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EEA-33 Industrial Emissions Country Profiles

Methodology report

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Authors:
Torleif Weydahl (NILU), Katrina Young (Aether)
Kathryn Hampshire (Aether), Justin Goodwin (Aether)
Marthe Granger (EEA), Bastian Zeiger (EEA)

ETC/ATNI consortium partners:
NILU – Norwegian Institute for Air Research, Aether Limited, Czech Hydrometeorological Institute (CHMI), EMISIA SA, Institut National de l'Environnement Industriel et des risques (INERIS), Universitat Autònoma de Barcelona (UAB), Umweltbundesamt GmbH (UBA-V), 4sfera Innova, Transport & Mobility Leuven NV (TML)

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Authors
Torleif Weydahl (NILU), Katrina Young (Aether),
Kathryn Hampshire (Aether), Justin Goodwin (Aether),
Marthe Granger (EEA), Bastian Zeiger (EEA).

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European Topic Centre on Air pollution,
transport, noise and industrial pollution
c/o NILU – Norwegian Institute for Air Research
P.O. Box 100, NO-2027 Kjeller, Norway
Tel.: +47 63 89 80 00
Email: etc.atni@nilu.no
Web : https://www.eionet.europa.eu/etcs/etc-atni

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Contents

Summary

The industrial emissions country profiles summarise key data related to industry: its relevance with respect to economic contributions, energy and water consumption, as well as air and water emissions and waste generation. The country profiles are developed for the EEA-33 countries which includes the 28 EU Member States together with Iceland, Lichtenstein, Norway, Switzerland and Turkey.

The present revision (v. 3.0) of this report includes data available at date of release. This year, a new reporting, the so-called EU-Registry and thematic data reporting, is introduced in order to gather the former E-PRTR, LCP and IED reportings and finally replace them. The 2018 data are not yet readily available. Nevertheless, more quality checks have been performed on the latest E-PRTR database in order to have the cleanest final E-PRTR dataset possible. Hence, the industrial emissions country profiles are enriched with the most up-to-date data sources while still only covering the years up to 2017.

This report describes the underlying methodology to the industrial emissions country profiles that are presented as a Tableau story on the EEA webpages ([1]). The scope of industry in this respect includes in short all industrial activities reported under the European Pollutant Release and Transfer Register (E-PRTR) excluding agriculture (activity code 7.(a) and 7.(b)). The data sources include Eurostat, the E-PRTR, greenhouse gas (GHG) emissions reported under the Monitoring Mechanism Regulation (MMR) and air pollutant emission inventories reported under the Convention on Long-range Transboundary Air Pollution (CLRTAP), each of which have their own data categories. A recently developed EEA-mapping which align these different categories is used ([2]). The data sources and industry scope is presented in full detail in the Annexes following this report.

The water and air pollutants including greenhouse gases are selected based on criteria related to their relative impact. Emissions of heavy metals to air and water have been combined by weighted averages using both eco toxicology and human toxicology characterisation factors ([3]). The amounts of hazardous and non-hazardous waste reported under Eurostat is presented, but excluding the major mineral waste that dominates the mining and construction sectors.

The data quality is evaluated and gap filling of Eurostat data is performed when needed. A method for E-PRTR outlier handling is proposed and applied where appropriate.

The significance of industry, given by gross value added (GVA), energy consumption and water use, as well as generation of waste are presented in the Tableau story as a sector percentage of EEA-33 gross total as well as percentage of country total. The trend in air and water pollution is presented as totals per pollutants relative to the latest year (2017). For the latest year the emissions are also given as percentage per sector relative to country total. The details on how the presented data is processed and aggregated is described in Annex 2.

Diffuse emissions and emissions to soil are not included in the country profiles due to limited data.

The report is to a large extent based on previous methodology reports for “Industrial pollution country profiles”, but is also further developed to reflect feedback received through Eionet review and general requests from EEA and the European Commission.

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[1] https://www.eea.europa.eu/themes/industry/industrial-pollution.

[2] https://cdr.eionet.europa.eu/help/nomenclature_emission.

[3] USEtox, 2017, 'USEtox (corrective release 2.1)' https://www.usetox.org/model/download/usetox2.1 accessed May 2019.

1 Introduction

Industrial pollution puts pressure on all environmental media (i.e. air, water, land and biota). These pressures are caused by emissions of different types of pollutants originating from a variety of industrial processes.

In order to better describe environmental pressures from industry, the European Environment Agency (EEA), together with the European Topic Centre on Air Pollution, Transport, Noise and Industrial Pollution (ETC/ATNI) and the previous ETC/ACM (European Topic Centre on Air pollution and Climate change Mitigation), have developed country profiles on industrial emissions in Europe ([4]). This report presents the methodology for developing the profiles and how the different pressures are quantified.

The aim of the country profiles is to provide insights into the key industrial pressures in the EEA member countries and, therefore, contribute to decision making. These country profiles can also be used to inform the research and scientific communities on data issues that prevent analysis and clear decision making. The profiles aim to monitor the progress of, and present findings on the state of industrial emissions. For the period of time 2007 to 2017 the addition of EEA-33 and EU-28 profiles enables a broader overview of industrial emissions in Europe.

2 Scope

This chapter outlines the scope of categories and pollutants included in the profiles. The scope has been designed to enable the consistent analysis of the emissions to air and water from industrial activities.

2.1 Definition of industry

There are different definitions of industry depending on the use of particular data sources and perspectives of interest. The questions tackled in this methodology report include whether or not 'industry' should be considered in its widest sense i.e. to include agriculture, transport associated with the movement of goods, transport associated with employees travelling to work, or waste generation and disposal.

First, however, it is useful to consider the different data sources available. These include Eurostat, the European Pollutant Release and Transfer Register (E-PRTR), greenhouse gas (GHG) emissions reported under the Monitoring Mechanism Regulation (MMR) and air pollutant emission inventories reported under the Convention on Long-range Transboundary Air Pollution (CLRTAP), each of which have their own data categories. As such, it is important to have a clear understanding of how these sources and categories relate to each other, and which categories should be included in 'industry'. The objective of this section is therefore to provide a transparent presentation of the scope of industry within the profiles.

The E-PRTR contains the data reported annually by industrial facilities that exceed capacity thresholds, and covers 65 economic activities within nine industrial sectors. These data cover pollutant releases to air, water and land (soil). This is the main data source for the profiles, because of the detailed level of reporting, the high spatial resolution and the fact that reporting is mandatory, annual, and with time series since 2007. It should be kept in mind that the data are a subset of total industry emissions, as they cover only emissions above certain thresholds that result from the activities covered. The E-PRTR also gives the emissions (greater than the thresholds) from industrial facilities being sent for treatment

[4] https://www.eea.europa.eu/themes/industry/industrial-pollution.

by wastewater treatment plants, so-called 'transfers' or 'indirect releases'. These emissions which are not directly released in the environment, are not considered in the country profiles (see also Section 2.2.4).

Data on economic activities within the European Union (EU) are grouped into categories based on the statistical classification of economic activities in the European Community (NACE), and are available from Eurostat. NACE coding is hierarchical and consists of a first-division level with an alphabetical code, and three further levels with two-, three- and four-digit numerical codes, respectively. The economic activities within the E-PRTR are used to select which economic activities within NACE should be used with regard to industry. Based on these considerations, NACE divisions B, C, D and E are included in industry as outlined in Table 2-1.

Table 2-1: NACE divisions.

NACE division code	NACE division name
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply, sewerage, waste management and remediation activities

National inventories of emissions to air are reported in separate national inventories for GHGs and air pollutants. Air pollutant emissions are reported under the Convention on Long-range Transboundary Air Pollution (CLRTAP) using Nomenclature for Reporting (NFR) categories. Greenhouse gas emissions are reported under the Monitoring Mechanism Regulation (MMR) to the EEA using Common Reporting Format (CRF) categories.

To ensure a consistent approach with regard to the activities included in 'industry', these data sources have been aligned using the mapping of industrial sectors developed by the EEA ([1]) in collaboration with the European Environment Information and Observation Network (EIONET) (2018 consultation). The EEA-mapping has been developed based on mapping all industrial categories following NFR, CRF, MMR, Annex I to the E PRTR regulation and the NACE divisions, to an overarching division of sectors and sub-sectors. The structure of industry sectors and sub-sectors covering the thematic scope of the country profiles are shown in Table 2-2. The exception is the EEA sector 'Energy supply' which is always presented as the main EEA sector. The less aggregated EEA sub-sectors are applied to the presentation of air and water pollutant emissions and waste data. The more aggregated EEA sectors are applied when presenting Gross Value Added (GVA), Energy consumption and water use.

Table 2-2: EEA sectors and sub-sectors covering the scope of the country profiles.

EEA sectors	EEA sub-sectors
Energy supply	Energy supply (*)
Extractive industry	Extractive industry
Manufacturing industry	Ferrous metal
	Non-ferrous metal
	Non-metallic minerals
	Chemicals
	Pulp, paper and wood
	Food and drink
	Other manufacturing
Waste	Waste management
	Wastewater treatment

(*) The sub-sectors for Energy supply from the EEA-mapping is not used.

The mapping table (Mapping Version 1) of the data sources is available on the EIONET Central Data Repository ([5]). The list of codes for these reporting systems included in the profiles is presented in Annex 1. A summary of what is included in the profiles is given in Box 2.1. An overview of the data sources used and the date when they have been accessed is provided in Table 2-3.

Box 2.1: Thematic scope of the profiles.

The scope of the country profiles spans multiple data sources, each with differing activity scope and coding systems. The activities included in the profiles are those falling into the categories of energy supply, extractive industry, waste (including waste management and wastewater treatment) and manufacturing industry (including ferrous and non-ferrous metals, non-metallic minerals, chemicals, pulp, paper and wood, food and drink and other manufacturing). A mapping of the categories and overview of how this has changed from the previous mapping is available in Annex 1. Some profiles also include the grouping "Non industry" (comprising all other activities) to provide context.

The energy used for transport related to these industries is not included (except pipelines for the transmission of energy). **Agricultural activities are also not included**, because of the often diffuse and country-specific nature of such data, which makes cross-comparisons inappropriate. **Major mineral waste, typically from Mining and quarrying and Construction, is excluded** from the waste analysis not to dominate the trend over other waste types and sectors.

The source codes of the data included are presented in Annex 1. In summary, these include:

- NACE divisions B, C, D and E
- NFR14 categories 1A1, 1A2, 1B, 2 (except 2A5b) and 5
- CRF 2006 categories 1A1, 1A2, 1B, 1C, 2 and 5 (except 5F)
- E-PRTR sectors: all except 7a, 7b

[5] https://cdr.eionet.europa.eu/help/nomenclature_emission.

Table 2-3: Data sources used for the country profiles, the latest year data available at the time of publishing.

Data source	Use	Reporting updates	Reference	Latest year data available for 2020 publication of the country profiles
Eurostat	Economy (GVA)	Annual	Eurostat (2020a)	2017
Eurostat	Energy consumption	Annual	Eurostat (2020b)	2017
Eurostat	Water use	Annual	Eurostat (2020c)	2016
Eurostat	Waste generation	Biennial	Eurostat (2020d)	2016
EEA	Emissions to air (CLRTAP)	Annual	EEA (2019a)	2017
EEA	Industry emissions to water and air (E-PRTR)	Annual	EEA (2020)	2017
EEA	GHG emissions (MMR)	Annual	EEA (2019b)	2017
International Energy Agency (IEA)	Industry energy consumption (gap-filling data)	Annual	IEA (2019)	2016
World Bank	Industry GVA (gap-filling data)	Annual	World Bank (2019a, 2019b)	2017
USEtox (release 2.11)	Eco toxicology and human toxicology characterisation factors	-	USEtox (2017)	

Data for all 33 EEA member countries (the 28 EU Member States (EU-28) together with Iceland, Liechtenstein, Norway, Switzerland and Turkey, known collectively as the EEA-33) are not always available from these data sources. Alternative data sources such as the International Energy Agency and the World Bank were used in such instances where possible (see Section 3.3 'Gap filling').

Exclusions

Within the initial scope of the E-PRTR sectors and NACE divisions B, C, D and E, some sectors have been excluded from the definition of industry. These exclusions are summarised below.

