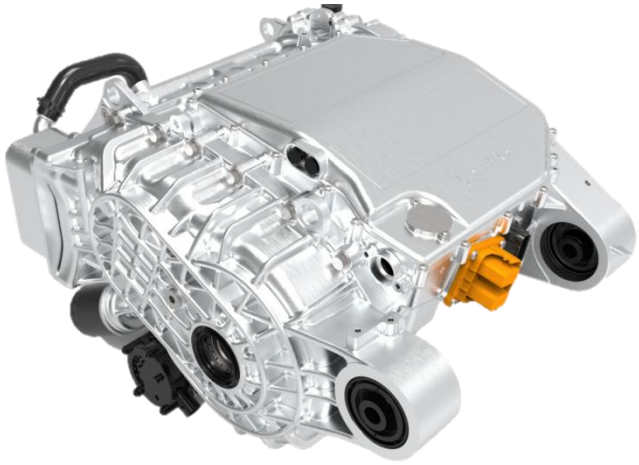
电动汽车用驱动电机系统产品类别规则

(征求意见稿)

PCR FOR THE DRIVE MOTOR SYSTEM FOR ELECTRIC VEHICLES

(Draft for open consultation)



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Content

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PCR development log (this section is for first edition PCR)

Period	Status	Notes
July—August 2024	Completed	PCR feasibility assessment
August-December 2024	Completed	Background research
January-October 2025	Completed	PCR group writing and compile
23rd October 2025	Completed	PCR draft for open consultation
23rd October-23rd December 2025	Ongoing	Open consultation stage
-	Pending	PCR verification based on ISO 14027
-	Pending	Finalization of draft

Revision Log (this section is for the PCR that is updated based on the formal version)

This is an overview of the changes made to this PCR. Type of changes:
- Editorial (ed): Text or layout edited, with no change in content.
- Technical (te): Existing content has been changed.
- Addendum (ad): New content has been added.

Date	Version No.	Type	Description of change
		/	/

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1. Introduction

1.1 General Information

Background of this PCR

This document is a Product Category Rules (PCR) that has been developed within the framework of EPD China, which is a program for type III environmental declarations according to ISO 14025:2006.The development of this document takes into account existing PCR and other international standards that may be cited for PCR to avoid unnecessary overlap in scope and to ensure harmonization of established methods related to product categories. The PCR is called the "PCR FOR THE DRIVE MOTOR SYSTEM FOR ELECTRIC VEHICLES" and the latest version of the PCR can be downloaded from www.epdchina.cn .

Standards

This PCR is developed according to the standards and reference information below to ensure different LCA practitioners generate consistent results while developing an EPD or carbon footprint (CFP) report.

References and standards

Standard ID	Standard name
ISO 14025:2006	Environmental labels and declarations - Type Ⅲ environmental declarations - Principles and procedures
ISO 14021:2016	Environmental labels and declarations - Self-declared environmental claim (Type II environmental labelling)
ISO 14040:2006	Environmental management - Life cycle assessment - Principles and framework
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines
ISO 14067:2018	Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification and communication
ISO 14046:2014	Environmental management - Water footprint - Principles, requirements, and guidelines
ISO 21930:2017	Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
ISO 14001:2015	Environmental management systems - Requirements with guidance for use
ISO 9001:2015,	Quality management systems – Requirements
ISO 22628:2022	Road vehicles – Recyclability and recoverability - Calculation method
EN 50693:2019	Product category rules for life cycle assessments of electronic and electrical products and systems
GB/T 24067-2024	Greenhouse gases-Carbon footprint of products-Requirements and guidelines for quantification
GB/T 19515-2023	Road vehicles – Recyclability and recoverability rate – Requirement and calculation method
GB/T 19596-2017	Terminology of electric vehicles
GB/T 18488-2024	Drive motor system for electric vehicles

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GB/T 26989-2011	Automobile recovery Terminology
T/CECA-G 0159-2022	Cycle efficiency of electric drive system for electric vehicle-Requirement and test method
T/CAAMTB 134-2023 T/CECA-G 0239-2023	Assessment requirements for quality grading and forerunner—Drive Motor System for Electric Vehicles

Historical version of this PCR

None

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1.2 Administrative Information

Administrative information

PCR Name	Product Category Rules for Drive Motor Systems for Electric Vehicles
Registration number	EPDCN-PCR-202410
Version No.	–
EPD Operator	EPD Promotion Center- EPD China Programme
EPD Operator Information	EPD Promotion Center- EPD China Programme Website: www.epdcchina.cn E-mail: secretary@epdchina.cn
PCR Working Group	Participating Experts： 秦歌(Ge Qin) XPT EDS (Hefei) Co., Ltd. 彭源丰(Yuanfeng Peng) Nio Co., Ltd. 王志明(Zhiming Wang) XPT EDS (Hefei) Co., Ltd. 孟大海(Dahai Meng) Nio Co., Ltd. 任钟鸣(Zhongming Ren) Shanghai University of Engineering Science Børge Heggen Johansen, epd-global Christofer Skaar, Asplan Viak PCR development work management and coordination: Håkon Hauan, epd-global Signe Nielsen, epd-global 云菲(Fei Yun) EPD China 曾榆植(Yuzhi Zeng) EPD China
Publication date	***Final Draft Date***
Expiration date	***Valid for 5 years (Expiration date based on final draft date)***
PCR Renewal schedule	Once a PCR is developed and published, it will become effective and used to carry out environmental impact assessment statements for products and services, including carbon footprint statements. In order to ensure the cycle stability of the statement, the drafter of the PCR needs to contact the Secretariat to apply for renewal within 3-6 months before the expiration of the PCR. If no contact is made before the expiration date, the PCR is considered invalid.
PCR Standards conformance	EPD Promotion Center GPI Project Guidelines 3.1, released on January 22, 2024 EPD Promotion Center PCR Universal Template 2.0, released on August 19, 2024
PCR Language(s)	The PCR will be constructed in Chinese or in English, but the Chinese version shall be the standard. For related links, please refer to www.epdchina.cn

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1.3 PCR Verification

PCR Verification

PCR Review Group	A complete list of members of the review group is available at www.epdchina.cn . Review group can be accessed via pcr@epdchina.cn . Experts in review group are required to explain any potential conflicts of interest to the EPD Promotion Center office, and they are not allowed to participate in the review if there is a conflict of interest.
PCR Review Group Chair	Name Company and Title (Email address)
PCR Review Group member	Name Company and Title (Email address)
Review Conclusions	***Fill in as the review report truly is***
Review Date	***Fill in as the review report truly is***

2. Scope of this PCR

2.1 Technical scope of this PCR

The product groups covered by this PCR include such as:

This PCR is suitable for driving motor systems for electric vehicles. "Electric vehicles" shall comply with the provisions of GB/T 19596-2017 Terminology for Electric Vehicles, which includes pure electric vehicles, hybrid electric vehicles and fuel cell electric vehicles.The "drive motor system" shall comply with the provisions of "GB/T 18488-2024 Drive Motor System for Electric Vehicles". The drive motor system is a system installed on electric vehicles to provide driving force for the vehicle and realize the mutual conversion between mechanical energy and electrical energy, including the drive motor, drive motor controller and auxiliary devices necessary for their work.

The drive motor system is a key core component of electric vehicles. Its function is to provide driving force for the vehicle and realize the mutual conversion between mechanical energy and electrical energy.

This PCR applies to both integrated drive motor systems and split drive motor systems. An integrated drive motor system is a combination of a drive motor, a drive motor controller, and auxiliary devices necessary for their operation, integrated into one drive motor system. A split drive motor system is a drive motor system in which the drive motor and the drive motor controller are not integrated into one. Gearbox oil and coolant are not included. The types of integrated drive motor systems are as follows:

This PCR does not apply to subsystems and components in the drive motor system.

Integrated drive motor system type

Product Type	Product Components
Type 1	Drive motor
	Motor Controller
Type 2	Drive motor
	Motor Controller
	Gearbox
Type 3	Dual drive motor
	Motor Controller
	Gearbox
Type 4	Drive motor
	Motor Controller
	Gearbox
	High-voltage auxiliary devices (on-board charger OBC, DC/DC converter, high-voltage power distribution unit PDU, air conditioning heater PTC, battery management system BMS, etc.)

