Chapter 1.8 - General Assessment of Completeness

Introduction

The German inventory is generally complete regarding the main pollutants, TSP, particulate matter and CO. National total emissions of these pollutants are considered to be representative and reflect the current emissions situation. Nevertheless, there are some cases where no appropriate method or data is available. It's assumed that these cases do not have a noticeable effect on the national totals and are in the range of its uncertainties.

In terms of heavy metals and POPs, the situation is different due to the low data availability. As additional information, there is a specific overview on the completeness of the German POP inventory available.

Germany does not report any emission data for years prior 1990. Due to the split into the German Democratic Republic and the Federal Republic of Germany before 1990, there are no consistent data sets covering what is now the reunited country. Germany has no plans to work on emission inventories for the years 1980 to 1989 in the future. However, some summarizing information on the time span 1970 to 1989 is presented below, also comparing these data to the current emission inventory.

Completeness in detail

The completeness of the German inventory as a whole has also been assessed by multiple reviews, both under the CLRTAP and the NECD. These reviews all confirm the good coverage of the German inventory. Where there are small omissions, Germany is working continuously to update and complete its data.

The following sections reflect on a few approaches, by source category, for improving the completeness of the inventory.

Fuel combustion



In principle, all combustion-related activities (1.A) are recorded in full within the National Energy Balance (NEB) of the Federal Republic of Germany. Nonetheless, where it is evident that complete coverage is not achieved for certain subsectors (i.e. non-commercial use of wood, waste fuels), the NEB is supplemented with further statistical data, surveys etc. Moreover, there are frequent changes within the NEB, in particular concerning renewable energies. Such changes in fuel and source categories require considerable research work. Insofar, it's not always possible to implement all data in time. However, based on current information, combustion related activity data can be considered complete.

This also applies for the main pollutants, particulate matter and CO. There may be cases, where a further breakdown of activity data and emission factors would be more appropriate to represent any specific technology. In such cases, where the share of a specific technology is very small, the influence of a missing sub-division on the national totals is considered small, too.

In some source categories, separation of combustion-related and non-combustion-related emissions from industry requires further verification. In general, for such categories, avoidance of double counting is an important part of quality assurance.

In terms of heavy metals and POPs, emissions are not yet complete in some sectors due to a lack of appropriate emission factors. Since they may not properly reflect the situation in Germany and in order to avoid inconsistencies within the German inventory as a whole, it is not always advisable to use default emission factors. In addition, fixed default EFs do not reflect the influence of technological developments onto the trends of certain emissions. Nevertheless, many country-specific emission factors (which are highly uncertain) are available for all combustion plants. All key categories are reported.

Industrial processes

In the area of industrial processes, for the application of higher tier approaches some use is made of production data from association statistics and of manufacturers' information. In the interest of the inventory's completeness and reliability those data sets get specific QA/QC procedures. The inventory is considered complete for the main industrial processes.

Agriculture

In the area of agriculture, while survey data from a past research project on management systems in animal husbandry are available, an effort is being made to carry out periodic, representative data surveys, in the interest of the inventory's continuing completeness and consistency.

Explanation on the use of notation keys

The use of notation keys in the German inventory is carefully checked each year. All notation keys are used as defined in the guidance documents. The following table from the stage 1 review gives a good indication on where and how frequently notation keys are used in the reporting:

Component	% Value	% 0	% NO	% NE	% NA	% IE	% C	% NR	% All
NOx	48.0	0.0	6.0	3.0	38.0	5.0	0.0	0.0	100.0
NMVOC	55.0	0.0	6.0	5.0	29.0	5.0	0.0	0.0	100.0
SOx	36.0	0.0	6.0	3.0	51.0	3.0	0.0	0.0	100.0
NH3	42.0	0.0	6.0	4.0	43.0	5.0	0.0	0.0	100.0
PM2.5	51.0	0.0	6.0	4.0	30.0	9.0	0.0	0.0	100.0
PM10	51.0	0.0	6.0	3.0	31.0	9.0	0.0	0.0	100.0
TSP	53.0	0.0	6.0	2.0	30.0	9.0	0.0	0.0	100.0
BC	23.0	0.0	6.0	22.0	45.0	4.0	0.0	0.0	100.0
CO	33.0	0.0	6.0	3.0	52.0	6.0	0.0	0.0	100.0
Pb	27.0	0.0	6.0	6.0	57.0	5.0	0.0	0.0	100.0
Cd	28.0	0.0	6.0	6.0	5 6 .0	5.0	0.0	0.0	100.0
Hg	28.0	0.0	6.0	6.0	5 6 .0	3.0	0.0	0.0	100.0
As	23.0	0.0	6.0	8.0	60.0	3.0	0.0	0.0	100.0
Cr	22.0	0.0	6.0	7.0	61.0	3.0	0.0	0.0	100.0
Cu	23.0	0.0	6.0	8.0	60.0	3.0	0.0	0.0	100.0
Ni	22.0	0.0	6.0	8.0	61.0	3.0	0.0	0.0	100.0
Se	17.0	0.0	6.0	12.4	61.0	3.0	0.0	0.0	100.0
Zn	22.0	0.0	6.0	9.0	60.0	3.0	0.0	0.0	100.0
DIOX	26.0	0.0	6.0	3.0	61.0	3.0	0.0	0.0	100.0
PAH	24.0	0.0	6.0	5. 0	62.0	2.0	0.0	0.0	100.0
HCB	11.7	0.0	6.0	11.4	68.9	2.0	0.0	0.0	100.0
РСВ	15.0	0.0	6.0	10.0	66.0	2.0	0.0	0.0	100.0

As shown in the table, most flagged cells are the ones reporting on the use of NE. Though NEs are great in number, the actual emission behind each of the notation keys is estimated to be very small. In some cases, it is actually used instead of NA to make absolutely sure to be on the conservative side of the estimate. As for categories, mainly **Industrial Processes** and **Waste** are using NEs (please refer to section 1c of the review report for details). Each use is individually justified in the corresponding source category sections of this report as well as in the table below.

Germany is working continuously to decrease the number of notation keys used and has already made good progress in this regard.

NFR categories reported as 'not estimated' ('NE')

