

CHAPTER 9.1 - Recalculations



Generally, improvement of the emission inventory is an ongoing task and triggers recalculations for all source categories and pollutants frequently.



Further information regarding recalculations (especially due to changes in methods or activity data) can be found in the corresponding chapters of the **National Inventory Document 2025** (NID 2025) ¹⁾.

Possible reasons for Recalculations

Due to the ever ongoing efforts to improve the inventory, more or less broad recalculations become necessary with each new submission.

Possible reasons for recalculations are

- **new** (sub-)categories to be included in the inventory or re-allocation of existing sub-categories within the inventory
- **data** (activity data & emission factors) for certain (sub-)categories **available for the first time**
- **change of data sources** (for activity data and emissions)
- use of **new emission factors** (due to: inquest, research projects, expert judgement etc.)
- **improvement of methods** used for calculating emissions
- **outcome of ongoing review** activities under both UN FCCC and UN ECE
- etc.

All these changes can effect *specific years* of the inventory as well as the *entire time series*, leading to more or less significant changes within the emission trends.

Declaration of Recalculations

Under UN FCCC reporting, parties have to comment any recalculations in any year leading to differences between latest and current submission for a given year or the time period or series. Thereby, highest attention is given to recalculations within base year and the most current year of the latest submission:

Recalculations in Base Year data

- mostly rather small but of highest importance
- mostly due to changed methods or emission factors used for entire time series
- impact on basis of any evaluation

Recalculations in data of current year of the latest submission

- mostly because of **corrected activity data** (especially in Energy Production) from finalized Energy Balances
- also due to changed methods, emission factors, or data sources used
- impact on the amount of emission reduction reported in latest submission

Under UN ECE, within the IIR, Germany focusses on recalculations in values reported for **1990** for all MAIN POLLUTANTS, HEAVY METALS and POPS, **1995** for PM_{2.5} and PM₁₀ and **2000** for BLACK CARBON (BC), and the **last year of the previous submission**, providing the **quantity** (in absolute numbers and in %) of change for any recalculated emission **and the reasons** for the recalculations carried out

Recalculations in current submission

Table 1: Overview of impact of recalculations on the level of National Totals (For more detailed information please mouseclick the pollutant.)

for reporting year:		BASE YEAR ¹				2022			
		prev. subm.	curr. subm.	±	± %	prev. subm.	curr. subm.	±	± %
Main pollutants									
NEC									
Nitrogen Oxides - NO _x (as NO ₂)	[kt]	2,842.27	2,846.04	3.77	0.13%	941.99	926.84	-15.15	-1.61%
Non-Methane VOC - NMVOC	[kt]	3,929.35	3,953.69	24.3	0.62%	1,034.51	1,051.46	16.94	1.64%
Sulphur Oxides - SO _x (as SO ₂)	[kt]	5,459.96	5,460.81	0.85	0.02%	255.44	246.27	-9.17	-3.59%
Ammonia - NH ₃	[kt]	734.36	834.48	100	13.6%	512.22	576.62	64.40	12.6%
Particulate Matter									
Particles <2.5µm - PM _{2.5}	[kt]	199.77	197.47	-2.30	-1.15%	84.29	82.31	-1.98	-2.35%
Particles <10µm - PM ₁₀	[kt]	337.92	334.41	-3.51	-1.04%	184.56	181.99	-2.57	-1.39%
Total Suspended Particles - TSP	[kt]	2,019.60	2,015.59	-4.01	-0.20%	330.46	327.93	-2.53	-0.77%
Black Carbon - BC	[kt]	39.20	39.20	0.00	0.00%	9.98	10.09	0.11	1.12%
Other									
Carbon Monoxide - CO	[kt]	13,320.20	13,320.53	0.33	0.002%	2,539.17	2,568.11	28.94	1.14%
Heavy Metals									
Priority HM									
Lead - Pb	[t]	1,899.27	1,899.27	0.00	0.00%	151.71	152.45	0.74	0.49%
Cadmium - Cd	[t]	29.10	29.10	0.00	0.00%	10.32	10.62	0.29	2.82%
Mercury - Hg	[t]	35.53	35.53	0.00	0.00%	6.559	6.556	-0.002	-0.03%
Other HM									
Arsenic - As	[t]	85.92	85.92	0.00	0.00%	5.58	5.76	0.18	3.19%
Chrome - Cr	[t]	165.69	165.69	0.00	0.00%	69.96	67.07	-2.89	-4.14%
Copper - Cu	[t]	619.88	619.88	0.00	0.00%	560.30	564.60	4.30	0.77%
Nickel - Ni	[t]	332.75	332.75	0.00	0.00%	143.26	136.14	-7.12	-4.97%
Selenium - Se	[t]	5.73	5.73	0.00	0.00%	2.879	2.931	0.052	1.79%
Zinc - Zn	[t]	474.15	474.15	0.00	0.00%	292.46	296.03	3.58	1.22%
Persistent Organic Pollutants - POPs									
Dioxines & Furanes - PCDD/F	[g]	805.10	805.10	0.00	0.00%	107.67	112.50	4.83	4.48%
Polycyclic Organic Hydrocarbons - PAHs									
Benzo(a)pyrene - B[a]P	[t]	26.99	26.99	0.00	0.00%	17.94	18.81	0.87	4.87%
Benzo(b)fluoranthene - B[b]F	[t]	35.83	35.83	0.00	0.00%	26.02	27.30	1.28	4.92%
Benzo(k)fluoranthene - B[k]F	[t]	16.26	16.26	0.00	0.00%	11.83	12.39	0.57	4.80%
Indeno(1,2,3-c,d)pyrene - I[1,2,3-c,d]P	[t]	23.03	23.03	0.00	0.00%	17.28	18.15	0.86	5.00%
Polycyclic Aromatic Hydrocarbons - PAH 1-4	[t]	115.67	115.67	0.00	0.00%	76.74	80.27	3.53	4.60%
Other POPs									
Hexachlorobenzene - HCB	[kg]	2,900.52	2,900.52	0.00	0.00%	4.63	4.68	0.04	0.94%
Polychlorinated Biphenyls - PCBs	[kg]	1,735.78	1,735.78	0.00	0.00%	213.40	209.46	-3.94	-1.85%

