

# Greenhouse Gas Inventory Report

## **Our Mission:**

To provide innovative, clean and efficient energy solutions for a better tomorrow

For the period: January 1, 2023 to December 31, 2023

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# Introduction

The global financial crisis is causing massive economic upheaval, but with the world's governments working together, recovery is now in sight. Yet the threat posed by global warming still requires a major breakthrough in international negotiations and a change in modern lifestyles to slow the rate of warming and avert an ecological catastrophe.

With our corporate mission of "To provide innovative, clean and efficient energy solutions for a better tomorrow", DET strive to do our utmost to help slow global warming and reduce our environmental impact and also believe in fulfilling Delta's CSR goals through sound corporate governance, balancing stakeholder interests and social participation.

Responding to climate change is not only a corporation's social responsibility. How to respond to the threat it poses; and take advantage of the opportunities it offers; is something that businesses must look at seriously in their corporate strategies.

Carbon emissions reporting becoming an important topic, there is an increasing move towards greenhouse emissions reporting and disclosure. DET is looking towards best practice in the area of sustainability reporting. Sometimes the information is included in Annual Reports or in annual Sustainability and Corporate Responsibility reports. The format and composition of the information varies widely.

Greenhouse Gas report illustrates for a typical company the strategy, targets, performance, and benchmarking of how the company is working to reduce its impact on and adapt to climate change. Clearly, in order to produce reliable information for such reporting, and to monitor emissions performance and management actions to achieve reductions during the year, companies will need to consider carefully processes, systems, controls and internal reporting requirements.



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# 1. Company Profile

Delta Electronics (Thailand) Public Company Limited (hereafter DET) was established in 1988. DET is the world's leading manufacturers and distributors; design and development of: Power Conversion Products (such as Switching Power Supply, Adaptor & Charger, AC-DC / DC-DC converter, Telecommunication / Server Power Supply); Magnetic products (such as Transformer, Line Filter, Coil); Electronic control units / Vision system for Automotive; EMI Filter; Cooling Fan; MTS (Molding, Tooling and Stamping); Solenoid product; PWB Assembly and Transformer. Its operation has now covered several regions i.e. Europe, Middle East, South America and Asia with a total consolidated sales turnover of approximate USD 1 billion.



Delta Electronics (Thailand) Public Company Limited had approximately 20,799 workers during the 2023-year in its Bangpoo Plant 1 & 3 & 5 & WHC3, Wellgrow Plant 6 &7 and Delta Green Industrial Thailand Company Limited.

Plant	Location	No. of Employee
DET Plant 1 & 3 & 5 & WHC3	Bangpoo	15,635
DET Plant 6 & 7	Wellgrow	5,129
DGIT	Bangkok	35
Total		20,851



# 2. GHG Management

## 2.1 Guideline of the report

This emissions inventory report has been prepared and written in accordance with the principles set out by the International Standards Organization (ISO) for the quantification and reporting of Greenhouse Gas Emissions and Removals (ISO14064-1).

## 2.2 Report Principle and Criteria

According to the report complete, consistent, accurate, relevant and transparent information complied principles.

## 2.3 Base Year

## Setting and Adjustment the base year

## Set the base year

Base-year Greenhouse Gas Inventory is annually thereafter, DET shall report the inventory of the preceding calendar year. In 2014, DET had built up several areas which consume high amount of electricity. So, DET has chosen the set base year for this report, which spans from January 1<sup>st</sup>, 2014 to December 31<sup>st</sup>, 2014, in the following manner:

- GHG Scope 1 (tCO<sub>2</sub>e) : 823.56 - GHG Scope 2 (tCO<sub>2</sub>e) – Location based : 37,662.19 - Total GHG Scope1 and 2 (tCO<sub>2</sub>e) – Location based : 38,486

## Adjust the base year

Amendments to the base year by the implementation team by adjustment the internal and external situation, and report to Top management for approval.

## Recalculation of the base year's emission

The base year emissions recalculation base-year inventory in the following cases should be re-calculated emissions for more than 5% significance threshold totally:

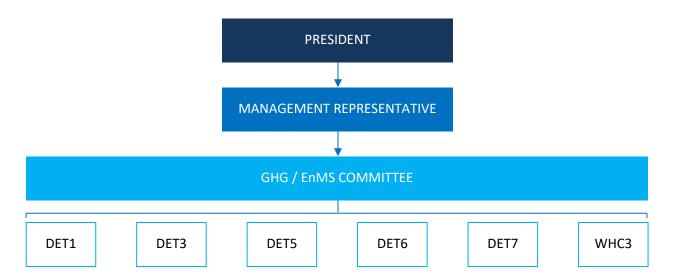
- When the operation of boundary changes;
- When the source of equity stakeholders / transfer;
- When a change in calculation method.

