Annex C:

China Green Car Assessment Program (C-GCAP) - Trial Version

Test & Assessment Rules for Low-Carbon Emissions

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Contents

1. Introduction to Assessment System

This low-carbon emissions segment examines only one indicator of carbon emissions in the life cycle of vehicles and is applicable to traditional gasoline vehicles (including non-PHEVs), plug-in hybrid electric vehicles (PHEVs) (including extended-range and plug-in vehicles) and battery electric vehicles (BEVs).

The life-cycle carbon emissions of vehicles are accounted with the China Automotive Life Cycle Model (CALCM) based on the IPCC 2013 GWP 100a, the accounting method specified in the *Carbon Footprint of Road Vehicle Products - Product Category Rules - Passenger Cars* (a standard under study) and China Automotive Life Cycle Database (CALCD), in combination with publicly available information and the test data of fuel consumption and power consumption under Chinese operating conditions provided by China Green Car Assessment Program (C-GCAP). The score of the low-carbon emissions segment is based on the life-cycle carbon emissions of vehicles.

1.1 Scoring Rules for Carbon Emissions from Vehicles Using Traditional Energy

This section applies to gasoline vehicles, diesel vehicles, conventional hybrid vehicles and PHEVs (including extended-range and plug-in hybrid vehicles). The scoring coefficients are listed in Table 1.

Table 1 Scoring Coefficients of Carbon Emissions from Vehicles Using Traditional Energy

Name	Life-Cycle Carbon Emissions of Vehicles (X/(gCO_2e/km))	Score
Carbon emissions	$X \geq 0.1677 \times CM + 111.398$	0
	$0.1677 \times CM + 104.148 \leq X < 0.1677 \times CM + 111.398$	10
	$0.1677 \times CM + 99.485 \leq X < 0.1677 \times CM + 104.148$	20
	$0.1677 \times CM + 94.639 \leq X < 0.1677 \times CM + 99.485$	30
	$0.1677 \times CM + 89.882 \leq X < 0.1677 \times CM + 94.639$	40
	$0.1677 \times CM + 85.501 \leq X < 0.1677 \times CM + 89.882$	50
	$0.1677 \times CM + 67.512 \leq X < 0.1677 \times CM + 85.501$	60
	$0.1677 \times CM + 52.112 \leq X < 0.1677 \times CM + 67.512$	70
	$0.1677 \times CM + 36.896 \leq X < 0.1677 \times CM + 52.112$	80
	$0.1677 \times CM + 25.096 \leq X < 0.1677 \times CM + 36.896$	90
	$X < 0.1677 \times CM + 25.096$	100

Name	Life-Cycle Carbon Emissions of Vehicles (X/(gCO_2e/km))	Score
Note: CM is the curb mass of the model, in kg.		

1.2 Scoring Rules for Carbon Emissions from BEVs

This section applies to BEVs. The scoring coefficients are listed in Table 2.

Table 2 Scoring Coefficients of Carbon Emissions from BEVs

Name	Life-Cycle Carbon Emissions of Vehicles (X/ (gCO_2e/km))	Score
Carbon emissions	X≥0.0879×CM+52.974	0
	0.0879×CM+48.152≤X<0.0879×CM+52.974	10
	0.0879×CM+44.603≤X<0.0879×CM+48.152	20
	0.0879×CM+42.464≤X<0.0879×CM+44.603	30
	0.0879×CM+40.795≤X<0.0879×CM+42.464	40
	0.0879×CM+39.692≤X<0.0879×CM+40.795	50
	0.0879×CM+33.785≤X<0.0879×CM+39.692	60
	0.0879×CM+29.996≤X<0.0879×CM+33.785	70
	0.0879×CM+25.902≤X<0.0879×CM+29.996	80
	0.0879×CM+21.793≤X<0.0879×CM+25.902	90
	X<0.0879×CM+21.793	100
Note: CM is the curb mass of the model, in kg.		

2. Accounting Method of Life-Cycle Carbon Emissions of Vehicles

2.1 Targets of Application

This method applies to M1 vehicles manufactured or sold in China, including passenger cars using gasoline or diesel only, non-PHEVs, PHEVs and BEVs.

2.2 Accounting Principles

2.2.1 Life Cycle Perspective

This document accounts for the life-cycle carbon emissions of passenger cars, and the life cycle includes the material production stage, the vehicle production stage and the vehicle use stage.

2.2.2 Functional Unit

Functional unit, a term used in life cycle assessment, refers to the quantified system performance of a product used as a benchmark unit. The accounting of the life-cycle carbon emissions of passenger cars is based on the functional unit, and the results are calculated relative to it. The functional unit for this method is the transport service provided by a passenger car traveling 1 km over its life cycle, and the life-cycle mileage is calculated as (1.5×10^5)km.

2.2.3 Prioritization of Scientific Methods

Methods of natural sciences (such as physics, chemistry and biology) are prioritized in the accounting of the life-cycle carbon emissions of passenger cars.

2.2.4 Consistency

In the accounting of life-cycle carbon emissions, assumptions, methods and data shall be applied consistently in order to draw conclusions based on the defined targets and scope.

2.2.5 Accuracy

The accounting of the life-cycle carbon emissions of passenger cars shall be accurate, verifiable, relevant and non-misleading, with minimal bias and uncertainty.

2.2.6 Transparency

All the relevant issues shall be presented and documented in an open, comprehensive and understandable manner; any relevant assumptions shall be disclosed; any estimates shall be clearly explained to avoid bias, and relevant explanations shall be given for the methods and data sources used.

2.2.7 Avoidance of Double Accounting

Double accounting of greenhouse gas (GHG) emissions within the system boundary shall be avoided.

2.3 Accounting Scope

2.3.1 Functional Unit

The functional unit is the transport service provided by a passenger car traveling 1km over its life cycle, and the life-cycle mileage is calculated as (1.5×10^5)km.

2.3.2 System Boundary

This method incorporates the raw materials (including original materials and recycled materials) production stage, the vehicle production stage and the use stage into the accounting scope of the life-cycle carbon emissions of passenger cars, excluding carbon emissions from the parts and components processing stage, the transportation stage, and the production and manufacturing processes of infrastructure such as roads and plants, equipment used in each process, and personnel and living facilities in plants. The system boundary is shown in Figure 1.

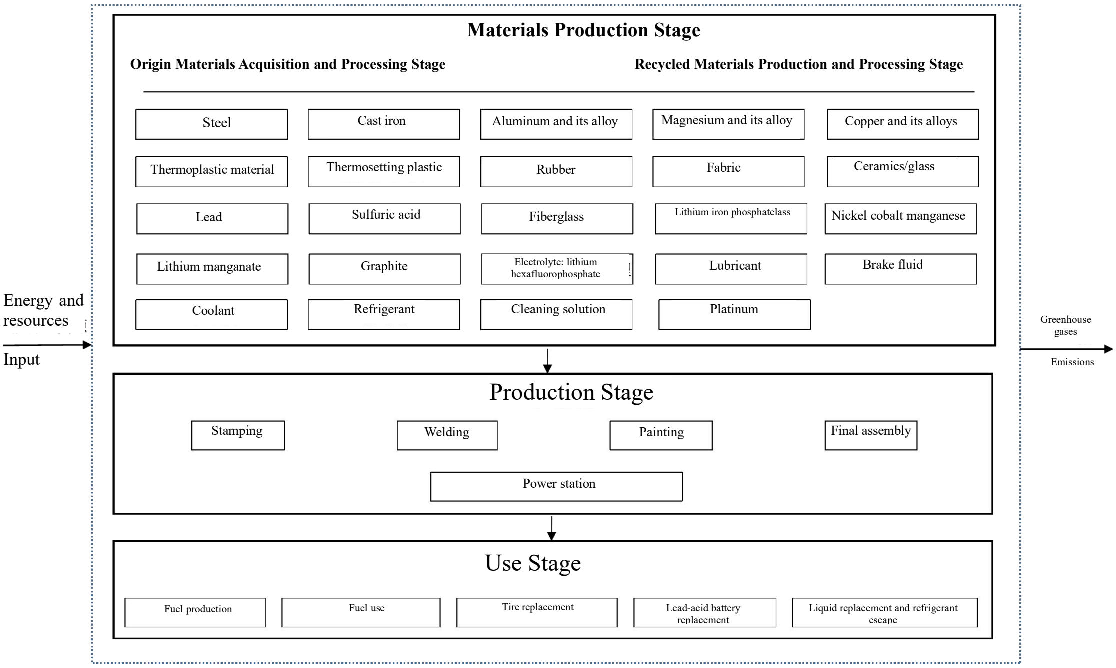

Figure 1 System Boundary for Life-Cycle Carbon Emissions of Passenger Cars

2.3.3 Carbon (GHG)

In this method, carbon (GHG) refers to the seven GHGs governed by the *United Nations Framework Convention on Climate Change*.

In this method, the GHG generated from fuel use in the use stage refers to CO_2 only and excludes the remaining emitted GHGs.

2.3.4 Carbon Emission Sources

This method accounts for carbon emissions from inputs and outputs during the life cycle of passenger cars, from energy use, combustion processes, chemical reactions, operation, and waste disposal. Land use and its changes are not considered.

Carbon offsets are not considered in this method.

Carbon footprints resulting from means of transport in non-fixed sites are not considered in this method.

The requirements for the accounting of carbon emissions from biological materials are as follows:

a) For recycled biological materials produced by waste, only the carbon footprints generated during the waste processing process are included.

b) For biological materials produced by non-waste (such as cash crops intended for the production of a biomass material), the carbon footprints generated during the production process and the crop plantation process are included, and assignment may be needed during the implementation process.

2.4 Inventory Data

Regarding inventory data, site-specific data provided by the manufacturer of the vehicle or/and default values can be used for all the processes included within the system boundary. When site-specific data is used for material weight, either site-specific data or default value can be used for the carbon emission factor of the material; when default value is used for material weight, it is the only acceptable data for the carbon emission factor of the material.

2.4.1 Site-specific Data

For all the processes included within the system boundary, the manufacturer of the vehicle shall provide site-specific data within 2 weeks after receiving the notification letter of the model to be evaluated and submit supporting documents for authentication, which can be used after verification and approval by the Evaluation Center. The site-specific data for the compositions and carbon emission factors of materials used in the complete vehicle shall be provided in accordance with Appendix 1 *Template for Accounting Report of Carbon Emission Factors of Materials Using Site-specific Data*, and the template for supporting documents for authentication is provided in Appendix 2 *Commitment Letter of Authenticity*.

2.4.1.1 Data Collection

If site-specific data is selected for carbon emission factors of materials in accounting, the *Summary Sheet of Key Parts and Components* (See Appendix 3) provides a reference on the collection of the site-specific data on material weight. The system boundary shall comply with Appendix 4 and shall be included in the accounting report in accordance with Appendix 1.

2.4.1.2 Data Assignment

It is possible that two or more products are manufactured simultaneously from a unit process in the product manufacturing processes while the material and energy inputs are not separated, and it is also possible that there are multiple input channels while there is only one output. In these cases, the data required for inventory calculations is not readily available, and the data on these processes must be allocated subject to certain relationships.