If a product exceeds the above range but has a reasonable reason to use this PCR, please contact the EPD Promotion Center Office to explain the product's functions and uses. The EPD Promotion Center Technical Committee will discuss and decide whether the product can use this PCR.

2.2 Geographical scope

This PCR can be used worldwide.

2.3 EPD Validity

An EPD based on this PCR shall be valid from its registration and publication at www.epdchina.cn and for a five-year period starting from the date of the verification report ("approval date"), or until the EPD has been de-registered from the offical website of EPD Promotion Center.

This PCR will not be valid under the following circumstances:

- The updated version of PCR is published on the EPD Promotion Center website;
- This PCR is not officially published and publicly available on the EPD Facilitation Center website.

The EPD based on this PCR shall be updated and re-verified if the following circumstances occur:

- Any environmental impact index of the product changes by 10% or more due to materials, workmanship or other reasons;
- Errors are found in the EPD declaration information during the annual or periodic review;
- Changes in product information, content claims or additional environmental information

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declared by the EPD, or

- The owner of the EPD has changed, the model number has been increased or decreased, or the production location has changed

3. Terms, definitions, and abbreviations

3.1 Terms and definitions

Environmental Product Declaration (EPD)

Environmental Product Declaration provide quantified environmental data using pre-determined parameters and, where relevant, additional environmental information.

[ISO 14025:2006]

Life cycle assessment (LCA)

Calculate and evaluate the inputs, outputs and potential environmental impacts of a product throughout its life cycle stages.

[ISO 14044: 2006]

Life cycle inventory analysis(LCI)

Phase of a life cycle assessment. Involves the compilation and quantification of the inputs and outputs of a product throughout its life cycle.

[ISO 14044: 2006]

Life cycle impact assessment(LCIA)

The phase of life cycle assessment aims to understand and evaluate the magnitude and significance of the potential environmental impacts of a product system throughout the product's life cycle.

[ISO 14044: 2006]

Product category rules(PCR)

A specific set of rules, requirements and guidance for the communication of Type III environmental declarations and footprint information for a specified product category or categories.

[ISO 14025: 2006]

Sensitivity analysis

A systematic procedure for estimating the impact of chosen methods and data on research results.

[ISO 14044: 2006]

Waste

Substances or articles that the holder intends to dispose of or is required to dispose of

[GB/T 24067-2024]

Functional unit

Used as a benchmark unit to quantify product system performance.

[ISO 14044: 2006]

Declared unit

A benchmark used as a reference unit in an environmental impact statement.

[EN 15804:2012]

Recycled material

Recycled materials are reused in the production process to make final products or product components.

[ISO 14021:2016]

Recovered material

Materials that might otherwise have been disposed of as waste or used for energy recovery are instead collected or recovered for use as material input, replacing new primary materials in a recycling or production process.

[ISO 14021:2016]

Proven recycling technology

Reuse technology for automotive materials that have reached mass production or trial production scale already exists.

[GB/T 19151-2023]

Recyclability rate

The percentage of the vehicle's mass that can be reused and/or recycled.

Note: In this PCR, the scope is adjusted from the entire vehicle to the drive motor system.

[GB/T 19151-2023]

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Recoverability rate

The percentage of the vehicle's mass that can be reused and/or recycled and/or recovered.

Note: In this PCR, the scope is adjusted from the entire vehicle to the drive motor system.

[GB/T 19151-2023]

Drive motor system

A system installed on electric vehicles to provide driving force for the vehicle and realize the mutual conversion between mechanical energy and electrical energy.

Note: It includes the drive motor, drive motor controller and auxiliary devices necessary for their operation. The auxiliary devices include the speed change device integrated with the drive motor.

[GB/T 18488-2024]

Integrated drive motor system

A combination of a drive motor, a drive motor controller and auxiliary devices necessary for their operation, integrated into an integrated drive motor system.

[GB/T 18488-2024]

Split drive motor system

A drive motor system in which the drive motor and the drive motor controller are not integrated.

[GB/T 18488-2024]

3.2 Abbreviations

CPC Central production classification 核心产品分类
GPI General Programme Instructions 通用程序指南
EPD Environmental product declaration 产品环境影响声明
PCR Production category rules 产品种类规则
LCA Life cycle assessment 生命周期评价
LCI Life cycle inventory 生命周期清单
LCIA Life cycle impact assessment 生命周期影响评价
PEF Product Environmental Footprint 产品环境足迹
RSL Reference service life 参考使用寿命
PPP Polluter Pays Principle 污染者付费原则
CAMDS China Automotive Material Data System 中国汽车材料数据系统
IMDS International Material Data System 国际材料数据系统
IPCC The Intergovernmental Panel on Climate Change 政府间气候变化专门委员会

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4. Life cycle assessment methodology

4.1 Goal and Scope

The objectives of this PCR study are as follows:

1. Based on life cycle assessment, clear and unified rules and requirements for EPD in electric vehicle drive motor systems have been issued.
2. Provide adjustable cradle-to-door environmental impact data of drive motor system for EPD or product carbon footprints for the entire vehicle product;
3. To ensure product comparability, EPD holders can only compare the environmental performance of products produced at different times, and can issue specific carbon reduction statements for their carbon footprint;
4. In general, it is not recommended to use EPD results directly to compare different products produced by different companies. If comparison needs to be made, the relavant requirements for comparability in ISO 14025 need to be met.

4.2 Functional Unit or Declaration Unit

In this PCR, the functional unit of the product is: a drive motor system that provides 1 kW peak power during the reference service life (RSL). The peak power is calculated according to the requirements of ISO 18488-2024.

When product functionality is uncertain or unknown, declaration units should be used instead of function units. The declaring entity should be noted in the EPD. In this PCR, the product declaration unit is a drive motor system.

Other performance of the product should be disclosed in the EPD report, including but not limited to product type, product weight (kg), peak power (kW), continuous power (kW), peak torque (Nm), maximum speed (Rmp), rated voltage (V), system efficiency (%), cooling method, design life, application model, etc. Some of the above performance indicators should be provided with reference to the technical requirements of GB/T 18488-2024 "Drive Motor System for Electric Vehicles".

4.3 Lifespan and reference service life

In this PCR, the reference service life (RSL) of the drive motor system product is determined by the warranty period of the product.

1. If there is a warranty period for the drive motor system, the warranty period shall prevail;
2. If there is no warranty period for the drive motor system, but there is a warranty period for the parts contained in the vehicle or the drive motor system, the warranty period shall prevail.
3. If the warranty period provided by the manufacturer includes both years and miles, convert the mileage into equivalent years according to the conversion factors in the table below, and then compare the converted years with the fixed warranty years. The years and miles are

converted according to the following relationship.

The relationship between the operating life and mileage of the drive motor system

Applicable vehicle categories	Applicable vehicle categories		Conversion relationship	Conversion Factor k
Light Vehicles	passenger car		Annual mileage calculated as 15000km	15000
	Light commercial vehicles		Annual mileage calculated as 40000km	40000
Heavy Commercial Vehicles	Bus	City Bus	Annual mileage calculated as 40000km	40000
		Ordinary bus		
	Truck	GVW≤5500kg	Annual mileage calculated as 40000km	40000
		GVW＞5500kg		
	Dump Truck		Annual mileage calculated as 40000km	40000
	Semi-trailer Tractor		Annual mileage calculated as 40000km	40000

4. If the same drive motor system is used in several different models or there are multiple warranty plans, the one with shortest warranty period will prevail.
5. If there is no warranty period or the warranty period does not meet the requirements, the default is 5 years.

Reference Service Life (RSL) must be precisely declared in the "Product Information" section of EPD and should provide relevant supporting documents.

