Industrial emissions policy country profile – Sweden

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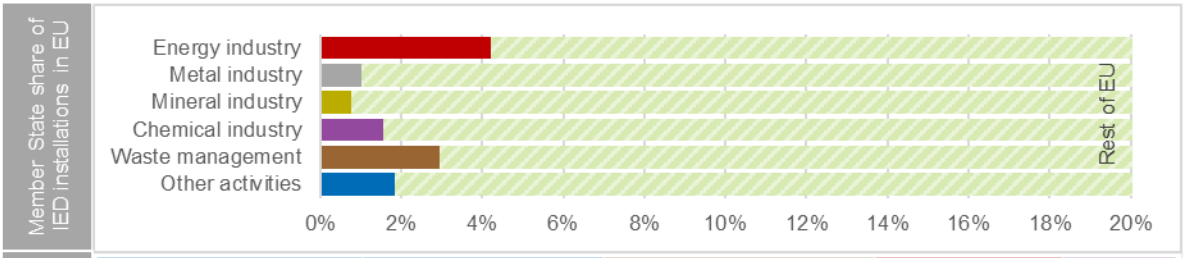
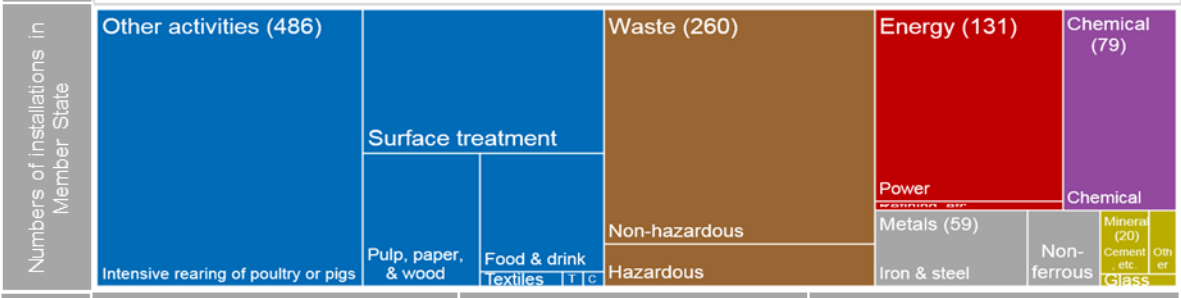
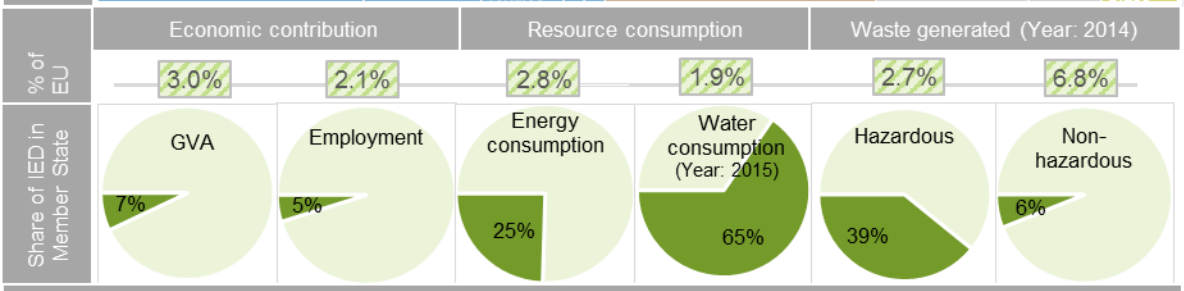
Abbreviations and units

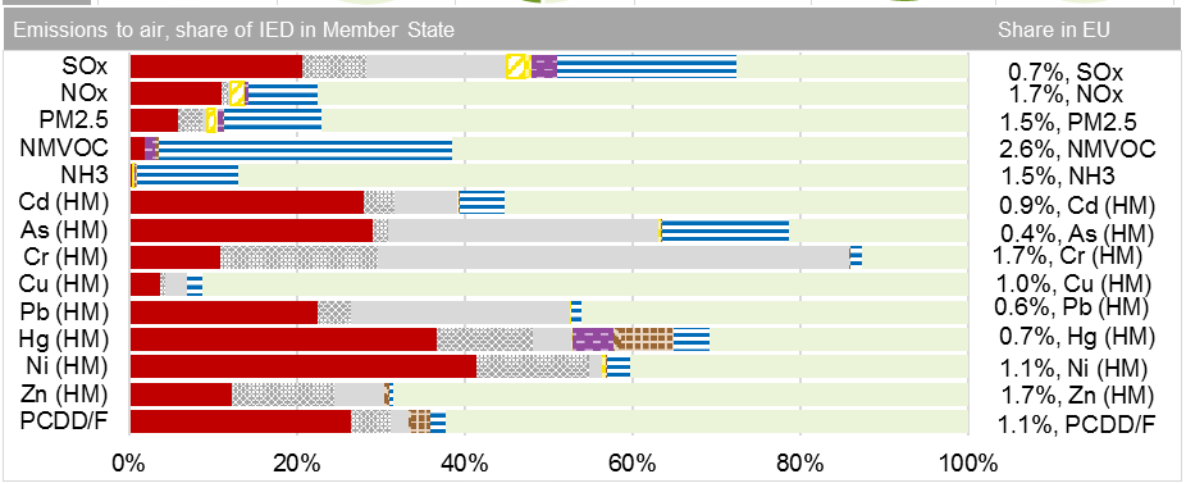
AOX	Adsorbable Organic Halides
As	Arsenic
Cd	Cadmium
CLRTAP	Convention on Long-range Transboundary Air Pollution
CO_2	Carbon Dioxide
Cr	Chromium
Cu	Copper
DG	Directorate-General
EEA	European Environment Agency
E-PRTR	European Pollutant Release and Transfer Register
EU	European Union
EUR	Euros
GVA	Gross 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

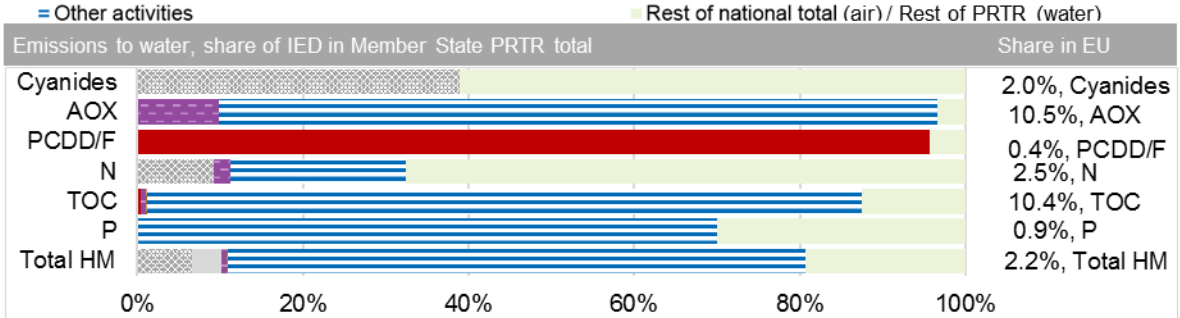
Summary of industrial statistics for Sweden











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 Sweden.

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 4) 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 Sweden and how they have been addressed.

The profile also identifies the impact of industrial sectors or activities in Sweden, within the scope of the IED policy, in each Member State 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

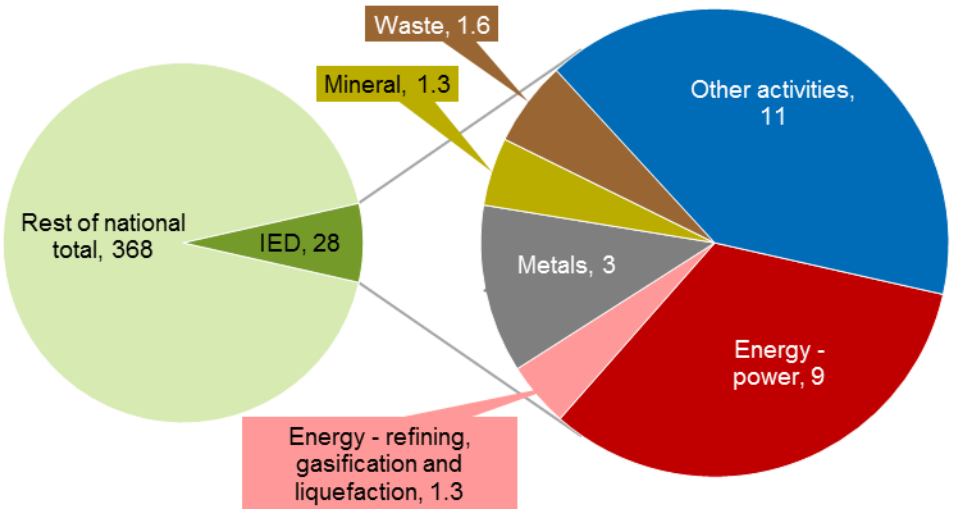
Gross value added (GVA) and employment are the indicators used to denote the economic contribution of IED activities. Combined, industrial sectors contribute a relatively small share (7%) of the total GVA across all economic activities in Sweden (Figure 1). Of this share, 'other activities' and the energy – power sector account for the largest contribution. By comparison, the energy – refining, gasification and liquefaction[1], metal, mineral and waste management sectors are smaller contributors to the Swedish GVA. No data is reported to Eurostat for the chemical sector for Sweden for confidentiality reasons.

The GVA reported in Figure 1 for 'other activities' relates to industrial sectors for pulp, paper, and wood-based products (€6.1 billion in 2015), food and drink products (€4.7 billion), and textiles and tanning (€0.45 billion). The comparative significance of pulp, paper and wood-based products to the GVA is reflected by the number of permitted IED installations (with 54 IED permitted installations in 2015 of the reported 486 within 'other activities').

Although not included in the economic data presented here (owing to data limitations set out in the accompanying methodology report), the intensive rearing of poultry or pigs is a significant industry in terms of the number of IED permitted installations in Sweden, comprising 26% of total IED installations in 2015 (Figure 5). Despite the relatively large number of permitted installations (namely pigs), as a proportion of farm holdings, intensive rearing of poultry or pigs accounts for 6.8% of the national total (based on the average monetary value of the agricultural output); and expressed as the number of holdings per 1,000 ha utilised agricultural area, 0.09% of agricultural activity in Sweden is regulated by the IED (CCB, 2014). Thus, the economic significance of intensive rearing of poultry or pigs to the agricultural sector as a whole may not be that significant. Nonetheless, this limited GVA data for sectors within 'other activities' remains a data gap for Sweden.

'Other activities' employ more people than other industrial sectors (Figure 2). The energy – power, metal and chemical sector employ similar numbers of people; thus, although no GVA data is available for the chemical sector it is understood to be a significant contributor to the Swedish economy.

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

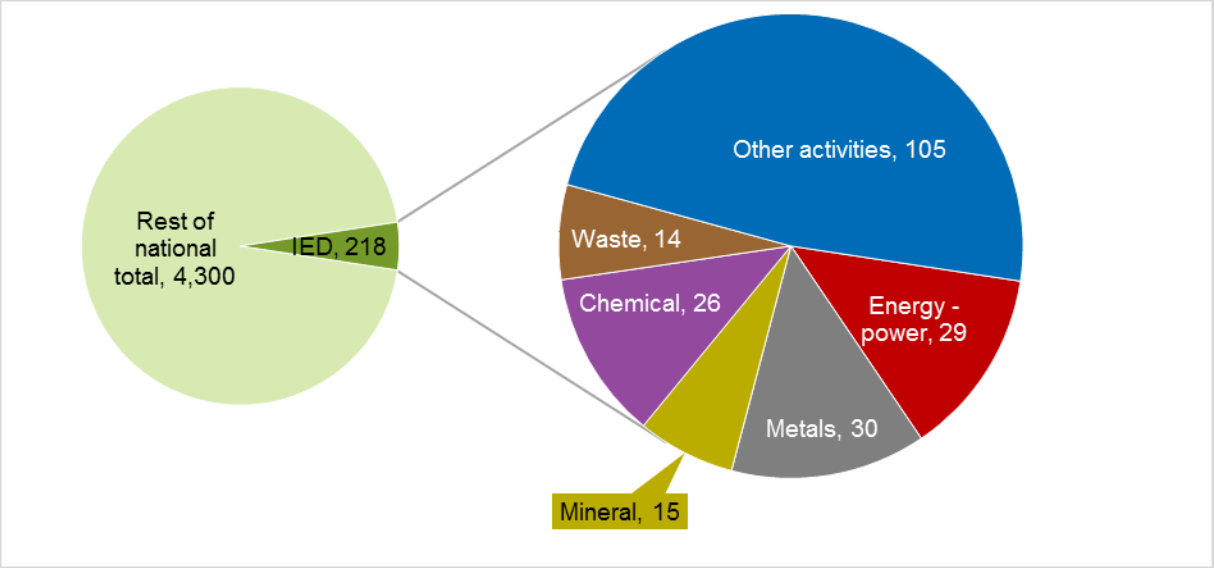


Note: Rest of national total means all NACE activity minus industrial sectors shown here. No data is reported for the chemical sector for confidentiality reasons. Estimate values are used for all industrial sectors in the chart above except the energy -power sector for which data was reported.

Source: Eurostat (2017a)

[1] Energy – refining, gasification and liquefaction is grouped in these profiles with coke; however as no permitted installations were reported for this IED activity, the sector is referred to as energy – refining, gasification and liquefaction for the Swedish profile.

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



Note: Rest of national relates to all NACE activity minus industrial sectors shown here. No data reported for energy – refining, gasification and liquefaction owing to low reliability of data for 2015.

Source: Eurostat (2017b)

The main area of economic growth in Sweden, as measured by growth in GVA is the energy - power sector (Figure 3). The GVA for this sector almost doubled in the period 2000 to 2015 (from €4.7 billion to €9.2 billion). The energy – refining, gasification and liquefaction sector has also grown at a similar rate in this time (although the total value is much smaller in comparison to the energy – power sector).

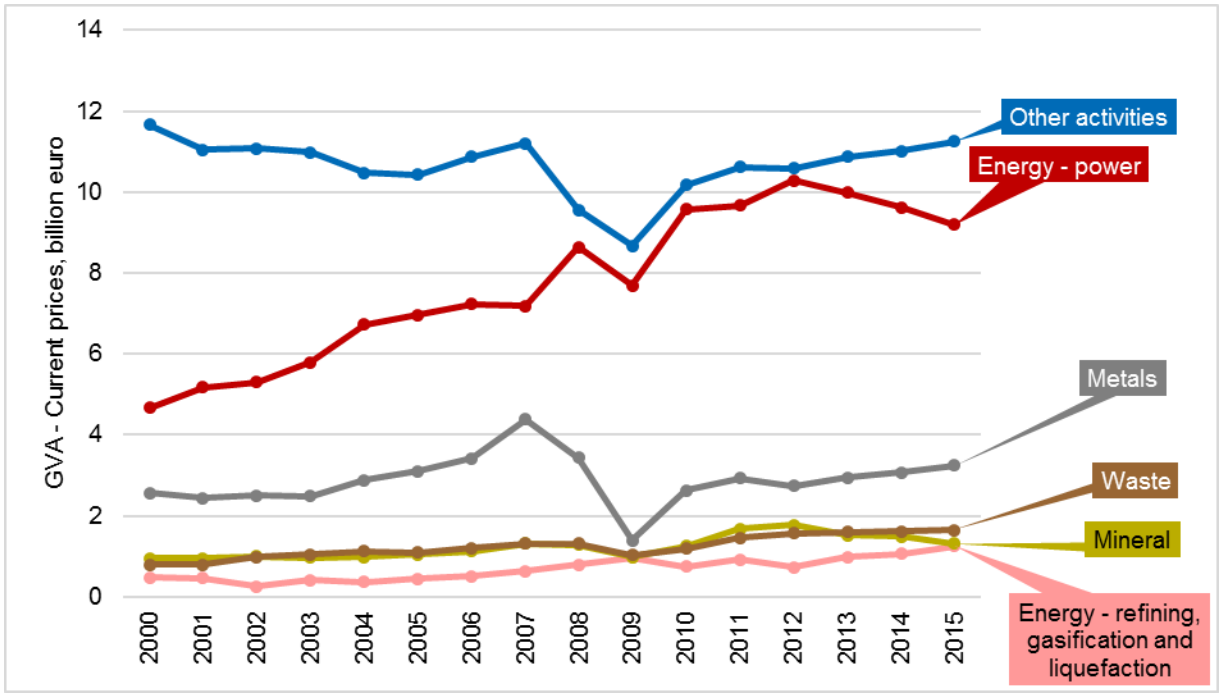
All industrial sectors experienced a dip in GVA in the year 2009 which may be as a result of the economic crisis.

The largest individual industrial sector contributing to GVA, pulp, paper and wood-based products, has decreased over time since 2000 with the lowest GVA reported in 2009 in line with the broader industry trends. Although the GVA has increased since 2009 for this sector, in 2015 it was still below 2000 levels (€6.1 billion in 2015 compared to €7.1 billion in 2000).

Taken together with the GVA data, it can be observed that employment (Figure 4) also fell after the economic crisis, although not to the same extent as the trends identified for GVA. The greatest decline in this time (as a ratio of overall employment) is apparent for manufacturing pulp, paper and wood-based products. Between 2008 and 2015, Figure 4 shows that the only sectors to report growth in employment include the energy – power, chemical and waste management sectors; and that this growth is marginal.

Limited data is reported for energy – refining, gasification and liquefaction. The trend indicates constant employment by the sector despite the fast rate of GVA growth.

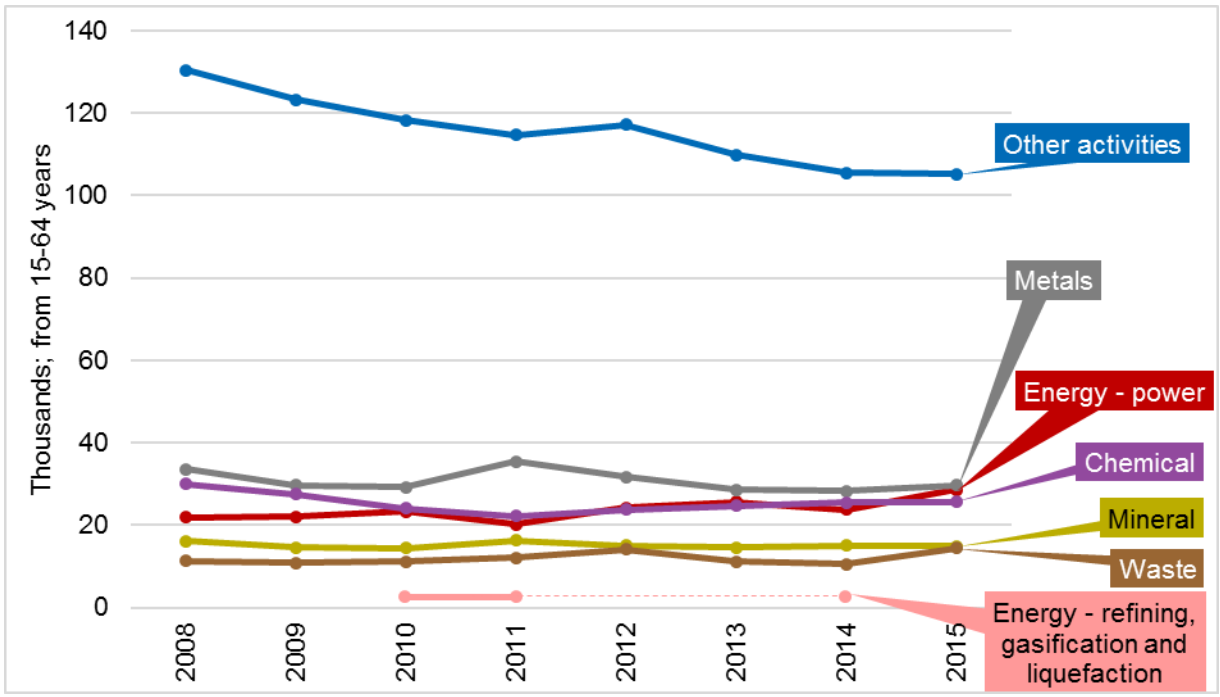
Figure 3: Gross value added of industrial sectors (2000-2015)



Note: No data is reported for the chemical sector owing to reasons of confidentiality. Estimate values are used for all industrial sectors in the year 2015 except the energy -power sector for which data was reported.

