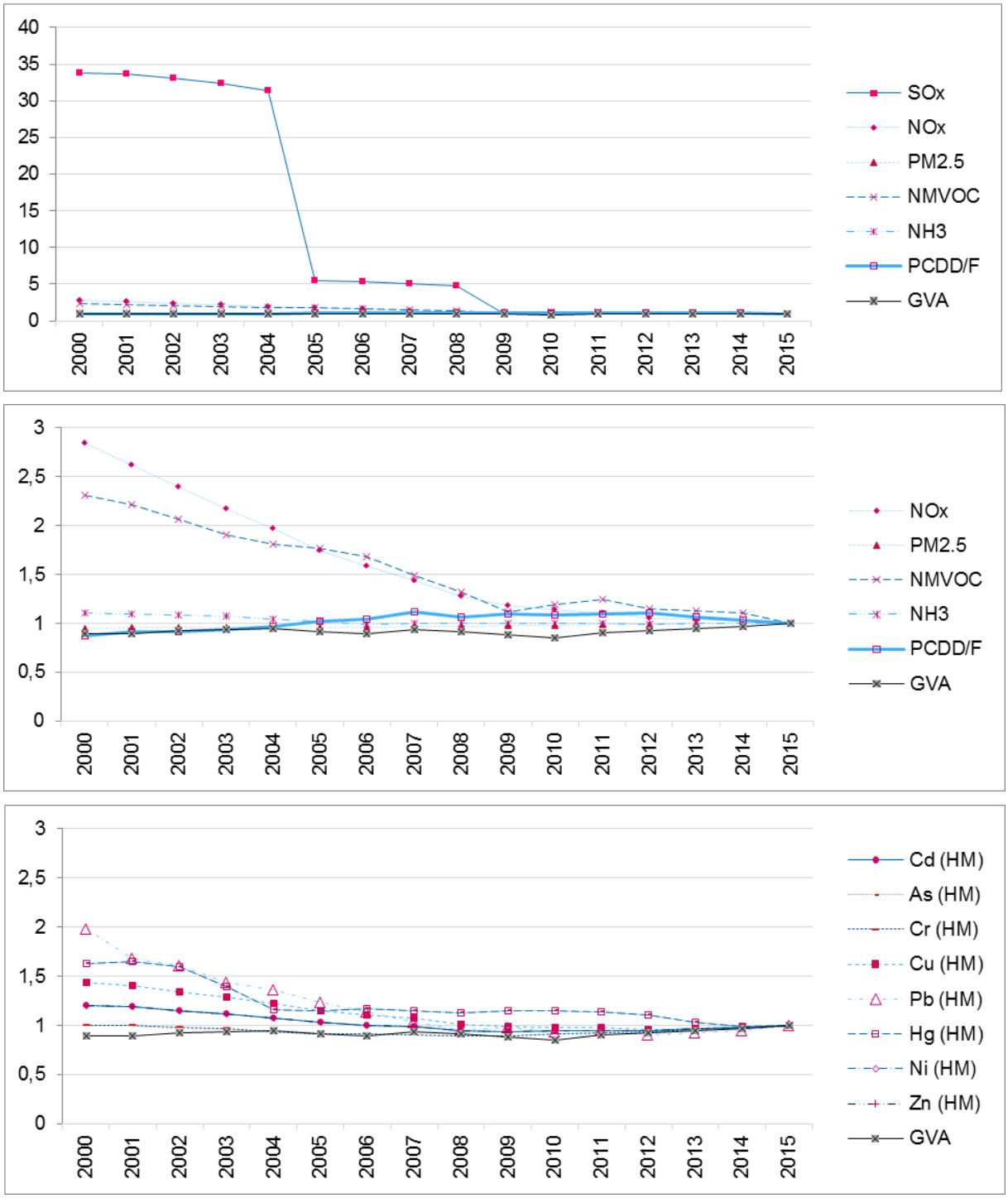


Note: The second chart removes PCDD/F from the first chart to make the detail for other pollutants more visible. The fourth chart removes Pb, Cu, and Cd from the third chart to make the detail for other pollutants more visible.
Source: EEA (2017a), Eurostat (2017a)

'Other activities'

Figure 20 illustrates a significant decline in emissions of SO_x from the 'other activities' sector. In addition, there have also been significant reductions of emissions of NO_x, NMVOC, and Pb between 2000 and 2015. However, emissions of $PM_{2.5}$ and PCDD/F appear to have slightly increased over the time period. Furthermore, there is no observed change in the level of Cr emissions when comparing 2000 to 2015 data although there has been a decline in the years in between.

Figure 20: Indexed emissions to air from other activities (indexed to 2015=1)



Note: The second chart shows pollutants with SO_x removed to make the detail for other pollutants more visible compared to the first chart.

Source: EEA (2017a), Eurostat (2017a)

Limitations

The use of emissions data reported to LRTAP has generally led to overreporting against IED activities as emissions are reported by NFR classification and thus no activity thresholds apply as in the case of IED annex I activities. Furthermore, the pollutant scope for reporting to LRTAP does not include HCl or HF.

Table 6: Gaps in emissions to air data for France

Missing data	Description	Conclusion and actions taken
Partial time series for certain pollutants and sectors	No extrapolation or interpolation undertaken as explained in the accompanying methodology paper.	No action
Data gaps	No data reported for the mineral sector.	No action

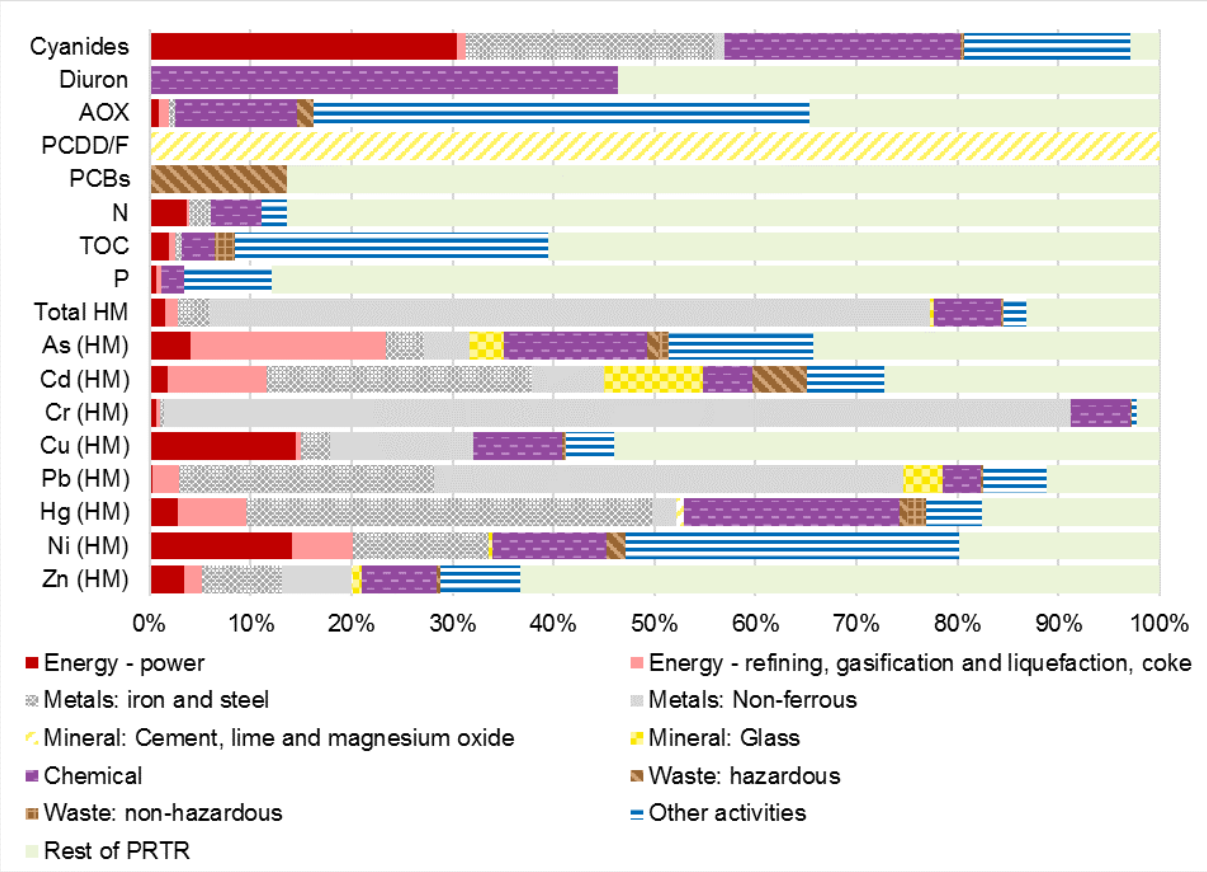
4.2 Emissions to water

Emissions to water data were obtained from the E-PRTR (EEA, 2017b), which has a broader industrial scope than the IED but is not a national total. No further data sources for emissions to water were identified to strengthen data reported to the E-PRTR. The figures in this section, apart from Figure 21, aggregate the separate metals into a single heavy metals metric based on their relative toxicity (predicted no effect concentrations). No data was reported for the mineral – other (ceramics) sector, although 72 installations were reported in 2015.

Almost all industrial sectors have reported emissions to water in 2015. The available data for emissions to water for the year 2015 are shown in Figure 21. This presents, per pollutant, the proportion of emissions to water by the industrial sectors with all the data reported by France to the E-PRTR in 2015.

For the pollutants cyanides, AOX, and most of the heavy metals the majority of the emissions to water are reported from the industrial sectors in France compared to the rest of PRTR total (typically above 50% and up to ~98% for Cr and cyanides). A number of different industrial sectors contribute the majority of these emissions including the chemicals, 'other activities', metals - iron and steel and energy-power sectors.

Figure 21: Pollutant emissions to water from IED industrial sectors and rest of PRTR total (2015)



Note: Rest of PRTR relates to the total for E-PRTR reporting minus the industrial sectors shown here.