4.4 System Boundary and Life cycle Stages

The full life cycle of the product is divided into the following stages:

- Production stage (A1-A3)
- Distribution stage (A4)
- Installation stage (A5)
- Use stage (B1-B7)
- End of life stage (C1-C4)
- Module D

In this PCR, some life cycle stages (such as those not included in A5, B1 and C1) are not considered, as follows:

- Installation stage (A5): Due to the small consumables and energy consumption at this stage, and there is generally no separate statistics, the inventory of this part is not collected in this PCR;
- Use stage (B1): The impact of the components of the driving motor system on the environment during use. During the use of the driving motor system, its components will not produce substances that can be released into the air and soil, so this process is not considered in this PCR.
- Waste stage (C1): Drive motor system products to disassemble, separate, pretreat (such as gearbox oil treatment) from vehicle parts, etc. In this PCR, this part of the data is not collected in the inventory.

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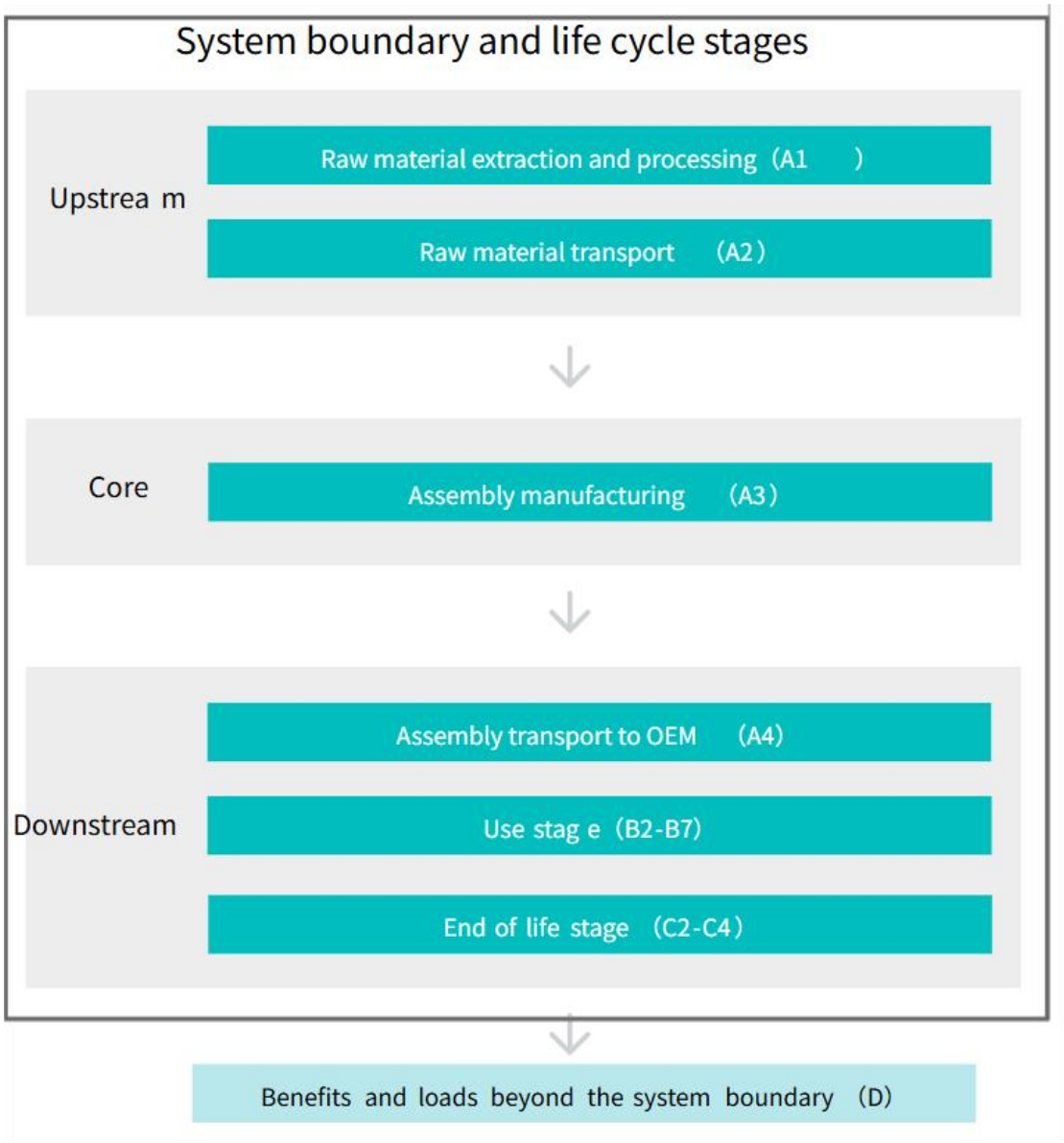
For the environmental impact assessment of drive motor system products, this PCR should be based on the following system boundaries:

If a functional unit is used to declare, the system boundary is: from the cradle to the grave, including A1-A4, B2-B7, C2-C4 and D modules (partially optional).

If the declaration unit is used to declare, the system boundary is from the cradle to the gate, including the A1-A3 module.

The boundary and life cycle stage of the driving motor system product are shown in the figure below.



Drive motor system product system boundary diagram

4.4.1 Life cycle stages

The complete life cycle of drive motor system products is divided into the following stages:

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1. Drive motor system production stage（A1-A3）
2. Drive motor system transportation stage（A4）
3. Drive motor system installation stage（A5）
4. Drive motor system use stage (B2-B7)
5. Drive motor system end-of-life stage (C1-C4)
6. Burden and benefits beyond product system boundaries（D）

Life cycle stage

Drive motor system production stage(A1-A3)	A1 Raw material acquisition and processing
	A2 Raw material transportation
	A3 Drive motor system assembly production
Drive motor system transportation stage(A4)	A4 Drive motor system transportation
Drive motor system installation stage(A5)	A5 Drive motor system installation
Drive motor system use stage(B2-B7)	B2 Drive motor system maintenance (optional)
	B3 Drive motor system parts maintenance (optional)
	B4 Drive motor system parts replacement(optional)
	B5 Drive motor system refurbishment(optional)
	B6 Drive motor system operating energy consumption(optional)
	B7 Drive motor system water consumption(optional)
Drive motor system end-of-life stage(C1-C4)	C1 End-of-life drive motor system transportation
	C2 End-of-life drive motor system dismantling
	C3 Disposal or sorting of materials/parts for end-of-life drive motor system
	C4 Waste incineration or landfill
Burden and benefits beyond product system boundaries（D）	D Reuse, Recover and/or Recycle(optional)

At each process or life cycle stage, the following life cycle inventories need to be included respectively.

Raw material acquisition and processing（A1）

This lifecycle stage covers all production activities prior to the production of the drive motor system assembly, including:

- Mining, extraction, conversion and processing of raw and subsidiary materials required at this stage. For example: alloy steel, cast iron, silicon steel, magnet steel, aluminum alloy, copper, ceramics, plastics, rubber and adhesives.
- If the raw and auxiliary materials are recycled materials, the recycling and reprocessing process of recycled materials from other product systems must be included.
- The processing from materials to finished products of sub-parts required for parts production. Sub-parts are generally parts of the finished parts purchased outside, and may also be parts manufactured in the parts factory. For example: production of stator assembly required sub-parts: stator core, enameled wire, insulation paint, insulation

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sleeve, insulation paper, temperature sensor, connector, etc.; production of rotor assembly required sub-parts: rotor core, plastic injection, Magnet, input shaft , etc. The list of sub-parts is based on the product BOM.

- Production and assembly process of parts. Parts are input components of the core stage drive motor system assembly production. For example, housing, stator assembly, rotor assembly, half shaft, intermediate shaft, ring gear differential assembly, etc. The parts list shall be based on the product BOM.
- If sub-parts, parts involved in multi-site processing, that is, semi-finished products processing (such as outsourcing machining, heat treatment, spraying, etc.), need to include semi-finished products processing.
- The production process of the energy (electricity, fuel, steam, etc.) used in this stage.
- Waste treatment processes involved in this phase. The environmental impacts of the waste treatment processes in this phase should be allocated to co-products according to the allocation rules in Chapter 4.7. The environmental burdens or benefits allocated to co-products should not be declared in Module D.
- The transportation process within each processing plant is integrated into the production process calculation.
- Packaging materials are not included.
- Including but not limited to the above.

