Umwelt Bundesamt

DEHSt
Deutsche Emissionshandelsstelle

Regional Workshop on Monitoring, Reporting and Verification of Greenhouse Gas Emissions

Bundesamt Deutsche Emissionshandelsstelle

MRV requirements in Germany and Europe from ETS perspective

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V 3.3 Economic Aspects, Monitoring and Evaluation

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Outline

- Compliance Cycle for EU ETS MRVA
- Institutional set up and tasks
- Main Elements of Monitoring and Reporting in EU ETS

Compliance Cycle for EU ETS MRV

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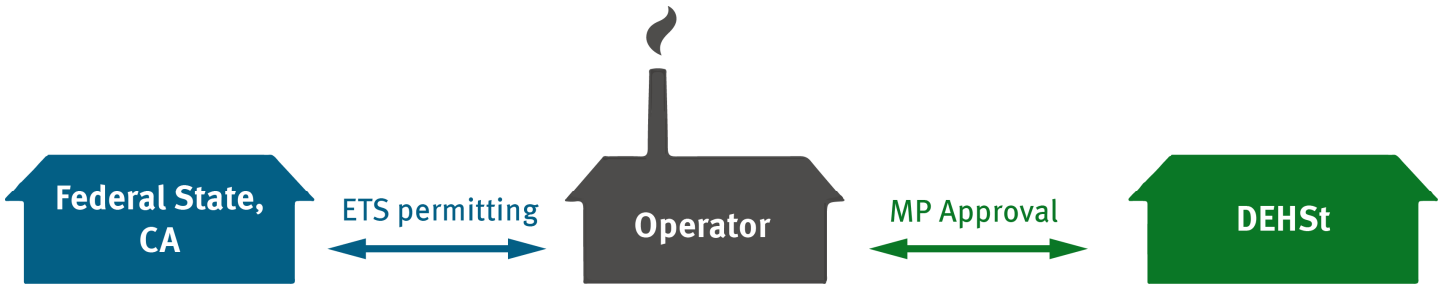
Installation and GHG Emissions Permit

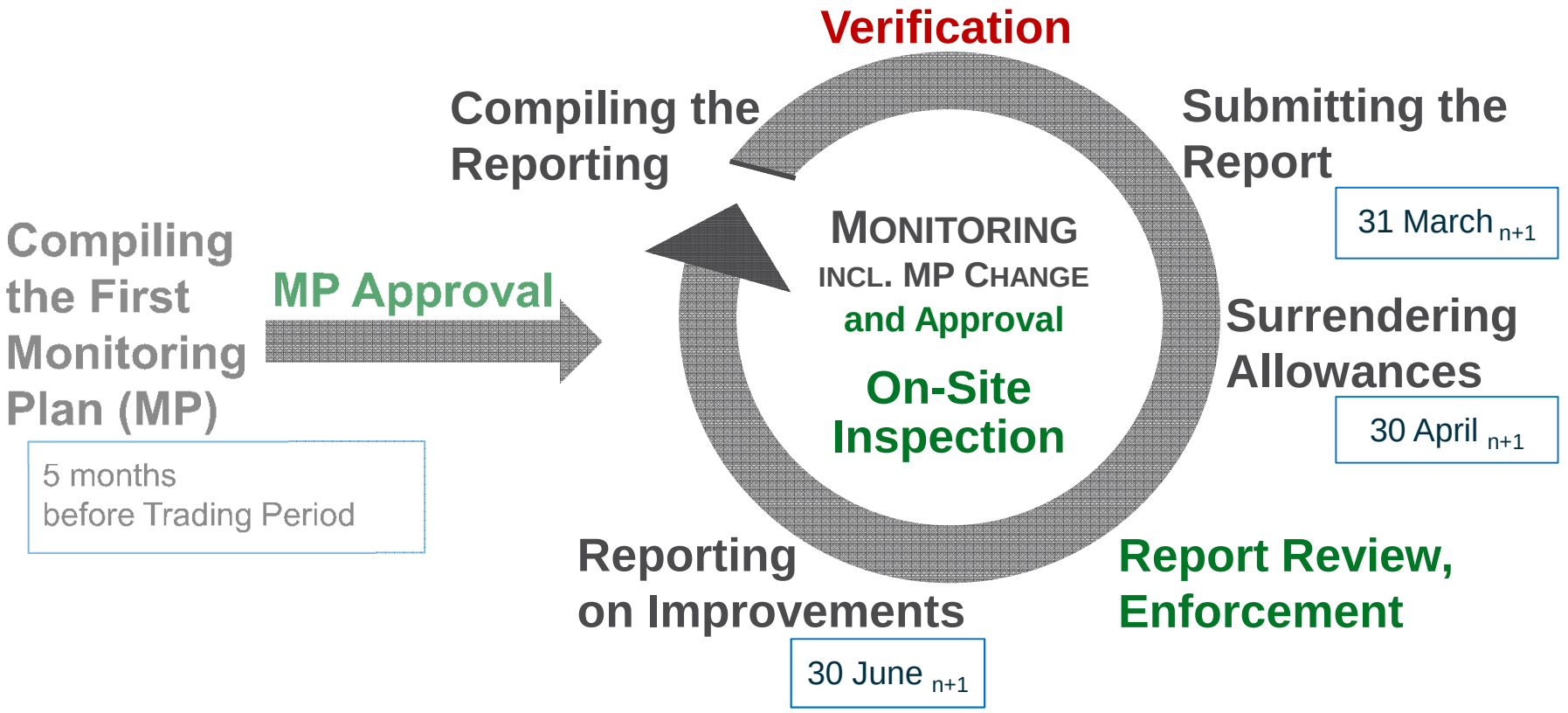
- EU ETS based on installation level, i.e. stationary technical unit/facility/site
- GHG emissions permit necessary, e.g. site specific, plant specific
- **GERMANY:**