The inventory is based on a material balance of inputs and outputs, and the assignment relationships shall reflect the basic relationships and characteristics of such inputs and outputs. The main assignment principles are as follows:

a) Processes that are shared with other product systems must be identified and treated according to the assignment procedures;

b) The sum of inputs and outputs before and after assignment must be the same in a unit process;

c) If several assignment procedures are available, explanations of the assignment method used and its justification must be provided;

d) Multiple outputs: The assignment is based on changes in resources consumption and carbon emissions as a result of changes in the products, functions or economic relevance provided by the studied system;

e) Multiple inputs: The assignment is based on real relationships. For example, emissions from production processes can be affected by changes in the waste streams as an input.

Data assignment problems are usually solved according to the following procedures:

a) Try to avoid or minimize assignment. For example: ① Further decompose the unit processes that have been divided during data collection, in order to exclude those units that are not relevant to the functions of the system; ② Extend the system boundary of the product to include some units that were excluded from the system;

b) Assign data in a manner that reflects its physical relationships, such as the proportional relationships of the weight, quantity, volume, area, and calorific value of the product;

c) When the physical relationships cannot be determined or used as a basis for assignment, the economic relationships will be the alternative, such as the proportional relationship of the output value or profit of the product. However, this economic assignment method is highly uncertain and is generally not recommended.

The assignment procedures for recycled materials apply to open-loop product systems, and when the waste generated outside the system is recycled, only the carbon emissions from the recycling process are included, while the carbon footprints of the original material that becomes the waste are excluded.

2.4.1.3 Data Quality Requirements

a) Time Range

The average data on the continuous production for the most recent 3 months to 1 year shall be collected; the average data on the continuous production for the most recent 1 year shall be prioritized.

b) Geographical Scope

Data from the actual geographical areas of production shall be collected.

c) Technical Scope

Data on the actual production process technologies or combinations of technologies shall be collected.

d) Integrity

Data within the system boundary of the product shall be collected.

e) Reproducibility

It should ensur that independent practitioners to reproduce the accounting results of carbon emissions.

f) Data Sources

Explanations for the data access and sources shall be provided.

2.4.2 Default Values

When default values are used for calculations, the percentages of periodic components, tires, lead-acid batteries and fluids by weight and the percentages of their material compositions, the carbon emission factors of materials, the carbon emission factor of vehicle production, and the number of tire, lead-acid battery and fluid replacement during the vehicle's cycle are acquired from CALCM. The percentages of components, tires, lead-acid batteries and fluids and the percentages of their material compositions are the weighted average of the production of more than 90 mainstream models decomposed by CATARC.

Carbon emissions from the materials, energy, fuel and production of the vehicles are collected from CALCD and represent the average level in China.

Fuel consumption data for the fuel cycle is the data disclosed by enterprises and published by the Ministry of Industry and Information Technology. The carbon emission factor of fuel production is collected from CALCD and represents the average level in China. Carbon emissions from fuel use are calculated with the CO_2 conversion factors provided in GB 27999-2019, which are 2.37kgCO_2e/L for gasoline and 2.60kgCO_2e/L for diesel.

2.5 Calculation Method

2.5.1 Materials Production Stage

The materials production stage consists of the original materials acquisition and processing process and the recycled materials production and processing process, and the materials are divided into five types: components, lead-acid battery, lithium-ion power battery, tires and liquid. Carbon emissions in the materials production stage shall be calculated according to Equation (1), with the calculation result rounded off (rounded) to two decimal places:

$$C_{Materials} = \sum_{P=1}^{5} C_P \quad \text{......................................(1)}$$

$C_{Materials}$ - Carbon emissions in the materials production stage, in kilograms of carbon dioxide equivalent (kgCO_2e);

C_P - Carbon emissions of components, lead-acid battery, lithium-ion power battery, tires or liquid, in kilograms of carbon dioxide equivalent (kgCO_2e).

When default values are used in accounting, regardless of recycled materials or original materials, the carbon emissions of components, lead-acid battery, lithium-ion power battery, tires and liquid shall be calculated according to Equation (2), respectively, with the calculation result rounded off (rounded) to two decimal places:

$$C_P = \sum_i (M_{P,i} \times U_i \times CEF_{P,i}) \quad \text{...................................(2)}$$

In which:

C_p - Carbon emissions of components, lead-acid battery, lithium-ion power battery, tires or liquid, in kilograms of carbon dioxide equivalent (kgCO_2e);

$M_{P,i}$ - Weight of the material i of the component P, in kilograms (kg);

U_i - Service factor of the material i, namely, the percentage of the material used in the manufacturing process in the content of the vehicle. When it is assumed that there is material wastage, the percentage would be more than 100%;

$C_{EFP,i}$ - Carbon emission factor of the material i of the component P, in kilograms of carbon dioxide equivalent per kilogram ($kgCO_2e/kg$).

When recycled materials and original materials are differentiated in accounting, the carbon emissions of components, lead-acid battery, lithium-ion power battery, tires and fluid shall be calculated according to Equation (3), respectively, with the calculation result rounded off (rounded) to two decimal places:

$$C_P = \sum_i [(1 - R_{P,i}) \times E_{V,P,i} + R_{P,i} \times E_{R,P,i}] \quad \text{(3)}$$

$$E_{V,P,i} = \mathrm{M}_{P,i} \times \mathrm{CEF}_{V,P,i} \times U_i \quad \text{(4)}$$

$$E_{R,P,i} = \mathrm{M}_{P,i} \times \mathrm{CEF}_{R,P,i} \times U_i \quad \text{(5)}$$

C_p - Carbon emissions of components, lead-acid battery, lithium-ion power battery, tires and liquid, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

$E_{V,P,i}$ - Carbon emissions of the original material i of the component P, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

$E_{R,P,i}$ - Carbon emissions of the recycled material i of the component P, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

$M_{P,i}$ - Weight of the material i of the component P, in kilograms (kg);

U_i - Service factor of the material i, namely, the percentage of the material used in the manufacturing process in the content of the vehicle. When it is assumed that there is material wastage, the percentage would be more than 100%;

$CEF_{V,P,i}$ - Carbon emission factor of the original material i of the component P, $kgCO_2e/kg$;

$CEF_{R,P,i}$ - Carbon emission factor of the recycled material i of the component P, $kgCO_2e/kg$;

$R_{P,i}$ - Percentage of the recycled material i as an input.

The weight of the material i of the component can be accounted with site-specific data or default values of the weight and replacement of the material; its carbon emission factor can be site-specific data or default value (the carbon emission factors of other homogeneous materials shall be site-specific data). When neither site-specific data nor default values are available, other secondary data can be the alternative. The functional unit and system boundary for the accounting of the carbon emission factor of the material i using site-specific data shall comply with Appendix 4; carbons (GHGs) and their sources shall comply with 2.3.3 and 2.3.4, respectively; the data and data quality requirements shall comply with 2.4. When site-specific data is used for the carbon emission factor of the material, an accounting report shall be submitted according to Appendix 1. The carbon emission factors of energy production and use shall be based on the default values.

The carbon emissions of lithium-ion power batteries used in pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars can be measured by their energy. The weight of power battery used in passenger cars using gasoline or diesel only is calculated as 0. The optional calculation formula is Equation (6), with the calculation result rounded off (rounded) to two decimal places:

$$C_{Li\ battery} = R_{Li\ battery} \times CEF_{Li\ battery} \cdots\cdots\cdots\cdots (6)$$

In which:

$C_{Li\ battery}$ - Carbon emissions of lithium-ion power battery, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

$R_{Li\ battery}$ - Energy of lithium-ion power battery, rounded off (rounded) to two decimal places, in kilowatt-hour (kWh);

$CEF_{Li\ battery}$ - Carbon emission factor of lithium-ion power battery pack, rounded off (rounded) to two decimal places, in kilograms of carbon dioxide equivalent per kilowatt-hour ($kgCO_2e/kWh$);

The carbon emission factor of lithium-ion power battery pack can be site-specific data or default value (the carbon emission factors of other homogeneous materials shall be site-specific data); the functional unit and system boundary for the accounting of the carbon emission factor of the lithium-ion power battery pack using site-specific data shall comply with Appendix 4; carbons (GHGs) and their sources shall comply with 2.3.3 and 2.3.4, respectively; the data and data quality requirements shall comply with 2.4. When site-specific data is used for the carbon emission factor of the material, an accounting report shall be submitted according to Appendix 1. The carbon emission factors of energy production and use shall be based on the default values.

2.5.2 Vehicle Production Stage

The carbon emissions in the vehicle production stage shall be calculated according to Equation (7), with the calculation result rounded off (rounded) to two decimal places:

$$C_{Production} = \sum \left(E_r \times CEF_r + E_r \times NCV_r \times CEF_r^{'}\right) + M_{CO_2} \quad \text{…………………………(7)}$$

In which:

$C_{Production}$ - Carbon emissions in the vehicle production stage, in kilograms of carbon dioxide equivalent (kgCO_2e);

E_r - Amount of the energy or fuel r purchased, in kilowatt-hour (kWh), cubic meter (m^3) or kilograms(kg);

CEF_r - Carbon emission factor of the energy or fuel r, in kilograms of carbon dioxide equivalent per kilowatt-hour (kgCO_2e/kWh), kilograms of carbon dioxide equivalent per cubic meter (kgCO_2e/m^3) or kilograms of carbon dioxide equivalent per kilogram (kgCO_2e/kg);

CEF'_r - Carbon emission factor from the use of the energy or fuel r, in tons of carbon dioxide equivalent per gigajoule (tCO_2e/GJ);

NCV_r - Average net calorific value of the energy or fuel r, in gigajoule per ton (GJ/t) or gigajoule per 10,000 cubic meters (GJ/10^4m^3);

M_{CO_2} - Amount of CO_2 escape during the welding process, in kilograms of carbon dioxide equivalent (kgCO_2e).

Enterprises may use either default values or site-specific data for carbon emissions in the vehicle production stage; the functional unit and system boundary for the accounting of carbon emissions in the vehicle production stage shall comply with Appendix 5; the carbon emission factor of fuel or energy shall be the default value; carbons (GHGs) and their sources shall comply with 2.3.3 and 2.3.4, respectively; the data and data quality requirements shall comply with 2.4.

2.5.3 Use Stage

The carbon emissions in the use stage shall be calculated according to Equation (8), with the calculation result rounded off (rounded) to two decimal places:

$$C_{Use} = C_{\text{Fuel production}} + C_{\text{Fuel use}} + C_{Maintenance} \quad \text{…………………(8)}$$

In which:

C_{Use} - Carbon emissions in the use stage, in kilograms of carbon dioxide equivalent (kgCO_2e);

$C_{Fuel\ production}$ - Carbon emissions from fuel production, in kilograms of carbon dioxide equivalent (kgCO_2e);

$C_{Fuel\ use}$ - Carbon emissions from fuel use, in kilograms of carbon dioxide equivalent

($kgCO_2e$);

$C_{Maintenance}$ - Carbon emissions from maintenance in the use stage, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

Carbon emissions from fuel production for Category-M1 vehicles using gasoline or diesel only, conventional hybrid vehicles, PHEVs and BEVs shall be calculated according to Equation (9), with the calculation result rounded off (rounded) to two decimal places:

$$C_{F\text{uel production}} = FC \times CEF_{F\text{uel}} \times L / 100 \quad \text{.................................(9)}$$

In which:

$C_{Fuel\ production}$ - Carbon emissions from fuel production, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

FC - Fuel consumption, in liter per 100 kilometers (L/100km) or kilowatt-hour per 100 kilometers (kWh/100km), which shall be the value under the Chinese operating conditions;

CEF_{Fuel} - Carbon emission factor of fuel production, in kilograms of carbon dioxide equivalent per liter ($kgCO_2e/L$) or kilograms of carbon dioxide equivalent per kilowatt-hour ($kgCO_2e/kWh$); the carbon emission factor of fuel production shall be the default value;

L - Life-cycle mileage of passenger cars, calculated as (1.5×10^5)km.

