GRAPHITE PRODUCTS

PRODUCT CATEGORY CLASSIFICATION: UN CPC 3795.

PCR REGISTRATION NUMBER TO BE ADDED BY SECRETARIAT
DRAFT VERSION 1.0. DO NOT USE OR CITE.

VALID UNTIL 20XX-YY-ZZ

DRAFT FOR OPEN CONSULTATION

INTRODUCTION TO OPEN CONSULTATION

This draft PCR is available for open consultation until 2022-08-13. Feel free to forward the draft to any other stakeholder you might think is relevant, including colleagues and other organisations.

We are interested in comments from stakeholders on:

- General
  - Alignment with PCRs available in other programmes for type III environmental declarations, industry-specific LCA guides or similar.
- Scope of PCR
  - Product category definition and description
  - Classification of product category using CPC codes
- Goal and scope, life cycle inventory and life cycle impact assessment
  - Functional unit/declared unit
  - System boundary
  - Allocation rules
  - Data quality requirements
  - Recommended databases for generic data
  - Impact categories and impact assessment methodology
- Additional information

Comments may be sent directly to the PCR Moderator (contact details available in Section 1). There is a template for comments on www.environdec.com that may be used.

For questions about the PCR, please contact the PCR moderator. For general questions about the International EPD® System, EPD or PCR development, please contact the Secretariat via pcr@environdec.com.

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1 INTRODUCTION

This document constitutes Product Category Rules (PCR) developed in the framework of the International EPD® System: a programme for type III environmental declarations[1] according to ISO 14025:2006, ISO 14040:2006, ISO 14044:2006, and product-specific standards such as EN 15804 and ISO 21930 for construction products. Environmental Product Declarations (EPD) are voluntary documents for a company or organisation to present transparent, consistent and verifiable information about the environmental performance of their products (goods or services).

The rules for the overall administration and operation of the programme are the General Programme Instructions (GPI), publicly available at www.environdec.com. A PCR complements the GPI and the normative standards by providing specific rules, requirements and guidelines for developing an EPD for one or more specific product categories (see Figure 1). A PCR should enable different practitioners using the PCR to generate consistent results when assessing products of the same product category.

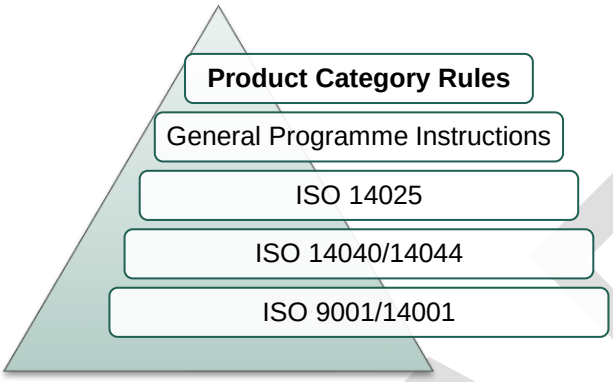

Figure 1 The hierarchy between PCRs, standards and other documents.

Within the present PCR, the following terminology is adopted:

- The term “shall” is used to indicate what is obligatory, i.e. a requirement.
- The term “should” is used to indicate a recommendation, rather than a requirement. Any deviation from a “should” requirement shall be justified in the PCR development process.
- The terms “may” or “can” is used to indicate an option that is permissible.

For definitions of further terms used in the document, see the normative standards.

A PCR is valid for a pre-determined period of time to ensure that it is updated at regular intervals. The latest version of the PCR is available at www.environdec.com. Stakeholder feedback on PCRs is very much encouraged. Any comments on this PCR may be sent directly to the PCR Moderator and/or the Secretariat during its development or during its period of validity.

Any references to this document shall include the PCR registration number, name and version.

The programme operator maintains the copyright of the document to ensure that it is possible to publish, update, and make it available to all organisations to develop and register EPDs. Stakeholders participating in PCR development should be acknowledged in the final document and on the website.

[1] Type III environmental declarations in the International EPD® System are referred to as EPDs, Environmental Product Declarations.

2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	Graphite products
Registration number and version:	*To be added by the Secretariat*
Programme:	The International EPD® System
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com E-mail: info@environdec.com
PCR Moderator:	Phoebe Whattoff, Minviro Ltd, phoebe@minviro.com
PCR Committee:	Phoebe Whattoff, Robert Pell - Minviro Ltd Nick Leveris, Harrison Kreafle - Novonix Filip Kozlowski - Woxna Graphite AB Franz Xaver Schwarz - SGL Carbon Scott Brombosz - Phillips 66 Dr Robert Feher - Graphit Kropfmühl Andreas Forfang - Elkem Jean-Philippe Fournier, Jerome Dewasch - Mersen Oliver HRDLICKA - Graphite Cova Christian Hetzer - Showa Denko Carbon Johann Leye - Rheinfelden Carbon Frank Rauscher - Imerys Thomas Schramm-Durst - Tokai ERFTCARBON Dirk Wallwaey, Marc-Oliver Loeh - Schunk Group Benedicte Allard - Tokai Cobex Daria Surovtseva - CarbonScape Ltd Carsten Wehling - Superior Graphite Corina Hebestriet - ECGA
Date of publication and last revision:	*To be added by the Secretariat*
Valid until:	*To be added by the Secretariat*
Schedule for renewal:	A PCR is valid for a pre-determined time period to ensure that it is updated at regular intervals. When the PCR is about to expire, the PCR Moderator shall initiate a discussion with the Secretariat how to proceed with updating the PCR and renewing its validity. A PCR may also be updated without prolonging its period of validity, provided significant and well-justified proposals for changes or amendments are presented. See www.environdec.com for the latest version of the PCR.

	When there has been an update of the PCR, the new version should be used to develop EPDs. The old version may however be used for 90 days after the publication date of the new version, as long as the old version has not expired.
Standards conformance:	General Programme Instructions of the International EPD® System, version 4.0, based on ISO 14025 and ISO 14040/14044 and EN15804
PCR language(s):	At the time of publication, this PCR was available in English. If the PCR is available in several languages, these are available at www.environdec.com. In case of translated versions, the English version takes precedence in case of any discrepancies.

2.2 SCOPE OF PCR

2.2.1 PRODUCT CATEGORY DEFINITION AND DESCRIPTION

This document provides Product Category Rules (PCR) for the assessment of the environmental performance of *graphite products* and the declaration of this performance by an EPD. The product category corresponds to UN CPC 3795.

Division: 37 - Glass and glass products and other non-metallic products

- *Group: 379 - Other non-metallic mineral products*
- Class 37950 – Graphite products. This includes natural graphite, artificial graphite, expanded, expandable graphite, flake graphite, synthetic speciality graphite, microcrystalline graphite and spheroidised graphite.

Natural graphite includes natural graphite from flake and vein deposits going into anodes for the lithium-ion battery industry as well as other markets such as refractories, and friction applications. More detail description of each product and its technical specifications are detailed in Table 1.

Artificial (synthetic) graphite includes synthetic graphite going into anodes, electrodes as well as graphite blocks and powders. Detailed information of each artificial product and its technical specifications are detailed in Table 1.

System boundaries of each graphite product contained within this graphite PCR are presented in Annex 1 and Annex 2.

PCR document may be given on the PCR Forum on www.environdec.com or directly to the PCR moderator during the period of validity. The PCR Moderator should initiate a revision process before the validity time expires to give due time for announcing and collecting comments.

EPDs shall be based on the latest version of the PCR, and refer to the version number and date of the PCR used. The production of new PCR versions does not affect the certification period of EPDs that are already published.

For the respective product, an LCA complying with ISO 14040 and based on plausible, transparent and credible data shall be submitted. All model assumptions with a decisive influence on the result should be specified.

This LCA must be representative of the products and the reference geographical area where processes occur which are described in the declaration.

2.2.2 GEOGRAPHICAL SCOPE

This PCR may be used globally. The data for the core module shall be representative for the site/region where the respective process is taking place.

2.2.3 EPD VALIDITY

An EPD based on this PCR shall be valid for a 5-year period starting from the date of the verification report (“approval date”), or until the EPD has been de-registered from the International EPD® System.

An EPD shall be updated and re-verified during its validity if changes in technology or other circumstances have led to:

- an increase of 10% or more of any of the declared indicators of environmental impact,
- errors in the declared information, or

- significant changes to the declared product information, content declaration, or additional environmental, social or economic information.

If such changes have occurred, but the EPD is not updated, the EPD owner shall contact the Secretariat to de-register the EPD.

3 PCR REVIEW AND BACKGROUND INFORMATION

This PCR was developed in accordance with the PCR development process described in the GPI of the International EPD® System, including open consultation and review.

3.1 OPEN CONSULTATION

3.1.1 VERSION 1.0

This PCR is available for open consultation from *2022-06-14* until *2022-08-13*, during which any stakeholder may provide comments by contacting the PCR Moderator and/or the Secretariat.

Add information about any physical or web-based meetings held during the open consultation phase, if applicable.

Stakeholders were invited via e-mail or other means to take part in the open consultation and were encouraged to forward the invitation to other relevant stakeholders. The following stakeholders provided comments during the open consultation and agreed to be listed as contributors in the PCR and at www.environdec.com.

