Energy Supply Systems for Buildings

Summary table with heating values and CO2 emissions

Table 1: Higher and lower heating values in MJ per kg or m^3 fuel

Gaseous fuels	**Higher Heating Value (HHV)**		**Lower Heating Value (LHV)**	
	MJ/kg	MJ/m^3	MJ/kg	MJ/m^3
Natural gas (US)	52.2	40.6	47.1	36.6
North-sea gas	42.3	35.2	38.1	31.7
Methane	55.5	39.8	50.0	35.8
Biogas	26,3	25.7	23.7	23.1
Hydrogen	141.7	12.7	120.0	10.8
Liquid fuels	MJ/kg	MJ/l	MJ/kg	MJ/l
Biodiesel	40.5	37.3	37.8	34.8
Gasoil	43.0	36.1	42.8	36.0
Solid fuels	MJ/kg	-	MJ/kg	-
Charcoal	29.6	-	28.4	-
Wood (dry)	16.2	-	15.4	-
Wheat straw	17.0	-	15.6	-

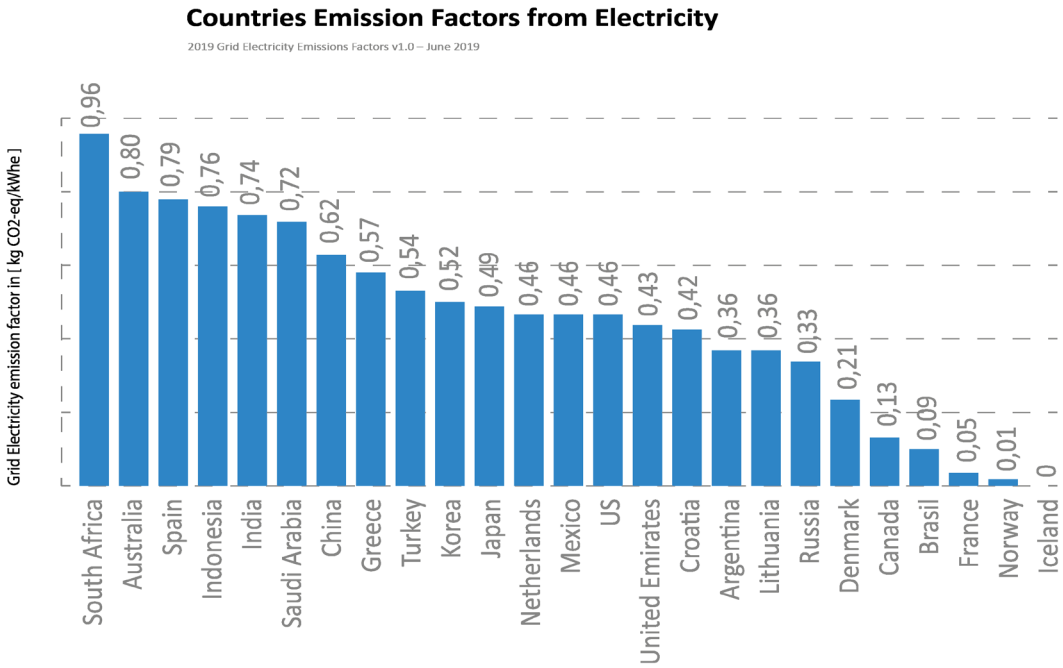
Table 2: Higher and lower heating values in kWh per kg or m^3 fuel

Gaseous fuels	Higher Heating Value [kWh]	Lower Heating value [kWh]
Natural gas (US) [per m^3]	11.3	10.2
North-sea gas [per m^3]	9.8	8.8
Methane [per m^3]	11.1	9.9
Biogas [per m^3]	7.1	6.4
Hydrogen [per kg]	39.4	33.3
Liquid fuels		
Biodiesel [per kg]	11.3	10.5
Gasoil [per kg]	11.9	11.9
Solid fuels		
Charcoal [per kg]	8.2	7.9
Wood (dry) [per kg]	4.5	4.3
Wheat straw [per kg]	4.7	4.3

Table 3: Specific CO2 emissions per kg fuel per kWh primary energy content of fuel

	Specific CO_2 emissions (kg CO_2)	
	Per kg fuel	Per kWh (HHV)
Methane (natural gas)	2.75	0.18
Biogas	2.99	0.22
Butane	3.03	0.22
Hydrogen	0	0
Biodiesel	2.85	0.25
Gasoil	3.15	0.25
Coal (coke)	2.82	0.39
Wood (dry)	1.83	0.41

Table 4: CO2-eq emissions

	Equivalent CO_2 emissions (kg-CO_2-eq/kWh HHV fuel)			
	Netherlands (NL)	United Kingdom (UK)	Germany (DE)	USA (US)
Methane (natural gas)	0.20	0.18	0.20	0.27
Biogas	0.30	0	-	-
Gasoil	0.26 (raw oil)	0.25	0.27	-
Coal (coke)	0.38	0.32	0.36	0.41
Wood (dry)	0.014	0	0.39	0.14

Graphic 1: CO2-eq emissions of electricity per kWhe (produced electricity)