## 2.4 Organizational and Operational Boundaries

The company used the operational control-based approach to defining organizational boundaries. Due to the control prescribed nature of the core company, the application of either the control or equity approach is likely to have the same effect. The activity data is gathered from Delta factories in Thailand. The organizational boundary of Delta Electronics (Thailand) PCL. is defined by the purposes of the greenhouse gas (GHG) inventory include core business activities only.



## 2.5 GHG Organization and Responsibility



## Responsibility:

## Executive Management Team (Management Representative & GHG / EnMS Committee)

DET's Executive Management Team shall review and ultimately approve DET's annual GHG inventory and Carbon Footprint Report / Strategy. Members of the Executive Management Team will also be responsible for the communication of the Report / Strategy at their plant through meetings and discussions where necessary.

### Plant Manager

DET's Plant Manager shall oversee the development of DET's annual GHG inventory and Carbon Footprint Report / Strategy. They shall review DET's annual GHG inventory and Carbon Footprint Report / Strategy, and assume ultimate responsibility for the achievement of targets set.

## Concern Department Manager

DET's Manager shall oversee the day-to-day development of DET's annual GHG inventory. They will develop and manage the projects annual communications strategy, arrange documentation to communicate inventory and strategy, arrange and coordinate the project's annual external verification and assurance process.

The Manager shall also provide support to the EMR in the development of DET's annual GHG inventory.

## **EMR** and Plant Representative

DET's EMR, together with members of the Plant Representative Team will gather data from facilities, finance and related dept; and develop an annual GHG inventory with Management Representative. They shall also work cooperatively with external verification and assurance team to allow smooth implementation of process.

DET's Plant Representative shall assist in the provision of data wherever applicable. The team shall ensure the collection of data for annual inclusion in DET's GHG inventory.



## 2.6 Management Review

As the new base year was set as 2014 for DET reported detailed greenhouse gas emissions, Management Representatives or his assignee shall review and approve Greenhouse Gas Inventory Report. On an annual basis, it shall be reviewed the relevance of DET's performance and the effectiveness of existing monitoring / measurement systems to provide accurate, complete and timely information sets to management team. The latest management review was held in February 1, 2023.

## 2.7 Verification of Greenhouse Gas Inventory Report

This Greenhouse gas Emissions report has been verified by SGS auditor. A positive assurance report has been given over the assertions and quantifications included in this report.



# 3. Primary Statement of GHG Inventory

## 3.1 Greenhouse Gas Emissions Sources

Emissions sources were identified with reference to the methodology described in the Greenhouse Gas Protocol and ISO14064-1:2018. Emissions sources Identification was achieved using specific guidance on Scope 3 factors included in ISO14064-1 Annex B and in the Greenhouse Gas Protocol (WBCSD).

These emissions have then been classified into 3 categories. The definition of each has been adapted from the Greenhouse Gas Protocol; the 3 types of emissions are:

- Direct Emissions (Scope 1 Category 1): from sources that are owned or controlled by DET and DGIT
- Indirect Emissions (Scope 2 Category 2): from generation of purchased electricity consumed by DET and DGIT
- Indirect Emissions (Scope 3 Category 3, 4, 5 and 6): Emissions that occur as a consequence of the activities of DET, but occur from sources not owned or controlled by DET and DGIT. Inclusions of these are determined on DET's aims of the program.