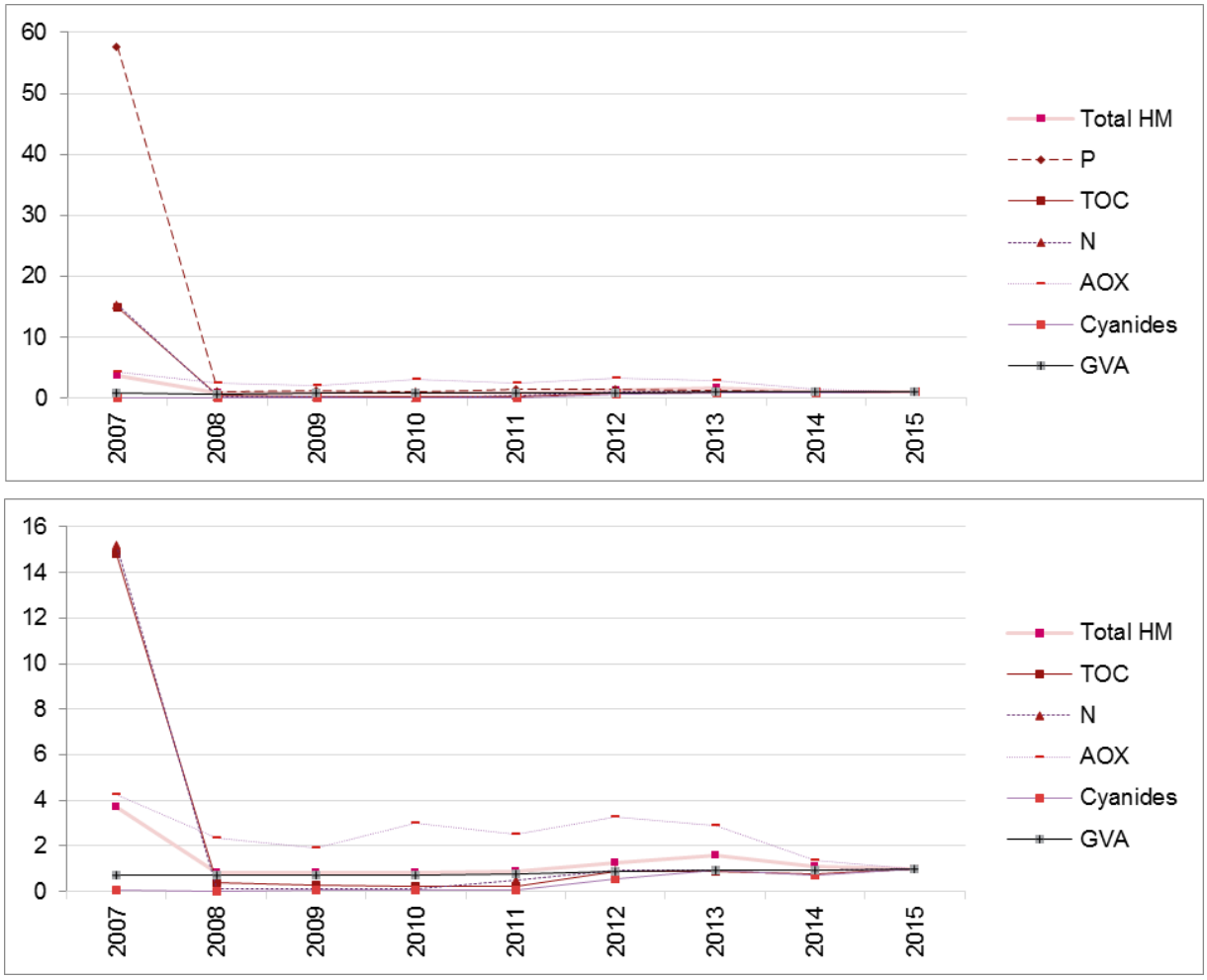
Source: EEA (2017b)

In the following subsections, emissions to water are shown in indexed charts by industrial sector. The emission data were indexed to compare the development of pollutant emissions with the GVA in specific industrial sectors from 2007 to 2015. It can be observed for some sectors that, especially in more recent years, pollutant emissions have decreased. This is likely to be due to legislative requirements under the existing IPPC Directive and more recently the IED. The economic crisis is also likely to have impacted on some sectors. Full details on the emissions reported by industrial sector and year are presented in tabular format in Table 7.

Energy industry

For the energy - power sector, there was an overall downward trend for emissions to water for all pollutants (in particular P, N, AOX and total heavy metals) between 2007 and 2015; except for cyanides where emissions have increased over the same period (Figure 22). No data for diuron, PCB, and PCDD/F emissions have been reported by this sector. The second chart shows pollutants with P removed to make the detail for other pollutants more visible compared to the first chart.

Figure 22: Indexed emissions to water from the energy - power sector (indexed to 2015=1)

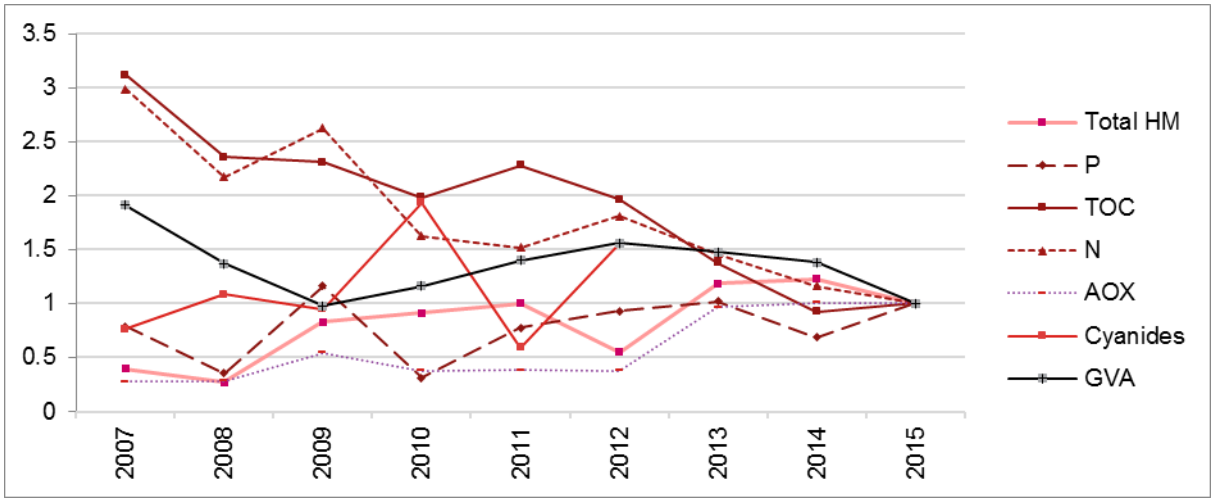


Note: No Diuron PCB, and PCDD/F reported. The second chart shows pollutants with P removed to make the detail for other pollutants more visible compared to the first chart.

Source: EEA (2017b), Eurostat (2017a)

Emissions to water from the energy - refining, gasification and liquefaction, coke sector show a very varied picture over time with several fluctuations in emissions levels over time (Figure 23). A consistent downward trend is only reported for TOC from 2007 to 2014. Some pollutants (cyanides, P, total heavy metals and AOX) also appear to have increased between 2007 and 2015.

Figure 23: Indexed emissions to water from the energy - refining, gasification and liquefaction, coke sector (indexed to 2015=1)



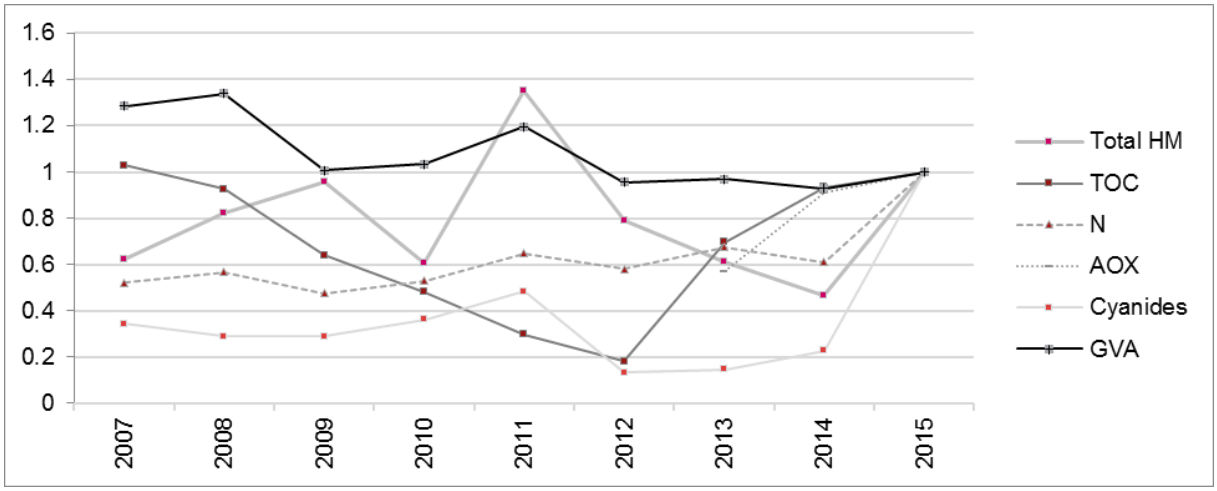
Note: No Diuron, PCBs or PCDD/F reported. No data was reported for Cyanides in 2013 and 2014.

Source: EEA (2017b), Eurostat (2017a)

Metal industry

Unlike other sectors, emissions to water from the metal - iron and steel sector show an upward trend from 2007 to 2015 for most pollutants reported, except for TOC where emissions have only slightly decreased (with several fluctuations during this period). For AOX data is only reported since 2013 (Figure 24). Cyanides, N, and total heavy metals appear to have significantly increased since 2007.

Figure 24: Indexed emissions to water from the metal - iron and steel sector (indexed to 2015=1)

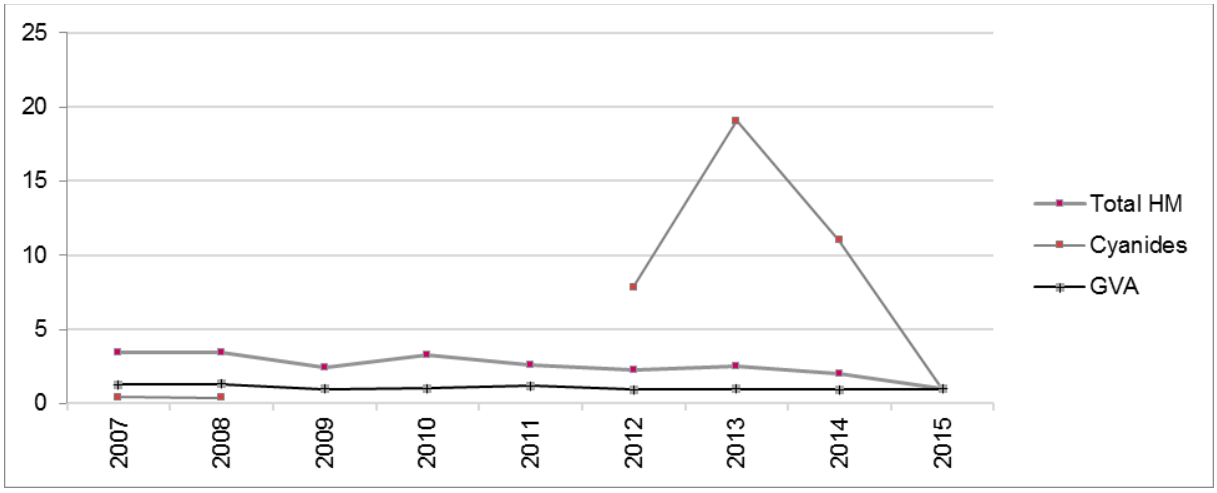


Note: No P, PCBs, PCDD/F, Diuron reported. Zero emissions were reported for AOX in 2007-2012. Values not plotted in these years for AOX to avoid misrepresenting the trend.