- Common Reporting Format (CRF) and NFR sector 3 — 'Agriculture' — has been excluded. The reasons for this exclusion are as follows: for specific substances (especially nutrients), agricultural discharges will be difficult to quantify, and relatively difficult to compare among the countries because of local conditions, monitoring efforts and different quantification methods.
- E-PRTR sectors 7a and 7b — 'Installations for the intensive rearing of poultry or pigs' and 'Intensive aquaculture' — have been excluded. These were excluded as they constitute activities which, e.g. in the NFR classification, are attributed to a sector different from the industry sector.
- CRF sector 5F – "Long-term C storage". This is a memo item (reported but not included in the national total emissions), and is not consistently reported across countries.
- NFR14 activity 2A5b – "Construction and demolition". This is categorised as a Residential & Commercial activity under the EEA mapping ([1])
- NACE activity E36 – "Water collection, treatment and supply". This is categorised as a Residential & Commercial activity under the latest EEA mapping. The exclusion of E36 is only feasible for GVA. For Waste, Energy and Water use it is combined with other categories and cannot be separated without excluding other categories that is included in the definition of industry.

The E-PRTR category 5f – 'Urban Waste Water Treatment Plants' (UWWTP) is included in the profiles in order to have the overall industrial emissions to water represented, even though only a limited part of the waste water released by UWWTP originate from industrial waste water.

2.2 Pollutants considered

The overall focus is on pollutants under specific industrial legislation. The profiles therefore do not track emerging pollutants. The pollutants included in this analysis have been determined based on multiple criteria, and are presented in Table 2-4 for air and Table 2-5 for water.

2.2.1 Air pollutants

Four factors were considered with regard to the inclusion of air pollutants. To be included in the profiles, pollutants must first meet the policy-related criteria (it must be included in a relevant piece of legislation). It must then meet at least one of the subsequent pressures and impacts criteria which relate to specific challenges posed by a pollutant. Finally, the quality of the data on the pollutant must be acceptable. In summary, for inclusion in the profiles:

Policy criteria

P1: the pollutant must be covered by the Industrial Emissions Directive (IED) (EC, 2010)([6])

and

Pressures/Impacts criteria

P/I1: more than half of the emissions of the pollutant to air must have occurred within industry for at least one year between 2007 and 2017, calculated as a percentage of industry emission data (E-PRTR) of total emissions in national inventories (LRTAP);

or

P/I2: the proportion of the pollutant's emissions to air within industry must be increasing (E-PRTR industry emissions as a percentage of national inventories, since 2007);

or

P/I3: the pollutant must be responsible for the largest aggregate damage-associated costs by industrial facilities (calculated by the EEA (2014) report *Costs of air pollution from European industrial facilities 2008–2012*) ([7]).

SOER: reported in E-PRTR by >=5% of facilities in EEA sector, SOER aggregation or EEA sub-sector (2007-2011 average)

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[6] EC, 2010, Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:334:0017:0119:en:PDF) accessed May 2019.

[7] EEA, 2014, *Costs of air pollution from European industrial facilities 2008–2012*. EEA Technical report No 20/2014, European Environment Agency (http://www.eea.europa.eu/publications/costs-of-air-pollution-2008–2012) accessed May 2019.

Polychlorinated biphenyls (PCBs) are not included in the profiles because of the poor quality of data reported in the E-PRTR. Table 2-4 summarises the air pollutants that are included in the country profiles with the pressures/impacts criteria met. The heavy metals are evaluated against the pressure/impacts criteria as a pollutant group not as individual pollutants.

Dioxins and Furans (PCDD and PCDF) and Polycyclic aromatic hydrocarbons (PAHs) are included because they are considered as key pollutants in the European environment state and outlook report (SOER) ([8]). The pollutant reported in E-PRTR by 5% or more of facilities in EEA sector, SOER aggregation or EEA sub-sector (2007-2011 average) is then considered of relevance with regard to the historical background. However, the pollutants are only presented on the EU-level (EEA33 and EU28) because there are too few E-PRTR facilities concerned to have it relevant at a national level.

The heavy metals emissions to air are grouped by taking the weighted sum using the USEtox characterisation factors ([9]) as given in Table 2-4. The heavy metals are presented both as a weighted sum of human toxicity and eco toxicity factors to illustrate both the ecosystem and human impact. The Ecotox CF is the endpoint eco toxicity characterisation factor (Em.airU) given as the potentially disappeared fraction of species per kilogram emitted [PDF.m3.day/$kg_{emitted}$]. The Human tox CF is the endpoint human health characterization factor for rural air (cancer and non-cancer) given as the disability-adjusted life year per kilogram emitted [DALY/$kg_{emitted}$]. The factors are from the USEtox release version 2.11. The following assumption has been made: air emissions were assumed to be to continental rural air.

Due to the relatively high USEtox factor on Copper and compounds (as Cu), the country profiles emission trends for Heavy metals will be dominated by the trends in Copper emissions when considering eco toxicity. When considering human toxicity, the emissions trends for Heavy metals will be dominated by Mercury. For Chromium (Cr) the USEtox factors distinguish between trivalent Chromium, Cr(III), which is relatively harmless and Hexavalent Chromium, Cr(VI), which is highly toxic. This division is not taken into account in the reported E-PRTR and CLRTAP emission. A ratio of Cr(VI) to Cr(Total) of 14% in industrial emissions is proposed based on a study ([10]) on power plants. Due to the lack of knowledge about the ratio of As(III) and As(V) in industrial emissions, a flat average of the two USEtox factors is used as an approximation. As(III) and As(V) have the same Human toxicity CF for emissions to air.

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[8] EEA, 2015, The European environment: state and outlook 2015, European Environment Agency (http://www.eea.europa.eu/soer) accessed May 2019.
[9] USEtox, 2017, 'USEtox (corrective release 2.1)' https://www.usetox.org/model/download/usetox2.1 accessed May 2019.
[10] French et al., 1998, Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units -- Final Report to Congress. Sustainability 2019, 11(6), 1655. https://doi.org/10.3390/su11061655.

Table 2-4: Air pollutants included in the industrial country profiles.

Pollutant	Abbre-viation	Ecotox CF [PDF.m3.day / $kg_{emitted}$]	Human tox CF [DALY / $kg_{emitted}$]	Group	Pressures/Impacts criteria met
Nitrogen oxides	NOx	-	-	Air pollutant	P/I2, P/I3
Non-methane volatile organic compounds	NMVOCs	-	-	Air pollutant	P/I2, P/I3
Particulate matter	PM_{10}	-	-	Air pollutant	P/I1
Sulphur dioxide	SO_2	-	-	Air pollutant	P/I1, P/I3
Arsenic and compounds (as As)	As	5.08E+03 (*)	4.96E-02	Heavy Metal	P/I1, P/I2
Cadmium and compounds (as Cd)	Cd	4.03E+05	2.00E-01		
Chromium and compounds (as Cr)	Cr	3.77E+03 (**)	5.30E-03 (**)		
Copper and compounds (as Cu)	Cu	1.82E+06	9.19E-05		
Lead and compounds (as Pb)	Pb	1.40E+02	4.38E-02		
Mercury and compounds (as Hg)	Hg	5.28E+03	3.62E+00		
Nickel and compounds (as Ni)	Ni	5.32E+04	1.26E-03		
Zinc and compounds (as Zn)	Zn	2.52E+04	1.60E-02		
Dioxins and Furans (as Teq)	PCDD + PCDF	-	-	Chlorinated organics	P/I1
Polycyclic aromatic hydrocarbons	PAHs	-	-	Other organic substances	in SOER

(*) The factor proposed is a flat average between As(III) and As(V).
(**) A ratio of Cr(VI) to Cr(Total) of 14% is used to estimate the average USEtox factor. The factor for Cr(VI) is 8 orders of magnitude larger than Cr(III).
Data sources
P1 = EC (2010).
P/I1, P/I2 = EEA (2019a and 2019b).
P/I3 = EEA (2014).
SOER= EEA(2015).

2.2.2 Greenhouse gases

To be included in the profiles, greenhouse gases (GHGs) must be covered by EU Emissions Trading Directive (EC, 2003) ([11]) and the Monitoring Mechanism Regulation (EC, 2013) ([12]). The total greenhouse gases reported as CO_2-equivalent under the MMR is used in the country profiles. This includes besides CO_2, methane (CH_4), hydrofluorocarbons (HFCs), nitrous oxide (N_2O) and some fluorine containing gases. CO_2-equivalent of components besides CO_2 account for about 18 percent of the total greenhouse gas emission in the EU-28 over the years 2013-2017 where CH_4 accounts for about 10 percent and N_2O about 5 percent . Some of the minor F-gases are reported by a reduced number of countries, but the contribution to the total greenhouse gas emissions in CO_2-equvivalents is overall very small (about 2 to 3 percent). The CO_2-eqivalent is based on the 100-year Global Warming Potential (GWP100) which is adopted by the UNFCCC ([13]).

[11] EC, 2003, Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32003L0087) accessed May 2019.
[12] EC, 2013, Regulation No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013R0525) accessed May 2019.
[13] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

2.2.3 Water pollutants

Four factors were considered with regard to the inclusion of water pollutants. For inclusion in the profiles, pollutants must first meet the policy-related criteria and then at least one of the subsequent pressures and impacts criteria, and the quality of the data on the pollutant must be acceptable. In summary, for inclusion in the country profiles:

Policy criteria

P1: the pollutant must be covered by the IED (EC, 2010) ([6]), the Water Framework Directive (WFD) (EC, 2000) ([14]) or the OSPAR (Convention for the Protection of the Marine Environment of the North-East Atlantic) list of chemicals for priority action;

and

Pressures/Impacts criteria

P/I1: the pollutant must be highlighted as having a potentially significant impact on health in water (determined through the toxicity, bioavailability and bioaccumulation potential);

or

P/I2: the pollutant must have significant eutrophication impacts on water and ecosystems;

or

P/I3: the substance must affect the oxygen balance of water.

The WFD's list of priority substances covers 45 substances or groups of substances, of which 21 are priority hazardous substances (EC, 2013) ([15]). In 2018 there have been several activities to review and discuss the Water Framework Directive, including a two year initiative to support exchange between experts and Competent Authorities for the improvement of the Water Framework Directive ([16]). Although the E-PRTR covers the WFD priority substances, and other substances, the data quality and consistency of reporting across countries is sufficient for only a small selection of water pollutants. Pollutants outside this selection are not included in the profiles because of the poor quality of the data reported in the E PRTR. For this reason polycyclic aromatic hydrocarbons (PAHs) and dioxins and furans are not reported as national profiles. Still, PAHs have sufficient data quality to be given on an EU-level (EEA33 and EU28).

Table 2-5 summarises the water pollutants that are included in the profiles with the pressures/impacts met. The heavy metals are evaluated against the pressure/impacts criteria as a pollutant group not as individual pollutants. It must be emphasised that this list of pollutants does not cover numerous organic pollutants, pesticides and emerging compounds, such as pharmaceuticals and micro plastics.

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[14] EC, 2000, Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32000L0060) accessed May 2019.

[15] EC, 2013, Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy Text with EEA relevance, (https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32013L0039) accessed August 2019.

[16] http://ec.europa.eu/environment/water/index_en.htm.

Agriculture, which is the main sector for pesticides emissions, is also not considered as part of the industry sector in the profiles.

Table 2-5: Water pollutants included in the industrial country profiles.

Pollutant	Abbre-viation	Ecotox CF [PDF.m3.day / $kg_{emitted}$]	Human tox CF [DALY / $kg_{emitted}$]	Group	Pressures/ Impacts criteria met
Arsenic and compounds (as As)	As	1.39E+04 (*)	7.21E-02	Heavy Metal	P/I1
Cadmium and compounds (as Cd)	Cd	1.14E+06	1.29E-02		
Chromium and compounds (as Cr)	Cr	2.52E+04 (**)	5.01E-02 (**)		
Copper and compounds (as Cu)	Cu	4.96E+06	3.69E-07		
Lead and compounds (as Pb)	Pb	3.44E+02	1.38E-04		
Mercury and compounds (as Hg)	Hg	1.10E+04	5.02E-02		
Nickel and compounds (as Ni)	Ni	1.49E+05	1.39E-03		
Zinc and compounds (as Zn)	Zn	6.66E+04	7.13E-04		
Total nitrogen	Tot-N	-	-	Inorganic substances	P1, P/I2
Total phosphorus	Tot-P	-	-	Inorganic substances	P1, P/I2
Total organic carbon	TOC			Organic substances	P1, P/I3
Polycyclic aromatic hydrocarbons	PAHs			Inorganic substances	P1, P/I2

(*) The factor proposed is a flat average between As(III) and As(V).
(**) A ratio of Cr(VI) to Cr(Total) of 44% is used to estimate the average USEtox factor. The factor for Cr(VI) is 9 orders of magnitude larger than Cr(III).
Data sources
P1 = EC (2010); OSPAR (2014); EC (2000).
P/I1 = WHO (2010); OSPAR (2014).
P/I2, P/I3 = EC (2000).