- *List of stakeholder names and affiliation will be added after the open consultation*

3.2 PCR REVIEW

3.2.1 VERSION 1.0

PCR review panel:	The Technical Committee of the International EPD® System. A full list of members is available at www.environdec.com. The review panel may be contacted via info@environdec.com. Members of the Technical Committee were requested to state any potential conflict of interest with the PCR Committee, and if there were conflicts of interest they were excused from the review.
Chair of the PCR review:	*To be added by the Secretariat*
Review dates:	*To be added by the Secretariat*

3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

As part of the development of this PCR, existing PCRs and other internationally standardized methods that could potentially act as PCRs were considered to avoid unnecessary overlaps in scope and to ensure harmonisation with established methods of relevance for the product category. The existence of such documents was checked among the following EPD programmes and international standardisation bodies:

- International EPD® System. www.environdec.com.

No existing PCRs or other relevant internationally standardized methods with overlapping scope were identified.

3.4 REASONING FOR DEVELOPMENT OF PCR

This PCR was developed to enable publication of EPDs for this product category based on ISO 14025, ISO 14040/14044 and EN 15804. The PCR enables different practitioners to generate consistent results when assessing the environmental impact of products of the same product category, and thereby it supports comparability of products within a product category.

3.5 UNDERLYING STUDIES USED FOR PCR DEVELOPMENT

The methodological choices made during the development of this PCR (declared/functional unit, system boundary, allocation methods, impact categories, data quality rules, etc.) were primarily based on the following underlying studies:

BASF, 2021. BASF – Product Carbon Footprint [Online]. Available at: https://www.basf.com/global/en/who-we-are/sustainability/we-drive-sustainable-solutions/quantifying-sustainability/product-carbon-footprint.html [Använd, April 2022].

Engels, P. et al., 2022. Life cycle assessment of natural graphite production for lithium-ion battery anodes based on industrial primary data. Journal of Cleaner Production.

Pell, R. et al., 2021. Towards sustainable extraction of technology materials through integrated approaches. *Nature Reviews Earth and Environment.*

Surovtseva, D. et al., 2022. Toward a lift cycle inventory for graphite production. *Journal of Industrial Ecology.*

Whattoff, P. et al., 2021. *Shifting the Lens.*

GOAL AND SCOPE, LIFE CYCLE INVENTORY AND LIFE CYCLE IMPACT ASSESSMENT

The goal of this section is to provide specific rules, requirements and guidelines for developing an EPD for the product category as defined in Section 2.2.1.

3.1 DECLARED/FUNCTIONAL UNIT

This PCR has a declared unit. The declared unit shall be 1 (one) kg of graphite product plus its packaging ready for delivery (the weight of the packaging shall not be included in the 1 kg declared unit). Graphite products included within this declared unit are defined in Table 1. Technical specifications of the graphite product defined in the EPD should be included. Technical specifications regarding each product contained within this PCR are shown in Table 1. This will increase comparability between other EPD's.

The EPD can state a functional unit of a product which is defined within the declared unit of this PCR. Graphite products defined within this PCR are described in Annex 1 and Annex 2. The reference flow in the LCA shall be defined at the point where the product arrives at the customer gate, i.e. any losses occurring before then must be taken into account.

The weight of the packaging of the studied product shall be reported separately. The environmental impacts in Section 4.4.5.1, use of resources in Section 4.4.5.2 and waste production and output flows in Section 4.4.5.3 of the product packaging shall be reported separately per life-cycle stages from those of the chemical product.

This PCR uses a declared unit instead of a functional unit. This is because not all relevant functional aspects are possible to capture in one or a few predefined functional units. All relevant functional aspects shall, however, be taken into consideration when comparing EPDs based on this PCR.

EPDs based on this PCR document together with the Annex (see Annex) may use a functional unit - instead of above declared unit.

This EPD shall specify that the EPD-type applies to a 'cradle-to-gate' approach.

3.2 TECHNICAL SPECIFICATION, LIFESPAN AND REFERENCE SERVICE LIFE (RSL)

Technical specifications of each product defined within the declared unit are shown below. An advised functional unit of each product classified within the declared unit are provided alongside the specifications of the graphite product, the result end use primary product and market use.

Table 1 – Technical specifications of each graphite product represented within the declared unit of this PCR.

Graphite Product	Advised Functional Unit	Specifications of Product	Resulting Primary Product	Market Use
Synthetic Graphite Electrode	1 kg of synthetic graphite	Purity > 99% C	Graphite Electrode (e.g. for steel production)	Steel Production
Synthetic Graphite for Anodes	1 kg of anode grade synthetic graphite	Final purity > 99.95% C Final PSD typically 10 - 20 µm	Graphite Anode Material	LIB Industry
Speciality Synthetic Graphite	1 kg of speciality synthetic graphite	3 - 800 µm	Graphite blocks and shapes, graphite powders	
Natural Graphite for Anodes (inc. vein graphite)	1 kg of natural anode grade graphite	Final Purity > 99.95% C NG flake size stated Final PSD typically 10 - 20 µm	Graphite anode material	LIB Industry
Expanded Graphite (EG) Flakes	1 kg of expanded graphite flakes	> 94% - < 99.999% C, 1 µm - 10 mm	EG based graphite foils	Gasket / Sealing Material; Heating & Cooling Systems;

			Micronized EG based powders	Thermal Management & Battery Application; Energy Storage Systems; Conductive Additves; Coatings
Expandable Graphite	1 kg of expandable graphite	> 94% - < 99.999% C, 1 µm - 1.6 mm	Expandable graphite	Expanded Graphite / Flexible Graphite Production Flame / Fire Retardant
Spherical Graphite	1 kg of spheroidised graphite	95% - 99.9% C, 10 µm - 25 µm		Feedstock to LIB Industry
Flake Graphite	1 kg of flake graphite	> 94% - < 99.999 %C, 1 µm - 1.6 mm	Flake natural graphite (Purified) natural graphite powders (after milling)	Conductive Additive; Powder Metallurgy Refractories, Foundries, Lubricants, Batteries Expandable / Expanded Graphite Production
Microcrystalline Graphite	1 kg of microcrystalline graphite	> 75% - < 99.999% C 1 µm - 1 mm		Friction Applications

The reference service life (RSL) is not applicable to this PCR.

3.3 SYSTEM BOUNDARY

The scope of this PCR and EPDs based on it is cradle-to-gate.

The system boundary of the product life cycle determines the processes to be included or excluded in the LCA. The system boundary of the declared unit is presented in section 4.4 (Figure 2). The system boundaries representing each product included within the declared unit are presented in Annex 1 and Annex 2.

The end of life treatment is excluded and there the following criteria shall be fulfilled (the first three criteria are adapted from EN 15804, and the fourth criteria is adapted from ISO 14025):

- the product is physically integrated with other products in subsequent life-cycle process (e.g. during installation in a building) so they cannot be physically separated from them at end of life,
- the product or material is no longer identifiable at end-of-life as a result of a physical or chemical transformation process,
- the product or material does not contain biogenic carbon, and
- the EPD shall not be used for business-to-consumer communication.

3.3.1 LIFE-CYCLE STAGES

For the purpose of different data quality rules and for the presentation of results, the life cycle of the product is divided into three life cycle stages:

- Upstream processes (from cradle-to-gate)
- Core processes (from gate-to-gate)
- Downstream processes (from gate-to-grave)

In the EPD, the environmental performance associated with each of the three life-cycle stages above shall be reported separately and in aggregated form. The processes included in the scope of the PCR and belonging to each life cycle stage are described in Sections 3.3.1.1–3.3.1.3.

3.3.1.1. Upstream processes

The following unit processes are part of the product system and shall be classified as upstream processes:

- Extraction and processing of raw materials required for the core processes,
- Recycling processes of secondary materials from other product life cycles,
- Production of input components,
  - Reagents
  - Production of upstream materials e.g. woodchip for graphite produced from renewable feedstock
  - Treatment of waste generated by the upstream module
- Relevant services, such as transport of raw materials and components along the upstream supply chain to a distribution point (e.g. a stockroom or warehouse),
- Production of distribution and consumer packaging
- Generation of electricity and production of fuels, steam and other energy carriers used in upstream processes.

Upstream processes not listed may also be included. All elementary flows at resource extraction shall be included, except for the flows that fall under the general cut-off rule in Section 3.5.

3.3.1.2. Core processes

The following unit processes are part of the product system and shall be classified as core processes:

- Transportation of materials and components to the manufacturing of the product under study,
- Manufacturing of the product under study (e.g. raw material extraction/precursor production, mineral processing, refining)
- Maintenance of manufacturing equipment
- End-of-life treatment of manufacturing waste, even if carried out by third parties, including transportation, and
- Generation of electricity and production of fuels, steam and other energy carriers used in core processes.
- Impacts due to land transformation
- Emissions generated during manufacturing (CO, NOx, SOx, heavy metals, PM, etc.)
- Storage of materials and product

Core processes not listed may also be included. Manufacturing of a minimum of 99% of the total weight of the declared product including packaging shall be included.

The following processes shall not be included:

- Manufacturing of production equipment, buildings and other capital goods,
- Business travel of personnel,
- Travel to and from work by personnel, and
- Research and development activities.