## **Actual Emissions**

## Scope **Emission Sources** Scope 1 Category 1: Direct GHG Emission 1.1 Stationary Combustion - Generator and Fire Pump (Diesel) 1.2 Mobile Combustion - Forklift and Truck (Diesel) - Company Car (Gasoline) / Company Van (Diesel) - Transportation for Sale Activities (Gasoline) 1.3 Direct process emissions from industrial processes - Injection LPG Cylinder - Welding LPG Cylinder 1.4 Direct fugitive emissions arise from the release of GHG in anthropogenic systems - Septic Tank (CH<sub>4</sub>) - Fire Extinguisher (CO<sub>2</sub> type & HFC227ea / FM200 type & FK-5-1-12/Novec1230 type) - Cooling System (HFC134a/R134a & HFC404/R404a & HFC23/R23 & HFC410A/R410A & HFC407c/R407c & HFO514A/R514A) - Air Compressor System (HFC407C/R407C) - Water Drinking Dispenser (HFC134a/R134a) - Circuit Breaker (SF<sub>6</sub>) Scope 2 Category 2: Indirect GHG Emission from purchased electricity 2.1 Electricity purchased from other organization 2.2 Electricity from renewable energy sources purchased from other organization (Unbundled Energy Attribute Certificates (REC), Green Electricity Products, Directly Procured from RE Generators (PPA)) used in: - Delta Electronics (Thailand) PCL. (Plant 1) - Delta Electronics (Thailand) PCL. (Plant 3) - Delta Electronics (Thailand) PCL. (Plant 5) - Delta Electronics (Thailand) PCL. (Plant 6) - Delta Electronics (Thailand) PCL. (Plant 7) - Delta Electronics (Thailand) PCL. (WHC3) - Delta Green Industrial (Thailand) CO., LTD. Scope 3 Category 3: Indirect GHG Emission from transportation 3.1 Transportation of Raw material (Ocean and Air Freight only) 3.2 Transportation of Finished Goods (Ocean and Air Freight only) 3.3 Transportation of Business trip by Air Freight 3.4 Transportation of Bus/Van for Employee 3.5 Emission from transportation that are not described in the above subcategories (Transportation of Food & Waste Management Entrepreneur, Ambulance) Category 4: Indirect GHG Emission from product used by organization

- 4.1 Canteen (Liquefied Petroleum Gas)
- 4.2 Industrial and Normal Waste (from Production / Garbage)



## **Actual Emissions**

Scope	Emission Sources
Scope 3	Category 5: Indirect GHG Emission associated with the use of products from the organization
	5.1 Emissions or removals from the use stage of the product
	5.2 Emission from downstream leased assets
	5.3 Emissions from end of life stage of the product
	5.4 Emission from investments
	Category 6: Indirect GHG Emission from other sources

## Remark:

- No biomass is used in DET operations and therefore no emissions from the combustion of biomass are included.
- No generated electricity from fuel combustion, heat or stream is used in DET operations and therefore no emissions from these sources are included.

## 3.2 Greenhouse Gas Emissions Inclusions & Exclusions

Scope of	Emissions	Emission Sources
	Inclusions:	Category 3: Indirect GHG Emission from transportation 3.1 Transportation of Raw material (Ocean and Air Freight only) 3.2 Transportation of Finished Goods (Ocean and Air Freight only) 3.3 Transportation of Business travel
		Category 3: Indirect GHG Emission from transportation
		3.4 Transportation of Bus/Van for Employee
		3.5 Emission from transportation that are not described in the above subcategories (Transportation of Food & Waste Management Entrepreneur, Ambulance)
Coope 2		Category 4: Indirect GHG Emission from product used by organization
Scope 3		4.1 Canteen (Liquefied Petroleum Gas)
	Evelueiene	4.2 Industrial and Normal Waste (from Production / Garbage)
	Exclusions:	Category 5: Indirect GHG Emission associated with the use of products from the organization
		5.1 Emissions or removals from the use stage of the product
		5.2 Emission from downstream leased assets
		5.3 Emissions from end of life stage of the product
		5.4 Emission from investments
		Category 6: Indirect GHG Emission from other sources

## Indirect Emissions (Scope 3)

The emissions are occurred as a consequence of the activities of DET, but occur from sources not owned or controlled by DET; therefore some Indirect Emissions (Scope 3) have been ignored.