The heavy metals emissions to water are grouped by taking the weighted sum using the USEtox characterisation factors as given in Table 2-5. The heavy metals are presented both as a weighted sum of human toxicity and eco toxicity factors to illustrate both the ecological and human impact. The Ecotox CF factors are the endpoint eco toxicity characterisation factor (Em.fr.waterC) given as the potentially disappeared fraction of species per kilogram emitted [PDF.m3.day/$kg_{emitted}$]. The Human tox CF factors in are the endpoint human health characterization factor for contaminated freshwater (cancer and non-cancer) given as the disability-adjusted life year per kilogram emitted [DALY/$kg_{emitted}$]. The following assumption has been made: water emissions were assumed to be to continental fresh water.

Due to the relatively high USEtox factor on Copper and compounds (as Cu), the country profiles emission trends for Heavy metals to water will be dominated by the trends in Copper emissions when considering eco toxicity. For Chromium (Cr) the USEtox factors distinguish between trivalent Chromium, Cr(III), which is relatively harmless and Hexavalent Chromium, Cr(VI), which is highly toxic. This division is not taken into account in the reported E-PRTR and CLRTAP emission. A ratio of Cr(VI) to Cr(Total) of 44% in industrial emissions is proposed based on a recent study ([17]). Due to the lack of knowledge about the ratio of As(III) and As(V) in industrial emissions, a flat average of the two USEtox factors is used as an approximation. As(III) and As(V) have the same Human toxicity CF for emissions to water.

[17] Hedberg et al., 2019, Improving the Life Cycle Impact Assessment of Metal Ecotoxicity: Importance of Chromium Speciation, Water Chemistry, and Metal Release. Sustainability 2019, 11(6), 1655. https://doi.org/10.3390/su11061655.

2.2.4 Waste

Waste can be seen as any substance or object which the holder discards or intends / is required to discard. As per the Waste Directive adopted in 2018, it can also be seen as a resource through reuse and recycling. The Directive therefore dictates that waste management should be transformed into sustainable material management ([18]). The country profiles cover all waste generated by the relevant sectors, which is treated in a variety of ways including recovery, incineration and landfill (among others). The 'major mineral waste' is, however, excluded from the profiles. This is the very large quantities from the mining and construction (demolition) operations, which when included dominate the contribution from other sectors. For EU-28, about 65% of the total waste mass is 'major mineral waste'. Although the quantity of waste undergoing different end-of-life treatments is an important issue, the profiles do not distinguish between the different treatment types because the focus is on level of waste generation by different sectors.

However, the profiles do group waste materials into two hazard levels: hazardous waste and non-hazardous waste. Materials classified as non-hazardous are easier to re-use, recycle and treat than hazardous waste. Hazardous waste include those materials and products that contain hazardous substances and can pose a risk to health or the environment if not managed and disposed of correctly. The Waste Directive states that measures to reduce the contents of hazardous substances in materials and products should be promoted. The properties of waste that render it hazardous are defined in Annex III of the Waste Directive and include, inter alia, explosive, flammable, toxic and carcinogenic properties. ([19])

The E-PRTR also include data on waste, however, waste transfers only, i.e. off-site movement of waste. This means that all waste that is managed on-site is not reported to the E-PRTR. In addition the reporting thresholds in E-PRTR excludes waste transfers below 2 000 tonnes (for non-hazardous waste) and 2 tonnes (for hazardous waste) and only the larger industrial facilities are included. Hence, the Eurostat data is more complete and therefore used for the country profiles. ([20])

2.2.5 Soil pollutants

Under E-PRTR, releases to soils are reported in few cases only, and after 2014, only for 4 of the EEA33 countries. No other inventory gives complete dataset. Soil pollutants may be defined and included in future versions of the profiles.

3 Data quality

3.1 General considerations

E-PRTR

The quality of the data reported to the E-PRTR is the responsibility of operators and national competent authorities. However, the EEA, with the ETC/ATNI, quality-checks the E-PRTR data set.

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[18] EC, 2018, Directive 2018/851/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives. (https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1530001632550&uri=CELEX:32018L0851) accessed May 2019.

[19] Note that the relatively large quantities of hazardous waste from the Estonian Energy sector is from shale oil extraction producing a lot of combustion waste (bottom- and fly ashes).

[20] https://www.eea.europa.eu/data-and-maps/indicators/industrial-waste-indicator/assessment-1.

While the E PRTR provides comprehensive information on emissions from large industrial sources, the completeness and consistency of reporting across countries varies. The overall accuracy can be compromised by a small number of significant outliers. Further improvements in the data quality would increase the robustness of the fact sheet data.

Moreover, only industrial operators meeting certain activity and emissions thresholds are captured in E-PRTR data.

Water emissions

Although there are a number of reporting obligations with regard to water emissions, none of the current databases cover all relevant sources and pathways of pollutants to water. As such, it is not possible to compare the industrial discharges to water with the total discharges from all economic activities on a regular basis. For this reason, we can only compare emissions to water from each industrial sub-sector with total *industrial* emissions to water (from the E-PRTR), rather than comparing it to overall emissions to water. Therefore, the significance of industry with regard to water emissions as a whole cannot be assessed.

The WFD's daughter directive's (EC, 2013) list of priority substances covers 45 substances or groups of substances, of which 21 are priority hazardous substances. Some of these have been excluded from the country profiles because of the poor quality of the data reported in the E-PRTR. For a more accurate representation of industrial emissions to water, an effort in the reporting of more complete and reliable data in the E-PRTR will have to be done.

3.2 A method for handling outlier E-PRTR data

The E-PRTR is based on data reported from the EU Member States to the EEA. The E-PRTR data collection process involves several steps of quality control and assurance. Nevertheless, data that are likely to result from erroneous reporting can still remain in the E-PRTR. Through the evaluation process of the country profiles, it has been proposed to have a mechanism for removing such outliers before the data are presented in the profiles.

A method for outlier handling has been applied to the E-PRTR dataset:

1. Consider the trend in air and water pollutants for each country as a total and identify sudden changes between years.
2. Investigate if there is a single facility behind possible sudden changes that are identified
3. Check if this facility is part of the Findings-log from the E-PRTR review process, and if it contains information that explains the behaviour.
4. Based on the E-PRTR findings-log and/or a general expert judgement whether the sudden change is likely, the facility and emissions are added to the list of outliers.
5. A new value replaces the value considered to be an outlier on the basis of the previous value reported by the same facility or the value that would correspond a change of units if the issue identified is a unit mistake.
6. A table of outliers and replacing values will be proposed, EEA project manager verifies and approves, and then the list is posted in the ETC website for reference by the country profiles as a link in a generic note to the graphs that documents that some values have been replaced due to the outlier checking.

The outlier handling procedure will be limited to outliers of a magnitude such that they influence the trends of the total EU-28 or EEA-33. A file listing the outliers is available for download.

3.3 Gap filling

The aim of the country profiles is to cover industrial emissions in all EEA-33 countries ([21]). A profile for the EEA-33 and EU-28 is also provided. However, not all of the data sources cover all of the countries. If data are missing, a gap-filling methodology was followed.

Final energy consumption — industry

The International Energy Agency's ([22]) energy balances can be used as an alternative data source for the countries with no data in Eurostat. The scope of industry with regard to the IEA data is the same as Eurostat data, except that construction data are also included in the IEA data. It is not possible to remove these construction data in order to match the scopes completely. No Eurostat or IEA data were available for Liechtenstein.

2017 data was available for all countries but Liechtenstein at the time of publishing, hence no gap filling was needed for Energy consumption.

Water use by sector

For almost all countries, the time-series Eurostat data for water use in industrial sectors and total water use are incomplete or missing. For each supply source (public water supply and/or self and other water supply), data from the latest available year were used. To avoid inconsistency, data for total water use and water use per NACE sector was taken from the same year and not extrapolated between years. The selected years are summarized in Table 3-1. If the Eurostat data are insufficient to calculate an industry water use as percentage of total use ('public water use' *and* 'self and other water supply'), the industry water use is reported as 'None'. This applied to Austria, Cyprus, Denmark, Finland, Hungary, Iceland, Ireland, Italy, Luxembourg, Norway, Slovakia, Portugal, Romania and United Kingdom . No data is reported for Liechtenstein.

[21] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

[22] IEA, 2019, Sankey, 'Final energy consumption' (http://www.iea.org/Sankey/index.html) accessed 14 August 2018.

Table 3-1 Selected year and available data sources for water use. The EEA-33 countries not listed here have not sufficient data in Eurostat to estimate an industry water use percentage.

Country	Data from year	Supply sources available in Eurostat
Belgium	2016	Public water supply and self and other water supply
Bulgaria	2016	Public water supply and self and other water supply
Croatia	2009 / 2016	Public water supply / self and other water supply
Czechia	2016	Public water supply and self and other water supply
Estonia	2016	Public water supply and self and other water supply
Germany	2016	Public water supply and self and other water supply
Greece	2016	Public water supply and self and other water supply
Netherlands	2016	Public water supply and self and other water supply
Spain	2016	Public water supply and self and other water supply
Switzerland	2012	Public water supply and self and other water supply
Sweden	2015	Public water supply and self and other water supply
Turkey	2010	Public water supply and self and other water supply
Latvia	2016	Public water supply and self and other water supply
Lithuania	2016	Public water supply and self and other water supply
Poland	2016	Public water supply and self and other water supply
Slovenia	2016	Public water supply and self and other water supply
Malta	2016	Public water supply and self and other water supply

Gross value added by sector

For those countries for which data were absent or incomplete, an alternative data source, the World Bank, was used. Two indicators were combined to obtain the industry GVA. National gross domestic product (GDP) was obtained from World Bank data ([23,24]) and converted into millions of euros using average annual USD to EUR exchange rates from AMECO (2019). The second data set, industry as a percentage of national GDP, was used to calculate industry GVA in millions of euros. Non-industry GVA was calculated by subtracting this industry GVA from national GDP. The World Bank's definition of industry is the same as Eurostat's, except that construction is also included in the World Bank's definition. 'Industry total' was the most detailed level of data available, so it was not possible to remove these construction data in order to match the scopes completely. Gap-filling based on this procedure was performed for Liechtenstein, Malta and Turkey.

For these countries, the alternative data are indicated in the profiles by showing only the allocation to 'Industry (no detail)'. It is evaluated if the NACE sector division (in percentage) from previous year Eurostat data can be applied in addition.

For United Kingdom, some data are missing for some of the NACE activities in the Eurostat data for 2017. A linear extrapolation calculation was performed using the trend from 2013 through 2016.

[23] World Bank, 2019a, 'Industry, value added (% of GDP)', (http://goo.gl/k23F3g) accessed May 2019.
[24] World Bank, 2019b, 'GDP at market prices (current US$)', (http://goo.gl/Bme8GU) accessed May 2019.

Waste generation data

Waste generation data from Eurostat is updated every two years, the last update including 2016 data which is available for all EEA-33 countries. The directive 2008/98/EC on waste ([25]), which first was fully implemented for the 2010 reporting, had significant influence on how waste is reported to EEA. Hence for consistency, only time series from 2010 to 2016 is considered in the profiles.

GVA data for some industry NACE categories and countries are marked as confidential. Hence, gap-filling was performed when needed for the non-industry sectors and then the remaining 'industry (no detail)' sector was calculated based on Total minus all other industry and non-industry sectors. A linear extrapolation calculation or a linear interpolation was performed to cover the missing non-industry data.

The gap-filling procedure was applied to Austria, Croatia, Liechtenstein, Norway, Poland and Sweden. A file listing the gap-filled data is available for download.

E-PRTR emissions

Gap-filling was not performed for the E-PRTR data. Turkey does not report to the E-PRTR. Croatia, an EU Member State since 2013, reported for the first time to the E PRTR in 2016, and emission data no earlier than 2014 data is available for Croatia. No data were available for Liechtenstein.

4 Presentation of data

This chapter gives a short overview of the data presentation in the Tableau story. The details on how data is extracted and aggregated for presentation is given in Appendix 2.

4.1 Significance of industry

This section highlights how important industry is for each country's economy. The graphs in the country profiles present information on the size of different industrial sectors in each country in terms of GVA, energy consumption and water use.

The two key parameters for each driver in this section, using energy consumption as the example industrial driver, are 'percentage of total energy consumption' and 'percentage of country energy consumption', as summarised below.

Percentage of total energy consumption in EEA-33

This represent the industrial energy consumption per sector compared to the other EEA-33 countries.

Percentage of the country energy consumption

This represent the share of the industrial energy consumption in the total energy consumption for the concerned country. This provides an overview of the significance of industrial energy consumption across all sectors within the selected country.

[25] EC, 2000, Directive 2008/98/EC of 19 November 2008 on waste (replaced by 2018/851/EC). https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0098&from=EN, accessed May 2019.