Source: EEA (2017b), Eurostat (2017a)

For the metal - non-ferrous sector only heavy metals and cyanides are reported at least for some years (Figure 25). Total heavy metals have followed a downward trend from 2007 to 2015. For cyanides, no data was reported for 2009-2011 so it is difficult to identify any clear trends. Emissions appear to have jumped significantly from 2012 to 2013 but then declined steeply between 2013 and 2015.

Figure 25: Indexed emissions to water from the metal - non-ferrous sector (indexed to 2015=1)



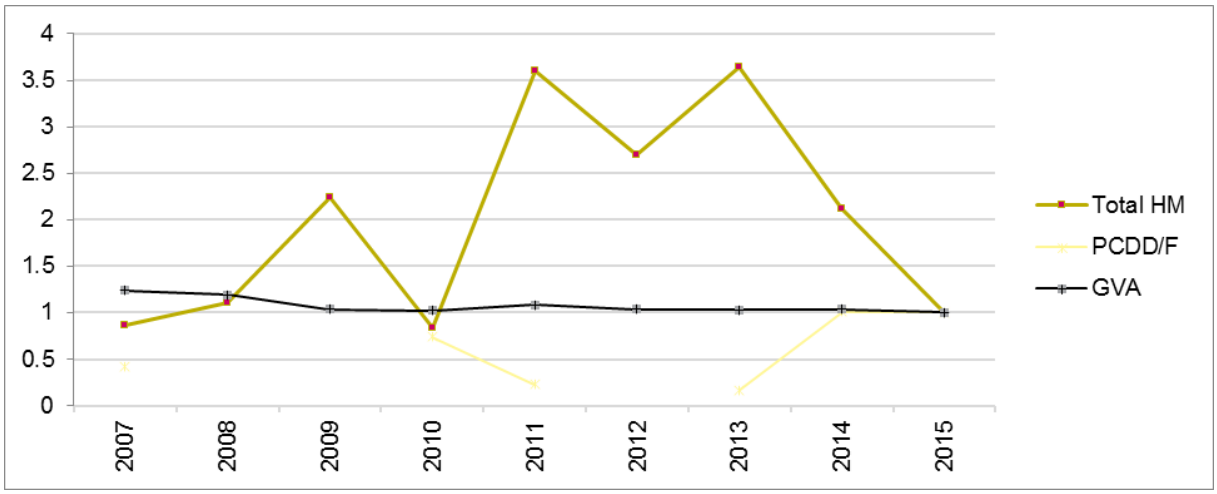
Note: Zero emissions were reported for cyanides 2009-2011. Values were not plotted for cyanides in these years to avoid misrepresenting the trend.

Source: EEA (2017b), Eurostat (2017a)

Mineral industry

As Figure 26 shows, the only pollutants reported for the mineral - cement sector are total heavy metals and PCDD/F and for the latter only for certain years. PCDD/F emissions have recently significantly increased from 2013 onwards. Total heavy metals have also overall slightly increased from 2007 to 2015, but with significant emission fluctuations in intermediate years. In the same period GVA has remained almost constant with a slight decrease.

Figure 26: Indexed emissions to water from the mineral-cement sector (indexed to 2015=1)

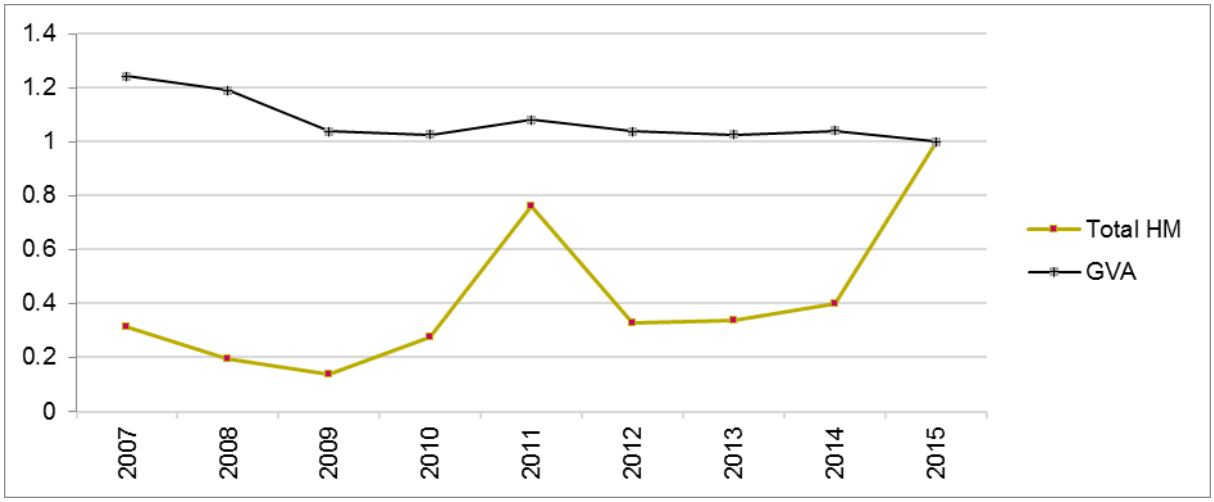


Note: Zero emissions were reported for PCDD/F in 2008-2009 and 2012. Values were not plotted for PCDD/F in these years to avoid misrepresenting the trend.

Source: EEA (2017b), Eurostat (2017a)

The mineral - glass sector only reports data for total heavy metals (Figure 27). Their emissions to water have significantly increased between 2007 and 2015 with the main increases observed in 2011 and 2015. The GVA has decreased in the same time period, thus providing no explanation for the increase.

Figure 27: Indexed emissions to water from the mineral - glass sector (indexed to 2015=1)



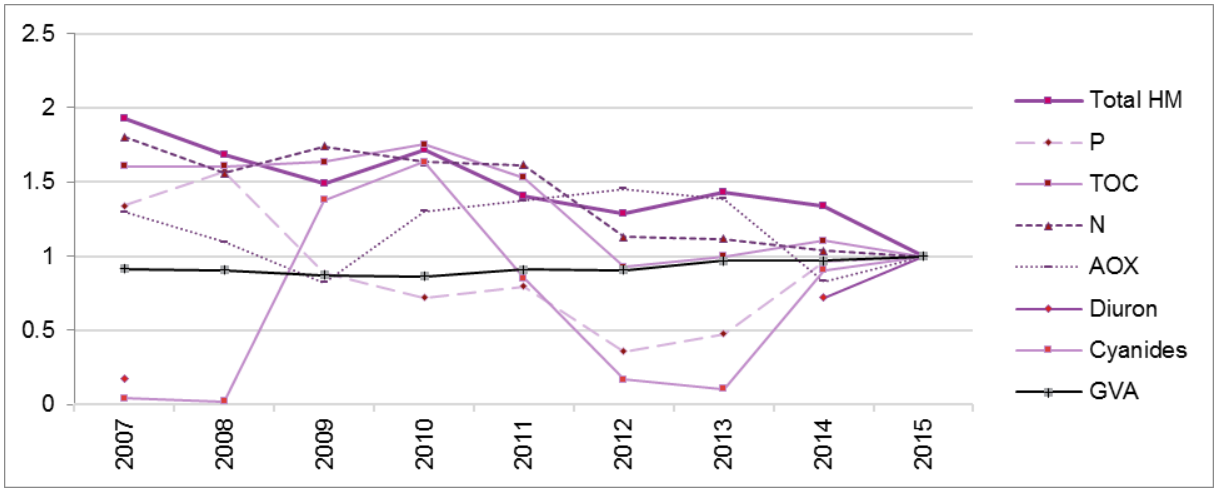
Note: Data only reported for heavy metals.

Source: EEA (2017b), Eurostat (2017a)

Chemical industry

Emissions of cyanides from the chemical sector have increased between 2007 and 2015 (Figure 28). No data was reported for diuron between 2008 and 2013 but does indicate an increase in emissions between 2014 and 2015. Total heavy metals, N, TOC, P, and AOX have decreased within the same period, with some fluctuations in between. Almost no change in GVA occurred between 2007 and 2015.

Figure 28: Indexed emissions to water from the chemical sector (indexed to 2015=1)



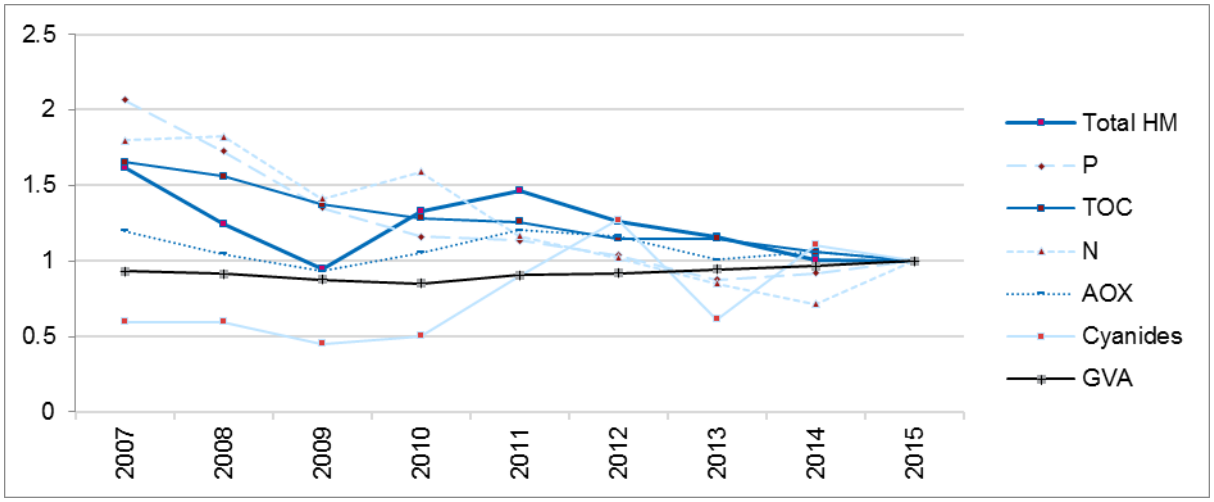
Note: No data for PCBs or PCDD/F reported. Zero emissions were reported for diuron in 2008-2013. Values were not plotted for diuron in these years to avoid misrepresenting the trend.

