Für Mensch & Umwelt

Umwelt Bundesamt

TFEIP Meeting 2023 Combustion & Industry Expert Panel

The Guidebook revision 2023 and open issues

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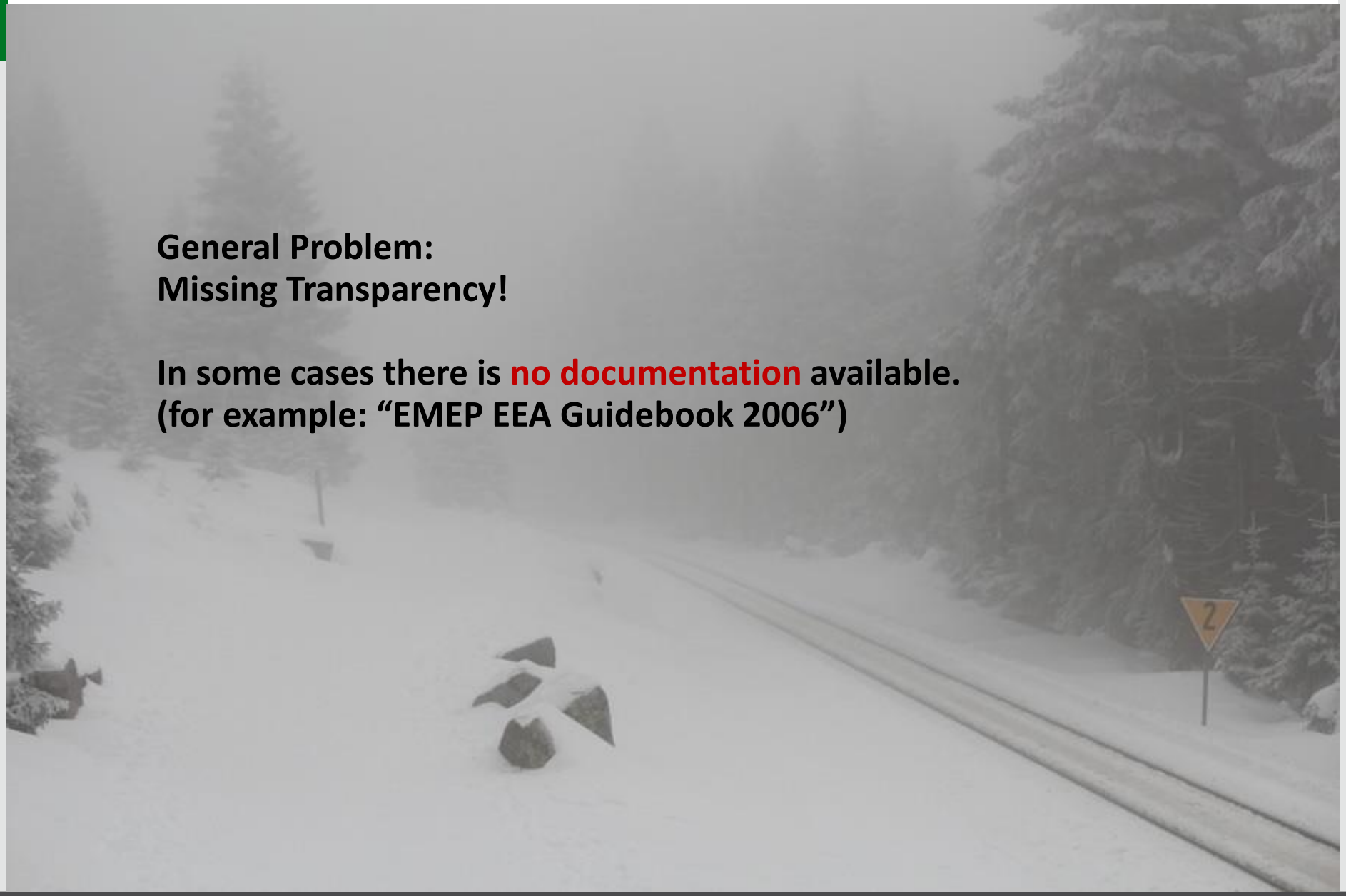
The Guidebook revision 2023 refers to the following source categories:

- **1.A.1**
- **1.A.2**
- **1.A.3.e**
- **1.A.4 (NH_3)**
- **1.A.4 new Annex for future reporting (presented by Tommi Forsberg)**
- **1.B.1.a**
- **1.B.1.b**
- **1.B.2.a.i, 1.B.2.b (presented by Christian Boettcher)**
- **1.B.2.a.iv**
- **1.B.2.a.v**
- **2.A.1**
- **2.B (small change of a note)**
- **2.C.1 (small change of two notes)**
- **2.C.3 (small change of a note)**
- **2.D.3.g**
- **2.H.1**



General Problem:
Missing Transparency!

In some cases there is no documentation available.
(for example: “EMEP EEA Guidebook 2006”)

General Problem:
Missing Transparency!

In some cases you can find a note to the original source –
but the reference does not contain the numbers which are published in the Guidebook
(a documentation on additional assumptions and calculation is missing)

Due to limited resources there is a need for setting priorities!

We have to be pragmatic!

- **Default emission factors which are evidently wrong and cause problems during the reviews have to be corrected firstly**

- **Default emission factors which are considered to be wrong but have no major influence on emission levels or trends can be corrected later**

- **Default emission factors which are undocumented but within a plausible range can be maintained as long as better values are available**

Other general aspects (LOQ)

- **Limit of quantification (LOQ): is the lowest concentration of a pollutant which can be quantified with a specified accuracy; analytical results are always above the limit of quantification** (in cases of measurement results < LOQ, usually LOQ or half of LOQ is used, marked with a "<")

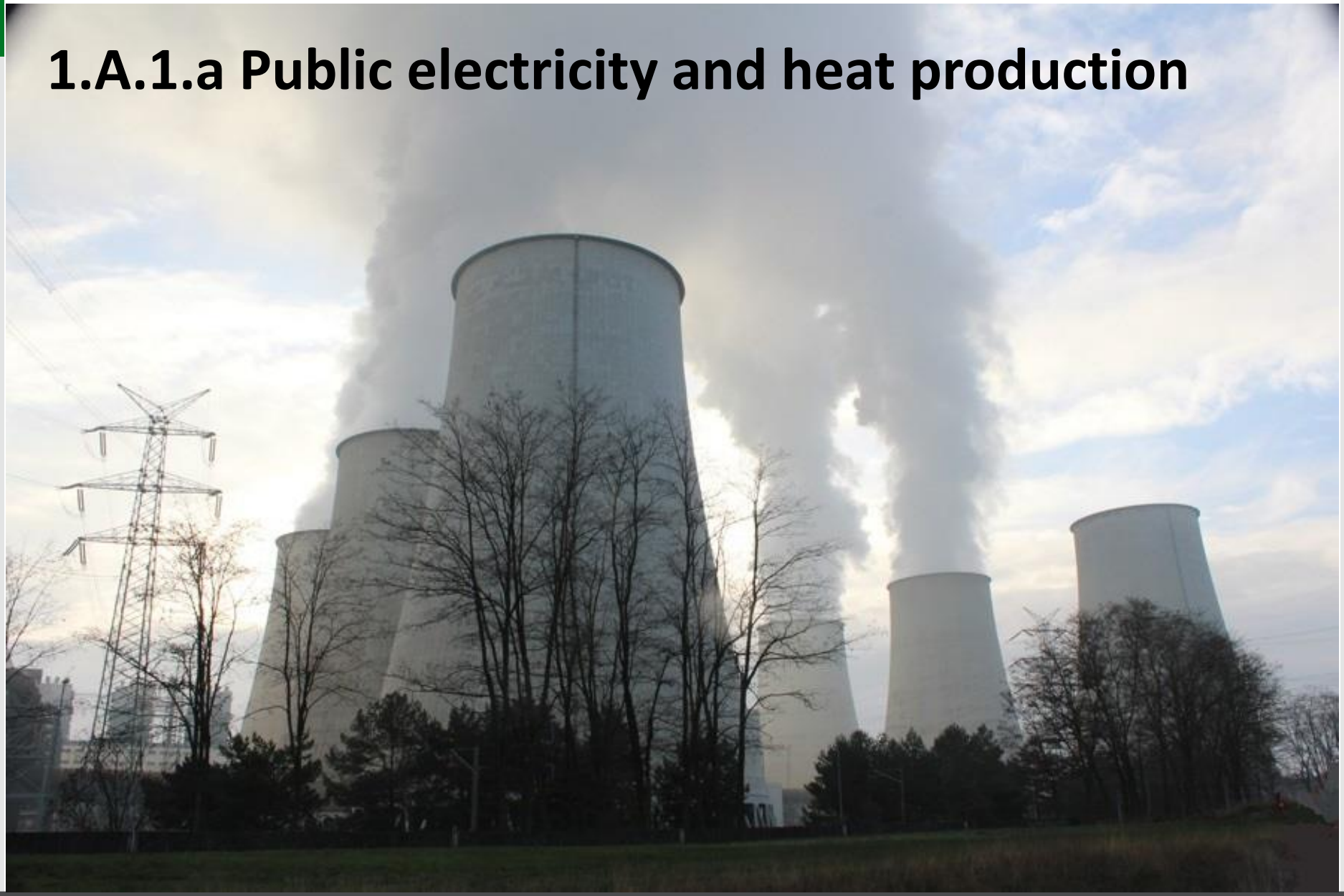
- **Limit of detection (LOD): is the lowest concentration of a pollutant which can be detected** (usually not published: internal value of the measurement institute)

