Sheet: 1.3.1 Nitrogen oxides (NOx) - emission factors (kg/TJ)

BACK TO MENU

Combustion in the Energy industries (Default values)

Fuel type	Fuel	Public Electricity and Heat Production[a]	Petroleum refining[a]	Manufacture of Solid Fuels and Other Energy[a]: Coke ovens	Patent fuel, BKB	Gas works	Charcoal production	Other own use
Coal	Coking Coal							
	Other Bituminous Coal & Anthracite	300[c]		300[c]		300[c]		300[c]
	Sub-Bituminous Coal	300[c]						
	Lignite	300[c]						
	Patent Fuel							
	Coke Oven Coke			300[c]	300[c]	300[c]		300[c]
	Gas Coke							
	BKB							
	Coke Oven Gas	77.8[b]		55[b]		55[b]		55[b]
	Blast Furnace Gas	10.5[b]		7.4[b]				
Gas	Gas Works Gas	10.5[b]		7.4[b]		7.4[b]		
	Natural Gas	105[b]	53[b]			53[b]		53[b]
Oil	Crude Oil	200[c]	200[c]					200[c]
	Natural Gas Liquids	200[c]						
	Refinery Gas	16[b]	11[b]					11[b]
	Liquefied Petroleum Gases	79[b]	56[b]					56[b]
	Motor Gasoline	373[b]						
	Aviation Gasoline							
	Gasoline type Jet Fuel							
	Kerosene type Jet Fuel							
	Kerosene	485[b]	167[b]					167[b]
	Gas/Diesel Oil	632[b]	222[b]					222[b]
	Heavy Fuel Oil	249[b]	145[b]					145[b]
	Petroleum coke	300[i]	300[i]					300[i]
	Other Petroleum Products	200[c]	145[b]					145[b]
Combustible renewables and waste	Primary Solid Biomass:							
	Wood	100[c]					12.3 [j]	
	Vegetal materials and wastes	100[c]						
	Other (e.g. animal products/wastes)	100[c]						
	Unspecified primary solid biomass	100[c]						
	Gas/Liquids from biomass + wastes							
	Municipal Waste	100[c]						
	Industrial Waste	100[c]						
	Charcoal							

Combustion in Manufacturing Industries and Construction (Default values)

Fuel type	Fuel	Iron and Steel	Non-ferrous metals	Non-metallic minerals	Chemicals	Pulp, Paper and print	Mining and Quarrying	Construction	Other (Please specify in sheet 1.1.1a, 1.1.1b or	Autoproduction of electricity/heat	Remainder (Non-specified)
Coal	Coking Coal		300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]
	Other Bituminous Coal & Anthracite		300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]
	Sub-Bituminous Coal										
	Lignite		300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]
	Patent Fuel										
	Coke Oven Coke		300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]	300[c]
	Gas Coke										
	BKB										
	Coke Oven Gas	176[b]		55[b]	55[b]	55[b]	55[b]	55[b]	55[b]	55[b]	55[b]
	Blast Furnace Gas	76[b]									
Gas	Gas Works Gas	76[b]	7.4[b]	7.4[b]	7.4[b]	7.4[b]	7.4[b]	7.4[b]	7.4[b]	7.4[b]	7.4[b]
	Natural Gas	53[b]	53[b]	53[b]	53[b]	53[b]	53[b]	53[b]	53[b]	53[b]	53[b]
Oil	Crude Oil	200[c]	200[c]	200[c]	200[c]	200[c]	200[c]	200[c]	200[c]	200[c]	200[c]
	Natural Gas Liquids									200[c]	
	Refinery Gas				11[b]				11[b]	11[b]	11[b]
	Liquefied Petroleum Gases	56[b]	56[b]	56[b]	56[b]	56[b]	56[b]	56[b]	56[b]	56[b]	56[b]
	Motor Gasoline	373[b]	373[b]	373[b]	373[b]	373[b]	373[b]	373[b]	373[b]	373[b]	373[b]
	Aviation Gasoline										
	Gasoline type Jet Fuel										
	Kerosene type Jet Fuel										
	Kerosene	167[b]	167[b]	167[b]	167[b]	167[b]	167[b]	167[b]	167[b]	167[b]	167[b]
	Gas/Diesel Oil	222[b]	222[b]	222[b]	222[b]	222[b]	222[b]	222[b]	222[b]	222[b]	222[b]
	Heavy Fuel Oil	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]
	Petroleum coke	300[i]	300[i]	300[i]	300[i]	300[i]	300[i]	300[i]	300[i]	300[i]	300[i]
	Other Petroleum Products	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]	145[b]
Combustible renewables and waste	Primary Solid Biomass:										
	Wood			100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]
	Vegetal materials and wastes			100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]
	Other (e.g. animal products/wastes)			100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]
	Unspecified primary solid biomass			100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]
	Gas/Liquids from biomass + wastes										
	Municipal Waste										
	Industrial Waste			100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]
	Charcoal	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]	100[c]

