2.A.5.a - Quarrying & Mining - Other Than Coal

Category Code	Method	AD	EF
2.A.5.a	T1/T2	NS/IS/AS	CS

Method(s) applied	
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 category chapters.	
(source for) Activity Data	
NS	National Statistics
RS	Regional Statistics
IS	International Statistics
PS	Plant Specific
As	Associations, business organisations
Q	specific Questionnaires (or surveys)
M	Model / Modelled
C	Confidential
(source for) Emission Factors	
D	Default (EMEP Guidebook)
CS	Country Specific
PS	Plant Specific
M	Model / Modelled
C	Confidential

NO_x	NMVOC	SO_2	NH_3	**$PM_{2.5}$**	**PM_{10}**	**TSP**	BC	CO	Heavy Metals	POPs
NA	NA	NA	NA	**L/-**	**L/T**	**L/-**	NA	NA	NA	NA

L/-	key source by **L**evel only
-/T	key source by **T**rend only
L/T	key source by both **L**evel and **T**rend
-/-	no key source for this pollutant
IE	emission of specific pollutant **I**ncluded **E**lsewhere (i.e. in another category)
NE	emission of specific pollutant **N**ot **E**stimated (yet)
NA	specific pollutant not emitted from this source or activity = **N**ot **A**pplicable
*	no analysis done

Quarrying & Mining is the main source for particulate matter emissions within the entire **Mineral industries sub-sector (2.A)**.

Short description

Generally, mining processes emit relevant amounts of particles.

NFR 2.A.5.a - Quarrying and mining of minerals (other than coal) includes the mining of limestone, hard rock, and building sands, as well as the increasing use of corresponding recyclates.

Due to the country-specific approach applied, the production of (potash and rock) salt is a sub-category of the mining processes considered in the German air pollutant emissions inventory.

Methodology

Withi the German air pollutant emissions inventory, different approaches are applied for (i) sands and rocks, and (ii) salts:

Sands and Rocks

By applying the 2023 GB method [1)], a tier2 method is available reflecting different national conditions, in particular specific input variables on humidity and wind speed, which are localized according to the German federal states. Here, as the three German city-states (Berlin, Hamburg, and Bremen) do not represent average weather conditions, they are considered part of the surrounding federal states (Brandenburg, Schleswig-Hollstein, and Niedersachsen). Parameters on weather as well as on areas can thus be improved in the model mentioned above. In a first approach, this was done by using weather data from the German Weather Service (DWD), which can be obtained as daily station data from (DWD, 2024) [2)]. No area information from the Corine land cover before 2010 is used (consistent data sets). In addition, information from CLC category 131 (Mineral extraction sites) had to be adjusted for areas of active open-pit lignite mines. (Copernicus, 2019) [3)]

Salts

Salt mining represents only a minor portion (less than 4%, depending on the PM fraction) of the particulate-matter emissions reported for NFR 2.A.5.a.

With respect to this limited scale of both activity and emissions, salt mining is considered too insignificant for the application of a higher tier (Please see trend discussion below). Therefore, in contrast to the mining/quarrying of sands and rocks described above, a tier1 approach based on information on production of salts and country-specific emission factors for TSP and PM is applied.

Activity Data

Sands and Rocks

As provided in the calculation model presented with the EMEP/EEA Guidebook, specific activity data for hard rock, sand, and recycled material are applied. Here, due to incomplete national statistics, these specific AD are taken from national and international association information available from Aggregates Europe – UEPG (2024) [4)].

Within the framework of technical consultations, historical data were confirmed by the National Association for Mineral Resources [5)].

However, additional information and figures on mineral raw materials are compiled by the Federal Institute for Geosciences and Natural Resources [6)] but are not yet available.

Therefore, for time series consistency, data gaps are closed via interpolation or expert adjustments.

Salts

Data of production of potash and rock salt are included in national statistics with data gaps being filled as already described for sands and rocks above. Here, as potash salt is dominating, all reported emissions are modelled as resulting from potash salt.

Emission factors

Emission factors

Sands and Rocks

As described above, the calculation model provided by the EEA as part of the EMEP/EEA GB takes into account national circumstances and reduction measures. The calculations are available in from of more than ten MS Excel files (individual years since 1990, annually from 2010). Since the GB tool in principle calculates emissions for exactly one year [7)], files must be available for those years for which specific input data are available. In case of data gaps, intermediate years are interpolated .

With the help of the GB tools, annual implied EFs are estimated which are used for the inventory method (EM = AR x EF). As the calculation of this implied emission factors is influenced by national circumstances and weather conditions, the EF are consideres as being country-specific.

