

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

| Category Code   | Method                               | AD       | EF |
|---|--------------------------------------|----------|----|
| 2.A.5.a   | T1/T2                                | NS/IS/AS | CS |
| <b>Method(s) applied</b>  |                                      |          |    |
| <b>D</b>  | Default                              |          |    |
| <b>T1</b>   | Tier 1 / Simple Methodology *        |          |    |
| <b>T2</b>   | Tier 2*                              |          |    |
| <b>T3</b>   | Tier 3 / Detailed Methodology *      |          |    |
| <b>C</b>  | CORINAIR                             |          |    |
| <b>CS</b>   | Country Specific                     |          |    |
| <b>M</b>  | Model                                |          |    |
| * as described in the EMEP/EEA Emission Inventory Guidebook - 2019, in category chapters. |                                      |          |    |
| <b>(source for) Activity Data</b>   |                                      |          |    |
| <b>NS</b>   | National Statistics                  |          |    |
| <b>RS</b>   | Regional Statistics                  |          |    |
| <b>IS</b>   | International Statistics             |          |    |
| <b>PS</b>   | Plant Specific                       |          |    |
| <b>As</b>   | Associations, business organisations |          |    |
| <b>Q</b>  | specific Questionnaires (or surveys) |          |    |
| <b>M</b>  | Model / Modelled                     |          |    |
| <b>C</b>  | Confidential                         |          |    |
| <b>(source for) Emission Factors</b>  |                                      |          |    |
| <b>D</b>  | Default (EMEP Guidebook)             |          |    |
| <b>CS</b>   | Country Specific                     |          |    |
| <b>PS</b>   | Plant Specific                       |          |    |
| <b>M</b>  | Model / Modelled                     |          |    |
| <b>C</b>  | Confidential                         |          |    |

| NO <sub>x</sub>   | NMVOG | SO <sub>2</sub> | NH <sub>3</sub> | PM <sub>2.5</sub> | PM <sub>10</sub> | TSP | BC | CO | Heavy Metals | POPs |
|---|-------|-----------------|-----------------|-------------------|------------------|-----|----|----|--------------|------|
| NA  | NA    | NA              | NA              | L/-               | L/T              | L/- | NA | NA | NA           | NA   |
| <b>L/-</b> key source by <b>Level</b> only  |       |                 |                 |                   |                  |     |    |    |              |      |
| <b>-/T</b> key source by <b>Trend</b> only  |       |                 |                 |                   |                  |     |    |    |              |      |
| <b>L/T</b> key source by both <b>Level</b> and <b>Trend</b>                                   |       |                 |                 |                   |                  |     |    |    |              |      |
| <b>-/-</b> no key source for this pollutant   |       |                 |                 |                   |                  |     |    |    |              |      |
| <b>IE</b> emission of specific pollutant <b>Included Elsewhere</b> (i.e. in another category) |       |                 |                 |                   |                  |     |    |    |              |      |
| <b>NE</b> emission of specific pollutant <b>Not Estimated</b> (yet)                           |       |                 |                 |                   |                  |     |    |    |              |      |
| <b>NA</b> specific pollutant not emitted from this source or activity = <b>Not Applicable</b> |       |                 |                 |                   |                  |     |    |    |              |      |
| * no analysis done  |       |                 |                 |                   |                  |     |    |    |              |      |

Regarding particulate emissions, Mining is the main emissions source in the Mineral industries.

In Germany, two different approaches are applied for sands and rocks, and for salts, respectively.

### Short description

The mining process emits relevant amounts of particles. Quarrying and mining of minerals other than coal is subsumed, in particular mining of limestone, hard rock and building Sands, with rising recycled materials.

Salt production is a sub-category of the mining activities in respect of the country specific approach used.

The Tier 1 methodology for the emissions from salt mining represents only a small portion of emissions from this sector - few than 4%, depending on the PM fraction. Considering the limited scale of the activity and emission, the part is considered to be below the significance for higher Tiers. Please see the small relevance of this under trend discussion.

## Methodology

With the use of the 2023 GB method <sup>1)</sup>, a Tier 2 method is available that can reflect different national conditions.

