

2021 GHG Scope 3 Calculation

The performance data reported as of 31st December 2021



Total GHG Scope 3 Calculation

Scope 3: Category	GHG Emissions (Unit: tCO2e)
Downstream Transportation and Distribution	51,804.86
Purchased Goods and Services	23.59
Business Travel:	903.90
- Vehicle	- 866.79
- Airplane	- 37.11
Total GHG (Scope 3) Emission	52,732.35

GHG Emission Scope 3: Downstream Transportation and Distribution

From the 2021 performance, only Nam Theun 2 Power Co., Ltd. (NTPC) located in Lao PDR has electric power transmissions to Thailand, the distance from the power plant to the power station is approximately 160 km.

During the transmission, the distribution losses are as below.

- Total electric power transmissions and distribution losses
= 4,976,427.747 MWh x 6.07%
= 302,069.16 MWh
- Total GHG Emission from electric transmissions and distribution losses
= 302,069 MWh x 0.49 tCO₂e/ MWh
= 148,013.89 tCO₂e



Reference: <http://www.ppa.egat.co.th/fppdx/index.php/2014-03-10-12-11-43/nam-theun-2>

- EGCO stakes 35% of the NTPC power plant,
Therefore, the electric transmissions and distribution losses of EGCO are equal to **51,804.86 tCO₂e**

Assumption:

- Thailand's average transmission losses rate = 6.07%
(Reference: <https://data.worldbank.org/indicator/EG.ELC.LOSS.ZS>)
- EGCO's GHG emission intensity in 2020 is 0.49 tCO₂e/ MWh

GHG Emission Scope 3: Purchased Goods and Services

Collected information: Amount of paper used in the office during the year 2021

The data collected by

1. Used paper: waste treated office paper
2. Ordered paper: the number of papers ordered

Total paper = 15,513.90 kg

GHG Emission = 15.52 tons x 1.52 tCO₂e/ ton material
= **23.59 tCO₂e**

Note:

- Scope of GHG (Scope 3) report: Subsidiaries and Joint Ventures by EGCO Equity (totally 25 power plants)
- Reference of emission factors: GHG emission factor (office paper) = 0.02 tCO₂e/ t of paper used

[Reference: EPA Emission Factors](#)

GHG Emission Scope 3: Business Travel (Vehicle)

The data collected by

1. Vehicle: fuel quantity used by separate fuel types

Formula Note:

$$\text{Fuel quantity (TJ)} = (\text{Fuel quantity (liter or kg)} \times \text{Net heating value}) / 10^6$$

$$\text{Scope 3 Vehicle} = \text{Fuel quantity (TJ)} \times \text{GHGs Emission factor}$$

Example of data calculation: QPL power plant

Item	Requested Information					
2.1 Business travel Vehicle (separate by fuel types)	please collect the fuel quantity used separated by types (Benzene, Diesel, LPG, CNG, Ethanol, Biodiesel).					
Business travel only employee under QPL (not includes O&M)						
Type of fuel	Unit	Fuel quantity (liter or kg)	Net heating value (MJ/kg)	Fuel quantity (TJ)	GHGs Emission factor (kgCo2e/TJ)	Scope 3 Vehicle (tCO2e)
Benzene	Liter		31.48	0.00	69,300.00	0.00
diesel	Liter	36,617.29	36.42	1.33	74,100.00	98.82
LPG	Kilogram		49.30	0.00	56,100.00	0.00
CNG	Kilogram		43.04	0.00	56,100.00	0.00
Ethanol	Liter		20.90	0.00	0.00	0.00
Biodiesel	Liter		33.30	0.00	0.00	0.00
Gasoline - additional	Liter	221.44	32.00	0.01	69,300.00	0.49

*No QMSI data included

Formula Note

$$\text{Fuel quantity (TJ)} = (\text{Fuel quantity (liter or kg)} \times \text{Net heating value}) / 10^6$$

$$\text{Scope 3 Vehicle} = \text{Fuel quantity (TJ)} \times \text{GHGs Emission factor}$$

Mobile Combustion
 from 2006 IPCC (kg CO2/TJ) on a Net Calorific Basis-Table 3.2.1 section 3.2.1.2

