EU-China Dialogue and Cooperation on ETS-related Policies and Measures
中欧碳市场政策对话与合作项目

TtT Intensive Phase (Day 4):
Representativeness of Default Values

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Recalling the General Training

‘Determination of Calculation Factors’

- ‘Calculation Factors’ (e.g. emission factors, NCVs, oxidation factors, conversion factors, carbon contents, biomass fractions, etc.) complement the data needed to calculate ETS emissions
- Values are derived from actual analysis of fuels/materials, or use of appropriate default values
- A tier system provides a good way to establish a hierarchy to represent different quality levels. The highest tier represents the highest quality level and the most stringent monitoring requirements
- Factors based on actual analyses specific to an installation represent highest tier compliance in the EU ETS

Advantages of using default values:

- Convenient - ‘off the shelf’ (if available)
- Easy – need for specialist equipment/expertise reduced
- Reduced data handling – less risk of errors creeping in
- Reduced cost

Disadvantages of using default factors:

- Default values are usually less representative (time and space) – the greater the inhomogeneity of a fuel or material stream, the less representative the value is
- They are almost always less accurate than factors determined by actual measurement
- Inaccuracy can result in over-reporting compared to the actual emissions and over-surrender of more allowances than necessary. It can also be a significant source of under-reporting and under-surrender
- Inappropriate factors pose reputational risks to: (i) public confidence in an enterprise’s reported emissions; and (ii) the integrity and reputation of the ETS

Deciding issues:

- MRR requirements for the industry sector (Annex IV: *Activity-specific monitoring methodologies related to installations)*
- Required tier
- Operator justifications concerning *technical feasibility* and *unreasonable costs* – final decision resides with the competent authority

Default values recognised under the EU ETS (MRR Article 31(1))

a) Standard factors and stoichiometric factors listed in the MRR (Annex VI: *Reference values for calculation factors*)
b) Standard factors used by the EU Member State for its national UNFCCC inventory submission
c) Literature values agreed with the competent authority, including standard factors published by the competent authority, which are compatible with factors referred to in point (b), but representative of more disaggregated sources of fuel streams
d) Values guaranteed by the supplier of a fuel or material where the operator can demonstrate to the satisfaction of the competent authority that the carbon content exhibits a 95% confidence interval of ≤ 1%
e) Values based on historical analyses, which the operator can demonstrate to the satisfaction of the competent authority that those values are representative for future batches of the same fuel or material

Default values derived from category (a) and (e) are usually regarded as meeting the lowest tier EU ETS requirement (which means expectation of a lower level of accuracy), whereas those from (b), (c) and (d) regarded as meeting a middle tier expectation (which means expectation of a higher level of accuracy):

Tier 1: ***Basic (general default values (default values under a and e)***
Tier 2: ***Use of more specific default values (default values under B, c and d)***
Tier 3: ***Factors determined by actual sampling and analysis of the fuel/material used by the installation***

EU ETS Default Factors

MRR Annex VI

"Reference values for calculation factors (Article 31(1)(a))"

MRR Annex VI, Table 1 (Part 1): Fuel emission factors related to net calorific value (NCV) and net calorific values per mass of fuel

Fuel	Emission factor [t CO_2/ TJ]	NCV [TJ/Gg	Source
Crude oil	73,3	42,3	IPCC 2006 GL
Orimulsion	77,0	27,5	IPCC 2006 GL
Natural gas liquids	64,2	44,2	IPCC 2006 GL
Motor gasoline	69,3	44,3	IPCC 2006 GL
Kerosene (other than jet kerosene)	71,9	43,8	IPCC 2006 GL
Shale oil	73,3	38,1	IPCC 2006 GL
Gas/Diesel oil	74,1	43,0	IPCC 2006 GL
Residual fuel oil	77,4	40,4	IPCC 2006 GL
Liquefied petroleum gases	63,1	47,3	IPCC 2006 GL
Ethane	61,6	46,4	IPCC 2006 GL
Naphtha	73,3	44,5	IPCC 2006 GL
Bitumen	80,7	40,2	IPCC 2006 GL
Lubricants	73,3	40,2	IPCC 2006 GL
Petroleum coke	97,5	32,5	IPCC 2006 GL
Refinery feedstocks	73,3	43,0	IPCC 2006 GL
Refinery gas	57,6	49,5	IPCC 2006 GL
Paraffin waxes	73,3	40,2	IPCC 2006 GL
White spirit and SBP	73,3	40,2	IPCC 2006 GL
Other petroleum products	73,3	40,2	IPCC 2006 GL