Raw material transportation（A2）

This life cycle stage covers all transport activities prior to the production of the drive motor system assembly, as follows:

- Transportation process of raw and auxiliary materials to the downstream plant;
- Transportation of sub-parts to downstream plants;
- Transportation of parts to drive motor system assembly production plants;
- If semi-finished product processing exists, it needs to include the transportation process between factories;
- Mode of transport and distance of transport should be disclosed in the EPD report.
- Including but not limited to the above.

Drive motor system assembly production（A3）

This life cycle stage covers all production processes of the drive motor system assembly, as follows:

- The manufacturing process of the drive motor system assembly.
- Waste gas, waste water, waste generated in the manufacturing process, such as landfill, incineration, etc.; in the case of recyclable solid waste (e.g., scrap metal chips, waste packaging, non-conforming products, etc.), the transportation of recyclable solid waste to the recycling plant. The environmental impact of the waste treatment process at this stage should be allocated to co-products in accordance with the rules for allocation in Chapter 4.7 and the environmental burdens or benefits assigned to co-products should not be declared in module D.

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- Drive motor system transportation processes within the plant, which can be incorporated into manufacturing process calculations.
- Production of energy (electricity, fuel, steam, etc.) used to drive the motor system assembly production process.
- Packaging materials are not included
- Including but not limited to the above.

Transportation Stage（A4）

This life cycle stage covers the transportation process of the drive motor system assembly to the vehicle factory, as follows:

- The transportation process of the drive motor system assembly to the vehicle factory.
- If there are multiple destinations for transportation, a weighted average will be calculated based on the weight ratio.
- The mode of transport and distance of transport should be disclosed in the EPD report.
- Storage operations are not included.

Installation Stage（A5）

- The installation process of the drive motor system in the vehicle factory.
  Since the consumables and energy consumption in this stage are relatively small and generally not counted separately, an inventory of this part will not be collected in this PCR.

Use Stage（B1-B7）

This life cycle stage begins when the drive motor system is delivered to the user, and ends when the drive motor system or the drive motor system included in the vehicle begins to be disposed of or discarded by the user, as follows:

- B2：Maintenance procedures for drive motor systems.
- B3：Repair procedures for drive motor system parts.
- B4：Replacement for drive motor system parts due to malfunction.
- B5：Repair/refurbishment for drive motor system due to malfunction.
- B6：
  Power loss of drive motor system products during reference service life

$$E = （0.7 \times （1 - \eta_{常温}） \times \left(\frac{E_{ci}}{L_c}\right)_{常温} + 0.3 \times （1 - \eta_{高温}） \times \left(\frac{E_{ci}}{L_c}\right)_{高温} ） \times L_{RSL}$$

E： Total electrical energy consumption of the drive motor system during the reference service life, in kWh

E_{ci}： Total electric energy consumed by the drive motor system under specified test conditions and test methods, unit "kWh"

$$E_{ci} = \int_{试验开始}^{试验结束} U_T * I_T \, dt$$

Among them,

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U_T：The DC bus voltage of the test object, unit "V"

I_T：The DC bus current of the test object, unit "A"

η：Conversion efficiency under room temperature or high-temperature test conditions

L_c：The mileage of electric vehicle with the drive motor system under the specified test conditions and test methods, in "km"

L_{RSL}：Total running mileage of the drive motor system within the reference service life, in "km"

The quantification methods of E_{ci}、L_c、$\eta_{常温}\ and\ \eta_{高温}$ are implemented in accordance with Appendix C of the standard T/CECA-G 0239-2023.

B7: The water consumption for operating the drive motor system , if no water is used then calculate as 0.

In this PCR, inventory data for the B2-B5 process can be collected and disclosed as an option.

End-of-life Stage(C1-C4)

This life cycle phase begins when the drive motor system or the drive motor system included in the vehicle is disposed of or discarded by the downstream user and ends when the drive motor system is returned to nature as waste or recycled into another product, as follows:

- C1：Disassembly, separation, and pretreatment of drive motor system products from vehicle parts (such as treatment of coolant and gearbox oil). In this PCR, this part of data is not included in the inventory collection.
- C2：Transportation of the scrapped drive motor system to the dismantling plant, if it is transported to the scrapping plant together with the whole vehicle, then this part of the transportation should be the transportation of the scrapped whole vehicle to the scrapping plant. , and distribute based on mass.
- C3：Sorting and processing of materials and parts.
- C4：Incineration and landfill.

At the end-of-life stage, the manufacturer shall submit a data table of the reusability and recyclability of the drive motor system with reference to ISO 22628:2002/ GB/T 19515-2023 as default. The table shall be provided with reference to Appendix A and Appendix B, and the reusability and recyclability shall be calculated for verification and review. All data must ensure the traceability of their sources. This PCR recognizes data from CAMDS and IMDS systems.

The scenarios of the waste stage can also be modeled based on actual scenarios or with assumptions. The assumptions made should be clearly recorded and made sure feasible in terms of technology, economy, and laws and regulations.

3R Relationship between reusability and recycling rate

	Recyclable	Remaining undefined material

<table>
<tr><td>（Parts）
Reuse</td><td>（Materials）
Recycle</td><td rowspan="2">（Materials）
Energy recovery</td><td rowspan="3">（Materials）</td></tr>
<tr><td colspan="2">Recyclability</td></tr>
<tr><td colspan="3">Recyclability rate</td></tr>
<tr><td colspan="4">Drive system quality</td></tr>
</table>

The degradation of a product's biogenic carbon content in a solid waste disposal site, declared as GWP-biogenic, shall be calculated without time limit. Any remaining biogenic carbon is treated as an emission of biogenic CO2 from the technosphere to nature.

Benefits and burdens beyond product system boundaries(D)

D: Reuse, Recover and/or Recycle

The environmental burden and potential benefits of recycling and reusing products beyond the original product system boundary are reported separately in Stage D of the EPD report. EPD users can decide to adopt the following allocation principles:

Default Polluter Paid Principle (PPP) Distribution Principles – Within the framework of the EPD Promotion Center, the default distribution rules for environmental impacts and benefits of recycling and/or reuse are based on the Polluter Paid Principle (PPP),that is, the party that benefits from the recovery or reuse process bears the relevant environmental impacts and benefits of the recovery or reuse process, and the original product manufacturer does not need to bear this part of the impact burden, nor does it participate in sharing the benefits (due to the environmental impact caused by the production of equivalent products avoided by recycling and reuse), and the results of this part are not incorporated into the results of the product's waste stage, and need to be counted and declared separately.

If the user of the EPD generated based on this PCR wishes to consider the impacts and benefits of stage D during use, the recommended allocation calculation formula and the referenced principles (such as the economic value allocation principle or the cascade utilization allocation principle) need to be explained additionally; in order to avoid double counting and confusion in the value chain process, it is recommended to adopt the default PPP principle.

Processes not considered at the product stage

The following processes are not included in the system boundary of the Drive Motor System product:

- Manufacturing of production equipment, factory buildings and other infrastructure
- Maintenance of production equipment, factory buildings and other infrastructure
- Lighting, heating, sanitation and infrastructure cleaning
- Staff business travel
- Staff commuting
- Accidents or environmental accidents

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- Administration, management and R&D activities
- Product-related marketing activities
- Staff catering facilities

4.4.2 Other boundary settings

Boundary towards nature

Boundaries towards nature are defined as where the flows of material and energy resources leaves nature and enters the technical system (i.e. the product system). Emissions cross the system boundary to nature when they are emitted to air, soil or water.

Boundary towards other technical systems

Boundaries towards other technical systems define the flow of materials and parts to/from the product system under study and from/to other product systems. If there is an inflow of recycled material to the product system in the production/manufacturing stage, the transportation from the scrapyard/collection site to the recycling plant, the recycling process, and the transportation from the recycling plant to the site where the material is being used shall be included. If there is an outflow of materials or parts from the production/manufacturing process, the transportation of materials to the scrap yard/collection site should be included.