In particular, this concerns input variables on humidity and wind speed, which are localized according to the administrative states of Germany. Larger city states (Berlin, Hamburg and Bremen) were merged with the respective larger states (Brandenburg, Schleswig-Holstein, Niedersachsen) as the city states do not necessarily represent the local weather conditions. Parameters on weather as well as on areas can thus be improved in the model above. In a first this was done by using weather data from the German Weather Service (DWD), which may be obtained as daily station data from the Open Data Portal: ClimateDataCenter (CDC) of the DWD URL:

[https://opendata.dwd.de/climate\\_environment/CDC/observations\\_germany/climate/daily/kl/](https://opendata.dwd.de/climate_environment/CDC/observations_germany/climate/daily/kl/)

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 <sup>2)</sup>) had to be adjusted for areas of active open-pit lignite mines.

For salt production currently a Tier 1 method is used: information on production of salts are multiplied with country specific emission factors for TSP and PM. Please see the small relevance of this under trend discussion.

## Activity Data

As provided in the Guidebook model, specific AD for hard rock, sand, and recycled material are applied. Because of incomplete national statistics, these AD are taken from national and international association information <sup>3)</sup>. Within the framework of technical consultations, historical data were confirmed by the National Association for Mineral Resources <sup>4)</sup>. Now we are additionally in contact with Federal Institute for Geosciences and Natural Resources for figures of mineral raw materials <sup>5)</sup>. For time series consistency, data gaps are closed via interpolation or expert adjustment.

Data of production of potash and rock salt are included in national statistics. Potash salt is dominating, nevertheless gaps of statistics are filled and emissions are modelled as potash salt only.

## Emission factors

The calculation of emissions takes into account national circumstances and reduction measures. The calculations are available in total more than ten Excel files (individual years since 1990, annually from 2010). Since the GB tool in principle calculates emissions for exactly one year <sup>6)</sup>, files must be available for exactly those years in which input data are available. Intermediate years are interpolated in case of data gaps.

With the help of the GB tools, IEFs are estimated on an annual basis, which are used for the inventory method AR x EF. The emission factors are virtual, but the calculation of this is modified by national circumstances on the parameters. So we would name the EF as country-specific.

