

Changes to legislation: There are currently no known outstanding effects for the Commission Regulation (EU) No 601/2012 (repealed), ANNEX VI. (See end of Document for details)

ANNEX VI

Reference values for calculation factors (Article 31(1)(a))**1. Fuel emission factors related to net calorific values (NCV)**

Table 1:

**FUEL EMISSION FACTORS RELATED TO NET CALORIFIC VALUE
(NCV) AND NET CALORIFIC VALUES PER MASS OF FUEL**

Fuel type description	Emission factor(t CO₂/TJ)	Net calorific value(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
Anthracite	98,3	26,7	IPCC 2006 GL
Coking coal	94,6	28,2	IPCC 2006 GL

a Based on NCV of 10,12 TJ/t.

b Based on NCV of 50,01 TJ/t.

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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
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)

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Waste tyres	85,0	n.a.	WBCSD CSI
Carbon monoxide	155,2 ^a	10,1	J. Falbe and M. Regitz, Römpp Chemie Lexikon, Stuttgart, 1995
Methane	54,9 ^b	50,0	J. Falbe and M. Regitz, Römpp Chemie Lexikon, Stuttgart, 1995

a Based on NCV of 10,12 TJ/t.

b Based on NCV of 50,01 TJ/t.

2. Emission factors related to process emissions

Table 2:

STOICHIOMETRIC EMISSION FACTOR FOR PROCESS EMISSIONS FROM CARBONATE DECOMPOSITION (METHOD A)

Carbonate	Emission factor [t CO ₂ /t Carbonate]
CaCO ₃	0,44
MgCO ₃	0,522
Na ₂ CO ₃	0,415
BaCO ₃	0,223
Li ₂ CO ₃	0,596
K ₂ CO ₃	0,318
SrCO ₃	0,298
NaHCO ₃	0,524
FeCO ₃	0,38
General	$\text{Emission factor} = \frac{M(\text{CO}_2)}{\{Y * [M(x)] + Z * [M(\text{CO}_3^{2-})]\}}$ <p>X = metal M(x) = molecular weight of X in [g/mol] M(CO₂) = molecular weight of CO₂ in [g/mol] M(CO₃²⁻) = molecular weight of CO₃²⁻ in [g/mol] Y = stoichiometric number of X Z = stoichiometric number of CO₃²⁻</p>

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Table 3:

STOICHIOMETRIC EMISSION FACTOR FOR PROCESS EMISSIONS FROM CARBONATE DECOMPOSITION BASED ON ALKALI EARTH OXIDES (METHOD B)

Oxide	Emission factor [t CO ₂ /t Oxide]
CaO	0,785
MgO	1,092
BaO	0,287
general: X _Y O _Z	<p>Emission factor = $\frac{M(\text{CO}_2)}{\{Y * [M(x)] + Z * [M(O)]\}}$</p> <p>X = alkali earth or alkali metal M(x) = molecular weight of X in [g/mol] M(CO₂) = molecular weight of CO₂ [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</p>

Table 4:

STOICHIOMETRIC EMISSION FACTORS FOR PROCESS EMISSIONS FROM OTHER PROCESS MATERIALS (PRODUCTION OF IRON AND STEEL, AND PROCESSING OF FERROUS METALS)⁰

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	3,0
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
Purchased pig iron	0,0409	0,15
Scrap iron	0,0409	0,15
Steel	0,0109	0,04

a IPCC 2006 Guidelines for National Greenhouse Gas Inventories.

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Table 5:

STOICHIOMETRIC EMISSION FACTORS FOR PROCESS EMISSIONS
FROM OTHER PROCESS MATERIALS (BULK ORGANIC CHEMICALS)⁰

Substance	Carbon content(t C/t)	Emission factor(t CO ₂ /t)
Acetonitril	0,5852	2,144
Acrylonitrile	0,6664	2,442
Butadiene	0,888	3,254
Carbon black	0,97	3,554
Ethylene	0,856	3,136
Ethylene dichloride	0,245	0,898
Ethylene glycol	0,387	1,418
Ethylene oxide	0,545	1,997
Hydrogen cyanide	0,4444	1,628
Methanol	0,375	1,374
Methane	0,749	2,744
Propane	0,817	2,993
Propylene	0,8563	3,137
Vinyl chloride monomer	0,384	1,407

a IPCC 2006 Guidelines for National Greenhouse Gas Inventories.

3. Global warming potentials for non-CO₂ greenhouse gases

[^{F1}Table 6:

GLOBAL WARMING POTENTIALS

Gas	Global warming potential
N ₂ O	298 t CO _{2(e)} /t N ₂ O
CF ₄	7 390 t CO _{2(e)} /t CF ₄
C ₂ F ₆	12 200 t CO _{2(e)} /t C ₂ F ₆

Textual Amendments

- F1** Substituted by Commission Regulation (EU) No 206/2014 of 4 March 2014 amending Regulation (EU) No 601/2012 as regards global warming potentials for non-CO₂ greenhouse gases (Text with EEA relevance).

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