NFR category	pollutants effected	explanation / reasoning				
1.A.1.b	HCB, PCBs	no EFs provided in EMEP GB 2016				
	HCB (as of 2012), PCBs BC, Pb, Cd,	no EFs provided in EMEP GB 2016				
1.A.2.a	As, Cr, Cu, Ni, Se, Zn, B[b]F, B[k]F, I[1,2,3-c,d]P	no country-specific tier2 EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view, Tables 3.7-3.30: BC, Pb, Cd, As, Cr, Cu, Ni, Se, Zn, B[b]F, B[k]F, I[1,2,3-c,d]P provided as 'not estimated' ('NE')				
1.A.2.b	BC, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/F, B[a]P, B[b]F, B[k]F, I[1,2,3-c,d]P, PAH 1-4	no country-specific tier2 EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view, Tables 3.7-3.30: BC, Pb, Cd, As, Cr, Cu, Ni, Se, Zn, B[b]F, B[k]F, I[1,2,3-c,d]P provided as 'not estimated' ('NE')				
1.A.2.e	ZI, PCDD/F,	only emissions from process-combustion systems of the sugar industry are reported; no country-specific tier2 EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view, Tables 3.7-3.30: BC, Pb, Cd, As, Cr, Cu, Ni, Se, Zn, B[b]F, B[k]F, I[1,2,3-c,d]P provided as 'not estimated' ('NE')				
1.A.2.g vii	HCB, PCBs	no EFs provided in EMEP GB 2019				
1.A.3.a i(i)	PCDD/F	no country-specific EF at hand; EMEP GB 2019, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation/view, Table 3.3				
1.A.3.a ii(i)	PCDD/F	no country-specific EF at hand; EMEP GB 2019, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation/view, Table 3.3				
1.A.3.b i - iv	НСВ	no EFs provided in EMEP GB 2019				
1.A.3.b vi	B[k]F	no EFs provided in EMEP GB 2019				
	Hg, as of 2000: BC	no EFs provided in EMEP GB 2019				
1.A.3.c	НСВ	no country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-c-railways/view, Tables 3.1-3.4: HCB and PCBs provided as 'not applicable'. However, no info on solid fuels (coal) —> 'NA' will be applied for next submission				
	as of 2000: BC	no EFs provided in EMEP GB 2016				
-		no appropriate EF available				
1.A.4.a II 1.A.4.b i		no EFs provided in EMEP GB 2019 no appropriate EF available				
		no EFs provided in EMEP GB 2019				
	Se	no appropriate EF available				
-		no EFs provided in EMEP GB 2019				
1.A.5.a	Se, Zn	no appropriate EFs available				
2.A.1	as of 2000: BC	no appropriate EFs available				
	as of 2000: BC	no appropriate EFs available				
	NO _x , BC, PM _{2.5} , PM ₁₀ , TSP, CO	no EFs for particulate matter provided in EMEP GB 2016, use of 'NA' will be checked				
2.B.6		no AD available so far				
Z.B./	as of 1995: PM _{2.5} , PM ₁₀ ; as of 2000: BC	use of split factors for PM will be checked for following submissions				
	as of 2000: BC					
	as of 2000: BC	use of default EF will be checked for following submissions				
2.C.2	NO _x , NMVOC, SO _x , BC, CO, Pb, Cd, Hg	use of default EF will be checked for following submissions				
2.C.3	NMVOC, BC,	use of default EF will be checked for following submissions				
2.C.4		no primary magnesium production in Germany; only F-Gases are reported under 2.C.4, other occurring emissions from secondary magnesium production are reported in the Energy sector under 1.A.2.b.				
205	as of 2000:	use of default EF will be checked for following submissions				
206	BC as of 2000:	use of default EF will be checked for following submissions				
	BC BC, PCBs	use of default EF will be checked for following submissions				
		use of default EF will be checked for following submissions				
	BC, B[a]P,	no country-specific EF at hand; EMEP GB 2016,				
2.0.3.0	1-4	https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/2-industrial-processes/2-d-l-other-solvent/2-d-3-b-road/view, Table 3.1: Benzo(a)pyrene, Benzo(a)fluoranthene, Benzo(k)fluoranthene and Indeno(1,2,3-cd)pyrene provided as 'not estimated' ('NE'); BC: use of 'NA' will be checked				
2.D.3.c	B[a]P, B[b]F, B[k]F, I[1,2,3-c,d]P, PAH 1-4	no country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/2-industrial-processes/2-d-l-other-solvent/2-d-3-c-asphalt/view, Table 3.1: Benzo(a)pyrene, Benzo(a)fluoranthene, Benzo(k)fluoranthene and Indeno(1,2,3-cd)pyrene provided as 'not estimated' ('NE')				