Carbon emissions in the fuel use process for Category-M1 vehicles using gasoline or diesel only, conventional hybrid vehicles, PHEVs and BEVs shall be calculated according to Equation (10), with the calculation result rounded off (rounded) to two decimal places:

$$C_{F\text{uel use}} = FC \times K_{CO_2} \times L / 100 \quad \text{...................................(10)}$$

In which:

$C_{Fuel\ use}$ - Carbon emissions in the fuel use process, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

FC - Fuel consumption, which shall be the value under the Chinese operating conditions;

K_{CO2} - Conversion coefficient, as specified in GB 27999-2019: 2.37kg/L for gasoline vehicles, 2.60kg/L for diesel vehicles, 0 for pure electric passenger cars;

L - Life-cycle mileage of passenger cars, calculated as (1.5×10^5)km.

Carbon emissions from tire replacement in the use stage shall be calculated according to Equation (11), with the calculation result rounded off (rounded) to two decimal places:

$$C_{Maintenance} = \sum_{P=1}^{2} (C_P \times N_P) + C_{Fluids\ r} \quad \text{.............................(11)}$$

In which:

$C_{Maintenance}$ - Carbon emissions from maintenance in the use stage, $kgCO_2e$;

C_P - Carbon emissions from the production of tire or lead-acid battery, $kgCO_2e$;

N_P - Number of tire or lead-acid battery replacements in the life cycle;

$C_{Fluids\ r}$ - Carbon emissions from liquid replacement and refrigerant escape in the use stage, $kgCO_2e$.

Carbon emissions from liquid replacement and refrigerant escape (once) in the use stage shall be calculated according to Equation (12), with the calculation result rounded off (rounded) to two decimal places:

$$C_{Fluids\ r} = \sum (M_{Fluid\ material\ i} \times CEF_{Fluid\ material\ i} \times N_{Fluid\ material\ i}) + M_{\mathrm{Re}frigerant} \times GWP_{\mathrm{Re}frigerant}$$

…(12)

In which:

$C_{Fluids\ r}$ - Carbon emissions from liquid replacement and refrigerant escape (once) in the use stage, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

$M_{Fluid\ material\ i}$ - Weight of the liquid material i, in kilograms (kg);

$\mathrm{M}_{\mathrm{Refrigerant}}$ - Weight of the refrigerant, in kilograms (kg);

$CEF_{Fluid\ material\ i}$ - Carbon emission factor of the liquid material i, in kilograms of carbon dioxide equivalent per kilogram ($kgCO_2e/kg$);

$N_{Fluid\ material\ i}$ - Number of the replacements of the liquid material i in the life cycle;

$GWP_{Refrigerant}$ - GWP of the refrigerant.

The weight of the liquid material i can be site-specific data or default value; the carbon emission factor of the liquid material i can be site-specific data or default value (the carbon emission factors of other homogeneous materials shall be site-specific data); the number of the replacements of the liquid material i can be site-specific data or default value. The functional unit and system boundary for the accounting of the carbon emission factor of the liquid material i using site-specific data shall comply with Appendix 4; carbons (GHGs) and their sources shall comply with 2.3.3 and 2.3.4, respectively; the data and data quality requirements shall comply with 2.4. When site-specific data is used for the carbon emission factor of the material, an accounting report shall be submitted according to Appendix 1. The GWP of the refrigerant is shown in Appendix 6.

2.5.4 Life-cycle Carbon Emissions

The total life-cycle carbon emissions of passenger cars shall be calculated according to Equation (13), with the calculation result rounded off (rounded) to two decimal places:

$$C = (C_{Materials} + C_{\mathrm{Production}} + C_{U\mathrm{se}})/1000 \ldots\ldots\ldots\ldots\ldots\ldots\ldots (13)$$

In which:

C - Total life-cycle carbon emissions of passenger cars, in tons of carbon dioxide equivalent (tCO_2e);

$C_{Materials}$ - Carbon emissions in the materials production stage, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

$C_{Production}$ - Carbon emissions in the vehicle production stage, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

C_{Use} - Carbon emissions in the use stage, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

Carbon emissions of the passenger cars per unit of life-cycle mileage shall be calculated according Equation (14), with the calculation result rounded off (rounded) to two decimal places:

$$C = (C_{Materials} + C_{\mathrm{Production}} + C_{U\mathrm{se}})/L \times 1000 \ldots\ldots\ldots\ldots\ldots\ldots (14)$$

In which:

C - Carbon emissions of the passenger cars per unit of life-cycle mileage, in grams of carbon dioxide equivalent per kilometer (gCO_2e/km);

$C_{Materials}$ - Carbon emissions in the materials production stage, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

$C_{Production}$ - Carbon emissions in the vehicle production stage, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

C_{Use} - Carbon emissions in the use stage, in kilograms of carbon dioxide equivalent ($kgCO_2e$);

L - Life-cycle mileage of passenger cars, in kilometers (km), calculated as (1.5×10^5)km.

Appendix 1

Template for Accounting Report of Carbon Emission Factors of Materials Using Site-specific Data

General Form for Carbon Emissions Data of the Product (CES)						
1. Basic Data						
1.1 Name of Enterprise						
1.2 National Industries Classification	1.3 Primary Class		1.4 Secondary Class			
1.5 Product Name						
1.6 Product Model						
1.7 Product Type						
1.8 Product Description*						
1.9 Collection Cycle						
1.10 Functional Unit Description						
1.11 Quantification Type		1.12 Quantity		1.13 Unit		
1.14 System boundary				1.15 Picture*		
1.16 Carbon emission factor		1.17 Unit				
1.18 Source of carbon emission factor						
1.19 Third Party Certification*		1.20 Certification Authority		1.21 Certificate No.*		
1.22 Report Upload*						
1.23 Form Validity						
1.24 Process Description*						
1.25 Mitigation Measures*						
2. Inventory Data						
2.1 Inventory Data of Materials/Parts and Components/Production						
2.1.1 Product Name	2.1.2 Product Model	2.1.3 Consumption	2.1.4 Unit	2.1.5 Carbon Emission Factor	2.1.6 Unit of Carbon Emission Factor	2.1.7 Source of Carbon Emission Factor
2.2 Inventory Data of Primary Energy						
2.2.1 Product Name	2.2.2 Product Model	2.2.3 Consumption	2.2.4 Unit	2.2.5 Carbon Emission Factor	2.2.6 Unit of Carbon Emission Factor	2.2.7 Source of Carbon Emission Factor
2.3 Inventory Data of Secondary Energy						
2.3.1 Product Name	2.3.2 Product Model	2.3.3 Consumption	2.3.4 Unit	2.3.5 Carbon Emission Factor	2.3.6 Unit of Carbon Emission Factor	2.3.7 Source of Carbon Emission Factor

2.4 Inventory Data of GHG Escape						
2.4.1 Product Name (Escaping Gas)	2.4.2 Product Model (Escape Method)	2.4.3 Consumption (Escape Amount)	2.4.4 Unit	2.4.5 Carbon Emission Factor	2.4.6 Unit of Carbon Emission Factor	2.4.7 Source of Carbon Emission Factor
2.5 Inventory Data of Transport*						
2.5.1 Product Name (Means of Transport)*	2.5.2 Product Model (Means of Transport)*	2.5.3 Consumption (Transport Consumption)*	2.5.4 Unit	2.5.5 Carbon Emission Factor	2.5.6 Unit of Carbon Emission Factor	2.5.7 Source of Carbon Emission Factor
Note: * represents optional.						

Appendix 2

Commitment Letter of Authenticity

Commitment Letter on Consistency between Accounting Report of Carbon Emission Factors of Materials Using Site-specific Data and Vehicle Model under Evaluation

We undertake that the accounting report of the carbon emission factors of materials using site-specific data is consistent with the ________*(vehicle model)* under evaluation. The data is authentic and valid. We will be liable for any consequences resulting from any inaccuracies.

Signature of Project Leader:

(Organization Seal):

Date:

Appendix 3

Summary Sheet of Key Parts and Components

Table 3.1 Summary Sheet of Key Parts and Components

No.	System	Sub-system	Parts and Components	Remarks
1	Power system	Engine	Cylinder block	
2			Cylinder head	
3			Cylinder head cover	
4			Crankshaft	
5			Camshaft	Including intake camshaft and exhaust camshaft.
6			Piston	Including all the pistons.
7			Connecting rod	
8			Gear	Crankshaft sprocket, camshaft sprocket, crankshaft pulley and crankshaft pulley.
9			Flywheel	
10			Intake manifold	
11			Exhaust manifold	
12			Oil pan	
13		Power battery	Box (shell)	Applicable to pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
14			Radiator	Applicable to pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
15			Cooling water connection	Applicable to pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
16			High-voltage copper bar	Applicable to pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
17			High-voltage box	Applicable to pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
18			Battery cell (single)	Applicable to pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
19		Drive motor	Shell	Including the outer shell and the end cover. Applicable to pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
20			Stator	Including iron core and winding. Applicable to pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
21			Rotor	Including iron core and rotating shaft. Applicable to pure electric passenger cars,

No.	System	Sub-system	Parts and Components	Remarks
				plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
22	Chassis system	Gearbox	Shell	
23			Precision gear (intermediate shaft)	The precision gear and intermediate shaft shall be accounted if a three-shaft gearbox is used.
24			Input shaft	
25			Output shaft	
26		Reducer	Shell	
27			Precision gear (intermediate shaft)	
28			Input shaft	
29			Output shaft	
30		-	Transmission shaft	Including axle tube, telescopic shaft and universal joint.
31		-	Drive shaft (half shaft)	The shaft in the gearbox that transmits the torque between the reducer and the driving wheels.
32		-	Sub-frame	The skeleton of the front and rear axles as a component.
33		-	Hub	
34		-	Tire	
35		-	Spare tire	
36		-	Brake disc	
37		-	Shock absorber	
38		-	Coil spring	
39		-	Steering column (tube)	A component of the steering system that connects the steering wheel to the steering gear.
40	Body system	Body in white	Door	
41			Engine cover	
42			Trunk lid	
43			Roof	
44			Fender	
45			Other body structural members and weld parts of covering parts	
46		Seat	Seat frame	
47			Seat foam	
48			Seat mask	
49		Glass	Front windshield	
50			Rear windshield	
51			Side glass	
52			Skylight glass	
53		Interior	Dashboard	A component with many holes for the

No.	System	Sub-system	Parts and Components	Remarks
				installation of various instruments.
54			Door shield	
55			Column guard plate	
56			Roof lining	
57		Bumper	Front bumper	
58			Rear bumper	
59	Electric system	Lead-acid battery	Lead-acid battery	
60		Air conditioning	Condenser	
61			Compressor	
62			Evaporator core	
63			Shell	
64		High-voltage wiring	Cable	Applicable to pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars.
65			Sheath	

Appendix 4

Accounting Scope of Carbon Emission Factors of Materials

4.1 Accounting Scope of Carbon Emission Factors of Materials

4.1.1 Steel

4.1.1.1 Functional Unit

The production of 1kg steel products in the plant.

