

GREENHOUSE GAS EMISSIONS INVENTORY REPORT

Wagon Company Limited



Dong Nai, 01/2026

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ACRONYMS

MOIT: Ministry of Industry and Trade

MONRE: Ministry of Natural Resources and Environment

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

DO: Diesel Oil

GHG: Greenhouse Gas

LPG: Liquefied Petroleum Gas

ND: Decree

QĐ: Decision

TT: Circular

Ltd.: Company Limited

INTRODUCTION

Pursuant to the requirements set out in the 2020 Environmental Protection Law, Decree No. 06/2022/ND-CP “Mitigation of greenhouse gas emissions and protection of ozone layer” Prime Minister’s Decision 13/2024/QĐ-TTg “Lists of sectors and greenhouse gas-emitting facilities required to develop greenhouse gas inventory (updated)” together with related guiding documents and circulars, *Wagon Co., Ltd.* has developed a Greenhouse-Gas (GHG) Inventory Report for 2025.

The implementation, review, and updating of this inventory are carried out under the direction of the Board of Directors of Wagon Co., Ltd. The company’s objective is to publicly disclose, in a transparent manner, all data related to its 2025 greenhouse-gas emissions, thereby aligning with its long-term goals of reducing GHG emissions in the future.

REPRESENTATIVE OF WAGON CO., LTD.



LEE TUNG LIN

REPORT

2025 Greenhouse Gas Inventory

I. FACILITY INFORMATION

1. Facility details

- Company name: *Wagon Co., Ltd.*
- Address: *No. 6 Road, Nhon Trach III Industrial Park – Phase 2, Nhon Trach Commune, Dong Nai Province, Vietnam*
- Business license number: *3603213003*
- Phone: *0251 368 2911*

2. Legal representative

- Legal representative: *Mr. LEE TUNG LIN*
- Position: *Deputy General Director*

3. Business and production information

- Area: *36,000 m²*
- Main products: *Manufacturing plant producing picture-frame products, souvenirs, zinc-plated jewelry, key-chains, mobile-phone straps, bookmark cards, luggage tags, pins, cups, medals and models, set-fasteners, badges, emblems, labels, product tags and belt buckles, bag accessories, wallets, shoes (including painting and galvanising stages).*
- Number of employees: *1,578 persons*
- Number of working hours per day: *8 hours*
- Number of working days per year: *302 days*
- Scale of production: *585,658 kilograms of product per year*

II. BUSINESS ACTIVITIES AND OPERATIONAL DATA

1. Boundary and scope of the facility

1.1. Organizational boundary

According to the guidance of ISO 14064-1:2018 – “Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals” the organization shall consolidate its facility-level GHG emissions and removals by one of the following approaches: (1) Control consolidation approach (operational control or financial control), (2) Equity-share consolidation approach. *Wagon Co.,*

Ltd. chooses the operational-control approach. An organization has operational control when it or one of its subsidiaries has full authority to implement operating policies at the activity level (source: ISO 14064-1:2018). Under this method, *Wagon Co., Ltd.* will calculate all GHG emissions and/or removals from facilities over which it has operational control.

Wagon Co., Ltd. owns the benefit and operational control of the facility located at *No. 6 Road, Nhon Trach III Industrial Park – Phase 2, Nhon Trach Commune, Dong Nai Province, Vietnam*. Consequently, the entire production plant, office area, auxiliary zones, and any activities capable of emitting and/or removing GHGs that fall within *Wagon’s* organizational boundary are included in this inventory. Detailed GHG-emitting activities are described in section 1.2

1.2. Operational boundary

Based on Vietnamese legal guidance for facility-level GHG inventories—Decree 06/2022/ND-CP “Regulations on Mitigation of greenhouse gas emissions and protection of ozone layer”, Circular 38/2023/BCT of the Ministry of Industry and Trade “Methods for measurement, report and verification of reduction in Greenhouse gas (GHG) emissions and GHG inventory development in Industry and Trade sector” and Circular 17/2022/TT-BTNMT of the Ministry of Natural Resources and Environment “Methods for measurement, reporting, appraisal of reduction of Greenhouse gas (GHG) emissions and GHG inventory development in waste management”—the potential GHG-emitting sources are classified as:

Direct emission sources:

The table below summarises the direct emission sources and the corresponding GHGs for each source at *Wagon Co., Ltd.*:

Table 1. Direct emission sources and associated GHGs at Wagon Co., Ltd.

No	Source	Equipment/ emission area	Description	Fuel type/ Refrigerant	Greenhouse gases							
					CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	
1	Stationary fuel combustion	Production area (painting, electroplating) Fire pump	The company uses LPG as direct combustion fuel in drying ovens serving painting and electroplating production activities for products. The company uses DO oil to run the fire pump	LPG Diesel oil	x x	x x	x x					
2	Mobile fuel combustion	Forklifts, trucks, pickup trucks Cars, lawn mowers	The company uses Diesel oil for forklifts, trucks, and pickup trucks for the purpose of transporting materials for production The company uses gasoline for some cars for transporting production materials, and the remaining cars are used for customer, employee, and executive transportation. Gasoline is also used for lawn mowers to cut grass around the factory.	Diesel oil Gasoline	x x	x x	x x					
3	Emissions from industrial processes		No emissions from the company's production process are recorded									
4	Refrigerant fugitive emissions and leakage	Air conditioners, heating units	In the 2025 reporting year, the company conducted maintenance and refrigerant	R32, R22, R410A, R134A				x				

No	Source	Equipment/ emission area	Description	Fuel type/ Refrigerant	Greenhouse gases							
					CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	
			recharging activities for air conditioners and heating units									
5	Fire extinguisher emissions	CO ₂ fire extinguishers	The company is equipped with MT3 fire extinguishers, which are gas-type extinguishers using CO ₂ gas, serving fire prevention and firefighting drills. In the 2025 reporting year, the company used some extinguishers for firefighting drills.	CO ₂	x							
6	Wastewater collection, management and treatment	Septic system for domestic wastewater treatment	Domestic wastewater and canteen wastewater from the company, after flowing through the septic tank, together with the company's industrial wastewater (industrial wastewater being predominant), are collected together and flow sequentially through the company's centralized aerobic biological wastewater treatment system. Wastewater as well as its sludge components are potential emission sources generating CH ₄ and N ₂ O.	Amount of easily biodegradable organic matter in wastewater		x						
		Centralized wastewater treatment system										

Specific emission sources are as follows:

i. Emissions from stationary sources: Emissions from stationary sources include fuel combustion activities in fixed installation equipment such as boilers, furnaces, burners, turbines, heaters, incinerators, etc. The combustion process of fossil fuels such as coal, oil, natural gas, or other fuel sources in these fixed installation equipment will generate CO₂, CH₄, and N₂O, which are the main corresponding GHGs for this source.

In this report, the stationary fuel combustion activities of *Wagon Co., Ltd.* are identified from drying ovens using LPG serving painting and electroplating production activities for products.

ii. Emissions from mobile sources: Emissions from mobile sources include fuel combustion activities of transportation equipment. Similar to stationary sources, mobile sources also use petroleum fossil fuels, and the combustion process will generate CO₂, CH₄, and N₂O, which are the main corresponding GHGs for this source.

In this report, the mobile fuel combustion activities of *Wagon Co., Ltd.* are identified as including:

- Diesel oil used for 01 forklift, 02 trucks (under 5 tons) and 01 pickup truck for the purpose of transporting materials for production.
- Gasoline used for the purpose of:
 - o Transporting materials for production: including 02 four-seater cars and 02 seven-seater cars.
 - o Transporting employees, executives, customers: including 01 four-seater car, 02 six-seater cars and 01 sixteen-seater car.
 - o Cutting grass around the factory: 03 lawn mowers

iii. Emissions from industrial processes: Emissions from industrial processes are emissions arising from chemical reactions or physical processes occurring in production lines, not including fuel combustion. This is a direct emission source for some manufacturing or chemical processing industries such as cement, aluminum, and chemical production.

Wagon Co., Ltd. does not have emissions from physical and chemical processing in the company's production process.

iv. Greenhouse gas emissions from refrigerant leakage from equipment: Emissions from refrigerant leakage from cooling equipment are a direct emission source in the Greenhouse Gas inventory report. These emissions are primarily related to leakage or evaporation of refrigerant solvents from industrial equipment and cooling systems.

In this report, activities related to fugitive emissions from refrigerants from equipment of *Wagon Co., Ltd.* are identified from cooling and heating equipment including:

- Air conditioners (R22, R410A, R134A, R32)
- Heating units (R22, R134A)

v. Emissions from CO₂ fire extinguishers

In 2025, *Wagon Co., Ltd.* used MT3 fire extinguishers, which are gas-type fire extinguishers using CO₂ gas, serving fire prevention, firefighting, and fire drills.

vi. Emissions from waste collection, management and treatment activities: Emissions from waste collection, management and treatment activities (including solid waste and wastewater) are direct or indirect emission sources depending on whether the waste is treated at the factory or transferred to a third-party unit for treatment. These emissions arise from waste treatment activities, operation of equipment and vehicles in the process of collecting, transporting and treating waste, or from natural decomposition of waste in the environment.

For **solid waste** (domestic waste, scrap and sludge), *Wagon Co., Ltd.* outsourced services from a third party for collection and treatment. Since this activity is outside the owned or controlled scope according to the organizational boundary of *Wagon Co., Ltd.*, this emission source **is not within** the operational boundary that needs to be inventoried.