Implementation Implementation Implementation Implementa			
Bask No. Par. Cd. No. Par. Cd. Bask No. Par. Cd. Par. Par. Par. Par. Par. Par. Par. Par.			explanation / reasoning
21.1 CO, PCBs, as low of default EF will be checked for CO und BC, but use of NN for PCB will be checked 21.3 as of 2000 use of default EF will be checked for CO und BC, but use of NN for PCB will be checked 21.3 as of 2000 use of default EF will be checked for CO und BC, but use of NN for PCB will be checked 21.3 as of 2000 use of default EF will be checked for CO und BC, but use of NN for PCB will be checked 21.3 as of 2000 information in EMPC B2016. 21.4 as of 2000 country-specific EF at hand; EMPC B2016. 21.5 as of NN for PCB, reg, reg, reg, reg, reg, reg, reg, reg	2.D.3.h	CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/F, B[a]P, B[b]F, B[k]F, I[x]P, PAH 1-4,	
21.1.2 so of 23000 use of default EF will be checked for following submissions 21.3.3 so of 23000 use of MAW will be checked - empty category 21.3.3 so of 23000 pic formation in BMEP GB 2016 21.4.3 So of 23000 pic formation in BMEP GB 2016 21.4.3 So of 23000 pic formation in BMEP GB 2016 22.4.4 Pic, Pic, Cit, Nic, So of Pic, Pic, Pic, Pic, Pic, Pic, Pic, Pic,	2.H.1	CO, PCBs, as	use of default EF will be checked for CO und BC, but use of 'NA' for PCB will be checked
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21.1 s6 of 70000 no Information in EMEP GB 2016 No., NY, C., NY,	2.H.3	as of 2000:	use of 'NA' will be checked - empty category
21. NVVCC, NV, SP, Mile, T2B, EC, CO accurtry-specific EF at hand; EMP GB 2016, T2B, EC, CO 22. PA, Mile, T2B, EC, CO accurtry-specific EF at hand; EMP GB 2016, T2B, EC, CO 22. PA, FC, T2B, EC, CO ber GB 2015, the specific FF at hand; EMP GB 2016, Table 31: NOX, CO, NUVOC, SOX, NH3, TSP, PM10, PM23, PCBs and HCB provided as 'not estimated' (NE') 23. PA, FC, T2B, EC, CO ber GB 2015, the specific FF at hand; EMP GB 2016 as 'not estimated' (NE') whereas EC provided as 'not estimated' (NE') 24. BC BC BC EP, FC, Table 31: Nov, CO, NUVOC, SOX, NH3, TSP, PM10, PM23, PCBs and HCB provided as 'not estimated' (NE') 24. BC Berosions of other animals (e.g. deer, ostrich ec:) were approximated with estimated population figures (see Rösemann et. al., 2017, Chapter 9) and submitted to the TENT of the NM100C, NVVCC, NVVCC PROVE NW100C P	2.1	as of 2000:	no information in EMEP GB 2016
2.K Hg.As, Cr. Her Ub 2010; Table 31: heavy metals provided as not estimated" (NE) whereas 62 provided as not applicable '(NA) -> used 'NA will be checked for next annual submission 2.K Hg.As, Cr. Her Ub 2010; Table 31: heavy metals provided as not estimated' (NE) whereas 62 provided as not applicable '(NA) -> used 'NA will be checked for next annual submission 3.R.Ah No., Mu, Cr., Mu, Cr., Mu, MV, Cr. No., Mu, MV, Cr. No., Mu, PM, Mu, TSP 5.A. No., Mu, PM, Mu, TSP No., Mu, PM, Mu, TSP No., Mu, PM, Mu, TSP 5.A. No., Mu, PM, Mu, TSP No., Mu, PM, Mu, TSP No., Mu, PM, Mu, TSP 5.A. No., Mu, PM, Mu, TSP No., Mu, PM, Mu, TSP No., Mu, PM, Mu, TSP 5.A. No., Mu, PM, SC, Mu, PM, Mu, TSP No., Mu, PM, SC, Mu, PM, Mu, TSP No., Mu, PM, SC, Mu, PM, Mu, TSP 5.A. No., Mu, PM, SC, Mu, PM, Mu, TSP No., Mu, PM, SC, Mu, PM, Mu, TSP No., Mu, PM, SC, Mu, PM, Mu, TSP 5.A. No., Mu, PM, SC, Mu, PM, SC, Mu, PM, SC, Mu, PM, SC, MU, MU, PM, MU, PM, MU, PM, MU, PM, MU, PM, MU, MU, MU, MU, MU, MU, MU, MU, MU, M	2.J	NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO,	https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/2-industrial-processes/2-j-production-of-pops-1/2-j-production-of-pops-2016/view,
2.1 BC BC emissions unlikely to occur from dry bulk goods; no information in EMEP GB 2016 3.8.4.h MH, PM, MM, PM, MM, PM, MM, TSP Tessions of other animals (e.g. deer, ostich etc.) were approximated with estimated population figures (see Rösemann et. al., 2017, Chapter 9) and submitted to the TERT of the NECD-Rever, WT. TERT Crontmed that emissions are below the threshold of significance. A detailed description of the animal figures used can be found in the National Inventory Report (NIR 2018, Chapter 5.1.3.2.3) SA MMVOC; TSP To country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-1-biological-treatment/view, Tables 3.1.6.3.2; BC provided as 'not estimated' (NE) S.8.1 as of 2000; BC, Ac, Cr, Zr, MK, Se, Zr, Cr, Cu, W, Se, Zr, Ch, Cu, W, Se, Zr, RU, F To country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-2-biological-treatment/view, Tables 3.1.4.3.6; BC provided as 'not estimated' (NE) S.8.2 BC, Ac, Cr, Cu, W, Se, Zr, RU, F The provided in EMEP GB 2016 for BC, use of 'NA' will be checked; for missing HM and B[k]F use of national EF will be checked VI.9. VCD.0F, HT, PP, Cd, HP, Ac, Se, Cr, Cu, W, Se, Zr, RU, F For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available VI.9. CD.0F, HC, RS, RCD.0F, R	2.К	Hg, As, Cr, Cu, Ni, Se,	https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/2-industrial-processes/2-k-consumption-of-pops/2-k-
ANNOC. Emissions of other animals (e.g., deer, dsr.net.cc.) were approximated with estimated population figures (see Addenied description of the animal figures used can be found in the National Inventory MNUCC. Missions of other animals (e.g., deer, dsr.net.cc.) were approximated with estimated population figures (see Addenied description of the animal figures used can be found in the National Inventory MNUCC. Missions of other animals (e.g., deer, dsr.net.ec.) were approximated with estimated population figures (see Addenied description of the animal figures used can be found in the National Inventory MNUCC. Missions of other animals (e.g., deer, dsr.net.ec.) were approximated with estimated of the left of the streshold of significance. A detailed description of the animal figures used can be found in the National Inventory MNUCC. Missions of other animals (e.g., deer, dsr.net, ed.) Missions are below the threshold of significance. A detailed description of the animal figures used can be found in the National Inventory Sa.1 #6 (700) For contry-specific EF at hand; EMEP GB 2016, for the sectoral-guidance-chapters/5-waste/5-b-2-biological-treatment/view, Tables 3.1-3.6: BC provided as 'not estimated' ('NE') Sc.1.bv Co. Ac, Cr. For HW use of 'NA' will be checked, for other pollutants no appropriate EFs available For HW use of 'NA' will be checked, for other pollutants no appropriate EFs available Co. Nr, Sc.2 Cr. Hy, As, Cr. Hy, As	2.L		BC emissions unlikely to occur from dry bulk goods; no information in EMEP GB 2016
