

APPENDIX 1

The procedure for calculating the SO_x emission factor from fuel sulphur content is given below. The units are given in parenthesis.

SFOC = Specific Fuel Oil Consumption (g/kWh)

SC = Sulphur content of fuel (mass-%)

M(S) = Molar mass of sulphur (g/mol)

M(SO₂) = Molar mass of sulphur dioxide (g/mol)

n(S) = number of moles of sulphur (mol)

n(SO₂) = number of mols of sulphur dioxide (mol)

m(S) = mass of sulphur (g)

m(SO₂) = mass of sulphur dioxide (g)

$$n(S) = \frac{m(S)}{M(S)} = \frac{SFOC * SC}{M(S)} = \frac{200 \text{ g / kWh} * 0.015}{32.0655 \text{ g/mol}} = 0.09356 \text{ mol/kWh}$$

$$n(S) = n(SO_2)$$

$$m(SO_2) = M(SO_2) * n(SO_2) = 64.06436 \text{ g/mol} * 0.09356 \text{ mol/kWh} = 5.994 \text{ g/kWh}$$

The procedure for calculating the CO₂ emission factor is given below. The units are given in parenthesis.

SFOC = Specific Fuel Oil Consumption (g/kWh)

CC = Carbon content of fuel (mass-%)

M(C) = Molar mass of carbon (g/mol)

n(C) = number of mols of carbon (mol)

m(C) = mass of carbon (g)

M(CO₂) = molar mass of carbon dioxide (g/mol)

n(CO₂) = number of mols of carbon dioxide (mol)

m(CO₂) = mass of carbon dioxide (g)

$$n(C) = \frac{m(C)}{M(C)} = \frac{SFOC * CC}{M(C)} = \frac{200 \text{ g / kWh} * 0.85}{12.01 \text{ g/mol}} = 14.15487 \text{ mol/kWh}$$

$$n(C) = n(CO_2)$$

$$m(CO_2) = M(CO_2) * n(CO_2) = 44.00886 \text{ g/mol} * 14.15487 \text{ mol/kWh} = 622.94 \text{ g/kWh}$$

Note that the carbon content of the diesel fuel varies depending on the type of fuel from 85 (HFO) to 88 (MDO, MGO) mass-%. The lower value was used in this example.