

## 2.C.7.a - Copper Production

### Short description

Within this NFR sub-category, SO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, TSP, PCDD/F, HCB, As, Cd, Cu, Hg, and Pb emissions from the production of copper are reported.

| Category Code | Method          |                 |                 |       |    | AD |    |    |     |      | EF    |     |     |                  |                   |
|---------------|-----------------|-----------------|-----------------|-------|----|----|----|----|-----|------|-------|-----|-----|------------------|-------------------|
| 2.C.7.a       | T1              |                 |                 |       |    | AS |    |    |     |      | D, CS |     |     |                  |                   |
| Key Category  | SO <sub>2</sub> | NO <sub>x</sub> | NH <sub>3</sub> | NMVOC | CO | BC | Pb | Hg | Cd  | Diox | PAH   | HCB | TSP | PM <sub>10</sub> | PM <sub>2.5</sub> |
| 2.C.7.a       | -               | -               | -               | -     | -  | -  | -  | -  | L/- | -    | -     | -   | -   | -                | -                 |

### Method

#### Activity data

The yearly production figures were taken from the annual statistical report of the German association for non-ferrous metals [\[Lit. 1\]](#).

#### Emission factors

The emission factors are either default values according to the 2019 EMEP/EEA air pollutant emission inventory guidebook [\[Lit. 2\]](#) or determined in several research projects or from companies environmental reports [\[Lit. 3\]](#).

Table 1: Tier1 emission factors applied for entire time series (primary and secondary copper production)

| Pollutant | EF  | Unit | Source                                           |
|-----------|-----|------|--------------------------------------------------|
| HCB       | 1   | mg/t | Emission guidebook 2019 <a href="#">[Lit. 2]</a> |
| PCDD/F    | 2.9 | µg/t | Emission guidebook 2019 <a href="#">[Lit. 2]</a> |

Table 2: Emission factors applied for primary copper production in 2019

| Pollutant         | EF     | Unit | Source                                           |
|-------------------|--------|------|--------------------------------------------------|
| TSP               | 0.09   | kg/t | Aurubis <a href="#">[Lit. 4]</a>                 |
| PM <sub>10</sub>  | 0.0765 | kg/t | Calculated from Aurubis <a href="#">[Lit. 4]</a> |
| PM <sub>2.5</sub> | 0.063  | kg/t | Calculated from Aurubis <a href="#">[Lit. 4]</a> |
| SO <sub>2</sub>   | 3.6    | kg/t | Aurubis <a href="#">[Lit. 4]</a>                 |
| As                | 0.8    | g/t  | Aurubis <a href="#">[Lit. 4]</a>                 |
| Cd                | 15     | g/t  | Emission guidebook 2019 <a href="#">[Lit. 2]</a> |
| Cu                | 13.8   | g/t  | Aurubis <a href="#">[Lit. 4]</a>                 |
| Hg                | 0.031  | g/t  | Emission guidebook 2019 <a href="#">[Lit. 2]</a> |
| Pb                | 3.1    | g/t  | Aurubis <a href="#">[Lit. 4]</a>                 |

Table 3: Emission factors applied for secondary copper production in 2019

| Pollutant         | EF        | Unit | Source                                           |
|-------------------|-----------|------|--------------------------------------------------|
| TSP               | 0.100     | kg/t | PAREST <a href="#">[Lit. 5]</a>                  |
| PM <sub>10</sub>  | 0.085     | kg/t | PAREST <a href="#">[Lit. 5]</a>                  |
| PM <sub>2.5</sub> | 0.07      | kg/t | PAREST <a href="#">[Lit. 5]</a>                  |
| SO <sub>2</sub>   | 3.0       | kg/t | Emission guidebook 2019 <a href="#">[Lit. 2]</a> |
| As                | 2         | g/t  | Emission guidebook 2019 <a href="#">[Lit. 2]</a> |
| Cd                | 486.428   | mg/t | NE-G-K <a href="#">[Lit. 3]</a>                  |
| Cu                | 46,088.62 | mg/t | NE-G-K <a href="#">[Lit. 3]</a>                  |

| Pollutant | EF        | Unit | Source                          |
|-----------|-----------|------|---------------------------------|
| Hg        | 2.644     | mg/t | NE-G-K <a href="#">[Lit. 3]</a> |
| Pb        | 21,977.15 | mg/t | NE-G-K <a href="#">[Lit. 3]</a> |

## Recalculations

Due to the use of new data for emission factors [\[Lit. 4\]](#), recalculations have been carried out for the entire time series for TSP, SO<sub>2</sub>, As, Cu and Pb in Primary copper production. The new EF for TSP, As, Cu and Pb are based on actual plant specific data. They are significantly lower than the default values from the EMEP/EEA Guidebook. Only the EF for SO<sub>2</sub> is slightly higher than the previously used default value.



For pollutant-specific information on recalculated emission estimates for Base Year and 2018, please see the pollutant specific recalculation tables following [chapter 8.1 - Recalculations](#).

## Planned improvements

No category specific improvements are planned.

## Bibliography

**Lit. 1:** German association for non-ferrous metals (WirtschaftsVereinigung Metalle): Annual statistical report:  
<https://www.wvmetalle.de>

**Lit. 2:** EMEP/EEA air pollutant emission inventory guidebook 2019

**Lit. 3:** Ökopol, IER, IZT, IfG: Bereitstellung einer qualitätsgesicherten Datengrundlage für die Emissionsberichterstattung zur Umsetzung von internationalen Luftreinhalte- und Klimaschutzvereinbarungen für ausgewählte Industriebranchen  
\\Teilvorhaben 2: NE-Metallindustrie, Kalkindustrie, Gießereien.

**Lit. 4:** Aurubis, Umwelterklärung 2020. 2020, Aurubis AG,  
<https://www.aurubis.com/de/verantwortung/kennzahlen--berichterstattung>

**Lit. 5:** PAREST, UBA Texte | 48/2013,  
<https://www.umweltbundesamt.de/publikationen/beschreibung-minderungsmaßnahmen-im-projekt-parest>