For **wastewater**, wastewater generated from *Wagon Co., Ltd.* is treated at the company's centralized wastewater treatment system. Therefore, this emission source is within the organizational boundary that needs to be included in the company's greenhouse gas inventory

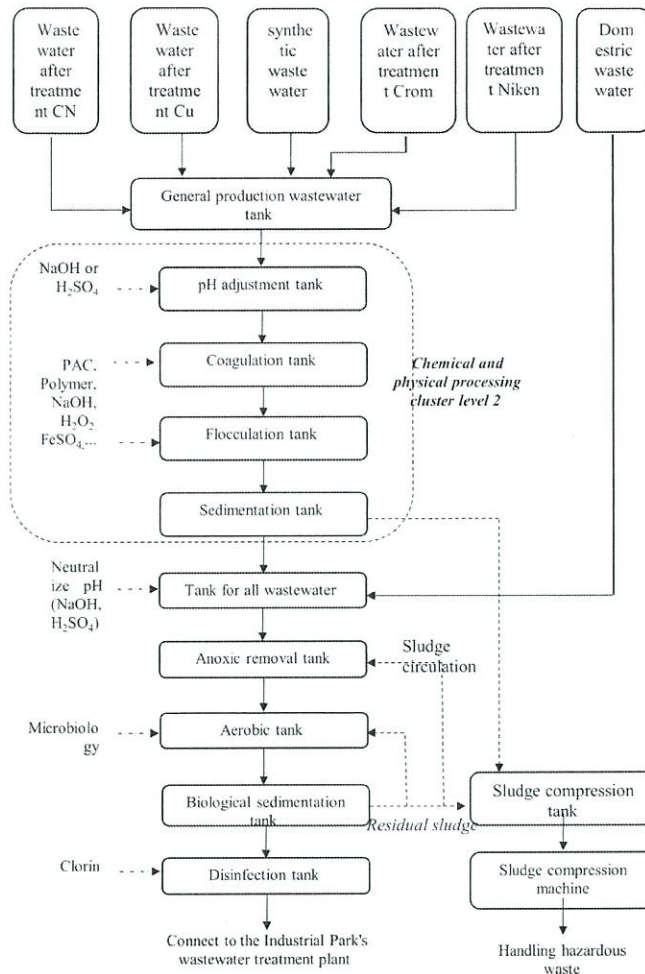


Figure 1. Diagram of wastewater treatment technology process of Wagon Co., Ltd. with capacity of 1,200 m³/day

Biological treatment processes in wastewater treatment activities are a potential cause of GHG emissions because wastewater as well as its sludge components can generate CH₄. The level of CH₄ emissions depends mainly on the amount of decomposable organic material in wastewater, temperature and type of treatment system. The main factor in determining the CH₄ generation potential of wastewater is the amount of easily biodegradable organic material in wastewater. Common parameters used to measure the organic content of wastewater are Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). Under the same conditions, wastewater with higher COD or BOD concentrations typically generates more CH₄ than wastewater with lower COD or BOD concentrations. Besides CH₄, N₂O is another potential GHG related to the decomposition process of nitrogen components in domestic wastewater, such as urea, protein and ammonia.

Wastewater generated from *Wagon Co., Ltd.* is treated at *Wagon Co., Ltd.*'s local wastewater treatment system. Domestic wastewater including worker sanitation, security, and canteen wastewater, after flowing through the septic tank, together with industrial wastewater after treatment, will be collected into a common wastewater tank and flow sequentially through tank systems with physicochemical treatment processes. Specifically, as follows:

Phase 1: Collection and Treatment

The wastewater treatment process includes:

- Domestic wastewater:
 - o Worker sanitation, security, canteen domestic wastewater → septic tank → (2)
 - o Canteen wastewater → oil separation tank → (2)
- Industrial wastewater:
 - o Polishing wastewater → (1)
 - o Electroplating, degreasing wastewater (separating each wastewater stream) specifically:
 - Cyanide wastewater → cyanide wastewater storage tank → environment creation tank → cyanide storage tank → neutralization tank → cyanide removal tank → (1)
 - Copper wastewater → 2 pH adjustment tanks → 6 copper removal tanks → pH adjustment tank → coagulation tank → flocculation tank → copper settling tank → (1)
 - Chromium wastewater → pH adjustment tank → coagulation tank → flocculation tank → chromium settling tank → (1)
 - Nickel wastewater → pH adjustment tank → coagulation tank → flocculation tank → nickel settling tank → (1)
 - o Paint wastewater → filtration system → (1)

(1) Common industrial wastewater storage tank (from production processes, exhaust gas treatment, post-filtration discharge, laboratory) → secondary physicochemical treatment cluster (pH adjustment tank → coagulation tank → flocculation tank → settling tank → (2)

Where:

(1): Common industrial wastewater storage tank

(2): Common wastewater storage tank (including both industrial wastewater and domestic wastewater)

Combined wastewater treatment cluster includes:

pH adjustment tank: Wastewater pH is automatically adjusted with H_2SO_4 or NaOH depending on the value obtained from the pH controller installed in the tank.

Coagulation tank: Here wastewater and coagulant chemicals (metal removal agents) are mixed evenly, these chemicals are supplied by corresponding metering pumps. Then the floc formation process occurs in the flocculation tank with coagulant aid. Through this, pollutants will be removed by the settling process taking place in the settling tank.

Flocculation tank: The precipitate sediments formed during the coagulation process are very small and have low specific gravity, so they settle very slowly. In this tank, coagulant aid chemicals will be pumped in by metering pumps to form large molecular weight floc particles with long molecular structure, through the mixing process will roll small floc particles together to form larger particles that are easier to separate from the solution during settling, carrying pollutants out of the water.

Combined settling tank: The settling tank has the function of separating floc sediment from water. The sediment part will be led to the sludge compression tank, the water part above continues to flow through the transfer tank.

Wastewater streams after primary physicochemical treatment will be pumped to the common industrial wastewater storage tank (TK07A). Then it will continue to be pumped into the secondary physicochemical treatment tank cluster. After secondary physicochemical treatment, industrial wastewater will flow to the common wastewater storage tank (transfer tank). Here wastewater combines with domestic wastewater to continue treatment using biological technology.

Phase 2: Centralized Treatment

(2) Common wastewater storage tank → biological treatment cluster (anoxic tank) → aerobic tank → biological settling tank → disinfection tank → Industrial Park connection.

Secondary physicochemical treatment tank cluster and biological technology treatment as follows:

Common wastewater storage tank (transfer tank): Industrial wastewater from the settling tank flows into the common wastewater storage tank. Here industrial wastewater is combined with domestic wastewater. At this tank, after checking the pH, acid or base will be added to neutralize the wastewater.

Anoxic tank: In the anoxic tank, water from the equalization tank is pumped according to the principle of water flowing from bottom to top, where the nitrate reduction process occurs to remove nitrogen in wastewater. Water and sludge automatically flow through the Aerotank to continue the aerobic treatment stage. Air will be supplied anoxically to the tank by air blowers. Air flow is precisely controlled.

Aerobic biological tank: Wastewater will be pumped into the aerobic biological tank according to the principle of evenly dispersing wastewater into the attached microbial media. Here the aerobic biological treatment process occurs using activated sludge attached to the media. Aerobic microorganisms will oxidize all organic substances in wastewater through the oxygen supply process in air blowers. The aerobic decomposition process occurs as follows: $C_xH_yO_zN_t + O_2 \rightarrow CO_2 + H_2 + \text{new biomass} + \text{other substances} \dots$ The treatment efficiency of the biofor tank achieves about 85% - 90% of BOD, COD indicators. Wastewater will automatically flow into the biological settling tank.

Biological settling tank: Under the effect of gravity, the mixture of sludge and water after biological treatment is separated, the clear water part will meet the requirements for connection to the common drainage system of the industrial park. The activated sludge part that settles at the bottom will be discharged into the sludge compression tank.

Sludge press: Sludge from the sludge storage tanks is pumped to the sludge press to perform the process of separating water from sludge. Sludge cake after water separation is collected and hired to a functional unit for treatment as hazardous waste. Water from the sludge pressing process is led to the collection pit, then pumped to the equalization tank to be treated again.

With the above wastewater process, wastewater after treatment meeting connection regulations will be connected to the Centralized Wastewater Treatment Station of the Industrial Park.

vii. Emission sources from other refrigerants

For other potential GHG emission sources, including medium voltage transformer stations that may generate SF₆ emissions due to leakage, *Wagon Co., Ltd.* confirms that the medium voltage transformer station is an asset and under the operational control of the electricity authority (EVN), therefore it is not within the Company's reporting scope.

Indirect Emission Sources

The table below summarizes the indirect emission sources of the factory as well as the corresponding GHGs of each emission source:

Table 2. Indirect emission sources and corresponding GHGs at each source of Wagon Co., Ltd

No	Source	Area/equipment generating emissions	Fuel type	Greenhouse gases						
				CO ₂	CH ₄	N ₂ O	HCFs	PFCs	SF ₆	NF ₃
1	Electricity consumption	Production machinery, equipment, office using electricity	Grid electricity	x	x	x				

Specific emission sources are as follows:

i. Emissions from electricity consumption: Emissions from electricity consumption are an indirect emission source in the greenhouse gas report. Although electricity consumption does not directly generate GHGs, power plants (especially thermal power plants using coal, oil, gas) emit CO₂ and other GHGs when producing electricity. Therefore, electricity consumption activities are listed as indirect GHG emission activities. Potential GHGs that may be emitted from the electricity production process can be referenced in the table above.