3.3.1.3. Downstream processes

The following unit processes are part of the product system and shall be classified as downstream processes:

- Transportation of the product to retailer/consumer,
- Product use, e.g. use of electricity or water, use activities causing direct emissions, maintenance activities,
- End-of-life treatment of the used product and its packaging, including transportation, and
- Generation of electricity and production of fuels, steam and other energy carriers used in downstream processes.

3.3.2 OTHER BOUNDARY SETTING

3.3.2.1. Boundary towards nature

Boundaries to 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. Specific considerations should be made for:

- Chemical flows into the environment - water, land and air. This includes acids and alkalis released into the environment as well as liquid streams that contain metals, salts, and some counter ions e.g. sulphates.
- Industrial water streams related to peripheral and auxiliary systems such as cooling water, equipment, and plant cleaning should be acknowledged within the system boundary.
- Emissions to air from graphite processing, mechanical processing or surface modification
- Emissions to land from mining / raw material extraction

3.3.2.2. Boundary towards other technical systems

Boundaries towards other technical systems define the flow of materials and components 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 transport 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 material or component to recycling, the transportation of the material to the scrapyard/collection site shall be included. The material or component going to recycling is then an outflow from the product system.

See Section 3.6 for further guidance.

3.3.2.3. 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 is accounted for shall be 100 years from the year that the LCA model best represents, considering the representativeness of the inventory data. This year shall, as far as possible, represent the year of the publication of the EPD.

3.3.2.4. Geographical boundary

The geographical boundary defines the geographical coverage of the LCA. This shall reflect the physical reality of the product under study, accounting for the representativeness of technology, input materials and input energy.

3.4 SYSTEM DIAGRAM

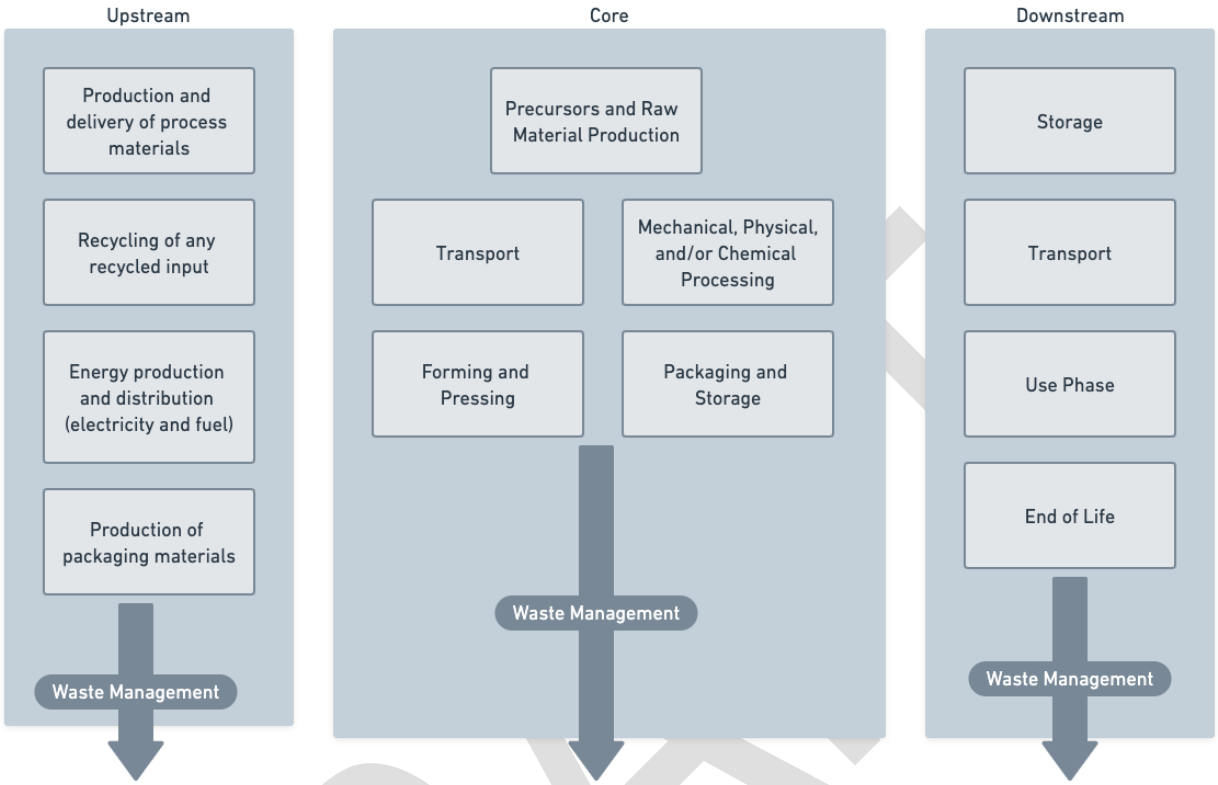

Figure 2 System diagram illustrating the processes that shall be included in the product system, divided into upstream, core and downstream processes. The illustration of processes to include may not be exhaustive.

3.5 CUT-OFF RULES

A cut-off rule of 5% shall be applied. In other words, the included inventory data (not including inventory data of processes that are explicitly outside the system boundary as described in Section 3.3) shall together give rise to at least 95% of the results of any of the environmental impact categories. Also, 95% of the mass of the product content and 95% of the energy use of the product life cycle shall be accounted for. The cut-off of inventory data should, however, be avoided, and all available inventory data shall be used.

The cut-off of inventory data, based on the above cut-off rule, should be an output of a sensitivity analysis, alone or in combination with expert judgment based on experience of similar product systems. Further, the cut-off shall be possible to verify in the verification process, hence the exclusion of inventory data based on the cut-off rule shall be documented in the LCA report, and the EPD developer shall provide the information the verifier considers necessary to verify the cut-off.

3.6 ALLOCATION RULES

Allocation can be divided into allocation of co-products, i.e. allocation of unit processes that generate several products, and allocation of waste, i.e. allocation of unit processes that generate materials that are, for example, landfilled recovered, recycled or reused, and which require further processing to cease being waste and become products (see criteria for end-of-waste state in Section 3.6.2).

The principles for allocation of co-products and allocation of waste are described separately in the following subsections

3.6.1 CO-PRODUCT ALLOCATION

The following hierarchy of allocation methods shall be followed for co-product allocation:

1. Allocation shall be avoided, if possible, by dividing the process to be allocated into sub-processes and collecting the inventory data for each sub-process.
2. If allocation cannot be avoided, the inventory data should be partitioned between the different co-products in a way that reflects the underlying physical relationships between them, i.e. allocation should reflect the way in which the inventory data changes if the quantities of delivered co-products change.
3. If a physical relationship between the inventory data and the delivery of co-products cannot be established, the inventory data should be allocated between the co-products in a way that reflects other relationships between them. For example, inventory data might be allocated between co-products in proportion to their economic values. If economic allocation is used, a sensitivity analysis exploring the influence of the choice of the economic value shall be included in the LCA report.

The following instructions should be applied to graphite products if allocation can not be avoided. This guidance should follow above hierarchy.

- If the ratio is equal or less than five (5), then mass allocation shall be applied, otherwise economic allocation shall be applied. (BASF, 2021)
- The ratio shall be calculated based on prices per kg of each product individually. Hence, the allocation method shall be determined for each individual co-product.
- Economic allocation factors shall be calculated from average prices over multiple years to average fluctuations or from a referenced document stating the price of the primary product and co-products.

Allocation shall be avoided if the price of the co-product is < 5% of the primary product. The cut-off rules shall be applied (see section 3.5), and 100% of the impact shall be assigned to the primary product.

The allocation method used shall be documented in the EPD.

3.6.2 ALLOCATION OF WASTE TREATMENT PROCESSES

Allocation of waste shall follow the polluter pays principle and its interpretation in EN 15804: “processes of waste processing shall be assigned to the product system that generates the waste until the end-of-waste state is reached.” The end-of-waste state is reached when all the following criteria for the end-of-waste state are fulfilled (adapted from EN 15804):

- the recovered material, component or product is commonly used for specific purposes;
- a market or demand, identified e.g. by a positive economic value, exists for such a recovered material, component or product;
- the recovered material, component or product fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and
- the use of the recovered material, product or construction element will not lead to overall adverse environmental or human health impacts.

The above outlined principle means that the generator of the waste shall carry the full environmental impact until the point in the product life cycle in which the end-of-waste criteria are fulfilled. Waste may have a negative economic market value, and then the end-of-waste stage is typically reached after (part of) the waste processing and further refinement, at the point at which the waste no longer has a negative market value. This allocation method is (in most cases) in line with a waste generator’s juridical and financial responsibilities. See the GPI for further information and examples.

3.7 DATA QUALITY REQUIREMENTS AND SELECTION OF DATA

Life cycle inventory data are classified into specific data and generic data, where the latter can be selected generic data or proxy data. The data categories are defined as follows:

- specific data (also referred to as “primary data” or “site-specific data”):
  - data gathered from the actual manufacturing plant where product-specific processes are carried out;
  - actual data from other parts of the life cycle traced to the product under study, for example site-specific data on the production of materials or generation of electricity provided by contracted suppliers, and transportation data on distances, means of transportation, load factor, fuel consumption, etc., of contracted transportation providers; and
  - LCI data from databases on transportation and energyware that is combined with actual transportation and energy parameters as listed above.
- generic data (sometimes referred to as “secondary data”), divided into:

- selected generic data: data (e.g. commercial databases and free databases) that fulfil prescribed data quality requirements for precision, completeness, and representativeness (see below Section 3.7.1),
- proxy data: data (e.g. commercial databases and free databases) that do not fulfil all of the data quality requirements of "selected generic data".