4.2 Industrial emissions to air and water

Some key parameters are used for all media to provide insights into the state of industrial emissions in the EEA countries.

Contribution of industry to a country's total emissions

Emissions from industrial activities are calculated as a percentage of the overall emissions of the country for each pollutant. For air emissions the country total reflect both industry and non-industry sectors, while for water emissions the country total is industry sectors only, due to the availability of the data. This is because the last year water emissions are based on E-PRTR, which is limited in scope to industry emissions, while the last year air emissions are based on CLRTAP data which has a broader scope.

The trend in industrial air emissions

The trend in the industrial emissions per pollutant is calculated as an index relative to the latest year. The trend is based on E-PRTR data and presented for all sectors combined, i.e., one trend line per pollutant.

4.3 Production of waste

All presentations of waste are given separately for hazardous and non-hazardous waste.

Percentage of total waste generated in EEA-33

This represent the waste generated by industry and non-industry per sector compared to the other EEA-33 countries.

Percentage of the country waste per sector

This represent the share of the industrial and non-industrial waste in the total quantity of waste generated by the selected country. This provides an overview of the significance of industrial waste across all sectors within the selected country.

The trend in waste

The trends in the waste generated are calculated as an index relative to the latest year. The trends are presented per industry sector and for the non-industry categories.

5 Closing remarks

The aim of the country profiles is to provide some insights into the main pressures on environment exerted by industrial activities for the EEA member countries and, therefore, contribute to decision making. In order to get closer to the effect of the industrial emissions, the final pressure from pollutant emissions to eco systems and humans has been considered for heavy metals through the USEtox factors.

The scope of industry includes UWWTP, which may lead to an over-estimation of industrial emissions. A reflexion will be conducted for the next revision.

Dioxins and furans and PAHs have been added to the list of pollutants considered in the profiles. However, the data quality is poor for many countries and these pollutants are only presented on an EU level.

Data on water use is limited for many countries, and the industrial share of water use is only calculated for 17 of the EEA-33 countries. In future versions, some improvements of the data sources will be sought.

Industry is a major contributor to soil contamination in Europe, in many cases via emissions to air. There is a lack of completeness in soil data for countries within the EEA-33, which limits the analysis of soil emission trends ([26]). The inclusion of emissions data may be developed in future versions of the country profiles.

[26] EEA, 2015, The European environment: state and outlook 2015, European Environment Agency (http://www.eea.europa.eu/soer) accessed May 2019.

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7 Units, abbreviations and acronyms

As	Arsenic
Cd	Cadmium
CF	characterisation factor
Cr	Chromium
Cu	Copper
CLRTAP	Convention on Long-range Transboundary Air Pollution
CO_2	Carbon dioxide
CRF	Common Reporting Format
DALY	Disability-adjusted life year
EEA	European Environment Agency
EEA-33	The 33 European Environment Agency member countries (the 28 European Union Member States together with Iceland, Liechtenstein, Norway, Switzerland and Turkey)
Eionet	European Environment Information Network
E-PRTR	European Pollutant Release and Transfer Register
ETC/ACM	European Topic Centre for Air Pollution and Climate Change Mitigation
ETC/ATNI	European Topic Centre on Air Pollution, Transport, Noise and Industrial Pollution
EU	European Union
EU-28	The 28 European Union Member States
GDP	Gross domestic product
GHG	Greenhouse gas
GVA	Gross value added
GWP	Global Warming Potential
Hg	Mercury
IEA	International Energy Agency
IED	Industrial Emissions Directive
MMR	Monitoring Mechanism Regulation
NACE	Statistical classification of economic activities in the European Community
NFR	Nomenclature for Reporting
Ni	Nickel
NMVOC	Non-methane volatile organic compound
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
Pb	Lead
PAH	Polycyclic aromatic hydrocarbons
PCDD	Dioxins
PCDF	Furans
PDF	Potentially disappeared fraction of species
PNEC	Predicted no effect concentration
SO_2	Sulphur dioxide
SO_x	Sulphur oxides
TOC	Total organic carbon
Tot-N	Total nitrogen
Ton-P	Total phosphorous
WFD	Water Framework Directive
Zn	Zinc

Annex 1
Scope of industry across datasets

Annex 1 Scope of industry across datasets

Table A1.1 presents the list of codes used to extract data from Eurostat (NACE codes), the E-PRTR, the CLRTAP (NFR codes) and the MMR (CRF codes).

The NACE codes listed are all of those beneath divisions B, C, D and E. There are different levels of activity, for example B05.1 is a subset of B05, but no double counting occurs as each facility reports only one NACE code.

Table A1.1 Industry codes.

E-PRTR sector codes	
1a	Mineral oil and gas refineries
1b	Installations for gasification and liquefaction
1c	Thermal power stations and other combustion installations (>50 MW)
1d	Coke ovens
1e	Coal rolling mills
1f	Installations for the manufacture of coal products and solid smokeless fuel
2a	Metal ore roasting or sintering installations
2b	Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting
2c	Installations for the processing of ferrous metals
2d	Ferrous metal foundries
2e	Installations for non-ferrous metals
2f	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process
3a	Underground mining and related operations
3b	Opencast mining and quarrying
3c	Installations for the production of cement clinker and lime in rotary kilns
3d	Installations for the production of asbestos and the manufacture of asbestos-based products
3e	Installations for the manufacture of glass, incl. Glass fibre
3f	Installations for melting mineral substances, incl. The production of mineral fibres
3g	Installations for the manufacture of ceramic products by firing
4a	Chemical installations for the production on an industrial scale of basic organic chemicals
4b	Chemical installations for the production on an industrial scale of basic inorganic chemicals
4c	Chemical installations for the production on an industrial scale of fertilisers
4d	Installations using a chemical or biological process for the production on an industrial scale of basic plant health products and of biocides
4e	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products
4f	Installations for the production on an industrial scale of explosives and pyrotechnic products
5a	Installations for the disposal or recovery of hazardous waste
5b	Installations for the incineration of non-hazardous waste
5c	Installations for the disposal of non-hazardous waste
5d	Landfills
5e	Installations for the disposal or recycling of animal carcasses and animal waste
5f	Urban waste-water treatment plants
5g	Independently operated industrial wastewater treatment plants
6a	Industrial plants for the production of pulp from timber or similar fibrous materials
6b	Industrial plants for the production of paper and board and other primary wood products
6c	Industrial plants for the preservation of wood and wood products with chemicals
8a	Slaughterhouses

E-PRTR sector codes	
8b	Treatment and processing intended for the production of food and beverage products from animal raw materials other than milk; from vegetable raw materials
8c	Treatment and processing of milk
9a	Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles
9b	Plants for the tanning of hides and skins
9c	Installations for the surface treatment of substances, objects or products using organic solvents
9d	Installations for the production of carbon (hard-burnt coal) or electrographite by means of incineration or graphitization
9e	Installations for the building of, and painting or removal of paint from ships

Eurostat NACE name	
B05	Mining of coal and lignite
B05.1	Mining of hard coal
B05.2	Mining of lignite
B06	Extraction of crude petroleum and natural gas
B06.1	Extraction of crude petroleum
B06.2	Extraction of natural gas
B07	Mining of metal ores
B07.1	Mining of iron ores
B07.2	Mining of non-ferrous metal ores
B07.21	Mining of uranium and thorium ores
B07.29	Mining of other non-ferrous metal ores
B08	Other mining and quarrying
B08.1	Quarrying of stone, sand and clay
B08.11	Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate
B08.12	Operation of gravel and sand pits; mining of clays and kaolin
B08.9	Mining and quarrying n.e.c.
B08.91	Mining of chemical and fertiliser minerals
B08.92	Extraction of peat
B08.93	Extraction of salt
B08.99	Other mining and quarrying n.e.c.
B09	Mining support service activities
B09.1	Support activities for petroleum and natural gas extraction
B09.9	Support activities for other mining and quarrying
B09.90	Support activities for other mining and quarrying
C10	Manufacture of food products
C10.1	Processing and preserving of meat and production of meat products
C10.11	Processing and preserving of meat
C10.12	Processing and preserving of poultry meat
C10.13	Production of meat and poultry meat products
C10.2	Processing and preserving of fish, crustaceans and molluscs
C10.3	Processing and preserving of fruit and vegetables
C10.31	Processing and preserving of potatoes
C10.32	Manufacture of fruit and vegetable juice
C10.39	Other processing and preserving of fruit and vegetables
C10.4	Manufacture of vegetable and animal oils and fats
C10.41	Manufacture of oils and fats
C10.42	Manufacture of margarine and similar edible fats
C10.5	Manufacture of dairy products
C10.51	Operation of dairies and cheese making
C10.52	Manufacture of ice cream

Eurostat NACE name	
C10.6	Manufacture of grain mill products, starches and starch products
C10.61	Manufacture of grain mill products
C10.62	Manufacture of starches and starch products
C10.7	Manufacture of bakery and farinaceous products
C10.71	Manufacture of bread; manufacture of fresh pastry goods and cakes
C10.72	Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes
C10.73	Manufacture of macaroni, noodles, couscous and similar farinaceous products
C10.8	Manufacture of other food products
C10.81	Manufacture of sugar
C10.82	Manufacture of cocoa, chocolate and sugar confectionery
C10.83	Processing of tea and coffee
C10.84	Manufacture of condiments and seasonings
C10.85	Manufacture of prepared meals and dishes
C10.86	Manufacture of homogenised food preparations and dietetic food
C10.89	Manufacture of other food products n.e.c.
C10.9	Manufacture of prepared animal feeds
C10.91	Manufacture of prepared feeds for farm animals
C10.92	Manufacture of prepared pet foods
C11	Manufacture of beverages
C11.01	Distilling, rectifying and blending of spirits
C11.02	Manufacture of wine from grape
C11.03	Manufacture of cider and other fruit wines
C11.04	Manufacture of other non-distilled fermented beverages
C11.05	Manufacture of beer
C11.06	Manufacture of malt
C11.07	Manufacture of soft drinks; production of mineral waters and other bottled waters
C12	Manufacture of tobacco products
C13	Manufacture of textiles
C13.1	Preparation and spinning of textile fibres
C13.2	Weaving of textiles
C13.3	Finishing of textiles
C13.9	Manufacture of other textiles
C13.91	Manufacture of knitted and crocheted fabrics
C13.92	Manufacture of made-up textile articles, except apparel
C13.93	Manufacture of carpets and rugs
C13.94	Manufacture of cordage, rope, twine and netting
C13.95	Manufacture of non-wovens and articles made from non-wovens, except apparel
C13.96	Manufacture of other technical and industrial textiles
C13.99	Manufacture of other textiles n.e.c.
C14	Manufacture of wearing apparel
C14.1	Manufacture of wearing apparel, except fur apparel
C14.11	Manufacture of leather clothes
C14.12	Manufacture of workwear
C14.13	Manufacture of other outerwear
C14.14	Manufacture of underwear
C14.19	Manufacture of other wearing apparel and accessories
C14.2	Manufacture of articles of fur
C14.3	Manufacture of knitted and crocheted apparel
C14.31	Manufacture of knitted and crocheted hosiery
C14.39	Manufacture of other knitted and crocheted apparel
C15	Manufacture of leather and related products

Eurostat NACE name	
C15.1	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur
C15.11	Tanning and dressing of leather; dressing and dyeing of fur
C15.12	Manufacture of luggage, handbags and the like, saddlery and harness
C15.2	Manufacture of footwear
C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
C16.1	Sawmilling and planing of wood
C16.2	Manufacture of products of wood, cork, straw and plaiting materials
C16.21	Manufacture of veneer sheets and wood-based panels
C16.22	Manufacture of assembled parquet floors
C16.23	Manufacture of other builders' carpentry and joinery
C16.24	Manufacture of wooden containers
C16.29	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials
C17	Manufacture of paper and paper products
C17.1	Manufacture of pulp, paper and paperboard
C17.11	Manufacture of pulp
C17.12	Manufacture of paper and paperboard
C17.2	Manufacture of articles of paper and paperboard
C17.21	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard
C17.22	Manufacture of household and sanitary goods and of toilet requisites
C17.23	Manufacture of paper stationery
C17.24	Manufacture of wallpaper
C17.29	Manufacture of other articles of paper and paperboard
C18	Printing and reproduction of recorded media
C18.1	Printing and service activities related to printing
C18.11	Printing of newspapers
C18.12	Other printing
C18.13	Pre-press and pre-media services
C18.14	Binding and related services
C18.2	Reproduction of recorded media
C19	Manufacture of coke and refined petroleum products
C19.1	Manufacture of coke oven products
C19.2	Manufacture of refined petroleum products
C20	Manufacture of chemicals and chemical products
C20.1	Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms
C20.11	Manufacture of industrial gases
C20.12	Manufacture of dyes and pigments
C20.13	Manufacture of other inorganic basic chemicals
C20.14	Manufacture of other organic basic chemicals
C20.15	Manufacture of fertilisers and nitrogen compounds
C20.16	Manufacture of plastics in primary forms
C20.17	Manufacture of synthetic rubber in primary forms
C20.2	Manufacture of pesticides and other agrochemical products
C20.3	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
C20.41	Manufacture of soap and detergents, cleaning and polishing preparations
C20.42	Manufacture of perfumes and toilet preparations
C20.5	Manufacture of other chemical products
C20.51	Manufacture of explosives