In this report, production activities using grid electricity will be collectively counted as electricity usage activities. Electrical energy used at *Wagon Co., Ltd.* is purchased from the national power grid. Therefore, *Wagon Co., Ltd.* identifies that the company has indirect emission sources from electricity consumption.

ii. Emissions from steam energy consumption: Emissions from steam energy consumption fall under indirect emissions similar to electricity consumption, if steam is supplied from external sources. The steam production process is also mainly through burning fossil fuels (such as coal, oil, biomass) in industrial boilers to heat water and generate steam. This generates GHGs such as CO₂, CH₄, and N₂O.

In this report, *Wagon Co., Ltd.* **does not** purchase or consume steam in the production process.

1.3. Reporting period covered

The database for calculating greenhouse gas emissions in the inventory report of *Wagon Co., Ltd.* is data from January 1 to December 31, 2025.

2. Infrastructure, technology and operations of the facility

2.1. Facility Infrastructure

The existing construction items and area of each item of *Wagon Co., Ltd.* are presented in the following table:

Table 3. List of existing items at *Wagon Co., Ltd.*

No	Items	Area (m ²)	Percentage (%)
I	Main construction	10,314.01	28.65
1	Casting workshop		
2	Grinding workshop		
3	Polishing workshop		
4	Mold workshop		
5	Electroplating workshop 1 + 2		
6	Painting workshop		
7	Coloring workshop 1 + 2		
8	Packaging workshop 1 + 2		
9	Workshop building 26	5,254.81	14.6
II	Auxiliary construction		
1	Workshop office		
2	Office building		
3	Finished goods warehouse		
4	Security house		
5	Electrical substation		
6	Worker restrooms		
7	Warehouse area		
8	Canteen		
9	Vehicle parking	1,083.46	3.01
III	Environmental construction		
10	Fire fighting water tank		
11	Wastewater treatment area		
12	Waste storage area	12,049.72	33.47
IV	Traffic yards, vacant land area		
V	Green trees, lawn area	7,298	20.27
	Total area	36,000	100

2.2. Production technology process of the facility

The production technology process of *Wagon Co., Ltd.* includes the following:

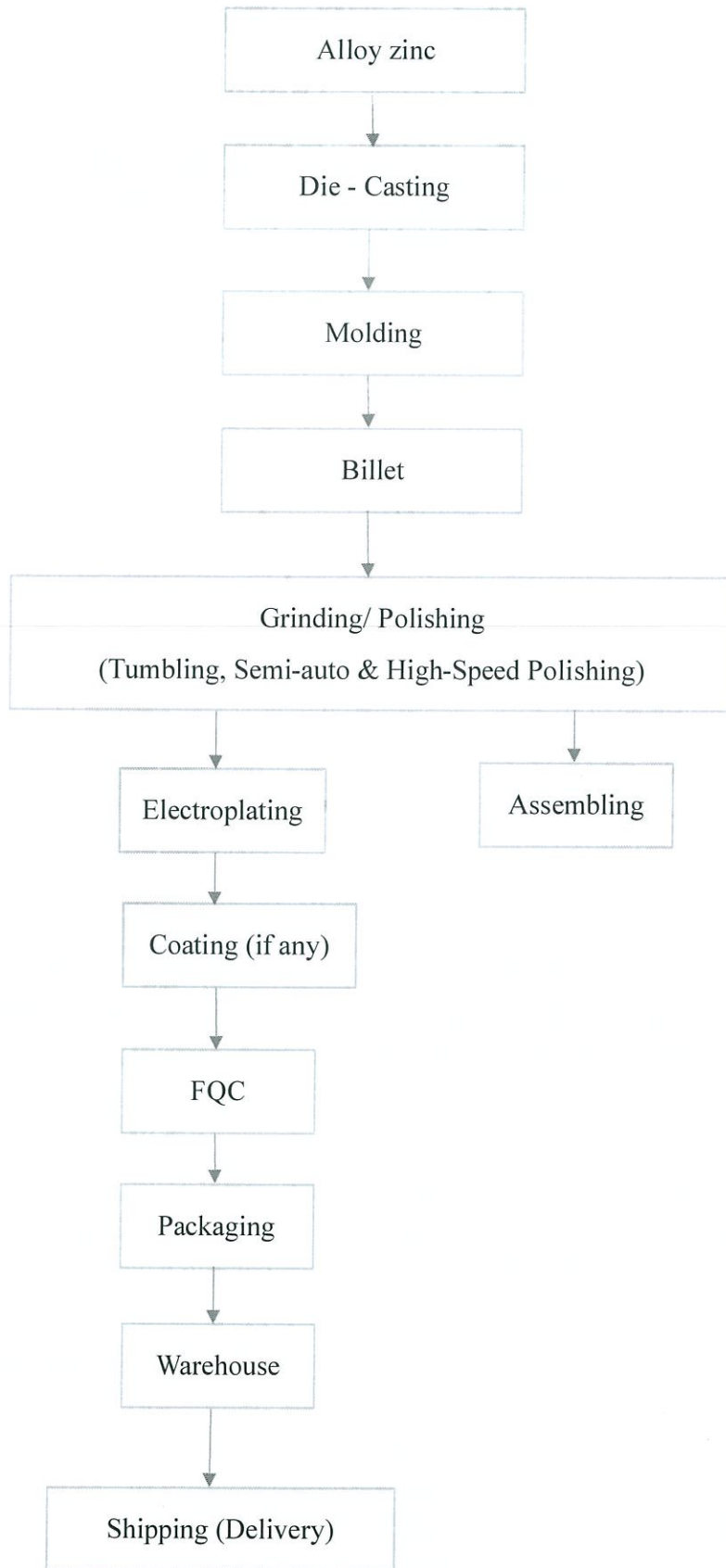


Figure 2. Production process of Wagon Company Limited

3. Emission sources and greenhouse gas sinks within the facility's operational scope

The table below presents the types of GHG emissions of *Wagon Co., Ltd.* identified from the operational boundary determined in section 1.2 according to guidance from Circular 38/2023-BCT and Circular No. 17/2022/TT-BTNMT.

Table 4. Summary of emission sources at *Wagon Co., Ltd.*

Emission scope	Emission type	Reported emission source	Fuel type
Direct Emissions	Emissions from stationary fuel combustion activities	Drying oven	LPG
		Fire pump	DO oil
	Emissions from mobile fuel combustion activities	Forklifts, trucks, pickup trucks, cars (16-seater)	DO oil
		Cars (4-seater, 6-seater, 7-seater), lawn mowers	Gasoline
	Emissions from equipment refrigerant fugitive emissions	Air conditioners, heating units	R22
			R134A
			R410A
			R32
	Emissions from CO ₂ fire extinguishers	CO ₂ fire extinguishers	CO ₂
	Emissions from waste collection, management and treatment activities	Septic system for domestic wastewater treatment	Wastewater
Centralized aerobic wastewater treatment system			
Indirect Emissions	Emissions from electricity consumption activities	Electricity purchased from national grid	Electrical energy

4. Information system and data on greenhouse gas emissions, identifying causes of limitations in facility greenhouse gas inventory

4.1. Information system and data related to greenhouse gas emissions

When conducting greenhouse gas emissions inventory, *Wagon Co., Ltd.* complies with guidance according to accounting principles for greenhouse gas inventory. These principles ensure transparency, accuracy, completeness, consistency and reliability of data. The following table presents data sources corresponding to inventoried activities of *Wagon Co., Ltd.*

Table 5. Information system and data related to emission data of *Wagon Co., Ltd.*

Activity	Data collection source
Direct emissions	
LPG drying oven	Activity log + Invoice
Fire pump	Activity log + Invoice
Delivery trucks	Activity log + Invoice
Delivery cars	Activity log + Invoice
Shuttle cars	Activity log + Invoice

Activity	Data collection source
Forklifts	Activity log + Invoice
Lawn mowers	Activity log + Invoice
Air conditioners, heating units	Invoice
CO ₂ fire extinguishers	Invoice
Septic system for domestic wastewater treatment	Estimate based on number of workers and working time in the year
Centralized aerobic wastewater treatment system	Water consumption statement, wastewater treatment cost invoice from Industrial Park, sludge treatment invoice, wastewater test report
Indirect emissions	
Electricity purchased for production	Electric meter, electricity usage invoice

4.2. Limitations and causes of limitations in greenhouse gas inventory implementation

a) Limitations on activity data

The Greenhouse gas (GHG) emissions for Wagon Co., Ltd. are calculated by multiplying activity data from facility operations by the corresponding emission factors. Activity data are gathered from primary company records, including utility invoices (electricity and fuel), operational logs, and wastewater inspection reports. However, certain data sources are subject to uncertainties due to the following subjective and objective factors:

Subjective factors:

Lack of direct measurement systems: The facility has not implemented a direct GHG monitoring system due to technological and financial constraints (specifically the high costs associated with equipment, maintenance, and calibration). Consequently, the company relies on activity data and default emission factors for its inventory.

Objective factors:

Variability in fuel and raw material quality: The quality of combustion fuels, such as gasoline and oil, can fluctuate within the suppliers' permitted tolerances regarding calorific value and specific gravity. Because the calculation utilizes average coefficients, these representative values may lead to minor variances in the final quantification results.

b) Dependence on default emission factors

- Emission factors for fuels: Source-specific emission factors are preferred for higher precision; however, due to the unavailability of manufacturer data for certain sources, the facility utilizes default factors. These are sourced from national regulations (Decision 2626/QĐ-BTNMT) and international guidelines (IPCC 2006/2019). These factors are considered less accurate than emission factors provided by fuel manufacturers.
- Emission factors for electricity: The indirect emissions from electricity are calculated based on the Vietnam national grid emission factor. There is an inherent data lag, as the 2025 inventory has to utilize the 2023 grid factor, which is currently the most recent dataset released by the relevant authorities.