Specific data shall be used for the core processes. Specific data shall be used for upstream and downstream processes, when available, otherwise generic data may be used. Generic data should be used in cases in which they are representative for the purpose of the EPD, e.g. for bulk and raw materials on a spot market, if there is a lack of specific data on the final product or if a product consists of many components.

Data sourced from proxy/generic values shall be declared within the limitations of the EPD, with recommendations to update the EPD once specific data is available.

Any data used shall represent average values for a specific reference year. However, the way these data values are generated could vary e.g. over time. Such variations shall be declared.

3.7.1 RULES FOR USING GENERIC DATA

For generic data to be classified as "selected generic data", the following requirements apply:

- datasets shall be based on attributional LCA modelling (e.g., not be based on marginal data and not include credits from system expansion),
- the reference year shall be as current as possible and should be representative for the validity period of the EPD,
- the 5% cut-off rule (as described in Section A.3.3) shall be met on the level of the product system,
- datasets shall represent average values for a specific reference year; however, how data are generated could vary, e.g. over time, and then they should have the form of a representative annual average value for a specified reference period (such deviations shall be justified and declared in the EPD), and
- the representativeness of the data shall be assessed to be better than ±5%, in terms of the environmental impact calculated on the basis of the data, of data that is fully representative for the given temporal, technological and geographical context.

If selected generic data that meets the above data quality requirements are not available, proxy data may be used. The environmental impacts associated with proxy data shall not exceed 10% of the overall environmental impact of the product system.

The EPD may include a data quality declaration to demonstrate the share of specific data, selected generic data and proxy data contributing to the results of the environmental impact indicators.

3.7.2 EXAMPLES OF DATABASES FOR GENERIC DATA

When conducting an EPD, database providers should be referenced and an explanation given to why these databases have been used.

Table 3 lists examples of databases and datasets to be used for generic data. Please note that a data quality assessment shall be performed also for data listed in the table, and that other data that fulfil the data quality requirements may also be used.

PROCESS	GEOGRAPHICAL SCOPE	DATASET	DATABASE
Electricity – market for high voltage	[CN-H]	Ecoinvent 3.8	Ecoinvent

Table 1 Examples of databases and datasets to use for generic data.

3.7.3 DATA QUALITY REQUIREMENTS AND OTHER MODELLING GUIDANCE PER LIFE-CYCLE STAGE

Below are further data quality requirement per life-cycle stage. Exceptions to the requirements may be accepted, if justified in the EPD; such exceptions are subject to the approval by the verifier on a case-to-case basis.

3.7.3.1. Upstream processes

- Data referring to processes and activities upstream in a supply chain over which the EPD owner direct management control shall be specific and collected on site.
- Data referring to contractors that supply main parts, packaging, or main auxiliaries should be requested from the contractor as specific data, as well as infrastructure, where relevant.
- Data on transport of main parts and components along the supply chain to a distribution point (e.g. a stockroom or warehouse) where the final delivery to the manufacturer can take place, should be specific and based on the actual transportation mode, distance from the supplier, and vehicle load.
- In case specific data is lacking, selected generic data may be used. If this is also lacking, proxy data may be used (see Section 3.7).
- For upstream processes modelled with specific data, generation of electricity used shall be accounted for in this priority:

    1. Specific electricity mix as generated, or purchased from an electricity supplier, demonstrated by a Guarantee of Origin or similar as provided by the electricity supplier.
    2. Residual electricity mix of the electricity supplier on the market.
    3. Residual electricity mix on the market.
    4. Electricity consumption mix on the market.

    The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total consumption mix.

    "The market" in the above hierarchy may correspond a national electricity market, if this can be justified.

    The mix of electricity used in upstream processes shall be documented in the EPD, where relevant.
- Packaging: specific data shall be used for the consumer packaging production if it is under the direct control of the organization or if the environmental impact related to the consumer packaging production is more than 10% of the total product environmental indicators. In other cases, generic data may be used. When consumer packaging shows the organization's logo, the LCA report should report the exerted/non-exerted direct control on the production of consumer packaging by the organization.

3.7.3.2. Core processes

- Specific data shall be used for raw material extraction / precursor production (includes all natural and synthetic graphite products described in Table 1, and Annex 1 & 2.
- Transport from the final delivery point of raw materials, chemicals, main parts, and components (see above regarding upstream processes) to the manufacturing plant/place of service provision should be based on the actual transportation mode, distance from the supplier, and vehicle load, if available.
- Goods: Specific data shall be used for the assembly of the product and for the manufacture of main parts as well as for on-site generation of steam, heat, electricity, etc., where relevant.
- Services: Specific data shall be used for the consumption of materials, chemicals, steam, heat, electricity, etc., necessary for execution of the service
- For electricity used in the core processes, generation of electricity used shall be accounted for in this priority:

    1. Specific electricity mix as generated, or purchased from an electricity supplier, demonstrated by a Guarantee of Origin or similar as provided by the electricity supplier.
    2. Residual electricity mix of the electricity supplier on the market.
    3. Residual electricity mix on the market.
    4. Electricity consumption mix on the market. This option shall not be used for electricity used in processes over which the manufacturer (EPD owner) has direct control[2].

[2] For electricity markets without trade of Guarantees of Origin (or similar), the residual mix will, however, be identical to the consumption mix.

The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total consumption mix.

"The market" in the above hierarchy may correspond a national electricity market, if this can be justified.

The mix of electricity used in the core processes shall be documented in the EPD, where relevant.

- Waste treatment processes of manufacturing waste should be based on specific data, if available.

3.7.3.3. Downstream processes

- Data for the use stage are usually based on scenarios, but specific data should be used when available and relevant.
- Data on the emissions from the use stage should be based on documented tests, verified studies in conjunction with average or typical product use, or recommendations concerning suitable product use. Whenever applicable, test methods shall be internationally recognised.
- The use of electricity in the region/country where the product is used (as specified in the geographical scope of the EPD) shall be accounted for in the following priority:
    1. Residual electricity mix on the market.
    2. Electricity consumption mix on the market.

  The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total production mix.

  "The market" in the above hierarchy may correspond a national electricity market, if this can be justified.

  The mix of electricity used in the downstream processes shall be documented in the EPD, where relevant.
- The transport of the product to the customer shall be described in the EPD, where relevant, and be accounted for in this priority:
    1. Actual transportation modes and distances to specific a customer or market, representing the geographical scope of the EPD.
    2. A weighted average of transportation modes and distances, based on transportation to several customers or markets, representing the geographical scope of the EPD.
- Scenarios for the end-of-life stage shall be technically and economically practicable and compliant with current regulations in the relevant geographical region based on the geographical scope of the EPD. Key assumptions regarding the end-of-life stage scenario shall be documented in the LCA report.
- The carbon content of the product can be used to calculate climate impact at end of life, depending on method of disposal. Graphite does not decompose, thus if buried, the carbon content of the graphite product cannot be used to calculate the climate impact at the end of life. If graphite is burnt, the carbon content of the graphite product can be used to calculate the climate impact at the end of life.

3.7.4 DATA QUALITY DECLARATION

EPDs may include a declaration of the quality of data used in the LCA calculations.

The data quality declaration shall demonstrate the share of specific data, selected generic data and proxy data used within the EPD.

3.8 ENVIRONMENTAL PERFORMANCE INDICATORS

The EPD shall declare the default environmental performance indicators and their methods as described at the website (www.environdec.com/indicators), which includes both inventory indicators and indicators of potential environmental impact. The source and version of the impact assessment methods and characterisations factors used shall be reported in the EPD. Alternative regional impact assessment methods and characterisation factors may be calculated and displayed in addition to the default list. If so, the EPD shall contain an explanation of the difference between the different sets of indicators, as they may appear to the reader to display duplicate information.

If the default list of environmental performance indicators and methods at the website is updated, the previous version of the list is valid in parallel to the new version during a transition period of at least 90 days, as described at the website.

Apart from the required inventory indicators, other inventory data may also be declared in the EPD, if relevant and useful for EPD users. Such data shall not be declared in the main body of the EPD, but in an annex.

To better characterise the environmental performance of a product category, the PCR recommends the declaration of environmental performance indicators not included in the default list; such additions shall be justified in the PCR development process.

The inclusion of environmental performance indicators, or exclusion of indicators in the default list, should be based on:

- the results and interpretation of the supporting LCA studies, including the use of normalisation and weighting of results to determine the most relevant impact categories,
- a literature review (LCA and non-LCA) of relevant impacts for the product category,
- a review of key environmental concerns regarding the product category, e.g. from NGOs, civil society, customers, and other stakeholders, for the geographical applicability of the PCR, and
- a review of requirements in other standards or methodological guidelines of relevance for the product category, to which harmonisation is desirable, such as EN 15804 for construction products.

An explanation as to why certain characterisation factors were selected shall be reported within the EPD. The characterisation factors recommended in the list below align with EN15804.