Eurostat NACE name	
C20.52	Manufacture of glues
C20.53	Manufacture of essential oils
C20.59	Manufacture of other chemical products n.e.c.
C20.6	Manufacture of man-made fibres
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
C21.1	Manufacture of basic pharmaceutical products
C21.2	Manufacture of pharmaceutical preparations
C22	Manufacture of rubber and plastic products
C22.1	Manufacture of rubber products
C22.11	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres
C22.19	Manufacture of other rubber products
C22.2	Manufacture of plastic products
C22.21	Manufacture of plastic plates, sheets, tubes and profiles
C22.22	Manufacture of plastic packing goods
C22.23	Manufacture of builders' ware of plastic
C22.29	Manufacture of other plastic products
C23	Manufacture of other non-metallic mineral products
C23.1	Manufacture of glass and glass products
C23.11	Manufacture of flat glass
C23.12	Shaping and processing of flat glass
C23.13	Manufacture of hollow glass
C23.14	Manufacture of glass fibres
C23.19	Manufacture and processing of other glass, including technical glassware
C23.2	Manufacture of refractory products
C23.3	Manufacture of clay building materials
C23.31	Manufacture of ceramic tiles and flags
C23.32	Manufacture of bricks, tiles and construction products, in baked clay
C23.4	Manufacture of other porcelain and ceramic products
C23.41	Manufacture of ceramic household and ornamental articles
C23.42	Manufacture of ceramic sanitary fixtures
C23.43	Manufacture of ceramic insulators and insulating fittings
C23.44	Manufacture of other technical ceramic products
C23.49	Manufacture of other ceramic products
C23.5	Manufacture of cement, lime and plaster
C23.51	Manufacture of cement
C23.52	Manufacture of lime and plaster
C23.6	Manufacture of articles of concrete, cement and plaster
C23.61	Manufacture of concrete products for construction purposes
C23.62	Manufacture of plaster products for construction purposes
C23.63	Manufacture of ready-mixed concrete
C23.64	Manufacture of mortars
C23.65	Manufacture of fibre cement
C23.69	Manufacture of other articles of concrete, plaster and cement
C23.7	Cutting, shaping and finishing of stone
C23.9	Manufacture of abrasive products and non-metallic mineral products n.e.c.
C23.91	Production of abrasive products
C23.99	Manufacture of other non-metallic mineral products n.e.c.
C24	Manufacture of basic metals
C24.1	Manufacture of basic iron and steel and of ferro-alloys
C24.2	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel
C24.3	Manufacture of other products of first processing of steel

Eurostat NACE name	
C24.31	Cold drawing of bars
C24.32	Cold rolling of narrow strip
C24.33	Cold forming or folding
C24.34	Cold drawing of wire
C24.4	Manufacture of basic precious and other non-ferrous metals
C24.41	Precious metals production
C24.42	Aluminium production
C24.43	Lead, zinc and tin production
C24.44	Copper production
C24.45	Other non-ferrous metal production
C24.46	Processing of nuclear fuel
C24.5	Casting of metals
C24.51	Casting of iron
C24.52	Casting of steel
C24.53	Casting of light metals
C24.54	Casting of other non-ferrous metals
C25	Manufacture of fabricated metal products, except machinery and equipment
C25.1	Manufacture of structural metal products
C25.11	Manufacture of metal structures and parts of structures
C25.12	Manufacture of doors and windows of metal
C25.2	Manufacture of tanks, reservoirs and containers of metal
C25.21	Manufacture of central heating radiators and boilers
C25.29	Manufacture of other tanks, reservoirs and containers of metal
C25.3	Manufacture of steam generators, except central heating hot water boilers
C25.4	Manufacture of weapons and ammunition
C25.5	Forging, pressing, stamping and roll-forming of metal; powder metallurgy
C25.6	Treatment and coating of metals; machining
C25.61	Treatment and coating of metals
C25.62	Machining
C25.7	Manufacture of cutlery, tools and general hardware
C25.71	Manufacture of cutlery
C25.72	Manufacture of locks and hinges
C25.73	Manufacture of tools
C25.9	Manufacture of other fabricated metal products
C25.91	Manufacture of steel drums and similar containers
C25.92	Manufacture of light metal packaging
C25.93	Manufacture of wire products, chain and springs
C25.94	Manufacture of fasteners and screw machine products
C25.99	Manufacture of other fabricated metal products n.e.c.
C26	Manufacture of computer, electronic and optical products
C26.1	Manufacture of electronic components and boards
C26.11	Manufacture of electronic components
C26.12	Manufacture of loaded electronic boards
C26.2	Manufacture of computers and peripheral equipment
C26.3	Manufacture of communication equipment
C26.4	Manufacture of consumer electronics
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks
C26.51	Manufacture of instruments and appliances for measuring, testing and navigation
C26.52	Manufacture of watches and clocks
C26.6	Manufacture of irradiation, electromedical and electrotherapeutic equipment
C26.7	Manufacture of optical instruments and photographic equipment

Eurostat NACE name	
C26.8	Manufacture of magnetic and optical media
C27	Manufacture of electrical equipment
C27.1	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus
C27.11	Manufacture of electric motors, generators and transformers
C27.12	Manufacture of electricity distribution and control apparatus
C27.2	Manufacture of batteries and accumulators
C27.3	Manufacture of wiring and wiring devices
C27.31	Manufacture of fibre optic cables
C27.32	Manufacture of other electronic and electric wires and cables
C27.33	Manufacture of wiring devices
C27.4	Manufacture of electric lighting equipment
C27.5	Manufacture of domestic appliances
C27.51	Manufacture of electric domestic appliances
C27.52	Manufacture of non-electric domestic appliances
C27.9	Manufacture of other electrical equipment
C28	Manufacture of machinery and equipment n.e.c.
C28.1	Manufacture of general-purpose machinery
C28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
C28.12	Manufacture of fluid power equipment
C28.13	Manufacture of other pumps and compressors
C28.14	Manufacture of other taps and valves
C28.15	Manufacture of bearings, gears, gearing and driving elements
C28.2	Manufacture of other general-purpose machinery
C28.21	Manufacture of ovens, furnaces and furnace burners
C28.22	Manufacture of lifting and handling equipment
C28.23	Manufacture of office machinery and equipment (except computers and peripheral equipment)
C28.24	Manufacture of power-driven hand tools
C28.25	Manufacture of non-domestic cooling and ventilation equipment
C28.29	Manufacture of other general-purpose machinery n.e.c.
C28.3	Manufacture of agricultural and forestry machinery
C28.4	Manufacture of metal forming machinery and machine tools
C28.41	Manufacture of metal forming machinery
C28.49	Manufacture of other machine tools
C28.9	Manufacture of other special-purpose machinery
C28.91	Manufacture of machinery for metallurgy
C28.92	Manufacture of machinery for mining, quarrying and construction
C28.93	Manufacture of machinery for food, beverage and tobacco processing
C28.94	Manufacture of machinery for textile, apparel and leather production
C28.95	Manufacture of machinery for paper and paperboard production
C28.96	Manufacture of plastics and rubber machinery
C28.99	Manufacture of other special-purpose machinery n.e.c.
C29	Manufacture of motor vehicles, trailers and semi-trailers
C29.1	Manufacture of motor vehicles
C29.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
C29.3	Manufacture of parts and accessories for motor vehicles
C29.31	Manufacture of electrical and electronic equipment for motor vehicles
C29.32	Manufacture of other parts and accessories for motor vehicles
C30	Manufacture of other transport equipment
C30.1	Building of ships and boats
C30.11	Building of ships and floating structures

Eurostat NACE name	
C30.12	Building of pleasure and sporting boats
C30.2	Manufacture of railway locomotives and rolling stock
C30.3	Manufacture of air and spacecraft and related machinery
C30.4	Manufacture of military fighting vehicles
C30.9	Manufacture of transport equipment n.e.c.
C30.91	Manufacture of motorcycles
C30.92	Manufacture of bicycles and invalid carriages
C30.99	Manufacture of other transport equipment n.e.c.
C31	Manufacture of furniture
C31.01	Manufacture of office and shop furniture
C31.02	Manufacture of kitchen furniture
C31.03	Manufacture of mattresses
C31.09	Manufacture of other furniture
C32	Other manufacturing
C32.1	Manufacture of jewellery, bijouterie and related articles
C32.11	Striking of coins
C32.12	Manufacture of jewellery and related articles
C32.13	Manufacture of imitation jewellery and related articles
C32.2	Manufacture of musical instruments
C32.3	Manufacture of sports goods
C32.4	Manufacture of games and toys
C32.5	Manufacture of medical and dental instruments and supplies
C32.9	Manufacturing n.e.c.
C32.91	Manufacture of brooms and brushes
C32.99	Other manufacturing n.e.c.
C33	Repair and installation of machinery and equipment
C33.1	Repair of fabricated metal products, machinery and equipment
C33.11	Repair of fabricated metal products
C33.12	Repair of machinery
C33.13	Repair of electronic and optical equipment
C33.14	Repair of electrical equipment
C33.15	Repair and maintenance of ships and boats
C33.16	Repair and maintenance of aircraft and spacecraft
C33.17	Repair and maintenance of other transport equipment
C33.19	Repair of other equipment
C33.2	Installation of industrial machinery and equipment
D35.1	Electric power generation, transmission and distribution
D35.11	Production of electricity
D35.12	Transmission of electricity
D35.13	Distribution of electricity
D35.14	Trade of electricity
D35.2	Manufacture of gas; distribution of gaseous fuels through mains
D35.21	Manufacture of gas
D35.22	Distribution of gaseous fuels through mains
D35.23	Trade of gas through mains
D35.3	Steam and air conditioning supply
E36	Water collection, treatment and supply
E37	Sewerage
E38	Waste collection, treatment and disposal activities; materials recovery
E38.1	Waste collection
E38.11	Collection of non-hazardous waste

Eurostat NACE name	
E38.12	Collection of hazardous waste
E38.2	Waste treatment and disposal
E38.21	Treatment and disposal of non-hazardous waste
E38.22	Treatment and disposal of hazardous waste
E38.3	Materials recovery
E38.31	Dismantling of wrecks
E38.32	Recovery of sorted materials
E39	Remediation activities and other waste management services

NFR14 (CLRTAP)	
1A1a	Public electricity and heat production
1A1b	Petroleum refining
1A1c	Manufacture of solid fuels and other energy industries
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (Please specify in your IIR)
1A3ei	Pipeline transport
1B1a	Fugitive emission from solid fuels: Coal mining and handling
1B1b	Fugitive emission from solid fuels: Solid fuel transformation
1B1c	Other fugitive emissions from solid fuels
1B2ai	Fugitive emissions oil: Exploration, production, transport
1B2aiv	Fugitive emissions oil: Refining / storage
1B2av	Distribution of oil products
1B2b	Natural gas (exploration, production, processing, transmission, storage, distribution and other)
1B2c	Venting and flaring (oil, gas, combined)
1B2d	Other fugitive emissions from energy production
2A1	Cement production
2A2	Lime production
2A3	Glass production
2A5a	Quarrying and mining of minerals other than coal
2A5c	Storage, handling and transport of mineral products
2A6	Other Mineral products (Please specify the sources included/excluded in the notes column to the right)
2B1	Ammonia production
2B10a	Chemical industry: Other
2B10b	Storage, handling and transport of chemical products
2B2	Nitric acid production
2B3	Adipic acid production
2B5	Carbide production
2B6	Titanium dioxide production
2B7	Soda ash production
2C1	Iron and steel production
2C2	Ferroalloys production
2C3	Aluminium production
2C4	Magnesium Production
2C5	Lead production
2C6	Zinc production
2C7a	Copper production
2C7b	Nickel production
2C7c	Other metal production (Please specify the sources included/excluded in the notes column to the right)
2C7d	Storage, handling and transport of metal products (Please specify the sources included/excluded in the notes column to the right)

