Transport fuel emissions

The following formula has been used to estimate greenhouse gas emissions from the combustion of diesel oil used for transport energy purposes.

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1\,000}$$

where:

E_{ij} is the emissions of gas type (j), carbon dioxide, methane or nitrous oxide, from fuel type (i) (CO_2-e tonnes).

Q_i is the quantity of fuel type (kilolitres) combusted for transport energy purposes

EC_i is the energy content factor of fuel type (i) (gigajoules per kilolitre or per cubic metre) used for transport energy purposes

EF_{ijoxec} is the emission factor for each gas type (j) (which includes the effect of an oxidation factor) for fuel type (i) (kilograms CO_2-e per gigajoule) used for transport energy purposes

Fuel combusted	**Energy content factor (GJ/kL unless otherwise indicated)** ***(EC_i)***	EMISSION FACTOR KG CO_2-E/GJ (RELEVANT OXIDATION FACTORS INCORPORATED) (***EF_{ijoxec}***)		
		CO_2	CH_4	N_2O
Diesel oil	38.6	69.2	0.01	0.6

Average diesel consumption for electricity generation during construction (i.e., first 3 months).

CO_2-e are estimated as follows:

Emissions of carbon dioxide:

= (3000 x 38.6 x 69.2)/1,000

= 8013.36t CO_2-e

Emissions of methane:

= (3000 x 38.6 x 0.01)/1,000

= 1.16 t CO_2-e

Emissions of nitrous oxide:

= (3000 x 38.6 x 0.6)/1,000

= 69.48 t CO_2-e

Total scope 1 GHG emissions = 8013.36 + 1.16 + 69.48

= 8084.00 t CO_2-e (0.01 Mt CO_2-e)

Average diesel consumption associated with vehicle movement on site mining 1.5 Mt/a (initial 18 months).

CO_2-e are estimated as follows:

Emissions of carbon dioxide:

= (6750 x 38.6 x 69.2)/1,000

= 18030.06 t CO_2-e

Emissions of methane:

= (6750 x 38.6 x 0.1)/1,000

= 2.61 t CO_2-e

Emissions of nitrous oxide:

= (6750 x 38.6 x 0.6)/1,000

= 156.33 t CO_2-e

Total scope 1 GHG emissions = 18030.06 + 2.61 + 156.33

= 18189.00 t CO_2-e (0.02 Mt CO_2-e)

Average diesel consumption associated with vehicle movement on site mining 2.5 Mt/a (18 months to 2 years).

CO_2-e are estimated as follows:

Emissions of carbon dioxide:

= (10350 x 38.6 x 69.2)/1,000

= 27646.09 t CO_2-e

Emissions of methane:

= (10350 x 38.6 x 0.01)/1,000

= 4.00 t CO_2-e

Emissions of nitrous oxide:

= (10350 x 38.6 x 0.6)/1,000

= 239.71 t CO_2-e

Total scope 1 GHG emissions = 27646.09 + 4.00 + 239.71

= 27889.79 t CO_2-e (0.03 Mt CO_2-e)

Average diesel consumption associated with vehicle movement on site mining 3.3 Mt/a (2 years to closure).

CO_2-e are estimated as follows:

Emissions of carbon dioxide:

= (13500 x 38.6 x 69.2)/1,000

= 36,060.12 t CO_2-e

Emissions of methane:

= (13500 x 38.6 x 0.01)/1,000

= 5.21 t CO_2-e

Emissions of nitrous oxide:

= (13500 x 38.6 x 0.6)/1,000

= 312.66 t CO_2-e

Total scope 1 GHG emissions = 36060.12 + 5.21 + 312.66

= 36377.99 t CO_2-e (0.04 Mt CO_2-e)

Fuel combustion emissions – liquid fuels

The following formula has been used to estimate greenhouse gas emissions from the stationary combustion of diesel oil.

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1\,000}$$

where:

E_{ij} is the emissions of gas type (j), (carbon dioxide, methane or nitrous oxide, from fuel type (i) (CO_2-e tonnes).

Q_i is the quantity diesel oil (i) (kilolitres) combusted for stationary energy purposes

EC_i is the energy content factor of fuel type (i) (gigajoules per kilolitre) for stationary energy purposes.

EF_{ijoxec} is the emission factor for each gas type (j) (which includes the effect of an oxidation factor) for fuel type (i) (kilograms CO_2-e per gigajoule).

Fuel combusted	**Energy content factor (GJ/kL unless otherwise indicated)** ***(EC_i)***	EMISSION FACTOR KG CO_2-E/GJ (RELEVANT OXIDATION FACTORS INCORPORATED) (***EF_{ijoxec}***)		
		CO_2	CH_4	N_2O
Diesel oil	38.6	69.2	0.1	0.2

Average diesel consumption for electricity generation during all operations.

CO_2-e are estimated as follows:

Emissions of carbon dioxide:

= (1800 x 38.6 x 69.2)/1,000

= 4808.02 t CO_2-e

Emissions of methane:

= (1800 x 38.6 x 0.1)/1,000

= 0.69 t CO_2-e

Emissions of nitrous oxide:

= (1800 x 38.6 x 0.2)/1,000

= 41.69 t CO_2-e

Total scope 1 GHG emissions = 4808.02 + 0.69 + 41.69

= 4850.40 t CO_2-e (0.005 Mt CO_2-e)