  Federal states: responsible for issuing GHG permits in context of the overall approval process of an installation (DEHSt hearing before permitting)

  DEHSt: responsible for Monitoring Plan (MP) approval (Federal State hearing before approval)



EU ETS Compliance Cycle for Monitoring, Reporting and Verification



black: Operator's tasks
green: Authority's tasks
red: Verifier's tasks

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Institutional set up and tasks

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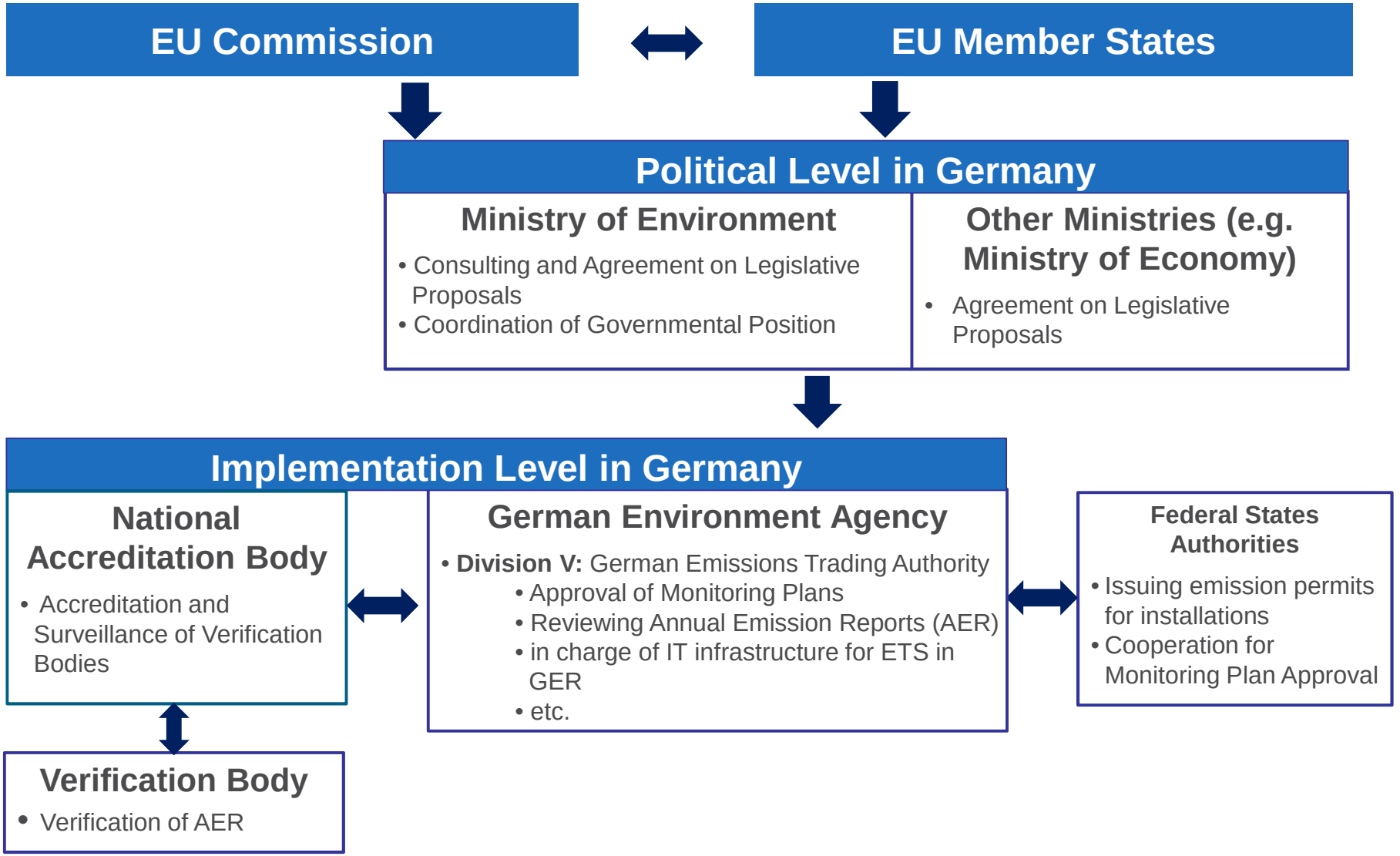
EU ETS: Institutional Set-up and Tasks