NFR14 (CLRTAP)	
2D3b	Road paving with asphalt
2D3c	Asphalt roofing
2D3d	Coating application
2D3e	Degreasing
2D3f	Dry cleaning
2D3g	Chemical products
2D3h	Printing
2D3i	Other solvent use
2G	Other product use
2H1	Pulp and paper industry
2H2	Food and beverages industry
2H3	Other industrial processes
2I	Wood processing
2J	Production of POPs
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)
2L	Other production, consumption, storage, transportation or handling of bulk products (Please specify the sources included/excluded in the notes column to the right)
5A	Biological treatment of waste - Solid waste disposal on land
5B1	Biological treatment of waste - Composting
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities
5C1a	Municipal waste incineration
5C1bi	Industrial waste incineration
5C1bii	Hazardous waste incineration
5C1biii	Clinical waste incineration
5C1biv	Sewage sludge incineration
5C1bv	Cremation
5C1bvi	Other Waste incineration
5C2	Open Burning of Waste
5D2	Industrial wastewater handling
5D3	Other wastewater handling
5E	Other waste handling (Please specify in IIR)
CRF (IPCC 2006)	
1.A.1.a	Public Electricity and Heat Production
1.A.1.b	Petroleum Refining
1.A.1.c	Manufacture of Solid Fuels and Other Energy Industries
1.A.2.a	Iron and Steel
1.A.2.b	Non-Ferrous Metals
1.A.2.c	Chemicals
1.A.2.d	Pulp, Paper and Print
1.A.2.e	Food Processing, Beverages and Tobacco
1.A.2.f	Non-metallic minerals
1.A.2.g	Other Manufacturing Industries and Constructions
1.A.3.e.i	Pipeline transport
1.B.1.a	Mining
1.B.1.b	Solid Fuel Transformation
1.B.2	Oil and Natural Gas and Other Emissions from Energy Production
2.A.1	Cement Production
2.A.2	Lime Production
2.A.3	Glass production
2.A.4	Other Process Uses of Carbonates
2.B.1	Ammonia Production
2.B.10	Other chemical industry
2.B.3	Adipic Acid Production
2.B.4	Caprolactam, Glyoxal and Glyoxylic Acid Production
2.B.5	Carbide Production
2.B.6	Titanium Dioxide Production
2.B.7	Soda Ash Production
2.B.8	Petrochemical and Carbon Black Production
2.C.1	Iron and Steel Production

NFR14 (CLRTAP)	
2.C.2	Ferroalloys Production
2.C.3	Aluminium Production
2.C.4	Magnesium Production
2.C.5	Lead Production
2.C.6	Zinc Production
2.C.7	Other Metal Industry
2.D.1	Lubricant Use
2.D.2	Paraffin Wax Use
2.D.3	Other non-energy products
2.E	Electronics industry
2.F	Product uses as ODS substitutes
2.G	Other Product Manufacture and Use
2.H	Other Industrial Process and Product Use
5.A	Solid Waste Disposal
5.B	Biological treatment of solid waste
5.C	Incineration and Open Burning of Waste
5.D.2	Industrial wastewater treatment and discharge
5.E	Other Disposal

Table A1.2 presents the corresponding NFR sector codes from the CLRTAP air emissions data (EEA, 2020a) for each EEA industry sectors.

Table A1.2 Mapping of NFR (CLRTAP) industry sectors to EEA industry sectors.

NFR14 (CLRTAP) sector code	**EEA industry sector**
1A1a	Energy supply
1A1b	Energy supply
1A1c	Energy supply
1A2a	Ferrous metal
1A2b	Non-ferrous metal
1A2c	Chemicals
1A2d	Pulp, paper and wood
1A2e	Food and drink
1A2f	Non-metallic minerals
1A2gvii	Other manufacturing
1A2gviii	Other manufacturing
1B1a	Extractive industry
1B1b	Energy supply
1B1c	Extractive industry
1B2ai	Extractive industry
1B2aiv	Energy supply
1B2av	Energy supply
1B2b	Extractive industry
1B2c	Extractive industry
1B2d	Energy supply
2A1	Non-metallic minerals
2A2	Non-metallic minerals
2A3	Non-metallic minerals
2A5a	Extractive industry
2A5c	Non-metallic minerals
2A6	Non-metallic minerals
2B1	Chemicals
2B2	Chemicals
2B3	Chemicals
2B5	Chemicals
2B6	Chemicals
2B7	Chemicals

NFR14 (CLRTAP) sector code	EEA industry sector
2B10a	Chemicals
2B10b	Chemicals
2C1	Ferrous metal
2C2	Ferrous metal
2C3	Non-ferrous metal
2C4	Non-ferrous metal
2C5	Non-ferrous metal
2C6	Non-ferrous metal
2C7a	Non-ferrous metal
2C7b	Non-ferrous metal
2C7c	Non-ferrous metal
2C7d	Non-ferrous metal
2D3a	Other manufacturing
2D3b	Other manufacturing
2D3c	Other manufacturing
2D3d	Other manufacturing
2D3e	Other manufacturing
2D3f	Other manufacturing
2D3g	Other manufacturing
2D3h	Other manufacturing
2D3i	Other manufacturing
2G	Other manufacturing
2H1	Pulp, paper and wood
2H2	Food and drink
2H3	Other manufacturing
2I	Pulp, paper and wood
2J	Other manufacturing
2K	Other manufacturing
2L	Other manufacturing
5A	Waste management
5B1	Waste management
5B2	Waste management
5C1a	Waste management
5C1bi	Waste management
5C1bii	Waste management
5C1biii	Waste management
5C1biv	Waste management
5C1bv	Waste management
5C1bvi	Waste management
5C2	Waste management
5D1	Wastewater treatment
5D2	Wastewater treatment
5D3	Wastewater treatment
5E	Waste management

Table A1.3 presents how the CRF sector codes used for the MMR (EEA, 2020c) GHG emissions are mapped to the EEA industry sectors.

Table A1.3 Mapping of CRF (MMR) industry sectors to EEA industry sectors.

CRF sector code	EEA industry sector
1.A.1.a	Energy supply
1.A.1.b	Energy supply
1.A.1.c	Energy supply
1.A.2.a	Ferrous metal
1.A.2.b	Non-ferrous metal
1.A.2.c	Chemicals

CRF sector code	EEA industry sector
1.A.2.d	Pulp, paper and wood
1.A.2.e	Food and drink
1.A.2.f	Non-metallic minerals
1.A.2.g	Other manufacturing
1.B.1	Extractive industries
1.B.2	Extractive industries
1.C	Energy supply
1.D.3	Energy supply
1.D.4	Energy supply
2.A.1	Non-metallic minerals
2.A.2	Non-metallic minerals
2.A.3	Non-metallic minerals
2.A.4	Non-metallic minerals
2.B.1	Chemicals
2.B.10	Chemicals
2.B.2	Chemicals
2.B.3	Chemicals
2.B.4	Chemicals
2.B.5	Chemicals
2.B.6	Chemicals
2.B.7	Chemicals
2.B.8	Chemicals
2.B.9	Chemicals
2.C.1	Ferrous metal
2.C.2	Ferrous metal
2.C.3	Non-ferrous metal
2.C.4	Non-ferrous metal
2.C.5	Non-ferrous metal
2.C.6	Non-ferrous metal
2.C.7	Non-ferrous metal
2.D.1	Other manufacturing
2.D.2	Other manufacturing
2.D.3	Other manufacturing
2.E.1	Other manufacturing
2.E.2	Other manufacturing
2.E.3	Other manufacturing
2.E.4	Other manufacturing
2.E.5	Other manufacturing
2.F.1	Other manufacturing
2.F.2	Other manufacturing
2.F.3	Other manufacturing
2.F.4	Other manufacturing
2.F.5	Other manufacturing
2.F.6	Other manufacturing
2.G	Other manufacturing
2.H	Other manufacturing
5.A.1	Waste management
5.A.2	Waste management
5.A.3	Waste management
5.B.1	Waste management
5.B.2	Waste management
5.C.1	Waste management
5.C.2	Waste management
5.D.1	Wastewater treatment
5.D.2	Wastewater treatment
5.D.3	Wastewater treatment
5.E	Waste management

Table A1.4 presents the mapping between the list of sector codes (MainIAActivityCode) used in each grouping of air pollutant emissions data from the E-PRTR (EEA, 2020b) to the EEA industry sectors used for the 2020 profiles.

Table A1.4 Mapping of E-PRTR industry sector codes to EEA industry sectors.

E-PRTR sector code	EEA industry sector
1.(a)	Energy supply
1.(b)	Energy supply
1.(c)	Energy supply
1.(d)	Energy supply
1.(e)	Energy supply
1.(f)	Energy supply
2.(a)	Ferrous metal
2.(b)	Ferrous metal
2.(c)	Ferrous metal
2.(d)	Ferrous metal
2.(e)	Non-ferrous metal
2.(f)	Other manufacturing
3.(a)	Extractive industry
3.(b)	Extractive industry
3.(c)	Non-metallic minerals
3.(d)	Non-metallic minerals
3.(e)	Non-metallic minerals
3.(f)	Non-metallic minerals
3.(g)	Non-metallic minerals
4.(a)	Chemicals
4.(b)	Chemicals
4.(c)	Chemicals
4.(d)	Chemicals
4.(e)	Chemicals
4.(f)	Chemicals
5.(a)	Waste management
5.(b)	Waste management
5.(c)	Waste management
5.(d)	Waste management
5.(e)	Waste management
5.(f)	Wastewater treatment
5.(g)	Wastewater treatment
6.(a)	Pulp, paper and wood
6.(b)	Pulp, paper and wood
6.(c)	Pulp, paper and wood
8.(a)	Food and drink
8.(b)	Food and drink
8.(c)	Food and drink
9.(a)	Other manufacturing
9.(b)	Other manufacturing
9.(c)	Other manufacturing
9.(d)	Other manufacturing
9.(e)	Other manufacturing

Table A1.5 shows the list of activities included in the "Non-industry" category of air pollutant emissions from the CLRTAP (EEA, 2019a).

Table A1.5 Non-industry groupings — CLRTAP.

NFR14 (CLRTAP) sector code	Non-industry sector name
1A3ai(i)	International aviation LTO (civil)
1A3aii(i)	Domestic aviation LTO (civil)

NFR14 (CLRTAP) sector code	Non-industry sector name
1A3bi	Road transport: Passenger cars
1A3bii	Road transport: Light duty vehicles
1A3biii	Road transport: Heavy duty vehicles and buses
1A3biv	Road transport: Mopeds and motorcycles
1A3bv	Road transport: Gasoline evaporation
1A3bvi	Road transport: Automobile tyre and brake wear
1A3bvii	Road transport: Automobile road abrasion
1A3c	Railways
1A3di(ii)	International inland waterways
1A3dii	National navigation (shipping)
1A3ei	Pipeline transport
1A3eii	Other
1A4ai	Commercial/institutional: Stationary
1A4aii	Commercial/institutional: Mobile
1A4bi	Residential: Stationary
1A4bii	Residential: Household and gardening (mobile)
1A4ci	Agriculture/forestry/fishing: Stationary
1A4cii	Agriculture/forestry/fishing: Off-road vehicles and other machinery
1A4ciii	Agriculture/forestry/fishing: National fishing
1A5a	Other stationary (including military)
1A5b	Other, mobile (including military, land-based and recreational boats)
2A5b	Construction and demolition
3B1a	Manure management — Dairy cattle
3B1b	Manure management — Non-dairy cattle
3B2	Manure management — Sheep
3B3	Manure management — Swine
3B4a	Manure management — Buffalo
3B4d	Manure management — Goats
3B4e	Manure management — Horses
3B4f	Manure management — Mules and asses
3B4gi	Manure management — Laying hens
3B4gii	Manure management — Broilers
3B4giii	Manure management — Turkeys
3B4giv	Manure management — Other poultry
3B4h	Manure management — Other animals
3Da1	Inorganic N-fertilisers (includes also urea application)
3Da2a	Animal manure applied to soils
3Da2b	Sewage sludge applied to soils
3Da2c	Other organic fertilisers applied to soils (including compost)
3Da3	Urine and dung deposited by grazing animals
3Da4	Crop residues applied to soils
3Db	Indirect emissions from managed soils
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products
3Dd	Off-farm storage, handling and transport of bulk agricultural products
3De	Cultivated crops
3Df	Use of pesticides
3F	Field burning of agricultural residues
3I	Agriculture other
6A	Other (included in national total for entire territory)

Table A1.6 presents the list of codes included in 'Non-industry' GHG emissions from the CRF (EEA, 2019b).

Table A1.6 Non-industry groupings — CRF.