## 3.3 Summary of Greenhouse Gas Emissions

Type of Emissions (Tones CO2e*)	Plant 1	Plant 3	Plant 5	Plant 6	Plant 7	WHC3	DGIT	2023 Performance
Direct (Scope 1) Emissions: Category 1: Direct GHG Emission								
1.1 Stationary Combustion								
- Generator (Diesel)	0	0.28	0.54	0.46	0.41	0.61	0	2.29
- Fire Pump (Diesel)	0	2.37	1.03	0.22	0	0	0	3.62
1.2 Mobile Combustion								
- Forklift and Truck (Diesel)	98.07	10.40	33.13	30.34	8.02	0	0	179.97
- Company Car (Gasoline)	0	0	12.69	0	0	0	0	12.69
- Company Van (Diesel)	0	0	27.84	0	0	0	0	27.84
- Transportation for Sale Activities	0	0	0	0	0	0	76.20	76.20
1.3 Direct process emissions from industrial processes								
- Injection LPG Cylinder	0	0	0	0	0.37	0	0	0.37
- Welding LPG Cylinder	0	0	0	0	0	0	0	0
1.4 Direct fugitive emissions arise from the release of GHG in anthropogenic systems								
- Septic Tank (CH <sub>4</sub> )	129.34	184.86	276.68	70.78	165.06	25.51	0	852.24
- Fire Extinguisher (CO <sub>2</sub> type)	0	0	0	0	0	0	0	0
- Fire Extinguisher (HFC227ea / FM200 type)	0	0	0	0	0	0	0	0
- Fire Extinguisher (FK-5-12 / Novec1230 type)	0	0	0	0	0	0	0	0
- Cooling System (HFC134a / R134a)	0	0	596.70	0	0	183.60	0	780.30
- Cooling System (HFC404a / R404a)	0	0	94.56	0	0	0	0	94.56
- Cooling System (HFC23 / R23)	0	0	0	0	0	0	0	0
- Cooling System (HFC410a / R410a)	0	0	0	0	0	0	0	0
- Cooling System (HFC407c / R407c)	0	0	0	0	0	0	0	0
- Cooling System (HFC514a / R514a)	0	0	0	0	0	0	0	0



Type of Emissions (Tones CO2e*)	Plant 1	Plant 3	Plant 5	Plant 6	Plant 7	WHC3	DGIT	2023 Performance
Direct (Scope 1) Emissions: Category 1: Direct GHG Emission								
- Air Compressor System (HFC407c / R407c) - Water Drinking Dispenser (HFC143a / R134a)	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0	0
- Circuit Breaker (SF6)  Total Direct (Scope 1) Emissions	227.41	197.91	1,043.17	101.80	173.86	209.72	0 76.20	0 2,030.08
Indirect (Scope 2) Emissions: Category 2: Indirect GHG Emission from purchased electricity								
<ul><li>2.1 All purchased electricity in owned buildings.</li><li>2.2 Unbundled Energy Attribute Certificates (53,462 RECs)</li></ul>	12,610.44 3,971.21	6,846.99 3,378.32	24,214.92 10,572.89	5,942.86 2,421.52	17,462.45 5,384.92	3,899.31 996.80	14.13 0	70,991.10 26,725.66
Total Indirect (Scope 2 – Location based) Emissions	12,610.44	6,846.99	24,214.92	5,942.86	17,462.45	3,899.31	14.13	70,991.10
Total Indirect (Scope 2 – Market based) Emissions	8,639.24	3,468.67	13,642.03	3,521.34	12,077.52	2,902.51	14.13	44,265.44
Total Gross Controlled Emissions (Scope 1 and Scope 2) – Location based	12,837.87	7,044.91	25,260.45	6,035.79	17,642.45	4,109.04	90.43	73,020.92
Total Gross Controlled Emissions (Scope 1 and Scope 2) – Market based	8,866.66	3,666.58	14,687.56	3,614.27	12,257.52	3,112.24	90.43	46,295.27
Indirect (Scope 3) Emissions: Category 3: Indirect GHG Emission from transportation								
3.1 Transportation of Raw material (Ocean and Air Freight only)								19,462.76
3.2 Transportation of Finished Goods								123,948.36
(Ocean and Air Freight only) 3.3 Transportation of Business trip by Air Freight			868.30				23.16	891.46
Total Indirect (Scope 3) Emissions								144,302.58
Total Gross Controlled Emissions (Scope 1 - Scope 3) – Location based								217,323.76
Total Gross Controlled Emissions (Scope 1 - Scope 3) – Market based								190,598.11

<sup>\*</sup>Data expressed in carbon dioxide equivalent units.