MRR Annex VI, Table 1 (Part 2): Fuel emission factors related to net calorific value (NCV) and net calorific values per mass of fuel

Fuel	Emission factor [t CO_2/ TJ]	NCV [TJ/Gg	Source
Anthracite	98,3	26,7	IPCC 2006 GL
Coking coal	94,6	28,2	IPCC 2006 GL
Other bituminous coal	94,6	25,8	IPCC 2006 GL
Sub-bituminous coal	96,1	18,9	IPCC 2006 GL
Lignite	101,0	11,9	IPCC 2006 GL
Oil shale and tar sands	107,0	8,9	IPCC 2006 GL
Patent fuel	97,5	20,7	IPCC 2006 GL
Coke oven coke and lignite coke	107,0	28,2	IPCC 2006 GL
Gas coke	107,0	28,2	IPCC 2006 GL
Coal tar	80,7	28,0	IPCC 2006 GL
Gas works gas	44,4	38,7	IPCC 2006 GL
Coke oven gas	44,4	38,7	IPCC 2006 GL
Blast furnace gas	260	2,47	IPCC 2006 GL
Oxygen steel furnace gas	182	7,06	IPCC 2006 GL
Natural gas	56,1	48,0	IPCC 2006 GL
Industrial wastes	143	n.a.	IPCC 2006 GL
Waste oils	73,3	40,2	IPCC 2006 GL

MRR Annex VI, Table 1 (Part 3): Fuel emission factors related to net calorific value (NCV) and net calorific values per mass of fuel

Fuel	Emission factor [t CO_2/ TJ]	NCV [TJ/Gg	Source
Peat	106,0	9,76	IPCC 2006 GL
Wood/wood waste	—	15,6	IPCC 2006 GL
Other primary solid biomass	—	11,6	IPCC 2006 GL (only NCV)
Charcoal	—	29,5	IPCC 2006 GL (only NCV)
Biogasoline	—	27,0	IPCC 2006 GL (only NCV)
Biodiesels	—	27,0	IPCC 2006 GL (only NCV)
Other liquid biofuels	—	27,4	IPCC 2006 GL (only NCV)
Landfill gas	—	50,4	IPCC 2006 GL (only NCV)
Sludge gas	—	50,4	IPCC 2006 GL (only NCV)
Other biogas	—	50,4	IPCC 2006 GL (only NCV)
Waste tyres	85,0 (1)	n.a.	WBCSD CSI
Municipal waste (non-biomass fraction)	91,7	n.a.	IPCC 2006 GL
Carbon monoxide	155,2 (2)	10,1	J. Falbe and M. Regitz, Römpp Chemie Lexikon, Stuttgart, 1995
Methane	54,9 (3)	50,0	J. Falbe and M. Regitz, Römpp Chemie Lexikon, Stuttgart, 1995

1. This value is the preliminary emission factor, i.e. before application of a biomass fraction, if applicable.
2. Based on NCV of 10,12 TJ/t
3. Based on NCV of 50,01 TJ/t

MRR Annex VI, Table 2: Stoichiometric emission factors for process emissions from carbonate decomposition (Method A)

Carbonate	Emission factor [t CO_2/ t Carbonate]
$CaCO_3$	0,440
$MgCO_3$	0,522
Na_2CO_3	0,415
$BaCO_3$	0,223
Li_2CO_3	0,596
K_2CO_3	0,318
$SrCO_3$	0,298
$NaHCO_3$	0,524
$FeCO_3$	0,380

Carbonate	Emission factor [t CO_2/ t Carbonate]
General	Emission factor = [M(CO_2)] / {Y * [M(x)] + Z *[M(CO_3^{2-})]} X = metal M(x) = molecular weight of X in [g/mol] M(CO_2) = molecular weight of CO_2 in [g/mol] M(CO_3^{2-}) = molecular weight of CO_3^{2-} in [g/mol] Y = stoichiometric number of X Z = stoichiometric number of CO_3^{2-}