Source: Eurostat (2017a)

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



Note: Estimate values are used for sectors within 'other activities' for the years 2009 and 2012 as no data was reported. Energy – refining, gasification and liquefaction data is reported for 2010, 2011 and 2014 only owing to low reliability in other years; the dashed line shows a hypothetical trend as insufficient data to interpolate.

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 GVA data for Sweden

Missing data	Description	Conclusion and actions taken
No data for chemical sector	Data is marked as confidential by Eurostat.	No action
Data gaps	No data reported for all sectors except energy – power for the year 2015	Data extrapolated

Table 3: Gaps in employment data for Sweden

Missing data	Description	Conclusion and actions taken
Limited time series for energy – refining, gasification and liquefaction.	Energy – refining, gasification and liquefaction data is reported for 2010, 2011 and 2014 only owing to low reliability. Insufficient data to interpolate. Hypothetical trend identified in the chart.	No action
Data gaps	Missing data for 'other activities' in 2009 and 'other activities' in 2012	Interpolation undertaken

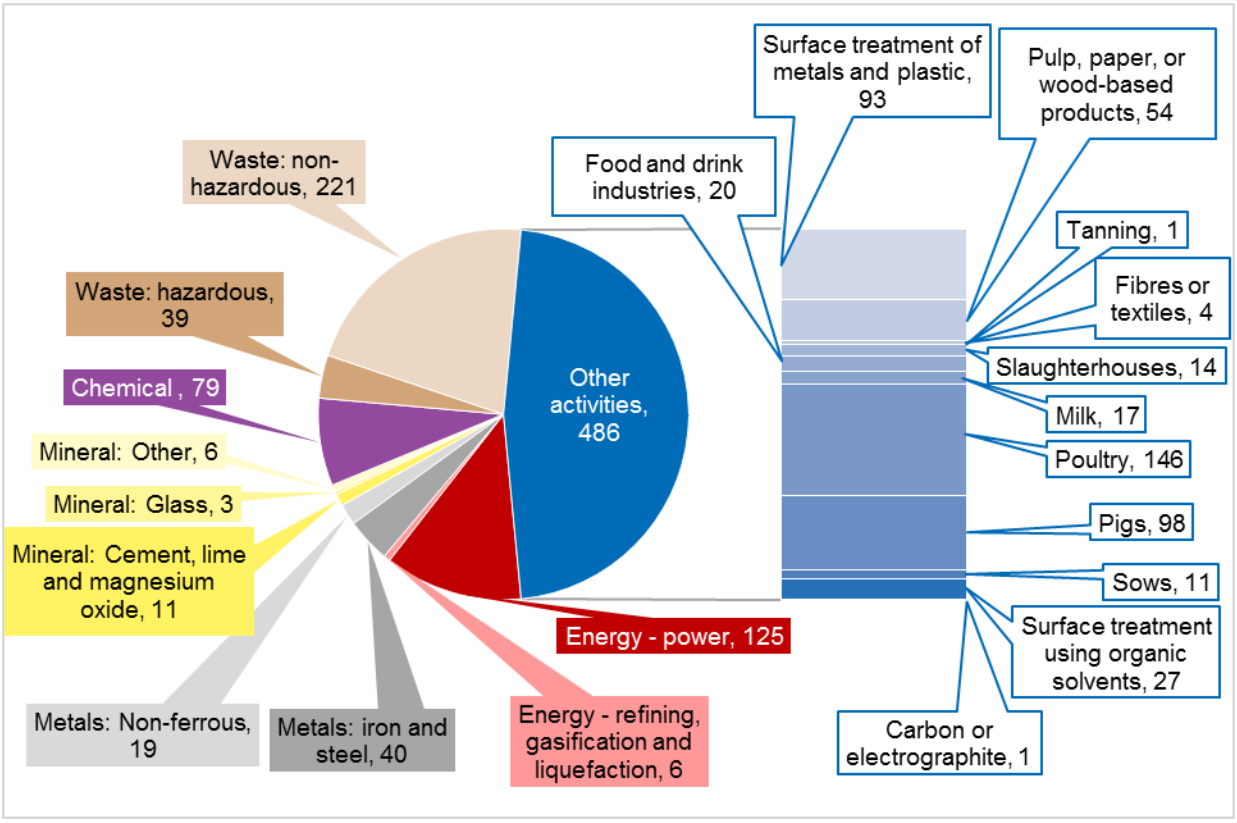
2.2 Number of IED installations

The most significant industrial sector in Sweden, according to the reported number of permitted IED installations, is intensive rearing of poultry or pigs, comprising 26% of total IED installations in 2015 (Figure 5, Table 4). This is followed by the waste management sector (25%).

Between 2011 and 2015, there was no change reported in the number of permitted IED installations in Sweden (comparing IPPCD installations to IED installations in this timeframe).

According to this same dataset, most IED activities occur in Sweden, except for the production of coke (IED activity 1.3), the production of plant protection products (IED activity 4.5), and temporary and underground storage of hazardous waste (IED activities 5.5 and 5.6).

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

Table 4: Number of installations in 2011 and 2015 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*	**125**	**125**	**0**
Energy: refining, gasification and liquefaction		**6**	**6**	**0**
	1.2 Refining	*5*	*5*	
	1.4 Gasification or liquefaction	*1*	*1*	
Metals: iron and steel		**40**	**40**	**0**
	2.1 Metal ore	*3*	*3*	
	2.2 Iron or steel	*12*	*12*	
	2.3 Processing ferrous metals	*11*	*11*	
	2.4 Ferrous metals foundries	*14*	*14*	
Metal: non-ferrous	*2.5 Processing of non-ferrous metals*	**19**	**19**	**0**
Mineral: Cement, lime and magnesium oxide	*3.1 Cement, lime and magnesium oxide*	**11**	**11**	**0**
Metal: glass	*3.3 Glass*	**3**	**3**	**0**
Mineral: Other		**6**	**6**	**0**
	3.4 Mineral fibres	*2*	*2*	
	3.5 Ceramic	*4*	*4*	
Chemical		**79**	**79**	**0**
	4.1 Organic chemicals	*49*	*49*	
	4.2 Inorganic chemicals	*15*	*15*	
	4.3 Phosphorus-, nitrogen- or potassium-based fertilisers	*1*	*1*	
	4.5 Pharmaceutical products	*12*	*12*	
	4.6 Explosives	*2*	*2*	
Waste: hazardous	*5.1 Disposal / recovery*	**39**	**39**	**0**
Waste: non-hazardous		**221**	**221**	**0**
	5.2 Co-/ incineration of hazardous and non-hazardous waste	*26*	*26*	
	5.3 Other non-hazardous	*10*	*10*	
	5.4 Landfills	*175*	*175*	
	6.5 Disposal of animal carcases	*10*	*10*	
Other activities		**486**	**486**	**0**
	6.1 Pulp, paper, or wood-based products	*54*	*54*	
	6.2 Textiles	*4*	*4*	
	6.3 Tanning	*1*	*1*	
	6.7 Surface treatment using organic solvents	*27*	*27*	
	2.6 Surface treatment of metals and plastic	*93*	*93*	
	6.4 (a) Slaughterhouses	*14*	*14*	
	6.4 (b) Food and drink	*20*	*20*	
	6.4 (c) Milk	*17*	*17*	
	6.6 (a) Poultry	*146*	*146*	
	6.6 (b) Pigs	*98*	*98*	
	6.6 (c) Sows	*11*	*11*	
	6.8 Production of carbon	*1*	*1*	
Total		**1,035**	**1,035**	**0**

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. IED activities 1.3, 4.5, 5.5 and 5.6 are removed from the table as no permitted installations reported for them.

Source: IPPCD and 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.

No national specific limitations were identified for this dataset.

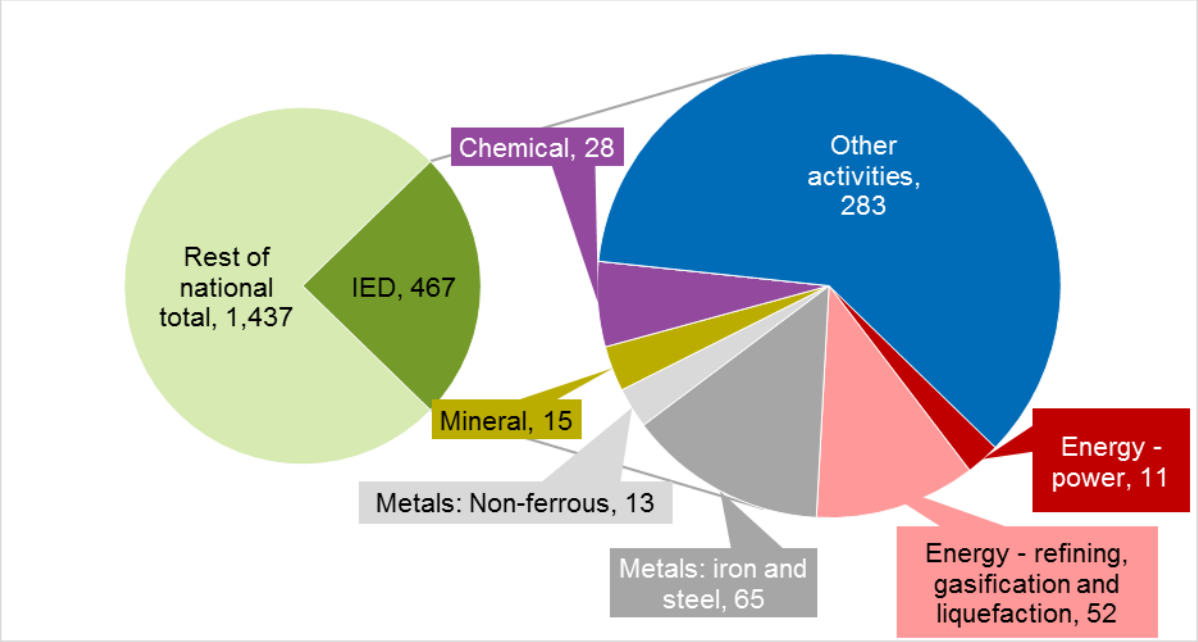
3 Resource use in industrial sectors

3.1 Energy consumption

In 2015, energy consumption in the industrial sectors in Sweden accounts for a quarter of total energy consumption. Consumption for 'other activities' represents the largest share of energy compared to other industrial sectors (Figure 6). This consumption is mainly for pulp, paper and wood-based products (267 PJ in 2015). As discussed previously in section 2.1, the sector also represents a leading industry with respect to national GVA or employment and the number of permitted IED installations.

No data was reported for the waste management industrial sector (Table 5). This is considered a significant data gap for Sweden in light of the large number of permitted IED installations for this sector. Similarly, the lack of energy consumption data for the intensive rearing of poultry or pigs within 'other activities' is also a particular data gap in light of the large number of IED installations permitted for this sector.

Figure 6: Energy consumption by industrial sector in 2015 (PJ)



Note: Rest of national total relates to gross inland consumption minus industrial sectors shown here. No data for the waste management industrial sector.

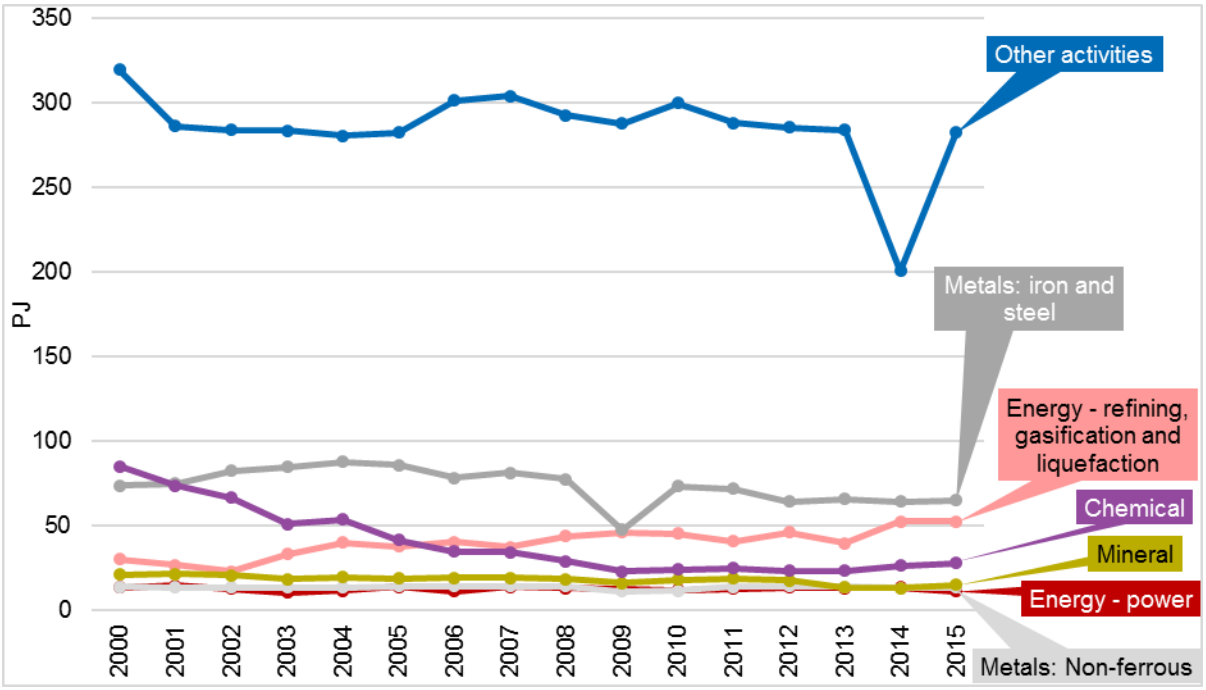
Source: Eurostat (2017c)

The time series in Figure 7 shows no real correlation between energy consumption across industrial sectors.

The decline in energy consumed by the iron and steel sector in 2009 is accompanied by a decline in the GVA, which together suggest that production may have fallen in this year owing to the economic crisis. While the energy consumed by the chemical sector also reached its lowest point in 2009, the constant downward trend since 2000 suggests this is owing to a broader trend than the economic crisis.

With the exception of the sudden fluctuation reported for 'other activities' in 2014, the energy consumed by other sectors is relatively stable over the complete time series. The fluctuation in energy consumed by 'other activities' is due to a reduction reported by the pulp and paper industry. The decline may be as a result of reduced production in 2014 although the trend is not reflected in the economic data considered in this profile, which together with the fact that energy consumption resumed 2013 levels again in 2015 suggests that the decline may be linked to reporting for the year 2014.

Figure 7: Energy consumption (in PJ) of industrial sectors (2000-2015)



Note: No data for the waste management sector.

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 5: Gaps in energy consumption data for Sweden

Missing data	Description	Conclusion and actions
No data for waste management	No data reported for all waste management	No action
No IED installations reported for coke	Separate energy balance indicators are reported for this IED activity (B_101312 - Coke Ovens)	Respective energy balance indicators removed from energy consumption for energy - refining, gasification and liquefaction. to avoid over reporting.

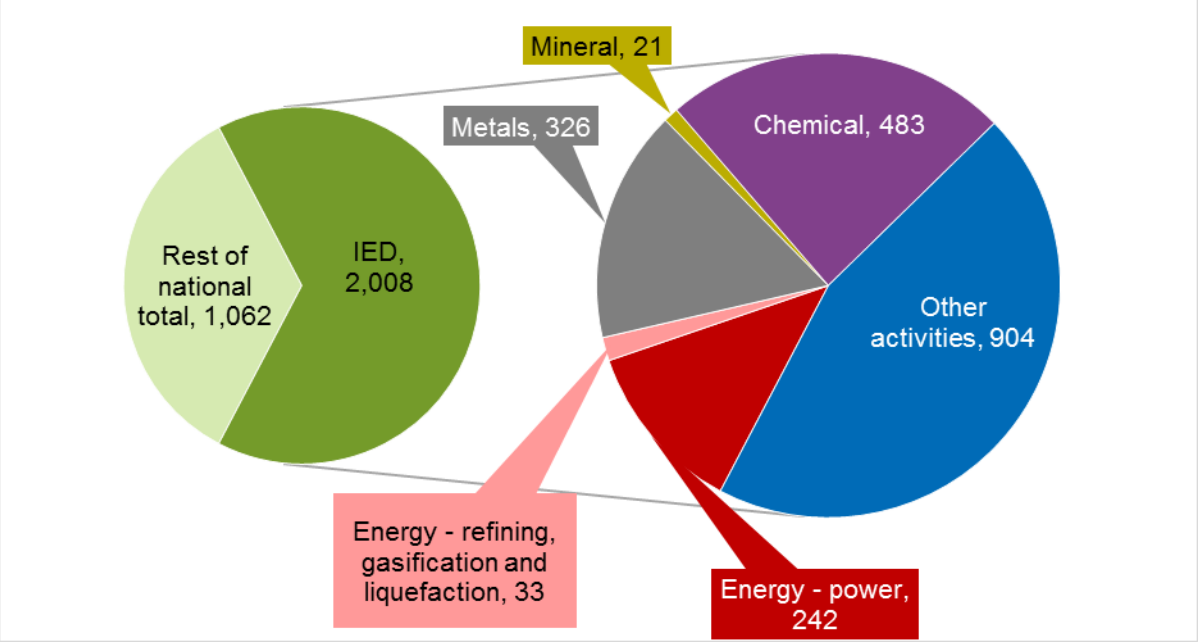
3.2 Water consumption

Data for water consumption by industrial sectors in Sweden is not reported to Eurostat. National data is available for the year 2015 but no time series is reported (Statistics Sweden, 2017a).

The reported data shows that the industrial sectors are relatively large consumers of water in Sweden (2,008 million m^3; accounting for 65% of total water consumed in 2015; Figure 8). Of this, 'other activities' is the largest consumer (using almost half the water consumed by total industry in 2015), followed by the chemical, metal and energy – power sectors.