## Quantity of Greenhouse Gas separated by type of emissions

Area		CO <sub>2</sub>	CH <sub>4</sub> *	N <sub>2</sub> O*	HFCs*	PFCs*	SF <sub>6</sub> *	Ton CO <sub>2</sub> -e
Scope 1	Total	289.19	853.67	12.36	874.86	0	0	2,030.08
Category 1: Direct GHG Emission	Plant 1	91.92	129.48	6.01	0	0	0	
	Plant 3	12.64	184.88	0.39	0	0	0	
	Plant 5	73.96	276.92	1.02	691.26	0	0	
	Plant 6	27.90	70.83	3.07	0	0	0	
	Plant 7	7.86	165.08	0.92	0	0	0	
	WHC3	0.61	25.51	0.00	183.60	0	0	
	DGiT	74.30	0.96	0.94	0	0	0	
Scope 2 (Location based)	Total	70,991.10	0	0	0	0	0	70,991.10
Category 2: Indirect GHG Emission from purchased	Plant 1	12,610.44	0	0	0	0	0	
electricity	Plant 3	6,846.99	0	0	0	0	0	
	Plant 5	24,214.92	0	0	0	0	0	
	Plant 6	5,942.86	0	0	0	0	0	
	Plant 7	17,462.45	0	0	0	0	0	
	WHC3	3,899.31	0	0	0	0	0	
	DGiT	14.13	0	0	0	0	0	
Scope 2 (Market based)	Total	44,265.44	0	0	0	0	0	44,265.44
Category 2: Indirect GHG Emission from purchased	Plant 1	8,639.24	0	0	0	0	0	
electricity	Plant 3	3,468.67	0	0	0	0	0	
	Plant 5	13,642.03	0	0	0	0	0	
	Plant 6	3,521.34	0	0	0	0	0	
	Plant 7	12,077.52	0	0	0	0	0	
	WHC3	2,902.51	0	0	0	0	0	
	DGiT	14.13	0	0	0	0	0	
Scope 3	Total	144,302.58						144,302.58
Category 3: Indirect GHG Emission from transportation	DET	144,279.42	0	0	0	0	0	
Emission from transportation	DGIT	23.16						
Total Gross Controlled Emissions (Location based)		215,582.87	853.67	12.36	874.86	0	0	217,323.7
Total Gross Controlled Emissic (Market based)	ons	188,857.22	853.67	12.36	874.86	0	0	190,598.1

Note: Greenhouse Gas Emissions Rate follows Global Warming Potential from IPPC GWP2021 AR6



## 3.4 Data Collection Quantification of Methodologies

The next table is shown the details of the sources, the relevant data, and the emission factors, which have been used. All factors have been approved by DET. The amount of  $CO_2e$  has been calculated by multiplying the activity data sources by DET by the relevant emission factors. As this is the first year that DET has produced these figures, there are no changes in methodology to report.