Main Elements of Monitoring and Reporting

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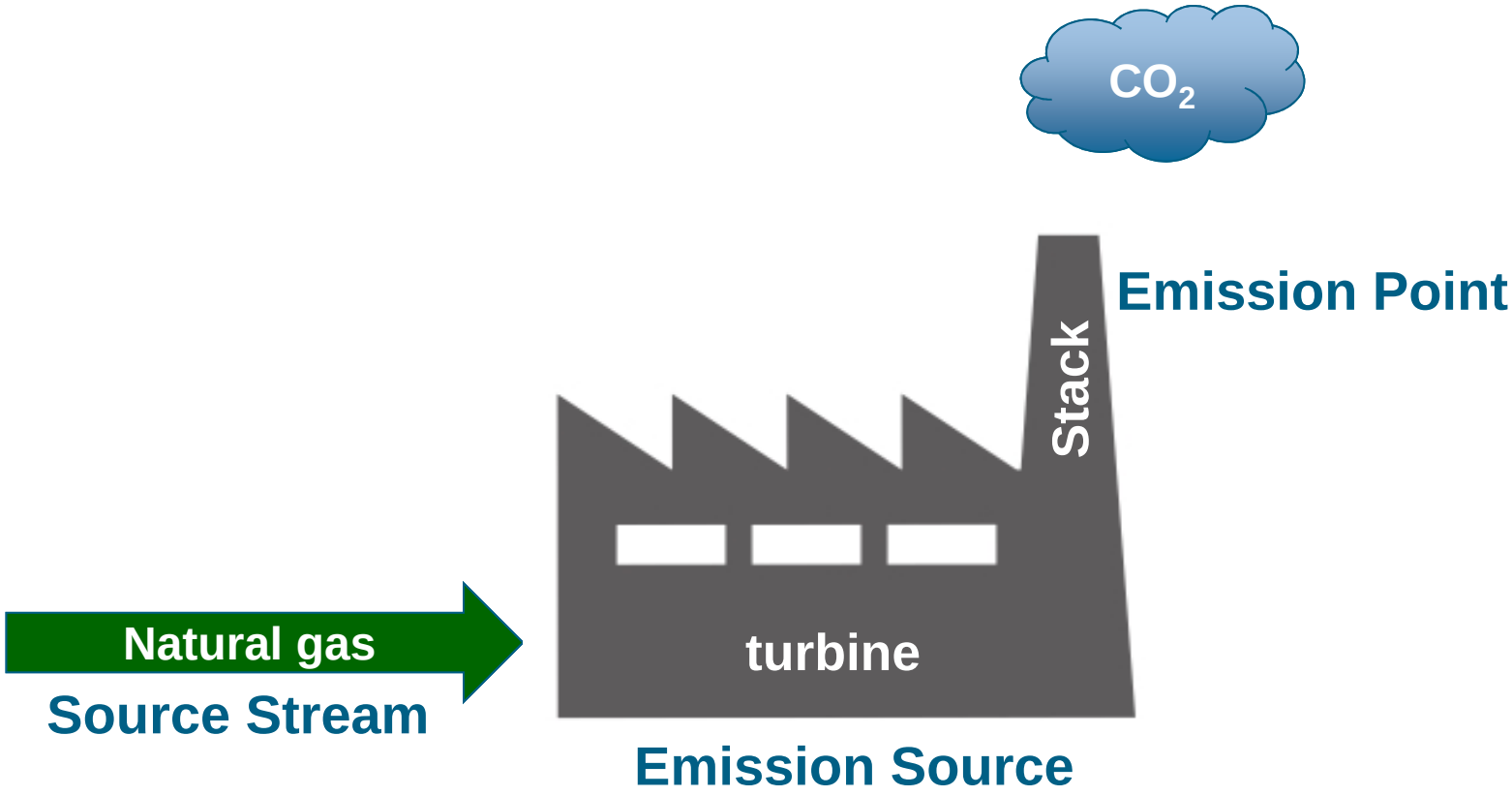
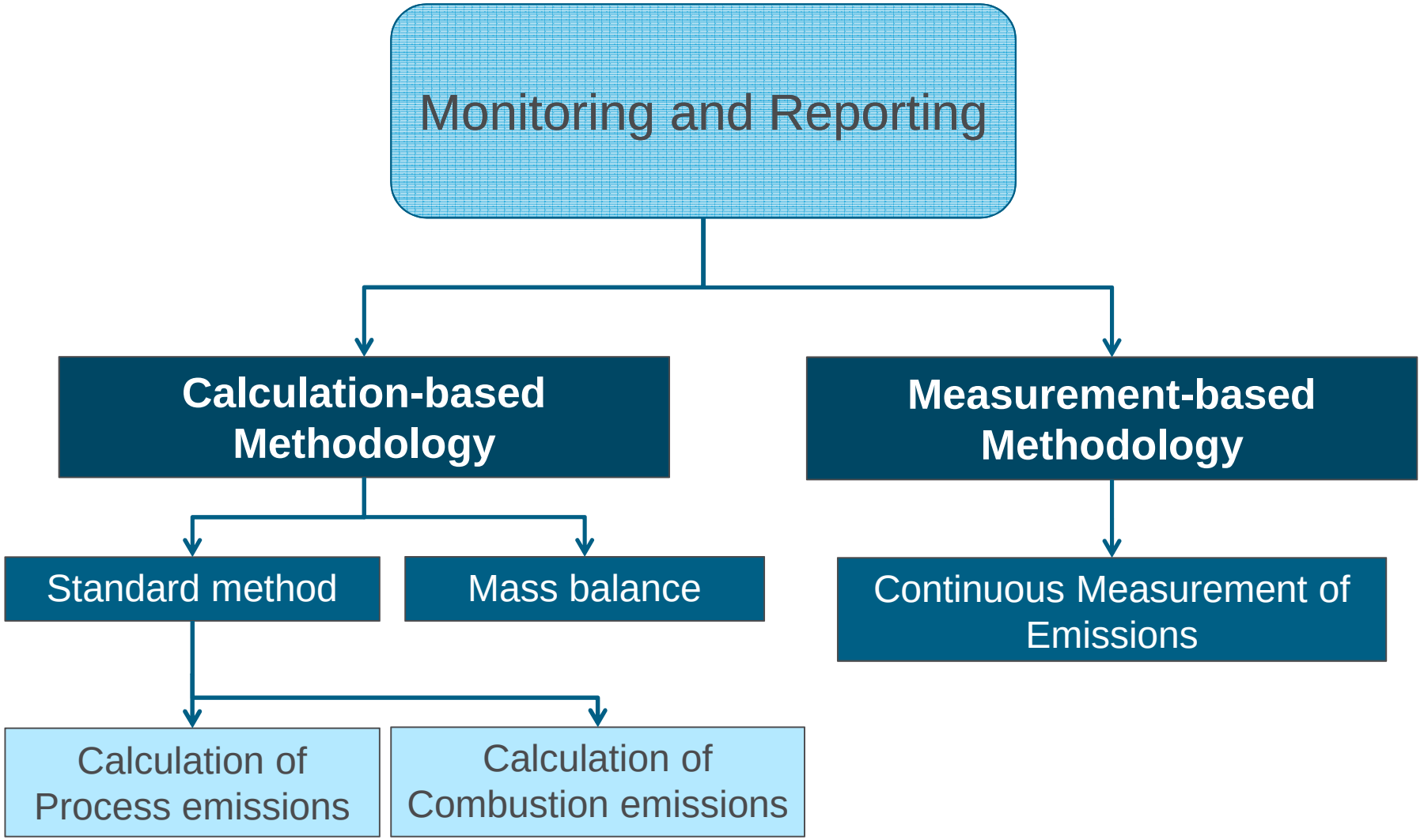
Explanation of Terminology used in EU ETS