- Global Warming Potential - relevant substances emitted throughout process chain
- Acidification Potential - relevant substances emitted during purification (acidic emissions to soil and waterways) and petroleum processing (sulphur and nitrogen oxides emissions to air and water). Within the production of certain graphite products e.g. synthetic graphite, offgas desulphurisation can occur in the graphitisation phase. This should be captured within relevant impact categories
- Eutrophication - relevant substances emitted as a result of petroleum process (phosphorous and nitrogen emissions to air and water)
- Fine Particulate Matter Formation - relevant substances emitted throughout the process chain
- Fossil Fuel Scarcity - relevant to raw material extraction
- Ionizing Radiaiton - relevant is nuclear power is used as a source of electricity
- Land Use - relevant to raw material extraction and the establishment of manufacturing facilities
- Mineral Resource Scarcity - relevant to raw material extraction
- Photochemical Ozone Formation - relevant substances emitted throughout process chain and through the use of heavy machinery
- Stratospheric Ozone Depletion - this category should be included when taking into account background processes such as infrastructure being built
- Toxicity - relevant substances emitted during petroleum processing and during purification as a result of using chemicals
- Water Consumption - significant amount of water is used within mineral processing of graphite products and the embodied impact of using hydropower used as an electricity source

3.9 INCLUDING MULTIPLE PRODUCTS IN THE SAME EPD

3.9.1 PRODUCTS FROM THE SAME COMPANY

Similar products from a single or several manufacturing sites covered by the same PCR and manufactured by the same company with the same major steps in the core processes may be included in the same EPD if none of the declared environmental performance indicators differ by more than 10% between any of the included products. The results for the environmental performance indicators of one representative product shall be declared according to Section 4.4.5. The choice of representative product shall be justified in the EPD, using, where applicable, statistical parameters.

3.9.2 SECTOR EPDS

The International EPD® System allows for an industry association to develop an EPD in the form of a Sector EPD. A Sector EPD declares the average product of multiple companies in a clearly defined sector in a clearly defined geographical area. Products covered in a sector EPD shall follow the same PCR and the same declared/functional unit shall be applied.

Any communication of the results from a Sector EPD should contain the information that the results are based on averages obtained from the sector as defined in the EPD. The communication shall not claim that the sector EPD results are representative for a certain manufacturer or its product.

The following information shall also be included a Sector EPD:

- a list of the contributing manufacturers that the Sector EPD covers,
- a description of how the selection of the sites/products has been done and how the average has been determined, and
- a statement that the document covers average values for an entire or partial product category (specifying the percentage of representativeness) and, hence, the declared product is an average that is not available for purchase on the market.

4 CONTENT AND FORMAT OF EPD

EPDs based on this PCR shall contain the information described in this section. Flexibility is allowed in the formatting and layout provided that the EPD still includes the prescribed information. A generic template for EPDs is available at www.environdec.com.

The EPD content shall:

- be in line with the requirements and guidelines in ISO 14020 (Environmental labels and declarations – General principles),
- be verifiable, accurate, relevant and not misleading,
- not include rating, judgements or direct comparison with other products[3], and
- shall include technical specifications of the product (see Tables 1 and 2) and state the market the product is used within

An EPD should be made with a reasonable number of pages for the intended audience and use.

The content of EPDs published in machine-readable format shall correspond with the content of the underlying EPD.

4.1 EPD LANGUAGES

EPDs should be published in English but may also be published in additional languages. If the EPD is not available in English, 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.

4.2 UNITS AND QUANTITIES

The following requirements apply for units and quantities:

- The International System of Units (SI units) shall be used where available, e.g., kilograms (kg), Joules (J) and metres (m). Reasonable multiples of SI units may be decided in the PCR to improve readability, e.g., grams (g) or megajoules (MJ). The following exceptions apply:
  - Resources used for energy input (primary energy) should be expressed as kilowatt-hours (kWh) or megajoules (MJ), including renewable energy sources, e.g., hydropower, wind power and geothermal power.
  - Water use should be expressed in cubic metres (m^3)
  - Temperature should be expressed in degrees Celsius (°C),
  - Time should be expressed in the units most practical, e.g., seconds, minutes, hours, days or years.
  - Results of the environmental performance indicators shall be expressed in the units prescribed by the impact assessment methods, e.g. kg CO_2 equivalents.
- Three significant figures[4] should be adopted for all results. The number of significant digits shall be appropriate and consistent.
- Scientific notation may be used, e.g. 1.2E+2 for 120, or 1.2E-2 for 0.012.
- The thousand separator and decimal mark in the EPD shall follow one of the following styles (a number with six significant figures shown for illustration):
  - SI style (French version): 1 234,56
  - SI style (English version): 1 234.56

  In case of potential confusion or intended use of the EPD in markets where different symbols are used, the EPD shall state what symbols are used for thousand separator and decimal mark.
- Dates and times presented in the EPD should follow the format in ISO 8601. For years, the prescribed format is YYYY-MM-DD, e.g., 2017-03-26 for March 26th, 2017.
- The result tables shall:

[3] Therefore, results of normalization are not allowed to be reported in the EPD.

[4] Significant figures are those digits that carry meaning contributing to its precision. For example with two significant digits, the result of 123.45 shall be displayed as 120, and 0.12345 shall be displayed as 0.12. In scientific notation, these two examples would be displayed as $1.2*10^2$ and $1.2*10^{-2}$.

- Only contain values or the letters “ND” (Not Declared). It is not possible to specify ND for mandatory indicators. ND shall only be used for voluntary parameters that are not quantified because no data is available.[5]
- Contain no blank cells, hyphens, less than or greater than signs or letters (except “ND”).
- Use the value “0” only for parameters that have been calculated to be zero.
- Footnotes shall be used to explain any limitation to the result value.

4.3 USE OF IMAGES IN EPD

Images used in the EPD, especially pictures featured on the cover page, may in themselves be interpreted as an environmental claim. Images such as trees, mountains, wildlife that are not related to the declared product shall therefore be used with caution and in compliance with national legislation and best available practices in the markets in which the EPD is intended to be used.

4.4 EPD REPORTING FORMAT

The reporting format of the EPD shall include the following sections:

- Cover page (see Section 4.4.1)
- Programme information (see Section 4.4.2)
- Product information (see Section 4.4.3)
- Content declaration (see Section □)
- Environmental performance (see Section 4.4.5)
- Additional environmental information (see Section 4.4.6)
- Additional social and economic information (see Section 4.4.7)
- References (see Section 4.4.9)

The following sections shall be included, if relevant:

- Differences versus previous versions (see Section 4.4.8)
- Executive summary in English (see Section 4.4.10)

4.4.1 COVER PAGE

The cover page shall include:

- Product name and image
- Name and logotype of EPD owner
- The text “Environmental Product Declaration” and/or “EPD”
- Programme: The International EPD® System, www.environdec.com
- Programme operator: EPD International AB
- Logotype of the International EPD® System
- EPD registration number as issued by the programme operator[6]
- Date of publication (issue): 20XX-YY-ZZ
- Date of revision: 20XX-YY-ZZ, when applicable
- Date of validity; 20XX-YY-ZZ

[5] This requirement does not intend to give guidance on what indicators are mandated (“shall”) or voluntary.

[6] The EPD shall not include a “registration number” if such is provided by the certification body, as this may be confused with the registration number issued by the programme operator.

- A note that *"An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com."*
- A statement of conformity with ISO 14025.
- For construction products:
  - a statement of conformity or non-conformity with EN 15804:2012+A1:2013, EN 15804:2012+A2:2019, or later versions of EN 15804 (if published), and ISO 21930.
  - ECO EPD logotype as approved by the ECO Platform.
- For EPDs covering multiple products: a statement that the EPD covers multiple products and a list of all products covered by the EPD.
- For Sector EPDs: a statement that the EPD is a Sector EPD.
- For construction product EPDs:

In the case of EPDs registered through a regional hub (a regional or national programme based on and fully aligned with the International EPD® System through an agreement with the programme operator), "Programme", "Programme operator", and "Logotype" shall be expanded to include a reference to the regional programme and the organisation responsible for it.

Where applicable, the cover page shall also include the following information:

- Information about dual registration of EPD in another programme, such as registration number and logotype.
- A statement of conformity with other standards and methodological guides.

4.4.2 PROGRAMME INFORMATION

The programme information section of the EPD shall include:

- Address of programme operator: *EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com*
- The following statement on the requirements for comparability of EPDs, adapted from ISO 14025: *"EPDs within the same product category but from different programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison."*
- A statement that the EPD owner has the sole ownership, liability and responsibility of the EPD
- Information about verification[7] and the PCR in a table with the following format and contents:

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
PCR: *<name, registration number, version and UN CPC code(s)>*
PCR review was conducted by: *<name and organisation of the review chair, and information on how to contact the chair through the programme operator>*
Life cycle assessment (LCA)
LCA accountability: *<name, organization>*
Third-party verification

[7] If the EPD has been verified by an approved individual verifier who has received contractual assistance from a certification body that is not accredited, this certification body shall not be included in this table.