III. RESULTS OF GREENHOUSE GAS EMISSIONS INVENTORY

1. Description of greenhouse gas emissions inventory method

The methods and calculation formulas used follow guidance in Circular 38/2023/TT-BCT of the Ministry of Industry and Trade for the industry and trade sector, Circular 17/2022/TT-BTNMT of the Ministry of Natural Resources and Environment for the waste management sector, as well as the National Greenhouse Gas Inventory Guidelines of the Intergovernmental Panel on Climate Change IPCC 2006 version (hereinafter referred to as IPCC 2006 Guidelines) and IPCC 2019 Guidelines.

Activity data at the facility are collected through company documents including invoices (electricity, fuel), activity logs, maintenance records for air conditioners, wastewater test result reports, etc. These data must ensure completeness, transparency, consistency, accuracy and comparability.

For emission factors, *Wagon Co., Ltd.* uses the latest national emission factors or according to regional/international reports published in cases where there are no emission factors from suppliers or national sources. The principle of selecting emission factors in the following order:

- Use emission factors provided by manufacturers or calculated by the facility appropriate to the current state of technology and production processes according to IPCC 2006 Guidelines and accepted by competent authorities.
- Use the latest factors updated for the calculation field according to the List of emission factors serving GHG inventory published by the Ministry of Natural Resources and Environment (Decision 2626/QD-BTNMT).
- If the above two cases are not applicable, apply GHG emission factors according to the latest IPCC guidance.

General formula for calculating GHG emissions:

$$\text{Total emissions} = \sum \text{GHG}_i \times \text{GWP}_i \quad (1)$$

Where:

Total emissions: Total emissions of the facility (tons CO₂e);

GWP_i: Global warming potential of GHG i, applying latest IPCC guidance;

GHG: Emission amount of GHG i (tons).

$$\text{GHG}_i = \text{AD}_i \times \text{EF}_i \quad (2)$$

Where:

AD_i: Activity data (usage amount or emission amount)

EF_i: Emission factor of GHG i

1.1. Method for calculating direct emissions

Direct GHG emissions from fuel combustion activities (stationary and mobile sources)

$$\text{CO}_2 \text{ emissions} = \text{AD} \times \text{EF}_{\text{CO}_2} \quad (3)$$

$$\text{CH}_4 \text{ emissions} = \text{AD} \times \text{EF}_{\text{CH}_4} \quad (4)$$

$$\text{N}_2\text{O emissions} = \text{AD} \times \text{EF}_{\text{N}_2\text{O}} \quad (5)$$

Where:

Emissions (tons CO₂, tons CH₄ and tons N₂O)

AD: activity data (TJ)

EF_{CO₂}: CO₂ emission factor of used fuel

EF_{CH₄}: CH₄ emission factor of used fuel

EF_{N₂O}: N₂O emission factor of used fuel

For CH₄, N₂O emissions, use formula (1) with GWP conversion factor for CH₄, N₂O for the purpose of converting to the same common unit of tons CO₂ equivalent.

Emissions from equipment refrigerant fugitive and leakage activities

$$Emissions = \sum(AD_j \times GWP_j)/1000 \quad (6)$$

Where:

Emissions (tons CO₂ equivalent)

j: refrigerant j

AD_j: amount of refrigerant j annually (kg)

GWP_j: global warming potential coefficient of refrigerant j, value selected according to latest IPCC update.

Calculation of emissions from CO₂ fire extinguisher leakage

GHG emissions from fire extinguishers are the amount of CO₂ gas used in the process of performing firefighting activities, fire drills, etc. and leakage from fire extinguishers using CO₂ gas at the facility.

$$CO_2 \text{ emissions} = \text{Amount of } CO_2 \text{ used} + \text{amount of } CO_2 \text{ leaked} \quad (7)$$

The leakage factor for CO₂ fire extinguishers is referenced according to TCVN 7026:2013 - Fire fighting - Portable fire extinguishers - Performance and construction.

Calculation of emissions from wastewater collection, management and treatment activities

Domestic wastewater: Since there is currently no detailed guidance on emission inventory from facility wastewater treatment systems, the calculation formula is referenced from IPCC 2019 Guidelines, Volume 5, Chapter 6, sections 6.1 and 6.3 for national level emission inventory and applied according to actual data at the facility.

CH₄ emissions from domestic wastewater:

$$CH_4 \text{ emissions} = [\sum_{i,j}(U_i \times T_{i,j} \times EF_j)](TOW - S) - R \quad (8)$$

Where:

CH₄ emissions: CH₄ emissions in inventory year, tons CH₄

S: organic component removed as sludge in inventory year, kg BOD/year

U_i: fraction of population in income group i in inventory year

T_{i,j}: degree of utilisation of treatment/discharge pathway or system, j, for each income group fraction i in inventory year

i: income group: rural, urban high income and urban low income

j: each treatment/discharge pathway or system

EF_j: emission factor, kg CH₄/kg BOD

R: amount of CH₄ recovered in inventory year, kg CH₄/year

TOW: total organics in wastewater in inventory year, kg BOD/year

$$TOW = P \times BOD \times 0.001 \times I \times (\text{working hours}/24 \times \text{working days}) * (9)$$

Where:

P: country population in inventory year (people);

BOD: country-specific per capita BOD in inventory year (g/person/day);

0.001: conversion from grams BOD to kg BOD

I: correction factor for additional industrial BOD discharged into sewers (for collected the default is 1.25, for uncollected the default is 1.00.).

Since formulas (8) and (9) apply to national scope, with GHG inventory scope for production facilities, the coefficients for population proportion in income group *i* in inventory year (*U_i*) and level of wastewater treatment/discharge use, *j*, for each income group *i* in inventory year (*T_{i,j}*) are considered equal to 0.

*The number 365 applies to national calculations. For facility calculations it will depend on labor hours per day and actual working days. Here the default is 11 hours (working hours + break time + overtime hours) working per day multiplied by actual number of working days. The actual working days of *Wagon Co., Ltd.* in 2025 is 302 days.

N₂O emissions from domestic wastewater:

$$N_2O \text{ emissions} = N_{EFFLUENT} \times EF_{EFFLUENT} \times 44/28 (10)$$

Where:

N₂O emissions: N₂O emissions in inventory year, kg N₂O/year

N_{EFFLUENT}: nitrogen in the effluent discharged to aquatic environments, kg N/year

EF_{EFFLUENT}: emission factor for N₂O emissions from discharged to wastewater, kgN₂O-N/kg N

44/28: The factor 44/28 is the conversion of kg N₂O-N into kg N₂O

$$N_{EFFLUENT} = (P \times \text{Protein} \times F_{NPR} \times N_{HH} \times F_{NON-CON} \times F_{IND-COM}) - N_{SLUDGE} (11)$$

Where:

P: number of workers

Protein: annual per capita protein consumption, kg/person/year

F_{NPR}: fraction of nitrogen in protein, default is 0.16 kg N/kg protein

F_{NON-CON}: factor for non-consumed protein added to the wastewater

F_{IND-COM}: factor for industrial and commercial co-discharged protein into the sewer system

N_{HH}: additional nitrogen from household products added to the wastewater, default is 1.1

N_{SLUDGE}: nitrogen removed with sludge (default = zero), kg N/year

Industrial wastewater: Since there is currently no detailed guidance on emission inventory from facility wastewater treatment systems, the calculation formula is referenced from IPCC 2019 Guidelines, Volume 5, Chapter 6, sections 6.2.3 and 6.4.1 for national level emission inventory and applied according to actual data at the facility.

CH₄ emissions from industrial wastewater:

$$CH_4 \text{ emissions} = \sum_i [(TOW_i - S_i) \times EF_i - R_i] (12)$$

Where:

CH₄ emissions: CH₄ emissions from industrial wastewater in inventory year, kg CH₄

i: Industrial sector

S_i: Organic proportion removed as sludge in inventory year, kg COD/year

EF_i: emission factor for industry i, kg CH₄/kg COD for treatment/discharge pathway or system(s) used in inventory year. If more than one treatment practice is used in an industry this factor would need to be a weighted average).

R_i: Amount of CH₄ recovered or flared in inventory year, kg CH₄/year

TOW_i: total organically degradable material in wastewater from industry i in inventory year, kg COD/year

$$TOW_i = P_i \times W_i \times COD_i \quad (13)$$

Where:

i: industrial sector

P_i: total industrial product for industrial sector i, tons/year

W_i: wastewater generated, m³/ton product

COD_i: chemical oxygen demand (industrial degradable organic component in wastewater), kg COD/m³

$$EF_j = B_0 \times MCF_j \quad (14)$$

Where:

j: each treatment/discharge pathway or system

B₀: maximum CH₄ producing capacity, kg CH₄/kg COD.

MCF_j: methane correction factor (fraction).

1.2. Method for calculating indirect emissions

Calculation of greenhouse gas emissions from electricity consumption

$$Total\ emissions = AD_n \times EF_n \quad (15)$$

Where:

AD: total electricity consumption (MWh) purchased from source n

EF: emission factor from source n (tons CO_{2e}/MWh)

2. Activity data related to facility greenhouse gas emissions

2.1. Direct greenhouse gas emission sources

Emissions from Stationary Combustion

GHG emissions from stationary fuel combustion activities at Wagon Co., Ltd. are calculated based on formulas (3), (4) and (5). CH₄ and N₂O types are converted to the same unit of CO₂ equivalent using formula (1). The following table summarizes the stationary fuel combustion activity data for production operations at Wagon Co., Ltd.:

Table 6. Fuel consumption with stationary sources at Wagon Co., Ltd

No	Fuel Type	Consumption	Unit	Consumption	Unit	Calorific value factor (TJ/Gg)	Total Consumption (TJ)
1	Diesel oil (fire pump)	10	Liters	0.00001	Gg	43	0.00036
2	LPG (production activities: painting, electroplating)	76,690	kg	0.07669	Gg	47.3	3.63

(Table template referenced from Appendix II, Section 1, Circular No. 38/2023/TT-BCT)

Emissions from mobile combustion

Following the same approach as stationary sources, emissions from mobile combustion at Wagon Co., Ltd. are quantified via formulas (3), (4) and (5). Emissions of CH₄ and N₂O are converted to the same unit of CO₂ equivalent using formula (1). The activity data for transport vehicles used at the facility is summarized in the table below.