e.g. a gas-fired power plant



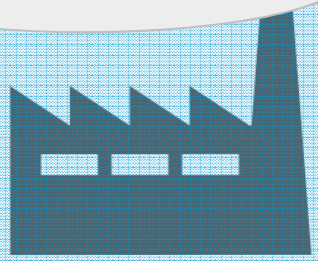
Principles and Methodologies for Determination of emissions



Calculation-based Methodology: a) *Standard Method*

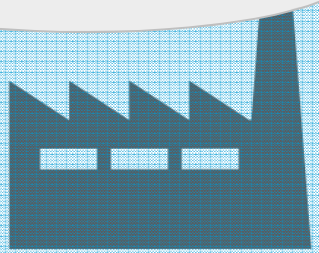
Combustion Emissions = Input Quantity ∗ NCV ∗ EF ∗ OF

Fuels for combustion



Process Emissions = Input Quantity ∗ EF ∗ CF

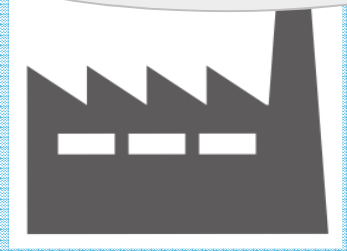
Process input materials



Calculation-based Methodology: b) *Mass Balance*

$$\text{Emissions} = 3.664 * \left[\begin{array}{l} \sum(\text{Quantity InputStream} * \text{CarbonContent}) \\ -\sum(\text{Quantity OutputStream} * \text{CarbonContent} \end{array} \right]$$

$$\sum C_{\text{InputStreams}}$$

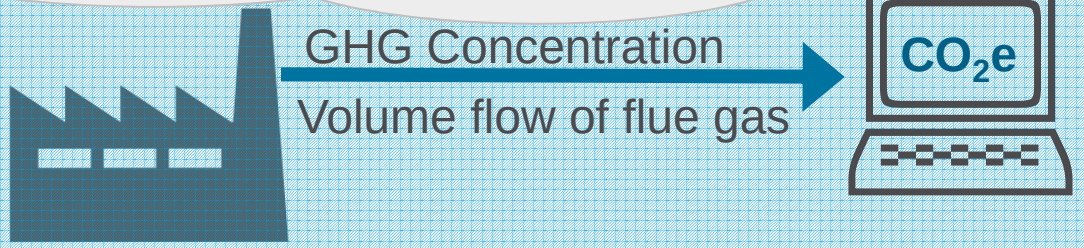


$$\sum C_{\text{OutputStreams}}$$

Products

Measurement-based Methodology:
Continuous Measurement of Emissions (CEMS)

$$\text{Emission} = \sum \text{GHG Concentration} * \text{FlueGasVolumeFlow}$$



Categorisation: General Rule and reason

General Rule

- The larger an installation or source stream/emission source (in terms of emissions) → the higher the quality requirements and the lower the uncertainty thresholds

Why Categorisation?

- Accurate and individual data for highly relevant (big) GHG source streams/sources.
- To reduce administrative burden for less relevant GHG sources streams/sources.