Within 'other activities', the sector consuming the largest quantity of water is the production of wood-based products (accounting for 91% of the water consumed by 'other activities'). In light of the large number of permitted IED installations for intensive rearing of poultry or pigs, the fact that no water consumption data could be reported for this industrial sector is likely to be a significant gap.

Figure 8: Water consumption (million m^3) for selected industrial sectors (2015)



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

Sources: Statistics Sweden (2017a)

Limitations

As only partial data was reported to Eurostat for water consumption by industrial sector, national data was used instead. This dataset reports total water use (including use of sea water) using NACE classifications. The dataset is only available for the year 2015 and no time series is available to identify trends over time. Limitations have arisen from the mapping owing to combined reporting of NACE classifications for the mineral sector (combined with the rubber sector) and for the metal sector (combined with the production of metal products). No data is reported for the waste management sector.

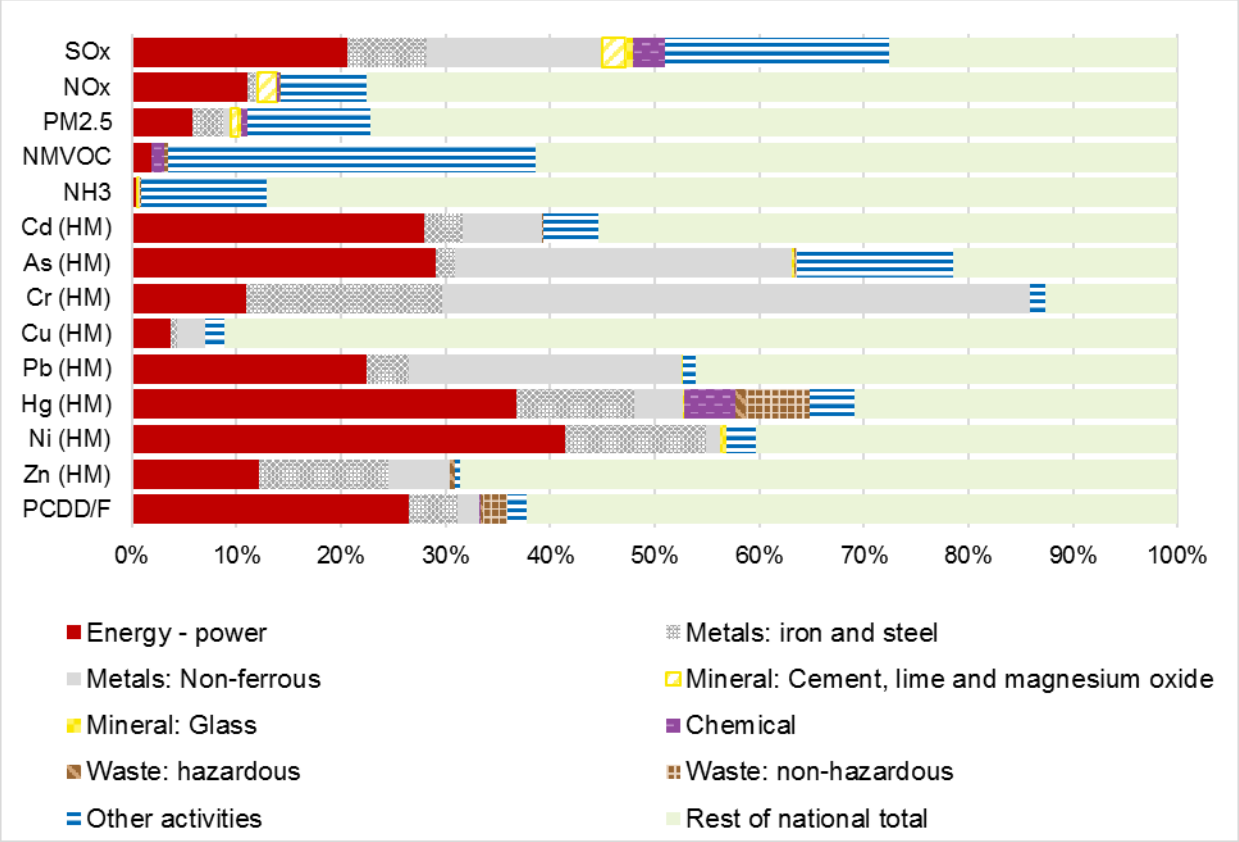
4 Emissions from industrial sectors

4.1 Emissions to air

Data were taken from inventories submitted by Member States under the CLRTAP (EEA, 2017a).

Among the industrial sectors, the energy – power sector is responsible for the greatest share of emissions to air for most pollutants included here (Figure 9 with the detail more clearly shown in Figure 10). For SOx and heavy metals the iron and steel and non-ferrous metal sectors are, together, a key source of emissions. For both NMVOC and NH_3, the main industrial sector source is 'other activities'. NMVOC emissions primarily can be attributed to surface treatments (IED activities 6.7 and 2.6) and NH_3 to intensive rearing of poultry or pigs (IED activity 6.6). The quantity of NMVOC emitted is much greater than NH_3 – as discussed below in relation to the sectoral analysis for 'other activities'.

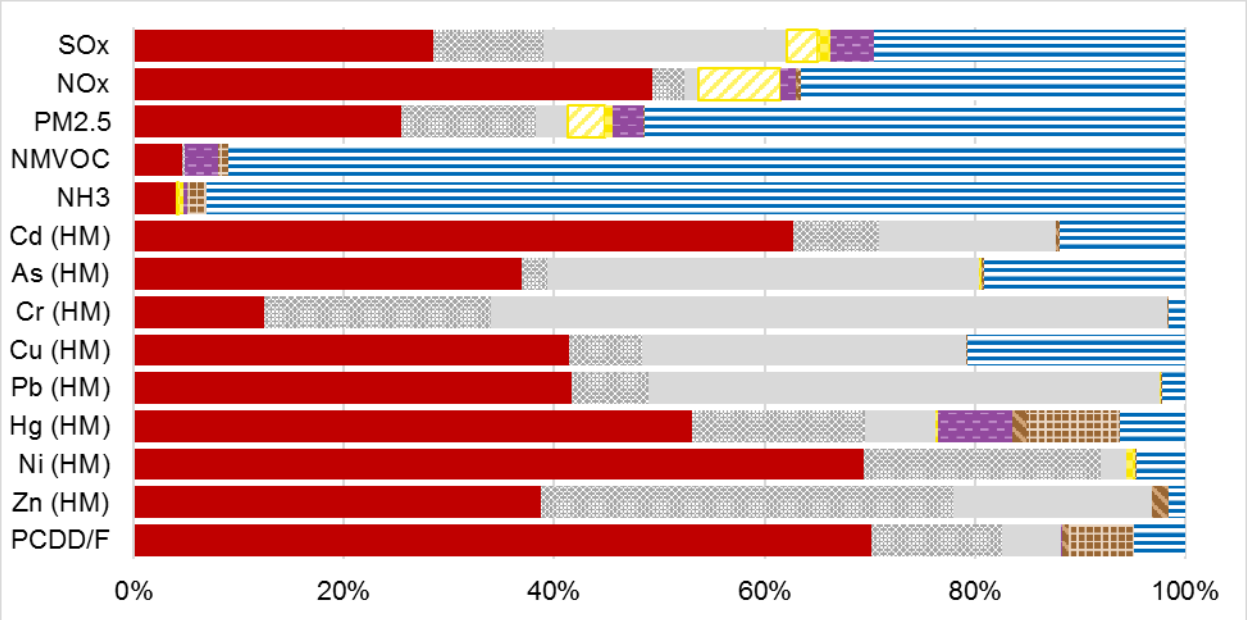
Figure 9: Emissions to air from industrial sectors and rest of national total (2015)



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.

Source: EEA (2017a)

Figure 10: Emissions to air from industrial sectors (2015)



Note: The key for this chart is shown in Figure 9.

Source: EEA (2017a)

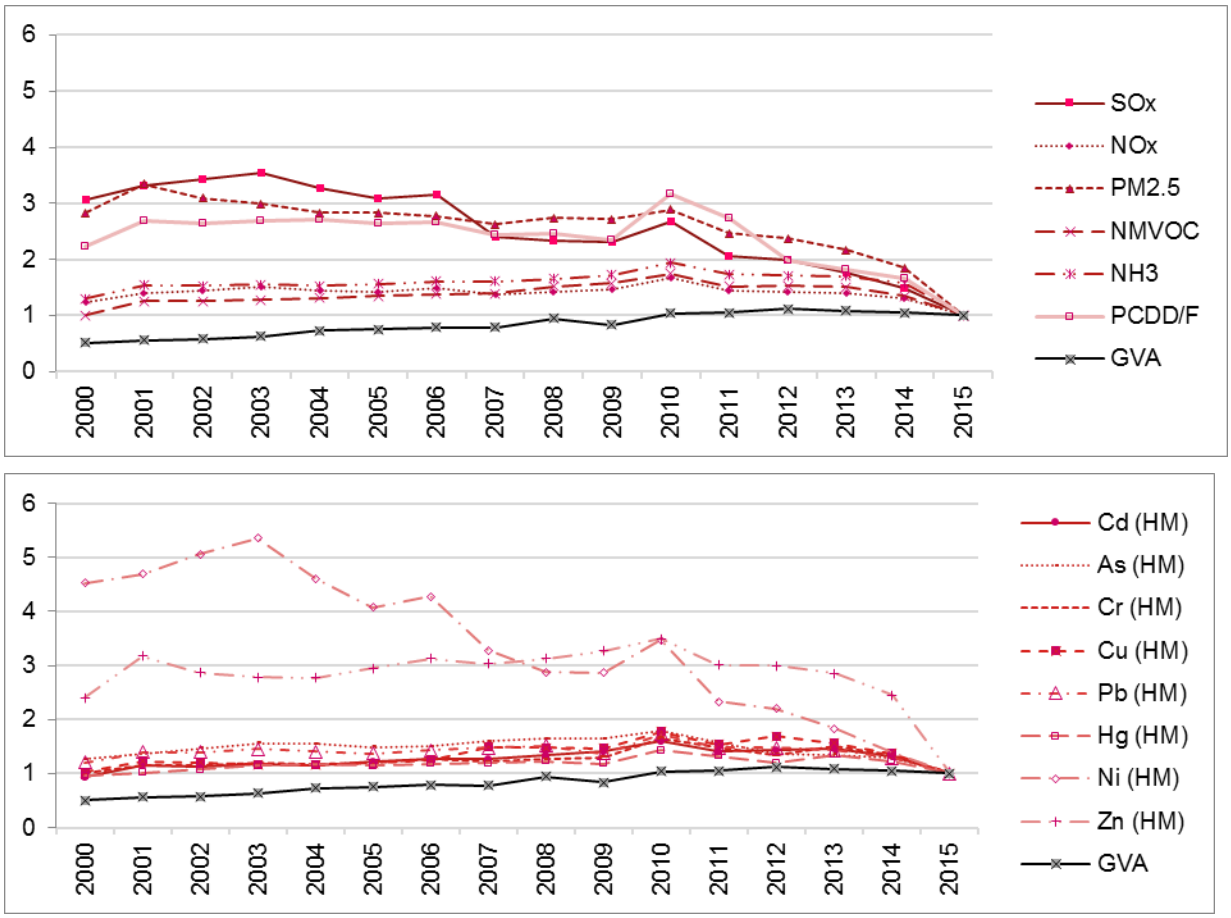
The following sections discuss the emission trends between 2000 and 2015 by industrial sector. Emissions data are shown in indexed charts by sector. This was done to compare the development of pollutant emissions with the GVA in specific sectors in the time period 2000 to 2015. Emissions from many sectors have decreased over time while GVA has grown; however, in the case of the metal and mineral sectors emissions have increased, for several pollutants and at a faster rate than the GVA growth. Appendix 2 includes in full detail the reported emissions to air from EEA (2017a).

Energy industry

Emissions data were reported for all pollutants included in this profile across the complete time series shown here for the energy – power sector. The trends show that emissions to air have declined over time, while GVA for the sector has increased (Figure 11). Although not apparent in Figure 11, the largest decrease in emissions in terms of quantity was reported for SOx (see Appendix 2).

Of the heavy metals reported, the most significant decline is reported for Ni and Zn. The decline in Zn emissions is most apparent since 2013 and could be indicative of compliance with the BAT in light of the growing GVA for the sector and steady number of permitted installations reported. A similar trend is apparent for Ni although emissions decreased in earlier years as well as more recently.

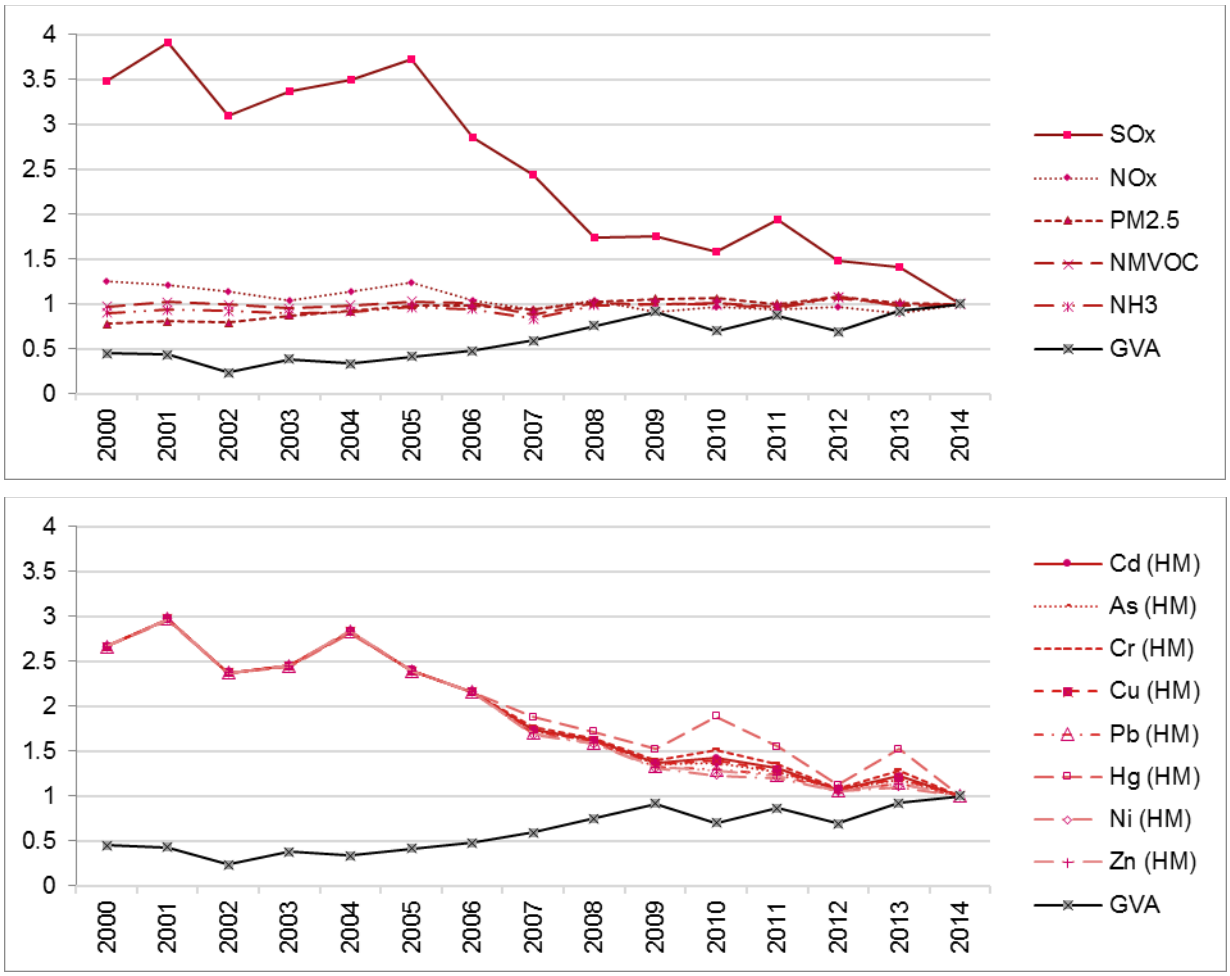
Figure 11: Indexed emissions to air from the energy - power industrial sector (indexed to 2015=1)



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

Emissions to air from the energy – refining, gasification and liquefaction sector were not reported for the year 2015 and so emissions are indexed to the year 2014. The reason given for this is that the emissions data for the year 2015 is confidential (except in the case of PCDD/F which is reported in the CLRTAP inventory as 'not occurring' for this sector). As with the energy – power sector, the trends show that emissions to air have declined over time, while GVA for the sector has increased (Figure 12). The most notable decrease was reported for emissions to air of SOx, although heavy metal emissions also decreased at a similar rate in this timeframe.

Figure 12: Indexed emissions to air from the energy – refining, gasification and liquefaction industrial sector (indexed to 2014=1)



Note: No emissions reported for PCDD/F.

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

Metal industry

The trends show that emissions to air have generally declined over time from the **iron and steel sector**, while GVA for the sector has increased (Figure 13). In addition to this overall declining trend, a drop in emissions to air is evident for the year 2009 for most pollutants (particularly SO_x, NO_x, $PM_{2.5}$, PCDD/F, Pb and Cr). The same trend is apparent in the energy consumption data which suggests that reduced production was the cause for this sudden decline in emissions followed by an immediate increase for the following year.

Zn appears to be a challenging pollutant for the iron and steel sector in Sweden with emissions peaking in 2006, and remaining higher than 2000 emission levels by 2015. Nonetheless, the year on year change for Zn emissions indicates that the rate of growth is slow.