Diesel Oil 74,100
 Gasoline 69,300

Reference Data:
 QPL Scope 3 Details
 Tab: Scope 3-Travel (Vehicle)
 Diesel - Cell: J16
 Gasoline - Cell: K16

Source: https://www.engineeringtoolbox.com/fuels-higher-calorific-values-d_169.html

Fuel	Density		Higher Heating Value (HHV) (Gross Calorific Value - GCV)			Lower Heating Value (LHV) (Net Calorific Value - NCV)		
	g/cm ³	lb/ft ³	[MJ/kg]	[Btu/lb]	[MJ/m ³]	[Btu/ft ³]	[MJ/m ³]	[Btu/ft ³]
Gasoline fuels	[kg/m ³]	[lb/ft ³]	[MJ/kg]	[Btu/lb]	[MJ/m ³]	[Btu/ft ³]	[MJ/m ³]	[Btu/ft ³]
Acetylene	1.997	31.1	13.9	48.9	2143	54.7	140	
Acetylene					22.5	560		
Hydrogen	0.090	2.65	39.4	141.7	6020	12.7	341	33.3
					120.0	5591	10.0	290
Methane	0.716	20.3	15.4	55.5	23074	39.0	1059	13.9
					40.0	1000	13.1	47.1
Natural gas (US market)	0.717	20.0	14.5	52.2	22446	40.0	1000	13.1
					40.0	1000	13.1	47.1
Town gas					18.0	453		

Note:

Scope of GHG (Scope 3) report: Subsidiaries and Joint Ventures by EGCO Equity (totally 25 power plants)
 Reference of emission factors: 2006 IPCC

Type of fuel	Net heating value (MJ/kg)	GHGs Emission factor (kgCo2e/TJ)
Benzene	31.48	69,300.00
diesel	36.42	74,100.00
LPG	49.30	56,100.00
CNG	43.04	56,100.00
Ethanol	20.90	0.00
Biodiesel	33.30	0.00
Gasoline - additional	32.00	69,300.00

Total GHG Emission of Business Travel (Vehicle) of EGCO Group= **866.79 tCO2e**

GHG Emission Scope 3: Business Travel (Airplane)

The data collected by
2. Airplane: Travel history

Example of data calculation: QPL power plant

Item	Requested Information	Fill in the details of traveling in the website below. The emissions will be auto-calculated. (ICAO Carbon Emission Calculator)
2.2 Business travel (Airplane)	Collect all the travel receipts includes •One way/ Round trip •Cabin class (Economy/ Premium) •Number of passengers •Route (Departure /Arrival location or airport)	https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx

Note:

Scope of GHG (Scope 3) report: Subsidiaries and Joint Ventures by EGCO Equity (totally 25 power plants)

Reference of emission factors: 2006 IPCC

[ICAO Carbon Emission Calculator](#)

Example

Trip No.	Type	Cabin Class	No. of passenger	From City/Airpot	To City/Airport	Total passengers' CO2/Journey (KG)
1	Round Trip	Economy	10	BKK	NRT	5224.8

Business travel only employee under QPL (not includes O&M)

Trip No.	Type	Cabin Class	No. of passenger	From City/Airpot	To City/Airport	Total passengers' CO2/Journey (KG)
1	One Way	Economy	3	BKK	MNL	437.70
2	Round Trip	Economy	2	BKK	MNL	583.60
3	One Way	Business	1	Johannesburg	MNL	1,709.28
4	One Way	Business	1	Capetown	MNL	1,841.94
5	One Way	Business	2	MNL	Capetown	3,283.87
6	One Way	Business	2	MNL	Johannesbur	3,418.56
7	Round Trip	Business	2	MNL	Capetown	6,567.74
8	Round Trip	Business	2	Johannesburg	MNL	6,837.12
9	Round Trip	Business	2	MNL	Memphis	4,941.36
10*	One Way	Business	1	BKK	MNL	145.90
						29,567.07

*QMSI Airfare data

Total GHG Emission of Business Travel (Airplane) of EGCO Group= **37.11 tCO2e**