Source: EEA (2017b), Eurostat (2017a)

'Other Activities'

Emissions to water from 'other activities' are shown in Figure 29. Emissions of heavy metals decreased from 2007 to 2009, followed by an increase to 2011, after which emissions have steadily decreased again. The trend of decreasing heavy metal emissions from 2011 to 2015 has taken place while GVA for the sector increased. Emissions of cyanides have increased in the time period whilst emissions of TOC, P and N have steadily declined.

Figure 29 Indexed emissions to water from 'other activities' (indexed to 2015=1)



Note: No data for PCBs or PCDD/F reported.

Source: EEA (2017b), Eurostat (2017a)

Additional data for emissions to water

Additional data reported to E-PRTR for emissions to water is presented in Table 7 – including for pollutants with limited time series that couldn't be shown on the charts indexed to 2015 emission levels.

Table 7: Emissions to water by pollutant and industrial sector (all available data) (kg)

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Energy - power									
Total HM	912	206	204	196	211	311	386	260	244
Total P	1,215,800	22,400	24,600	23,200	29,100	29,300	24,400	19,200	21,100
Total TOC	16,172,400	391,900	269,800	263,100	256,100	955,000	961,000	859,700	1,091,200
Total N	25,664,000	177,000	177,000	146,000	835,000	1,609,000	1,577,000	1,596,000	1,690,000
AOX	20,500	11,280	9,320	14,500	12,200	15,810	14,010	6,450	4,820
Cyanides	137	63	253	205	204	2,210	3,601	2,850	3,971
Energy - refining, gasification and liquefaction, coke									
Total HM	75	51	156	172	189	103	224	232	188
Total P	13,500	6,010	19,910	5,320	13,250	15,880	17,400	11,720	17,090
Total TOC	1,147,000	868,300	850,000	729,000	838,100	723,400	505,400	340,300	368,000
Total N	391,400	284,400	343,400	213,200	199,300	237,300	191,300	152,000	131,000
AOX	1,360	1,390	2,660	1,850	1,870	1,860	4,710	4,940	4,890
Cyanides	92.0	130.2	113.8	232.0	71.1	186.0	-	-	120.0
Metals: iron and steel									
Total HM	253	264	305	403	359	285	351	264	255
Total TOC	382,000	149,000	149,000	234,000	636,000	448,000	488,000	392,000	417,000
Total N	308,300	303,800	135,900	263,100	183,100	182,400	234,000	236,400	160,900
AOX	-	-	-	-	-	-	1,810	2,890	3,180
Cyanides	1,102	926	924	1,161	1,547	427	469	726	3,206

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Metals: Non-ferrous									
Total HM	295	388	453	286	640	374	290	220	473
Total TOC	358,300	322,700	222,900	167,400	104,000	62,800	242,500	325,000	348,100
Total N	499,000	543,000	457,100	509,000	622,000	556,000	648,000	586,000	959,000
AOX	1,370	1,010	-	-	-	-	-	-	-
Cyanides	56	51	-	-	-	1,020	2,480	1,430	130
Mineral: Cement, lime and magnesium oxide									
Total HM	4.15	5.34	10.77	4.05	17.30	13.00	17.54	10.21	4.81
PCDD/F	0.0005	-	-	0.0008	0.0003	-	0.0002	0.0011	0.0011
Mineral: Glass									
Total HM	18.05	11.25	7.88	15.79	43.90	18.95	19.37	22.91	57.65
Mineral: Other									
Total HM	-	-	-	-	-	0.14	-	-	-
Chemical									
Total HM	1,950	1,701	1,511	1,740	1,420	1,302	1,446	1,352	1,012
Total P	96,190	112,720	63,400	51,570	57,080	25,610	34,080	69,210	71,760
Total TOC	3,052,300	3,048,600	3,102,400	3,327,200	2,906,800	1,761,600	1,899,800	2,100,000	1,899,800
Total N	4,165,300	3,602,300	4,022,000	3,775,900	3,721,700	2,605,700	2,575,000	2,396,300	2,308,600
PCDD/F	-	0.0002	0.0004	0.01	-	0.05	-	-	-
AOX	78,590	66,470	49,890	79,010	83,340	88,140	83,940	50,360	60,640
Diuron	2.00	-	-	-	-	-	-	8.20	11.40
Cyanides	133	63	4,220	4,998	2,600	511	317	2,768	3,060
Waste: hazardous									
Total HM	190	210	58	93	94	121	93	64	32
Total P	41,050	16,700	-	-	63,600	-	-	-	-
Total TOC	1,193,000	856,900	-	-	-	-	-	-	-
Total N	1,130,000	1,050,000	-	-	243,000	-	-	-	-
PCBs	0.40	0.73	0.51	0.28	0.30	0.17	0.16	0.26	0.14
AOX	20,040	19,460	8,940	9,980	8,410	6,330	6,750	7,740	7,790
Cyanides	5,125	5,023	-	-	105	-	-	-	-
Waste: non-hazardous									
Total HM	73.51	33.93	2.28	7.09	6.14	28.64	23.96	98.73	8.99
Total P	13,200	190,400	-	-	-	100,000	5,180	-	-
Total TOC	822,000	1,880,100	79,700	-	64,600	63,500	200,200	146,300	1,134,200
Total N	428,000	3,389,000	264,000	-	-	-	-	-	-
PCDD/F	-	-	0.2	-	0.0002	-	-	-	-
AOX	-	1,210	-	12,200	-	-	-	-	-
Cyanides	-	-	-	-	-	-	70.50	-	52.00
Other activities									
Total HM	563	431	328	461	508	439	403	349	347
Total P	586,610	490,020	384,000	330,160	322,090	295,310	248,720	261,140	284,060
Total TOC	29,243,200	27,557,500	24,270,200	22,735,300	22,226,400	20,324,500	20,291,400	18,734,300	17,688,700
Total N	2,113,300	2,143,000	1,660,800	1,869,200	1,371,200	1,201,800	998,400	840,000	1,175,300
AOX	296,480	258,520	230,550	260,260	297,060	287,410	249,470	261,750	247,150
Diuron	1.42	1.49	1.49	-	-	-	-	-	-
Cyanides	1,280	1,280	967	1,080	1,920	2,720	1,312	2,370	2,142

Source: EEA (2017b)

Limitations

No limitations arise as a result of the mapping to IED activities as E-PRTR activities are well aligned in this respect. However, it is generally expected that emissions to water reported to E-PRTR will be underreporting against IED activities because of the reporting thresholds which apply (as well as inconsistencies between years). E-PRTR also has a limited timeseries.

Table 8: Gaps in emissions to water data for France

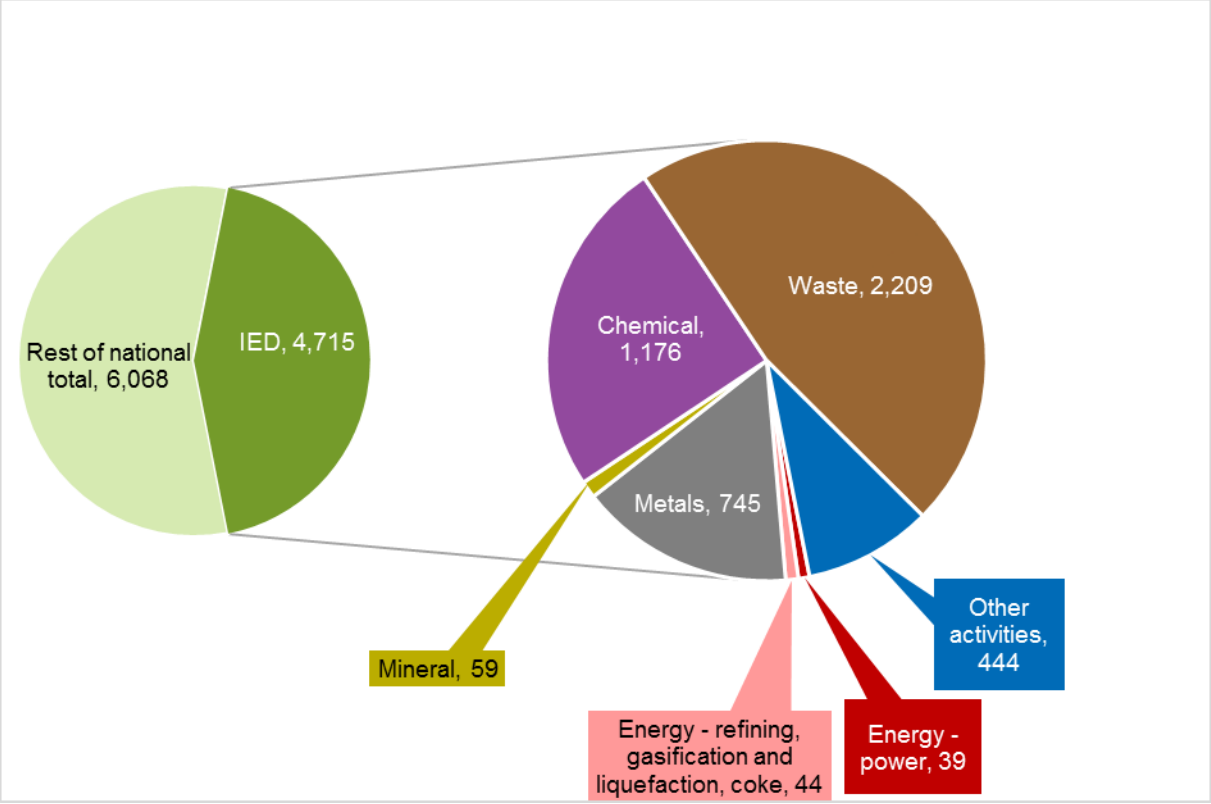
Missing data	Description	Conclusion and actions taken
Gaps in time-series	No gap-filling for emissions data has been carried out – as explained in the accompanying methodology paper	No action
Data gaps	No data reported for several sectors	No action

5 Waste generated by industrial sectors

The data presented in this section is the generation of waste by waste category (hazardous and non-hazardous) (Eurostat, 2017e). Data is reported by Member States biennially.

Industrial sectors account for a significant share of total hazardous waste generated in France (around 44%) (Figure 30). Of this, the waste management sector generates the largest quantity (47%). Other important quantities of hazardous waste are generated by the chemicals and metals sectors accounting for 25% and 16%, respectively.