Salts

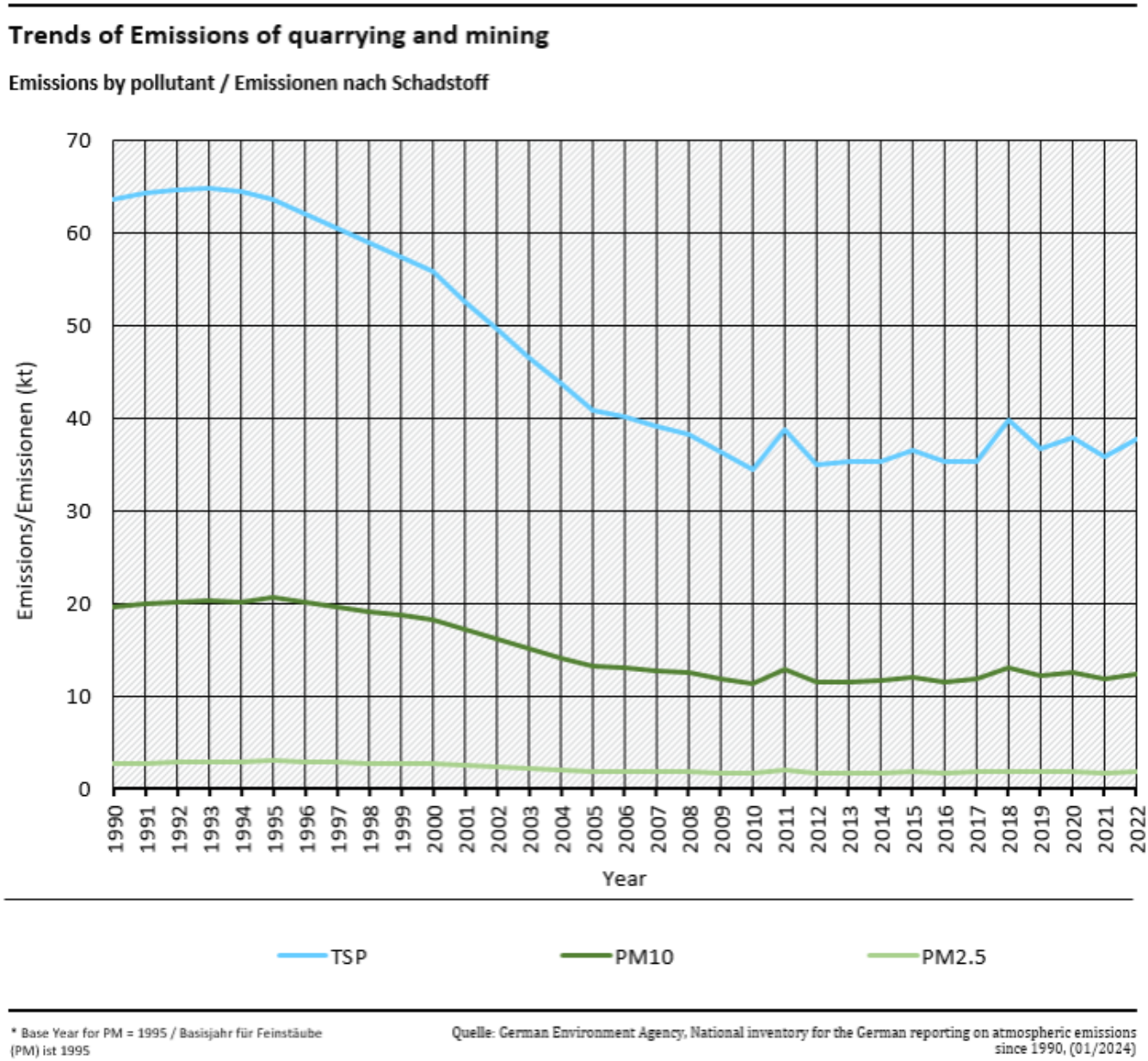
The emission factors for salt production are based on analogy to bulk product handling by an UBA expert judgement:

Table 2: Overview of emission factors applied for salt mining, in [kg/t salt]

	value	trend
TSP	0.031	constant over time
PM_{10}	0.016	constant over time
$PM_{2.5}$	0.003	constant over time