4.1.1.2 Accounting Boundary

In this document, the system boundary for carbon emissions from steel includes the main processes from iron ore mining, iron ore beneficiation, sintering, ironmaking (BF) to steelmaking (BOF and EAF), the production processes of related auxiliary materials (metallurgical lime, metallurgical coke and ferrosilicon) and the transport process of the main original materials (ore, coal, etc.), of which the proportion of EAF steel is 10%, as shown in Figure 4.1.

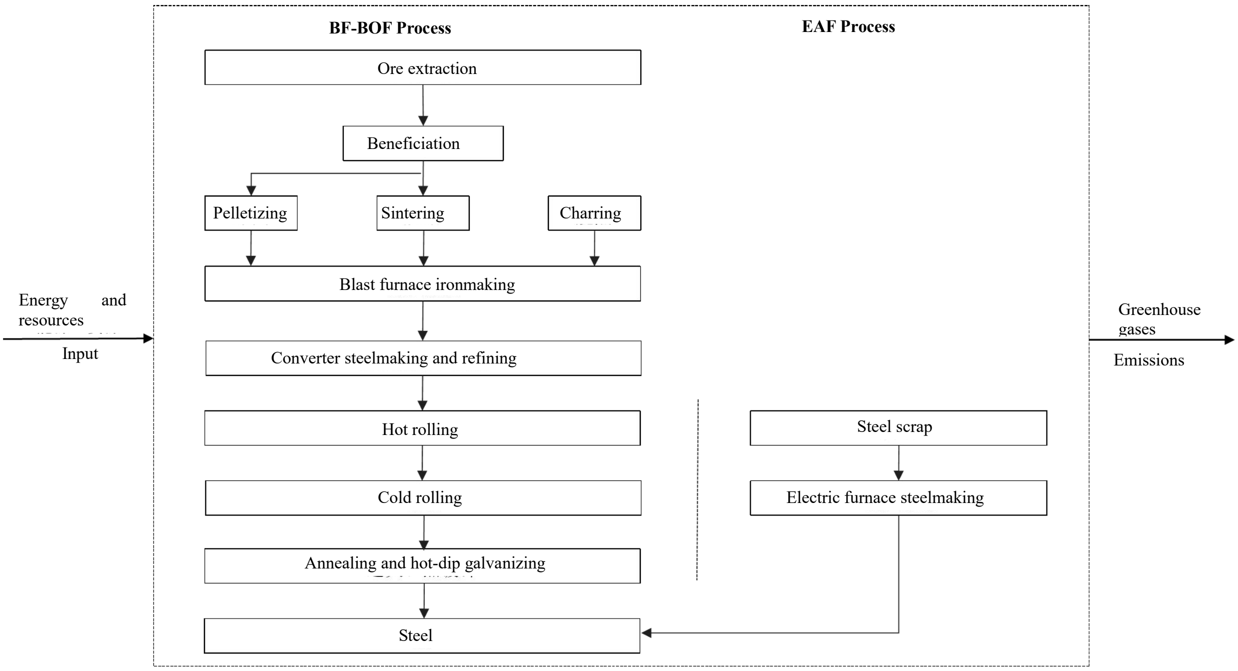

Figure 4.1 System Boundary for the Accounting of Carbon Emissions from Steel (Including Steel Scrap Recycling)

4.1.2 Cast Iron

4.1.2.1 Functional Unit

The production of 1kg cast iron in the plant.

4.1.2.2 Accounting Boundary

In this document, the system boundary for carbon emissions from cast iron includes the processes of ore mining, ore beneficiation, pelleting, sintering, charring, blast furnace ironmaking, molten iron pouring and casting separation, as shown in Figure 4.2.

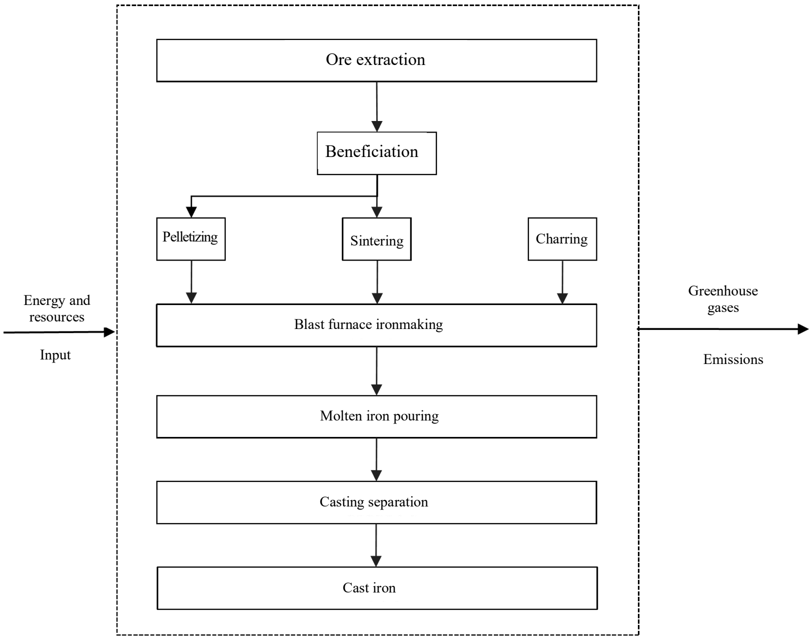

Figure 4.2 System Boundary for the Accounting of Carbon Emissions from Cast Iron

4.1.3 Aluminum and Its Alloy

4.1.3.1 Functional Unit

The production of 1kg aluminum and its alloy in the plant.

4.1.3.2 Accounting Boundary

In this document, the system boundary for carbon emissions from aluminum and its alloy includes bauxite extraction, aluminium oxide production, electrolysis of cryolite - aluminium oxide fused salt, purification of electrolytic aluminum liquid (decontamination) and casting of aluminium ingots, extrusion process, production of auxiliary raw materials (carbon anodes or anode paste), and transport process of the main materials, as shown in Figure 4.3.

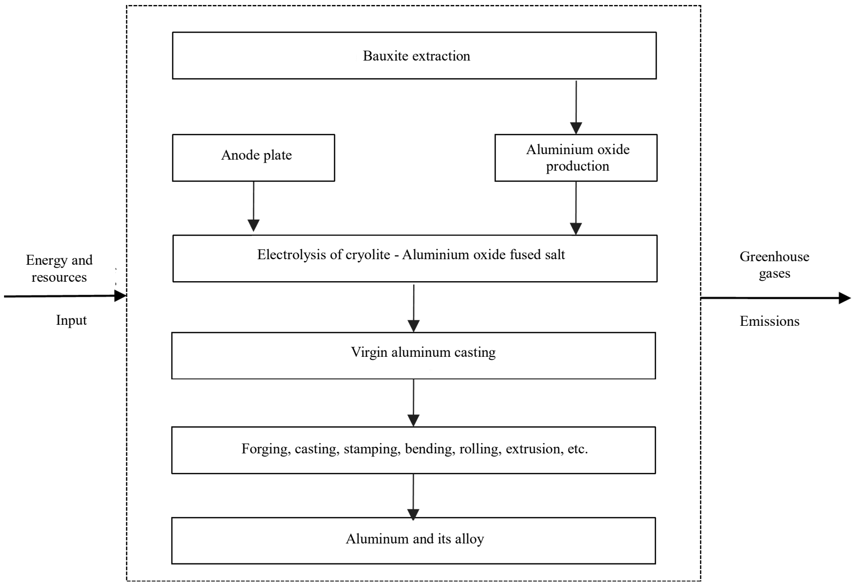

Figure 4.3 System Boundary for the Accounting of Carbon Emissions from Aluminum and Its Alloy

4.1.4 Magnesium and Its Alloy

4.1.4.1 Functional Unit

The production of 1kg magnesium and its alloy in the plant.

4.1.4.2 Accounting Boundary

In this document, the system boundary for carbon emissions from magnesium and its alloy includes five stages: dolomite extraction, dolomite calcination, pelleting of ingredients and reduction and refining of coarse magnesium, and casting process, as well as the production of the main auxiliary materials, silicon iron and fluorite powder, as shown in Figure 4.4.

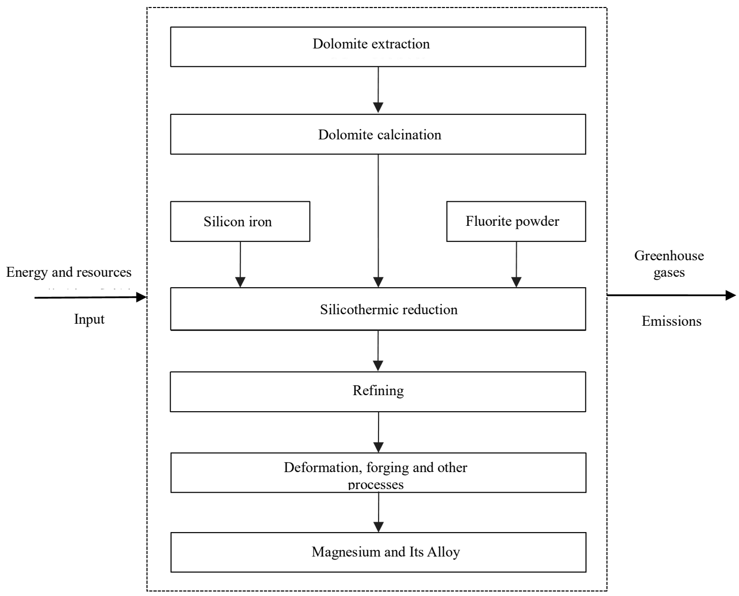

Figure 4.4 System Boundary for the Accounting of Carbon Emissions from Magnesium and Its Alloy

4.1.5 Copper and Its Alloys

4.1.5.1 Functional Unit

The production of 1kg copper and its alloys in the plant.

4.1.5.2 Accounting Boundary

In this document, the system boundary for carbon emissions from copper and its alloys includes processes such as copper ore extraction (open mining and pit mining), copper ore beneficiation, copper smelting (thermometallurgy and hydrometallurgy) and electrolysis (electrowinning), as shown in Figure 4.5.

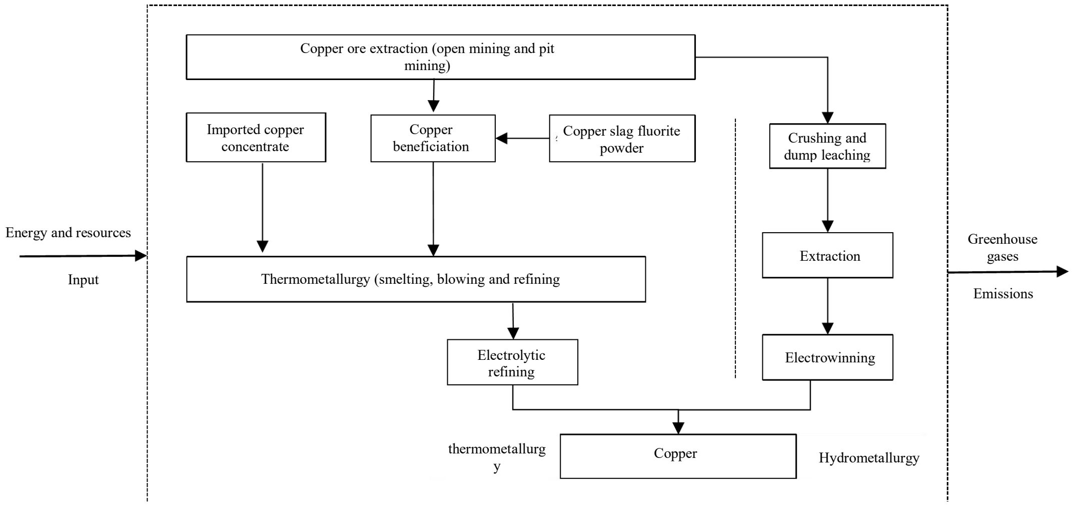

Figure 4.5 System Boundary for the Accounting of Carbon Emissions from Copper and Its Alloys

4.1.6 Platinum

4.1.6.1 Functional Unit

The production of 1kg platinum in the plant.