EU ETS in Germany: Scope in „Numbers“

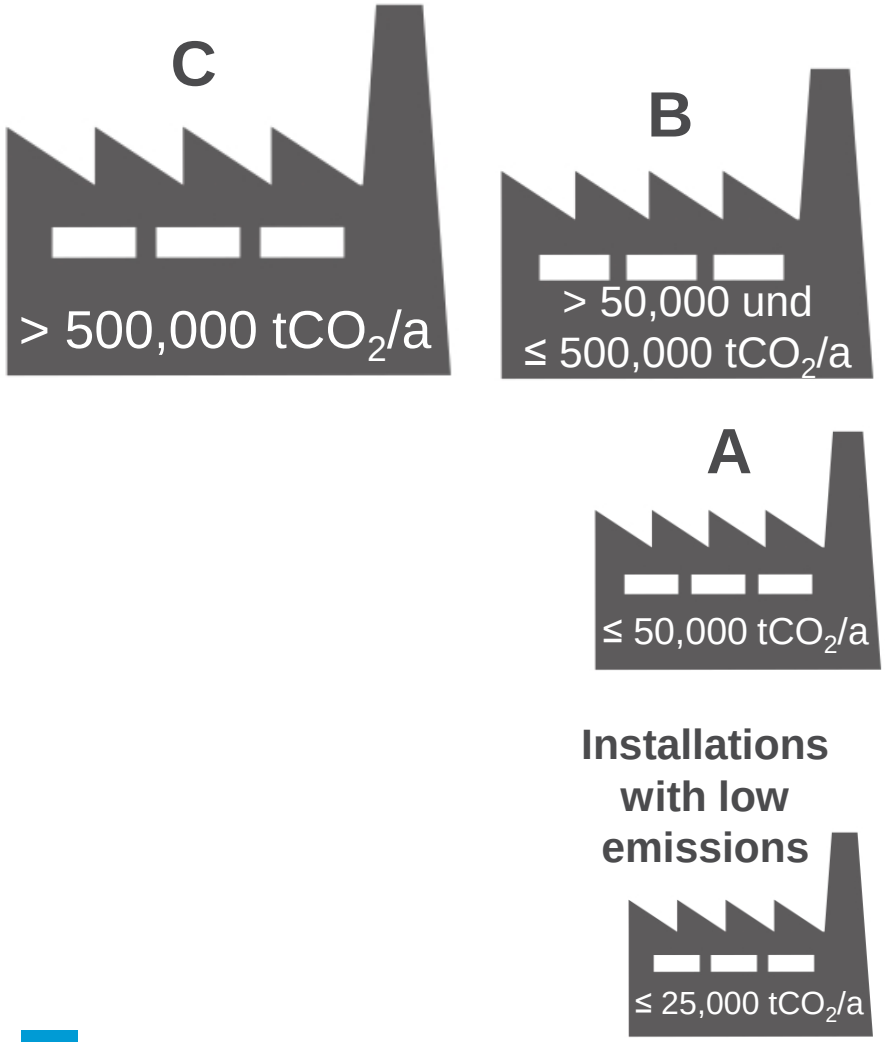
Installation category	Number of installations in Germany	Total annual emissions per year
Category C (>500 kt CO_2-eq/yr)	136 (7 %)	343.2 million t CO_2-eq (81.3 %)
Category B (>50 kt CO_2-eq/yr)	409 (22 %)	60.8 million t CO_2-eq (14.4 %)
Category A (≤ 50 kt CO_2-eq/yr)	1325 (71 %)	18.3 million t CO_2-eq (4.3 %)
of which are low emitters < 25 kt CO_2-eq/yr	1052 (56 %)	8.6 million t CO_2-eq (2 %)

total: **1870** **422.3** million t CO_2-eq

Based on Greenhouse Gas Emissions in Germany - Report 2019 (for emissions in 2018)

Categorisation of installations

Basis: Ø annual emission of the previous trading period
without emissions stemming from biomass and before subtraction of transferred emissions



- Meeting highest tiers
- Meeting minimum requirements
- Additional simplifications (Art. 47 MRR)

Levels of data quality: EU ETS tier approach

Tier = requirements [regarding data quality] used for determining activity data, calculation factors, annual emissions…