Table 7. Fuel consumption with mobile sources at Wagon Co., Ltd.

No	Vehicle type	Vehicle information (brand, model, license plate...)	Fuel type	Consumption (liters)	Distance traveled in year (km)
1	Truck	60C-50670	DO oil	2,786	No data
2	Truck	60C-72624	DO oil	4,819	
2	Pickup truck	60LD-02341	DO oil	4,808	
3	4-seater car	60A-58841	Gasoline	9,972	
4	4-seater car	60K-22687	Gasoline	191	
5	4-seater car	60LD-02114	Gasoline	5,533	
6	6-seater car	60A-99580	Gasoline	4,980	
7	6-seater car	60K-28046	Gasoline	2,547	
8	7-seater car	60K-40978	Gasoline	4,995	
9	7-seater car	60K-40957	Gasoline	4,505	
10	16-seater car	60K-60858	DO oil	1,100	
11	Forklift	CHL CPCD80	DO oil	2,070	
12	Lawn mower	HONDA HRJ216K3 TWNH	Gasoline	1,380	
13	Lawn mower	HONDA HRJ196	Gasoline		
14	Lawn mower	HONDA HRJ196	Gasoline		
15	Total consumption			DO oil	
16	Total consumption			Gasoline	28,379

(Table template referenced from Appendix II, Section 1, Circular No. 38/2023/TT-BCT)

The global warming potential (GWP) coefficients, calorific values, and specific gravities used in calculating emissions from stationary and mobile combustion fuels at the facility are presented in the table below.

Table 8. Emission factors of fuel consumed for stationary and mobile sources at Wagon Co., Ltd

Sector	Fuel type	Parameter	Value	Unit	Reference source
Manufacturing industry	DO oil	Net calorific value	43.0	TJ/Gg	IPCC 2006 Guidelines, Volume 2, Chapter 1, Table 1.2
		CO ₂ emission factor	74,100	kg CO ₂ /TJ	Decision 2626/QĐ-BTNMT
		CH ₄ emission factor	3	kg CH ₄ /TJ	Decision 2626/QĐ-BTNMT
		N ₂ O emission factor	0.6	kg N ₂ O/TJ	Decision 2626/QĐ-BTNMT
	LPG	Net calorific value	47.3	TJ/Gg	IPCC 2006 Guidelines, Volume 2, Chapter 1, Table 1.2
		CO ₂ emission factor	63,100	kg CO ₂ /TJ	Decision 2626/QĐ-BTNMT
		CH ₄ emission factor	1	kg CH ₄ /TJ	Decision 2626/QĐ-BTNMT
		N ₂ O emission factor	0.1	kg N ₂ O/TJ	Decision 2626/QĐ-BTNMT
Transportation	DO oil	Net calorific value	43	TJ/Gg	IPCC 2006 Guidelines, Volume 2, Chapter 1, Table 1.2
		Specific gravity of DO oil	0.84	kg/liter	Decision No. 28/PLX-QĐ-TGD on promulgation and publication of application of base standards for petroleum products of Vietnam National Petroleum Group
		CO ₂ emission factor	74,100	kg CO ₂ /TJ	Decision 2626/QĐ-BTNMT
		CH ₄ emission factor	3.9	kg CH ₄ /TJ	Decision 2626/QĐ-BTNMT
		N ₂ O emission factor	3.9	kg N ₂ O/TJ	Decision 2626/QĐ-BTNMT
	Gasoline	Net calorific value	44.3	TJ/Gg	IPCC 2006 Guidelines, Volume 2, Chapter 1, Table 1.2
		Specific gravity	0.77	kg/liter	EURO4 - fuel parameter IV-PH (2016)
		CO ₂ emission factor	69,300	kg CO ₂ /TJ	Decision 2626/QĐ-BTNMT
		CH ₄ emission factor	33	kg CH ₄ /TJ	Decision 2626/QĐ-BTNMT
		N ₂ O emission factor	3.2	kg N ₂ O/TJ	Decision 2626/QĐ-BTNMT
		GWP _{CO2}	1		

Sector	Fuel type	Parameter	Value	Unit	Reference source
GWP used to convert GHG emissions to tCO _{2e} unit		GWP _{CH4}	27.9		IPCC Sixth Assessment Report 2021 (AR6), Chapter 7, Supplementary Material, Table 7.SM.7
		GWP _{N2O}	273		

GHG Emissions from equipment refrigerants

GHG emissions from refrigerant leakage (fugitive emissions) from cooling equipment at Wagon Co., Ltd. are calculated using Formula (6). The 2025 data, including the types of refrigerants used, the amount charged, and the Global Warming Potential (GWP) values for each refrigerant, are presented in the table below.

Table 9. Refrigerants used and amount of refrigerant charged annually at Wagon Co., Ltd.

No	Source	Refrigerant type	Amount of refrigerant charged (kg)
1	Air conditioners, heating units	R22	45.4
		R134A	77.0
		R32	9.5
		R410A	11.3

Table 10. Global warming index of refrigerants related to Wagon Co., Ltd

No	Refrigerant type	Reference source	GWP
1	R-22 (HCFC-22)	IPCC Sixth Assessment Report on Climate Change (AR6), Chapter 07, Supplementary Material, Table 7.SM.7	1,960
2	R134A (HFC-134A)	IPCC Sixth Assessment Report on Climate Change (AR6), Chapter 07, Supplementary Material, Table 7.SM.7	1,530
3	R-410A (HFC-32/HFC-125) (50%/50%)	IPCC Sixth Assessment Report on Climate Change (AR6), Chapter 07, Supplementary Material, Table 7.SM.7 + ANSI/ASHRAE Addendum f to ANSI/ASHRAE Standard 34-2019	2,255.5
4	R-32 (HFC-32)	IPCC Sixth Assessment Report on Climate Change (AR6), Chapter 07, Supplementary Material, Table 7.SM.7	771

Emissions from fire extinguishers

GHG emissions from CO₂ fire extinguishers at Wagon Co., Ltd. are calculated based on formula (7).

Table 11. Equipment type and amount of CO₂ charged and leaked annually at Wagon Co., Ltd

No	Type of fire extinguisher	Gas	Number of tank	Leakage (kg)	Usage/filling (kg)	Total (kg)
1	CO ₂ fire extinguisher - MT3	CO ₂	10	-	30,00	66,60
2	CO ₂ fire extinguisher - MT3	CO ₂	244	36,60		

(Table template referenced from Appendix II, Section I, Circular No. 38/2023/TT-BCT)

Emissions from waste collection, management and treatment

Domestic wastewater and industrial wastewater

Wastewater at Wagon Co., Ltd. consists primarily of industrial wastewater and domestic wastewater from employee activities. Both streams are collected and treated at the company's centralized Wastewater Treatment Plant (WWTP), which utilizes a combination of physicochemical and biological treatment methods.

Domestic wastewater: Generated from ancillary facilities (e.g., restrooms, canteens, and office blocks), domestic wastewater undergoes preliminary treatment in septic tanks before being conveyed to the centralized WWTP for integrated treatment with production wastewater.

Production wastewater: Generated throughout various manufacturing stages, production wastewater is treated at the on-site WWTP, which has an operational capacity of 1,200 m³/day. The treatment sequence includes physicochemical processes followed by aerobic biological treatment.

Wagon Co., Ltd. recognizes that both the wastewater treatment process and the resulting sludge have the potential to generate CH₄ and N₂O. The parameters and operational data for the wastewater treatment system are detailed in the table below.

Table 12. Information on activity data of Wagon Co., Ltd.'s wastewater treatment system

No	Emission source	Activity data	Value	Unit	Reference source	Notes
1	Septic system for domestic wastewater treatment	Number of workers	1,188	people/month	Actual factory data	
		Working hours per day	11	hours/day	Average time estimate based on factory data	
		Working days per year	302	days/year	Actual factory data	
		Estimated BOD ₅ value in domestic wastewater for selected	40	g/person/day	IPCC 2019 Guidelines, Volume 5, Chapter 6, Table 6.4,	

No	Emission source	Activity data	Value	Unit	Reference source	Notes
		regions and countries			estimated BOD ₅ value in domestic wastewater for selected regions and countries	
		Average annual protein consumption per capita	35	kg protein/person/year	Food and Agriculture Organization of the United Nations (2023)	
		Nitrogen ratio in protein	0.16	kg N/kg protein	IPCC 2019 Guidelines, Volume 05, Chapter 06, page 6.40	
		F _{NON-COM} : Factor for non-consumed nitrogen from food waste discharged into treatment system	1	kg N/kg N	IPCC 2019 Guidelines, Volume 05, Chapter 06, page 6.43	Selection of adjustment factor for non-consumed nitrogen, based on available nitrogen, for cases without garbage disposal at sink so F _{NON-COM} = 1.
		F _{IND-COM} : Factor for nitrogen from industry and commerce discharged into	1	kg N/kg N	IPCC 2019 Guidelines, Volume 05, Chapter 06, page 6.43	Wagon's industrial wastewater is mainly heavy metals, does not contain organic Nitrogen so F _{IND-COM} = 1

No	Emission source	Activity data	Value	Unit	Reference source	Notes
		treatment system				
		N _{HH} : Amount of nitrogen from household products discharged into wastewater	1.1	kg N/kg N	IPCC 2019 Guidelines, Volume 05, Chapter 06, page 6.40	Sanitary water may contain household chemicals (detergents, shampoo, dishwashing liquid, etc.) so use default N _{HH} coefficient 1.1 from household products
2	Centralized aerobic wastewater treatment system	Wastewater flow	79,204	m ³ /year	Industrial park wastewater connection invoice	
		Average COD concentration after treatment	19	mg/l	Company's 2025 wastewater measurement and analysis results	
		Average COD concentration before treatment	994	mg/l		Biofor tank treatment efficiency achieves about 85% - 90% of BOD, COD indicators.