MRR Annex VI, Table 3: Stoichiometric emission factors for process emissions from carbonate decomposition (Method B)

Oxide	Emission factor [t CO_2/ t Oxide]
CaO	0,785
MgO	1,092
BaO	0,287
General: X_YO_Z	Emission factor = [M(CO_2)] / {Y * [M(x)] + Z * [M(O)]} X = alkali earth or alkali metal M(x) = molecular weight of X in [g/mol] M(CO_2) = molecular weight of CO_2 [g/mol] M(O) = molecular weight of O [g/mol] Y = stoichiometric number of X: = 1 (for alkali earth metals), = 2 (for alkali metals) Z = stoichiometric number of O = 1

MRR Annex VI, Table 4: Emission factors for process emissions from other process materials (production of I&S and processing of ferrous metals)[1]

Input or output material	Carbon content (t C/ t)	Emission factor [t CO_2/ t]
Direct reduced iron (DRI)	0,0191	0,07
EAF carbon electrodes	0,8188	3,00
EAF charge carbon	0,8297	3,04
Hot briquetted iron	0,0191	0,07
Oxygen steel furnace gas	0,3493	1,28
Petroleum coke	0,8706	3,19
Pig iron	0,0409	0,15
Iron / iron scrap	0,0409	0,15
Steel / steel scrap	0,0109	0,04

1. IPCC 2006 Guidelines for National Greenhouse Gas Inventories

EU ETS Default Factors

MRR Annex IV

“Activity-specific monitoring methodologies related to installations (Article 20(2))”

MRR Annex IV, Section 9: Sector-specific requirements for production of cement clinker

- **Sub-section B. Specific Monitoring Rules: Calculation Method B – Clinker Output Based**
  - ➢ **By way of derogation from Annex II of MRR Section 4, the operator must in the case of Tier 1 apply an emission factor of 0,525 t CO_2/t clinker**

- **Sub-section C. Emissions Related to Discarded Dust**
  - ➢ **By way of derogation from Annex II of MRR Section 4, the operator must in the case of Tier 1 apply an emission factor of 0,525 t CO_2/t dust**

MRR Annex IV, Section 8: Sector-specific requirements for PFC emissions from production or processing of primary aluminium

B. Specific Monitoring Rules: Calculation Method A – Slope Method

Table 1 (MRR Annex IV Section 8)

Technology-specific emission factors related to activity data for the slope method

(for use where Tier 1 compliance is approved)

Technology	Emission factor for CF_4 (SEF_{CF4}) [(kg CF_4/t Al) / (AE-Mins/cell-day)]	Emission factor for C_2F_6 (F_{C2F6}) [t C_2F_6/ t CF_4]
Centre Worked Prebake (CWPB)	0.143	0.121
Vertical Stud Søderberg (VSS)	0.0092	0.053

MRR Annex IV, Section 8: Sector-specific requirements for PFC emissions from production or processing of primary aluminium

B. Specific Monitoring Rules: Calculation Method B – Overvoltage Method

Table 2 (MRR Annex IV Section 8)

Technology-specific emission factors related to overvoltage activity data

(for use where Tier 1 compliance is approved)

Technology	Emission factor for CF_4 [(kg CF_4/t Al) / mV]	Emission factor for C_2F_6 [t C_2F_6/ t CF_4]
Centre Worked Prebake (CWPB)	1.16	0.121
Vertical Stud Søderberg (VSS)	Not Applicable	0.053

Concluding Points

- Data quality is essential to maintain confidence in the honesty and effectiveness of an ETS

- Preference should be to use calculation factors determined from actual sampling and analysis, where technically feasible and not involving unreasonable costs:
  - Batch/delivery specific
  - Plant/installation specific

- A hierarchy can also be relevant for the selection of default values, e.g. national/sector specific default values published by a competent authority are likely to be more appropriate

- A tier system can help to enforce selection of the best approach:
  - Use of factors determined from actual sampling and analysis as opposed to default values
  - Use of default factors from more appropriate/representative sources

- Traceability of default factors is important to confirm the reliability and appropriateness of the source

Thank you for your attention!

For further information or required clarification please contact:

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