Figure 30: Hazardous waste generation by industrial sector in 2014 (kt)

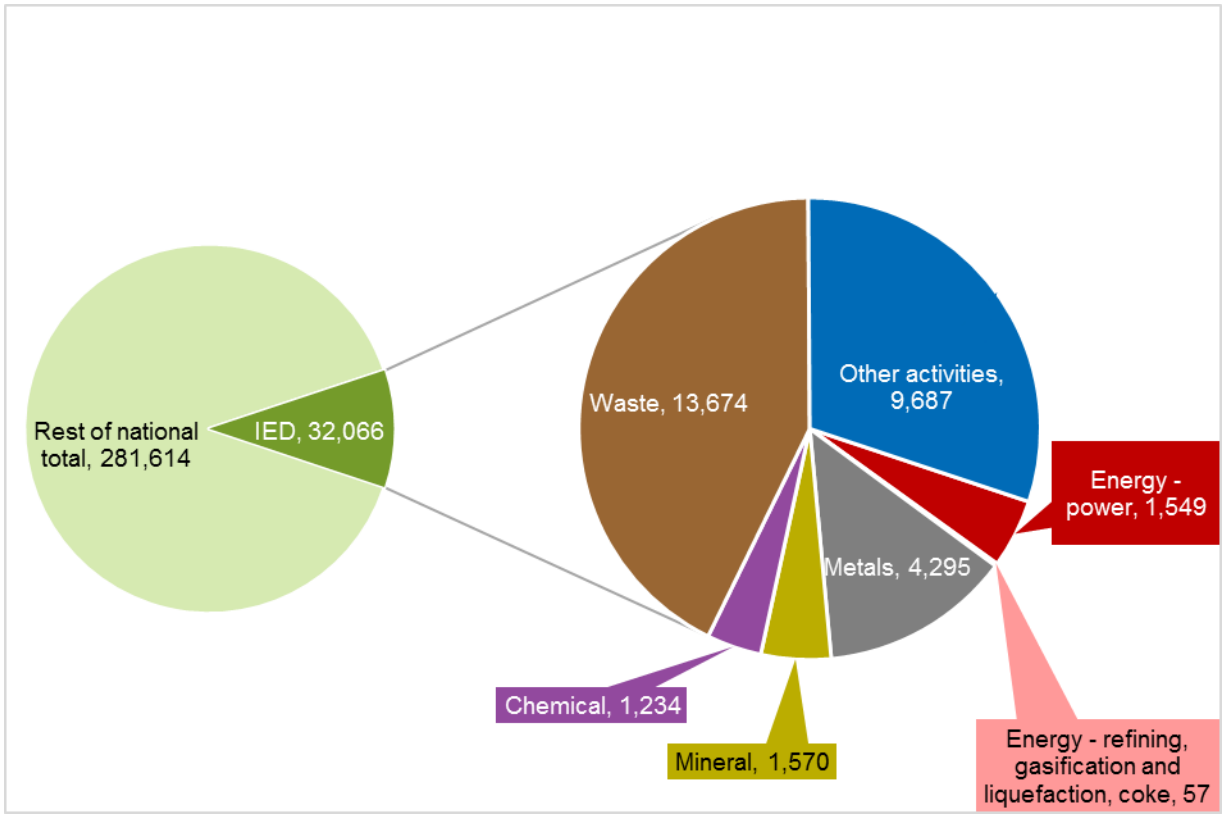


Note: Rest of national total relates to all NACE activity minus the industrial sectors shown here.

Source: Eurostat (2017e)

In comparison, industrial sectors only account for a small share (around 10%) of total non-hazardous waste in France (Figure 31) – with the waste management sector again accounting for a considerable amount of this (43% of total industrial sector waste generation), followed by the 'other activities' and metals sectors accounting for 30% and 13%, respectively.

Figure 31: Non-hazardous waste generation by industrial sector in 2014 (kt)



Note: Rest of national total relates to all NACE activity minus the industrial sectors shown here.

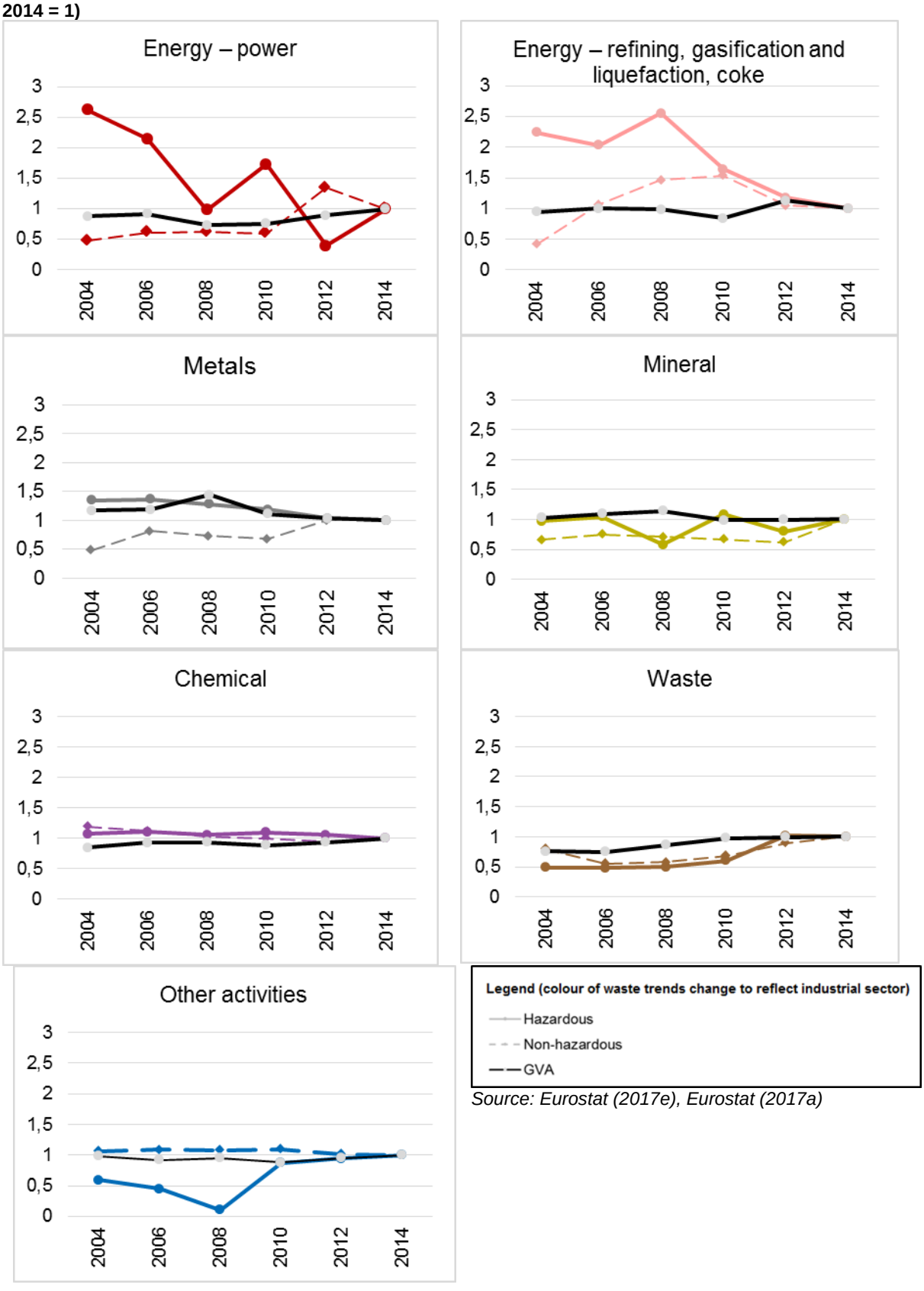
Source: Eurostat (2017e)

In the energy - power sector, hazardous waste generation has overall decreased by a factor of around 1.5. In terms of non-hazardous waste, the amounts generated doubled over the same time period. A similar picture can be observed for the energy - refining, gasification and liquefaction, coke sector where hazardous waste generation has decreased since 2004, with a peak in 2008, whereas non-hazardous waste generated has doubled within 10 years. Between 2004 and 2014 hazardous waste generation has slightly decreased in the metals sector (by a factor of 0.5) but non-hazardous waste generation has doubled in the same period. GVA in this sector decreased in that time frame, thus not providing an explanation for this. The mineral sector hazardous waste generation overall did not change between 2004 and 2014, but had a significant low in 2008. An upward trend is reported for non-hazardous waste, especially between 2012 and 2014. Limited evolution of hazardous and non-hazardous waste generated by the chemical sector can be observed while GVA has only slightly increased. Overall, the waste management sector has had an increase in both hazardous and non-hazardous waste generation with hazardous waste doubling between 2004 and 2014. Finally, hazardous waste generated by 'other activities' had a downward trend from 2004 to 2008 before increasing until 2014. Almost no change in generation of non-hazardous waste is reported between 2004 and 2014.

Limitations

The use of NACE classifications for reporting has generally led to overreporting for waste generation data against each industrial sector compared to a scope strictly limited to the IED. No data could be included within 'other activities' to reflect the IED activity intensive rearing of poultry or pigs as reporting was not at the appropriate level of NACE classification.

Figure 32: Hazardous and non-hazardous waste generation by industrial sector relative to GVA (indexed; 2014 = 1)



Source: Eurostat (2017e), Eurostat (2017a)

6 Challenges and Pressures

This section identifies the political and environmental challenges and pressures related to sectors or specific activities which are within the scope of the IED, and in particular whether the impact of these in a region or Member State is substantially above the EU average for that activity or sector. It is about the specific circumstances of the environmental impact of the industrial sectors or activities in that Member State which may have been indicated for example by public complaint, high profile media attention, political intervention, implementation of a specific national policy and/or which are evident from literature or analysis[1].

As shown in section 2, key industries in France in terms of the reported number of IED installations are intensive rearing of poultry or pigs (50% of total in 2015), followed by non-hazardous waste management (7%) and the chemicals industrial sector (6%). The sectors identified as making the largest contribution to the French economy as measured by GVA are food and drink production within the 'other activities' industrial sector (31% of total industrial GVA), energy – power (23%) and the chemicals (20%) industrial sector.

The industrial sector identified in section 4.1 as contributing the largest burden to the environment for emissions to air was the energy - power sector. It is responsible for the greatest share of emissions of heavy metals to air, as well as for the pollutants SO_x, NO_x and PCDD/F. The sector 'other activities' is mainly responsible for emissions to air of $PM_{2.5}$, NMVOC and NH_3. Regarding emissions to water, the non-ferrous metals industry (contributing a significant share of the pollutants Cr and Pb), iron and steel (mainly Hg and Cd), waste management (sole emitter of PCBs), chemicals (sole emitter of diuron) and 'other activities' (AOX, TOC and Ni) sectors were identified as having significant environmental burdens. The waste management, chemical and metals industrial sectors mainly contribute to hazardous and non-hazardous waste generation.

Key challenges were discussed with the French authorities, as set out below.