Temporal boundary

The temporal boundary defines the time period for which the life cycle inventory data is recorded, e.g. for how long emissions from waste deposits are accounted. As default, the time period over which inputs to and outputs from the product system are accounted for shall be 100 years from the year that the LCA model best represents, considering the representativeness of the inventory data. The starting year should be as close as possible to the year of publication of the EPD.

Geographical boundary

The geographical boundaries define the geographical coverage of the LCA. This should reflect the physical reality of the product being studied, taking into account the representativeness of the technology, input materials and input energy.

4.5 Cut-off rules

The default cut-off for this PCR is 1%. In other words, the included inventory data (excluding those that explicitly exceed the system boundary described in Chapter 4.5) should together produce results for at least 99% of the environmental impact categories. In addition, at least 99% of the product mass content and at least 99% of the energy use over the product life cycle should be included. However, data exclusion should be avoided and all available inventory data should be used.

According to the above cut-off rules, the cut-offs in the inventory data should be the result of sensitivity analysis or the judgment of experts with experience in similar product systems. In

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addition, it should be possible to verify the information of the cut-offs during the verification. Therefore, the list of data discarded according to the cut-off rules should be recorded in the LCA report, and the EPD developer should provide the auditor with supporting information that the auditor considers necessary for the verification of the cut-off list.

In order to increase transparency and improve structural accuracy, the key raw material parts, regardless of the proportion of quality, cannot be discarded. The list of specific key material types is as follows:

Key material types for drive motor system products

Assembly	Critical Materials/Parts
Drive motor housing assembly	Motor housing/assembly housing
	Motor end cover
Motor Stator Assembly	Stator silicon steel sheet
	varnished wire
Drive motor rotor assembly	rotor core
	magnet steel
Differential System	Differential housing
	Gear
	Shaft Gear
	differential mechanism
	oil pump
Machine controller	Motor controller housing
	Motor controller cover
	Water-cooled plate
	Power Module

4.6 Allocation rules

4.6.1 General allocation rules

1. If possible, it is advisable to avoid allocation through the following methods:
   a) Divide unit processes into two or more sub-processes and collect input and outputs related to these subprocesses.
   b) Expand the product system to include functions related to symbiotic products.
2. If allocation is unavoidable, the inputs and outputs of different products or functions in the system should be divided to reflect the underlying physical relationships between them, that is, they should reflect the way in which inputs and outputs change due to changes in the quantity of products or functions provided by the system.
3. If physical relationships alone cannot be established or used as a basis for allocation (or are too time-consuming), inputs should be allocated between products and functions to reflect other relationships. For example, input and output data can be allocated to by-products in proportion to the economic value of the products. If economic allocation is used, the LCA report should include a sensitivity analysis of the impact of the choice of economic value on the results.

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4.6.2 Co-product allocation rules

There may be co-products in the production of products or the operation of the system, and the distribution should follow the following rules:

1. All kinds of input and output flows should be distributed among various symbiotic products according to physical laws (for example, for the core production process of the driving motor system, priority should be allocated according to output or system quality);
2. If physical laws cannot be defined, the distribution should be based on economic value.
3. Some outputs may include two components of symbiotic products and waste at the same time. At this time, the proportion of the two needs to be determined, and the input and output are only allocated to the symbiotic product part.

4.6.3 Allocation rules for reuse, recovery and/or recycling

Unless otherwise required in the PCR, the polluter pays principle(PPP) allocation approach should be adopted for recycling and recovery processes, and the product should only consider the impact of waste transportation to the treatment plant. When the transportation distance is unknown, reasonable estimates should be made and combined with sensitivity analysis.

If the loads and benefits arising from reuse, recovery and/or recycling beyond the boundaries of the system are quantified, they should be declared separately in Module D of the LCA report. The declared results shall be calculated in accordance with the modeling rules of Module D in EN 15804.

4.7 Data Quality Requirements

The selection of data should follow the requirements of ISO 14040/14044 and GB/T 24067. The data quality information reported by the EPD shall comply with the requirements of EN 15941.

LCA calculations and EPD usually require two different types of data:

Primary data: Quantified values of processes or activities obtained by direct measurements or measurement-based calculations. Primary data obtained from within the product system, also known as field data. Data collected from actual manufacturing plants performing specific processes of product, as well as data on other parts of the life cycle of the specific product system being studied, such as materials or electricity provided by contracted suppliers, enabling data on actual deliveries, transportation based on actual fuel consumption, and related emissions.

Secondary data (also called “background data”): data that does not meet the requirements of primary data and comes from:

- Secondary data are credible data verified by authoritative organizations and can come from databases, public literature, national emission factors, calculated estimated data or other representative data.

- Secondary data may include data obtained from alternative processes or estimates.

4.7.1 General data requirements

In general, field data should always be preferred. The field data collected should be representative. For the most important unit processes, field data should be used even if there is no financial or operational control. If field data are not available, background data should be considered. Background data should be temporally, geographically and technically representative. If background data are used for LCA calculations, an assessment of data quality should be documented.

For drive motor system manufacturing enterprises that have financial or operational control processes, on-site data should be collected. For processes without financial or operational control, data collection should be carried out in the following priority order based on data quality:

1. On-site data that meets data quality requirements.

2. If on-site data meeting quality requirements cannot be obtained, substitute data may be used. Substitute data should come from industry-representative products or products manufactured using similar processes, and serve as replacement data for the specific actual process. Typical examples are as follows:

a) When material input information cannot be obtained due to possible confidentiality reasons, use publicly available material information from industry-representative products for input-output modeling;

b) When specific plastic input parameters (such as HDPE) are not available, use process data for polyethylene plastics. Depending on the specific assessment, the process analyzed, and the contribution to the overall PCF, using polyethylene data as a substitute for polypropylene may also meet requirements.

4.7.2 Data requirements for production stage

Collection of on-site data during the production phase (such as raw material usage, energy consumption, waste generation, etc.) should be based on the average on-site data of the past year. If on-site data have been collected for less than one year, this should be indicated in the EPD report, explaining the rationale and representativeness of the chosen time period and ensuring the data quality requirements are met. The data can be averaged over different periods.

4.7.3 Data requirements for use stage

During the use stage, parameter information regarding stages B2-B7 should be clearly provided, including but not limited to: 1. The names, quantities, and frequencies of maintenance, repair, or replacement parts; 2. All parameter data involved in total energy consumption calculations, ensuring compliance with testing specifications. If this information cannot be provided as required, an alternative calculation plan must be submitted with detailed explanations.

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4.7.4 Electricity mix

For all manufacturing processes, electricity should be modeled in the following order of priority:

1. On-site power generation model: If the power is provided to the factory by the production assets in the energy-consuming factory, or the production assets are connected to the energy-consuming factory through direct and dedicated connection and used for the accounting products, and are not connected to the public power grid, the product can use the on-site power generation model.
2. Power combination model of a specific supplier: If there is a physical connection between the production process and the power supplier, and a power purchase contract is signed between the two, whether it is specifically for renewable electricity (such as power purchase agreement PPA) or (partially) based on fossil fuel power purchase contract.
3. Regional average consumer side power combination data set model: When the supplier-specific power information cannot be obtained, the reviewed life cycle database regional average consumption side power combination data set model should be preferred.
4. National average consumption side power combination data set model.

Note that when the declaration claim of renewable energy that meets the requirements is met or the requirements of green power direct connection is met or used in any priority order, the life cycle secondary data set corresponding to renewable power can be used for this part, and the rest is measured on the regional/national average consumption side.

Note 1: The definition of "Green Power Direct Connection" shall be implemented with reference to the "Notice on Matters Related to the Orderly Promotion of the Development of Green Power Direct Connection" (Development and Reform Energy [2025] No. 650).

Note 2: The renewable power declaration claims that it shall meet the minimum requirements related to reliability, including: the cancelled energy attribute certificate corresponding to the declared electricity, the declared power shall occur in the same time cycle as the power generation represented by the certificate, and renewable energy power generation and actual power consumption are located within the same grid area or national boundary.