Emission or Removal Sources	Data Unit	Emission Factors [kgGHG / unit]	Global Warming Potential [GWP100]	Factor Sources
Electricity - Location-based: Local grid mix - Market-based: (Local grid mix - Unbundle Energy Attribute Certificates (REC))	kWh	CO <sub>2</sub> e = 0.4999	CO <sub>2</sub> e = 1.00	TGO Database updated April, 2022 with reference Thai National LCI Database, TIISMTEC-NSTDA, AR5 (with TGO electricity 2016-2018)
Diesel (Stationery Combustion)	Liter	$CO_2 = 2.70$ $CH_4 = 0.000109$ $N_2O = 0.0000219$ $CO_2e = 2.7078$	$CO_2 = 1.00$ $CH_{4-lossil combustion} = 27.0$ $N_2O = 273$ $CO_2e = 1.00$	(Mar 1 de diculiery 2010 2010)
Diesel (Mobile Combustion - On road)	Liter	$CO_2e = 2.7076$ $CO_2 = 2.70$ $CH_4 = 0.000142$ $N_2O = 0.000142$ $CO_2e = 2.7406$	$CO_2e = 1.00$ $CO_2 = 1.00$ $CH_{4-lossil combustion} = 27.0$ $N_2O = 273$ $CO_2e = 1.00$	Emission Factor:
Diesel (Mobile Combustion - Off road-Industry)	Liter	$CO_2 = 2.1400$ $CO_2 = 2.18$ $CH_4 = 0.000151$ $N_2O = 0.00104$ $CO_2e = 2.9793$	$CO_2 = 1.00$ $CO_2 = 1.00$ $CH_{4-lossil combustion} = 27.0$ $N_2O = 273$ $CO_2e = 1.00$	<ul> <li>TGO Database updated April, 2022 with reference to IPCC Vol.2 table 2.2, 3.2.1, 3.2.2, DEDE, AR5</li> </ul>
Gasoline (Mobile Combustion)	Liter	$CO_2 = 2.18$ $CH_4 = 0.00104$ $N_2O = 0.000101$ $CO_2e = 2.2394$	$CO_2 = 1.00$ $CH_{4-lossil combustion} = 27.0$ $N_2O = 273$ $CO_2e = 1.00$	GWP     IPCC, 2021, AR6     Climate Change 2022 Mitigation of Climate Change Annex II, Table 9 GWP100 value.  Add throughout lift-time for a page 10.00 page.
LPG (Stationery Combustion)	kg	$CO_2 = 3.11$ $CH_4 = 0.0000493$ $N_2O = 0.00000493$ $CO_2e = 3.1134$	$CO_2 = 1.00$ $CH_{4-lossil combustion} = 27.0$ $N_2O = 273$ $CO_2e = 1.00$	<ul> <li>and atmospheric lifetimes for a range of GHGs</li> </ul>
LPG (Mobile Combustion)	kg	$CO_2 = 3.11$ $CH_4 = 0.00306$ $N_2O = 0.00000986$ $CO_2e = 3.2049$	$CO_2 = 1.00$ $CH_{4-fossil combustion} = 27.0$ $N_2O = 273$ $CO_2e = 1.00$	_
Truck 10 wheels / B5 / 16 tons (0% load)	km	$CO_2e = 0.6053$	$CO_2e = 1.00$	
Truck 10 wheels / B5 / 16 tons (100% load)	Ton-km	$CO_2e = 0.0489$	$CO_2e = 1.00$	TGO Database updated July, 2022 with
Truck 6 wheels / B5 / 11 tons (0% load)	km	$CO_2e = 0.4923$	$CO_2e = 1.00$	reference Thai National LCI Database,TIIS
Truck 6 wheels / B5 / 11 tons (100% load)	Ton-km	$CO_2e = 0.0613$	$CO_2e = 1.00$	MTEC-NSTDA (with TGO electricity 2016 2018)
Pick-up 4 wheels / 7 tons (0% load)	km	$CO_2e = 0.3131$	$CO_2e = 1.00$	2010)
Pick-up 4 wheels / 7 tons (100% load)	Ton-km	$CO_2e = 0.1411$	$CO_2e = 1.00$	
Ship Container	Ton-km	$CO_2e = 0.0107$	CO <sub>2</sub> e = 1.00	TGO Database updated July, 2022 with reference Ecoinvent 2.2, IPCC 2007 GWF 100a
Air Freight (Outbound)	Ton-km	CO <sub>2</sub> e = 0.53867	CO <sub>2</sub> e = 1.00	GOV.UK Greenhouse gas reporting Conversion factors 2022 condensed set (fo most users)
Sea (In Land)	Ton-km	$CO_2e = 0.0107$	CO <sub>2</sub> e = 1.00	TGO Database updated July, 2022 with reference Thai National LCI Database,TIIS MTEC-NSTDA (with TGO electricity 2016 2018)
Refrigerant (HCFC22 or R22) Refrigerant (HFC134a or R134a) Refrigerant (HFC404a or R404a) Refrigerant (HFC23 or R23) Refrigerant (HFC407c or R407c) Refrigerant (HFC410a or R410a) Refrigerant (HFC32 or R32) Refrigerant (HF	kg	CO <sub>2</sub> e = 1.00	HCFC22 = 1,960 HFC134a = 1,530 HFC404a = 4,728 HFC23 = 14,600 HFC407c = 1,908 HFC410a = 2,256 HFC32 = 771 HFO514 = 2 HFC227 = 3,600	IPCC, 2021, AR6 Chapter 7 Supplementary Material - 7.SM.6 - Tables of GHG Lifetimes, Radiative Efficiencies and Metrics.
Circuit Breaker (SF <sub>6</sub> )	kg	$CO_2e = 1.00$	$SF_6 = 24,300$	
Waste (Paper)	kg	$CO_2e = 2.93$	CO <sub>2</sub> e = 1.00	CFP Guideline; 3 <sup>rd</sup> Edition
Waste Water (Industrial)	m³	$CO_2e = 0$	$CO_2e = 1.00$	IPCC Volume 5 : Wastewater Treatment and Discharge
Waste Water (Domestic)	m³	CO <sub>2</sub> e = 1.00	$CH_{\text{4-fugitive}} = 29.8$	IPCC, 2021, AR6 Climate Change 2022 Mitigation of Climate Change Annex II, Table 9 GWP100 value and atmospheric lifetimes for a range of GHGs