CH₄ and N₂O emissions from the septic system for domestic wastewater and the centralized aerobic wastewater treatment system at *Wagon Co., Ltd.* are calculated based on formulas (8)-(15). Related emission factors used in calculating emissions from the wastewater

treatment process and interpretation of factor selection according to actual facility conditions with cited sources are presented in the table below.

Table 13. Emission factors and related parameters for calculating emissions from wastewater treatment activities at Wagon Co., Ltd

No	Emission Source	Parameter	Value	Unit	Reference Source
1	Septic system for domestic wastewater treatment	Maximum CH ₄ generation capacity - B ₀ for domestic wastewater treatment and discharge	0.60	kg CH ₄ /kg BOD	Decision 2626/QĐ-BTNMT
		Methane correction factor of septic system for domestic wastewater treatment and discharge	0.50		Decision 2626/QĐ-BTNMT
		N ₂ O emission factor for domestic wastewater treatment and discharge	0.01	kg N ₂ O-N/kg-N	Decision 2626/QĐ-BTNMT
2	Centralized aerobic wastewater treatment system	Maximum CH ₄ generation capacity - B ₀ for industrial wastewater treatment and discharge	0.25	kg CH ₄ /kg COD	Decision 2626/QĐ-BTNMT
		Methane correction factor of centralized, aerobic wastewater treatment system	0.30		Decision 2626/QĐ-BTNMT

2.2. Indirect greenhouse gas emission sources

Electricity consumption

Table 14. Activity data on electricity consumption at Wagon Co., Ltd

No	Electricity source used	Consumption (kWh)	Consumption (MWh)	Notes
1	Electricity purchased from grid	8,175,668	8,175.668	Company only purchases electricity from national grid for production

(Table template referenced from Appendix II, Section 1, Circular No. 38/2023/TT-BCT)

GHG emissions from electricity consumption for production at Wagon Co., Ltd. are calculated based on formula (16). The emission factor of Vietnam's power grid is presented in the following table::

Table 15. Emission factor of Vietnam's power grid

Parameter	Value	Unit	Reference source
Emission factor of Vietnam's power grid 2023	0,6592	tCO ₂ td/MWh	Official Dispatch No. 1726/BĐKH-PTCBT announcing the calculation results of Vietnam's electricity grid emission factor for 2023

3. Greenhouse gas inventory results

Following the selection of the quantification methodology and the consolidation of all relevant activity data and emission factors, Wagon Co., Ltd. has established a comprehensive basis for its GHG inventory. The detailed results for each emission source are presented in the table below. For the 2025 reporting period, the total GHG emissions for Wagon Co., Ltd. amounted to **6,197.56 tCO₂e**.

Table 16. GHG emission results from each source at Wagon Co., Ltd

Source	Equipment Generating Emissions	Activity Data	Unit	CO ₂ Emissions (tons CO ₂)	CH ₄ Emissions (tons CH ₄)	N ₂ O Emissions (tons N ₂ O)	HFCs Emissions (tons HFCs)	GHG Emissions (tons CO ₂ e)	Percentage	
Direct emissions	Stationary fuel combustion	10	liters	0.03	0.0011	0.0002		0.12	0.002%	
	Mobile fuel combustion	Drying oven for painting, electroplating (LPG)	76,690	kg	228.89	0.0109	0.0004		229.29	3.7%
		Trucks, pickup trucks, cars, forklifts (DO)	15,583	liters	41.85	0.0022	0.0041		43.03	0.69%
	Refrigerant leakage from cooling equipment	Cars, lawn mowers (Gasoline)	28,379	liters	65.21	0.0356	0.0029		66.99	1.08%
		R32	9.5	kg				0.010	7.32	0.12%
		R22	45.4	kg				0.045	88.98	1.44%
		R410A	11.3	kg				0.011	25.49	0.41%
	Leakage: CO ₂ fire extinguishers	R134a	77.0	kg				0.077	117.81	1.9%
		CO ₂	66.6	kg	0.067				0.067	0.001%
	Wastewater collection and treatment	Septic system for domestic wastewater treatment	6,631.15	kgBOD/year		1.99	0.04		67.51	1.09%
Centralized wastewater treatment system		77,204.10	kgCOD/year		5.79			161.55	2.61%	
Indirect emissions	Purchased electricity use	8,175.67	MWh	5,389.40				5,389.40	86.96%	
Scope 1 - Direct emissions (tons CO₂e)				336.04	7.83	0.05	0.14	808.16	13.04%	
Scope 2 - Indirect emissions (tons CO₂e)				5,389.40	7.83	0.05	0.14	5,389.40	86.96%	
Total GHG emissions (tons CO₂e)				5,725.44	7.83	0.05	0.14	6,197.56	100.00%	

Emissions by scope

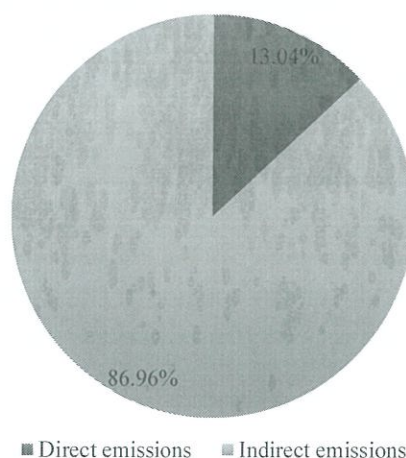


Figure 3. Emission distribution by scope at Wagon Co., Ltd.

Emissions by source

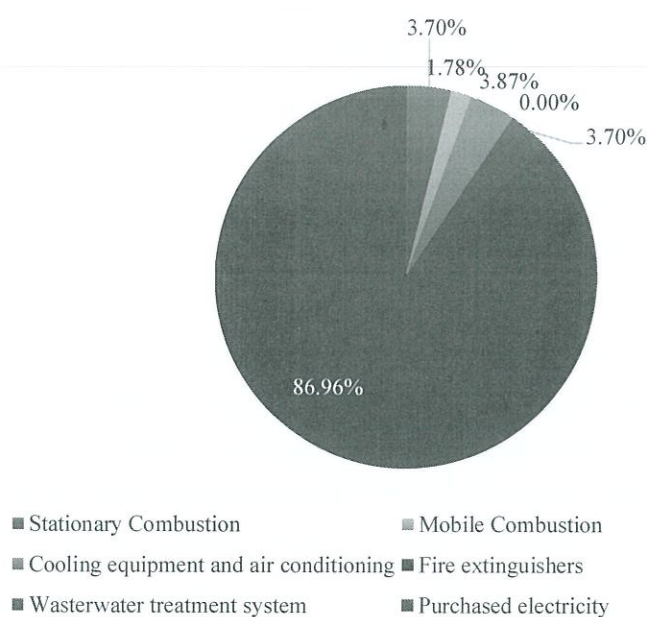


Figure 4. Emission distribution by scope at Wagon Co., Ltd.

4. Reliability, completeness, and uncertainty of information and data on greenhouse gas emissions and facility greenhouse gas inventory results

4.1. Report completeness

The report is prepared based on report template No. 06 - Facility-level greenhouse gas inventory results report template stipulated in Decree 06/2022/NĐ-CP regulating greenhouse gas emission mitigation and ozone layer protection. *Wagon Co., Ltd.* commits that the information provided is accurate, transparent and consistent with the content stipulated in Decree 06/2022/NĐ-CP and related decisions and circulars.

4.2. Appropriateness of inventory method

The method used by *Wagon Co., Ltd.* is the GHG inventory method based on regulations in Circular No. 38/2023/TT-BCT dated December 27, 2023 of the Ministry of Industry and Trade on Technical regulations for measurement, reporting, verification of greenhouse gas emission mitigation and greenhouse gas inventory in the industry and trade sector, Circular 17/2022/TT-BTNMT dated December 15, 2022 of the Ministry of Natural Resources and Environment on Technical regulations for measurement, reporting, verification of greenhouse gas emission mitigation and greenhouse gas inventory in the waste management sector. In addition, *Wagon Co., Ltd.* also refers to the GHG inventory method for activities in the industrial production sector applied according to IPCC 2006 Guidelines and IPCC 2019 Guidelines.

4.3. Data calculation completeness

Data completeness is a prerequisite for data quality, as incomplete data can reduce data validity and reliability.

Input data in this report represents the inventory period in the report from January 1 to December 31, 2025. Data was collected and compiled by the ESG department. Activity data were all verified using documentation records, invoices and activity logs of *Wagon Co., Ltd.* *Wagon Co., Ltd.* ensures full evidence is provided if requested.

Emission factors used in GHG emission calculations are taken from national documents (Decision 2626/QĐ-BTNMT: Announcement of list of emission factors serving greenhouse gas inventory), international guidelines (IPCC 2006 & 2019) and are cited in detail in this report.