All those involved in self-power modeling should explain the power composition, system boundary and other relevant information of the model in EPD.

4.7.5 Data requirements for transportation stage

During the transportation stage, actual transportation methods and distances should be collected and calculated based on specific data; if specific data is not available or unavailable, it is recommended to use the following default transport scenario, with the usage and reasons documented.

Destination	Transportation methods	Transportation distance
Within province	Truck (National 5)	1000km
Cross-province	Truck (National 5)	2000km
Cross-border	Ship	10000km

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4.7.6 Data requirements for disposal stage

If there is no specific data, a default scenario should be established for transporting C2 to waste disposal (e.g., 100 kilometers, loading rate 85%);
If there are several relevant general practices, then more than one waste management and disposal plan should be included, but the most conservative one should always be included.

5. Impact categories and impact assessments

5.1 Environmental impact indicators

Below are the recommended impact indicators, which should be reported when developing the EPD. However, deviations from default impact metrics are allowed to better highlight the environmental performance of a group of products. This PCR regulation uses the following environmental, resource, and waste indicators.

Environmental impact categories

Impact category	Recommended LCIA method/model	Indicator	Unit
Climate change - Total[a]	Bern model - Global warming potential (GWP) over a 100-year time horizon based on IPCC 2021	Global Warming Potential total (GWP-total)	kg CO_2 eq.
Climate change - fossil		Global Warming Potential total (GWP fossil)	kg CO_2 eq.
Climate change-biogenic		Global Warming Potential total (GWP biogenic)	kg CO_2 eq.
Climate change - land use and change in land use[b]		Global Warming Potential (GWP - Land Use and Land Use Change)	kg CO_2 eq.
Ozone Depletion	Steady-state ODPs, WMO 2014	Ozone Depletion Potential (ODP)	kg CFC-11 eq.
Acidification	Accumulated Exceedance, Seppälä et al. 2006, Posch et al., 2008	Acidification potential, Accumulated Exceedance (AP)	mol H^+ eq.
Eutrophication - Freshwater	EUTREND model, Struijs et al., 2009b,as implemented in ReCiPe	Eutrophication potential to reach nutrients in freshwater bodies (EP-freshwater)	kg P eq.
Eutrophication - Ocean	EUTREND model, Struijs et al., 2009b,as implemented in ReCiPe	Eutrophication potential to reach the nutrients in the ocean (EP-marine)	kg N eq.
Eutrophication - Land	Accumulated Exceedance, Seppälä et al. 2006, Posch et al.	Eutrophication potential, Accumulated Exceedance	mol N eq.

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		(EP-terrestrial)	
Photochemical ozone formation	LOTOS-UROS, Van Zelm et al., 2008, as applied in ReCiPe	Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.
Consumption of abiotic resources - minerals and materials[c d]	CML 2002, Guinée et al., 2002, and van Oers et al. 2002.	Abiotic Depletion for non-fossil resources potential (ADP-minerals & metals)	kg Sb eq.
Consumption of abiotic resources - fossil resourcesc	CML 2002, Guinée et al., 2002, and van Oers et al. 2002.	Abiotic Depletion for non-fossil resources potential (ADP-fossil)	MJ，Calculated with low calorific value
Water consumption	Available WAter REmaining (AWARE) Boulay et al., 2016	Water deprivation potential (WDP)	m^3 eq.

Notes：

a The total global warming potential (GWP-total) is the sum of

— GWP-fossil

— GWP-biogenic

— GWP-luluc

b It is permitted to omit GWP-luluc as separate information if its contribution is < 5 % of GWP-total over the declared modules excluding module D. However, this should not be omitted in the carbon footprint assessment (CFP) reports.

c The abiotic depletion potential is calculated and declared in two different indicators:

— ADP-minerals&metals include all non-renewable, abiotic material resources (i.e. excepting fossil resources);

— ADP-fossil includes all fossil resources and includes uranium.

d Ultimate reserve model of the ADP-minerals&metals model

5.2 Additional environmental impact indicators

As shown in the table below, other environmental impact categories may be disclosed as optional environmental indicators.

If additional indicators are used, the influencing indicators, characteristic factors and recommended evaluation models should be listed, and the PCR should provide the requirements for stating these indicators (should/recommended/optional).

Other environmental impact categories

Impact category	Recommended LCIA methods or models	Indicator	Unit
Human Toxicity	USEtox2.1 model (Fantke et al.	Comparative Toxicity	CTUh

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– Cancer	2017, Rosenbaum et al. 2008), as in Saouter et al. (2018)	Unit for Humans (CTUh)	
Human Toxicity – Non-Cancer	USEtox2.1 model (Fantke et al. 2017, Rosenbaum et al. 2008), as in Saouter et al. (2018)	Comparative Toxicity Unit for Humans (CTUh)	CTUh
Ecotoxicity – Freshwater	USEtox2.1 model (Fantke et al. 2017, Rosenbaum et al. 2008), adapted as in Saouter et al. (2018)	Comparative Toxicity Unit of Ecosystem (CTUe)	CTUe
Land Use	LANCA model (De Laurentiis et al. 2019) and on the LANCA CF version 2.5 (Horn and Maier, 2018)	Soil Quality Index (SQP)	dimensionless (pt)
Ionizing Radiation – Human Health	Human health effect model as developed by Dreicer et al. (1995) and published in Frischknecht et al. (2000).	Human exposure to U^{235}	kBq U^{235}
Particle emissions	PM model (Fantke et al., 2016 in UNEP 2016)	Effects of PM2.5 exposure on human health	disease incidence

Impact category	Recommended LCIA methods or models	Indicator	Unit
(Can be supplemented)			

For the disclaimer of environmental impact indicators mentioned in Chapters 5.1 and 5.2, please see the following table:

Indicator	Unit	Disclaimer
Global Warming Potential total (GWP-total)	kg CO_2 eq.	None
Global Warming Potential total (GWP fossil)	kg CO_2 eq.	None
Global Warming Potential total (GWP biogenic)	kg CO_2 eq.	None
Global Warming Potential (GWP - Land Use and Land Use Change)	kg CO_2 eq.	None
Ozone Depletion Potential (ODP)	kg CFC-11 eq.	None
Acidification potential, Accumulated Exceedance (AP)	mol H^+ eq.	None
Eutrophication potential to reach nutrients in freshwater bodies (EP-freshwater)	kg P eq.	None

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Eutrophication potential to reach the nutrients in the ocean (EP-marine)	kg N eq.	None
Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	mol N eq.	None
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	None
Abiotic Depletion for non-fossil resources potential (ADP-minerals & metals)	kg Sb eq.	2
Abiotic Depletion for non-fossil resources potential (ADP-fossil)	MJ， Calculated with low calorific value	2
Water deprivation potential (WDP)	m^3 eq.	2
Comparative Toxicity Unit for Humans (CTUh)	CTUh	2
Comparative Toxicity Unit for Humans (CTUh)	CTUh	2
Comparative Toxicity Unit of Ecosystem (CTUe)	CTUe	2
Soil Quality Index (SQP)	dimensionless (pt)	2
Human exposure to U^{235}	kBq U^{235}	1
Effects of PM2.5 exposure on human health	disease incidence	None
Disclaimer 1: This impact category deals primarily with the ultimate impacts on human health from the nuclear fuel cycle, i.e. low-dose ionizing radiation. It does not consider the impacts that may result from nuclear accidents, occupational exposures, and radioactive waste disposal in underground facilities. This indicator also does not measure potential ionizing radiation from soil, radon gas, and certain materials. Disclaimer 2: The results of this environmental impact indicator should be used with caution due to the high uncertainty of these results or the limited experience with this indicator.		

5.3 Use of resources

Besides the environmental impact indicators, indicators describing resource use shall also be provided in PCR. Similar to environmental impact indicators, deviations are allowed for less unnecessary or additional indicators, and this should be verified during the PCR verification process. Below demonstrates the use of resources categories, taken from EN 15804.