4.1.6.2 Accounting Boundary

In this document, the system boundary for carbon emissions from platinum includes platinum ore mining, extraction, enrichment, and sulfur removal, as shown in Figure 4.6.

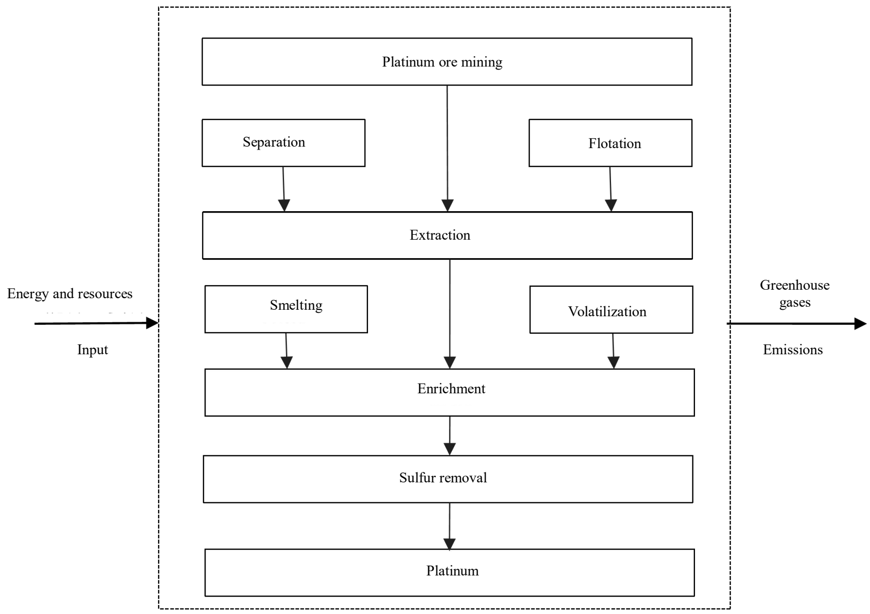

Figure 4.6 System Boundary for the Accounting of Carbon Emissions from Platinum

4.1.7 Thermoplastic Material

4.1.7.1 Functional Unit

The production of 1kg thermoplastic materials in the plant.

4.1.7.2 Accounting Boundary

In this document, the system boundary for carbon emissions from thermoplastic materials includes crude oil (raw coal) mining, coke production, calcium carbide production, distillation, cracking and separation stages, as shown in Figure 4.7.

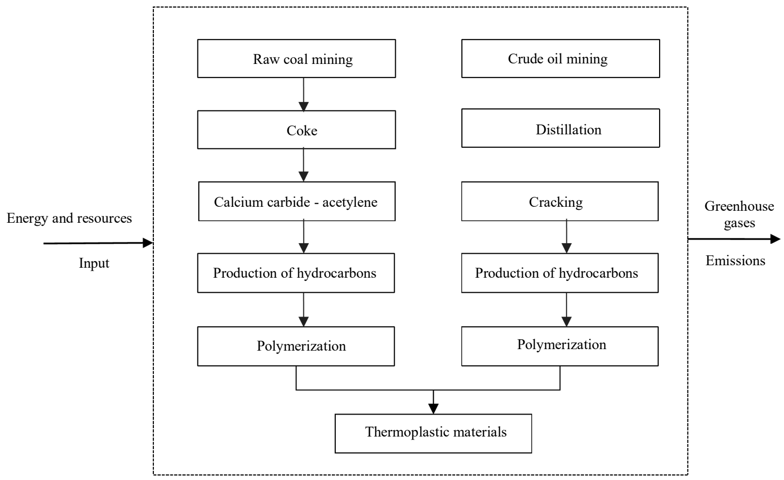

Figure 4.7 System Boundary for the Accounting of Carbon Emissions from Thermoplastic Material

4.1.8 Thermoplastic Material

4.1.8.1 Functional Unit

The production of 1kg thermoplastic materials in the plant.

4.1.8.2 Accounting Boundary

In this document, the system boundary for carbon emissions from thermoplastic materials includes crude oil mining, distillation, cracking and separation processes, as shown in Figure 4.8.

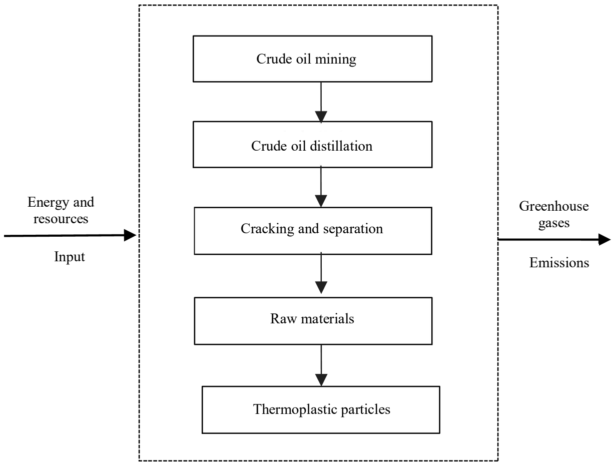

Figure 4.8 System Boundary for the Accounting of Carbon Emissions from Thermoplastic Material

4.1.9 Rubber

4.1.9.1 Functional Unit

The production of 1kg rubber in the plant.

4.1.9.2 Accounting Boundary

In this document, the system boundary for carbon emissions from rubber includes processes such as plasticating, mixing, moulding, vulcanizing and trimming, as shown in Figure 4.9.

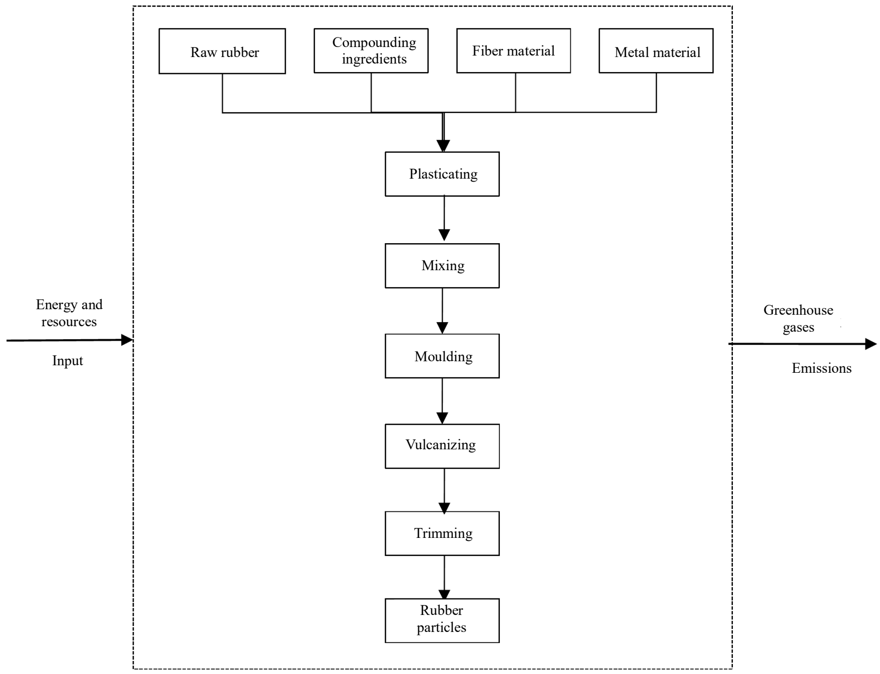

Figure 4.9 System Boundary for the Accounting of Carbon Emissions from Rubber

4.1.10 Fabric

4.1.10.1 Functional Unit

The production of 1kg fabrics in the plant.

4.1.10.2 Accounting Boundary

In this document, the system boundary for carbon emissions from fabric includes stages such as weaving, dyeing and finishing, as shown in Figure 4.10.

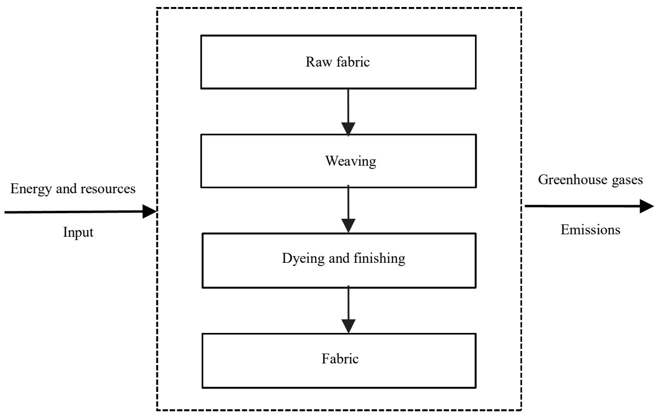

Figure 4.10 System Boundary for the Accounting of Carbon Emissions from Fabric

4.1.11 Ceramics/Glass

4.1.11.1 Functional Unit

The production of 1kg ceramics/glass in the plant.

4.1.11.2 Accounting Boundary

In this document, the system boundary for carbon emissions from ceramics/glass includes processes such as the extraction, crushing, mixing, melting, moulding, annealing, quenching or ion exchange of silica sand, sodium carbonate, feldspar, dolomite, limestone and mirabilite, as shown in Figure 4.11.

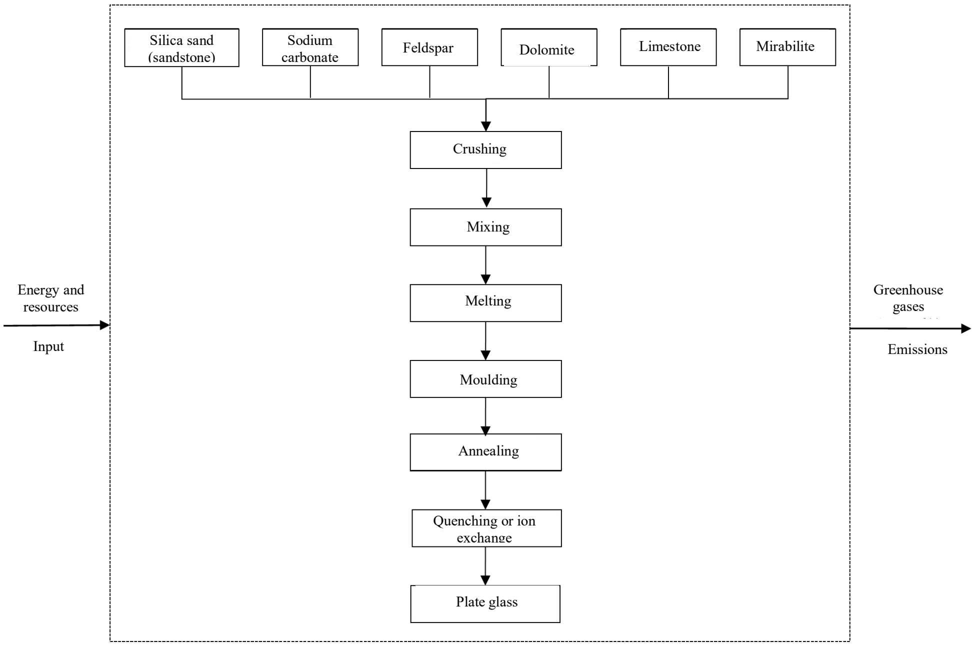

Figure 4.11 System Boundary for the Accounting of Carbon Emissions from Ceramics/Glass

4.1.12 Lead

4.1.12.1 Functional Unit

The production of 1kg lead products in the plant.