Uncertainty for activity data (source stream quantity)	Uncertainty for CEMS (GHG mass stream)
Tier 4 = ± 1.5 %	Tier 4 = ± 2.5 % (n.a. for N_2O)
Tier 3 = ± 2.5 %	Tier 3 = ± 5 %
Tier 2 = ± 5 %	Tier 2 = ± 7.5 %
Tier 1 = ± 7.5 %	Tier 1 = ± 10 %

High data quality

Low data quality

Calculation factors
Tier 3 = Individually determined by sampling and analysis
Tier 2 = National standard Factors (e.g. from national inventories or values separately published by CA)
Tier 1 = International Standard Factors (IPCC based values included in the regulation)

Highest tier: What does that imply?

Import coal: solid source stream used in the activity combustion

→ $\boldsymbol{CO_2 = Quantity \times NCV \times EF \times OF}$

→ meeting highest tier for every **parameter**

- **amount**: tier 4: ±1.5%
- **NCV**: tier 3: sampling and analyses according to standards, sampling plan, analyses frequency, accredited laboratory
- **EF**: tier 3: see NCV
- **OF**: national law: default value 1

Further simplifications and deviations

- *Large simplification* up to conservative estimate for source streams consist exclusively of **biomass** or with a biomass fraction ≥ 97%
- *Simplification* for **commercial standard fuels**

- Temporary or individual application for *deviations* in terms of **technical or economic reasons** always possible → subject to CA approval

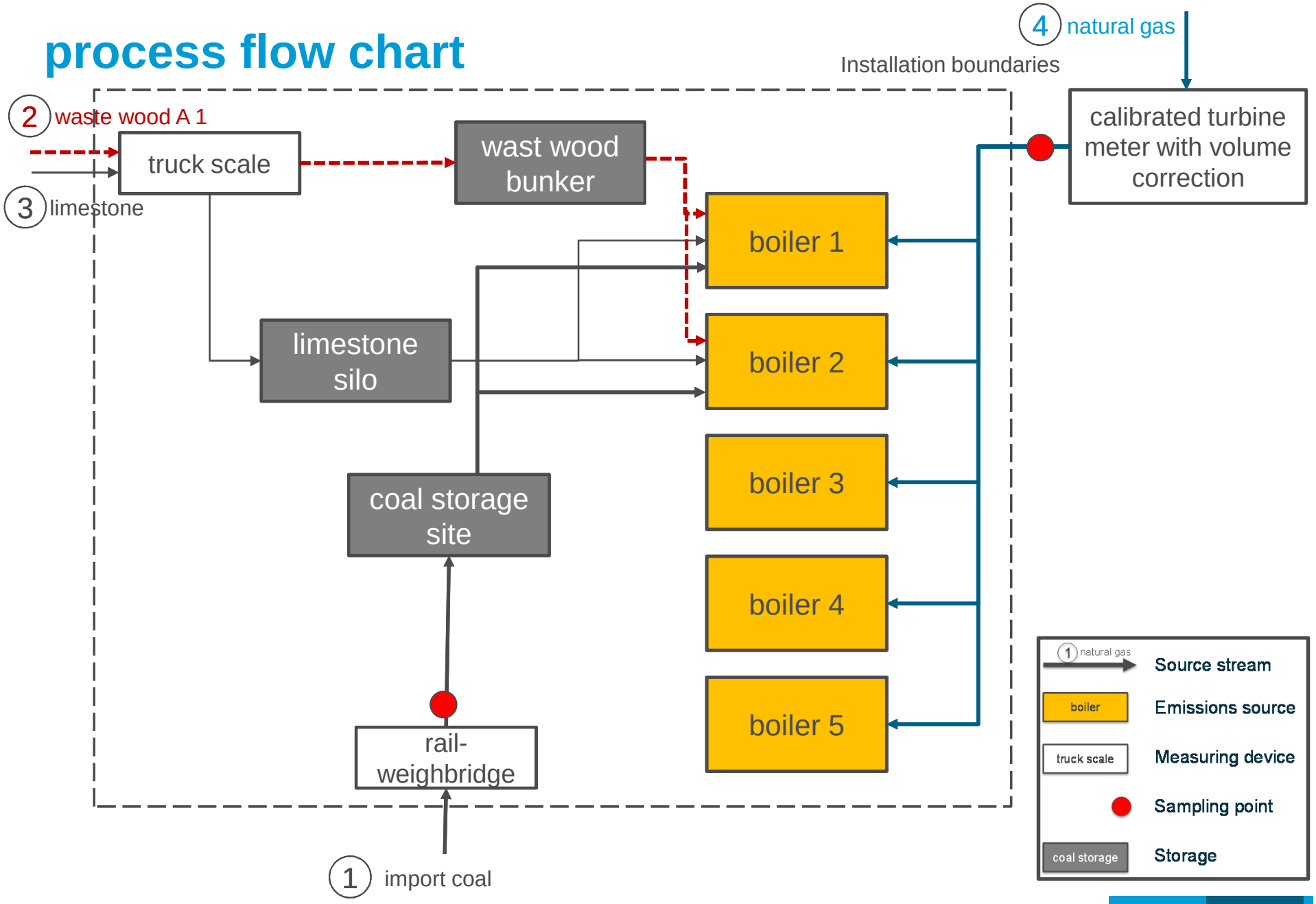
Most important content of a Monitoring Plan (MP)