## 3.5 References for Emission Factors

CO<sub>2</sub> Emission Factor Sourced from: Thailand National Data Base

CO<sub>2</sub> Emission Factor Sourced from: Electricity Generating Authority of Thailand (EGAT) 2011

CO<sub>2</sub> Emission Factor Sourced from: GOV.UK - Greenhouse gas reporting:

conversion factors 2022 condensed set (for most users)

• ISO14064-1 GHG Part 1: Specification for Quantification, Monitoring and

Reporting of Entity Emissions and Removal

Google Map (<a href="http://map.google.co.th/maps?hl=th&tab=wl">http://map.google.co.th/maps?hl=th&tab=wl</a>)

ISO14040 Environmental Management – Life Cycle Assessment – Principles and Framework

• ISO14044 Environmental Management – Life Cycle Assessment – Requirements and Guidelines

• Carbon Footprint Product Guideline (TGO) – February 2020

Carbon Footprint Organization Guideline (TGO) – April 2020

Carbon Footprint Organization Guideline (TGO) – April 2021

AA1000: A Standard for Ethical Performance

PAS2050: Assessing the Life Cycle Greenhouse Gas Emissions of

Goods & Services

ISO26000: Guidance on Social Responsibility

IPCC Volume 5: Wastewater Treatment and Discharge

The Global Warming Potential (GWP)

Sourced from:

IPCC AR6 (Sixth Assessment Report) Climate

change 2021 The Physical Science Basis

IPCC AR6 (Sixth Assessment Report) Climate Change

2022 Mitigation of Climate Change

http://www.searates.com/reference/portdistance

http://www.timeanddate.com/

https://www.prokerala.com/travel/airports/distance/

• http://ports.com/sea-route



## 3.6 Uncertainty Management

This Greenhouse Gas Inventory report has been assessed and evaluated the uncertainty rating. The rating is 24 points which focus on Electricity consumption (98% of Greenhouse Gas Inventory). The rating is 18 points which focus on Transportation system (Company's car and van). The rating is 16 points which focus on Septic Tank (Domestic Wastewater). The rating is 12 points which focus on Fire Fighting System, Diesel used in Electricity Backup System, Refrigerant, LPG used in Welding & Injection Process and Transportation for Sale Activities which has been shown the activity data is moderated data quality which comes from the regular measurement eq. Meter Reading, Purchase Order, etc.; and Emission factors is uncertainty of data quality which comes from Manufacturer to provide coefficient. And the rating is 6 points which focus on Transportation system (Forklift).

Explanation: Greenhouse Gas Inventory and the estimated operation itself on the scientific uncertainty, to achieve the purpose of continuous improvement of data quality, therefore, uncertainty is evaluated. IPCC uncertainty is used in more complex calculation. DET adapts Delta Group Guideline for the model of uncertainty which provided by the way of class distinction specify below.

The uncertainty of inventory operations can be divided into model uncertainty and parameter uncertainty. Since the pattern is more complex uncertainty, therefore, not be included in this assessment of the range of uncertainty. Parameter uncertainty refers to the uncertainty of quantitative parameters. Activity data and Emission factors include the uncertainty of activity data differentiate the following 3 levels:

- Automatic Continuous Measurement
- Regular Measurement (Meter reading, Purchase order)
- Own Estimation

Note: Order of score is 6-1; the higher score the better the response data, the lower score the uncertainty; will Emission Factors in 6 categories:

- Measurement / Material and Energy balance coefficient
- Manufacturer to provide coefficient
- Regional Emission Factors
- National Emission Factors
- International Emission Factors

Value Type	Data Quality Level						
	X=6-5 Points	Y=4-3 Points	Z=2-1 Points				
Activity Data	Automatic Continuous Measurement	Regular Measurement (Meter Reading, Purchase Order)	Own Estimation				
	A=6-5 Points	B=4-3 Points	C=2-1 Points				
Emission Factors	- From Measurement / Quality Factor - Manufacturer to provide coefficient	- Regional Emission Factors - National Emission Factors	International Emission Factors				

The qualitative analysis of uncertainty assessment method adopted, in the following table will be divided into 6 overall data quality as the following table:

Rating	Overall Level of Scoring Data	Explanation
First Class	1 - 9	High uncertainty, Data quality is very poor.
Second Class	10 - 18	Uncertainty, Moderate data quality.
Third Class	19 - 27	Slightly uncertainty, Data quality is good.
Fourth Class	28 - 36	Uncertainty is very low, Excellent data quality.