- **All Default emission factors which are based on measurement data below the limit of quantification are marked with a "<"**

- **Distinction between emission values < LOQ which are theoretically possible** (for example PCDD/F from advanced coal fired power plants) **and emissions which are impossible** (PCDD/F from natural gas combustion: chlorine-content < LOQ, PAH from natural gas combustion: absence of aromatic compounds)

- **Remaining problem: how to deal with time series consistency in the case of EFs < LOQ;** (LOQ depends on the measurement institute and is changing over time)

1.A.1.a Public electricity and heat production



1.A.1.a

- **Improvement of descriptions for emission sources and impacts of abatement systems**
- **Avoidance of duplicating information: Tier 2 emission factors are only available for the main pollutants: HM and POPs are only available as Tier 1 factors** (with a few exceptions)
- **New Tier 1 emission factors for iron and steel process gases and biogas** (for biogas also EFs which refer to electricity generated)

1.A.1.a fuel classification

Table 3-1 Tier 1 fuel classifications

Tier 1 Fuel type	Associated fuel types
Hard coal	Coking coal, other bituminous coal, sub-bituminous coal, coke, manufactured 'patent' fuel
Brown coal	Lignite, oil shale, manufactured 'patent' fuel, peat
Natural gas~~Gaseous fuels~~	Natural gas, liquified natural gas ~~liquids, liquefied petroleum gas, refinery gas (EFs for refinery gas are available in section 1.A.1.b), gas works gas, coke oven gas, blast furnace gas~~
Other gases	refinery gas (EFs for refinery gas are available in section 1.A.1.b), gas works gas, coke oven gas, blast furnace gas (EFs for iron and steel gases in 1.A.2), pit gas
Heavy fuel oil	Residual fuel oil, refinery feedstock, petroleum coke, orimulsion, bitumen
Light oil	Gas oil, kerosene, naphtha, shale oil, liquified petroleum gas
Solid ~~B~~biomass	Wood, charcoal, vegetable (agricultural) waste
Biogases	Biogas, sewage gas, landfill gas

Note: The associated fuel types indicated in Table 3-1 are based on the emission characteristics and are not to be used for

1.A.1.a open issues

- **Cross-pollutant-consistency**
- **Heavy metals and POPs** (new data available, concept for implementation is needed)
- **Tier 3 emission factors for power plants**
- **“New” LCP BREF data available (2017) but not implemented; Question: Is somebody using data from the Annex D “Emission factors derived from emission limit values”?**
- **Specific flue gas volume**

1.A.1.b Petroleum refining

1.A.1.b/ 1.B.2.aiv: minor corrections

- **1.A.1.b: Correction of the SOx emission factor for refinery gas which was originally derived from natural gas (0.281 g/GJ) and is now from refinery gas: 10.15 g/GJ**