Trend discussion

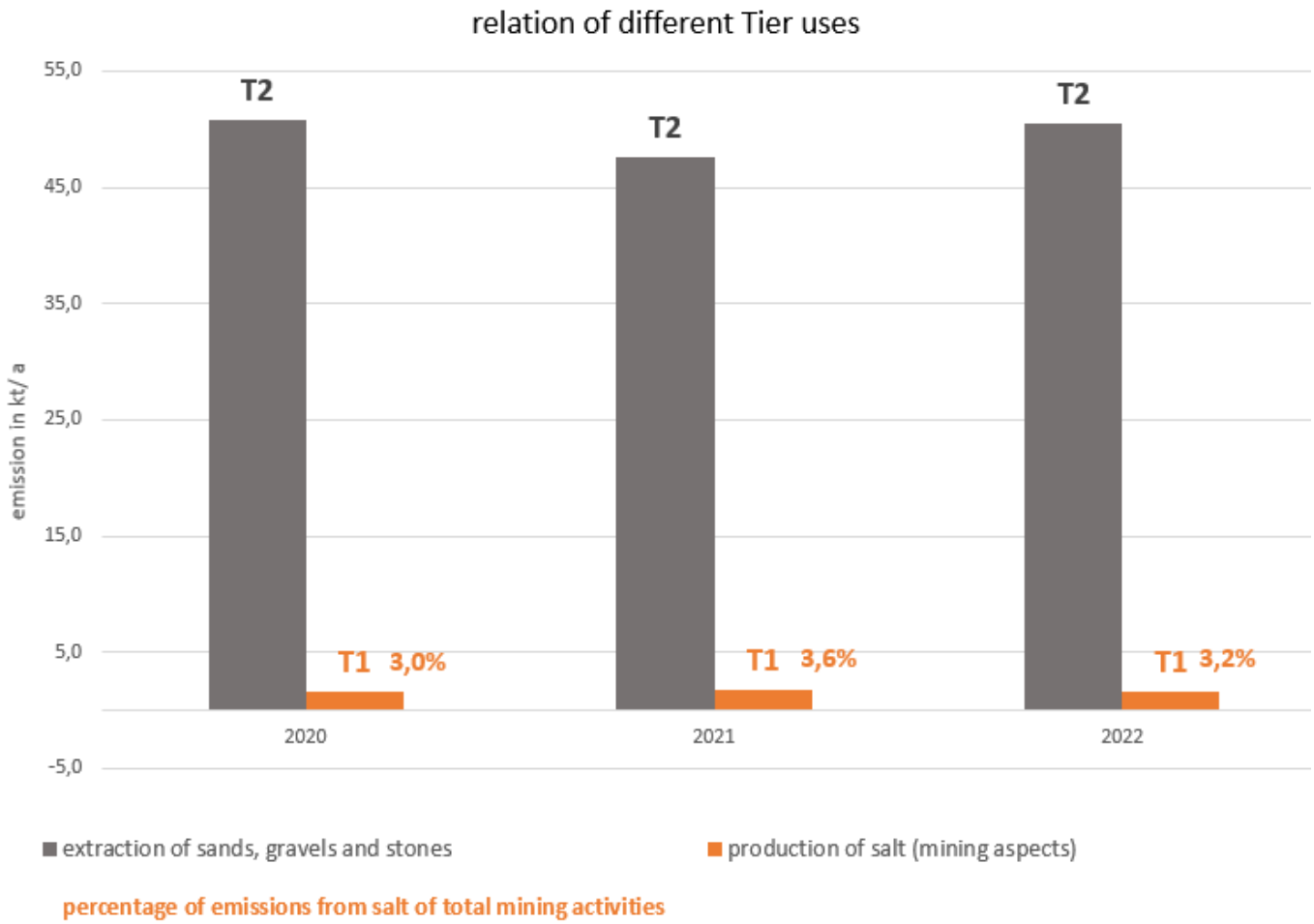
Trends in emissions follow the shrinking mining activities.



Emission trends in NFR 2.A.5.a

note: small change for 2023

As mentioned above, emissions from salt mining represent only a small portion (less than 4%) of the total emissions allocated to NFR sub-sector 2.A.5.a, depending on the specific pm fraction.



share-of-salt-in-mining

Recalculations

Recalculations were necessary due to updated production figures for the most recent year.

For **pollutant-specific information on recalculated emission estimates for Base Year and 2022**, please see the recalculation tables following chapter 8.1 - Recalculations.

Planned improvements

It is planned to further evaluate country-specific conditions.

[1), 7)] EMEP/EEA (2023): EMEP/EEA air pollutant emission inventory guidebook 2023; URL: https://www.eea.europa.eu/publications/emep-eea-guidebook-2023/part-b-sectoral-guidance-chapters/2-industrial-processes-and-product-use/2-a-mineral-products/2-a-5-a-quarrying-1/view; Copenhagen, 2023

[2)] DWD (2024): ClimateDataCenter (CDC): URL:

https://opendata.dwd.de/climate_environment/CDC/observations_germany/climate/daily/kl/
[3] Copernicus (2019): CLC-classes: URL:
https://land.copernicus.eu/user-corner/technical-library/corine-land-cover-nomenclature-guidelines/html/index-clc-131.html
[4] Aggregates Europe – UEPG (2023): aggregates production data for European countries:
https://www.aggregates-europe.eu/facts-figures/figures/; Brussels, Belgium, 2023
[5] BV-Miro (2024): National Association for Mineral Resources: https://www.bv-miro.org/
[6] BGR - Federal Institute for Geosciences and Natural Resources:
https://www.bgr.bund.de/DE/Themen/Min_rohstoffe/Produkte/produkte_node.html;