Resource usage indicators

Parameters	Unit of measurement
Use of renewable primary energy excluding renewable primary energy resources used as raw materials PERE	MJ, net calorific value
Use of renewable primary energy resources used as raw materials PERM	MJ, net calorific value
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) PERT	MJ, net calorific value
Use of non-renewable primary energy excluding	MJ, net calorific value

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non-renewable primary energy resources used as raw material (PENRE)	
Use of non-renewable primary energy resources used as raw materials PENRM	MJ, net calorific value
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) PENRT	MJ, net calorific value
Net use of fresh water (FW)	m3
Use of secondary raw materials (SM)	kg
Use of renewable secondary fuels (RSF)	MJ, net calorific value
Use of non-renewable secondary fuels (NRSF)	MJ, net calorific value
Note: In order to identify the input part of renewable/non-renewable primary energy used as an energy carrier and not used as raw materials, the indicator “use of renewable/non-renewable primary energy excluding renewable/non-renewable primary energy resources used as raw materials” is considered and can be calculated as the difference between the total input of primary energy and the input of energy resources used as raw materials.	

5.4 Waste generation and outflows

Waste generation and material flow indicators

Impact category	Unit of measurement
Hazardous waste disposal (HWD)	kg
Non-hazardous waste disposed (NHWD)	kg
Radioactive waste disposed (RWD)	kg
Materials for energy recovery (MER)	kg
Material for recycling (MFR)	kg
Components for reuse (CRU)	kg
Exported thermal energy (ETE)	MJ, net calorific value
Exported electricity energy (EEE)	MJ, net calorific value
Notes: Disposal of characteristic hazardous waste should follow the applicable laws of the host country .	

5.5 Product Biogenic Carbon Content Information

The biochar absorbed, stored, and released by all biomass-based materials involved in this PCR (such as wood, bio-based polymers, natural fibers, etc.) should be quantified separately at each stage of the lifecycle and must not be directly combined with or offset by GWP results.

During the raw material stage (module A1), if biomass absorbs CO_2 during growth, it should be recorded as "biological carbon absorption."

If the biochar is released at the end of its product lifecycle, (such as in modules C1 to C4), its "biological carbon emissions" should be recorded separately in the corresponding module.

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If carbon is stored in the product in a solid form for an extended period (≥100 years), it can be considered "long-term storage" and should be described in module "D".

If the quality of biological carbon materials included in the product is below 5% of the product's quality, the claim for biological carbon content can be omitted.

5.6 Additional environmental information

In addition to environmental impacts, resource usage, and waste generation, EPD holders can declare other environmental information that is not derived from LCA-based calculations.

Such as:

- The release of dangerous substances into indoor air, soil, and water during the use stage,
- Instructions for proper use of the drive system, such as minimizing energy or water consumption or improving the durability of the drive system;
- Instructions for proper maintenance and service of the electric drive system;
- Information on key components that determine the durability of the electric drive system;
- Information on recycling, including, for example, appropriate procedures for recycling the entire electric drive system or selected components and the potential environmental benefits to be gained;
- Information on appropriate reuse methods for drive electric drive systems (or part of drive electric drive systems) and procedures for waste disposal at the end of their lifecycle;
- Information on the disposal of the drive system or inherent materials, and any other information deemed necessary to minimize the end-of-life impact of the product;

A more detailed description of the organization's overall environmental work, such as:

- The existence of any type of organized environmental activity, and
- Information on where interested parties may find more details about the organization’s environmental work.

6. LCA report requirements based on this PCR

6.1 Overview

- The life cycle report needs to include the following information:
- Product specifications, general information
- Declaration units and functional units
- Life Cycle Inventory
- Key Assumptions and Product Allocation Principles
- Environment, resources and waste indicators
- Additional environmental impact information

6.2 Product specifications, general information

Includes: report date, name of the person writing the report, product category rules adopted,

product specifications and models, representative pictures of the products, and basic information of the company.

6.3 Functional unit or declaration unit

Definition of functional unit, product category, functional unit description and rationale (e.g., benchmark product and corresponding standard, etc.)

6.4 Life Cycle Inventory

6.4.1 Data source

The life cycle report should state the life cycle inventory database used and the source and database version of the data used for calculation. Provide enterprise prospect data and information on prospect data acquisition, including data acquisition time, data collection method, and data collection site. Data quality evaluation should be provided in the life cycle assessment report.

6.4.2 Data Description

1. Raw material acquisition stage（A1-A3）

- Clearly identify and quantify each material, component and corresponding data used to manufacture the functional unit;
- Identify and justify approximations or omissions of materials, components, or processes;
- Propose quality and energy consumption benchmarks for validating cut-off rule;
- Identify transportation data for raw materials to the manufacturing site and to the manufacturer’s final logistics center;
- It is recommended to add a flow chart of the raw material acquisition and product manufacturing stages.

2.Transportation stage（A4）

The life cycle report should present the transportation scenarios from the manufacturer platform to the logistics center and their corresponding transportation data.

3.Use stage（B2-B7）

Should include:

- Clearly identify all operating modes of the product;
- Propose methods for measuring or quantifying energy consumption/material consumption for different operating modes;
- If the regulation or standard involves the method of measuring the energy consumption of the product, it should be clearly identified;
- Propose the selected energy management mode and corresponding data;
- Clearly identify and quantify the elements used to operate and maintain the product, and the corresponding data;
- Identify the reasons for the approximation or exclusion.

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4.End-of-life stage（C1-C4）

- Propose and identify transportation scenarios and corresponding data;
- Describe the product recycling process and corresponding data;
- Identify and propose approximate values or exclusions for recycling;

7. Content of EPD based on this PCR

7.1 Principles of including multiple products in the same EPD

Products from single or multiple manufacturing sites covered by the same PCR and manufactured by the same company with identical or similar main steps in the core process may be included in the same EPD if the difference in environmental performance indicators between the declared products does not exceed 10%.

7.2 Mandatory information and format of the EPD

An EPD based on this PCR should contain the information described in the following sections. There can be flexibility in the format and layout as long as the EPD still contains the specified information. A generic template for an EPD is available at www.epdchina.cn.

EPDs should be published in English/Chinese but may also be published in additional languages. If the EPD is not available in English/Chinese, it shall contain an executive summary in English including the main content of the EPD. This summary is part of the EPD and, thus, also subject to the verification process.

7.3 General Information

As a general rule, EPD content

▪ Should comply with the requirements and guidelines in ISO 14025;

▪ Should be verifiable, accurate, relevant and not misleading, and should not include ratings, judgements or direct comparisons with other products;

▪ A reasonable amount of EPD should be created for the target users and purpose.

7.3.1 Programme information

EPD owner	Company Name EPD owner contact information (As addresses, websites, contacts, phone numbers, emails)
Product name	
Production Address	
Product Information	For example: National Economic Classification Code For example: United Nations Central Product Classification Code (UNCPC code) For example: Product Identification Code listed by China's National Bureau of

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	Statistics
Product applications	
EPD execution agency	EPD Promotion Center-EPD China Programme Address: 3rd Floor, Lane 320, Tianping Road, Xuhui District, Shanghai Website: www.epdchina.cn Email: secretary@epdchina.cn
LCA Consultants	Name, Company, Signature
Copyright Notice	EPD owners independently own this EPD.
Comparability	It is not recommended to compare environmentally friendly products from the same category across different product operators. Only when all stages of the lifecycle are considered can EPD fully comply with PCR, making it comparable. However, even with the same PCR, variations and deviations are possible.
Validity period	The release date for EPD is 20YY-MM-DD, valid until 20YY-MM-DD
LCA Software (Version Number)	
LCI Database (Version Number)	
Data collection period	MM/YYYY-MM/YYYY
PCR	PCR Name and Version Number
Other reference documents and version numbers	For example: EN15804
Verification statement according to EN 15804	
Independent review and verification of reports and data according to ISO 14025:2010 ☐ Internal ☐ External Third-party verification agency: <Auditor Name, Agency> is a certified third-party agency Approved and registered by the EPD Promotion Center	
The data update/supplementation procedures during the validity period of the EPD are verified by a third-party agency: ☐ Yes ☐ No	

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7.3.2 Information about the company or manufacturer

The manufacturer shall declare the following information:

- The location of the main manufacturing plant for final assembly;
- The manufacturer's environmental policy;
- Relevant environmental certifications, such as EN ISO 9001, EN ISO 14001, EN ISO 50001, OHSAS 18001, EN ISO 45001, etc.