CRF2006	Non-industry sector name
1.A.3.a	1.A.3.a - Domestic Aviation
1.A.3.b.i	1.A.3.b.i – Cars
1.A.3.b.ii	1.A.3.b.ii - Light duty trucks
1.A.3.b.iii	1.A.3.b.iii - Heavy duty trucks and buses
1.A.3.b.iv	1.A.3.b.iv – Motorcycles
1.A.3.b.v	1.A.3.b.v - Other Road Transportation
1.A.3.c	1.A.3.c – Railways
1.A.3.d	1.A.3.d - Domestic Navigation
1.A.3.e	1.A.3.e - Other Transportation
1.A.4.a	1.A.4.a - Commercial/Institutional
1.A.4.b	1.A.4.b – Residential
1.A.4.c	1.A.4.c - Agriculture/Forestry/Fishing
1.A.5.a	1.A.5.a – Stationary
1.A.5.b	1.A.5.b – Mobile
3.A.1	3.A.1 - Enteric Fermentation - Cattle
3.A.2	3.A.2 - Enteric Fermentation - Sheep
3.A.3	3.A.3 - Enteric Fermentation - Swine
3.A.4	3.A.4 - Enteric Fermentation - Other livestock
3.B.1	3.B.1 - Manure Management - Cattle
3.B.2	3.B.2 - Manure Management - Sheep
3.B.3	3.B.3 - Manure Management - Swine
3.B.4	3.B.4 - Manure Management - Other livestock
3.B.5	3.B.5 - Manure Management - Indirect N2O Emissions
3.C.1	3.C.1 – Irrigated
3.C.2	3.C.2 – Rainfed
3.C.3	3.C.3 - Deep Water
3.C.4	3.C.4 - Other Rice Cultivation
3.D.1	3.D.1 - Direct N2O emissions from managed soils
3.D.2	3.D.2 - Indirect N2O emissions from managed soils
3.E	3.E - Prescribed Burning of Savannas
3.F.1	3.F.1 - Cereals
3.F.2	3.F.2 - Pulses
3.F.3	3.F.3 - Tubers and roots
3.F.4	3.F.4 - Sugar cane
3.F.5	3.F.5 - Other Agricultural residues
3.G	3.G - Liming
3.H	3.H - Urea Application
3.I	3.I - Other Carbon-containing Fertilizers
6	6 - Other Sector

Table A1.7 presents the list of energy consumption sectors from Eurostat (2020b) and the groups they are aggregated to. The EEA industry groups/sectors have a higher level of aggregation than previously to align with the GVA and water use sectors.

Table A1.7 Industry groupings — energy consumption.

Energy consumption sector	Eurostat Code	EEA industry sector (group)
Final consumption - energy use	FC_E	Total Energy Consumption
Final consumption - industry sector - iron and steel - energy use	FC_IND_IS_E	Manufacturing industry
Final consumption - industry sector - non-ferrous metals - energy use	FC_IND_NFM_E	Manufacturing industry

Energy consumption sector	Eurostat Code	EEA industry sector (group)
Final consumption - industry sector - chemical and petrochemical - energy use	FC_IND_CPC_E	Manufacturing industry
Final consumption - industry sector - non-metallic minerals - energy use	FC_IND_NMM_E	Manufacturing industry
Final consumption - industry sector - mining and quarrying - energy use	FC_IND_MQ_E	Extractive industry
Final consumption - industry sector - food, beverages and tobacco - energy use	FC_IND_FBT_E	Manufacturing industry
Final consumption - industry sector - textile and leather - energy use	FC_IND_TL_E	Manufacturing industry
Final consumption - industry sector - paper, pulp and printing - energy use	FC_IND_PPP_E	Manufacturing industry
Final consumption - industry sector - transport equipment - energy use	FC_IND_TE_E	Manufacturing industry
Final consumption - industry sector - machinery - energy use	FC_IND_MAC_E	Manufacturing industry
Final consumption - industry sector - wood and wood products - energy use	FC_IND_WP_E	Manufacturing industry
Final consumption - industry sector - not elsewhere specified - energy use	FC_IND_NSP_E	Non-specified (Industry)

Table A1.8 presents the list of GVA activities and their NACE code from Eurostat (2020a) and the EEA industry sectors (group) they are aggregated to. Note that the NACE code E36 relates to residential, commercial and institutional activities which are categorised as non-industry.

Table A1.8 Industry groupings — GVA.

GVA NACE activity	NACE code	EEA industry sector (group)
Total — All NACE activities	TOTAL	Total economy
Mining and quarrying	B	Extractive industry
Manufacture of food products; beverages and tobacco products	C10–C12	Manufacturing industry
Manufacture of textiles, wearing apparel, leather and related products	C13–C15	Manufacturing industry
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	C16	Manufacturing industry
Manufacture of paper and paper products	C17	Manufacturing industry
Printing and reproduction of recorded media	C18	Manufacturing industry
Manufacture of coke and refined petroleum products	C19	Manufacturing industry
Manufacture of chemicals and chemical products	C20	Manufacturing industry
Manufacture of basic pharmaceutical products and pharmaceutical preparations	C21	Manufacturing industry
Manufacture of rubber and plastic products	C22	Manufacturing industry
Manufacture of other non-metallic mineral products	C23	Manufacturing industry
Manufacture of basic metals	C24	Manufacturing industry
Manufacture of fabricated metal products, except machinery and equipment	C25	Manufacturing industry
Manufacture of computer, electronic and optical products	C26	Manufacturing industry
Manufacture of electrical equipment	C27	Manufacturing industry
Manufacture of machinery and equipment n.e.c.	C28	Manufacturing industry
Manufacture of motor vehicles, trailers and semi-trailers	C29	Manufacturing industry
Manufacture of other transport equipment	C30	Manufacturing industry
Manufacture of furniture; other manufacturing	C31–C32	Manufacturing industry
Repair and installation of machinery and equipment	C33	Manufacturing industry
Electricity, gas, steam and air conditioning supply	D	Energy supply
Water collection, treatment and supply	E36	Non-industry
Sewerage, waste management, remediation activities	E37–E39	Waste

Table A1.9 presents the list of detailed NACE codes used in each grouping of waste generation data from the Eurostat table (Eurostat, 2020d). Note that E36 relates to residential, commercial and institutional activities which are categorised as non-industry, but due to the data aggregation in Eurostat is grouped together with E37 and E39 and cannot be separated out.

Table A1.9 Industry groupings — Waste data.

NACE code aggregate	EEA industry sector (group)
D	Energy supply
C19	Energy supply
C23	Non-metallic minerals
C24_C25	Metal production and manufacturing
B	Extractive industry
C20-C22	Chemicals
E36_E37_E39	Waste
E38	Waste
C16	Pulp, paper, wood
C17_C18	Pulp, paper, wood
C10-C12	Food and drink
C13-C15	Other manufacturing
C26-C30	Other manufacturing
C31-C33	Other manufacturing

Table A1.10 Industry groupings — Water data.

NACE code aggregate	EEA industry sector (group)
B	Extractive industry
C	Manufacturing industry
D3511_D3513	Energy supply
By gap-filling	Industry (no detail)

Annex 2
Data extraction procedures and implementation of the graphs

Annex 2 Data extraction procedures and implementation of the graphs

A.1 Significance of industry to GVA, energy consumption and water use

A.1.1 Data sources

The data sources for this chapter are taken from the Eurostat statistics database.

Data extraction 1: Gross value added (nama_10_a64) (Eurostat, 2020a[27])

- Indicator: GVA at basic prices
- Unit: Previous years prices, million Euro (PYP_MEUR)
- NACE Rev. 2 codes: (total, B, C, D and E)
- Period: 2007–2017
- Country (GEO): EU-28 countries plus Iceland, Liechtenstein, Norway, Switzerland, Turkey.

The GVA values for NACE sectors B, C, D and E cover 'industrial GVA'. The GVA values for NACE sectors B, C, D and E are then subtracted from total GVA for each country and year to obtain 'Non-industry GVA'. Total GVA covers all economic activity.

For alternative data and gap-filling with World Bank data please refer to Chapter 3.3 in main report.

Data extraction 2: Complete energy balances - annual data (nrg_bal_c) ((Eurostat, 2020b[28])

- Indicators: 'Final consumption - energy use' (FC_E) and industry categories as given in Table A1.7 in Annex 1
- Product (SIEC): All products (TOTAL)
- Unit: Terajoule
- Period: 2007–2017
- Country (GEO): EU-28 countries plus Iceland, Norway, Switzerland, Turkey.

For alternative data and gap-filling with IEA data please refer to Chapter 3.3 in main report. The 'Non-industry' energy contribution is calculated for each country by withdrawing the "energy consumption" of the industrial sectors from the overall "Final consumption – energy use" of the country.

The industry groups (i.e. indicators) in Data extraction 2 are assigned to sectors for aggregation, as shown Table A.1.7 in Annex 1. The new sectors are based on the EEA mapping ([29]) with higher aggregation to be aligned with the division used for GVA and water.

Data extraction 3: Water use (env_wat_cat) (Eurostat, 2020c[30])

- Indicators: 'Public water supply' and 'Self and other supply'
- NACE Rev. 2: B, C, 'D2511_D3513' and 'TOTAL_HH'
- Unit: Million cubic metres
- Period: 2007–2017
- Country (GEO): EU-28 countries plus Iceland, Norway, Switzerland and Turkey

The water use data within NACE sectors B, C and 'D2511_D3513' cover water use in extractive industry, manufacturing and production and distribution of electricity respectively. These are the only NACE

[27] Eurostat, 2020a, 'National Accounts aggregates by industry (up to NACE a*64)' (nama_10_a64), accessed May 2020.
[28] Eurostat, 2020b, 'Complete energy balances - annual data' (nrg_bal_c), accessed May 2020.
[29] https://cdr.eionet.europa.eu/help/nomenclature_emission.
[30] Eurostat, 2020c, 'Water use by supply category and economical sector' (env_wat_cat), accessed May 2020.

aggregations available in the relevant Eurostat table matching the scope of the profiles. The use of water for cooling purposes in production and distribution of electricity (D2511_D3513_CL) is included within D2511_D3513. Water use for B, C and D are then subtracted from total water use for each country and year to obtain 'Non-industry water use'. The water use data set is heavily gap filled due to a lack of comprehensive time series. No data were available for Liechtenstein.

A.1.2 Graphs available in the Tableau story

Title: Significance of industry
Description: Energy consumption, GVA and water use of industry as a percentage of the EEA-33 total, and as a percentage of the country's total

Sub-graphs: Energy consumption /GVA / Water consumption
Developing the figures based on Data extraction 1, 2 and 3.

Part 1, stacked bar graph
Sum the values for industry for each country and each year by summing the contribution from industry sectors as detailed in Table A1.7 (Energy) Table A1.8 (GVA) and Table A.10 (Water).

Sum the total contribution (either by using the Eurostat total or by summing the industry and non-industry sectors) across countries (EEA33), per year, to obtain the EEA33 total.

For each country and year, subtract the sum of the industry contribution from the total to obtain 'Non-industry'.

For each sector, country and year, divide the contribution by the total value of EU-28 or EEA-33 for that year, respectively. The data obtained should be presented for all countries:

- as a stacked bar graph
- showing the country names on the Y axis
- showing the 'percentage of total EEA-33 energy consumption' on the x-axis
- colour each bar on the graph by energy sector; non-industry data should be represented in grey.

Part 2, Pie chart
For each country, year and sector (including 'non-industry'), divide the contribution from each sector by the total value for the country. The data obtained should be presented per country:

- as a pie chart for the *latest year* for the country highlighted in the bar graph in Part 1
- the percentage of total country energy consumption should be shown
- colour each section of the pie chart by energy sector; non-industry data should be shown in grey.

EU-28 profile
This will be displayed as per the method for Part 1 and 2 described above, however the x-axis would display percentage of total EU-28 energy consumption. The energy consumption will be presented as a stacked bar for each EU-28 country, coloured by sector. Sum the total energy consumption by sector for the latest year for all EU-28 countries. Divide the sector energy consumption by total EU-28 energy consumption. Present in a pie chart as per the bullet points above.

EEA-33 profile
This will be displayed as per the method described above. The energy consumption will be presented as a stacked bar for each EEA-33 country, coloured by sector. Sum the total energy consumption by sector for the latest year for all EEA-33 countries. Divide the sector energy consumption by total EEA-33 energy consumption. Present in a pie chart as per the bullet points above.

A.2 Emissions to air

The graphs in this section present industry emissions, by sector, as a percentage of total country emissions for that pollutant.

A.2.1 Data sources

The data sources related to air emissions in this chapter are the EEA databases for emissions reported under the CLRTAP ([31]), the E-PRTR ([32]) and the MMR ([33]). Trends for industry emissions to air are extracted from the E-PRTR. The EEA-33 countries' total air emissions, and industrial emissions from the latest year, are extracted from the CLRTAP database. The EEA-33 countries' GHG emissions are extracted from the MMR database for all available years.