S.A. MMs_p. PMs_p. ISP no country-specific EF at hand; EMEP GB 2016, intps://www.eca.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-1-biological-treatment/view, Tables 3.1.6.3.2: BC provided as 'not estimated' (NE') S.B.2. as of 2000, BC no country-specific EF at hand; EMEP GB 2016, intps://www.eca.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-2-biological-treatment/view, Tables 3.1-3.6: BC provided as 'not estimated' (NE') S.B.2. as of 2000, BC no country-specific EF at hand; EMEP GB 2016, intps://www.eca.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-2-biological-treatment/view, Tables 3.1-3.6: BC provided as 'not estimated' (NE') S.C.1.D. V NC vov. Se, TA,	3.B.4.h	NMVOC, NH ₃ , PM _{2.5} ,	NECD-Review. The TERT confirmed that emissions are below the threshold of significance. A detailed description of the animal figures used can be found in the National Inventory
5.8.1 BC 02000: bttps://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-1-biological-treatment/view, Tables 3.1 & 3.2: BC provided as 'not estimated' (NE') 5.8.2 as of 2000: BC no country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-2-biological-treatment/view, Tables 3.1-3.6: BC provided as 'not estimated' (NE') S.6.2 BC, AS, CF, 2N, BK/F NE' provided in EMEP GB 2016 for BC, use of 'NA' will be checked; for missing HM and B[k]F use of national EF will be checked S.C.2 NMVOC, NH, PD, CG, 2N, BC, PCOD/F, HCB, PCBS For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available 2N, BC, C, Cu, NI, Se, Zn, PC, CU, NI, Se, Zn, no country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, AS, CF, GI, BIa/F, B[DF, Cu, NI, Se, Zn, NI, Se, Zn, PC, CH, HCB, PCBS I.A.3.a PCDD/F, HTpS://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, AS, CF, GI, RJ, Se, Zn, NI, Se, Zn, PAH 1-4, HCB, PCBS PD, Cd, Hg, B[A]F, B[DF, Cu, NI, Se, Zn, PAH 1-4, HCB, PCBS no country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, AS, CF, PCDD/F, B[A]F, [B]F, [B]F, B[A]F, [B]F, [B]F, Cu, NI, Se, Zn, PCDD/F, B[A]F, [B]F, [B]F, [B]F, Cu, NI	5.A	PM _{2.5} , PM ₁₀ ,	
5.B.2 BC https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-2-biological-treatment/view, Tables 3.1-3.6: BC provided as 'not estimated' ('NE') 5.B.2 BC, As, Cr, Cu, Ni, Se, Zh, PCDD/F, Horzofabre NK provided in EMEP GB 2016 for BC, use of 'NA' will be checked; for missing HM and B[k]F use of national EF will be checked 5.C.2 NMVOC, NH, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zh, PCDD/F, HCD, PCDD/F, Benzofabre For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available 7.D.2 PD, Cd, Hg, As, Cr, Cu, Ni, Se, Zh, PCDD/F, Benzofabre For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available 8 PD, Cd, Hg, As, Cr, Cu, Ni, Se, Zh, PCDD/F, Benzofabre For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available 1.A.3.a PCDD/F, Leg, PCDB/F, Benzofabre For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available (iii) B[a]F, B[b]F, Cu, Ni, Se, Zh, PCDD/F, Benzofabre For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available (iii) B[a]F, B[b]F, Cu, Ni, Se, Zh, PCDD/F, Benzofabre For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available (iii) B[a]F, B[b]F, Cu, Ni, Se, Zh, PCDD/F, Benzofabre For Bala [iii) B[a]F, B[b]F, Cu, Ni, Se, Zh, PCDD/F, Benzofabre For Bala <td< td=""><td>5.B.1</td><td></td><td>https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-1-biological-treatment/view, Tables 3.1 & 3.2: BC provided as 'not estimated' ('NE')</td></td<>	5.B.1		https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-1-biological-treatment/view, Tables 3.1 & 3.2: BC provided as 'not estimated' ('NE')
5.C.1.b v Cu, Ni, Se, 2, Ni, Se, Ni, Se, Zh, Cr, Cu, Ni, Se, Zh, Cr, CDD/F, HCB, PCDD/F,	5.B.2	вс	https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/5-waste/5-b-2-biological-treatment/view, Tables 3.1-3.6: BC provided as 'not
NH ₂ , Pb, Cd, Hg, As, Cr, Cl, N, Kse, Zn, PCDD/F, HCB, PCBs For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available NB, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/F, HCB, PCBs no country-specific EF at hand; EMEP GB 2016, no country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, As, Cr, B[a]P, B[b]F, PAH 1-4, HCB, PCBs Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, HCDD/F, B[a]P, B[b]F, Cu, Ni, Se, Zn, HCDD/F, B[a]P, B[b]F, HCD, HCD, HCDD/F, B[a]P, B[b]F, HCDD/F, B[a]P, B[b]F, HCDD/F, B[a]P, B[b]F, HCDD/F, B[a]P, B[b]F, HCDD/F, HCDD/F, HCDD/F, HCDD/F, HCDD/F, HCDD/F, HCDD/F, HCDD/F, HCDD/F, HCDD/	5.C.1.b v	Cu, Ni, Se, Zn, B[k]F	'NE' provided in EMEP GB 2016 for BC, use of 'NA' will be checked; for missing HM and B[k]F use of national EF will be checked
As, Cr, Cu, NI, Se, Zn, I(ii) no country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, As, Cr, B[a]P, B[b]F, Cu, Ni, Se, Zn, PCDD/F, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene provided as 'not estimated' ('NE') whereas HCB and PCBs are provided B[k]F, I[x]P, As, Cr, Cu, Ni, Se, Zn, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, no country-specific EF at hand; EMEP GB 2016, no country-specific EF at hand; EMEP GB 2016, no country-specific EF at hand; EMEP GB 2016, Ni, Se, Zn, 1.A.3.a PCDD/F, B[a]P, B[b]F, Cu, Ni, Se, Zn, PCDD/F, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene provided as 'not estimated' ('NE') whereas HCB and PCBs are provided B[k]F, I[x]P, B[a]P, B[b]F, Cu, Ni, Se, Zn, PCDD/F, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene provided as 'not estimated' ('NE') whereas HCB and PCBs are provided B[k]F, I[x]P, as 'not applicable' -> 'NA' will be applied for next submission PAH 1-4, HCB, PCBs 1.A.5.c all no 4.D available for multilateral multilateral more times	5.C.2	NH ₃ , Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/F,	For HM use of 'NA' will be checked, for other pollutants no appropriate EFs available
As, Cr, Cu, Ni, Se, Zn, ii(ii) no country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, As, Cr, B[a]P, B[b]F, [Cu, Ni, Se, Zn, PCDD/F, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene provided as 'not estimated' ('NE') whereas HCB and PCBs are provided B[k]F, I[x]P, PAH 1-4, HCB, PCBs 14.5.c all no country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, As, Cr, so country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, As, Cr, so country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, As, Cr, so country-specific EF at hand; EMEP GB 2016, https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, As, Cr, NG, BCB, PCBs	1.A.3.a i(ii)	As, Cr, Cu, Ni, Se, Zn, PCDD/F, B[a]P, B[b]F, B[k]F, I[x]P, PAH 1-4,	https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/F, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene provided as 'not estimated' ('NE') whereas HCB and PCBs are provided
	1.A.3.a ii(ii)	Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/F, B[a]P, B[b]F, B[k]F, I[x]P, PAH 1-4,	https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation-2016/view, Table 3.3: Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/F, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene provided as 'not estimated' ('NE') whereas HCB and PCBs are provided
	1.A.5.c		no AD available for multilateral military operations