4.1.12.2 Accounting Boundary

In this document, the system boundary for carbon emissions from lead includes processes such as lead and zinc mining (open mining and pit mining), beneficiation and thermometallurgy (sinter-blower process and SKS process), as shown in Figure 4.12.

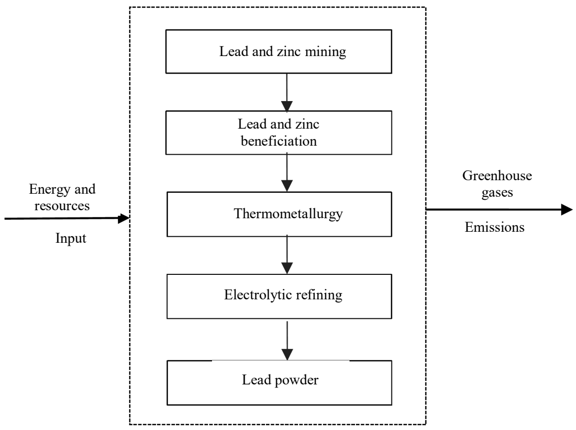

Figure 4.12 System Boundary for the Accounting of Carbon Emissions from Lead

4.1.13 Sulfuric Acid

4.1.13.1 Functional Unit

The production of 1kg sulfuric acid in the plant.

4.1.13.2 Accounting Boundary

In this document, the system boundary for carbon emissions from sulfuric acid includes the processes from ore (sulphur iron ore and sulphur) mining, beneficiation and transport to sulphur acid production; for the acid production with metallurgical fume, only the sulphur acid production process is included, and the mining and production processes of metallurgical raw materials and their distribution are excluded, as shown in Figure 4.13.

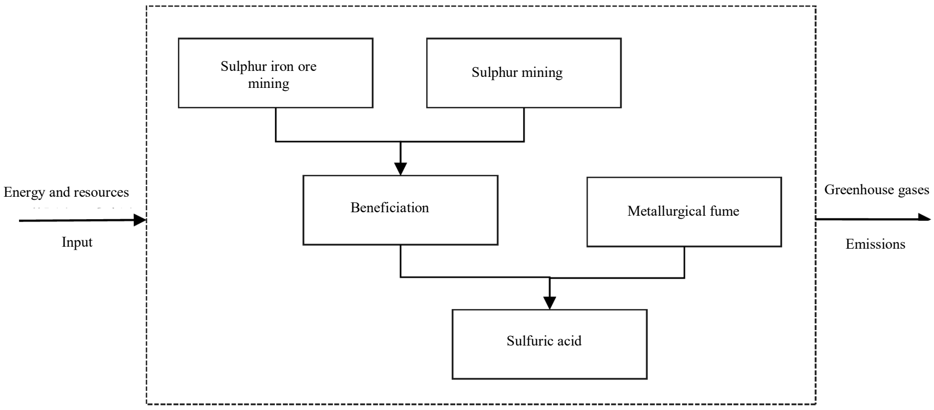

Figure 4.13 System Boundary for the Accounting of Carbon Emissions from Sulfuric Acid

4.1.14 Fiberglass

4.1.14.1 Functional Unit

The production of 1kg fiberglass in the plant.

4.1.14.2 Accounting Boundary

In this document, the system boundary for carbon emissions from fiberglass includes processes such as ore mining, cleaning and drying, kiln heating and melting, electrically heated wire drawing, wire drawing and softening, as shown in Figure 4.14.

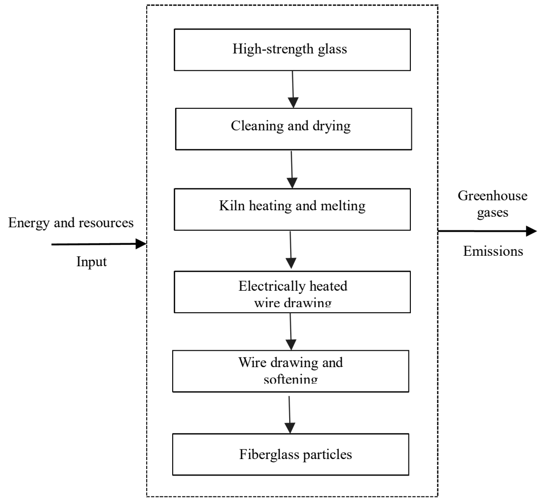

Figure 4.14 System Boundary for the Accounting of Carbon Emissions from Fiberglass

4.1.15 LFP

4.1.15.1 Functional Unit

The production of 1kg LFP in the plant.

4.1.15.2 Accounting Boundary

This document requires accounting of carbon emissions from LFP of power batteries in pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars; the system boundary for carbon emissions from LFP includes processes such as ore mining, blending, spray drying, sintering, crushing, mixing and baking, as shown in Figure 4.15.

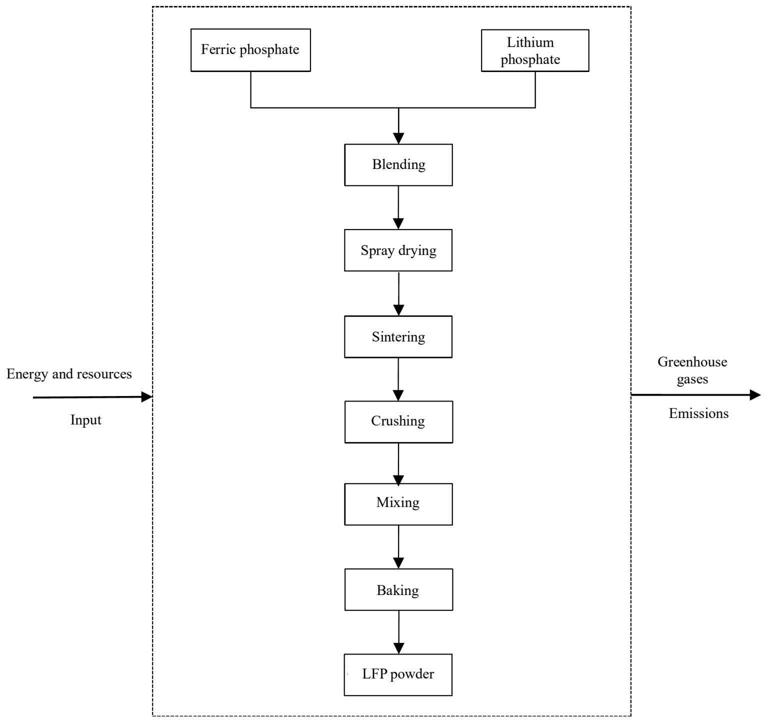

Figure 4.15 System Boundary for the Accounting of Carbon Emissions from LFP

4.1.16 NCM

4.1.16.1 Functional Unit

The production of 1kg NCM in the plant.

4.1.16.2 Accounting Boundary

This document requires accounting of carbon emissions from NCM of power batteries in pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars; the system boundary for carbon emissions from NCM includes processes such as ore mining, mixing, sintering, crushing, iron removal, sieving and packaging, as shown in Figure 4.16.

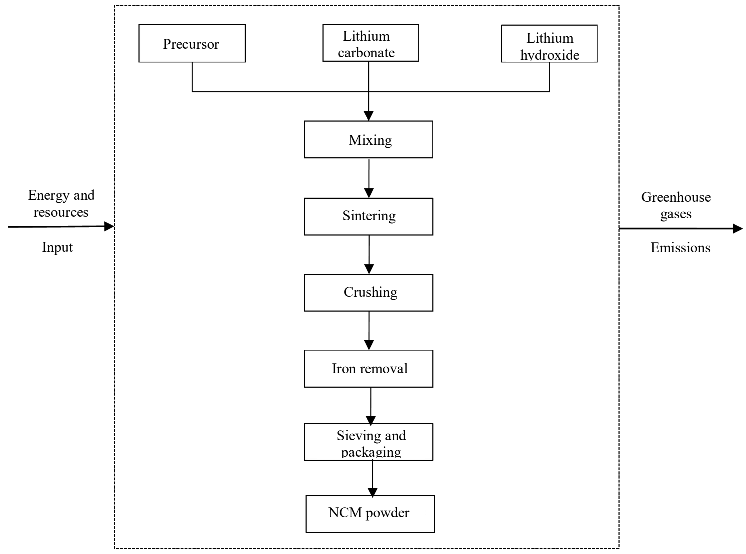

Figure 4.16 System Boundary for the Accounting of Carbon Emissions from NCM

4.1.17 LMO

4.1.17.1 Functional Unit

The production of 1kg LMO in the plant.

4.1.17.2 Accounting Boundary

This document requires accounting of carbon emissions from LMO of power batteries in pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars; the system boundary for carbon emissions from LMO includes processes such as ore mining, blending, roasting, grinding and sieving, as shown in Figure 4.17.

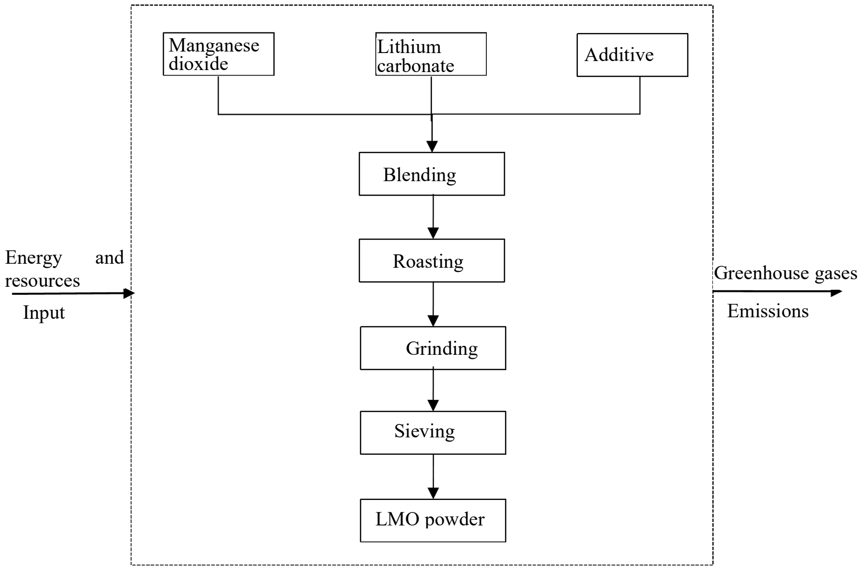

Figure 4.17 System Boundary for the Accounting of Carbon Emissions from LMO

4.1.18 Graphite

4.1.18.1 Functional Unit

The production of 1kg graphite in the plant.

4.1.18.2 Accounting Boundary

This document requires accounting of carbon emissions from graphite of power batteries in pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars; the system boundary for carbon emissions from graphite includes processes such as graphite ore mining, crushing, granulation, graphitizing and sieving, as shown in Figure 4.18.