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☐ EPD verification by individual verifier Third-party verifier: *<name, organisation, and signature of the third-party verifier>* Approved by: The International EPD® System
OR
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☐ EPD verification by accredited certification body Third-party verification: *<name, organisation>* is an approved certification body accountable for the third-party verification The certification body is accredited by: *<name of accreditation body & accreditation number, where applicable>*
OR
Independent third-party verification of the declaration and data, according to ISO 14025:2006 via: ☐ EPD verification by EPD Process Certification* Internal auditor: *<name, organisation>* Third-party verification: *<name, organisation>* is an approved certification body accountable for third-party verification Third-party verifier is accredited by: *<name of accreditation body & accreditation number, where applicable>* *For EPD Process Certification, an accredited certification body certifies and reviews the management process and verifies EPDs published on a regular basis. For details about third-party verification procedure of the EPDs, see GPI v4, Section 7.5.
Procedure for follow-up of data during EPD validity involves third-party verifier: ☐ Yes ☐ No

4.4.3 PRODUCT INFORMATION

The product information section of the EPD shall include:

- address and contact information to EPD owner,
- description of the organisation. This may include information on products- or management system-related certifications (e.g. ISO 14024 Type I environmental labels, ISO 9001- and 14001-certificates and EMAS-registrations) and other relevant work the organisation wants to communicate (e.g. SA 8000, supply-chain management and social responsibility),
- name and location of production site,
- product identification by name, and an unambiguous identification of the product by standards, concessions or other means,
- identification of the product according to the UN CPC scheme system. Other relevant codes for product classification may also be included, e.g.
    - Common Procurement Vocabulary (CPV),
    - United Nations Standard Products and Services Code® (UNSPSC),
    - Classification of Products by Activity (NACE/CPA),
    - Australian and New Zealand Standard Industrial Classification (ANZSIC), or

- Global Trade Item Number (GTIN).

- a description of the product,
- a description of the technical purpose of the product, including its application/intended use,
- a description of the background system, including the main technological aspects,
- for EPDs covering multiple products: a description of the selection of products/sites, a list of contributing manufacturers (if Sector EPD), etc. (see Section 3.9),
- geographical scope of the EPD, i.e., for which geographical location(s) of use and end-of-life the product's performance has been calculated,
- declared/functional unit,
- reference service life (RSL) and/or technical/actual lifespan, if relevant,
- declaration of the year(s) covered by the data used for the LCA calculation and other relevant reference years,
- reference to the main database(s) for generic data and LCA software used, if relevant,
- system diagram of the processes included in the LCA, divided into the life cycle stages,
- description if the EPD system boundary is "cradle-to-gate", "cradle-to-gate with options" or "cradle-to-grave",
- information on which life-cycle stages are not considered (if any), with a justification of the omission, and
- references to any relevant websites for more information or explanatory materials.

This section may also include:

- name and contact information of organisation carrying out the underlying LCA study,
- any additional information about the underlying LCA-based information, such as cut-off rules, data quality, allocation methods, and other methodological choices and assumptions,
- a description of the material properties of the product with a declaration of relevant physical or chemical product properties, such as density, etc., and
- if end-of-life treatment is not included, the EPD shall contain a statement that it shall not be used for communicating environmental information to consumers/end users of the product.

4.4.4 CONTENT DECLARATION

The content declaration section shall declare the weight of one unit of product, as purchased, and contain information about the content of the product in the form of a list of materials and chemical substances including information on their environmental and hazardous properties. The gross weight of each material/substance shall be declared, including a minimum of 95% of the materials/substances in one unit of product.

The content declaration does not apply to proprietary materials and substances covered by exclusive legal rights including patent and trademarks. In general, an indication that a product is "free" of a specific hazardous material or substance should be done with caution and only when relevant, following the rules in ISO 14021 on self-declared environmental claims.

Information on the hazardous properties of materials and chemical substances should follow the requirements given in the latest revision of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS),[8] issued by the United Nations or national or regional applications of the GHS. As an example, the following regulations should be used for EPDs intended to be used in the European Union:

- Regulation (EC) No 1907/2006 of the European parliament and of the council of 18 December 2006 concerning the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH); and
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling, and packaging of substances and mixtures.

[8] The GHS document is available at www.unece.org.

4.4.4.1. Information about recycled materials

When a product is made in whole or in part with recycled materials, the provenience of the materials (pre-consumer or post-consumer) shall be presented in the EPD as part of the content declaration.

To avoid any misunderstanding about which material that may be considered “recycled material”, the guidance given in ISO 14021 shall be considered. In brief, the standard states that:

- only pre-consumer or post-consumer materials (scraps) shall be considered in the accounting of the recycled materials, and
- materials coming from scrap reutilisation (such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it) shall not be considered as recycled content.

4.4.4.2. Information about packaging

As packaging is strongly connected with the product, the producer shall provide information about packaging in the EPD, when applicable. Packaging may be classified as:

- Distribution Packaging: packaging designed to contain one or more articles or packages, or bulk materials, for the purposes of transport, handling and/or distribution (ISO 21067-1:2016, Section 2.2.6)
- Consumer Packaging: packaging constituting, with its content, a sales unit for the final user or consumer at the point of retail (ISO 21067-1:2016, Section 2.2.7).

Consumer packaging is generally the outcome of eco-design processes, or other activities, under direct control of the organisation. Many critical categories with strict legal requirements belong to consumer packaging category like food contact packaging and pharmaceutical packaging.

The weight of the packaging per product, and the type and function of the packaging, shall be reported in the EPD.

A statement of the source of the materials (pre-consumer or post-consumer) shall be presented in the EPD when the packaging is made in whole or in part by recycled materials.

4.4.5 ENVIRONMENTAL PERFORMANCE

4.4.5.1. Environmental impacts

The EPD shall declare the environmental impact indicators, per declared unit, per life-cycle stage and in aggregated form, using the default impact categories, impact assessments methods and characterisation factors available at www.environdec.com/indicators. The source and version of the impact assessment methods and characterisation factors used shall be reported in the EPD.

Alternative regional life cycle impact assessment methods and characterisation factors may be calculated and displayed in addition to the default list. If so, the EPD shall contain an explanation of the difference between the different sets of indicators, as they may appear to the reader to display duplicate information.

The EPD should select relevant impact categories from section 4.8 and provide an explanation as to why this was chosen.

4.4.5.2. Use of resources

The EPD shall declare the indicators for resource use listed at www.environdec.com/indicators per declared unit, per life-cycle stage and in aggregated form.

4.4.5.3. Waste production and output flows

Waste generated along the whole life cycle production chains shall be treated following the technical specifications described in the GPI. The EPD shall declare the indicators for waste production and output flows as listed at www.environdec.com/indicators per declared unit, per life-cycle stage and in aggregated form.

4.4.6 ADDITIONAL ENVIRONMENTAL INFORMATION

An EPD may declare additional environmentally relevant information not derived from the 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 product, e.g. to minimise energy or water consumption or to improve the durability of the product,
- instructions for proper maintenance and service of the product, e.g. to minimise energy or water consumption or to improve the durability of the product,
- information on key parts of the product that determine its durability,
- information on recycling including, e.g. suitable procedures for recycling the entire product or selected parts and the potential environmental benefits gained,
- information on a suitable method of reuse of the product (or parts of the products) and procedures for disposal as waste at the end of its life cycle,
- information regarding disposal of the product, or inherent materials, and any other information considered necessary to minimise the product's end-of-life impacts, and
- a more detailed description of an organisation's overall environmental work, in addition to the information listed under Section 4.4.3, such as:
    - the existence of any type of organised environmental activity, and
    - information on where interested parties may find more details about the organisation's environmental work.

Any additional environmental information declared shall be substantiated and verifiable, and be derived using appropriate methods and be specific, accurate, not misleading, and relevant to the specific product. Quantitative information is preferred over qualitative information.

4.4.7 ADDITIONAL SOCIAL AND ECONOMIC INFORMATION

The EPD may also include other relevant social and economic information as additional and voluntary information. This may be product information or a description of an organisation's overall work on social or economic sustainability, such as activities related to supply chain management or social responsibility.

Any additional social and economic information declared shall be substantiated and verifiable, and be derived using appropriate methods and be specific, accurate, not misleading, and relevant to the specific product. Quantitative information is preferred over qualitative information.

4.4.8 DIFFERENCES VERSUS PREVIOUS VERSIONS

For EPDs that have been updated, the following information shall be included:

- a description of the differences versus previously published versions, and
- a revision date on the cover page.

4.4.9 REFERENCES

A reference section shall be included, including a list of all sources referred to in the EPD, including the GPI (including version number), and PCR (registration number, name, and version) used to develop the EPD.

The databases used within the EPD shall be referenced, with an explanation as to why the databses were used.

4.4.10 EXECUTIVE SUMMARY IN ENGLISH

The executive summary, if included (see Section 4.1), shall contain relevant summarised information related to the programme, product, environmental performance, information related to pre-certified EPDs, and information related to sector EPDs. Besides this, further information may be added such as additional environmental, social or economic information, references as well as differences versus previous EPD versions.