NFR categories reported as 'included elsewhere ('IE')

NFR category	pollutants effected	included in	explanation / reasoning
1.A.1.a	B[b]F, B[k]F, I[1,2,3-c,d]P	PAHs 1-4 total	only summarized PAH data available
1.A.1.b	B[b]F, B[k]F, I[1,2,3-c,d]P	PAHs 1-4 total	only summarized PAH data available
1.A.1.c	B[b]F, B[k]F, I[1,2,3-c,d]P	PAHs 1-4 total	only summarized PAH data available
1.A.2.b	PM _{2.5} , PM ₁₀ , TSP	2.C	considered to be process emissions
1.A.2.c	all emissions	1.A.2.g viii (energy related emissions), 2.B (process related emissions)	
1.A.2.d	all emissions	1.A.2.g viii (energy related emissions), 2.H.1 (process related emissions)	
1.A.2.e	PM _{2.5} , PM ₁₀ , TSP	2.C (process related	only emissions from process-combustion systems of the sugar industry are reported. Emissions from CHP plants and steam boiler are reported under 1.A.2.g viii
	NO _x , NMVOC, SOx, PM _{2.5} , PM ₁₀ , TSP, BC, Pb, Cd, Hg	2.A.1-4	
1.A.2.g viii	B[b]F, B[k]F, I[1,2,3-c,d]P	PAHs 1-4 total	only summarized PAH data available