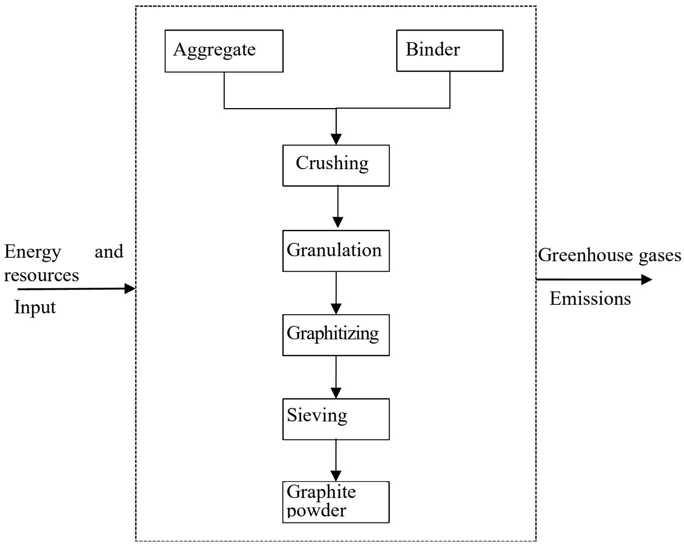

Figure 4.18 System Boundary for the Accounting of Carbon Emissions from Graphite

4.1.19 Electrolyte: LiPF6

4.1.19.1 Functional Unit

The production of 1kg LiPF6 in the plant.

4.1.19.2 Accounting Boundary

This document requires accounting of carbon emissions from LiPF6 electrolyte of power batteries in pure electric passenger cars, plug-in hybrid electric passenger cars and NOVC hybrid passenger cars; the system boundary for carbon emissions from LiPF6 includes processes such as ore mining, dissolving, LiPF6 crystallisation, separation and drying, as shown in Figure 4.19.

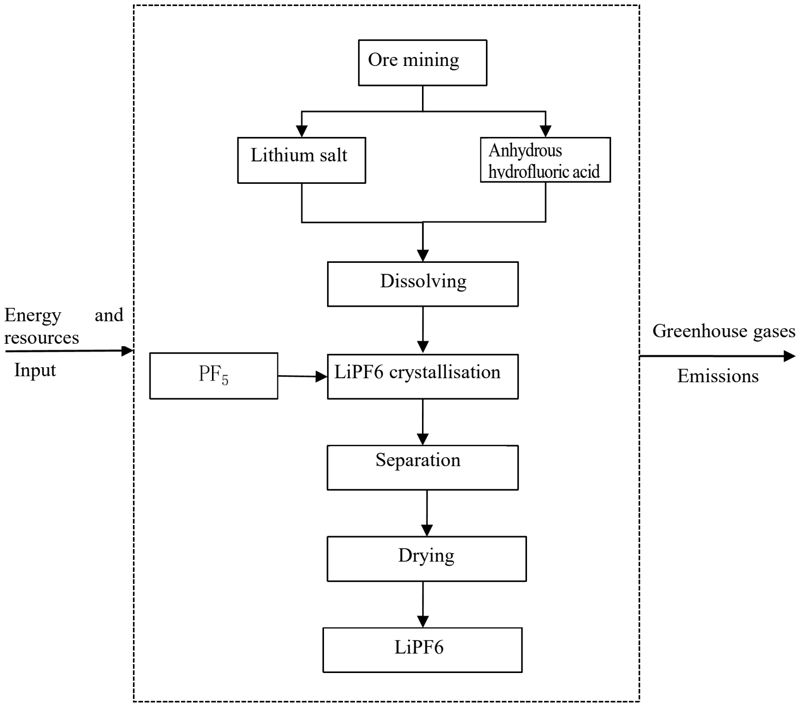

Figure 4.19 System Boundary for the Accounting of Carbon Emissions from LiPF6

4.1.20 Lubricant

4.1.20.1 Functional Unit

The production of 1kg lubricant in the plant.

4.1.20.2 Accounting Boundary

In this document, the system boundary for carbon emissions from lubricant includes processes such as dosing in the blending tank, heating, mixing and stirring, filtering and filling, as shown in Figure 4.20.

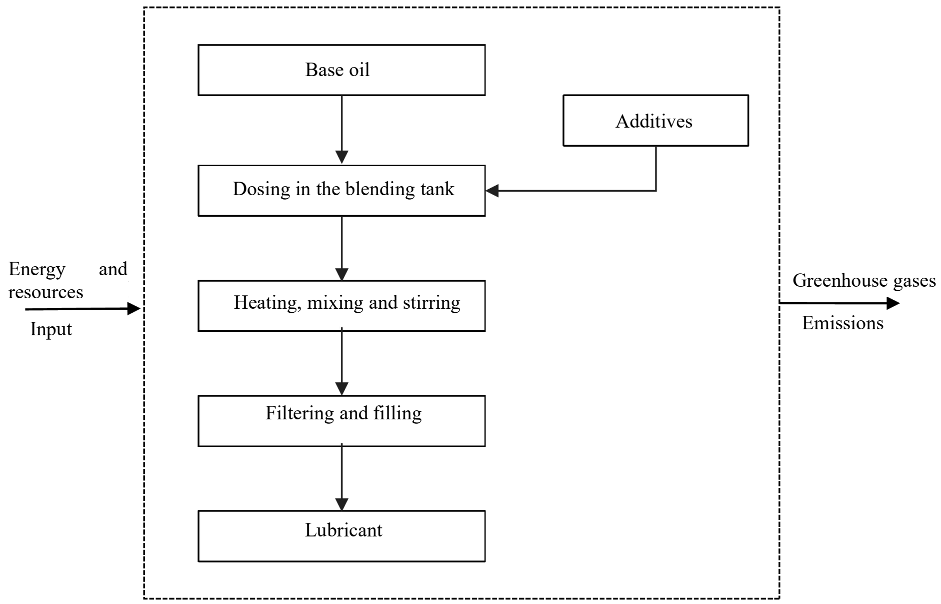

Figure 4.20 System Boundary for the Accounting of Carbon Emissions from Lubricant

4.1.21 Brake Fluid

4.1.21.1 Functional Unit

The production of 1kg brake fluid in the plant.

4.1.21.2 Accounting Boundary

In this document, the system boundary for carbon emissions from brake fluid includes processes such as mixing, dosing, stirring, discharging and dispensing, as shown in Figure 4.21.

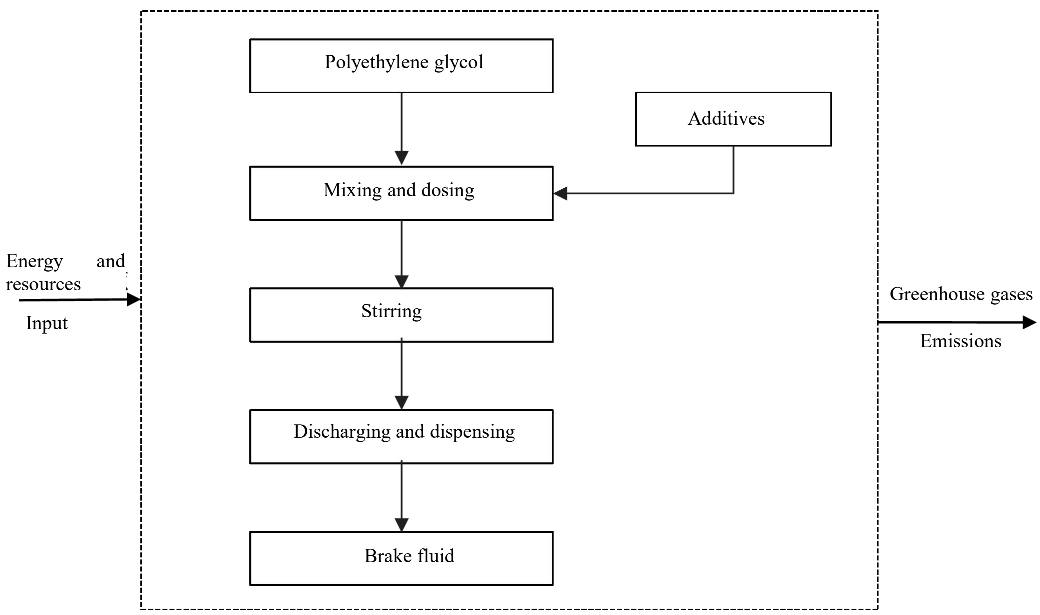

Figure 4.21 System Boundary for the Accounting of Carbon Emissions from Brake Fluid

4.1.22 Coolant

4.1.22.1 Functional Unit

The production of 1kg coolant in the plant.

4.1.22.2 Accounting Boundary

In this document, the system boundary for carbon emissions from coolant includes processes such as water softening, stirring and temporary storage and dispensing, as shown in Figure 4.22.

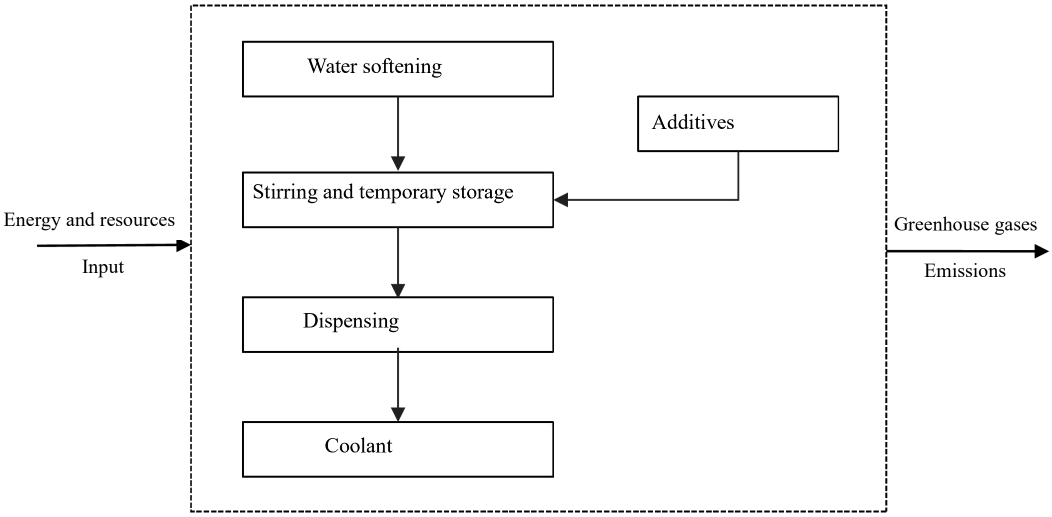

Figure 4.22 System Boundary for the Accounting of Carbon Emissions from Coolant

4.1.23 Refrigerant

4.1.23.1 Functional Unit

The production of 1kg refrigerant in the plant.

4.1.23.2 Accounting Boundary

In this document, the system boundary for carbon emissions from refrigerant includes processes such as the production and fluorination of chlorotrifluoroethane, as shown in Figure 4.23.