- **1.B.2.aiv: deletion of Tier 1 heavy metal EFs which were derived from PRTR data (double-counting with 1.A.1.b)**

1.A.1.b/ 1.B.2.aiv: open issues

- **general revision of the refinery chapters necessary:**
  - **Tier 1 EFs which refer to crude oil input**
  - **complete reporting of all internal emission sources**
  - **clear allocation of all specific emission sources to 1.A.1.b and 1.B.2.aiv**

1.A.1.c: no changes in 2023, open issues

- **Chapter covers only coking plants**
- **Briquette factories are missing**
- **Energy production for Natural gas and oil production is missing**

1.A.2: minor changes

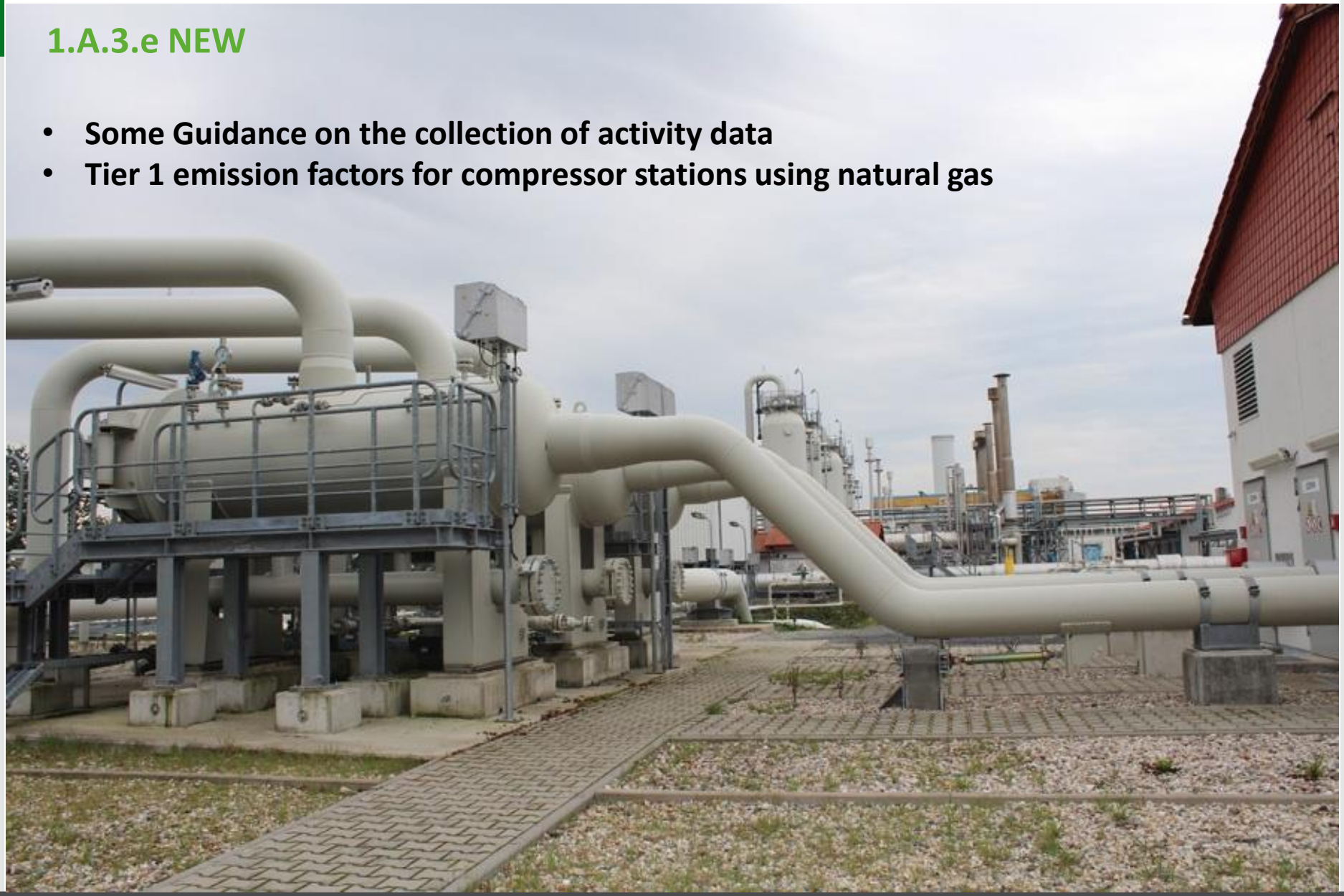
- **Fuel categories**
- **Marking of values < LOQ**
- **Correcting the unit of PAH EFs for liquid fuels (mg/GJ → µg/GJ)**
- **New Tier 2 emission factors for blast furnace gas**