NFR category	pollutants effected	included in	explanation / reasoning
1.A.3.d i(ii)	all emissions	1.A.3.d ii	no separate AD available for international inland navigation
2.A.1	CO, B[b]F, B[k]F, I[1,2,3- c,d]P	CO: 1.A.2.f; B[b]F, B[k]F, l[1,2,3-c,d]P in PAHs 1-4 total	only summarized PAH data available
2.A.2	NH ₃ , CO	1.A.2.f	
2.A.3	CO	1.A.2.f	
2.A.5.c	PM _{2.5} , PM ₁₀ , TSP, BC	2.L	emissions from storage, handling and transport of mineral products are included in NFR 2.L
2.A.6	CO	1.A.2.f	
2.B.10.b	PM _{2.5} , PM ₁₀ , TSP	2.L	emissions from storage, handling and transport of chemical products are included in NFR 2.L
2.C.7.d	PM _{2.5} , PM ₁₀ , TSP	2.L	emissions from storage, handling and transport of metal products are included in NFR 2.L
2.D.3.b	СО	1.A.2.f	
3.B.4.a	NO _x , NMVOC, NH ₃ , PM _{2.5} , PM ₁₀ , TSP	3.B.1.a, 3.B.1.b	buffaloes included in the population figures for cattle
3.B.4.f	NO _x , NMVOC, NH ₃ , PM _{2.5} , PM ₁₀ , TSP	3.B.4.e	mules and asses are included in population figures for horses