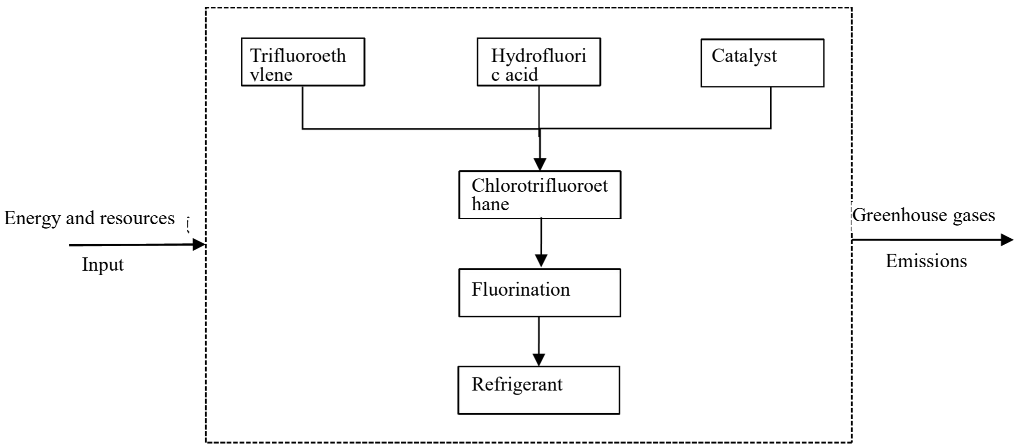

Figure 4.23 System Boundary for the Accounting of Carbon Emissions from Refrigerant

4.1.24 Cleaning Solution

4.1.24.1 Functional Unit

The production of 1kg cleaning solution in the plant.

4.1.24.2 Accounting Boundary

In this document, the system boundary for carbon emissions from cleaning solution includes processes such as water softening, stirring and temporary storage and dispensing, as shown in Figure 4.24.

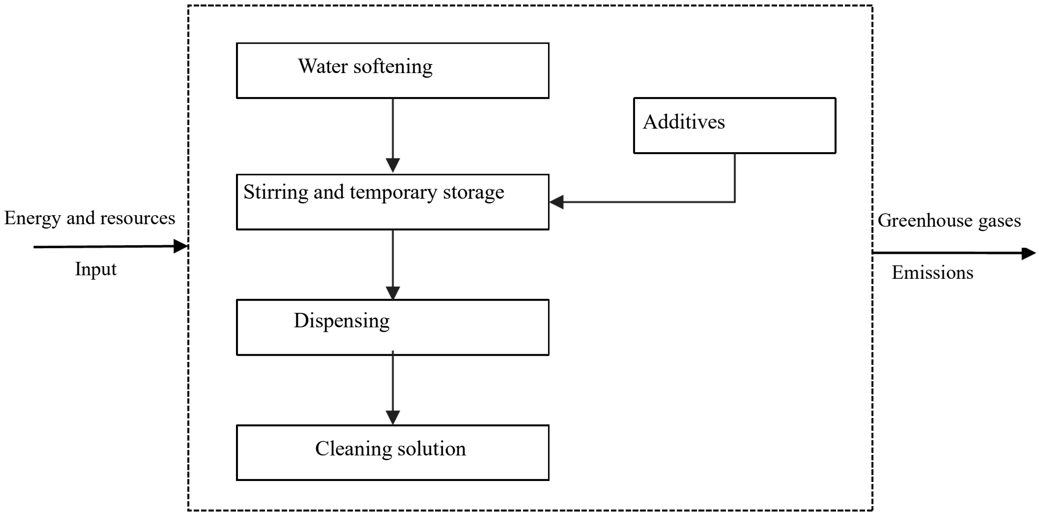

Figure 4.24 System Boundary for the Accounting of Carbon Emissions from Cleaning Solution

4.1.25 Lithium-ion Power Battery Pack

4.1.25.1 Functional Unit

The production of 1kWh lithium-ion power battery pack.

4.1.25.2 Accounting Boundary

In this document, the system boundary for carbon emissions from lithium-ion power battery pack includes processes such as resources extraction, processing and purification, production and manufacturing of various original materials, as shown in Figure 4.25.

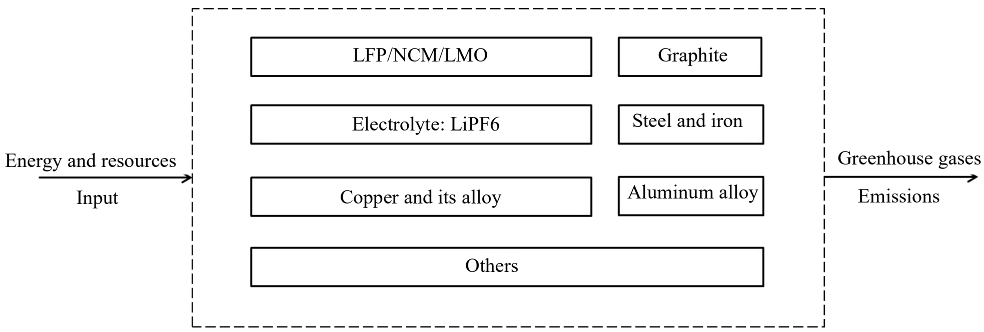

Figure 4.25 System Boundary for the Accounting of Carbon Emissions from Lithium-ion Power Battery Pack

4.1.26 Biological Materials

4.1.26.1 Functional Unit

The production of 1kg biological materials in the plant.

4.1.26.2 Accounting Boundary

In this document, the system boundary for carbon emissions from biological materials produced by non-waste includes processes such as planting, harvesting, and production of biological materials, as shown in Figure 4.26.

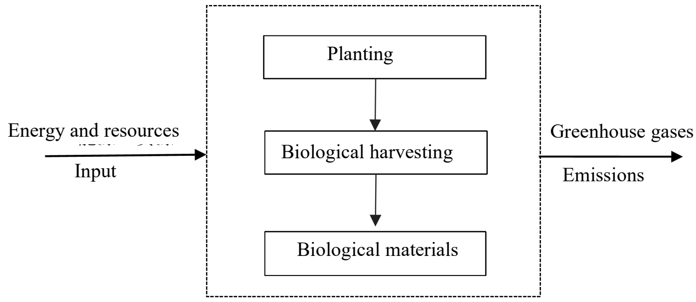

Figure 4.26 System Boundary for the Accounting of Carbon Emissions from Biological Materials Produced by Non-waste

In this document, the system boundary for carbon emissions from biological materials produced by waste includes the carbon footprints generated from the waste processing process only, as shown in Figure 4.27.

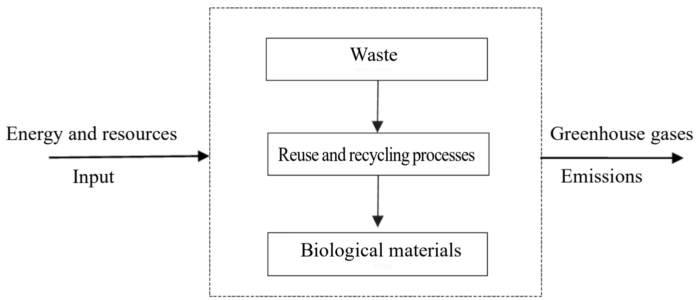

Figure 4.27 System Boundary for the Accounting of Carbon Emissions from Biological Materials Produced by Waste

4.1.27 Recycled Materials

4.1.27.1 Functional Unit

The production of 1kg recycled materials in the plant.

4.1.27.2 Accounting Boundary

The boundary shall be determined according to the actual situation. It shall include processes such as the processing and re-manufacturing of recycled materials produced by waste materials and exclude material use and scraping; infrastructure such as manufacturing of equipment for production and plant construction is not included in the boundary.

4.1.28 Other Homogeneous Materials

4.1.28.1 Functional Unit

The production of 1kg homogeneous materials in the plant.

4.1.28.2 Accounting Boundary

The boundary shall be determined according to the actual situation. It shall include processes such as resources extraction, processing and purification, production and manufacturing and exclude use and disposal; infrastructure such as manufacturing of equipment for production and plant construction is not included in the boundary.

Appendix 5

Accounting Scope of Carbon Emissions from Vehicle Production

5.1 Accounting Scope of Carbon Emissions from Vehicle Production

5.1.1 Functional Unit

The production of one passenger car in the plant.

5.1.2 Accounting Boundary

The accounting boundary includes carbon emissions from the stamping, welding, painting, final assembly and power station processes of vehicle production. Stamped parts included in the accounting of carbon emissions in the vehicle production stage include doors, trunk, fenders and engine cover.

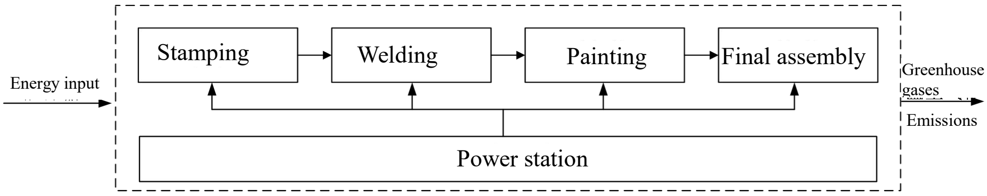

Figure 5.1 Accounting Boundary of Vehicle Production

Appendix 6

Types of Carbons (GHGs)

The types and GWP of carbons (GHGs) are shown in 6.1.

Table 6.1 Types and GWP of Carbons (GHGs)

Industrial Name or Generic Name	Molecular Formula	100-Year GWP
CO_2	CO_2	1
Methane	CH_4	27.9
Nitrous oxide	N_2O	273
HFCs	HFC-23	14600
	HFC-32	771
	HFC-41	135
	HFC-125	3740
	HFC-134	1260
	HFC-134a	1530
	HFC-143	364
	HFC-143a	5810
	HFC-152	21.5
	HFC-152a	164
	HFC-161	4.84
	HFC-227ca	2980
	HFC-227ea	3600
	HFC-236cb	1350
	HFC-236ea	1500
	HFC-236fa	8690
	HFC-245ca	787
	HFC-245cb	4550
	HFC-245ea	255
	HFC-245eb	325
	HFC-245fa	962
	HFC-263fb	74.8
	HFC-272ca	599
	HFC-329p	2890
	HFC-365mfc	914
	HFC-43-10mee	1600
	HFO-1123	0.005
	HFO-1132a	0.052
	HFO-1141	0.024

Industrial Name or Generic Name	Molecular Formula	100-Year GWP
	HFO-1225ye(Z)	0.344
	HFO-1225ye(E)	0.118
	HFO-1234ze(Z)	0.315
	HFO-1234ze(E)	1.37
	HFO-1234yf	0.501
	HFO-1336mzz(E)	17.9
	HFO-1336mzz(Z)	2.08
	HFO-1243zf	0.261
	HFO-1345zfc	0.182
	3,3,4,4,5,5,6,6,6-Nonafluorohex-1-ene	0.204
	3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluorooct-1-ene	0.162
	3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-Heptadecafluorodec-1-ene	0.141
PFCs	PFC-14	7380
	PFC-116	12400
	PFC-218	9290
	PFC-C-318	10200
	PFC-31-10	10000
	Octafluorocyclopentene	78.1
	PFC-41-12	9220
	PFC-51-14	8620
	PFC-61-16	8410
	PFC-71-18	8260
	PFC-91-18	7480
	1,1,2,2,3,3,4,4,4a,5,5,6,6,7,7,8,8, 8a-octadecafluoronaphthalene	7800
	1,1,2,2,3,3,4,4,4a,5,5,6,6,7,7,8,8, 8a-octadecafluoronaphthalene	7120
	PFC-1114	0.004
	PFC-1216	0.09
	1,1,2,3,4,4-hexafluorobuta-1,3-diene	0.004
	Octafluoro-1-butene	0.102
	Octafluoro-2-buene	1.97
Sulfur hexafluoride	SF_6	25200
Nitrogen trifluoride	NF_3	17400

Note:

Data source: *Sixth Assessment Report of Intergovernmental Panel on Climate Change* (IPCC)