## 3.7 Compare GHG with Base year

DET use electricity as a main power and fuel to operate our business. These are non-renewable energy sources and lead to GHG emissions in Scope 1 and 2.

At our Thailand's sites, DET has set the target to reduce Scope 1 and 2 GHG emissions 56.6% per MUSD output value by 2025 from a 2014 base year. The latest statistics shows that the direct emissions (Scope 1 - Category 1) of 2023 were 2,030 tons $CO_2e$ , indirect emissions (Scope 2 - Category 2) were 70,991 tons  $CO_2e$  for location-based and 44,265 tons $CO_2e$  for market-based and other indirect emissions (Scope 3 - Category 3, 4, 5 and 6) were 144,303 tons $CO_2e$  separately, that mean the GHG intensity (Thailand's sites) of 2022 (scope1 and 2) was 19.87 tons $CO_2e/MUSD$  for location-based and 16.80 tons $CO_2e/MUSD$  for market-based. This represents a 51% and 58% reduction for location-based and market-based emissions, respectively, from our base year of 2014, and a 11% and 25% decrease, respectively, from 2022.

For GHG scope3, major global distribution centers cooperate with logistics providers to implement transportation cost optimization, consolidated delivery, full-truck load, packaging design, container packaging and selection of optimal delivery routes. Since Delta attained ISO/IEC 27001 Information Security Management System (ISMS), we encourage our suppliers to utilized e-invoice and e-document as much as possible to save natural resource and mitigate greenhouse gas from distance transportation.

To respond to the circumstances of climate change and align with the target 56.6% of decreasing Scope 1 and 2 GHG emission intensity by 2025. DET has been participating and registering in T-VER since 2014. There are total 8 projects had been registered in T-VER and it is proximately accredited 5,600 tonsCO<sub>2</sub>e carbon credits that had been reduced from those projects. In additional, Delta group (Delta Electronics, Inc., its subsidiaries including Delta Electronics (Thailand) PCL.) have joined the RE100, a global initiative bringing together the world's most influential businesses committed to 100% renewable electricity which DET has set the target 35% of increasing renewable energy intensity by 2025 compared with base year 2020.



# 4. Future Opportunity

## 4.1 Performance Overview and Monitoring

DET shall review the future targets and ensure the remain appropriate for the business and industry, therefore continuous to drive DET's performances and associated management reward by planning, implementing and documenting the actions; to monitor Greenhouse Gas Inventory through the meeting to maintain GHG information management quality and; to reduce or prevent Greenhouse Gas Emissions which is apart of Energy Saving project.

The target information is base on estimates and assumptions that are subject to significant inherent uncertainties, which may be difficult to predict and may be beyond control. As with most forward looking information, there can be no assurance that targets will be realized.

## 4.2 Greenhouse Gas Reduction and Removal

DET will have a management plan in place for managing and reducing emissions by early 2014 with the aim to be carbon emissions reduction by the end of 2025. DET reflects to the Energy Saving Action Plan to reduce the scope 1 and scope 2 by 56.6% per million USD output value (a measurement of product sale price x production quantity) based on 2014 actual by 2025.



## 5. Reference

## 5.1 Unbundle Energy Attribute Certificates (REC)

Delta Electronics Thailand PCL. - Plant 1





























Verification Key 6 0 1 8 5 5 7 8



















## Delta Electronics Thailand PCL. - Plant 3











































## Delta Electronics Thailand PCL. - Plant 5























THE INTERNATIONAL REC STANDARD



























## Delta Electronics Thailand PCL. - Plant 6













































## Delta Electronics Thailand PCL. - Plant 7

















Verification Key
1 2 4 3 4 9 4 9



























## Delta Electronics Thailand PCL. – WHC 1 (reported as DET3)









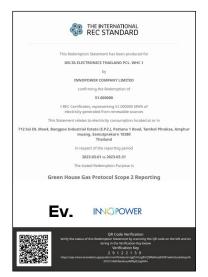


















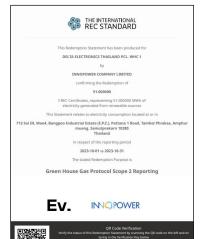


















## Delta Electronics Thailand PCL. – WHC 2 (reported as DET3)













































## Delta Electronics Thailand PCL. - WHC 3







