4.4. Data representativeness

Representativeness for data quality and inventory results will ensure the integrity of input data, as well as the accuracy of calculation methods used in the report.

For each emission source, *Wagon Co., Ltd.* has checked and cross-referenced data to ensure minimizing errors to the lowest level of errors in the data collection and compilation process. For each emission source identified according to operational boundaries, the company has built a clear documentation system recording the origin and method of data collection with all data.

All emission factors used are factors prescribed by national or international standards with citations from reputable sources widely used for GHG inventory.

4.5. Data abnormality

During the collection and compilation process, activity data based on invoices are checked and cross-referenced with previous years through the financial approval process, so no abnormalities are recorded for this data. In 2025, the company had no changes in the production process, therefore the abnormality of activity data is identified at a low level.

4.6. Uncertainty quantification

Conducting Greenhouse Gas inventory is not an activity with absolute scientific accuracy but still has many sources of uncertainty regarding total greenhouse gas emissions. For example, quantifying greenhouse gas emissions from wastewater treatment sources is based on complex

processes (especially biological) that are difficult to achieve the same level of accuracy as in other industrial sectors.

All data from each source collected must have qualitative and quantitative uncertainty assessments. Quantification of GHG inventory uncertainty is performed according to the Tier 1 method guided in Chapter 3, Volume 1, IPCC 2006 Guidelines, IPCC 2019 Guidelines:

$$U_{\text{emissions}} = \sqrt{U_{AD}^2 + U_{EF}^2} \quad (16)$$

Where:

$U_{\text{emissions}}$: Uncertainty at emission source

U_{AD} : Uncertainty of activity data from each emission source

U_{EF} : Uncertainty of emission factor at each emission source

Both activity data and emission factors can be the result of several different parameters and this often occurs with emission factors (e.g., emission factor $EF = a \times b \times c$). The uncertainty of the emission factor will be calculated as follows:

$$U_{EF} = \sqrt{U_a^2 + U_b^2 + U_c^2} \quad (17)$$

If an emission factor is determined to be within a certain range (Lowest emission factor - Highest emission factor) and assuming that this range contains 95% of emission factor values, then the following formula is used to calculate the uncertainty level:

$$U_{EF} = (\text{min EF} - \text{EF})/\text{EF} \times 100\% \quad (18)$$

$$U_{EF} = (\text{max EF} - \text{EF})/\text{EF} \times 100\% \quad (19)$$

Where:

U_{EF} : Uncertainty of emission factor

Min EF: Lowest value of emission factor

Max EF: Highest value of emission factor

EF: Default emission factor

Formula for calculating total emission uncertainty:

$$U_E = \frac{\sqrt{(U_1 \times E_1)^2 + (U_2 \times E_2)^2 + \dots + (U_n \times E_n)^2}}{|E_1 + E_2 + \dots + E_n|} \quad (20)$$

Where:

U_E : Total emission uncertainty

U_i : Uncertainty at each emission source

E_i : Emission estimate of each emission source

Interpretation of selection of coefficients for calculating uncertainty of activity data and emission factors as well as results of uncertainty quantification are presented in the tables below:

Table 17. Coefficients for calculating uncertainty of GHG emission factors at Wagon Co., Ltd

Source	Default emission factor	Unit	Range		Reference source
			Minimum value - Min	Maximum value - Max	
Direct Emissions					
<i>Stationary fuel combustion</i>					
Diesel oil - CO ₂	74,100	Kg CO ₂ /TJ	72,600	74,800	IPCC 2006, Volume 2, Chapter 2, Table 2.3 - Default emission factors for stationary fuel combustion in manufacturing and construction industries
Diesel oil - CH ₄	3	Kg CH ₄ /TJ	1	10	IPCC 2006, Volume 2, Chapter 2, Table 2.3
Diesel oil - N ₂ O	0.6	Kg N ₂ O/TJ	0.2	2	IPCC 2006, Volume 2, Chapter 2, Table 2.3
LPG - CO ₂	63,100	Kg CO ₂ /TJ	61,600	65,600	IPCC 2006, Volume 2, Chapter 2, Table 2.3
LPG - CH ₄	1	Kg CH ₄ /TJ	0.3	3	IPCC 2006, Volume 2, Chapter 2, Table 2.3
LPG - N ₂ O	0.1	Kg N ₂ O/TJ	0.03	0.3	IPCC 2006, Volume 2, Chapter 2, Table 2.3
<i>Mobile fuel combustion</i>					
Diesel oil - CO ₂	74,100	Kg CO ₂ /TJ	72,600	74,800	IPCC 2006, Volume 3, Chapter 3, Table 3.2.1 - Default CO ₂ emission factors for road transport and uncertainty range
Diesel oil - CH ₄	3.9	Kg CH ₄ /TJ	1.6	9.5	IPCC 2006, Volume 3, Chapter 3, Table 3.2.2 - Default CH ₄ and N ₂ O emission factors for road transport and uncertainty range
Diesel oil - N ₂ O	3.9	Kg N ₂ O/TJ	1.3	12	IPCC 2006, Volume 3, Chapter 3, Table 3.2.2 - Default CH ₄ and N ₂ O emission factors for road transport and uncertainty range

Source	Default emission factor	Unit	Range		Reference source
			Minimum value - Min	Maximum value - Max	
Gasoline - CO ₂	69,300	Kg CO ₂ /TJ	67,500	73,000	IPCC 2006, Volume 3, Chapter 3, Table 3.2.1 - Default CO ₂ emission factors for road transport and uncertainty range
Gasoline - CH ₄	33	Kg CH ₄ /TJ	9.6	110	IPCC 2006, Volume 3, Chapter 3, Table 3.2.2 - Default CH ₄ and N ₂ O emission factors for road transport and uncertainty range
Gasoline - N ₂ O	3.2	Kg N ₂ O/TJ	0.96	11	IPCC 2006, Volume 3, Chapter 3, Table 3.2.2 - Default CH ₄ and N ₂ O emission factors for road transport and uncertainty range
<i>Fugitive emissions from wastewater treatment system</i>					
Maximum CH ₄ generation capacity - B ₀	± 30%				IPCC 2019, Volume 5, Chapter 6, Table 6.7
Domestic wastewater					
MCF of septic system	0.5		0.4	0.72	IPCC 2019, Volume 5, Chapter 6, Table 6.3 - Default MCF values and emission factors for domestic wastewater by treatment system type and discharge pathway
MCF of centralized treatment system	± 10%				IPCC 2019, Volume 5, Chapter 6, Table 6.7 (Updated) default uncertainty range for domestic wastewater
N ₂ O emission	0.01		0.0005	0.25	IPCC 2006, Volume 5, Chapter 6, Table 6.11

Source	Default emission factor	Unit	Range		Reference source
			Minimum value - Min	Maximum value - Max	
factor (Kg N ₂ O-N/kg-N)					
Industrial wastewater					
MCF of wastewater treatment system	0.3		0.2	0.4	IPCC 2006, Volume 5, Chapter 6, Table 6.8

Table 18. Coefficients for calculating uncertainty of activity data at Wagon Co., Ltd

Source	Default coefficient	Unit	Range		Reference source
			Minimum value - Min	Maximum value - Max	
Direct Emissions					
<i>Stationary fuel combustion</i>					
Industrial fuel combustion (other, excluding energy-intensive industries)	± 5%				IPCC 2006, Volume 2, Chapter 2, Table 2.15 - Uncertainty level related to stationary source combustion activity data
<i>Fugitive emissions from wastewater treatment system</i>					
- Domestic wastewater					
Biochemical oxygen demand (BOD)	± 30%				IPCC 2019, Volume 5, Chapter 6, Table 6.7
BOD ₅ - Asia, Middle East, Latin America region	40		35	45	IPCC 2019, Volume 5, Chapter 6, Table 6.4
Adjustment factor for industrial BOD discharged directly to sewers	± 0%				IPCC 2019, Volume 5, Chapter 6, Table 6.7
F _{NPR} - Nitrogen ratio in protein	0.16	kg N/kg protein	0.15	0.17	IPCC 2019, Volume 5, Chapter 6, Table 6.11

Source	Default coefficient	Unit	Range		Reference source
			Minimum value - Min	Maximum value - Max	
F _{NON-COM} (kg N/kg N)	1		0.9	1.2	IPCC 2019, Volume 5, Chapter 6, Table 6.11
F _{IND-COM} (kg N/kg N)	1		1.0	1.4	IPCC 2019, Volume 5, Chapter 6, Table 6.11
- Industrial wastewater					
Chemical oxygen demand (COD)	± 5%				Permissible error for wastewater monitoring equipment (surface water, groundwater, rainwater, seawater, wastewater) according to Circular No. 10/2021/TT-BTNMT dated June 30, 2021 providing for environmental monitoring techniques and management of environmental quality monitoring information and data
Combined coefficient between Wastewater/unit production (W) and COD/unit wastewater (COD)	-50% / +100 %				IPCC 2006, Volume 5, Chapter 6, Table 6.10
Indirect Emissions					
Steam and electricity production	Less than 1%				IPCC 2006, Volume 2, Chapter 2, Table 2.15 - Uncertainty level related to stationary source combustion activity data

Results of uncertainty quantification are presented in the following table:

Table 19. Results of uncertainty quantification by GHG emission source at Wagon Co., Ltd.