Transport (Default values)

Fuel type	Fuel	Civil Aviation[e]	Road transport	Railways	Navigation[e]	Pipeline transport	Non-specified transport
Coal	Coking Coal						
	Other Bituminous Coal & Anthracite			300[c]			
	Sub-Bituminous Coal						
	Lignite						
	Patent Fuel						
	Coke Oven Coke						
	Gas Coke						
	BKB						
	Coke Oven Gas						
	Blast Furnace Gas						
Gas	Gas Works Gas						
	Natural Gas		53[b]			53[b]	
Oil	Crude Oil						
	Natural Gas Liquids						
	Refinery Gas						
	Liquefied Petroleum Gases		383[b]				
	Motor Gasoline		708[b]		220[f]		
	Aviation Gasoline	234[b]					
	Gasoline type Jet Fuel	235[b]					
	Kerosene type Jet Fuel	234[b]					
	Kerosene		612[b]				
	Gas/Diesel Oil		632[b]	900[c]	1000[g]		
	Heavy Fuel Oil		682[b]	1249[b]	1800[h]		
	Petroleum coke						
	Other Petroleum Products			1200[c]	1500[c]		
Combustible renewables and waste	Primary Solid Biomass:						
	Wood						
	Vegetal materials and wastes						
	Other (e.g. animal products/wastes)						
	Unspecified primary solid biomass						
	Gas/Liquids from biomass + wastes						
	Municipal Waste						
	Industrial Waste						
	Charcoal						

Combustion in Other sectors (Default values)

Fuel type	Fuel	Commercial/ Institutional	Residential	Agriculture/Forestry/ Fishing	Non-specified "Other sectors"
Coal	Coking Coal				
	Other Bituminous Coal & Anthracite	100[c]	34[k]	100[c]	100[c]
	Sub-Bituminous Coal				
	Lignite				
	Patent Fuel		100[c]		100[c]
	Coke Oven Coke	100[c]	100[c]	100[c]	100[c]
	Gas Coke				
	BKB		100[c]		100[c]
	Coke Oven Gas	38[b]	38[b]		38[b]
	Blast Furnace Gas				
Gas	Gas Works Gas	5.25[b]	5.25[b]		5.25[b]
	Natural Gas	37[b]	37[b]	37[b]	37[b]
Oil	Crude Oil	100[c]		100[c]	100[c]
	Natural Gas Liquids				
	Refinery Gas				
	Liquefied Petroleum Gases	33[b]	18.7[b]	33[b]	33[b]
	Motor Gasoline	373[b]	373[b]	373[b]	373[b]
	Aviation Gasoline				
	Gasoline type Jet Fuel				
	Kerosene type Jet Fuel				
	Kerosene	100[b]	25[k]	100[b]	100[b]
	Gas/Diesel Oil	133[b]	74[b]	133[b]	133[b]
	Heavy Fuel Oil	87[b]	49[b]	87[b]	87[b]
	Petroleum coke				
	Other Petroleum Products				
Combustible renewables and waste	Primary Solid Biomass:				
	Wood	100[c]	73[k]	100[c]	100[c]
	Vegetal materials and wastes	100[c]	47[k]	100[c]	100[c]
	Other (e.g. animal products/wastes)	100[c]	100[c]	100[c]	100[c]
	Unspecified primary solid biomass	100[c]	100[c]	100[c]	100[c]
	Gas/Liquids from biomass + wastes	100[c]	100[c]		100[c]
	Municipal Waste				
	Industrial Waste				
	Charcoal	100[c]	72[l]	100[c]	72[l]

[a] Includes own use
[b] Derived from Kato and Akimoto. 1992 assuming average calorific values as given in the IEA Energy Statistics and Balances of non-OECD Countries (International Energy Agency, 1998).
[c] IPCC. 1996
[e] excluding international bunkers
[f] IPCC Guidelines (IPCC.1996) default for 4-stroke gasoline used on inland waterways (2-stroke = 60).
[g] IPCC Guidelines (IPCC.1996) default for gas/diesel used on inland waterways.
[h] IPCC Guidelines (IPCC,1996) default for RFO used in ocean-going ships.
i Assumed = emision factor for 'Other Bituminous Coal & Anthracite'
[k] Zhang et al. (2000) Average EF for household stoves in China. (For 'vegetal materials and waste', EF = average for wheat and maize residues)
[l] EF derived from Bertschi *et al.* (2003) for charcoal cooking fires.
[j] EF derived from Bertschi *et al.* (2003) for earthen charcoal-making kilns (in Zambia).

Details of user-entered emission factors

Fuel	Sector / Sub-sector / Sub-sub-sector	Emission factor	Units	Reference source	Notes/Comments