It was further mentioned, that there are challenges with the new BREF document that is currently under revision for the food processing industry. France is concerned by many subsectors and it is challenging to involve all the professional federations and assert all their specificities/arguments well during the Sevilla process. At the moment there are no problems in this sector.

[1] The challenges and pressures included here do not concern the implementation of the IED.

Table 9: Key challenges identified in France

Ammonia and nitrate pollution from IRPP sector	*FR-1*
IED activities / sectors	6.6 Other activities - Intensive rearing of poultry and pigs
Medium and pollutants	Ammonia emissions to air and nitrate emissions to water
Description	France experiences challenges with the emissions of Nitrate to the soil that then affects the groundwater quality. One source of this pollution stems from farms for the rearing of pigs and poultry. The main problem is that these facilities have not followed the industrialisation and the automatization that comes with it such as some other countries. Although this is only one of the sources, it also comes from the rearing of other animals and agriculture, i.e. spraying of nitrogen fertiliser. Thus, this challenge can only be regarded as partly stemming from IED activities. The agricultural sector in France is very important and even the smallest changes require a lot of time because there is a lot of opposition from the farmers and the associations. The IRPP sector in France is very big amounting to more than 50% of the entire IED facilities across all sectors; there are 3,189 IRPP facilities and 6,408 IED facilities in total in France.
Years applicable / current	2004 until ongoing
Related infringement cases	The Court of Justice of the EU (CJEU) has upheld a European Commission complaint that France breached the 1991 nitrates directive because it failed to designate a sufficient number of vulnerable areas in three river basins.
Public complaints	-
Media Attention	-
Political interventions	Since 2011 France has undertaken national measures to improve the water protection, notably an action plan against nitrate pollution which was approved by the European Commission in 2016.
Policies implemented to address challenge	Competent authorities have also taken national measures to implement efficiently IRPP BAT conclusions in regards to the number of installations. IRPP BAT conclusions will also improve the protection of the environment.
Related policies	At a broad policy level the following EU policies are related to this challenge: the Common Agricultural Policy, the Nitrates Directive and Water Framework Directive.

Emissions from the paper production	*FR-2*
IED activities / sectors	6.1. Production in industrial installations of: (a) pulp from timber or other fibrous materials; (b) paper or card board with a production capacity exceeding 20 t/day; (c) wood-based panels with a production capacity exceeding 600 m^3/day
Medium and pollutants	6.1 (a) and (b): SO_x and NO_x emissions to air 6.1 (c): Air pollution with dust and formaldehyde
Description	There are some challenges in the paper production sector because there is a large variety of products being manufactured that emit different pollutants at different levels (several shutdown phases). The same is applicable for wood panels manufacturing where different types of woods are used which results in a large variation of emission levels which can cause problems to comply with BAT-AELs.
Years applicable / current	-
Related infringement cases	No.
Public complaints	-
Media Attention	-
Political interventions	-
Policies implemented to address challenge	-
Related policies	-

Public acceptance of new or revised permits in general, e.g. plants in the cement production, which have requested a derogation based on BAT-AELs	*FR-3*
IED activities / sectors	Cross-cutting challenge
Medium and pollutants	-
Description	In general, in France there are societal acceptance problems when permits are issued or revised, e.g. on odours from pig rearing or waste treatment facilities. When permits are being revised with a request for derogation or new installations planned strong public opposition can happen when the site is located close to settlements or sensitive environments. In the beginning of 2017, due to the applicability of the BREF for the Production of Cement, Lime and Magnesium Oxide approximately seven cement plants have requested a derogation based on the new emission limits defined. When a derogation is requested a public stakeholder consultation is conducted. During this, for two installations, there has been strong public opposition to granting these derogations.
Years applicable / current	The challenge regarding the cement plant occurred in mid 2015 and is ongoing.
Related infringement cases	No.
Public complaints	There are public complaints regarding the cement plants e.g. on odours, noises , dust or any pollutant which can have a significant impact on the environment.
Media Attention	-
Political interventions	-
Policies implemented to address challenge	-
Related policies	-

7 References

AMEC (2016) Supporting the evaluation of Regulation (EC) No 166/2006 concerning the establishment of a European Pollutant Release and Transfer Register and its triennial review.

CGDD (Commissariat general au developpement durable) (2014) Reperes: Industries et environnement.

CEPI (2016) Key statistics 2016 European Pulp and Paper Industry. http://digibook.digi-work.com/Digibooks.aspx/Get/cepi/1641/KeyStatistics2016_Finalpdf

CEPS et al. (2016) Composition and drivers of energy prices and costs: case studies in selected energy-intensive industries. Final Report;

EC (2010) BREF: Cement, Lime and Magnesium Oxide Manufacturing Industries. European Commission.

EC (2013) Communication from the Commission (COM/2013/407) Action Plan for a competitive and sustainable steel industry in Europe http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52013DC0407

EC (2015) Statistical pocketbook 2015 EU Energy in figures. http://ec.europa.eu/energy/sites/ener/files/documents/PocketBook_ENERGY_2015%20PDF%20final.pdf

EC (2016) Supporting the evaluation of Regulation (EC) No 166/2006 concerning the establishment of a E-PRTR and its triennial review. European Commission.

EEA (2016) EEA country factsheets on industrial emissions. http://www.eea.europa.eu/themes/industry/industrial-pollution

EEA (2016b) Mapping industry across datasets. https://forum.eionet.europa.eu/nrc-industrial-pollution/library/consultations/2016/draft-2016-country-profiles/methodology/mapping-industry-across-datasets/

EEA (2017a) Data on emissions of air pollutants submitted to the LRTAP Convention and copied to EEA https://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-convention-on-long-range-transboundary-air-pollution-lrtap-convention-11 [last update: 12 July 2017]

EEA (2017b) European Pollutant Release and Transfer Register [last update: 17 July 2017]. http://prtr.ec.europa.eu/#/home

ETC/ACM (2016) Summary report on 2014 E-PRTR data. European Environment Agency.

Eurostat (2017a) National accounts aggregates by industry [nama_10_a64] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64&lang=en

Eurostat (2017b) Employment by sex, age and detailed economic activity [lfsq_egan22d] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsq_egan22d&lang=en

Eurostat (2017c) Simplified energy balances - annual data [nrg_100a] http://appsso.eurostat.ec.europa.eu/nui/show.do?wai=true&dataset=nrg_100a

Eurostat (2017d) Water use in the manufacturing industry by activity and supply category [env_wat_ind] and Water use by supply category and economical sector [env_wat_cat] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_wat_ind&lang=en and http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_wat_cat&lang=en

Eurostat (2017e) Generation of waste by waste category, hazardousness and NACE Rev. 2 activity [env_wasgen] http://appsso.eurostat.ec.europa.eu/nui/show.do?lang=en&dataset=env_wasgen

Ministère de l'environnement, de l'énergie, et de la mer (2017). Personal communicaton

Appendices

Appendix 1 Mapping industrial sectors across data sources for France

Appendix 2 Emissions to air by pollutant and industrial sector (detail)

Appendix 1: Mapping industrial sectors across data sources for France

Industrial sector† *Sector classification*	**GVA** **Eurostat (2017a)** **NACE Rev 2**	**Employment** **Eurostat (2017b)** **NACE Rev 2**	**Energy consumption‡** **Eurostat (2017c)** **Energy balance indicator**	**Water consumption** **Eurostat (2017d)** **NACE Rev 2**	**Emissions to air** **EEA (2016c)** **NFR14 sector classification**	**Emissions to water^** **EEA (2017)** **E-PRTR**	**Waste generated** **Eurostat (2017e)** **NACE Rev 2**
Time series available	*2000-2015, annually*	*2008-2015, annually*	*2000-2015, annually*	*2000-2015, annually*	*2000-2014, annually*	*2007-2015, annually*	*2004-2014, every 2 years*
Energy power	D (electricity, gas, steam and air conditioning supply)	D35 (electricity, gas, steam and air conditioning supply)	B_101301 - Own Use in Electricity, CHP and Heat Plants	D (electricity, gas, steam and air conditioning supply)	1A1a Public electricity and heat production; 1A2a-f Stationary combustion in manufacturing industries and construction	Power generation (1c)	D (electricity, gas, steam and air conditioning supply)
Energy - refining, gasification and liquefaction, coke	C19 (coke and refined petroleum products)	C19 (coke and refined petroleum products)	B_101307 - Petroleum Refineries; B_101312 - Coke Ovens; B_101314 - Gas Works; B_101316 - Coal Liquefaction Plants; B_101317 - Liquefaction (LNG) / regasification plants; B_101319 - Gas-to-liquids (GTL) plants (energy); B_101320 - Non-specified (Energy)	**DATASETS COMBINED:** C19 (coke and refined petroleum products) **AND** C20 (chemicals) and C21 (pharmaceutical products)	1A1b Petroleum refining; 1A1c Solid fuels and other energy industries	Refining (1a), gasification and liquefaction (1b), coke ovens (1c)	C19 (coke and refined petroleum products)
Metals: iron and steel	C24 (basic metals)	C24 (basic metals)	B_101315 - Blast Furnaces B_101805 - Iron and Steel	C24 (basic metals)	2C1 Iron and steel	Iron and steel manufacturing (2a-d)	C24-C25 (basic metals; fabricated metal products, except machinery and equipment)
Metals: non-ferrous			B_101810 - Non-Ferrous Metals		2C2-7 Non-ferrous metals	Non-ferrous metal production (2e)	
Minerals, in aggregate (cement, lime and magnesium oxide, glass and other)	C23 (non-metallic mineral products)	C23 (non-metallic mineral products)	B_101820 - Non-Metallic Minerals	Insufficient granularity in reported data	2A1 Cement; 2A2 Lime; 2A3 Glass; 2A6 Other	Cement, lime and magnesium oxide (3c); Glass (3e); Other (3f-g)	C23 (non-metallic mineral products)
Chemical	C20 (chemicals); C21 (pharmaceutical products)	C20 (chemicals); C21 (pharmaceutical products)	B_101815 - Chemical and Petrochemical	**DATASETS COMBINED:** C20 (chemicals) and C21 (pharmaceutical products) **AND** C19 (coke and refined petroleum products)	2B1 Ammonia; 2B6 Titanium dioxide; 2B2 Nitric acid; 2B7 Soda ash; 2B3 Adipic acid; 2B10a Other; 2B5 Carbide; 2J Production of POPs	Chemical industry (4a-f)	C20-C22 (chemicals; pharmaceuticals; rubber and plastic products)
Waste: hazardous	E37-E39 (water supply; sewerage, waste management and remediation)	E38 (waste collection, treatment and disposal activities; materials recovery)	No indicator	Insufficient granularity in reported data	5C1bi Industrial waste incineration 5C1biv Sewage sludge incineration 5C1bii Hazardous waste incineration 5C1bvi Other waste incineration 5C1biii Clinical waste incineration	Hazardous waste (5a)	E37-E39 (water supply; sewerage, waste management and remediation)
Waste: non-hazardous			B_101318 - Gasification plants for biogas	Insufficient granularity in reported data	5A Solid waste disposal on land; 5C1a Municipal waste incineration; 5B1 Composting; 5C1bv Cremation; B2 Anaerobic digestion at biogas facilities; 5D2 Industrial wastewater handling	Non-hazardous waste (5b-e; g)	
Other activities (paper and board, pulp, textiles, tanning, food and drink products, intensive rearing of pigs and poultry, and surface treatment)	C10-C12 (food and drinks and tobacco)	C10 (food products); C11 (drink products)	B_101830 - Food and Tobacco	**DATASETS COMBINED:** C10-12 (food and drinks and tobacco); C13-15 (textiles; wearing apparel; leather); C16-17 (paper and wood products)	2H Food and beverages industry	Food and drink (8a-c)	C10-C12 (food products; drink products; tobacco)
	C13-C15 (textiles; wearing apparel; leather)	C13-C15 (textiles; wearing apparel; leather)	B_101835 - Textile and Leather			Pre-treatment or dyeing of textile fibres or textiles (9a); Tanning of hides and skins (9b)	C13-C15 (textiles; wearing apparel; leather)
	C16 (wood products)	C16 (wood products);	B_101851 - Wood and Wood Products		2I Wood processing		C16 (wood products)
	C17 (paper and paper products)	C17 (paper and paper products)	B_101840 - Paper, Pulp and Print		2H1 Pulp and paper industry	Pulp, paper and wood production (6a-c)	C17-C18 (paper and paper products; printing)
	Insufficient granularity in reported data	Insufficient granularity in reported data	No indicators	Insufficient granularity in reported data	3B4gi Manure management - Laying hens; 3B4gii Manure management - Broilers	Intensive rearing of poultry and pigs (7a)	Insufficient granularity in reported data
	Insufficient granularity in reported data	Insufficient granularity in reported data	No indicators	Insufficient granularity in reported data	2D3d Coating applications; 2D3e Degreasing; 2D3f Dry cleaning; 2D3g Chemical products; 2D3h Printing; 2D3i Other solvent use; 2G Other product use; 2H3 Other industrial processes	Surface treatment (2f; 9c); Production of carbon (9d)	Insufficient granularity in reported data
Rest of national total	*All NACE activities*	*All NACE activities*	*B_100900 – Gross inland consumption*	*All NACE activities*	*National total for the entire territory (based on fuel sold)*	*National total for all E-PRTR activities reported*	*All NACE activities plus households*