5 LIST OF ABBREVIATIONS

ANZSIC	Australian and New Zealand Standard Industrial Classification
CPC	Central product classification
CPV	Common procurement vocabulary
EPD	Environmental product declaration
GPI	General Programme Instructions
GTIN	Global trade item number
ISO	International Organization for Standardization
LCA	Life cycle assessment
LCI	Life cycle inventory
NACE/CPA	Classification of products by activity
ND	Not declared
PCR	Product category rules
REACH	Restriction of chemicals
RSL	Reference service life
SI	The International System of Units
UN	United Nations
UNSPSC	United Nations standard products and services code

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ISO (2013) ISO/TS 14067:2013, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication.

ISO (2014) ISO 14046:2014, Environmental management – Water footprint – Principles, requirements and guidelines.

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7 VERSION HISTORY OF PCR

VERSION 1.0, 2022-XX-YY

Original version of the PCR.

8 ANNEX 1

8.1.1 SYNTHETIC GRAPHITE FOR ELECTRODES

Figure 3 details the system boundary for an EPD on synthetic graphite produced for electrodes.

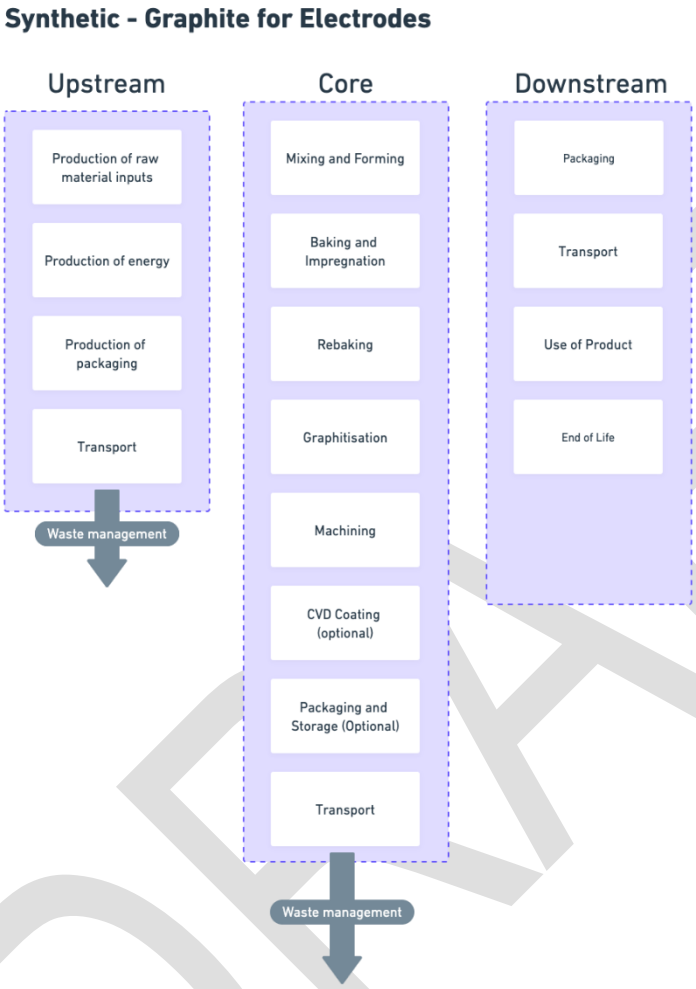

Figure 3 System Boundary of Synthetic Graphite for Electrodes.

8.1.2 SYNTHETIC GRAPHITE FOR ANODES

Figure 4 details the system boundary for an EPD on synthetic graphite produced for anodes.

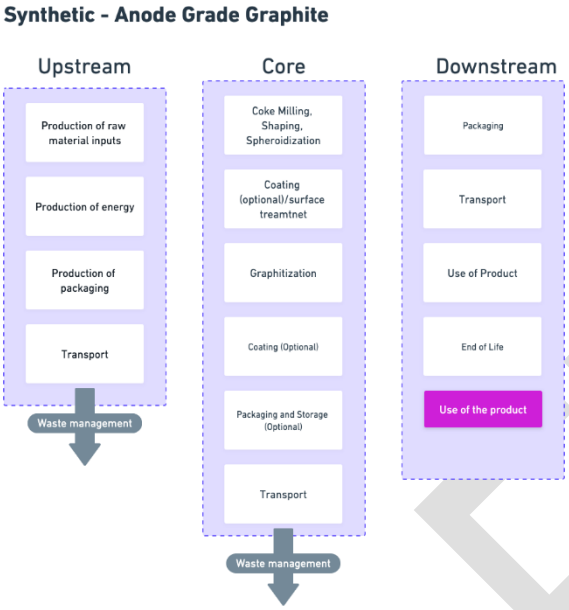

Figure 4 System Boundary for Synthetic Graphite for Anodes.

8.1.3 SYNTHETIC GRAPHITE FOR SPECIALITY SYNTHETIC GRAPHITE

Figure 5 details the system boundary for an EPD on speciality synthetic graphite.

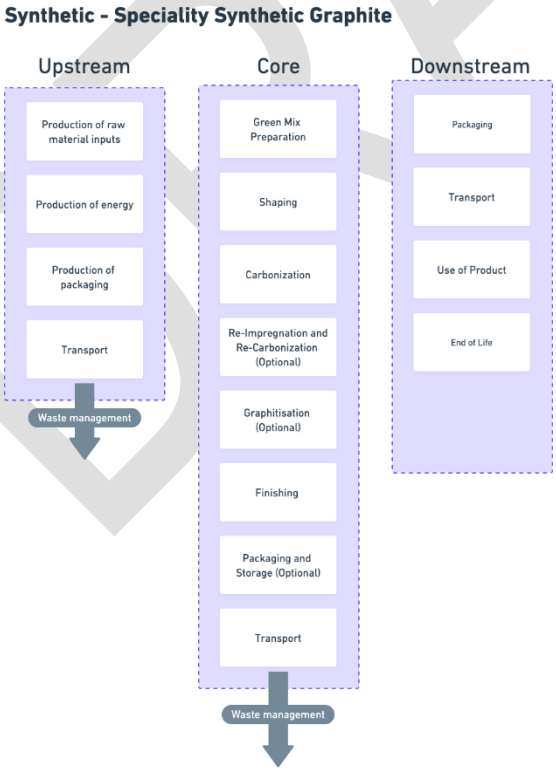

Figure 5 System Boundary for Speciality Synthetic Graphite.

9 ANNEX 2

9.1.1 NATURAL GRAPHITE FOR ANODES

Figure 6 details the system boundary for an EPD on natural graphite for anodes.

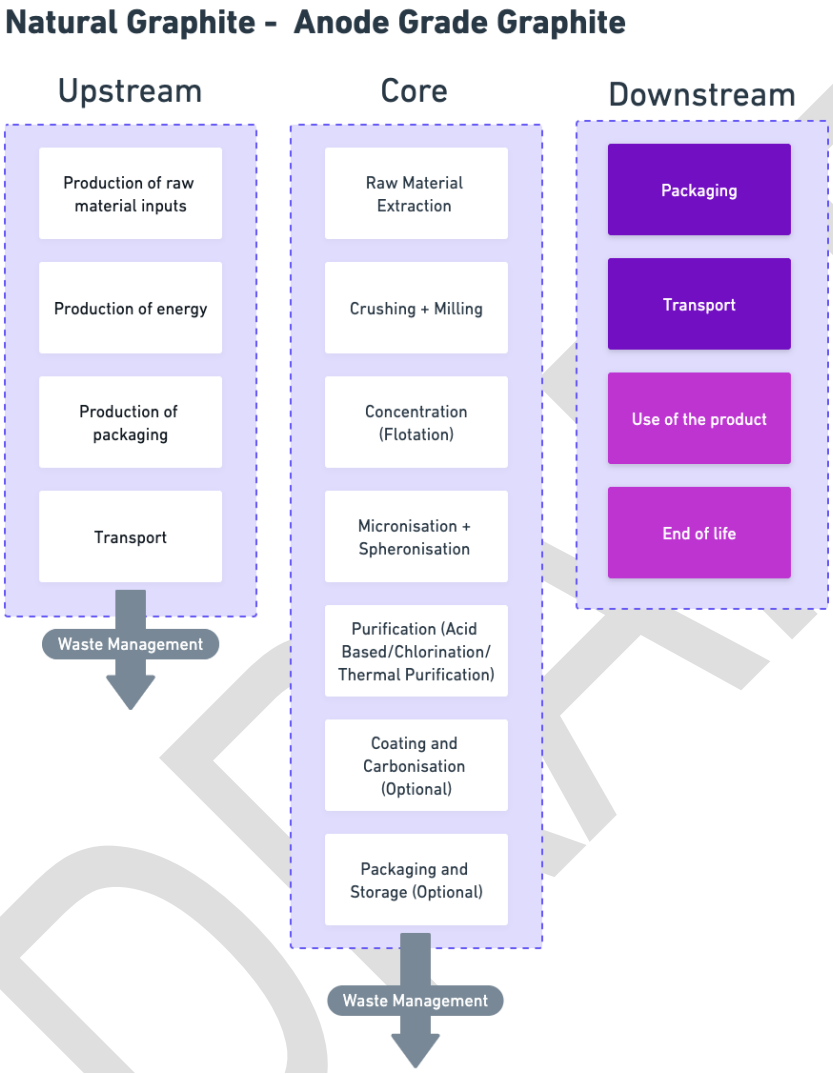

Figure 6 System Boundary for Natural Graphite for Anodes.