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

Table 2: Overview of applied emission factors, in kg/t salt

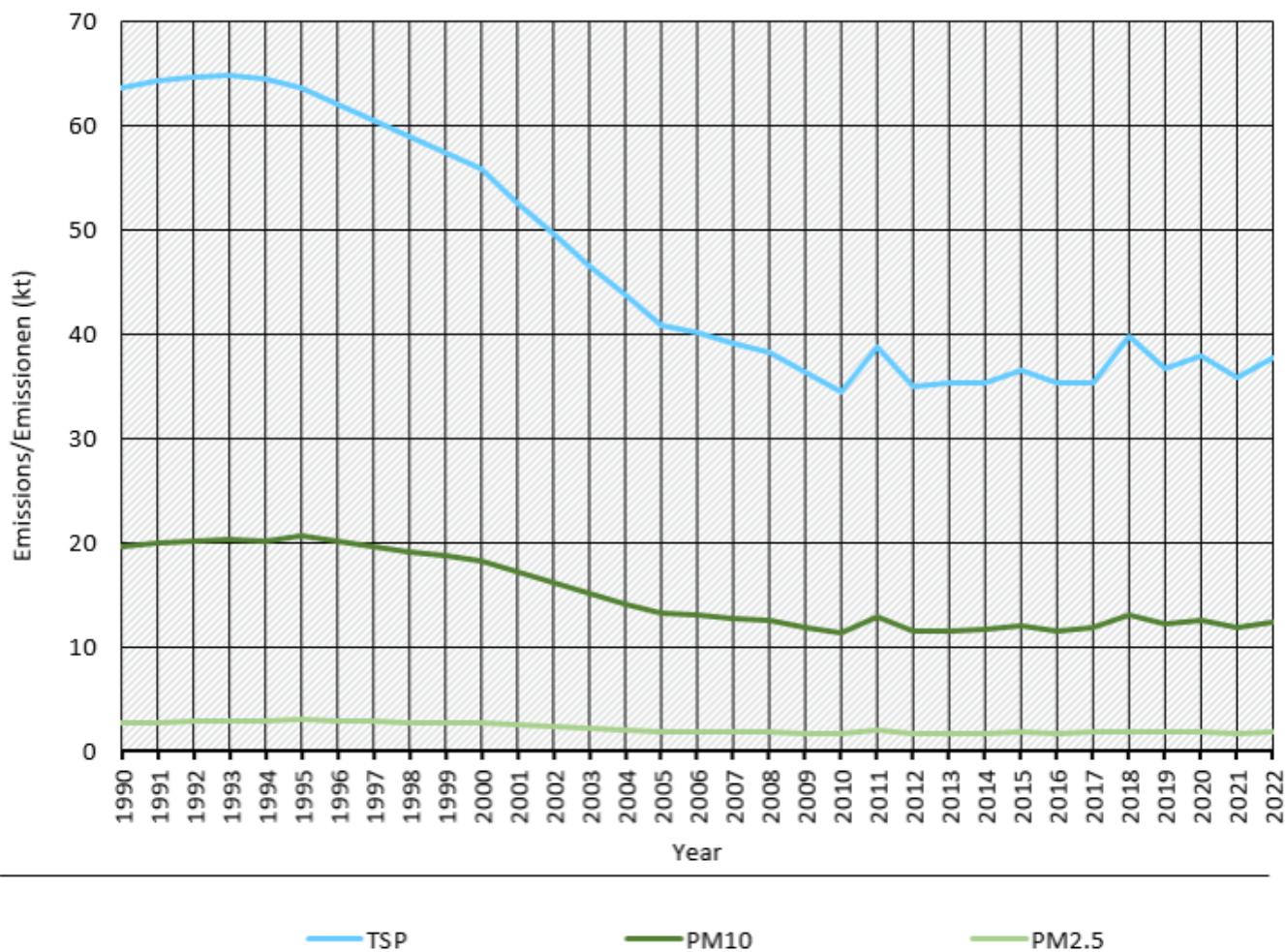
|                         | EF value | EF trend |
|-------------------------|----------|----------|
| <b>TSP</b>              | 0.031    | constant |
| <b>PM<sub>10</sub></b>  | 0.016    | constant |
| <b>PM<sub>2.5</sub></b> | 0.003    | constant |

## Trend discussion

Trends in emissions follow the shrinking mining activities.