Notes: † Number of IED installations is reported against IED activities for years 2011, 2013 and 2015.

Appendix 2: Emissions to air by pollutant and industrial sector (detail)

Notes: Emissions rounded to two decimal places except in cases, where more decimal places were necessary to show the real value. Industrial sectors and pollutants with no data reported across the timeseries have been removed.

Source: EEA (2017a)

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Energy - power																	
SO_x	Gg (1000 tonnes)	304.22	240.32	229.46	232.06	211.47	223.83	207.97	209.90	177.34	160.30	156.59	128.28	136.08	115.08	82.36	73.59
NO_x	Gg (1000 tonnes)	244.05	211.44	219.43	223.75	218.69	236.81	217.00	207.83	176.28	158.02	160.12	142.68	146.02	140.45	110.00	106.85
$PM_{2.5}$	Gg (1000 tonnes)	16.53	13.98	13.52	13.46	14.03	14.35	14.65	14.21	12.35	10.21	10.41	9.60	9.24	8.98	8.45	8.53
NMVOC	Gg (1000 tonnes)	9.58	8.49	8.27	8.12	7.95	7.85	8.18	8.21	7.30	5.71	6.08	6.55	5.58	4.79	4.90	4.55
NH_3	Gg (1000 tonnes)	0.88	0.90	1.03	0.99	1.08	0.74	0.90	1.02	1.24	0.98	1.11	1.14	1.23	1.46	1.47	1.13
Cd (HM)	Mg (tonne)	6.16	5.62	5.45	4.26	3.85	3.61	2.65	2.51	2.48	1.58	1.59	1.58	1.30	1.34	1.45	1.30
As (HM)	Mg (tonne)	9.56	8.88	8.82	8.05	7.55	7.14	6.80	7.10	7.94	3.68	3.77	3.51	2.94	3.12	2.43	2.25
Cr (HM)	Mg (tonne)	14.88	13.44	13.74	14.71	15.41	19.56	15.09	17.12	12.35	10.62	10.39	11.08	9.01	8.63	7.53	7.61
Cu (HM)	Mg (tonne)	17.38	14.37	13.91	12.41	12.85	11.54	10.11	9.83	9.40	10.14	10.42	8.99	7.07	9.31	9.66	12.38
Pb (HM)	Mg (tonne)	146.31	128.83	127.12	92.72	83.75	82.06	76.15	77.63	65.23	39.74	49.85	48.66	39.40	40.17	41.32	33.33
Hg (HM)	Mg (tonne)	7.49	6.63	6.17	3.85	3.79	3.91	3.39	2.90	2.67	2.38	2.42	2.78	2.24	2.04	2.00	1.75
Ni (HM)	Mg (tonne)	80.67	71.43	61.36	59.57	59.41	69.22	66.65	56.55	46.33	54.98	51.95	44.75	37.45	28.46	21.11	17.57
Zn (HM)	Mg (tonne)	146.89	130.20	121.96	72.25	69.27	67.72	57.99	64.48	60.85	58.19	65.04	65.12	56.16	59.85	59.86	62.93
PCDD+PCDF	g	323.05	246.38	240.48	142.19	218.98	107.57	40.69	40.64	28.83	23.16	32.35	30.51	18.95	24.37	23.53	23.20

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Energy - refining. gasification and liquefaction. coke																	
SO_x	Gg (1000 tonnes)	91.66	90.98	86.14	78.46	72.98	60.87	59.94	54.13	50.72	40.92	31.11	27.26	19.82	16.91	17.60	14.37
NO_x	Gg (1000 tonnes)	28.82	28.87	26.83	27.12	27.74	25.38	26.24	26.08	25.68	21.82	17.55	16.04	13.64	12.51	11.15	10.85
$PM_{2.5}$	Gg (1000 tonnes)	2.27	2.34	2.12	2.05	1.96	1.70	1.50	1.28	1.11	1.02	0.79	0.67	0.58	0.49	0.45	0.40
NMVOC	Gg (1000 tonnes)	1.62	1.59	1.51	1.37	1.40	1.68	1.38	1.59	1.35	1.37	1.08	1.01	0.99	0.97	0.95	0.93
Cd (HM)	Mg (tonne)	0.13	0.13	0.13	0.12	0.12	0.11	0.10	0.10	0.10	0.09	0.07	0.06	0.04	0.04	0.03	0.03
As (HM)	Mg (tonne)	0.43	0.45	0.43	0.41	0.41	0.36	0.33	0.33	0.33	0.29	0.22	0.18	0.13	0.10	0.09	0.08
Cr (HM)	Mg (tonne)	1.50	1.50	1.42	1.40	1.41	1.31	1.31	1.29	1.27	1.21	1.03	0.98	0.79	0.71	0.68	0.63
Cu (HM)	Mg (tonne)	0.95	0.97	0.91	0.89	0.90	0.82	0.80	0.79	0.78	0.73	0.61	0.56	0.44	0.39	0.37	0.34
Pb (HM)	Mg (tonne)	0.96	1.00	0.96	0.92	0.92	0.82	0.76	0.77	0.76	0.68	0.54	0.46	0.33	0.28	0.25	0.22
Hg (HM)	Mg (tonne)	0.30	0.30	0.28	0.27	0.27	0.24	0.21	0.20	0.20	0.18	0.15	0.13	0.10	0.09	0.09	0.08
Ni (HM)	Mg (tonne)	58.22	62.28	59.68	56.45	56.26	48.68	43.89	45.11	44.72	38.60	28.79	22.15	14.17	10.37	8.60	7.12
Zn (HM)	Mg (tonne)	4.12	4.15	3.92	3.86	3.87	3.59	3.56	3.50	3.45	3.28	2.77	2.62	2.08	1.87	1.78	1.65
PCDD+PCDF	g	0.36	0.37	0.34	0.34	0.34	0.30	0.28	0.27	0.27	0.24	0.20	0.18	0.14	0.13	0.12	0.12
Metals: iron and steel																	
SO_x	Gg (1000 tonnes)	1.23	1.17	1.19	1.17	1.24	1.14	1.56	0.95	0.91	0.72	1.02	0.96	1.33	1.13	1.22	1.02
NO_x	Gg (1000 tonnes)	2.15	2.05	2.02	1.99	2.08	1.91	2.00	1.90	1.92	1.19	1.20	0.76	0.85	1.29	0.94	0.91
$PM_{2.5}$	Gg (1000 tonnes)	4.80	4.17	3.79	3.03	3.04	2.73	2.81	2.47	2.42	2.14	2.72	2.31	1.91	2.32	2.25	2.32
NMVOC	Gg (1000 tonnes)	1.87	1.71	1.72	1.64	1.66	1.53	1.55	1.59	1.50	1.19	1.40	1.35	1.26	1.39	1.42	1.26
Cd (HM)	Mg (tonne)	5.02	4.82	4.59	2.84	0.94	0.61	0.46	0.30	0.31	0.16	0.15	0.13	0.17	0.24	0.24	0.12
As (HM)	Mg (tonne)	1.03	0.91	0.81	0.39	0.37	0.31	0.75	0.41	0.38	0.19	0.17	0.11	0.11	0.09	0.10	0.08
Cr (HM)	Mg (tonne)	70.67	44.81	19.94	10.78	11.09	10.52	14.71	4.45	7.40	3.03	4.48	2.82	3.55	3.21	2.85	2.73
Cu (HM)	Mg (tonne)	5.39	4.63	8.72	1.91	4.93	4.46	9.32	2.59	2.47	1.43	1.35	2.52	2.31	1.89	2.13	1.53
Pb (HM)	Mg (tonne)	37.05	35.75	33.89	18.35	12.96	11.25	13.51	9.00	8.35	6.01	6.23	4.18	10.61	5.28	3.29	3.47
Hg (HM)	Mg (tonne)	0.35	0.33	0.31	0.30	0.30	0.27	0.45	0.23	0.26	0.21	0.35	0.23	0.29	0.29	0.56	0.30
Ni (HM)	Mg (tonne)	17.33	16.59	15.64	11.51	11.81	10.81	13.64	1.61	2.61	1.37	0.96	1.41	3.00	2.39	2.94	3.15
Zn (HM)	Mg (tonne)	428.98	327.35	233.03	141.11	95.44	90.35	140.82	82.97	73.65	37.16	38.41	48.48	62.25	37.56	27.68	29.51
PCDD+PCDF	g	11.60	9.80	13.60	13.43	13.85	12.63	13.21	12.92	11.14	2.89	3.54	2.70	1.53	0.87	0.80	0.85