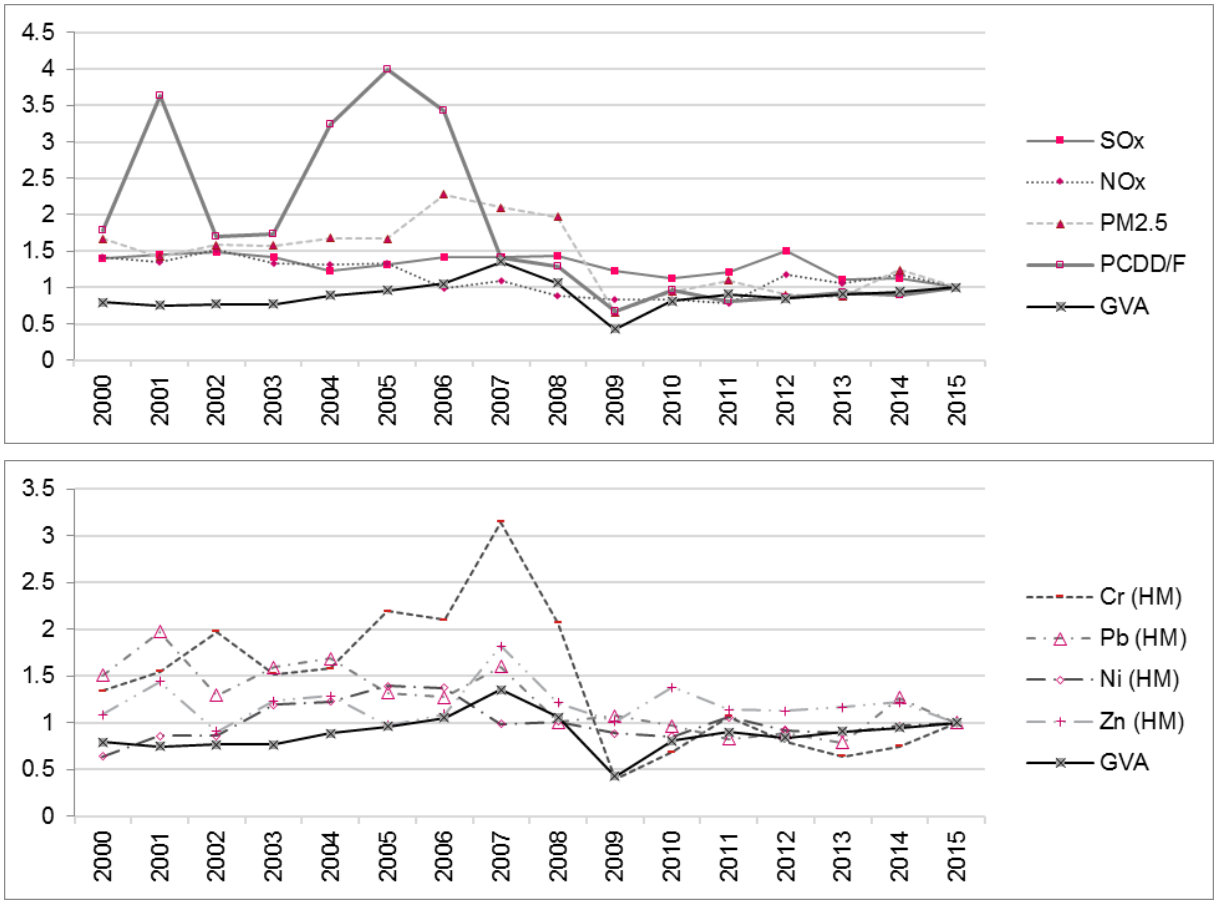
Figure 13: Indexed emissions to air from iron and steel sector (indexed to 2015=1)

Notes: No NH_3 emissions reported (emissions reported as not estimated which indicates this is a data gap).

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

Emissions to air from the **non-ferrous metal sector** have generally decreased over time with a stark decrease to 2009 which coincides with the drop in GVA associated with the economic recession (Figure 14). Whilst PCDD/F emissions have decreased overall since 2000, there are two periods of elevated emission levels: 2001 and 2004-6. The same trend is evident for $PM_{2.5}$ but to a lesser extent, but with elevated emissions from 2006-2008. SO_2 emissions have declined by a third since 2012. There was significant year-on-year fluctuation of heavy metal emissions.

Figure 14: Indexed emissions to air from non-ferrous metal production (metal industrial sector) (indexed to 2015=1)



Note: No NMVOC or NH_3 reported in the first chart (emissions reported in the CLRTAP inventory as 'not estimated' which indicates this is a data gap). Of the heavy metal pollutants, no emissions are reported for Cd, As, Cu and Hg (emissions reported as not estimated which indicates this is a data gap).

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

Mineral industry

The indexed chart for cement, lime and magnesium oxide industry emissions shows NOx emissions increased between 2000 and 2015 at a slightly faster rate than GVA growth (Figure 15). The limited time series for NH_3 and limited pollutant coverage for this sector is due to the pollutants not being applicable (except in the case of the missing years for NH_3 which is a data gap). The trend for NH_3 shows several large fluctuations which cannot be explained from the available data. It is possible that the surges in emissions are related to increased production, or as a result of changes to reporting.

Figure 15: Indexed emissions to air from cement, lime and magnesium oxide production (mineral industrial sector) (indexed to 2015=1)

Note: No NMVOC or heavy metal emissions are reported. Zero emissions reported for NH_3 in 2005. Value is not plotted to avoid misrepresenting the trend.

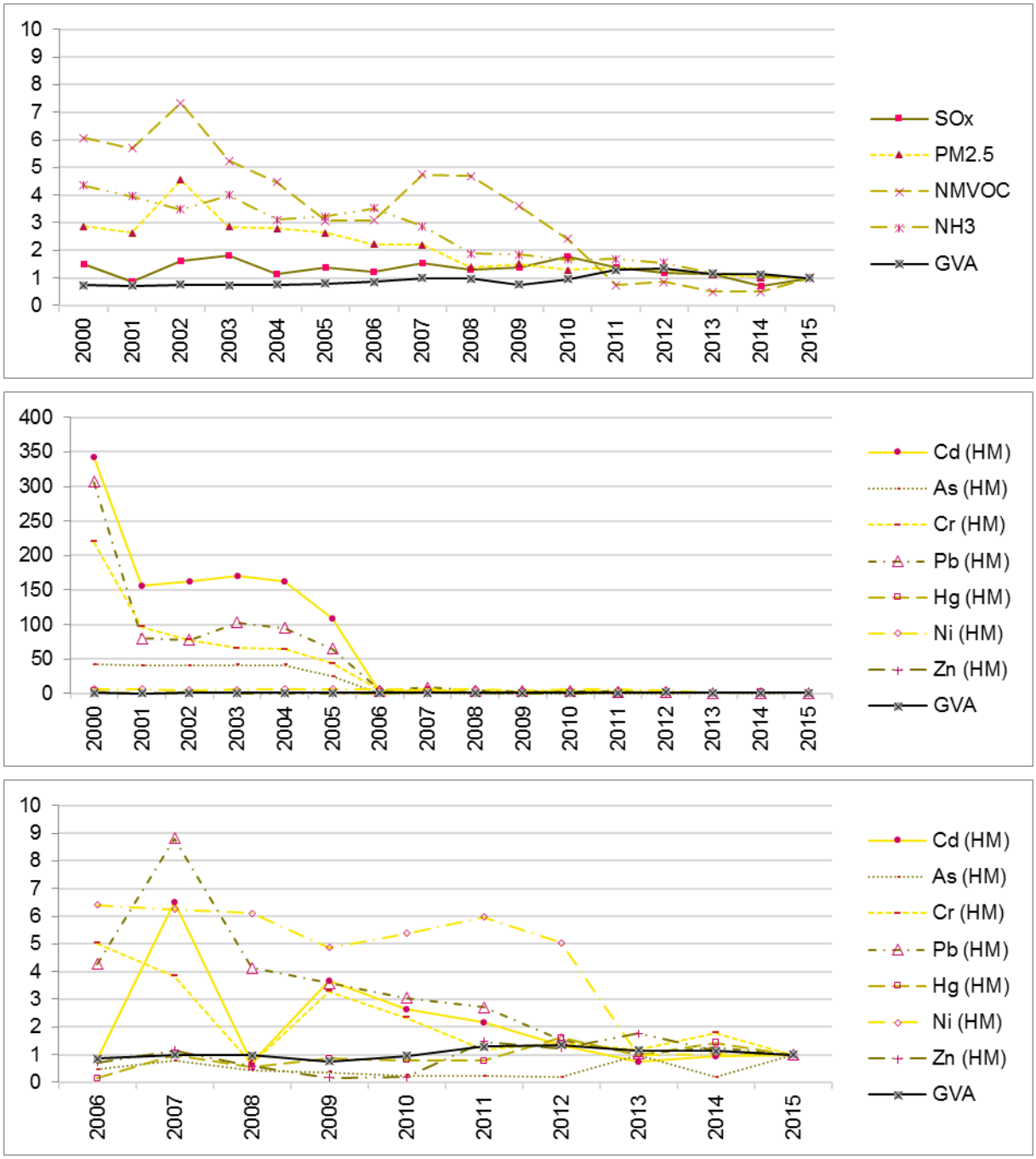
Source: EEA (2017a), Eurostat (2017a)

SO_2, $PM_{2.5}$, NMVOC and NH_3 emissions to air from **glass production** decreased between 2000 and 2010 but have marginally increased thereafter. It is unclear if this trend will continue or if emissions will remain constant following this slight increase. NO_x emissions were reported up to 2013, showing a steady decrease although the trend could not be indexed in the chart below.

Between 2000 and 2006 heavy metal emissions to air from the glass sector decreased considerably (Figure 16 and see Appendix 2 for the detail). Thereafter, As, Hg and Zn have presented a challenge for the sector, increasing between 2006 and 2015.

The overall increases in emissions in more recent years from glass production are slight, however a longer timeseries is needed to determine the extent of this increase if no action is taken by the sector to limit emissions.

Figure 16: Indexed emissions to air from glass production (mineral industrial sector) (indexed to 2015=1)

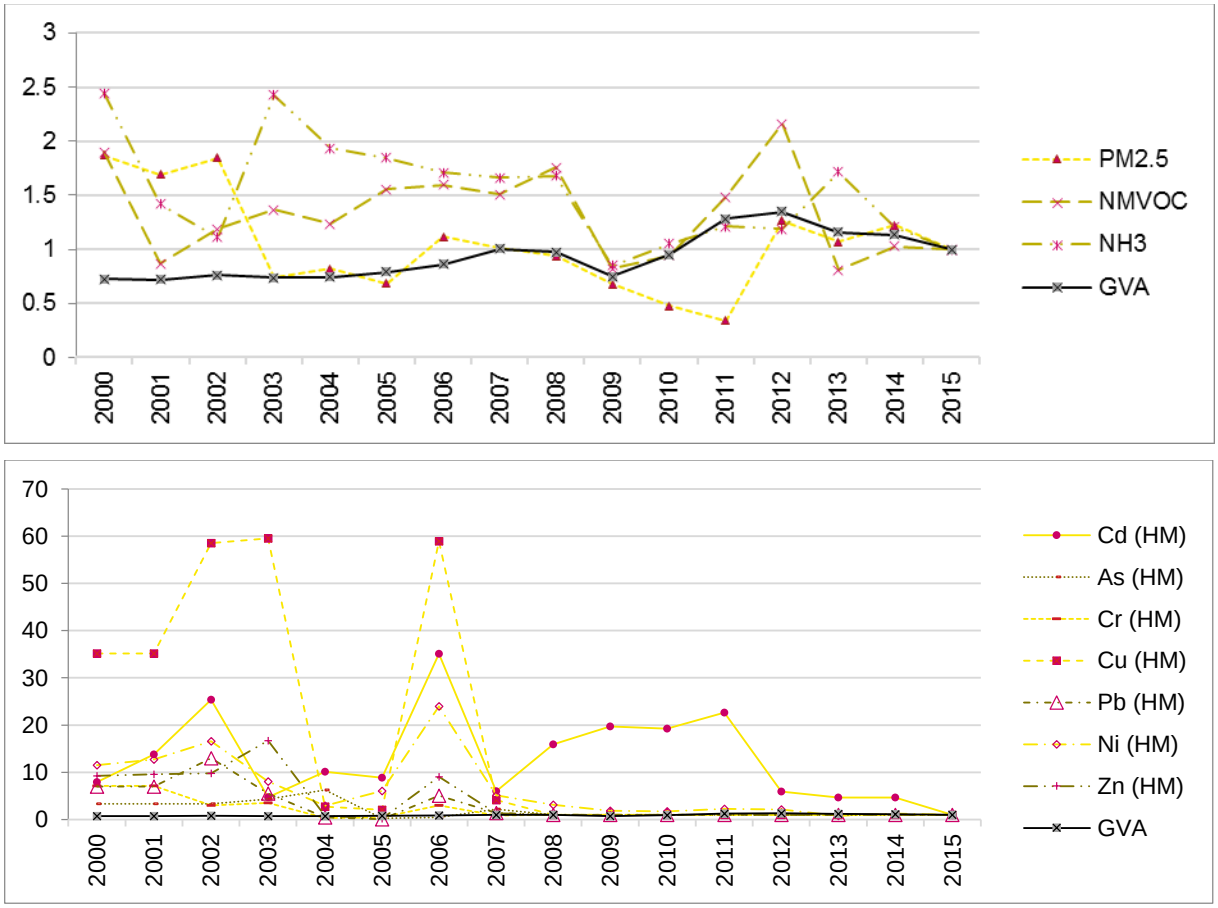


Note: No NOx, PCDD/F or Cu emissions reported. NO_x is reported as 'not applicable' to the sector in the CLRTAP inventory; however, the other emissions not reported are identified as gaps in reporting. Zero emissions reported for Zn between 2000 and 2002. Values not plotted to avoid misrepresenting the trend. The second and third charts above show heavy metal emissions, with a reduced time series in the third chart to make the detail visible with outliers removed.

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

Overall emissions of pollutants from the **mineral – other sector** have decreased between 2000 and 2015 (Figure 17). Since 2011, emissions to air of $PM_{2.5}$ and NMVOC have increased, marking a challenge for the mineral – other sector. The spikes in emissions reported for all heavy metal pollutants in the chart below (most significant for Cu, Cd, Ni) relates to very small variations in the quantity reported each year (see Appendix 2).

Figure 17: Indexed emissions to air from other mineral production (mineral industrial sector) (indexed to 2015=1)



Note: No SO_x, NO_x, Hg or PCDD/F emissions reported. Of these pollutants, only PCDD/F is identified as a data gap as the others are reported as 'not applicable' to the sector by the CLRTAP inventory.

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

Chemical industry

Emissions to air from the chemical sector have generally decreased between 2000 and 2015, except in the case of PCDD/F (Figure 18). As no GVA data is reported for the sector (owing to confidentiality reasons), it is not possible to track these trends in relation to GVA growth although it is noted that employment by the sector has gradually decreased over time which could indicate reduced production levels which have in turn driven the reduced emissions to air.

Figure 18: Indexed emissions to air from the chemical industrial sector (indexed to 2015=1)

Note: Limited heavy metal emissions reported (only Hg emissions reported as other heavy metals are mainly 'not applicable' to the sector, as reported in the CLRTAP inventory). Zero emissions reported for PCDD/F in 2000. Value not plotted to avoid misrepresenting the trend.

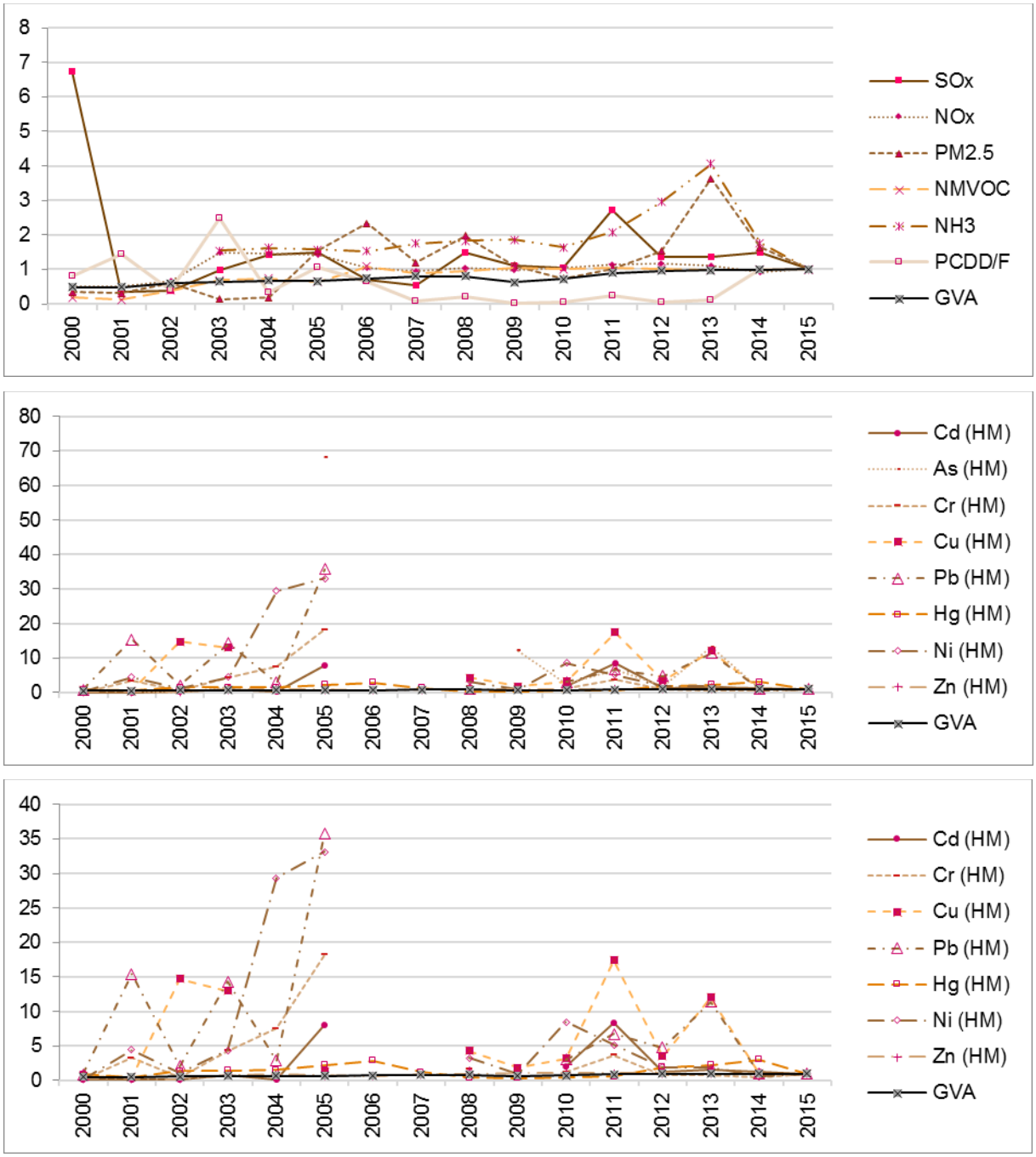
Source: EEA (2017a), Eurostat (2017a)

Waste management industry

Emissions to air are reported for all pollutants in the scope of this profile emitted from the hazardous waste management sector. All emissions have declined over time except PCDD/F which has increased marginally (from 0.05 g/ year in 2000 to 0.07 g in 2015).

Overall the quantity of emissions reported by the sector is quite small (see Appendix 2). Together with the large number of reported IED installations permitted for this sector, the general declining trend in emissions, and the growth in GVA, it can be inferred that the sector has succeeded in mitigating its environmental impact in terms of emissions to air while growing.