¹: Base Year of reporting: 1990; excumptions: PM_{2.5} and PM₁₀: 1995 and BC: 2000

Overview of reasons for recalculations against Submission 2024

(main changes only, without claim to completeness)

1. revision of (primary) activity data

- 1.A together with 2.C.1: [finalisation of National Energy Balance 2022](#) ²⁾
- 2.A.2 and 2.A.3: small updates of statistical data for most recent years
- 3.B.4.e: Horse numbers were corrected in all years and all districts by a factor of 2.75 to include horses which are kept outside of agricultural holdings and not counted by agricultural census

2. update or revision of entire model

- 1.A.3.a: routine revision of TREMOD Aviation (TREMOD AV) ³⁾
- 1.A.3.b: routine revision of TREMOD ⁴⁾
- 1.A.2.g vii, 1.A.4.a ii, 1.A.4.b ii and 1.A.4.c ii: routine revision of TREMOD Mobile Machinery (TREMOD MM) ⁵⁾
- 1.A.3.d: routine revision of E.M.M.A. model maintained at BSH ⁶⁾

3. newly implemented activity and/or emission factors

- 3.D.a.1: application of NH₃ emission factors for mineral fertilizers in EMEP (2023)
- 3.D.a.4: calculation of NH₃ from crop residues according to tier2 method from EMEP (2023). Cover crops are another newly reported source of PM emissions from soils.

4. revision of emission factors

- mobile combustion over-all: revision of (implied) country-specific emission factors as part of model revision
- 1.A.3.b i, ii, iv, vi, vii, and 1.A.3.d.i (i): correction of rounding errors in emission factors for B[a]P, B[b]F, B[k]F, I[x]P, and PAH1-4
- 1.A.3.c - abrasive particulate matter: consideration of new (and far lower) emission factors for PM₁₀ from the abrasion of wheel on rail from a corresponding measurement campaign as part of a research project ⁷⁾
- 3.B: improved emission factors for cattle and pig housing were introduced based on national research projects
- 3.B: N₂O emission factors were adopted from the IPCC Refinement (2019): N₂O EF for solid manure storage doubles, also affecting the corresponding NO_x and N₂ EFs.

5. re-allocation of activity data and/or emissions

6. as an outcome of the ongoing review activities under both UNFCCC and UNECE

¹⁾ UBA, 2025: National Inventory Document for the German Greenhouse Gas Inventory 1990-2023 (NID 2025), <https://www.umweltbundesamt.de/themen/klima-energie/treibhausgas-emissionen?listpart=1#articlelist>, Dessau, April 2025

²⁾ AGEb, 2024: Working Group on Energy Balances (Arbeitsgemeinschaft Energiebilanzen (Hrsg.), AGEb): Energiebilanz für die Bundesrepublik Deutschland; <https://ag-energiebilanzen.de/wp-content/uploads/2024/03/EBD22e.xlsx>, (Aufruf: 04.12.2024), Köln & Berlin, 2024

³⁾ Allekotte et al. (2024): TREMOD Aviation (TREMOD AV) - Revision des Modells zur Berechnung des Flugverkehrs (TREMOD-AV). Heidelberg, Berlin: Ifeu Institut für Energie- und Umweltforschung Heidelberg GmbH & Öko-Institut e.V., Berlin & Heidelberg, 2024.

⁴⁾ Knörr et al. (2024a): Knörr, W., Heidt, C., Gores, S., & Bergk, F.: Fortschreibung des Daten- und Rechenmodells: Energieverbrauch und Schadstoffemissionen des motorisierten Verkehrs in Deutschland 1960-2035, sowie TREMOD, im Auftrag des Umweltbundesamtes, Heidelberg [u.a.]: Ifeu Institut für Energie- und Umweltforschung Heidelberg GmbH, Heidelberg & Berlin, 2024.

⁵⁾ Knörr et al. (2024b): Knörr, W., Heidt, C., Gores, S., & Bergk, F.: ifeu Institute for Energy and Environmental Research (Institut für Energie- und Umweltforschung Heidelberg gGmbH, ifeu): Aktualisierung des Modells TREMOD-Mobile Machinery (TREMOD MM) 2024, Heidelberg, 2024.

⁶⁾ Deichnik (2024): Aktualisierung und Revision des Modells zur Berechnung der spezifischen Verbräuche und Emissionen des von Deutschland ausgehenden Seeverkehrs. from Bundesamts für Seeschifffahrt und Hydrographie (BSH - Federal Maritime and Hydrographic Agency); Hamburg, 2024.

⁷⁾ DZSF (Deutsches Zentrum für Schienenverkehrsforschung / German Centre for Rail Traffic Research) research project on "Size-specific and spatial distribution of traffic-related abrasion and particulate emissions" (Größenspezifische und räumliche

Verteilung von verkehrsbedingten Abrieben und partikulären Emissionen)

https://www.dzsf.bund.de/SharedDocs/Standardartikel/DZSF/Projekte/Projekt_44_Abriebe_Emissionen.html