7.3.3 Description of the product or system being analyzed

- Basic product information and application
- Composition of materials and substances
- Manufacturing process

7.4 LCIA information

- Functional/Declaration unit
- System boundary
- Excluded processes
- Allocation rules
- Cut-off rules
- Electricity mix
- Environmental impact
- Assumptions and limitations

The EPD Owner should provide at least the following information and data about the drive motor system:

1 General Information:

- Type of drive motor
- Product weight
- Design life of the product

2 Main Parameters (for parameter definitions and test methods, see GB/T 18488-2024):

- Operating voltage range
- Continuous power
- Peak torque and duration
- Peak power and duration
- Maximum operating speed
- Insulation class
- Protection class
- Cooling method
- Operating condition energy efficiency

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8 References

[1] ECO PLATFORM LCA Calculation Rules and Specifications for EPDs Version 1.1 (June 2024)

[2] EPD CHINA GENERAL PROGRAMME INSTRUCTIONS VERSION 3.1 Date: 22ed January 2024

[3] EPDCN-PCR-202202 New Energy Passenger Vehicle

[4] PCR 2022:06 ELECTRICAL MOTORS AND GENERATORS AND PARTS THEREOF (FOR INDUSTRIAL APPLICATIONS)

[5] PCR 2024:02 PASSENGER CARS

[6] ANNEX to the Commission Delegated Regulation supplementing Regulation (EU) 2023/1542 of the European Parliament and of the Council by establishing the methodology for the calculation and verification of the carbon footprint of electric vehicle batteries

[7] GB/T 38146.1-2019 China Vehicle Operating Conditions Part 1: Light Vehicles

[8] GB/T 38146.2-2019 China Vehicle Operating Conditions Part 2: Heavy Commercial Vehicles

[9] Ministry of Commerce, National Development and Reform Commission, Ministry of Public Security, Ministry of Environmental Protection: Regulations on Mandatory Scrapping Standards for Motor Vehicles – Appendix 2: Summary Table of Reference Values for Vehicle Service Life and Mileage

[10] National Development and Reform Commission, National Energy Administration: Notice on Matters Concerning the Orderly Promotion of Direct Green Power Connection Development

[11] Ministry of Finance, State Taxation Administration, Ministry of Industry and Information Technology, Ministry of Science and Technology, December 26, 2017: Announcement on the Exemption of Vehicle Purchase Tax for New Energy Vehicles

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Appendix A

Data Sheet

Table A.1 gives a data sheet template for calculating the reusability and recyclability of a drive motor system (the material classification part is optional).

Table A.1 Data table

Drive system name					Drive electric drive system mass（m_E）/kg			
Drive motor system (type/style)								Other
Material Classification	Metal	Polymers (excluding rubber)	Rubber	Glass	Liquid	Improved organic natural materials		
Mass/kg								
Pre-processing（m_P）								
Pre-processing of parts or materials					Mass/kg			
Liquid			m_{P1}					
Battery			m_{P2}					
Oil Filter			m_{P3}					
Fuel tank			m_{P4}					
Tire			m_{P5}					
Catalytic system			m_{P6}					
m_P（The sum of $m_{P1}-m_{P6}$）=								
Disassembly（m_D[a]）								
No.	Parts Name	Mass/kg	No.	Parts Name	Mass/kg	No.	Parts Name	Mass/kg
1			6			11		
2			7			12		
3			8			13		
4			9			14		
5			10			The sum of mass of other m_D parts		
m_D/kg =								
Metal separation（m_M[a]）								
Drive motor system metal residue/kg								
Non-metallic residue（m_{Tr}[a]和m_{Te}[a]）/kg								
Recyclable materials（m_{Tr}）								
Technical No.	Mass/kg	Technical No.	Mass/kg	Technical No.	Mass/kg			
CPTL-1		CPTL-6		CPTL-11				
CPTL-2		CPTL-7		CPTL-12				
CPTL-3		CPTL-8		CPTL-13				
CPTL-4		CPTL-9		CPTL-14				

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CPTL-5		CPTL-10		Other	
m_{Tr}/kg =					
Materials for energy recovery（m_{Te}）					
m_{Te}/kg =					
Drive motor system reusability（R_{eye}）and recyclability rate（R_{cov}）					
$R_{eye} = \frac{m_P + m_D + m_M + m_{Tr}}{m_E} \times 100\%$					
$R_{cov} = \frac{m_P + m_D + m_M + m_{Tr} + m_{Te}}{m_E} \times 100\%$					
The calculation results for each stage are precise to two decimal places, and the final result is precise to one decimal place.					
[a] Create a separate list for the components, materials, and technologies in the attachment.					
Verified reuse technologies are detailed in GBT 19515-2023.					

Table A.2 Quality Variable Symbols and Descriptions

Symbols	Descriptions
m_P	The mass of the material considered during the pre-processing stage
m_D	The mass of the materials considered during the disassembly stage
m_M	The mass of the metals considered in the metal separation stage
m_{Tr}	The mass of the material considered to be recyclable at the stage of processing of non-metallic residues
m_{Te}	The mass of material that is considered energy-recoverable during the non-metallic residue processing stage
m_E	The mass of drive motor system
All mass units are expressed in kilograms, accurate to 2 decimal places	

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Appendix B

Calculation process

Table B.1 shows the calculation process of the reusability and recycling rate of the drive motor system in a schematic way.

Table B.1 Calculation process

<table>
<tr><td rowspan="2">Calculation steps (by clause)</td><td colspan="2">Drive motor system components</td><td rowspan="2">Treatment</td><td colspan="3">Mass of components of drive electric drive system[a]/kg</td></tr>
<tr><td>General Features</td><td>Name List</td><td>Reusable or recyclable</td><td>Energy recovery possible</td><td>Unknown residue</td></tr>
<tr><td>1. Preprocessing（6.3.1）</td><td>Parts and Liquids</td><td>By the manufacturer's own explanation</td><td>Reusable or recyclable</td><td>m_P</td><td>Not applicable</td><td>Not applicable</td></tr>
<tr><td>2. Disassembly（6.3.2）</td><td>Parts</td><td>By the manufacturer's own explanation</td><td>Reusable or recyclable</td><td>m_D</td><td>Not applicable</td><td>Not applicable</td></tr>
<tr><td>3. Metal separation（6.3.3）</td><td>Materials</td><td>Metals (black wire and non-ferrous metals)</td><td>Reusable</td><td>m_M</td><td>Not applicable</td><td>Not applicable</td></tr>
<tr><td rowspan="5">4. Non-metallic residue treatment</td><td rowspan="5">Materials</td><td>Glass</td><td>Reusable</td><td rowspan="5">m_{Tr}</td><td>Not applicable</td><td>Not applicable</td></tr>
<tr><td>Polymers (excluding rubber)</td><td>Reusable or recyclable</td><td rowspan="4">m_{Te}</td><td>Not applicable</td></tr>
<tr><td>Rubber</td><td>Reusable or recyclable</td><td>Not applicable</td></tr>
<tr><td>Improved organic natural materials</td><td>Reusable or recyclable</td><td>Not applicable</td></tr>
<tr><td>Other</td><td>--</td><td>Non-recyclable</td></tr>
<tr><td colspan="2" rowspan="3"></td><td></td><td></td><td colspan="3">The mass of drive motor system（ m_E）</td></tr>
<tr><td colspan="5">Reusability rate，$R_{eye} = \frac{m_P+m_D+m_M+m_{Tr}}{m_v} \times 100\%$</td></tr>
<tr><td colspan="5">Recyclability rate，$R_{cov} = \frac{m_P+m_D+m_M+m_{Tr}+m_{Te}}{m_v} \times 100\%$</td></tr>
<tr><td colspan="7">[a] In Stage 4, the mass allocation of treatment methods for the five material types is declared by the manufacturer.</td></tr>
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