Emission data for years before 1990

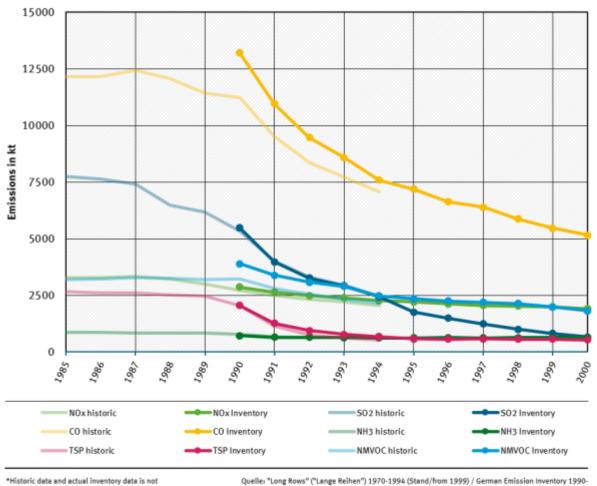
Consistent time series for emissions for years before 1990 are not available.

Up to 1994, Germany calculates some sector's emissions separately for both parts of Germany in distinct procedures, using different substructures and data sources. From 1995 onward, the emissions were calculated for the unified country only.

All inventory improvements coming from our own QA/QC or review recommendations can not be applied for the years before 1990. Insofar, the long-time series is provided only as additional information and to illustrate the general trend since 1970.

Historic and actual inventory emissions of air pollutants in Germany

1970-1994 & 1990-2018



"Historic data and actual inventory data is not Quelle: "Long Rows" ("Lange Reihen") 1970 comparable due to changes in methodologies & data sources

Visual comparison of historic data and inventory data for the years 1985 to 2000

2019 (08.01.2021)