- Non-technical description of the installation and its activities (e.g. combustion, production of cement)
- Installation flow chart:
  - Used (if applicable, also produced) **source streams**
  - **Emission sources** (e.g. boilers, furnance)
  - **Measuring devices** for determination of source stream quantity
  - **Sampling points**
- List of all source streams
- Description of applied methods for the determination of source stream amounts and calculation parameters (e.g. NCV, EF)
- Evidences as Annexes (e.g. uncertainty assessment)
- Further documents (e.g. risk assessment)

Example: Non-technical description

- The cogeneration installations consists of 5 units (50 MW each) for the generation of process steam and electricity.
- The boilers of units 1 and 2 are fired with imported coal.
- The quantity of coal delivered is determined using a rail-weighbridge. Each delivery is sampled by the operator on unloading. The coal is temporarily stored in a storage area before being used in the boilers.
- Blocks 1 and 2: In addition, waste wood A 1 is burned. Morover limestone is used for exhaust gas cleaning. The quantities of both material flows are determined on delivery on a calibrated truck scale. Limestone is stored in a limestone silo and waste wood is stored in bunker before use.
- In blocks 1 and 2, natural gas is used exclusively for start-up and auxiliary firing.
- The boilers in units 3, 4 and 5 are operated exclusively with natural gas.
- The quantity of natural gas is determined by the natural gas supplier using calibrated turbine meter with volume correction. There it is also sampled and analysed using calibrated process gas chromatographs.

process flow chart



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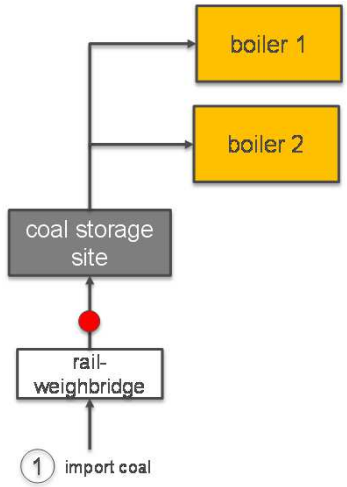
Uncertainty assessment for source stream amount

- Cumulative impact of all **components** on the uncertainty (error propagation)
- Example: Import-coal
  - **Delivered amount** → officially verified railweighbridge
  - **Stock changes** → storage density, storage volume

$$U_{amount\ coal} = \frac{\sqrt{(U_D \times x_D)^2 + (U_B \times x_B)^2 + (U_E \times x_E)^2}}{|x_D + x_B - x_E|} = ?$$



comparison with tier 4 (1.5%)

U_D: uncertainty of determination of delivered amount

x_D: delivered amount

U_B: uncertainty of determining the stock level at the beginning of the year

x_B: stock level at the beginning of the year

U_E: uncertainty of determining the stock level at the end of the year

x_E: stock level at the end of the year

Why is a Monitoring Plan necessary and reasonable?

- Description of processes, methods and data flows
- Explanation how legal requirements are fulfilled and justifications of derogations

➔ Transparency (both for operators and third parties)

➔ Legal certainty for operators by approval of monitoring plan

Thank you for your attention!

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