### Trends of Emissions of quarrying and mining

Emissions by pollutant / Emissionen nach Schadstoff



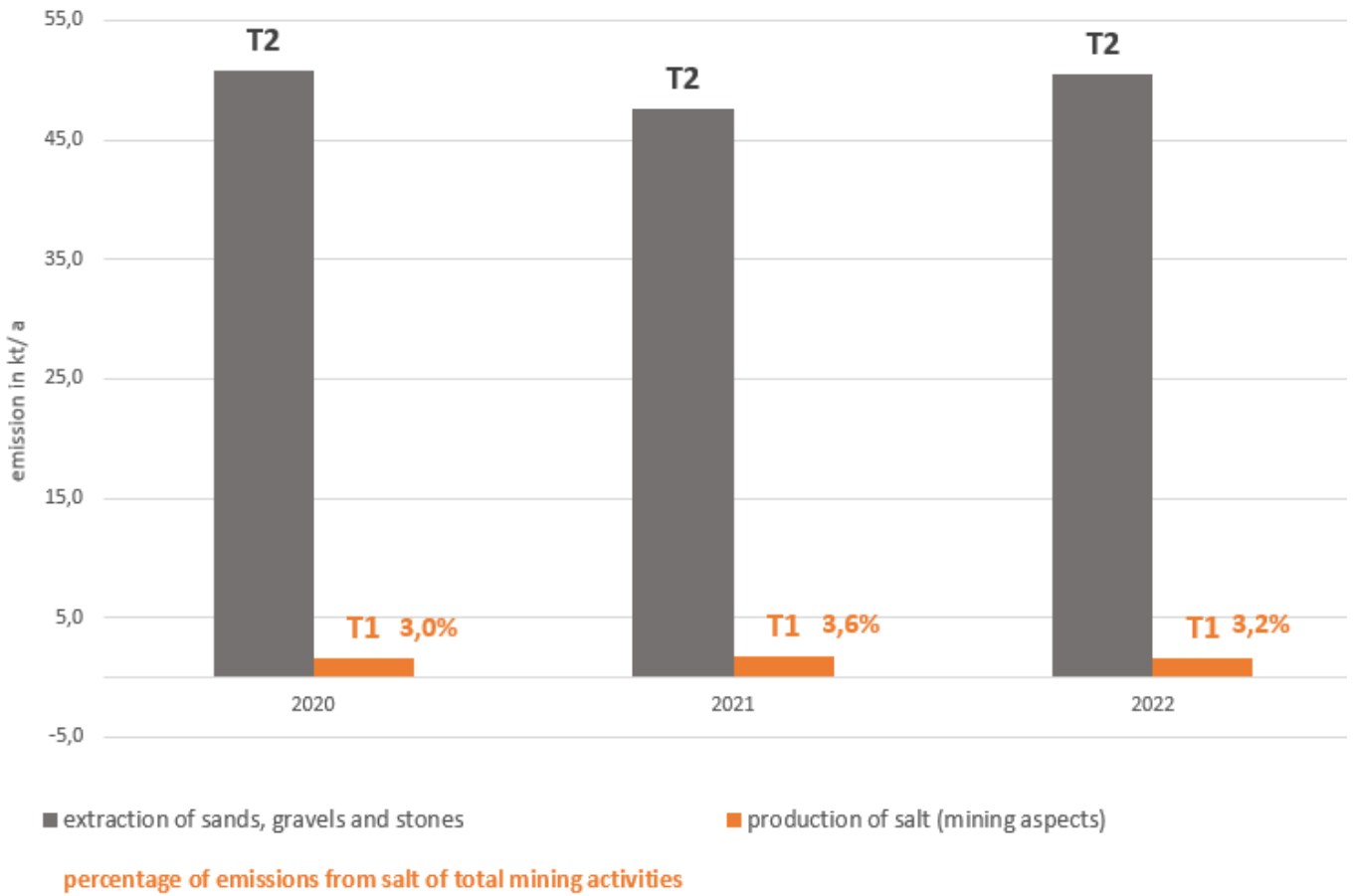
\* Base Year for PM = 1995 / Basisjahr für Feinstäube (PM) ist 1995

Quelle: German Environment Agency, National inventory for the German reporting on atmospheric emissions since 1990, (01/2024)

#### Emission trends in NFR 2.A.5.a

The Tier 1 methodology for the emissions from salt mining represents only a small portion of emissions from this sector - few than 4%, depending on the PM fraction. Considering the limited scale of the activity and emission, the part is considered to be below the significance for higher Tiers.