Figure 19: Indexed emissions to air from hazardous waste (waste management industrial sector) (indexed to 2015=1)



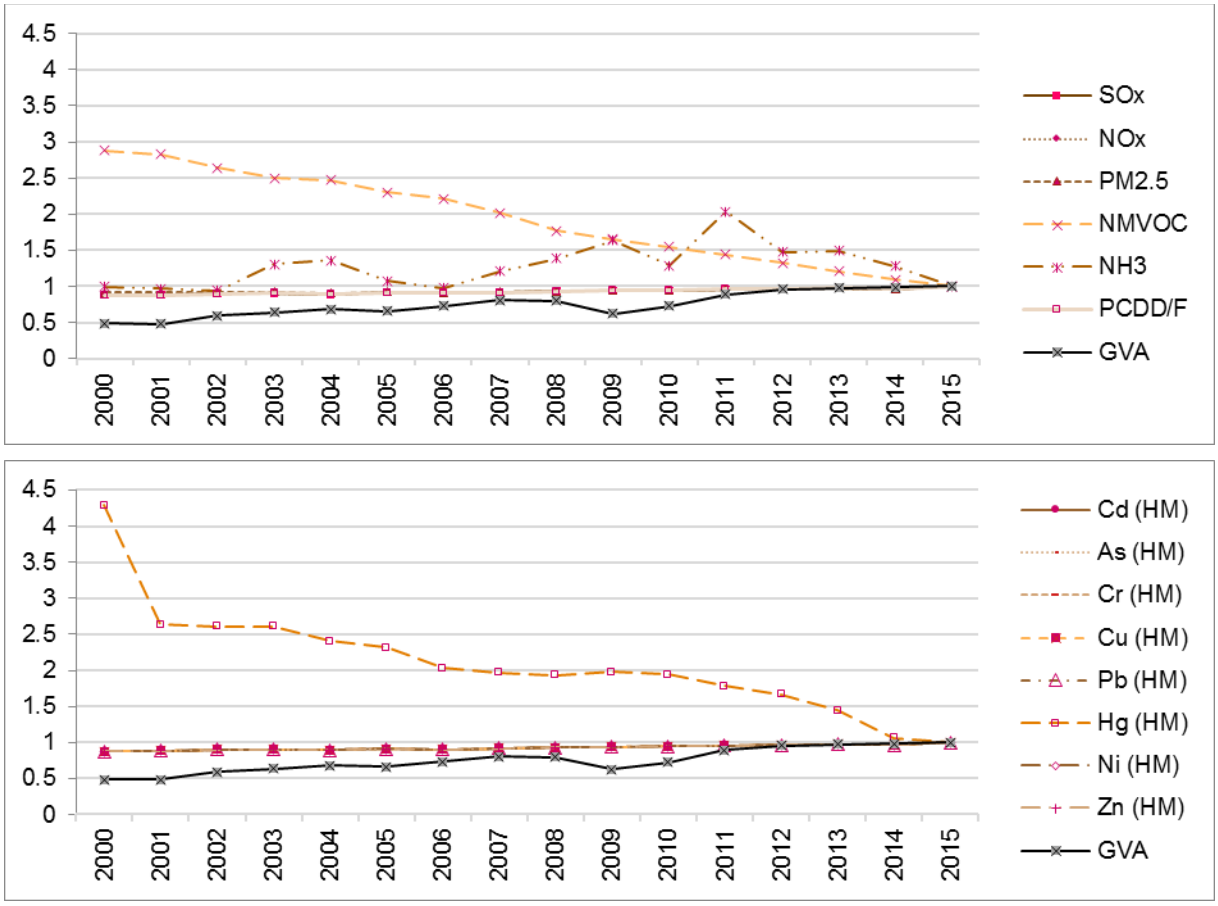
Note: Zero emissions reported for NH_3 between 2000 and 2002 (first chart). Zero emissions reported for Cd between 2006 and 2009, for As in 2000, in 2004 and between 2006 and 2008, for Cr and Pb in 2006, 2007 and in 2009, for Cu in 2004, 2006 and 2007, and for Ni in 2006 and 2007 (second and third charts). Values not plotted for these

pollutants in these years to avoid misrepresenting the trends. As removed from the third chart as an outlier to make detail visible for other pollutants.

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

A similar trend is apparent for emissions to air from the **non-hazardous waste management** sector and the same conclusion can be drawn. Emissions to air are reported for all pollutants in the scope of this profile. All emissions have declined over time except PCDD/F which has increased marginally (from 0.59 g/ year in 2000 to 0.67 g in 2015). Again, the quantity of emissions reported by the sector is quite small (see Appendix 2). Together with the large number of reported IED installations permitted for this sector, the general declining trend in emissions, and the growth in GVA, it can be inferred that the sector has succeeded in mitigating its environmental impact in terms of emissions to air while growing.

Figure 20: Indexed emissions to air from non-hazardous waste (waste management industrial sector) (indexed to 2015=1)

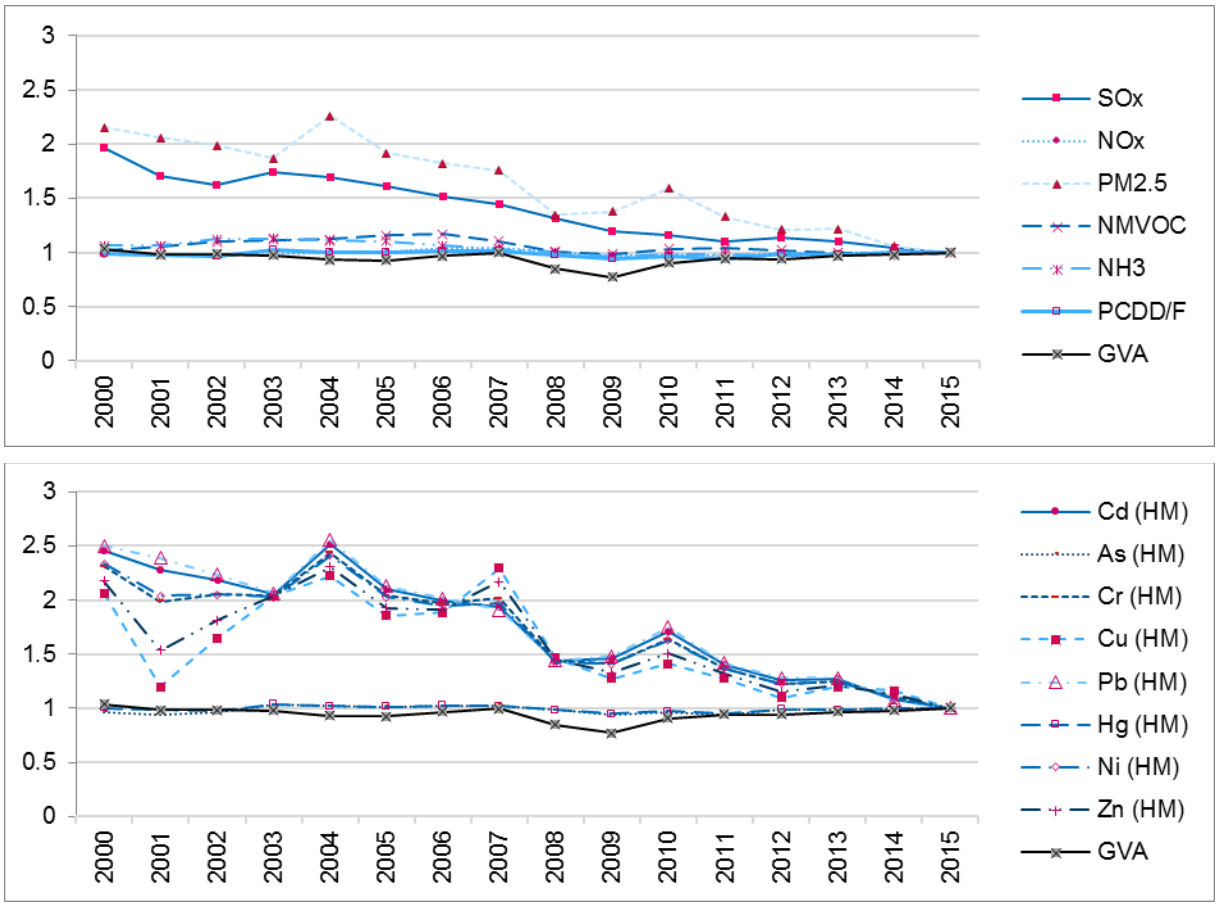


Source: EEA (2017a), Eurostat (2017a)

'Other activities'

Emissions to air are reported for all pollutants in the scope of this profile. Emissions have decreased between 2000 and 2015 (Figure 21). Although emissions of NMVOC and NH_3 show a downward trend over time (indicating a reduction of emissions), the quantity emitted for each pollutant has only decreased fractionally and remains high in comparison to other sectors (see Appendix 2). The main sources of these emissions are surface treatment industries (NMVOC) and the intensive rearing of poultry or pigs sector (NH_3).

Figure 21: Indexed emissions to air from other activities (indexed to 2015=1)



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

Limitations

The use of emissions data reported to CLRTAP 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.

Table 6: Gaps in emissions to water data for Sweden

Missing data	Description	Conclusion and actions taken#
Data gaps	No data for energy – refining, gasification and liquefaction for the year 2015.	Emissions and GVA indexed to 2014
Reduced pollutant coverage	Reduced pollutant coverage for certain sectors owing to data gaps.	No action

4.2 Emissions to water

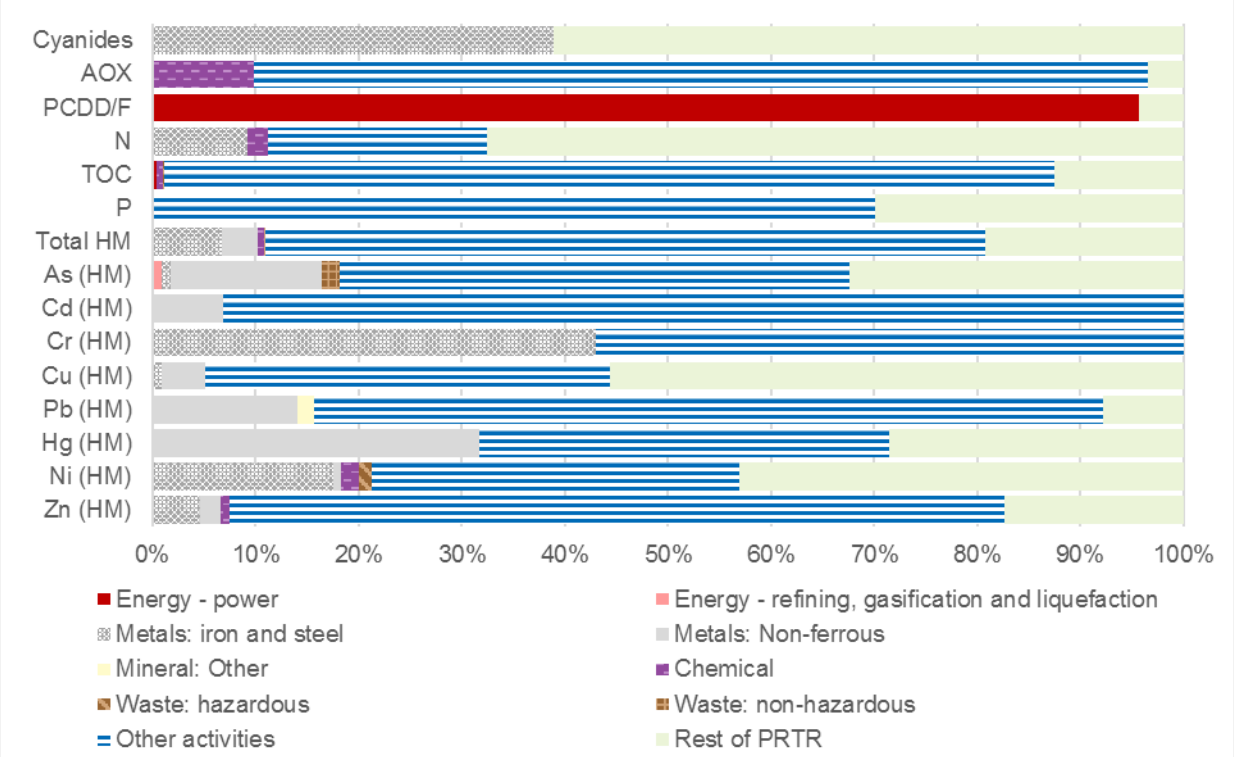
Emissions to water data were obtained from the E-PRTR (EEA, 2017b), which has a broader industrial scope than the IED but is not a national total. The figures in this section, apart from Figure 22, aggregate the separate metals into a single heavy metals metric based on their relative toxicity (reciprocal predicted no effect concentrations), expressed in Hg equivalents.

As a proportion of the national reporting to the E-PRTR, the industrial sector accounts for circa one third of the total reported to E-PRTR (presented as rest of PRTR, Figure 22). This represents a comparatively small share of total emissions reported to E-PRTR – in light of the alignment between IED and E-PRTR activities (see accompanying methodology report).

Sufficient data was reported to show a trend for emissions to water for a selection of pollutants from all industrial sectors - shown in an indexed chart in the following subsection to allow direct comparison with GVA trends over the same time series. Limited pollutant coverage is available for most sectors except the chemical sector and 'other activities'. Full details on the emissions reported by industrial sector and year are presented in tabular format at the end of this section.

The available data of emissions to water for the year 2015 are shown in Figure 22. This plot presents, per pollutant, the proportion of emissions to water by the industrial sector compared to the data reported by Sweden to the E-PRTR in 2015. Total heavy metals are reported here together with the emissions reported by heavy metal pollutant. As indicated previously, total heavy metals are the aggregate of all heavy metal pollutants reported to the E-PRTR and included in this analysis (aggregated by toxicity according to PNEC values against Hg).

Figure 22: Pollutant emissions to water from industrial sectors and rest of PRTR total (2015)



Notes: Rest of PRTR relates to the national total for E-PRTR reporting minus the industrial sectors shown here. No emissions data reported for the mineral sector in 2015. No data are reported for diuron and PCBs.

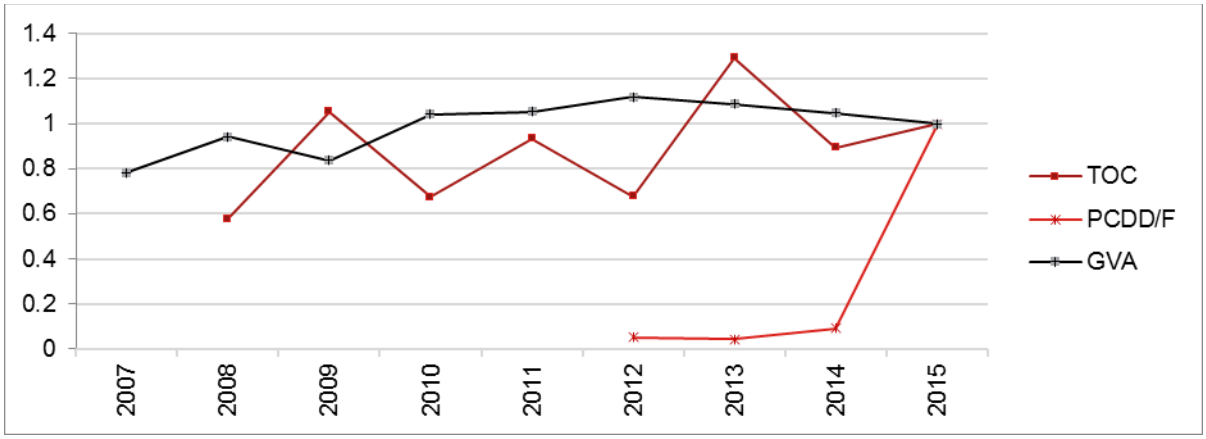
Source: EEA (2017b)

The following sections discuss the emission trends between 2000 and 2015 by industrial sector. 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 2007 to 2015. Emissions from many sectors have decreased over time while GVA has grown; except, in the case of TOC and PCDD/F emissions from the energy – power sector, and the reported emissions from the iron and steel sector where emissions have grown over time.

Energy industry

Emissions to water of TOC and PCDD/F were the only pollutants reported by the energy – power industrial sector in 2015. Emissions increased for both with some fluctuations reported for TOC between years. Heavy metal emissions were reported in 2008 and between 2010 and 2012 with Zn being the main pollutant in terms of toxicity.

Figure 23: Indexed emissions to water from the energy - power industrial sector (indexed to 2015=1)

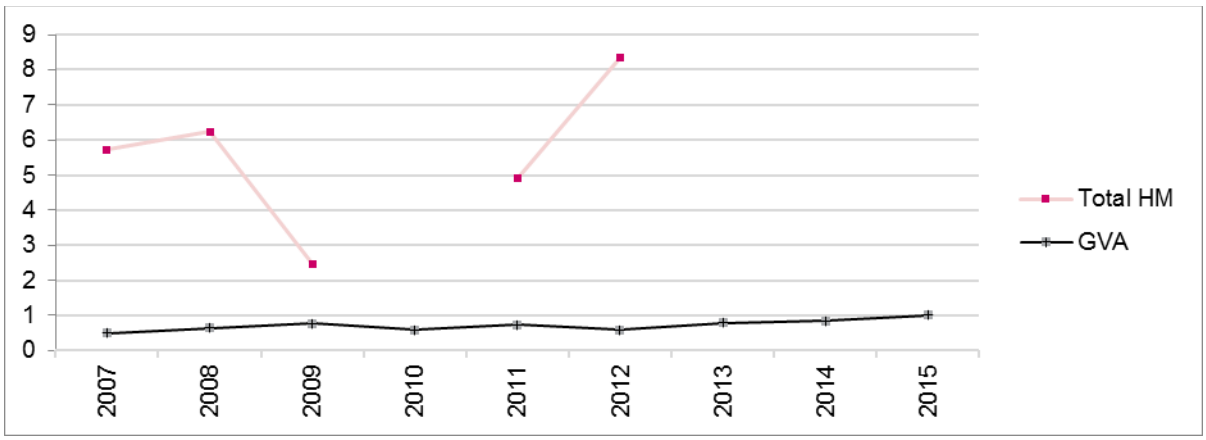


Notes: Only TOC and PCDD/F emissions reported. Zero emissions reported for PCDD/F between 2007 and 2011 and for TOC in 2007. Values not plotted for these pollutants in these years to avoid misrepresenting the trends.

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

Heavy metal emissions to water are reported for the energy – refining, gasification and liquefaction sector. However, the time series is incomplete with data only reported for between 2007 and 2009, 2011, 2012 and 2015, giving the chart the appearance of considerable fluctuations. The variation can be attributed to reporting of from one facility which reports intermittently between years, most likely depending on where it falls in relation to the reporting thresholds. The main pollutant reported in terms of toxicity is As.

Figure 24: Indexed emissions to water from the energy – refining, gasification and liquefaction industrial sector (indexed to 2015=1)



Notes: Only heavy metal emissions reported – presented here in aggregate form by PNEC value. Zero emissions are reported in 2010, 2013 and 2014. Values are not plotted for these years to avoid misrepresenting a trend.

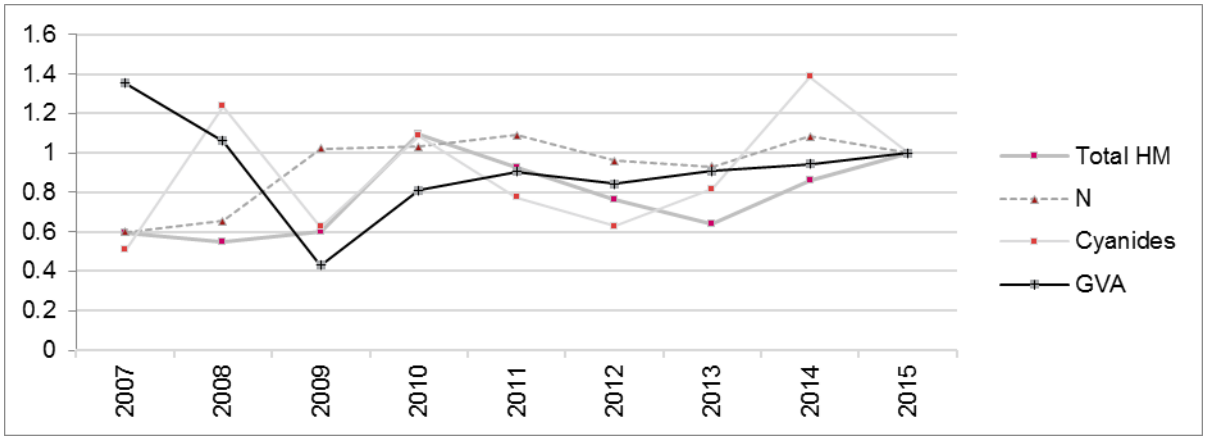
Source: EEA (2017b), Eurostat (2017a)

Metal industry

Similar to the trend identified for emissions to air, emissions to water decreased in 2009 in line with the GVA and it is expected that reductions in production as a result of the economic crisis were the driver for this trend.