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Metals: Non-ferrous																	
SO_x	Gg (1000 tonnes)	6.84	6.73	12.11	5.44	6.04	6.31	5.78	5.54	4.65	3.75	3.27	3.44	3.48	3.51	4.70	5.56
$PM_{2.5}$	Gg (1000 tonnes)	0.49	0.48	0.47	0.37	0.27	0.27	0.27	0.25	0.15	0.12	0.12	0.11	0.16	0.11	0.12	0.13
NMVOC	Gg (1000 tonnes)	0.17	0.16	0.14	0.11	0.11	0.12	0.08	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cd (HM)	Mg (tonne)	0.07	0.07	0.06	0.05	0.03	0.03	0.04	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02
As (HM)	Mg (tonne)	0.07	0.07	0.07	0.05	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cr (HM)	Mg (tonne)	0.21	0.19	0.18	0.15	0.10	0.10	0.10	0.09	0.06	0.05	0.06	0.06	0.07	0.05	0.06	0.06
Cu (HM)	Mg (tonne)	0.12	0.11	0.10	0.09	0.05	0.05	0.06	0.05	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.04
Pb (HM)	Mg (tonne)	0.33	0.27	0.62	0.58	0.48	0.13	0.15	0.12	0.08	0.07	0.11	0.11	0.12	0.10	0.11	0.11
Hg (HM)	Mg (tonne)	0.20	0.14	0.14	0.13	0.06	0.06	0.07	0.06	0.04	0.04	0.07	0.07	0.08	0.06	0.07	0.07
Ni (HM)	Mg (tonne)	0.94	0.59	0.60	0.61	0.70	0.71	0.59	0.57	0.52	0.46	0.62	0.15	0.95	0.79	0.87	0.93
Zn (HM)	Mg (tonne)	1.52	1.13	1.09	1.02	0.51	0.47	0.58	0.47	0.34	0.28	0.56	0.54	0.59	0.47	0.54	0.56
Chemical																	
SO_x	Gg (1000 tonnes)	14.70	14.22	12.08	10.84	9.13	7.63	7.32	6.79	6.28	4.67	4.52	4.70	3.89	3.97	4.04	3.31
NO_x	Gg (1000 tonnes)	11.15	10.11	9.06	10.09	10.08	9.39	8.12	8.84	7.17	5.67	5.22	5.05	5.07	5.13	5.30	5.17
$PM_{2.5}$	Gg (1000 tonnes)	0.45	0.42	0.38	0.39	0.43	0.38	0.43	0.34	0.33	0.22	0.29	0.25	0.24	0.25	0.26	0.24
NMVOC	Gg (1000 tonnes)	43.87	44.83	42.54	41.43	40.39	36.50	30.21	23.92	23.52	18.71	18.76	15.57	15.44	13.10	13.35	16.77
NH_3	Gg (1000 tonnes)	5.90	5.53	5.01	5.40	5.08	4.95	3.60	4.00	3.95	2.98	2.98	3.19	3.11	3.12	3.10	3.90
Cd (HM)	Mg (tonne)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Hg (HM)	Mg (tonne)	1.01	0.83	0.75	0.86	0.73	0.82	0.62	0.59	0.58	0.53	0.48	0.54	0.47	0.38	0.36	0.35
PCDD+PCDF	g	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.04

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Waste: hazardous																	
SO_x	Gg (1000 tonnes)	0.44	0.38	0.32	0.28	0.24	0.29	0.17	0.18	0.20	0.20	0.21	0.18	0.19	0.14	0.20	0.17
NO_x	Gg (1000 tonnes)	2.01	2.07	2.16	2.14	1.91	2.23	1.97	1.68	1.74	1.47	1.67	1.60	1.61	1.23	1.49	1.29
$PM_{2.5}$	Gg (1000 tonnes)	0.19	0.14	0.10	0.05	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.01	0.01	0.01
NMVOC	Gg (1000 tonnes)	0.08	0.07	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.05	0.04	0.03	0.04	0.03
Cd (HM)	Mg (tonne)	0.58	0.47	0.37	0.26	0.17	0.16	0.16	0.13	0.15	0.15	0.13	0.13	0.13	0.09	0.11	0.10
As (HM)	Mg (tonne)	0.14	0.13	0.12	0.10	0.08	0.07	0.10	0.06	0.07	0.12	0.10	0.09	0.05	0.02	0.03	0.03
Cr (HM)	Mg (tonne)	1.05	0.98	0.92	0.84	0.76	0.45	0.50	0.41	0.35	0.25	0.38	0.18	0.14	0.10	0.12	0.09
Cu (HM)	Mg (tonne)	1.56	1.26	0.97	0.65	0.37	0.27	0.32	0.16	0.14	0.13	0.18	0.12	0.14	0.17	0.17	0.16
Pb (HM)	Mg (tonne)	4.07	3.59	3.11	2.79	2.55	2.26	2.31	2.10	2.13	2.26	2.20	2.33	2.34	1.58	2.01	2.00
Hg (HM)	Mg (tonne)	1.02	0.91	0.82	0.66	0.56	0.42	0.94	0.20	0.25	0.24	0.40	0.25	0.27	0.23	0.24	0.26
Ni (HM)	Mg (tonne)	0.70	0.59	0.48	0.32	0.19	0.19	0.17	0.22	0.17	0.12	0.15	0.10	0.16	0.09	0.12	0.16
Zn (HM)	Mg (tonne)	2.50	2.33	2.14	2.03	1.90	2.18	1.98	1.80	1.93	2.10	2.35	2.20	2.28	1.62	2.87	2.09
PCDD+PCDF	g	10.01	7.65	5.40	3.23	2.53	1.85	1.16	0.44	0.42	0.39	0.42	0.50	0.60	0.34	0.59	0.51
Waste: non-hazardous																	
SO_x	Gg (1000 tonnes)	0.56	0.41	0.29	0.25	0.22	0.20	0.17	0.18	0.18	0.17	0.15	0.14	0.14	0.14	0.14	0.14
NO_x	Gg (1000 tonnes)	2.30	1.81	1.32	1.25	1.18	1.03	0.68	0.64	0.63	0.52	0.42	0.42	0.39	0.39	0.39	0.38
$PM_{2.5}$	Gg (1000 tonnes)	0.28	0.19	0.12	0.10	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.09
NMVOC	Gg (1000 tonnes)	10.15	10.06	9.93	10.14	10.15	9.97	9.93	10.20	10.06	9.63	9.22	9.05	8.09	7.52	7.18	6.89
NH_3	Gg (1000 tonnes)	1.91	2.08	2.28	2.43	2.52	2.63	2.92	2.95	3.03	3.31	3.76	3.98	4.21	4.47	4.73	4.99
Cd (HM)	Mg (tonne)	0.52	0.28	0.19	0.11	0.05	0.04	0.02	0.02	0.01	0.01	0.01	0.0042	0.0040	0.0036	0.0037	0.0030
As (HM)	Mg (tonne)	0.06	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.0038
Cr (HM)	Mg (tonne)	0.22	0.13	0.11	0.10	0.09	0.13	0.10	0.05	0.06	0.03	0.03	0.03	0.01	0.02	0.01	0.01
Cu (HM)	Mg (tonne)	1.69	0.81	0.59	0.33	0.09	0.10	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02
Pb (HM)	Mg (tonne)	9.30	4.46	3.17	1.67	0.36	0.27	0.11	0.09	0.09	0.06	0.04	0.04	0.04	0.03	0.03	0.03
Hg (HM)	Mg (tonne)	0.55	0.34	0.25	0.19	0.14	0.15	0.13	0.12	0.12	0.12	0.12	0.13	0.13	0.14	0.14	0.14
Ni (HM)	Mg (tonne)	0.34	0.25	0.14	0.14	0.13	0.07	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01
Zn (HM)	Mg (tonne)	6.97	4.22	2.63	1.53	0.55	0.57	0.26	0.31	0.35	0.25	0.24	0.22	0.18	0.17	0.14	0.14
PCDD+PCDF	g	96.78	45.60	26.11	5.53	9.43	3.56	0.22	0.15	0.14	0.12	0.11	0.12	0.12	0.13	0.13	0.14

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Other activities																	
SO_x	Gg (1000 tonnes)	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.0015	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015
NO_x	Gg (1000 tonnes)	2.50	2.30	2.10	1.90	1.72	1.53	1.39	1.26	1.12	1.03	1.00	0.97	0.93	0.91	0.89	0.88
$PM_{2.5}$	Gg (1000 tonnes)	16.63	16.79	16.81	16.79	16.67	16.74	16.77	16.92	16.99	17.12	17.21	17.27	17.36	17.43	17.45	17.54
NMVOC	Gg (1000 tonnes)	475.01	456.28	426.32	392.03	373.55	364.59	346.60	305.69	270.71	230.73	245.29	257.26	235.58	231.35	228.20	205.95
NH_3	Gg (1000 tonnes)	111.41	109.69	108.84	107.83	104.73	102.37	99.96	100.80	100.94	100.54	101.00	100.19	99.58	100.78	100.50	100.69
Cd (HM)	Mg (tonne)	0.47	0.47	0.45	0.44	0.42	0.40	0.39	0.39	0.37	0.37	0.37	0.37	0.37	0.38	0.38	0.39
As (HM)	Mg (tonne)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr (HM)	Mg (tonne)	0.86	0.86	0.84	0.83	0.80	0.79	0.78	0.78	0.76	0.76	0.78	0.80	0.81	0.82	0.84	0.86
Cu (HM)	Mg (tonne)	1.20	1.17	1.12	1.07	1.01	0.96	0.92	0.89	0.84	0.82	0.82	0.81	0.80	0.81	0.82	0.83
Pb (HM)	Mg (tonne)	4.51	3.82	3.65	3.26	3.11	2.80	2.58	2.36	2.18	2.22	2.12	2.18	2.07	2.11	2.16	2.28
Hg (HM)	Mg (tonne)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni (HM)	Mg (tonne)	0.47	0.47	0.45	0.44	0.42	0.40	0.39	0.39	0.37	0.37	0.37	0.37	0.37	0.38	0.38	0.39
Zn (HM)	Mg (tonne)	94.68	93.18	90.33	87.44	83.81	80.61	78.72	77.11	74.30	73.33	74.01	74.51	74.45	75.54	76.92	78.47
PCDD+PCDF	g	1.13	1.19	1.18	1.20	1.25	1.32	1.34	1.44	1.37	1.42	1.41	1.42	1.43	1.38	1.34	1.29

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