Data extraction 4: Carbon dioxide emissions
The following data are selected from the MMR database (EEA, 2019b):

- country (all EEA-33 countries)
- CRF sector codes
- year (all available)
- 'All greenhouse gases - (CO_2-equivalent)' (see section 2.2.2)
- emissions (in Gg CO_2-equivalents)

Emissions from extraction 4 are grouped into industry sectors as per the mapping document (summarised in Table A1.3 of Annex 1 of this methodology report). Non-industry activities are defined as detailed in Table A1.6.

Data extraction 5: industrial air emissions
The following data are selected from the E-PRTR database (EEA, 2020):

- years (2007–latest available)
- sector codes (all 'MainIAActivityCodes' except Agriculture)
- pollutant name (of those listed in Table 2-4)
- emissions (in kg)
- medium (i.e. 'Air' in this case)
- main activity indicator ('True' or '1')
- country (of the EU-28 countries plus Iceland, Norway, Switzerland and Liechtenstein)

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[31] EEA, 2019a, 'National emissions reported to the Convention on Long-range Transboundary Air Pollution (LRTAP Convention)', European Environment Agency (https://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-convention-on-long-range-transboundary-air-pollution-lrtap-convention-13), extract given by EEA before official publishing, May 2019.
[32] EEA, 2020, 'The European Pollutant Release and Transfer Register (E-PRTR), Member States reporting under Article 7 of Regulation (EC) No 166/2006', European Environment Agency (https://www.eea.europa.eu/data-and-maps/data/member-states-reporting-art-7-under-the-european-pollutant-release-and-transfer-register-e-prtr-regulation-23) v18, accessed February 2020.
[33] EEA, 2019b, 'National emissions reported to the UNFCCC and to the EU greenhouse gas monitoring mechanism', European Environment Agency (https://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-15), v22, accessed May 2019.

Data are taken from the E-PRTR database. A query is created to link the tables [PollutantRelease], [FacilityReport] and [FacilityID_Changes] to add the fields 'ReportingYear' [FacilityID_Changes] and 'NACEMainEconomicActivity' [FacilityReport] to the data in [PollutantRelease], via the field 'FacilityReportID'. The result from this query is written to a text data file for further processing by another script, which maps and aggregates emissions to industrial sectors (as per the mapping document summarised in Table A1.4 of Annex 1 of this methodology report), by country, year and pollutant.

Turkey does not report data to the E-PRTR.

Data extraction 6: air pollutant emissions
The following data are selected from the CLRTAP database (EEA, 2019a):

- country (all EEA-33 countries)
- sector codes (as detailed in Table A1.1 for industry and Table A1.5 for non-industry)
- year (latest available)
- pollutant name (of those listed in Table 2-4)
- emissions (in Gg)

The data from data extraction 6 on air pollutants are taken from a database containing information on annual air pollutant emissions submitted by EEA member countries to the CLRTAP. It covers emissions data reported since 1990 by all EEA countries. The emissions are broken down by NFR sector, using the revised 'NFR14' nomenclature ([34]).

Emissions from data extraction 6 are grouped into industry sectors as per the mapping document (summarised in Table A1.2 of Annex 1 of this methodology report). Non-industry activities are grouped together, as detailed in Table A1.5.

A.2.2 Graphs available in the Tableau story

Title: Contribution to air emissions
Description: Industrial air emissions (E-PRTR) including carbon dioxide (MMR) as a percentage of total country emissions, by sector origins

Developing the figure
For the latest year in each country, pollutant and sector group, divide the industry emissions by country total industrial emissions for that pollutant (Data extraction 4 and 6).
Estimate the total impact from heavy metals both as the weighted sum using human tox factors and as the weighted sum using ecotox factors (see Table 2-4).The data obtained should be presented per country:

- as a bar chart of the latest year
- showing the pollutant on the Y axis
- showing the percentage of total country pollutant emissions on the *x*-axis
- colour the bars on the graph by sector; non-industry data should be represented in grey.

(34) http://www.ceip.at/reporting_instructions.

EU-28 profile
For the latest year, sum emissions in EU-28 countries for each pollutant and sector group. Divide this by total EU-28 industrial emissions for that pollutant. Follow the steps outlined above to create the bar graph.

EEA-33 profile
For the latest year, sum emissions for each pollutant and sector group. Divide this by total EEA-33 industrial emissions for that pollutant. Follow the steps outlined above to create the bar graph.

Title: Trends in air emissions
Description: Trends in total air emissions (E-PRTR) including greenhouse gases (MMR) in the relevant country scaled by the latest year's emissions

Developing the figures
Sum the industry pollutant emissions in by year and country to get total industry emissions for each country by pollutant per year, combining the data on greenhouse gas emissions and other air pollutants (Data extractions 4 and 5).
Estimate the total impact from heavy metals both as the weighted sum using human tox factors and as the weighted sum using ecotox factors (see Table 2-4).
Divide the industry emissions in each year by the latest year's emissions, for each pollutant and country, to normalise the trends.

The data obtained should be presented:
- as a line graph
- showing industrial emissions (relative to the latest year), on the Y axis
- showing the year on the x-axis
- colour the lines by pollutant.

EU-28 profile
Sum industry air emissions by year for all EU-28 countries to get total air industry emissions by pollutant per year. Then follow the steps outlined above to produce the line graph.

EEA-33 profile
Sum industry air emissions by year for all countries to get total air industry emissions by pollutant per year. Then follow the steps outlined above to produce the line graph.

A.3 Emissions to water

A.3.1 Data sources

Data extraction 7: Industrial water emissions
The following data are selected from the E-PRTR database (EEA, 2020):
- year (2007–latest available)
- sector codes (all Main IA Activity Codes except Agriculture)
- pollutant name (of those listed in Table 2-5)
- emissions (in kg)
- medium (i.e. 'Water' in this case)
- main activity indicator ('True' or '1')
- country (of the EU-28 countries plus Iceland, Norway, Switzerland and Liechtenstein).

Data are taken from the E-PRTR. A query is created to link the tables [PollutantRelease], [FacilityReport], and [FacilityID_Changes] to add the fields 'ReportingYear' and [FacilityID_Changes] from [FacilityReport] to the data in [PollutantRelease], via the field 'FacilityReportID'. The result from this query is written to a text data file for further processing by another script, which maps and aggregates emissions to industrial sectors (as per the mapping document summarised in Table A1.4 of Annex 1 of this methodology report), by country, year and pollutant.

Turkey does not report data to the E-PRTR.

A.3.2 Graphs available in the Tableau story

Title: Contribution to water emissions
Description: Industrial water releases as a percentage of country E-PRTR industrial emissions, by sector origins.

Developing the figure
For the latest year in each country, pollutant and industry sector, divide the industry emissions by country total industrial emissions for that pollutant (Data extraction 7).
Estimate the total impact from heavy metals both as the weighted sum using human tox factors and as the weighted sum using ecotox factors (see Table 2-5).

The data obtained should be presented per country:

- as a bar chart of the latest year
- showing the pollutants on the Y axis
- showing the percentage of country total pollutant emissions on the *x*-axis
- colour the bars on the graph by industry sector; non-industry data should be represented in grey

EU-28 profile
For the latest year for all EU-28 countries, pollutant and NACE activity, divide industry emissions by total EU-28 industrial emissions for that pollutant. Follow the steps outlined above to create the line graph.

EEA-33 profile
For the latest year for all countries, pollutant and NACE activity, divide industry emissions by total EEA-33 industrial emissions for that pollutant. Follow the steps outlined above to create the line graph.

Title: Trends in water emissions
Description: Trends in total industrial water emissions (E-PRTR) in the relevant country scaled by the latest year's emissions

Developing the figures
Sum the emissions by year and country to get total water industry emissions for each country by pollutant per year (Data extraction 7).
Estimate the total impact from heavy metals both as the weighted sum using human tox factors and as the weighted sum using ecotox factors (see Table 2-5).
Divide the industry emissions in each year by the latest year's emissions, for each pollutant and country, to normalise the trends.

The data obtained should be presented per country:

- as a line graph
- showing industrial emissions (relative to the latest year), on the Y axis
- showing the year on the *x*-axis
- colour the lines by pollutant.

EU-28 profile
Sum the emissions in each NACE division by year for all EU-28 countries to get total water industry emissions by pollutant per year. Then follow the steps outlined above to produce the line graph.

EEA-33 profile
Sum the emissions in each NACE division by year for all countries to get total water industry emissions by pollutant per year. Then follow the steps outlined above to produce the line graph.

A.4 Generation of Waste

A.4.1 Data sources

Data are retrieved from the Eurostat statistics database.

Data extraction 8: Generation of waste (env_wasgen) (Eurostat, 2020d[35])

- Waste type: Waste excluding major mineral waste ('TOT_X_MIN')
- NACE Rev. 2 codes: All categories are listed in Table A1.1
- Time: 2010, 2012, 2014 and 2016 (or all years)
- Unit: Tonne
- Hazard: Hazardous waste; Non-hazardous waste
- Country (GEO): EU-28 countries plus Iceland, Liechtenstein, Norway, Switzerland, Turkey

The waste data is mapped from NACE codes to industry sectors (as per the mapping document summarised in Table A1.9 in Annex 1 of this report), then aggregated up by country, year and industry sector.

A.4.2 Graphs available in the Tableau story

Title: Contribution to waste
Description: Industrial waste as a percentage of total EEA-33 waste and percentage of country-specific waste generation for hazardous and non-hazardous waste. Hazardous and non-hazardous waste is presented separately by selection in a drop-down menu.

Developing the figures
Part 1, stacked bar graph
Sum the industrial waste by sector, country and year, for each hazard type (Data extraction 8).
Sum total waste (excluding major mineral waste) for all countries by year, for each hazard type (Data extraction 8).
Subtract the sum of industry waste for each country and year from total waste (excluding major mineral waste) in each country and year, for each hazard type, to obtain non-industry waste by country, hazard type and year.
Divide waste by the total EEA-33 waste generation for each year.

[35] Eurostat, 2020d, 'Generation of waste by waste category, hazardousness and NACE Rev. 2 activity' (env_wasgen), accessed May 2020.

The sector percentages are stacked within each country, and countries are ordered on the graph according to the sum of the percentages. The data obtained should be presented:

- as a stacked bar graph for the latest year available
- showing the country names on the Y axis
- showing the 'percentage of total EEA-33 waste generation' on the *x*-axis
- colour by sector (grouped by type, non-industry is grey).

Part 2, pie chart
For each country, year, hazard type and category (sectors and non-industry), divide the waste generation by total country waste generation to obtain the percentage of country-specific waste generation. The data obtained should be presented:

- as a pie chart
- the size of each section should represent the percentage of waste from each category in the specific country
- colour each section of the pie chart by category.

EU-28 profile
Follow the steps above to produce the bar graphs of waste generated and waste intensity by EU-28 country. To create the pie chart, sum the waste generation by year, hazard type and category for all EU-28 countries. Divide this by the total EU-28 waste generation. Display this as a pie chart showing the percentage of waste from each NACE division for a given year for all EU-28 countries.

EEA-33 profile
Follow the steps above to produce the bar graphs of waste generated and waste intensity by country. To create the pie chart, sum the waste generation by year, hazard type and category for all countries. Divide this by the total EEA-33 waste generation. Display this as a pie chart showing the percentage of waste from each NACE division for a given year for all EEA-33 countries.

Title: Trends in waste
Description: Trends in industrial waste generation for hazardous and non-hazardous waste per country. Hazardous and non-hazardous waste is presented separately by selection in a drop-down menu.

Developing the figure
Divide the industry waste generation for each year by that of the latest year for each category, hazard type and country, to normalise the trends (Data extraction 8).

The data obtained should be presented:
- as a line graph
- showing industrial waste generation (relative to the latest year) on the Y axis
- showing the year on the *x*-axis
- colour the lines by category.

EU-28 profile
Divide the total EU-28 industry waste generation for each year by that of the latest year's waste for each category and hazard type. Follow the steps outlined above to create the line graph.

EEA-33 profile
Divide the total EEA-33 industry waste generation for each year by that of the latest year's waste for each category and hazard type. Follow the steps outlined above to create the line graph.

European Topic Centre on Air pollution,
transport, noise and industrial pollution
c/o NILU – Norwegian Institute for Air Research
P.O. Box 100, NO-2027 Kjeller, Norway
Tel.: +47 63 89 80 00
Email: etc.atni@nilu.no
Web : https://www.eionet.europa.eu/etcs/etc-atni

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