Emissions to water from the iron and steel sector have increased over time for all pollutants, and at a faster rate than GVA growth. This apparent increase in emissions is also linked to intermittent reporting by facilities to the E-PRTR (particularly for cyanides), indicative of fluctuations in meeting the reporting thresholds rather than no emissions reported one year compared to the next. This variation makes it difficult to determine a trend from the timeseries. Emissions of heavy metals (comprising mainly Zn and Cr in terms of toxicity) peaked in 2010 but remain high in 2015, shown in the figure below.

Figure 25: Indexed emissions to water from the iron and steel industrial sector (indexed to 2015=1)

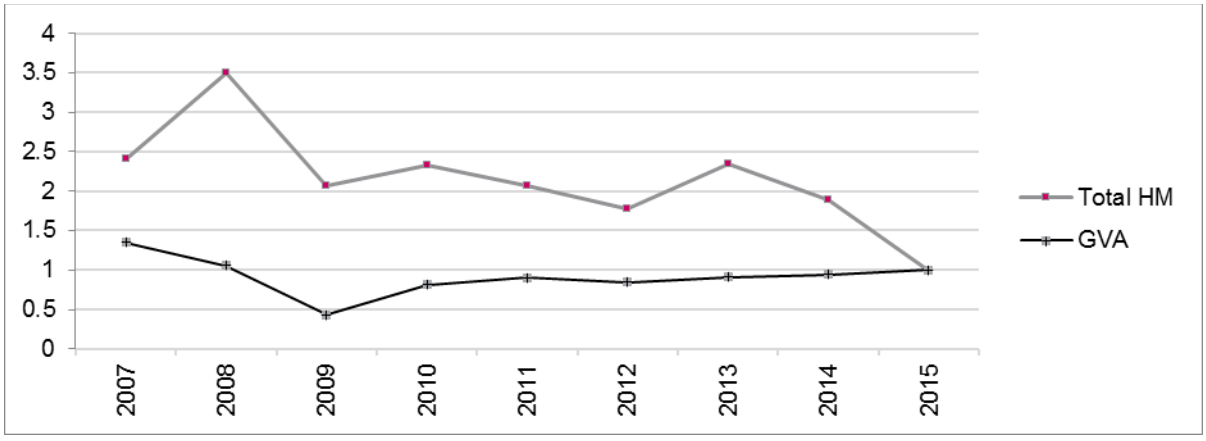


Notes: Only heavy metal emissions, total N and cyanides reported. Heavy metals presented here in aggregate form by PNEC value.

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

Heavy metal emissions to water from the non-ferrous metal sector spiked in 2008 and generally decreased since then. Across the timeseries, the sector reports a range of heavy metal pollutants consistently between years, including Zn, Ni, Hg, Pb, Cu, Cd and As. Cr and Ni are only reported in intermittent years in relatively small quantities when measured in terms of toxicity.

Figure 26: Indexed emissions to water from the non-ferrous industrial sector (indexed to 2015=1)



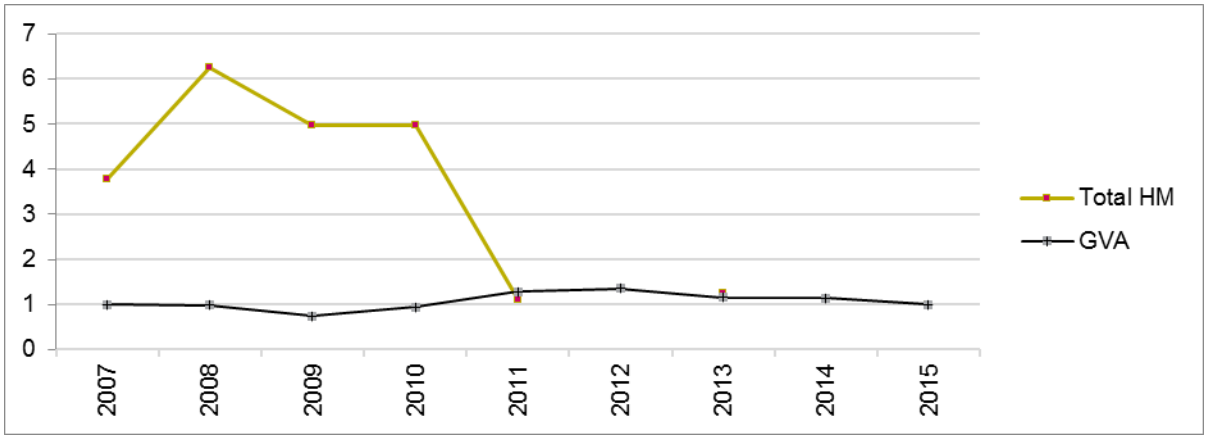
Notes: Only heavy metal emissions reported – presented here in aggregate form by PNEC value

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

Mineral industry

Limited emissions to water data are reported to the E-PRTR for the mineral (other) sector. Based on these reported data, emissions from the mineral sector make up an extremely small proportion of total emissions reported to E-PRTR. Only heavy metal emissions are reported, comprising Zn between 2007 and 2010, and Pb in 2010 and in subsequent years intermittently. The sparse data and limited pollutant coverage make it difficult to discern a trend.

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



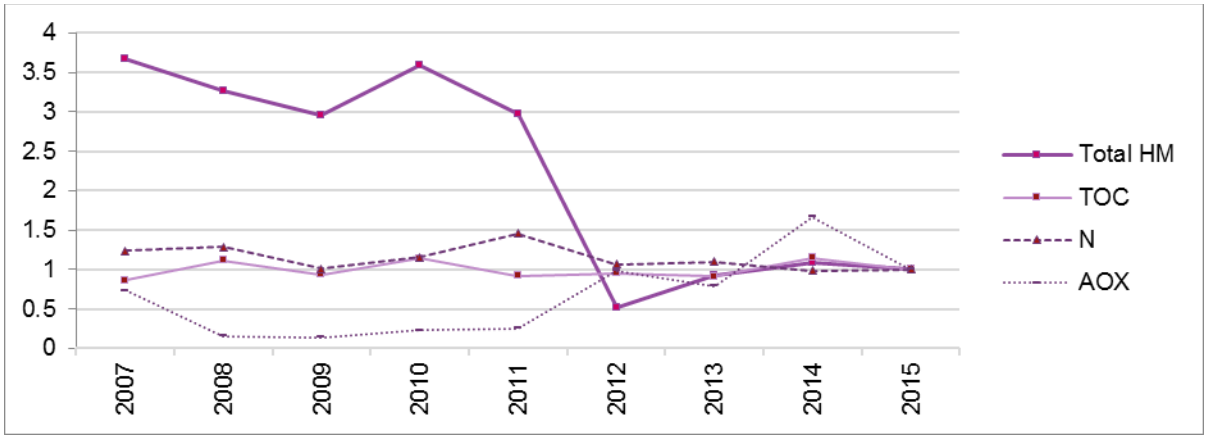
Note: Only heavy metal emissions reported. Heavy metal emissions presented here in aggregate form by PNEC value. Zero emissions reported in 2012 and 2014. Values have not been plotted for these years to avoid misrepresenting the trend.

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

Chemical industry

The time series for emissions to water for the chemical sector are illustrated in Figure 28. Emissions to water of AOX increased over time. All pollutants reported decreased between 2007 and 2015, with the most significant decline reported for heavy metals. The decline in heavy metals is primarily for Pb and Cr which were no longer reported after 2011.

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



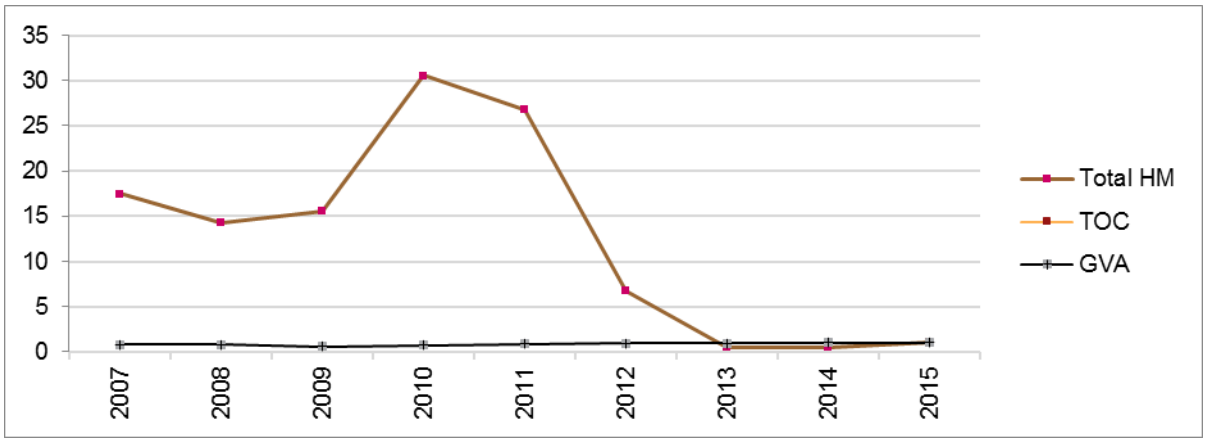
Note: Only heavy metals, TOC, total N and AOX emissions reported. Heavy metal emissions presented here in aggregate form by PNEC value. No GVA available for the chemical sector.

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

Waste management industry

Within the hazardous waste management industrial sector, emissions are only reported for heavy metals and TOC. Emissions have decreased while GVA has increased, with the largest decrease occurring between 2011 and 2013. There was a spike in emissions in 2010-2011 after which emissions decreased despite the increasing trend in GVA, indicating that emissions have become decouples from GVA. The decrease is due to Zn (which was not reported after 2012) and to a lesser extent Ni. The trend is similar to that for emissions to air for this sector.

Figure 29: Indexed emissions to water from hazardous waste management (indexed to 2015=1)

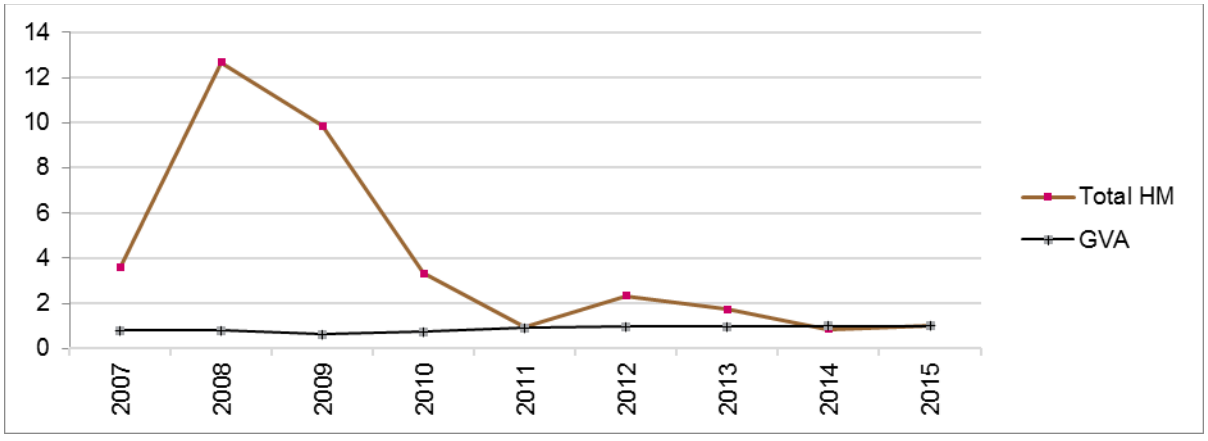


Note: Only heavy metals and TOC emissions reported. Heavy metal emissions presented here in aggregate form by PNEC value.

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

Within the non-hazardous waste management industrial sector, emissions of heavy metals have decreased while GVA has increased. There was a spike in emissions in 2008, after which emissions decreased greatly from 2009 to 2011. The decrease is due to Hg (large quantity in terms of toxicity reported in 2008) and to a lesser extent Zn (large quantity in 2009); thereafter, emissions are mainly As. The trend is similar to that for emissions to air for this sector.

Figure 30: Indexed emissions to water from non-hazardous waste management (indexed to 2015=1)



Notes: Only heavy metal emissions reported – presented here in aggregate form by PNEC value

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

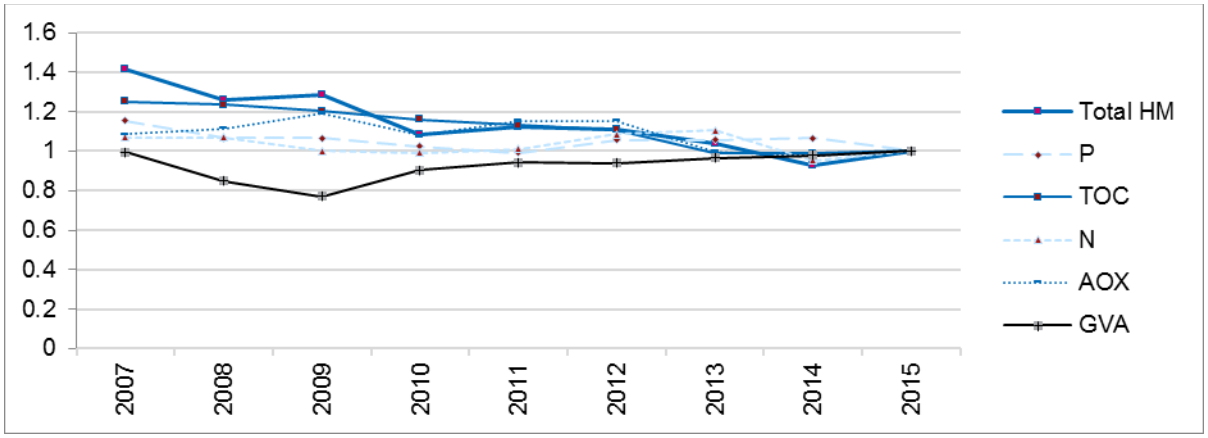
'Other activities'

Emissions to water from 'other activities' decreased for all reported pollutants between 2007 and 2015.

Emissions to water of all pollutants presented in the chart below, emanate primarily from the pulp, paper and wood-based product sector. The surface treatment sector also contributes to emissions for certain pollutants including total N and heavy metals as does the food and drink sector for total N and TOC.

Note that no emissions to water were reported for intensive rearing of poultry or pigs. This is an important data gap in light of the significance of the sector in terms of the number of permitted IED installations reported.

Figure 31: Indexed emissions to water from 'other activities' (indexed to 2015=1)



Notes: No diuron, PCBs, cyanide or PCDD/F reported. Heavy metal emissions presented here in aggregate form by PNEC value.

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

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 activity thresholds which apply (as well as inconsistencies between years). E-PRTR also has a limited timeseries.

Table 7: Gaps in emissions to water data for Sweden

Missing data	Description	Conclusion and actions taken
Limited pollutant coverage	No data reported for diuron and PCBs as no companies exceeded reporting thresholds.	No action
Limited time series	Where no data is reported for 2015 and so indexing is not possible; and where no data is reported for one year but not the next	Pollutants for certain sectors could not be indexed and are presented in table format separately. Data gaps between years are shown as fluctuations in the indexed charts and trend analysis is limited.
Limited sector coverage	Particularly for the mineral sector	No action

Additional data for emissions to water

Additional data reported to E-PRTR for emissions to water are presented in Table 8 – including for pollutants with no time series.

Table 8: Emissions to water by pollutant and industrial sector (all available data) (in kg unless t stated)

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Energy - power									
Total HM	-	0.68	-	1.21	2.16	6.54	-	-	-
TOC	-	131,000	239,000	153,000	212,000	154,000	293,000	203,000	227,000
Energy - refining, gasification and liquefaction									
Total HM	2.77	3.01	1.19	-	2.37	4.03	-	-	0.48
AOX	11,400	4,100	11,200	28,700	-	14,400	-	-	-
Metals: iron and steel									
Total HM	69	63	69	126	107	88	74	100	115
N	520,000	568,500	885,000	893,500	944,000	833,000	805,000	937,200	866,000
Cyanides	436	1,060	536	933	666	540	702	1,190	858
Metals: Non-ferrous									
Total HM	146	212	125	142	125	107	142	115	61
TOC	183,000	176,000	152,000	159,000	121,000	-	-	-	-
Mineral: Other									
Total HM	2.91	4.81	3.82	3.83	0.85	0.00	0.96	0.00	0.77
Chemical									
Total HM	38	34	31	38	31	5	10	11	10
TOC (t)	281	364.7	304.8	371.3	301.3	311.6	298.1	373.3	326
N (t)	237.5	246.6	193	221.8	279.1	203.7	211	189	191.3
AOX	33,000	7,080	6,310	10,530	11,600	44,500	35,800	75,000	45,000
Cyanides	134	-	-	-	-	-	-	-	-
Waste: hazardous									
Total HM	6.35	5.18	5.64	11.07	9.72	2.44	0.18	0.18	0.36
TOC	-	-	-	-	-	-	-	-	68,800
Waste: non-hazardous									
Total HM	3.28	11.61	9.05	3.04	0.87	2.14	1.58	0.78	0.92
N	-	-	-	61,800	64,100	75,100	-	-	-
PCBs	-	-	-	-	0.47	0.48	-	-	-
Other activities									
Total HM	1,718	1,526	1,556	1,315	1,357	1,343	1,259	1,126	1,211
P	258,520	238,920	238,500	229,000	222,250	236,840	236,310	238,730	223,850
TOC (t)	59,002	58,155	56,628	54,725	53,314	52,152	46,570	46,586	47,102
N (t)	2,134	2,133	1,997	1,978	2,017	2,168	2,206	1,902	1,995
AOX	431,520	442,700	474,000	428,770	457,950	457,760	394,480	387,770	397,140

Notes: Industrial sectors and pollutants with no data reported across the timeseries have been removed. Total heavy metals is expressed in Hg equivalents using reciprocal predicted no effect concentrations.

