

5.D.1 - Domestic & Commercial Wastewater Handling

Short description

| Category Code | Method | | | | | AD | | | | | EF | | | | |
|---------------|-----------------|--------|-----------------|-----------------|-------------------|------------------|-----|----|----|----|----|----|------|-----|-----|
| 5.D.1 | T1 | | | | | NS | | | | | D | | | | |
| | NO _x | NM VOC | SO ₂ | NH ₃ | PM _{2.5} | PM ₁₀ | TSP | BC | CO | Pb | Cd | Hg | Diox | PAH | HCB |
| Key Category: | - | -/- | - | - | - | - | - | - | - | - | - | - | - | - | - |

T = key source by Trend **L** = key source by Level

| Methods | |
|-----------|---------------------------------|
| D | Default |
| T1 | Tier 1 / Simple Methodology * |
| T2 | Tier 2* |
| T3 | Tier 3 / Detailed Methodology * |
| C | CORINAIR |
| CS | Country Specific |
| M | Model |

* as described in the EMEP/EEA Emission Inventory Guidebook - 2019, in the group specific chapters.

| AD - Data Source for Activity Data | |
|------------------------------------|--------------------------------------|
| NS | National Statistics |
| RS | Regional Statistics |
| IS | International Statistics |
| PS | Plant Specific data |
| As | Associations, business organisations |
| Q | specific Questionnaires (or surveys) |
| M | Model / Modelled |
| C | Confidential |
| EF - Emission Factors | |
| D | Default (EMEP Guidebook) |
| C | Confidential |
| CS | Country Specific |
| PS | Plant Specific data |
| M | Model / Modelled |

In category **5.D.1**, **NM VOC emissions** from domestic and commercial wastewater handling are reported. The domestic section is covered by wastewaters of municipal origin (large centralised plants; ranging from 1000 up to >100.000 resident values). The commercial section is covered by industrial and commercial wastewaters, co-treated in municipal wwt-plants. According to national experts, dry toilets (including latrines) do not play a role in sewage treatment in Germany because they are not in compliance with the legislation and thus do not constitute a procedure of orderly wastewater disposal. Due to that reason NH₃ emissions are not estimated. § 55 of the German water resources act (german: Wasserhaushaltsgesetz, WHG) demands the assuring of the general wellbeing in order of the wastewater disposal (german: gemeinwohlverträgliche Abwasserentsorgung). To ensure this requirement the water regarding laws of the several federal states of Germany (e.g. § 46 Abs. 1 WG BW; Art. 34 BayWG) obligate to the transfer of wastewater from the citizen to the public authorities or to assigned companies (german: Überlassungspflicht). The details are described in municipal bylaws which for the most cases obligate to the connection to the municipal wastewater infrastructure (german: Anschluss- und Benutzungszwang). Exceptions are possible but most likely realised in form of septic tanks or drainless cesspools. We assume that if there are very little exceptions for dry-toilets on a municipal level, that those are demanded to be separating toilets, as urine and faeces would be collected separately. Because of the necessary contact between urine and faeces to build ammonia from urea (contained in urine) by hydrolysis through urease (enzyme, contained in faeces) and the assumed very little number of exceptions, there are no assessable emissions of ammonia. The superior federal law (WHG) described above was redesigned and implemented in its current form in the year 2009 following the reform of federalism (german: Föderalismusreform) and to implement requirements from the 2000/60/EC Water Framework Directive. The regulation has been described by the laws of the federal states before this time but latest with the implementation of the requirements of the 91/271/EEC directive concerning urban waste water treatment (e.g. BayROKAbwV).

Method

Emissions reported under this category are calculated using the Tier 1 approach of the EMEP/EEA Guidebook 2019, where the emission factor (EF) is 15 mg/m³ wastewater (Part B, 5.D, chap. 3.2.2, Table 3-1, p. 7 ¹⁾). This EF is multiplied with the total amount of wastewater (AD) treated in domestic and commercial wwt-plants, following the equation:



$$\text{Emissions}_{\text{(NMVOC)}} = \text{AD} \times \text{EF}$$

(ibid., chap. 3.2.1)

Activity data

Total volumes of treated municipal wastewater are derived by the German statistical agency (Statistisches Bundesamt, Fachserie 19, Reihe 2.1.2 ²⁾). The data source is published on a three-year basis with new data only for the respective year of the update. The availability of the data starts in 1991 with an exception for the following update, which was for 1995. Missing data are inter- or extrapolated

Emission factors

See method

Uncertainties

The AD from Statistisches Bundesamt have an uncertainty of $\pm 3\%$ (normal distribution) whereas the uncertainty for the EF, due to its range (5/50 mg/m³), is -70 / +210 % and the distribution lognormal.

Recalculations

Recalculations were necessary, because new statistical data for total volumes of treated municipal wastewater in 2019 were issued by the German statistical agency. Out of that reason changes in inter-/extrapolation between 2017 – 2020 were necessary and listed in the following table.

Table: Revised volumes of treated municipal wastewater and NMVOC-Emissions

| Total wastewater | Unit | | 2017 | 2018 | 2019 | 2020 |
|------------------|-------------------|----------|---------------|---------------|---------------|---------------|
| | [m ³] | IIR 2023 | 9.403.348.667 | 9.225.645.333 | 9.047.942.000 | 8.870.238.667 |
| | | IIR 2022 | 9.499.670.000 | 9.418.288.000 | 9.336.906.000 | 9.255.524.000 |
| NMVOC-Emission | [kt] | IIR 2023 | 0,141 | 0,138 | 0,136 | 0,133 |
| | | IIR 2022 | 0,142 | 0,141 | 0,140 | 0,139 |



For **pollutant-specific information on recalculated emission estimates for Base Year and 2019**, please see the recalculation tables following [chapter 8.1 - Recalculations](#).

Planned improvements

Currently no improvements are planned.

¹⁾ EMEP/EEA, 2019: EMEP/EEA air pollutant emission inventory guidebook 2019, Copenhagen, 2019

²⁾ Statistisches Bundesamt, Fachserie 19, Reihe 2.1.2