relation of different Tier uses



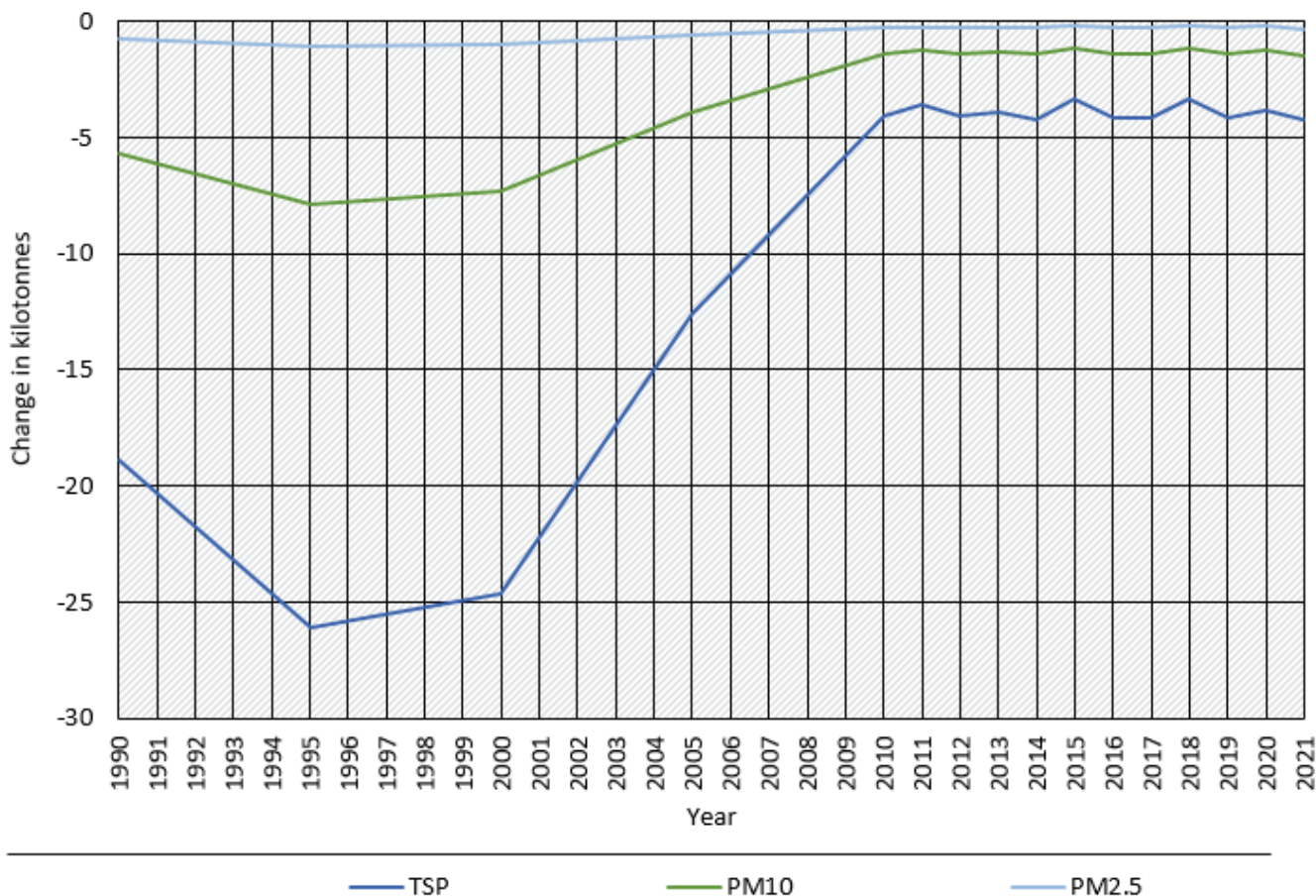
share-of-salt-in-mining

## Recalculations

Recalculations were necessary due to improvement of method. The significant changes can be shown as an absolute difference over time as follows:

### Emissions in Germany in NFR Quarrying & Mining - Other Than Coal

Absolute changes compared to last year's submission



Quelle: German Environment Agency, National inventory for the German reporting on atmospheric emissions since 1990, (02/2024)

#### Recalculations in NFR 2.A.5.a

The former years in particular were improved by valid meteorological data.

#### Planned improvements

At the moment, it is planned evaluate further Country specific conditions.

<sup>1)</sup> EMEP/EEA, 2023: EEA Report No 06/2023 EMEP EEA air pollutant emission inventory guidebook 2023, Copenhagen, 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>

<sup>2)</sup> Copernicus 2019: CLC-classes; URL: <https://land.copernicus.eu/user-corner/technical-library/corine-land-cover-nomenclature-guidelines/html/index-clc-131.html>

<sup>3)</sup> European Industry Association data are published annually at <https://www.aggregates-europe.eu/facts-figures/figures/>

<sup>4)</sup> <https://www.bv-miro.org/>

<sup>5)</sup> [https://www.bgr.bund.de/DE/Themen/Min\\_rohstoffe/Produkte/produkte\\_node.html](https://www.bgr.bund.de/DE/Themen/Min_rohstoffe/Produkte/produkte_node.html)

<sup>6)</sup> EMEP/EEA, 2023: EEA Report No 06/2023 EMEP EEA air pollutant emission inventory guidebook 2023, Copenhagen, 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>