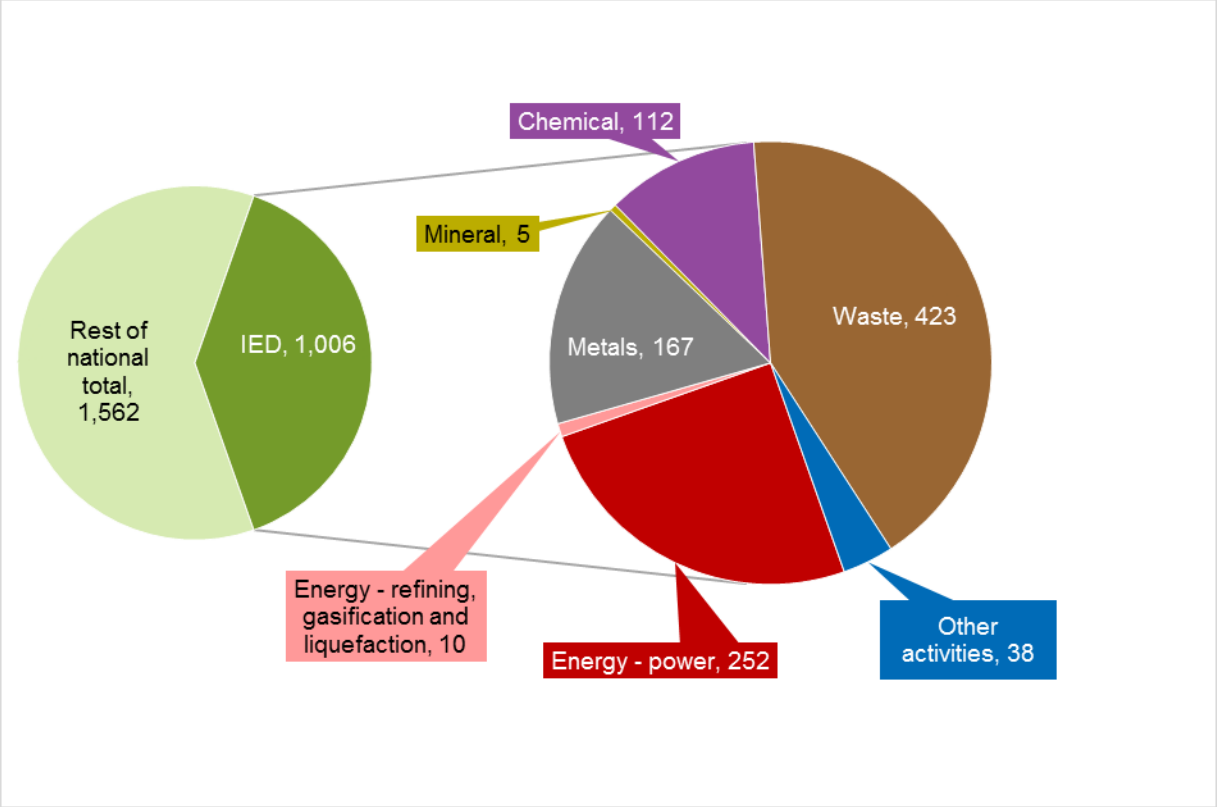
Source: EEA (2017b)

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 considerable share of total hazardous waste generated in Sweden (39% of the national total) (Figure 32). Of this, the waste management industrial sector generates the largest quantity (42% of industry total and 16% of the national total). Conversely, industry generates a small share of the non-hazardous waste in Sweden (6% of the national total) (Figure 33). The waste management sector again generates a significant share of this (38% of industry total but just 2% of the national total). Typical waste streams from the waste management sector that require disposal include a mixture of ash, carbon and lime residue, bottom ash, leachate, bioaerosols and discards.

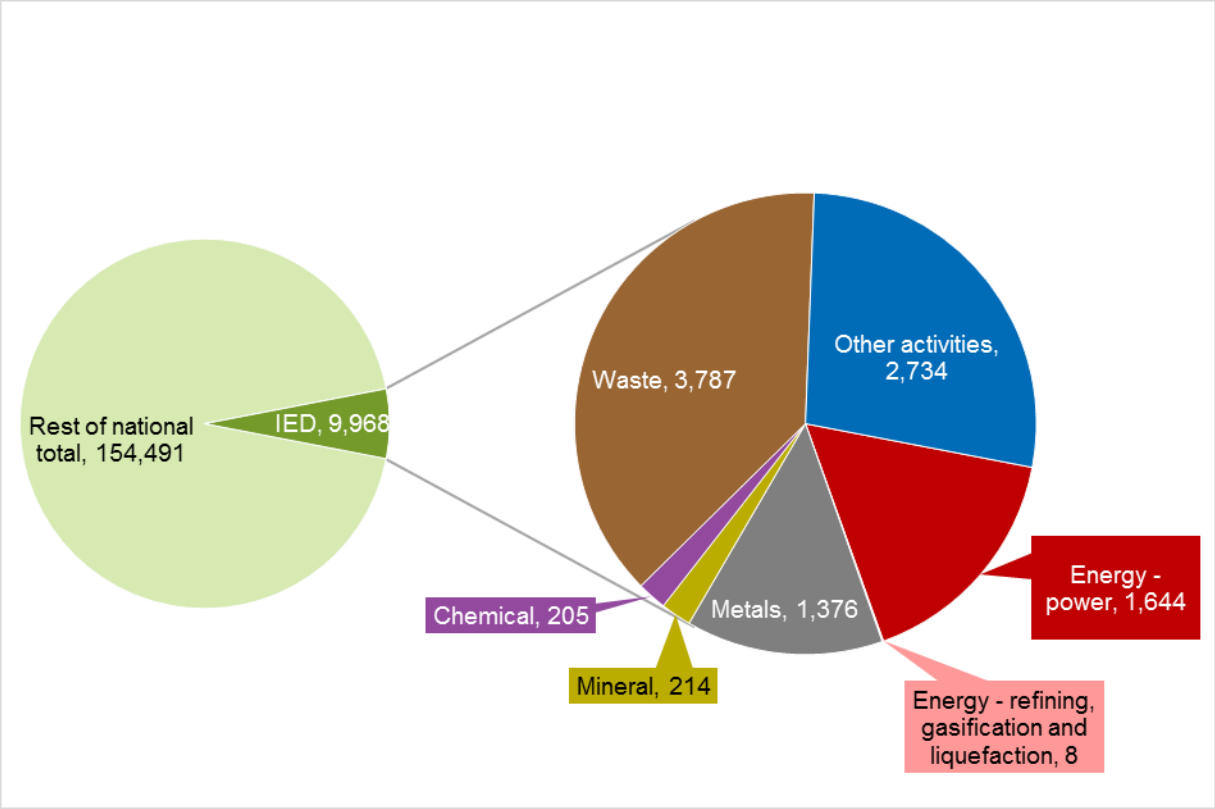
Figure 32: Hazardous waste generation by industrial sector in 2014 (kt)



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

Source: Eurostat (2017e)

Figure 33: Non-hazardous waste generation by industrial sector in 2014 (kt)

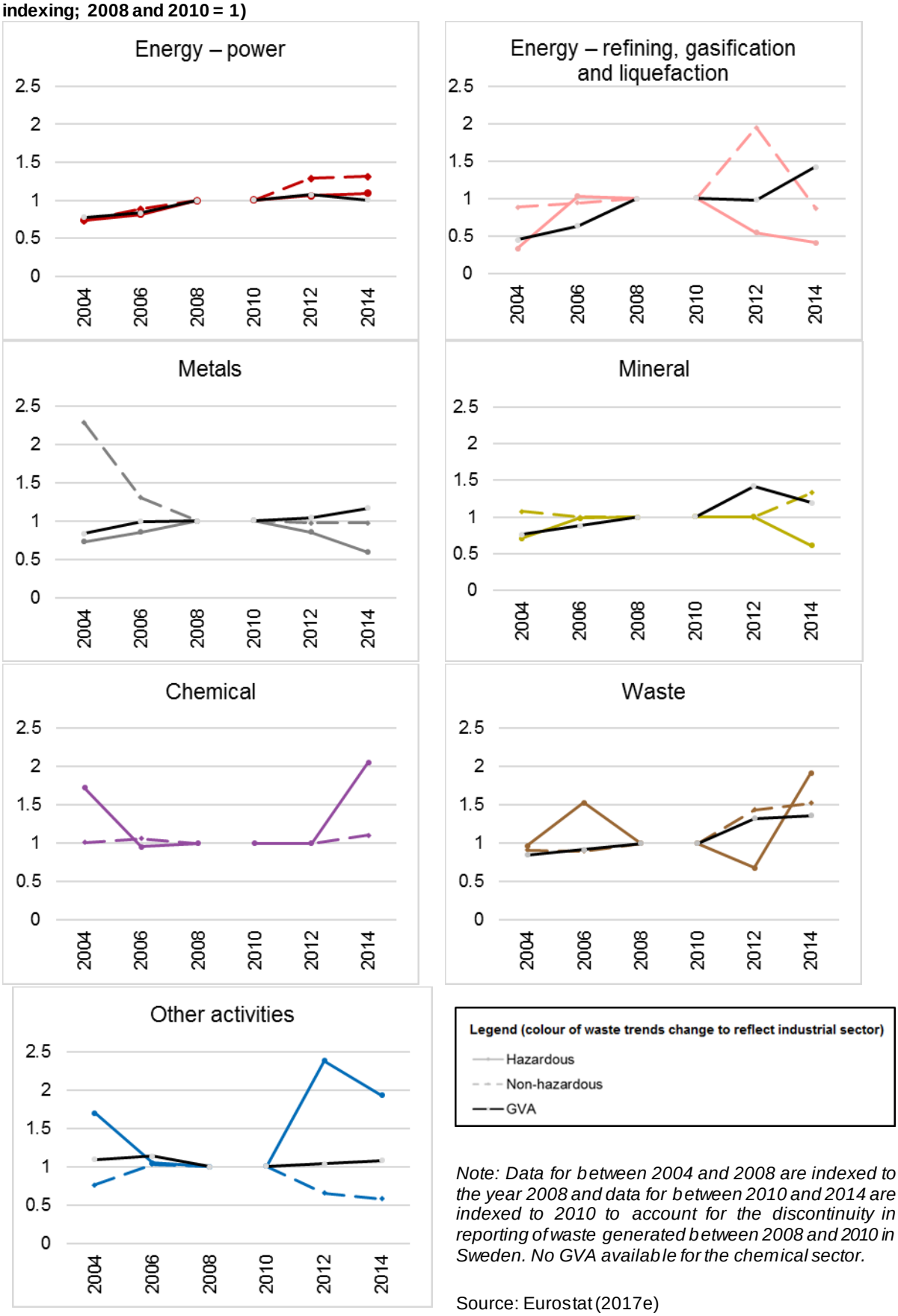


Source: Eurostat (2017e)

Since 2010, generation of hazardous waste from the energy – refining, gasification and liquefaction, metals and mineral sectors has reduced, and it has increased from the energy - power, chemical, waste management and 'other activities' sectors (Figure 34). The generation of non-hazardous waste has declined since 2010 from 'other activities', and increased from waste management, energy-power, and mineral sectors. Remaining sectors showed no change.

Note that data are indexed to two years in order to account for changes in the reporting methodology between 2008 and 2010 affecting the comparability between the data. The changes to reporting included the reclassification of several waste categories (Statistics Sweden, 2017b).

Figure 34: Hazardous and non-hazardous waste generation by industrial sector relative to GVA (2 points of indexing; 2008 and 2010 = 1)



Note: Data for between 2004 and 2008 are indexed to the year 2008 and data for between 2010 and 2014 are indexed to 2010 to account for the discontinuity in reporting of waste generated between 2008 and 2010 in Sweden. No GVA available for the chemical sector.

Source: Eurostat (2017e)

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.

Table 9: Gaps in waste generation data for Sweden

Missing data	Description	Conclusion and actions taken
Inconsistency between reporting years	Reporting method changed between 2008 and 2010.	Data indexed to two years to allow trend to be analysed over time.

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[2].

As shown in section 2, key industries in Sweden in terms of the reported number of IED installations include: waste management (260 permitted installations) and intensive rearing of poultry or pigs (255 permitted installations). The energy – power and surface treatment sectors are also significant in size with 125 and 120 permitted installations, respectively.

The quantitative analysis in section 4 shows that while emissions to air from many sectors have decreased over time as GVA has grown, in the case of the iron and steel and mineral sectors emissions have increased, for several heavy metal pollutants (including As, Hg and Zn) and at a faster rate than the GVA growth. Emissions to water also present a challenge for certain sectors where emissions have increased at a faster rate than GVA growth, namely for TOC and PCDD/F emissions from the energy – power sector, and total N, cyanides and total heavy metal emissions from the iron and steel sector.

Of note, the metals sector appears to have been the only sector in Sweden to be noticeably affected by the economic crisis, with declines reported in 2009 for the sector's GVA and energy consumption, together with declines in emissions to air and water for the same year.

However, according to the Swedish EPA there are no political or environmental challenges/pressures related to the sectors covered by the IED which are substantially above the EU average for the sectors that so far have received applicable BAT-conclusions. The reason for this is a long-term history with strict environmental legislation and an integrated approach to environmental permitting, which includes national and EU-wide requirements.

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

7 References

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Appendices

Appendix 1 Mapping industrial sectors across data sources for Sweden

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

Appendix 1: Mapping industrial sectors across data sources for Sweden

Industrial sector †	GVA	Employment	Energy consumption‡	Water consumption	Emissions to air	Emissions to water	Waste generated
	Eurostat (2017a)	**Eurostat (2017b)**	**Eurostat (2017c)**	**Statistics Sweden (2017a)**	**EEA (2017a)**	**EEA (2017b)**	**Eurostat (2017e)**
Sector classification	*NACE Rev 2*	*NACE Rev 2*	*Energy balance indicator*	*Own definitions*	*NFR14 sector classification*	*E-PRTR*	*NACE Rev 2*
Time series available	*2000-2015, annually*	*2008-2015, annually*	*2000-2015, annually*	*No time series*	*2000-2015, 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	D35 (electricity, gas, steam and air conditioning supply)	1A1a Public electricity and heat production; 1A2a-f Stationary combustion in manufacturing industries and construction	*No data reported*	D (electricity, gas, steam and air conditioning supply)
Energy: refining, gasification and liquefaction	C19 (coke and refined petroleum products)	C19 (coke and refined petroleum products)	B_101307 - Petroleum Refineries; 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)	C19 (coke and refined petroleum products)	1A1b Petroleum refining; 1A1c Solid fuels and other energy industries	Refining (1a)	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-C25 (basic metals; fabricated metal products, except machinery and equipment)	2C1 Iron and steel	*No data reported*	C24-C25 (basic metals; fabricated metal products, except machinery and equipment)
Metals: non-ferrous			B_101810 - Non-Ferrous Metals		2C2-7 Non-ferrous metals	*No data reported*	
Mineral: Cement, lime and magnesium oxide	C23 (non-metallic mineral products)	C23 (non-metallic mineral products)	B_101820 - Non-Metallic Minerals	C22-C23 (rubber and plastic products; non-metallic mineral products)	2A1 Cement; 2A2 Lime	Cement, lime and magnesium oxide (3c)	C23 (non-metallic mineral products)
Mineral: Glass					2A3 Glass	*No data reported*	
Mineral: Other					2A6 Other	*No data reported*	
Chemical	C20 (chemicals); C21 (pharmaceutical products)	C20 (chemicals); C21 (pharmaceutical products)	B_101815 - Chemical and Petrochemical	C20 (chemicals); C21 (pharmaceutical 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 (4b; e)	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)	*Unavailable*	*Unavailable*	5C1bi Industrial waste incineration 5C1biv Sewage sludge incineration; 5C1bii Hazardous waste incineration; 5C1bvi Other waste incineration; 5C1biii Clinical waste incineration	*No data reported*	E37-E39 (water supply; sewerage, waste management and remediation)
Waste: non-hazardous			B_101318 - Gasification plants for biogas		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 (5d)	
Other: Food and drink products	C10-C12 (food and drinks and tobacco)	C10 (food products); C11 (drink products)	B_101830 - Food and Tobacco	C10 (food products); C11 (drink products)	2H Food and beverages industry	Food and drink (8c)	C10-C12 (food products; drink products; tobacco)
Textiles and tanning	C13-C15 (textiles; wearing apparel; leather)	C13 (textiles); C15 (tanning)	B_101835 - Textile and Leather	C13 (textiles); C15 (tanning)	*Unavailable*	Pre-treatment or dyeing of textile fibres or textiles (9a); Tanning (9b)	C13-C15 (textiles; wearing apparel; leather)
Pulp, paper and wood-based products	C16-17 (paper, paper products and wood-based products)	C16-17 (paper, paper products and wood-based products)	B_101840 - Paper, Pulp and Print	C16-17 (paper, paper products and wood-based products)	2H1 Pulp and paper industry	Pulp, paper and wood production (6a-c)	C16-C18 (paper, paper products and wood-based products; printing)
Intensive rearing of poultry and pigs	*Insufficient granularity in reported data*	*Insufficient granularity in reported data*	*Unavailable*	*Insufficient granularity in reported data*	3B3 Manure management – Swine; 3B4gi Manure management - Laying hens; 3B4gii Manure management - Broilers	Intensive rearing of poultry and pigs (7a)	*Insufficient granularity in reported data*
Surface treatment	*Insufficient granularity in reported data*	*Insufficient granularity in reported data*	*Unavailable*	*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*

Note: † Number of IED installations is reported against IED activities for years 2011, 2013 and 2015. ‡ Additional energy balance indicator available for the production of coke (B_101312 - Coke Ovens); excluded from the Swedish profile to reflect the fact that no IED installations are permitted for this IED activity.

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

Note: Emissions rounded to two decimal places unless data is less. Industrial sectors and pollutants with no data reported across the timeseries have been removed.