1.A.2: open issues

- **Allocation 1.A.2/ NFR2**

1.A.3.e NEW

- **Some Guidance on the collection of activity data**
- **Tier 1 emission factors for compressor stations using natural gas**



1.A.4 – Ammonia from wood combustion

Original Tier 1 Emission Factor for NFR 1.A.4.b using biomass:

NO_X : 50 g/GJ
NH_3 : 70 g/GJ No combustion process!

New data from Germany, CO and NH_3 were measured simultaneously
Calculation of a ratio between CO and NH_3 (incomplete combustion)
Using the ratio for calculating new NH_3

NO_X : 50 g/GJ
NH_3 : 8 g/GJ

For boilers NH_3 is considered to be not applicable. This is only relevant in the case of using SCR

2.A.1 – Cement production

Table 3.1 Tier 1 emission factors for source category 2.A.1 Cement production.

Tier 1 default emission factors					
	Code	Name			
NFR source category	2.A.1	Cement clinker production			
Fuel	NA				
Not applicable	PCBs				
Not estimated	NO_x, CO, NMVOC, SO_x, NH_3, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/F, Benzo(a)pyrene, Benzo(a)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, HCB				
Pollutant	**Value**	**Unit**	**95 % confidence interval**		**Reference**
			Lower	**Upper**	
TSP	260	g/Mg clinker	3.6~~130~~	520	European Commission (2010), VDZ (2022)
PM_{10}	234	g/Mg clinker	3.6~~117~~	468	European Commission (2010), VDZ (2022)
$PM_{2.5}$	130	g/Mg clinker	2.8~~65~~	260	European Commission (2010), VDZ (2022)
BC	3	% of $PM_{2.5}$	1.5	6	US EPA (2011, file no.: 91127)

Emission factors in the table above are provided for particulate fractions only and include the ~~additional~~ emissions ~~resulting~~ from the rotary kiln, the preheater and the raw mill. The handling and processing of the product ~~and raw materials~~is not considered. Particulate matter (PM) emissions from the combustion processes are included in chapter 1.A.2.f. For Tier 1 the emissions of NO_x, CO, NMVOC, SO_x, heavy metals and POPs can be assumed to be mainly due to the combustion of the solid and waste fuels and will be included in the emission factors in chapter 1.A.2.f. To avoid double counting, it is good practice to estimate these emissions in chapter 1.A.2.f. In the Tier 1 approach they will, as far as they originate from the chemical composition of the raw meal, be reported as 'not estimated' (NE).

2.H.1 Pulp and Paper

Starting position:
Tier 1 emission factor (kraft pulping): SO_2: 2 kg/Mg air dried pulp
Tier 2 emission factor (acid sulfit process): SO_2: 4 kg/Mg air dried pulp

Tier 2 > Tier 1

Implementation of the BREF 2014 just for the acid sulfit process:
SO_2: 1.6 kg/Mg air dried pulp

Keeping the BREF 2001 for Tier 1

Implementation of the BREF 2014 for the neutral sulphite semi-chemical process (NSCC): NO_X, SO_2, CO and TSP

Other source categories: minor changes

- **2.B.10.a: additional comment regarding BC**
- **2.C.1: additional comment regarding PAH**
- **2.C.3: clarification regarding HCB and PCDD/F**
- **2.D.3.g: adjustment of the wording in accordance with the BREF: Bitumen instead of Asphalt**

2.I Wood processing: still open issues

- **Request for Tier 1 emission factors for PM10 and PM2.5**
- **NMVOC emissions from the use of glues in the wood industry**
- **Method for calculating emissions from chipboard production**

We are on the way…
…to the next Guidebook revision…

Thank you very much for your attention!

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