9.1.2 NATURAL GRAPHITE FOR EXPANDED GRAPHITE FLAKES

Figure 7 details the system boundary for an EPD on expanded graphite flakes.

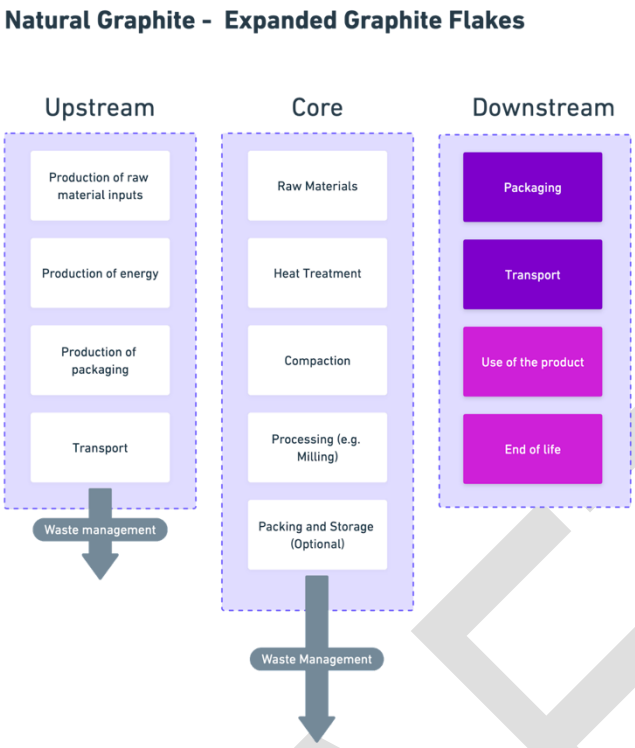

Figure 7 System Boundary for Natural Expanded Graphite Flakes.

9.1.3 NATURAL GRAPHITE FOR EXPANDABLE GRAPHITE

Figure 8 details the system boundary for an EPD on natural expandable graphite.

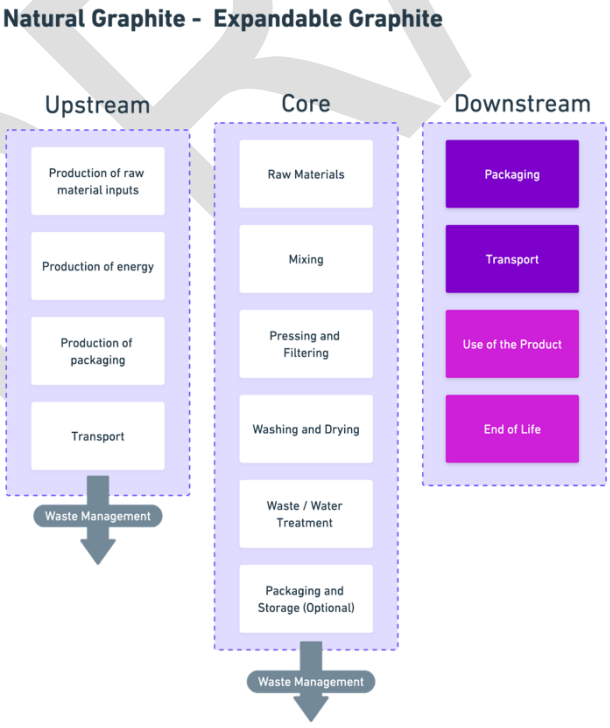

Figure 8 System Boundary for Natural Expandable Graphite.

9.1.4 NATURAL GRAPHITE FOR SPHERICAL GRAPHITE

Figure 9 details the system boundary for an EPD on natural spherical graphite.

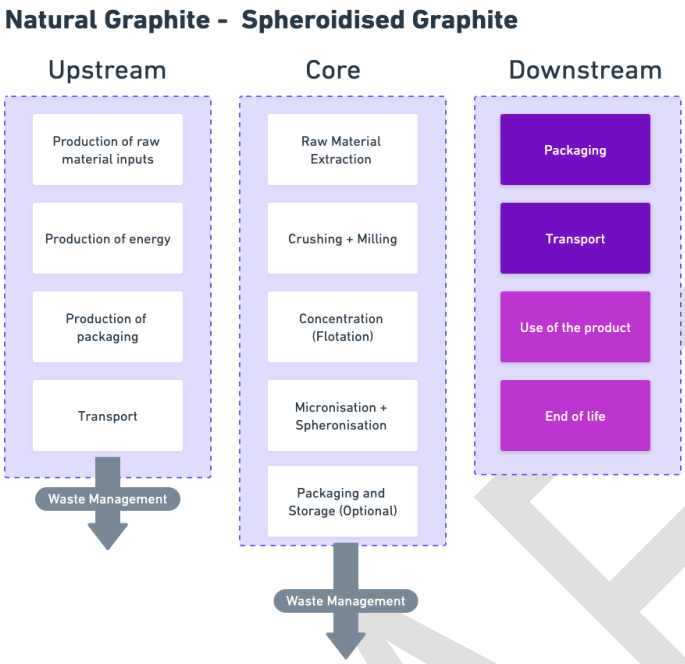

Figure 9 System Boundary for Natural Spherical Graphite.

9.1.5 NATURAL GRAPHITE FOR FLAKE GRAPHITE

Figure 10 details the system boundary for an EPD on natural flake graphite.

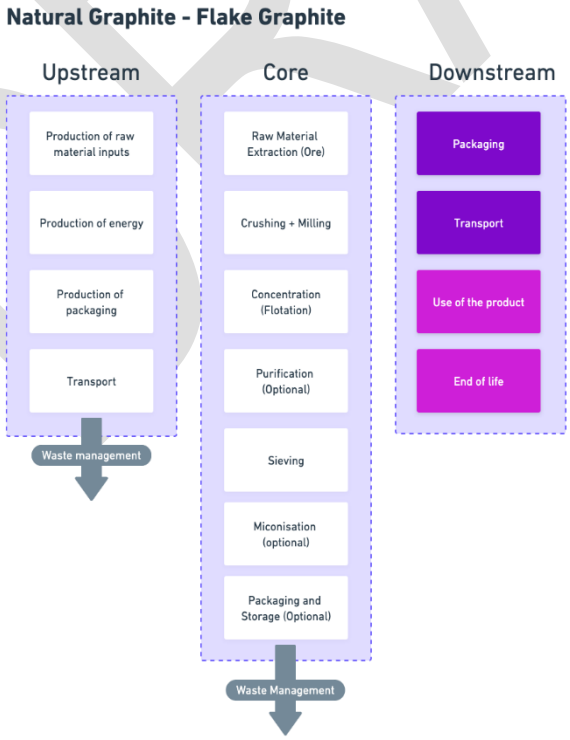

Figure 10 System Boundary for Natural Flake Graphite.

9.1.6 NATURAL GRAPHITE FOR MICROCRYSTALLINE GRAPHITE

Figure 11 details the system boundary for an EPD on natural microcrystalline graphite.

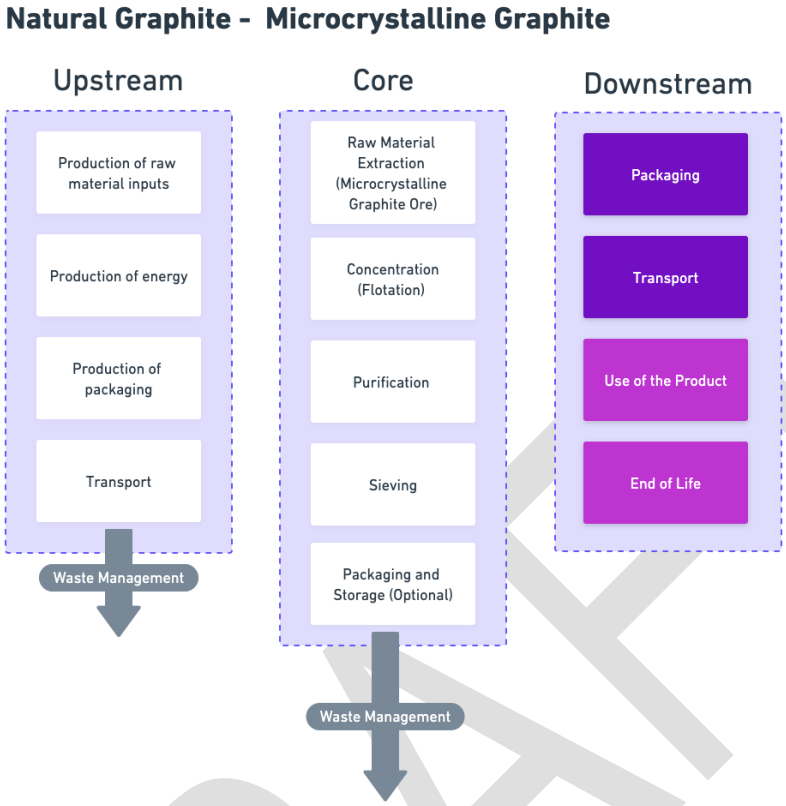

Figure 11 System Boundary for Natural Microcrystalline Graphite.

GRAPHITE PRODCUTS

PRODUCT CATEGORY CLASSIFICATION: UN CPC 3795