Source: EEA, 2017b

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Energy - power																	
SO_x	kt	12.15	13.11	13.58	14.02	13.01	12.23	12.47	9.53	9.23	9.12	10.57	8.20	7.91	6.95	5.94	3.96
NO_x	kt	17.88	20.07	20.61	21.71	20.59	20.52	21.31	19.76	20.34	21.00	24.16	20.85	20.55	19.92	18.79	14.37
$PM_{2.5}$	kt	3.15	3.73	3.45	3.33	3.15	3.16	3.09	2.92	3.05	3.02	3.22	2.74	2.64	2.42	2.06	1.11
NMVOC	kt	3.00	3.73	3.75	3.81	3.91	4.02	4.10	4.14	4.51	4.70	5.21	4.52	4.55	4.50	4.00	2.98
NH_3	kt	0.42	0.50	0.50	0.51	0.50	0.51	0.53	0.52	0.54	0.56	0.63	0.56	0.56	0.55	0.51	0.33
Cd (HM)	t	0.14	0.18	0.17	0.18	0.18	0.18	0.19	0.19	0.21	0.22	0.24	0.21	0.22	0.22	0.20	0.15
As (HM)	t	0.26	0.29	0.31	0.33	0.32	0.31	0.31	0.33	0.34	0.34	0.38	0.33	0.29	0.28	0.27	0.21
Cr (HM)	t	0.65	0.74	0.75	0.77	0.75	0.78	0.81	0.78	0.82	0.83	1.07	0.95	0.86	0.97	0.86	0.64
Cu (HM)	t	1.45	1.74	1.71	1.67	1.64	1.70	1.77	2.11	2.10	2.07	2.52	2.18	2.41	2.21	1.95	1.42
Pb (HM)	t	2.75	3.19	3.19	3.30	3.20	3.13	3.27	3.38	3.46	3.13	3.94	3.38	3.37	3.27	2.93	2.28
Hg (HM)	t	0.14	0.15	0.16	0.17	0.18	0.17	0.18	0.18	0.19	0.18	0.22	0.20	0.18	0.20	0.19	0.15
Ni (HM)	t	12.91	13.39	14.42	15.28	13.13	11.62	12.19	9.35	8.22	8.16	9.89	6.65	6.27	5.22	3.94	2.85
Zn (HM)	t	35.53	46.95	42.39	41.23	40.97	43.65	46.19	44.81	46.32	48.32	51.62	44.45	44.33	42.26	36.20	14.80
PCDD/F	g	16.70	20.15	19.73	20.20	20.29	19.83	19.95	18.20	18.35	17.63	23.77	20.52	14.91	13.63	12.44	7.50

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Energy - refining, gasification and liquefaction																	
SO_x	kt	1.08	1.21	0.96	1.04	1.08	1.15	0.88	0.75	0.54	0.54	0.49	0.60	0.46	0.44	0.31	-
NO_x	kt	2.12	2.04	1.93	1.75	1.93	2.08	1.75	1.59	1.75	1.52	1.64	1.58	1.64	1.51	1.69	-
$PM_{2.5}$	kt	0.19	0.20	0.19	0.21	0.23	0.24	0.24	0.23	0.25	0.26	0.26	0.24	0.27	0.25	0.24	-
NMVOC	kt	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.08	0.08	0.08	0.08	0.09	0.08	0.08	-
NH_3	kt	0.06	0.07	0.07	0.06	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.08	0.07	0.07	-
Cd (HM)	kg	1.19	1.32	1.06	1.09	1.26	1.07	0.96	0.78	0.72	0.61	0.64	0.58	0.48	0.55	0.45	-
As (HM)	kg	3.55	3.96	3.16	3.26	3.77	3.19	2.88	2.30	2.14	1.80	1.82	1.70	1.42	1.58	1.33	-
Cr (HM)	kg	2.09	2.33	1.86	1.92	2.21	1.88	1.69	1.39	1.28	1.10	1.19	1.06	0.85	1.01	0.78	-
Cu (HM)	t	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-
Pb (HM)	t	0.04	0.05	0.04	0.04	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	-
Hg (HM)	kg	0.18	0.20	0.16	0.17	0.19	0.16	0.15	0.13	0.12	0.10	0.13	0.11	0.08	0.10	0.07	-
Ni (HM)	t	0.71	0.79	0.63	0.65	0.75	0.63	0.57	0.45	0.42	0.35	0.33	0.32	0.28	0.29	0.26	-
Zn (HM)	t	0.04	0.04	0.03	0.03	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	-
Metals: iron and steel																	
SO_x	kt	2.06	1.91	1.59	1.80	1.79	2.09	2.55	2.63	2.54	1.64	2.68	2.50	2.15	2.46	1.64	1.45
NO_x	kt	0.93	0.87	0.87	0.96	0.98	1.01	1.04	1.03	0.93	0.67	0.93	0.97	0.95	0.94	0.89	0.90
$PM_{2.5}$	kt	2.01	1.59	1.79	1.63	1.47	2.56	2.55	2.18	2.25	1.37	1.40	1.87	2.06	1.91	0.70	0.56
NMVOC	kt	0.14	0.16	0.14	0.12	0.13	0.11	0.11	0.10	0.11	0.07	0.11	0.10	0.09	0.10	0.09	0.10
Cd (HM)	t	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.02
As (HM)	t	0.02	0.02	0.02	0.01	0.005	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.01
Cr (HM)	t	1.39	1.29	1.51	1.25	1.95	1.81	2.54	1.78	1.83	0.99	1.43	1.66	1.24	1.63	1.03	1.11
Cu (HM)	t	0.28	0.22	0.24	0.21	0.25	0.27	0.29	0.27	0.27	0.14	0.23	0.23	0.25	0.20	0.22	0.24
Pb (HM)	t	1.20	0.77	0.64	0.47	0.47	0.68	0.88	0.77	0.82	0.40	0.56	0.40	0.43	0.47	0.42	0.40
Hg (HM)	t	0.16	0.09	0.10	0.16	0.16	0.13	0.07	0.07	0.08	0.08	0.07	0.09	0.06	0.07	0.05	0.05
Ni (HM)	t	1.22	1.22	1.26	0.95	0.92	1.31	1.38	1.17	1.29	0.82	1.00	1.10	0.97	1.35	0.99	0.92
Zn (HM)	t	10.97	9.20	11.54	10.10	8.91	11.13	15.73	10.68	12.71	6.36	10.58	8.64	10.81	6.00	13.61	14.94
PCDD/F	g	7.93	4.16	5.41	3.38	5.35	5.53	3.43	2.56	2.99	0.92	2.59	2.12	1.13	1.16	1.23	1.33

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Metals: Non-ferrous																	
SO_x	kt	4.53	4.69	4.78	4.57	3.97	4.24	4.57	4.58	4.64	3.95	3.61	3.91	4.84	3.56	3.65	3.23
NO_x	kt	0.52	0.50	0.56	0.49	0.48	0.49	0.36	0.41	0.33	0.31	0.31	0.29	0.44	0.39	0.44	0.37
$PM_{2.5}$	kt	0.23	0.19	0.22	0.22	0.23	0.23	0.31	0.29	0.27	0.090	0.129	0.150	0.123	0.120	0.170	0.137
NMVOC	kt	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.02	0.02	-	-	-	-	-	-	-
Cd (HM)	t	0.06	0.14	0.06	0.06	0.07	0.07	0.09	0.11	0.051	0.05	0.03	0.04	0.06	0.03	0.08	0.04
As (HM)	t	0.17	0.36	0.18	0.22	0.20	0.23	0.36	0.58	0.28	0.28	0.27	0.32	0.39	0.34	0.41	0.23
Cr (HM)	t	4.44	5.11	6.51	5.03	5.22	7.24	6.94	10.40	6.84	1.31	2.28	3.54	2.65	2.12	2.47	3.30
Cu (HM)	t	1.94	1.72	1.38	1.35	1.42	1.48	1.23	3.15	1.31	0.89	0.80	1.17	0.91	0.89	1.14	1.05
Pb (HM)	t	4.00	5.24	3.43	4.24	4.49	3.51	3.38	4.25	2.68	2.86	2.58	2.21	2.37	2.10	3.36	2.66
Hg (HM)	t	0.10	0.09	0.07	0.06	0.06	0.05	0.03	0.06	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.02
Ni (HM)	t	0.06	0.09	0.09	0.12	0.12	0.14	0.14	0.10	0.101	0.09	0.09	0.11	0.09	0.09	0.10	0.10
Zn (HM)	t	7.84	10.38	6.53	8.90	9.27	7.03	7.91	13.14	8.78	7.32	9.98	8.22	8.13	8.44	8.80	7.21
Mineral: Cement, lime and magnesium oxide																	
SOx	kt	0.21	0.12	0.19	0.18	0.19	0.28	0.30	0.33	0.39	0.31	0.39	0.41	0.39	0.44	0.43	0.41
NOx	kt	1.86	2.15	1.68	1.39	1.95	1.79	1.94	1.60	1.60	1.46	1.42	1.78	1.90	1.90	2.26	2.27
PM2.5	kt	0.36	0.39	0.34	0.32	0.36	0.40	0.30	0.39	0.30	0.24	0.19	0.20	0.16	0.18	0.17	0.15
NH3	kt	0.07	0.06	0.06	0.07	0.07	-	0.002	0.02	0.04	0.03	0.03	0.03	0.03	0.01	0.01	0.01

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mineral: Glass																	
SOx	kt	0.24	0.14	0.26	0.30	0.18	0.22	0.20	0.25	0.21	0.23	0.29	0.23	0.19	0.19	0.12	0.16
NOx	kt	0.48	0.47	0.48	0.49	0.47	0.48	0.48	0.49	0.49	0.48	0.47	0.48	0.46	0.02	-	-
PM2.5	kt	0.10	0.09	0.15	0.10	0.09	0.09	0.08	0.07	0.05	0.05	0.04	0.05	0.04	0.04	0.03	0.03
NMVOC	kt	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	0.002	0.001	0.001	0.002
NH3	kt	0.17	0.15	0.14	0.16	0.12	0.13	0.14	0.11	0.07	0.07	0.07	0.07	0.06	0.05	0.04	0.04
Cd (HM)	kg	28.40	13.00	13.50	14.10	13.50	9.00	0.07	0.54	0.06	0.30	0.22	0.18	0.11	0.06	0.08	0.08
As (HM)	kg	66.55	64.04	63.48	65.37	64.96	38.52	0.73	1.22	0.70	0.57	0.38	0.35	0.27	1.57	0.30	1.58
Cr (HM)	kg	36.70	16.10	13.00	11.00	10.70	7.30	0.84	0.64	0.11	0.55	0.39	0.20	0.24	0.20	0.30	0.17
Cu (HM)	kg	1.93	1.89	1.54	1.81	1.87	1.91	1.94	1.87	1.80	1.36	1.54	1.72	1.40	-	-	-
Pb (HM)	kg	2,884.6	752.84	728.12	964.13	895.59	608.81	40.16	82.86	38.87	33.72	28.59	25.40	14.45	9.66	11.79	9.40
Hg (HM)	kg	2.40	0.39	0.50	0.97	0.93	1.00	0.10	0.74	0.40	0.64	0.59	0.58	1.20	0.75	1.06	0.75
Ni (HM)	kg	230.48	226.17	188.95	219.05	225.57	230.08	234.46	229.01	223.55	177.94	197.0	218.6	184.86	36.36	37.00	36.62
Zn (HM)	kg	-	-	-	0.40	0.10	0.30	0.70	1.13	0.57	0.16	0.18	1.46	1.21	1.74	1.13	0.99
Mineral: Other																	
PM2.5	kt	0.08	0.07	0.08	0.03	0.03	0.03	0.05	0.04	0.04	0.03	0.02	0.01	0.05	0.04	0.05	0.04
NMVOC	kt	0.05	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.02	0.02	0.04	0.05	0.02	0.03	0.03
NH3	kt	0.16	0.09	0.07	0.16	0.13	0.12	0.11	0.11	0.11	0.06	0.07	0.08	0.08	0.11	0.08	0.07
Cd (HM)	kg	1.90	3.30	6.07	1.12	2.43	2.12	8.40	1.43	3.81	4.71	4.61	5.41	1.41	1.11	1.11	0.24
As (HM)	kg	1.00	1.00	1.00	1.30	1.86	0.07	0.13	0.65	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Cr (HM)	kg	24.00	24.00	10.00	11.91	0.98	1.44	10.09	2.97	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37
Cu (HM)	kg	6.00	6.00	10.00	10.17	0.46	0.35	10.06	0.70	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Pb (HM)	kg	7.00	7.00	13.00	5.53	0.47	0.06	5.02	1.36	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hg (HM)	kg	0.02	0.01	0.10	0.10	0.002	0.11	0.10	0.10	-	-	-	-	-	-	-	-
Ni (HM)	kg	35.40	39.00	51.00	24.67	9.07	18.63	73.76	15.63	9.61	5.71	5.21	7.01	6.51	2.51	3.91	3.07
Zn (HM)	kg	103.00	107.00	109.00	186.62	9.11	2.02	100.76	14.50	11.15	11.15	11.15	11.15	11.15	11.15	11.15	11.15

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Chemical																	
SOx	kt	3.88	3.72	3.87	2.87	0.62	0.50	0.61	0.67	0.57	0.47	0.62	0.62	0.56	0.50	0.56	0.57
NOx	kt	1.13	0.94	0.75	0.72	0.78	0.68	0.69	0.59	0.57	0.44	0.58	0.50	0.48	0.44	0.48	0.44
PM2.5	kt	0.20	0.22	0.23	0.24	0.36	0.22	0.15	0.16	0.14	0.08	0.12	0.17	0.28	0.13	0.15	0.13
NMVOC	kt	3.99	4.01	3.70	3.69	3.89	3.57	3.45	3.57	2.38	2.47	2.76	2.21	1.99	2.03	1.84	2.00
NH3	kt	0.13	0.09	0.09	0.08	0.11	0.10	0.09	0.05	0.04	0.03	0.05	0.04	0.03	0.04	0.03	0.02
Hg (HM)	t	0.10	0.06	0.10	0.09	0.13	0.12	0.06	0.05	0.03	0.07	0.02	0.02	0.03	0.03	0.02	0.02
PCDD/F	g	-	0.01	0.01	0.03	0.02	0.01	0.01	0.004	0.002	0.01	0.01	0.01	0.01	0.02	0.02	0.02
Waste: hazardous																	
SOx	t	15.00	0.78	0.86	2.21	3.16	3.32	1.57	1.17	3.31	2.48	2.33	6.07	3.01	3.03	3.29	2.23
NOx	t	43.00	43.20	57.41	126.86	125.63	122.92	91.36	81.00	88.88	85.35	88.89	98.09	101.20	96.66	80.44	86.12
PM2.5	t	0.39	0.35	0.66	0.14	0.20	1.71	2.61	1.34	2.20	1.24	0.83	1.14	1.70	4.04	1.82	1.11
NMVOC	t	0.37	0.25	0.77	1.35	1.44	1.26	2.10	1.76	1.83	2.04	1.95	2.04	1.98	1.92	1.93	1.95
NH3	t	-	-	-	0.74	0.79	0.76	0.74	0.85	0.88	0.90	0.79	1.00	1.42	1.96	0.85	0.48
Cd (HM)	kg	0.04	0.03	0.07	0.40	0.08	4.00	-	-	-	-	1.00	4.20	0.60	0.80	0.60	0.50
As (HM)	kg	-	0.10	0.04	0.80	-	34.00	-	-	-	6.00	1.20	3.30	0.90	6.60	0.50	0.50
Cr (HM)	kg	0.15	9.20	1.45	12.00	21.00	51.00	-	-	4.60	-	3.40	10.20	2.20	2.00	1.40	2.80
Cu (HM)	kg	0.61	0.49	14.70	13.00	-	1.26	-	-	4.30	1.80	3.20	17.40	3.50	12.00	1.00	1.00
Pb (HM)	kg	0.60	10.80	1.46	10.00	2.00	25.00	-	-	0.80	-	2.10	4.70	3.34	8.00	0.70	0.70
Hg (HM)	kg	3.30	1.90	5.40	5.60	5.80	8.70	11.01	4.79	1.60	1.30	2.00	2.27	7.57	8.77	11.90	3.90
Ni (HM)	kg	0.27	7.11	1.84	7.00	47.00	53.00	-	-	5.20	1.60	13.60	8.20	3.00	2.90	0.90	1.60
Zn (HM)	kg	147.61	152.63	128.85	504.87	559.53	459.68	402.16	546.50	578.64	644.17	617.7	645.5	625.60	606.56	608.58	615.45
PCDD/F	mg	51.91	93.00	25.00	161.10	22.00	70.00	43.00	4.73	14.00	1.11	3.60	16.00	3.94	6.89	65.00	65.00

Pollutant	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Waste: non-hazardous																	
SOx	kt	0.007	0.007	0.008	0.008	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
NOx	kt	0.054	0.05	0.05	0.06	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
PM2.5	t	2.41	2.41	2.44	2.43	2.37	2.42	2.38	2.43	2.45	2.47	2.48	2.51	2.54	2.56	2.52	2.62
NMVOC	kt	1.83	1.79	1.68	1.58	1.57	1.46	1.40	1.28	1.12	1.05	0.98	0.91	0.84	0.76	0.69	0.63
NH3	kt	0.14	0.14	0.14	0.19	0.20	0.15	0.14	0.17	0.20	0.23	0.18	0.29	0.21	0.21	0.18	0.14
Cd (HM)	kg	0.33	0.33	0.33	0.34	0.33	0.34	0.34	0.34	0.35	0.35	0.35	0.36	0.36	0.36	0.36	0.37
As (HM)	kg	0.88	0.89	0.91	0.91	0.90	0.92	0.91	0.92	0.94	0.95	0.95	0.96	0.97	0.98	0.97	1.01
Cr (HM)	kg	0.88	0.88	0.90	0.91	0.89	0.92	0.91	0.92	0.94	0.94	0.95	0.96	0.97	0.98	0.97	1.00
Cu (HM)	kg	0.81	0.81	0.83	0.83	0.82	0.84	0.83	0.84	0.86	0.86	0.87	0.88	0.89	0.90	0.89	0.92
Pb (HM)	kg	1.95	1.96	2.00	2.01	1.98	2.03	2.01	2.04	2.07	2.09	2.10	2.12	2.15	2.17	2.14	2.22
Hg (HM)	t	0.109	0.07	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.03
Ni (HM)	kg	1.13	1.13	1.15	1.16	1.14	1.17	1.16	1.18	1.20	1.21	1.21	1.23	1.24	1.25	1.24	1.28
Zn (HM)	t	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PCDD/F	g	0.59	0.59	0.60	0.60	0.59	0.61	0.60	0.61	0.62	0.63	0.63	0.64	0.64	0.65	0.64	0.67
Other activities																	
SOx	kt	8.11	7.01	6.68	7.15	6.97	6.65	6.24	5.94	5.42	4.91	4.76	4.54	4.66	4.53	4.27	4.11
NOx	kt	10.52	10.35	10.46	10.52	10.73	10.73	11.11	11.12	10.77	10.33	10.47	10.33	10.54	10.64	10.66	10.64
PM2.5	kt	4.84	4.63	4.47	4.20	5.09	4.31	4.09	3.95	3.03	3.09	3.57	2.99	2.73	2.74	2.38	2.25
NMVOC	kt	58.81	60.69	63.24	64.13	64.46	66.49	67.10	63.40	58.11	56.65	59.45	59.85	58.75	57.40	57.37	57.44
NH3	kt	7.68	7.64	8.08	8.13	7.99	7.96	7.64	7.46	7.25	6.94	7.09	7.10	7.00	7.06	7.06	7.20
Cd (HM)	kg	70.87	65.81	62.97	59.32	72.67	60.60	57.68	55.82	41.49	42.21	49.43	40.51	36.53	36.69	31.24	28.90
As (HM)	kg	104.43	101.87	104.06	111.81	110.62	110.06	110.65	111.37	106.87	102.36	104.7	102.3	106.48	106.77	108.13	108.44
Cr (HM)	kg	193.04	165.64	171.13	170.91	203.70	170.06	164.20	168.21	120.28	118.07	136.7	114.5	102.19	104.44	91.87	83.52
Cu (HM)	t	1.47	0.85	1.17	1.45	1.58	1.32	1.34	1.63	1.04	0.90	1.00	0.91	0.78	0.85	0.82	0.71
Pb (HM)	kg	307.33	293.14	274.70	253.28	314.01	261.30	247.43	234.35	176.65	182.09	214.4	174.0	157.44	157.18	131.97	122.86
Hg (HM)	kg	17.72	17.44	17.30	18.34	18.00	17.95	18.08	18.06	17.38	16.80	17.20	16.80	17.48	17.40	17.68	17.69
Ni (HM)	t	0.45	0.39	0.40	0.39	0.46	0.39	0.38	0.38	0.27	0.27	0.31	0.26	0.24	0.24	0.21	0.19
Zn (HM)	t	1.29	0.92	1.08	1.21	1.37	1.15	1.14	1.29	0.86	0.79	0.89	0.78	0.68	0.72	0.68	0.60
PCDD/F	g	0.51	0.50	0.50	0.53	0.52	0.52	0.52	0.52	0.50	0.49	0.50	0.49	0.51	0.51	0.52	0.52

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