Source	Activity	CO ₂ emissions				CH ₄ emissions				N ₂ O emissions				HFCs emissions			GHG emissions (ton CO ₂ e)		
		Activity data uncertainty (%)	Emission factor uncertainty (%)	Combined uncertainty (%)	Activity data uncertainty (%)	Emission factor uncertainty (%)	Combined uncertainty (%)	Activity data uncertainty (%)	Emission factor uncertainty (%)	Combined uncertainty (%)	Activity data uncertainty (%)	Emission factor uncertainty (%)	Combined uncertainty (%)	Activity data uncertainty (%)	Emission factor uncertainty (%)	Combined uncertainty (%)			
Direct Emissions	Stationary fuel combustion	Diesel oil	5	-2.0	5.4	5	-66.7	66.9	5	-66.7	66.9	5	-66.7	66.9				0.12	
		LPG	5	-2.4	5.5	5	-70.0	70.2	5	-70.0	70.2							229.29	
	Mobile fuel combustion	Diesel oil	5	-2.0	5.4	5	-59.0	59.2	5	-66.7	66.9							43.03	
		Gasoline	5	-2.6	5.6	5	-70.9	71.1	5	-70.0	70.2							66.99	
	Refrigerant leakage	R-32																	7.32
		R-134a																	117.81
		R-22																	88.98
		R-410A																	25.49
	Fire extinguisher	CO ₂	0	0.00	0														0.07
		Waste collection and treatment	Domestic wastewater				12.5	36.1	38.2	41.70	-95.00	103.8							67.51
Centralized wastewater						5.00	44.8	45.1	5.00	30.00	30.4							161.55	
Indirect Emissions	Purchased electricity	1	0.00	1														5,389.40	
	Total uncertainty																	6,197.56	

± 1.58 %

Dong Nai, date 31 month 01 year 2026

REPRESENTATIVE OF WAGON CO., LTD.



LEE TUNG LIN

REFERENCES

1. Official Dispatch No. 1726/BĐKH-PTCBBT dated December 3, 2024 of the Department of Climate Change, Ministry of Natural Resources and Environment regarding the announcing the calculated emission coefficient for the national power grid in 2023.
2. Decree No. 06/2022/ND-CP dated January 7, 2022 on mitigation of greenhouse gas emissions and protection of the ozone layer.
3. Decision No. 2626/QĐ-BTNMT dated October 10, 2022 of the Ministry of Natural Resources and Environment on announcing the list of emission factors for greenhouse gas inventory.
4. Decision No. 28/PLX-QĐ-TGDĐ dated January 31, 2023 of Vietnam National Petroleum Group on promulgating and publishing the application of base standards for petroleum products of Vietnam National Petroleum Group.
5. Circular No. 17/2022/TT-BTNMT dated November 15, 2022 of the Ministry of Natural Resources and Environment on methods for measurement, reporting, appraisal of ghg emission mitigation and greenhouse gas inventory development in waste management.
6. Circular No. 38/2023/TT-BCT dated December 27, 2023 of the Ministry of Industry and Trade: methods for measurement, reporting and verification of GHG emission mitigation and GHG inventory development in the industry and trade sector.
7. Intergovernmental Panel on Climate Change IPCC (2006) National Greenhouse Gas Inventory Guidelines 2006 version.
8. Intergovernmental Panel on Climate Change IPCC (2019) 2019 Refinement to the 2006 National Greenhouse Gas Inventory Guidelines.
9. Intergovernmental Panel on Climate Change IPCC (2021) Sixth Assessment Report of the IPCC.

APPENDICES

APPENDIX 1. DETAILED ACTIVITY DATA BY EMISSION SOURCE (2025)

1. Activity data on diesel oil and LPG consumption for stationary sources

- LPG consumption

No.	Month	Fuel	Consumption	Unit	Purpose of use
1	01/2025	LPG	6,450	kg	Drying oven serving production activities: painting, electroplating
2	02/2025	LPG	3,480	kg	
3	03/2025	LPG	6,830	kg	
4	04/2025	LPG	6,350	kg	
5	05/2025	LPG	6,240	kg	
6	06/2025	LPG	5,960	kg	
7	07/2025	LPG	6,030	kg	
8	08/2025	LPG	7,340	kg	
9	09/2025	LPG	7,100	kg	
10	10/2025	LPG	6,890	kg	
11	11/2025	LPG	6,850	kg	
12	12/2025	LPG	7,170	kg	
Total			76,690	kg	

- Diesel oil consumption

No.	Month	Fuel	Consumption	Unit	Purpose of use
1	03/2025	Diesel oil	10	Liters	Fire pump
Total			10	Liters	

2. Activity data on gasoline and diesel oil consumption for mobile sources

No	Equipment/vehicle used	Number of equipment/vehicles used	Fuel	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Vehicles transporting goods from factory for delivery, transporting materials for production																	
1	Truck 60C-50670	1	DIESEL OIL	liters	180		95	185	95	180	634	342	180	272	280	343	2,786
2	Truck 60C-72624	1	DIESEL OIL	liters	259	75	311	260	243	242	397	489	618	659	621	645	4,819
3	4-seater car 60A-58841	1	GASOLINE	liters	203	213	317	291	294	401	511	412	382	409	395	420	4,248
4	7-seater car 60K-40978	1	GASOLINE	liters	326	179	267	341	501	465	294	456	491	568	612	495	4,995
5	7-seater car 60K-40957	1	GASOLINE	liters	207	169	276	279	482	328	490	321	405	493	589	466	4,505
6	Pickup truck 60LD-02341	1	DIESEL OIL	liters	264	149	294	218	292	438	517	461	495	603	588	489	4,808
7	4-seater car 60LD-02114	1	GASOLINE	liters	257	175	287	333	367	757	526	424	474	608	585	740	5,533
Vehicles for transporting employees, executives, customers																	
8	6-seater car 60A-99580	1	GASOLINE	liters	355	350	305	400	340	450	445	475	370	550	475	465	4,980
9	6-seater car 60K-28046	1	GASOLINE	liters	172	174	294	236	225	178	90	300	240	120	240	278	2,547
10	4-seater car 60K-22687	1	GASOLINE	liters	-	71	-	75	-	45	-	-	-	-	-	-	191
11	16-seater car 60K-60858	1	DIESEL OIL	liters	-	-	-	-	-	-	223	211	142	211	146	167	1,100

No	Equipment/vehicle used	Num ber of equip ment/ vehicl es used	Fuel	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Other vehicles																	
12	Forklift CHL CPCD80 SERIAL NO: 010309L29110	1	DIESE L OIL	liters	210	60	50	150	120	240	270	120	180	120	300	240	2,060
13	Lawn mower HONDA HRJ216K3 TWNH (1) HONDA HRJ196 (2)	3	GASO LINE	liters	60	180	120	120	60	120	120	120	120	120	120	120	1,380

3. Activity data on refrigerant charging

No.	Refrigerant	Amount charged (kg)	Purpose of use
1	HFC-32 (R-32)	9.5	Air conditioners, heating units
2	HFC-134a (R-134a)	77.0	
3	HCFC-22 (R-22)	45.4	
4	R-410A	11.3	
Total		143.2	

4. Data on CO₂ fire extinguisher charging and leakage

No	Fire extinguisher type	Gas	Capacity (kg)	Number of tank	Usage/filling (kg)	Leakage (kg)
1	MT3 fire extinguisher in use	CO ₂	3	10	30 (used for fire drill)	
2	MT3 fire extinguisher not in use	CO ₂	3	218		32.70
3	MT3 fire extinguisher not in use	CO ₂	3	17		2.55
4	MT3 fire extinguisher not in use	CO ₂	3	2		0.30
5	MT3 fire extinguisher not in use	CO ₂	3	2		0.30
6	MT3 fire extinguisher not in use	CO ₂	3	5		0.75

5. Activity data of wastewater treatment system

No.	Month	Centralized wastewater flow (m ³ /month)	Wastewater test result			
			COD input (mg/l)	COD output (mg/l)	BOD input (mg/l)	BOD output (mg/l)
1	01/2025	4,538				
2	02/2025	3,958				
3	03/2025	5,758	863	2.50	445	2.5
4	04/2025	6,671				
5	05/2025	4,712				
6	06/2025	5,969	764	27.50	595	2.5
7	07/2025	7,728				
8	08/2025	6,554				
9	09/2025	8,137	1,470	2.50	338	8.5
10	10/2025	8,840				

No.	Month	Centralized wastewater flow (m ³ /month)	Wastewater test result			
			COD input (mg/l)	COD output (mg/l)	BOD input (mg/l)	BOD output (mg/l)
11	11/2025	8,076				
12	12/2025	8,263	877	42.50	310	12.3
Total			79,204			

5. Activity data on electricity consumption

No.	Month	Consumption	Unit
1	01/2025	427,900	kWh
2	02/2025	470,494	kWh
3	03/2025	662,232	kWh
4	04/2025	631,876	kWh
5	05/2025	605,529	kWh
6	06/2025	726,014	kWh
7	07/2025	802,227	kWh
8	08/2025	735,976	kWh
9	09/2025	716,126	kWh
10	10/2025	821,916	kWh
11	11/2025	786,195	kWh
12	12/2025	789,183	kWh
Total		8,175,668	kWh

APPENDIX 2. SUPPORTING DOCUMENTATION

- 2.1. Business registration
- 2.2. Detailed list of gasoline and oil consumption in 2025
- 2.3. Liquefied petroleum gas (LPG) invoices
- 2.4. Refrigerant gas invoices
- 2.5. List of chemicals used at the factory
- 2.6. Wastewater measurement and analysis results for 4 quarters of 2025
- 2.7. EVN grid electricity consumption invoices
- 2.8. Environmental permit for 2025
- 2.9. Report proposing re-issuance of environmental permit

APPENDIX 3. FACTORY IMAGES

Factory overview:



Drying:

