Product Category Rules for Building-Related Products and Services

From the Environmental Product Declaration Programme of Institut Bauen und Umwelt e.V. (IBU)

Part A: Calculation Rules for the Life Cycle Assessment and Requirements for the Project Report in Accordance with EN 15804+A2:2019

Version 1.5

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Disclaimer: In the event of any discrepancy regarding wording, interpretation of requirements, or terminology, the German version of the IBU PCR Part A, Version 1.5 shall prevail. The German version shall be regarded as the authoritative reference for the interpretation and application of the requirements contained herein.

Version History

Version	Comment	Date
1.0	Alignment with EN 15804+A2	01.07.2020
1.1	Revision based on Recommendation No. 20200924-b: Allocation of outputs in Modules A1 to A3 (Clause 5.5.1)	08.01.2021
	Revision of Clause 7.1.3 following a Board resolution	
1.1.1	Deletion in Clause 5.5.1 in accordance with SVR Recommendation 20191018-b	02.09.2021
1.2	Addition of interpretation rules in Clause 8 and requirements for additional evidence in Clause 9.1	17.11.2021
1.3	Additional requirement regarding representativeness for industry-wide EPDs in Clause 5.2 and extension of the requirements in Clause 9.1 for additional evidence in accordance with SVR Proposal 20211116-5	31.08.2022
1.4	Revision of PCR Part A incorporating resolutions of the SVR and ECO Platform	15.04.2024
1.5	Editorial and substantive revision based on the ECO Platform LCA Calculation Rules v2.0 and resolutions adopted during the 80th, 81st and 82nd SVR meetings. Main changes:	15.06.2026

	1. Clarification of requirements for production site information, including mandatory postal codes where unique identification is limited (Clause 5.1) 2. Clarification of average, representative and sample EPDs (Clause 5 / 5.3.1) 3. Revision of the A1–A3 system boundaries, waste logic and allocation diagram, including the treatment of biogenic carbon in packaging (Clause 5.5.1) 4. Clarification of declaration requirements for relevant B modules (Clauses 5.5.3 / 5.5.4) 5. New requirements of the ECO Platform and the special provision for production sites located in Germany (Clauses 6.5 / 6.5.1 / 6.5.3) 6. Clarification of biogas accounting (Clause 6.5.2) 7. Addition of product-specific allocation rules, including those for cement and concrete precursor products (Clause 6.6.1) 8. New provisions and clarifications regarding net flow calculation and Module D logic (Clause 6.6.3) 9. Clarification of the FW indicator / use of fresh water resources (Clause 7.1.4) 10. Flexibility regarding EF/JRC characterisation factors and clarification of the 12-month transition period (Clause 7.2) 11. Clarification of additional information in EPDs (Clause 9) 12. Revision of energy-related result indicators, including the non-derecognition of primary energy in the landfilling of non-compostable materials (Clause 11 – Annex 1) 13. Revision of the re-use rules (Clause 13 – Annex 3) 14. Addition regarding gross/net emissions in the case of significant quantities of secondary fuels (Clause 14 – Annex 4) 15. Addition of rules on carbonation, including the SVR circular resolution on the mineralisation of biogenic CO2 (Clause 15 – Annex 5)	

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List of Abbreviations

ADP fossil	Abiotic depletion potenzial fossil resources
ADP-mine-rals&metals	Abiotic depletion potenzial, minerals&metals
AIB	Association of Issuing Bodies
AP	Acidification potenzial
C-content	Carbon content
c-PCR	Complementary Product Category Rules
CRU	Components for re-use
EEE	Exported electrical energy
EET	Exported thermal energy
EF	Environmental Footprint
ENTESO-E	European Network of Transmission System Operators for Electric-ity
EPD	Environmental product declaration
EoL	End of life
EP	Eutrophication potenzial
ETP-fw	Ecotoxicity Potential, freshwater
FW	Use of fresh net water
GoO(s)	Guarantee(s) of Origin
GWP	Global warming potenzial
HTP-c	Human Toxicity Potential, carcinogenic effects
HTP-nc	Human Toxicity Potential, non-carcinogenic effects
HWD	Hazardous waste disposed
IBU	Institut Bauen und Umwelt e.V.
ILCD	International life cycle data system
IRP	Ionizing Radiation Potential
ISO	International organisation for standardization
JRC	Joint Research Centre
LCA	Life cycle assessment
LCI	Life cycle inventory
LCIA	Life cycle impact assessment
MER	Materials for energy recovery

MFR	Materials for recycling
MNR	Module not relevant
NHWD	Non-hazardous waste disposed
NMVOC	Non-methane volatile organic compounds
ND	Not declared
NRSF	Use of non-renewable secondary fuels
ODP	Ozone depletion potenzial
PCR	Product category rules
PEF	Product Environmental Footprint
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
PENRM	Use of non-renewable primary energy used as raw materials
PENRT	Total use of non-renewable primary energy
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
PERM	Use of renewable primary energy used as raw materials
PERT	Total use of renewable primary energy
PM	Potential incidence of disease due to particulate matter emissions
POCP	Photochemical ozone creation potenzial
PPA	Power Purchase Agreement
R1-value	Factor for efficiency evaluation of waste incineration plants, according to European waste directive
RSF	Use of renewable secondary fuels
RSL	Reference service life
RWD	Radioactive waste disposed
SM	Use of secondary materials
SQP	Soil Quality Potential
SVR	Technical Advisory Board (of IBU e.V.)
UTCE	Union for the Co-ordination of Transmission of Electricity
VOC	Volatile organic compounds
WDP	Water Deprivation Potential
WIP / MVA	Waste incineration plant

1 Scope

This document constitutes Part A of the description of the Product Category Rules (PCR) for Environmental Product Declarations (EPD) of products and services in the construction sector issued by the Institut Bauen und Umwelt e.V. (IBU). The document specifies both the calculation rules for the Life Cycle Assessment (LCA) to which an EPD is subject, and the requirements for documenting the life cycle assessment in the project report in accordance with *DIN EN 15804:2012+A2:2019*. This standard is hereinafter referred to as "EN 15804+A2."

In the IBU PCR documents Part B "Product Category Rules," additional specific requirements are defined. This present document "Product Category Rules for construction-related products and services Part A" and the PCR Part B documents are publicly accessible in the EPD online tool at www.epd-online.com.

In this document, numerous excerpts from the EN 15804+A2 standard are cited (in *italics*) to illustrate the placement of the IBU Product Category Rules Part A within the normative text. The present text does not replace the knowledge of EN 15804+A2.

2 Content, Structure and Accessibility of the Project Report

A project report for the EPD shall be submitted for each EPD within the programme of the Institut Bauen und Umwelt e.V. (IBU).

NOTE: *If EPDs are created for several products within the scope of the PCR Part B document at the same time, the background information for these products may be documented in a single project report. It is the responsibility of the EPD creator to verify that the products declared in the EPDs fall within the scope of the selected PCR Part B document. Furthermore, the products shall be based on a similar design and similar product manufacturing; the calculations of the individual products must exhibit synergies that justify this approach. The admissibility of such a combined report must be substantiated.*

The project report is the systematic and comprehensive compilation of the project documentation and serves as the basis for the verification of an EPD. The project report shall document that the information based on a Life Cycle Assessment and the additional information in an EPD comply with the requirements of this set of rules.

The project report shall include all data and information required by these rules. Particular attention shall be paid to complete transparency (including confidential data) and traceability of all information.

The contents of the project report are based on EN 15804+A2 and follow the content of this set of rules. Both the creation and the verification of the project report are facilitated by using the report template; use of the report template is optional but recommended. A report template for the project report is available in the EPD online tool at www.epd-online.com.

The project report shall be made accessible to the verifiers under conditions of confidentiality (see ISO 14025). The project report is not part of the public communication and may therefore contain confidential data relevant for verification.

3 General Information in the Project Report

The project report shall include the following general information:

- Client commissioning the Life Cycle Assessment, institution, and names of the internal or external life cycle assessors;
- Report date and version number;
- Confirmation that the Life Cycle Assessment study has been carried out in accordance with the requirements of these Product Category Rules Part A, with reference to EN 15804:2012+A2:2019 and the product group–specific requirements in Part B.

4 Goal of the Study

The following information is required:

- The reasons for carrying out the study;
- The intended application;
- the target audience, i.e. whether the information and data for an EPD are intended for communication between business partners (business-to-business) and/or between manufacturers and consumers (business-to-consumer).

5 Scope of the Study

5.1 Product Description and Manufacturing

The product to be assessed shall be described with respect to its material, technical, and functional specifications. In this regard, reference should be made to the corresponding European standards, which shall be cited transparently. All products covered by the EPD shall be specified by manufacturer or trade name, product/article number, or similar identifier.

The manufacturing processes underlying the modelling shall be documented. It shall be explained for which data primary data from the manufacturer are available and which data have been taken as generic data from background databases. The primary data shall be documented in the project report or in an annex to the project report.

For an EPD of a manufacturer or a distributor, the location of all production sites for which the EPD is representative shall be stated in the EPD at least at country and city level. In addition to the city, a postal code shall be added if the uniqueness of the assignment might otherwise be limited.

The allocation of real material and energy flows determined as primary data to generic background datasets from databases shall be presented in tabular form when describing the calculation model or data quality.

Further explanations and an example table for documenting data quality are provided in Clause 6.4.2.

5.2 Application Area of the Construction Product

The application area of the declared product shall be described, e.g., "application in interior spaces or in outdoor areas."

5.3 EPD Variants and Classification of Construction Products

Within the scope of the IBU EPD Programme, both individual manufacturers and groups of manufacturers may declare their products:

A) Manufacturer declaration
B) Manufacturer group declaration (e.g., association, sector)

For both options, various EPD variants are possible:

1. Specific EPD (+ project-specific EPD)
2. Average EPD
3. Representative EPD
4. Model EPD
5. Model EPD with scoring system

Classification of Construction Products

For all EPD variants except specific or project-specific EPDs, a classification of the construction products shall be carried out. The classification refers to grouping similar products into subgroups declared in one EPD. Only products that fall within the scope of the same selected PCR Part B document may be aggregated into subgroups. These products form the product class declared in the EPD. The procedure and criteria for grouping subgroups (classification) shall be described transparently in the project report.

Rules applicable to all EPD variants:

- The EPD variant and the products or product classes declared within it shall be specified in the project report and in the scope Clause of the EPD.
- In the EPD, in addition to a general product description, the names of the products or product classes, including any product codes to which the EPD applies, shall be stated. This ensures that the resulting average, model or representative EPD contains sufficient information for the products covered by the EPD and that its use in a building LCA is possible.

- The manufacturers and production sites covered by the declaration shall be clearly identifiable. If the number of plants is too large, reference may be made to an externally linked list.
- If product classes are formed, the derivation of the classification shall be described transparently and the rationale for classifying different products shall be justified.
- The classification is subject to verification.

5.3.1 Explanations of the Possible EPD Variants in Detail

5.3.1.1 Specific EPD

In a specific EPD, a specific product of a manufacturer is considered. The product can be clearly identified and described. The life cycle assessment calculation relates to precisely this one real product.

This EPD variant also includes the project-specific EPD, in which a specific product for use in a specific construction project is considered.

5.3.1.2 Average EPD

The environmental indicators can be calculated for an average and thus generally virtual product. The products included form the product class declared in the EPD. It shall be taken into account that this also requires ranges to be specified for the technical data as well as for the product composition.

Averaging may refer to a product class of one manufacturer, to several manufacturing plants of one manufacturer, or to several manufacturers within an association/sector.

The averaging shall be described in a transparent and comprehensible manner. The possible deviations for the indicator "GWP total" shall be determined quantitatively within the product class and stated both in the project report and in the EPD.

Justification: The greater the deviation of the results of the products included, which are to be covered by an average EPD, the less the mean value represents the actual product, and the less suitable the EPD is for use in a building life cycle assessment and/or a building sustainability certification.

5.3.1.3 Representative EPD

The environmental indicators can be calculated for a representative product, acting as a proxy for a product class. Representativeness can refer, for example, to the highest share in terms of sales, a typical design, or a medium or highest mass within the product class.

The representativeness of the product may refer to a product class of one manufacturer with one or more manufacturing plants as well as to several manufacturers within an association/sector.

The representativeness of the declared product shall be described in a comprehensible manner. The possible deviations for the indicator "GWP total" shall be determined quantitatively within the product class and stated both in the project report and in the EPD. If only very small deviations are assumed, these shall be estimated quantitatively and this estimation shall be plausibly justified.

5.3.1.4 Sample EPD

The environmental indicators may be declared as a sample EPD for a product with the highest environmental impacts. The sample EPD applies directly as a conservative assumption for all products within the product class.

The presentation of the actual highest values for all environmental indicators shall be described in a transparent and comprehensible manner. If there is a linear relationship between the environmental burdens and, for example, mass, with identical composition of the products covered in the class, the conversion of the environmental indicators from the sample EPD to individual products from the product class may be specified by providing scaling factors in the EPD or, where applicable, in an Annex to the EPD. Scaling should be derived by determining at least two points for each indicator.

5.3.1.4.1 Sample EPD with scoring system

- A sample EPD with a scoring system requires individual approval by the SVR. The approach shall be presented to the SVR by the applicant and discussed with the potential verifier on a case-by-case basis.
- If there are many products with very different compositions within a product class, determining a product with the highest environmental impacts is challenging. Methodological guidance can be found in the IBU General Programme Instructions.

Individualization of manufacturer group declarations

The procedure for the individualization of manufacturer group declarations via the IBU Secretariat is described in the General Programme Instructions. The options for individualization shall be described in the project report.

5.4 Declared/functional unit

The life cycle assessment shall be calculated for a declared unit of the construction product, as specified in PCR Part B of the product category rules applicable to the product to be declared. It is also possible, in accordance with PCR Part B, to specify a functional unit.

[EN 15804+A2, Clause 6.3.2.1]: "The functional unit of a construction product shall specify:

- *the application of a product or product groups covered by the functional unit;*

- *the reference quantity for the functional unit when integrated in the construction works;*
- *the quantified key properties, when integrated into a building, for the functional use, quantified performance characteristics or minimum performance of the construction product, taking into account the functional equivalent of the building;*
- *the minimum performance characteristics under defined conditions shall be fulfilled over the defined time period of the functional unit;*
- *a specified period of time under reference in-use conditions considering the RSL. If the functional unit uses a different time period than the RSL, the RSL shall be given as technical information in the EPD (see [EN 15804+A2] 6.3.4)."*

[EN 15804+A2, Clause 6.3.2.2]: "The future function of the product within the building or construction works is often uncertain, as the full functionality of a product may not be required at building level. It is therefore difficult to define a complete functional unit, including information on the required technical performance of the product within the building or construction works over the full life cycle.

Nevertheless, for a 'cradle-to-grave' EPD with a functional unit, a default (typical) application and the key functionalities shall be defined. These are normally required from the product or products in this application and provide other functional information as additional technical information.

The declared technical performance shall be based on specifications for determination or calculation of this performance given in the relevant European harmonized technical specification (harmonized European Standard and European Assessment Document), if available."

[EN 15804+A2, Clause 6.3.3]: "The declared unit shall be applied if a functional unit cannot be defined, e.g. since a function of the product cannot unequivocally be described because it can be used in many different ways in the context of construction works, or when the precise function of the product or scenarios at the building level is not stated or is unknown. The declared unit may also be used as an alternative to the functional unit.

An EPD based on a declared unit may cover all modules of the life cycle (i.e. cradle to grave) and Module D. The declared unit shall relate to the typical applications of products and their reference service life."

Usually, the declared unit refers to the product "at factory gate." If a system ("kit") marketed by a manufacturer is declared, or if product losses occur during installation (A5), the declared unit may also refer to the product "as installed."

The permissible declared/functional unit is bindingly specified in the respective PCR Part B documents.

The chosen declared/functional unit shall be stated in the project report. In all cases, the mass basis of the declared/functional unit shall be provided to allow conversion to 1 kg.

5.5 System Boundaries

The definition of the system boundary and thus of the type of EPD with regard to the life cycle stages covered and the declared modules shall follow the modular structure according to EN 15804+A2 (Clause 5.2).

The processes included in the individual modules shall be described completely and should not repeat the general wording described in PCR Part A and B and in EN 15804+A2.

[EN 15804+A2, Clause 5.2]: "All construction products and materials shall declare modules A1-A3, modules C1-C4 and module D."

The graphical representation of the system boundary shall be provided in the EPD in a designated table:

- All mandatory modules shall be marked with an X and thus declared.
- All other modules relevant at product level, namely A4, A5, B1, B2, B6, and B7, may either be marked with an X and declared, or marked as ND (Not Declared) and not declared.
- Modules B3 to B5, which are only relevant at building level, shall by default be marked as MNR (Module Not Relevant) and should not be declared at product level.

[EN 15804+A2, Clause 5.2]: "Only products which fulfil all three of the conditions below shall be permitted to be exempt from this requirement:

- *the product or material is physically integrated with other products during installation so they cannot be physically separated from them at end of life; and*
- *the product or material is no longer identifiable at end of life as a result of a physical or chemical transformation process; and*
- *the product or material does not contain biogenic carbon.*

***NOTE:** This means any product containing biogenic carbon cannot omit the declaration of modules C1-C4 and module D.*

Construction products and materials that are identified as exemptions may omit the declaration of modules C1-C4 and module D. Any omission of modules C1-C4 and module D shall be justified.

EPDs not declaring modules C1-C4 and module D shall provide information on where to find scenarios for the end-of-life modules.

*→ **EXAMPLE**: End-of-life scenarios for cement can be found in EPDs for concrete and mortar."*

[EN 15804+A2, Clause 7.2.2]: "Information modules that generate any input or output flows considered in the declaration of module D shall also be declared.

→ ***EXAMPLE**: The declaration of benefits of material and energy recovery in module D from packaging recovery in A5 is only possible if optional module A5 has been declared, including all related processes."*

"[The project report and] the EPD [shall] specify which type of EPD is being declared:

a) *cradle to gate with modules C1-C4 and module D (A1-A3 + C + D);*
b) *cradle to gate with options, modules C1-C4 and module D (A1-A3 + C + D and additional modules. The additional modules may be one or more selected from A4 to B7);*
c) *cradle to grave and module D (A + B + C + D);*
d) *cradle to gate (A1-A3);*
e) *cradle to gate with options (A1-A3 and additional modules; the additional modules may be A4 and A5)."*

Losses and waste flows, where they occur, shall be accounted for in the modules in which they arise, together with their associated environmental impacts (including their original production, transport to the construction site, etc.).

Further provisions regarding the declaration of waste flows that have reached end-of-waste status and that may result in benefits due to the further treatment of these material flows are explained in *[EN 15804+A2, Clause 6.3.5.5]*:

"This output, however, reaches the end-of-waste state when it complies with all the following criteria:

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

***NOTE:** The "specific purpose" in this context is not restricted to the function of a certain product but can also be applied to a material serving as input in the production process of another product or of energy."*

The determination that end-of-waste status has been reached, and thus the change in status from *waste* to *secondary material* or *secondary fuel*, shall be supported by an appropriate and differentiated justification.

In accordance with EN 15804+A2, the life cycle of a product is declared by means of information modules A to C. Module D shall be considered as supplementary

information on benefits and loads beyond the system boundary. Therefore, aggregation of results across modules A to D is not permitted.

Apart from modules A1 to A3, which describe the manufacturing stage of a product and are therefore known, the calculation of all other modules is based on assumptions, referred to as scenarios (see Clause 6.2, Development of Product-Level Scenarios).

5.5.1 A1-A3 Information Modules of the Product Stage

[EN 15804+A2, Clause 6.2.2]: "The product stage includes:

- *A1, raw material extraction and processing, processing of secondary material input (e.g. recycling processes);*
- *A2, transport to the manufacturer;*
- *A3, manufacturing;*

including provision of all materials, products and energy, as well as waste processing up to the end-of-waste state (6.3.5.5 and Annex B) or disposal of final residues, during the product stage."

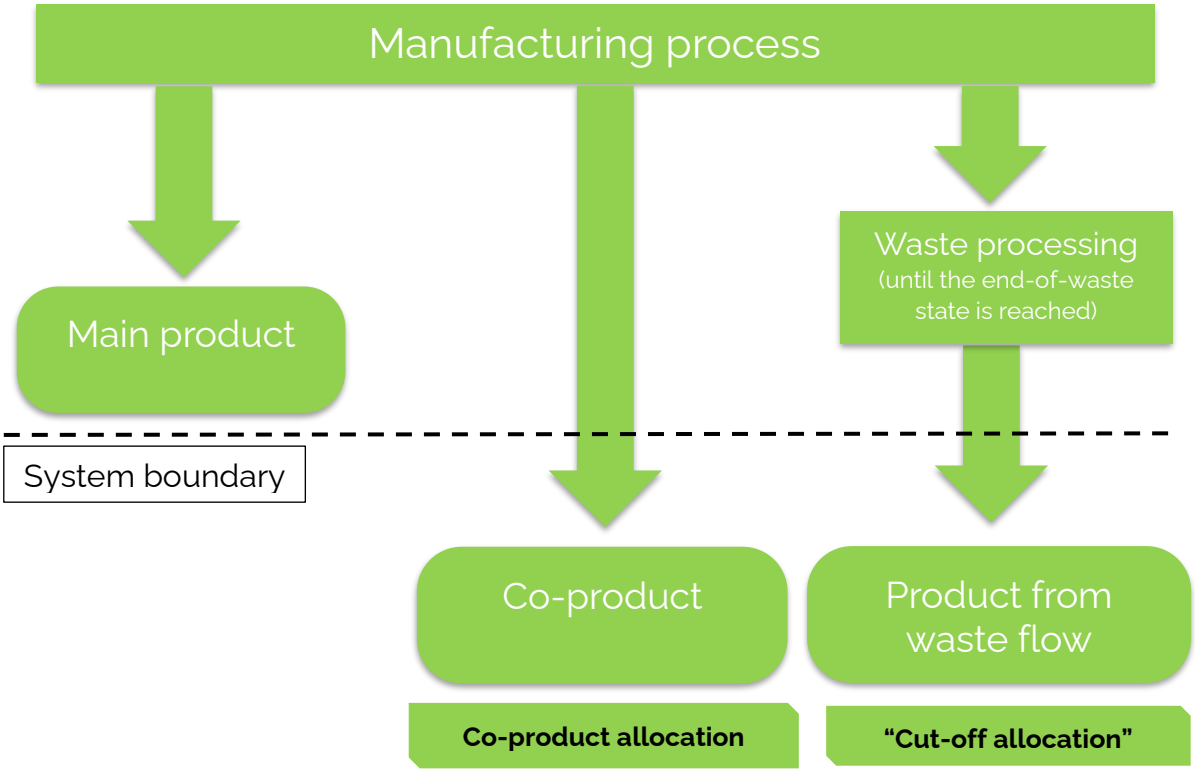
[EN 15804+A2, Clause 6.2.2]: "Modules A1, A2 and A3 may be declared as an aggregated module A1-3."

Waste processing in A1-A3: The environmental impacts resulting from the disposal of waste are declared in modules A1-A3.

[EN 15804+A2, Clause 6.3.5.2]: "The product stage is an information module required to be included in each EPD. […] The system boundary with nature is set to include those processes that provide the material and energy inputs into the system and the following manufacturing and transport processes up to the factory gate, as well as the processing of any waste arising from those processes. […]

Flows leaving the system at the end-of-waste boundary of the product stage (A1-A3) shall be allocated as co-products […]."

Important: The allocation of **production waste** that has reached the end-of-waste state differs from the co-product allocation described in Clause 6.6.1.



Background: In addition to the allocation rules, the polluter-pays principle in accordance with *EN 15804+A2, Clause 6.3.5.1* must be taken into account for products resulting from waste; i.e. the environmental loads associated with waste processing must be assigned entirely to the system generating the waste. Therefore, a so-called "cut-off allocation" is applied to these products. In practice, this corresponds to an economic value of "0" for this material/energy flow. [1]

Two possible approaches for practical implementation are described:

Case A: During manufacturing in A1-A3, the main product and a waste flow arise. The waste flow undergoes processing within A1-A3. If this material/energy flow reaches the end-of-waste state (in accordance with EN 15804+A2, 6.3.5.5), it leaves module A1-A3 through "cut-off allocation" and is declared using the indicators CRU and/or MFR and/or MER or EEE/EET (see Clause 7.1.5 for explanations). At the same time, the amount of avoided material or energy of equivalent quality is declared as a benefit in module D. The same declaration rules apply as for materials/energy applied to module C (see Clause 6.6.3). The material flows are taken into account in the net flow calculation.

→ **EXAMPLE Case A:** During the manufacture of façade elements, significant quantities of offcuts arise within A1-A3. This waste flow is sorted and shredded within A1-A3. As a market exists for this homogeneous plastic, the end-of-waste state is reached. However, cut-off allocation is applied to the main product and the plastic granulate as a product resulting from a waste flow. All loads from manufacturing and waste processing up to the production of the plastic granulate (= end-of-waste state) are assigned to the façade element. The

[1] A credit ("loop") for materials/energy from waste within A1-A3 is generally not permitted.

avoided loads from producing plastic granulate of comparable quality are declared in module D.

NOTE 1: *This provision also justifies the declaration of "missing" scrap in module D if the net flow calculation results in a negative value for SM in module D, e.g. where the input contains a high proportion of scrap.*

NOTE 2: *This provision takes key fundamental methodological rules into account, even though it somewhat contradicts the following paragraph of EN 15804+A2, which, however, primarily concerns the allocation of co-products directly resulting from the production process:*

[EN 15804+A2, Clause 6.3.5.2]: "Loads and benefits from allocated co-products shall not be declared in module D. […] Therefore, as a general rule, potential loads or benefits from A1-A3 do not appear in module D."

Case B: During manufacturing in A1-A3, the main product and a waste flow arise. The waste flow undergoes processing within A1-A3. If this material/energy flow reaches the end-of-waste state (in accordance with EN 15804+A2, 6.3.5.5), it leaves module A1-A3 through cut-off allocation and is declared using the indicators CRU and/or MFR and/or MER or EEE/EET (see Clause 7.1.5 for explanations). If the quantities of this material/energy flow are very small, further declaration in module D may be omitted. This is a conservative approach and simplifies the accounting.

→ **EXAMPLE Case B:** During the manufacture of injection-moulded parts, small quantities of sprues arise. This plastic is granulated or sent for incineration. As the quantity is very small relative to the main product, this recoverable material or energy flow is cut off (cut-off allocation). However, no declaration is made in module D.

[EN 15804+A2, Clause 6.3.5.2]: "The product stage includes:

- *A1, extraction and processing of raw materials (e.g. mining processes) and biomass production and processing (e.g. agricultural or forestry operations);*
- *A1, reuse of products or materials from a previous product system;*
- *A1, processing of secondary materials used as input for manufacturing the product, but not including those processes that are part of waste processing in the previous product system;*
- *A1, generation of electricity, steam and heat from primary energy resources, also including their extraction, refining and transport;*
- *A1, energy recovery and other recovery processes from secondary fuels, but not including those processes that are part of waste processing in the previous product system;*

For module A1, the following must be taken into account:

[EN 15804+A2, Clause 6.3.5.2]: "In the case of input of secondary materials or energy recovered from secondary fuels, the system boundary between the system under study and the previous system (providing the secondary materials) is set where outputs of the previous system, e.g. materials, products, building elements or energy, reach the end-of-waste state [in accordance with the European Waste Framework Directive] (see also EN 15804+A2, Clause 6.3.5.5 and Annex B)."

A2, transportation up to the factory gate and internal transport;

A3, production of ancillary materials or pre-products;

A3, manufacturing of products and co-products;

A3, manufacturing of packaging;

A1-A3, processing up to the end-of-waste state or disposal of final residues, including any packaging not leaving the factory gate with the product.

The rules specified in this European Standard for defining the end-of-waste state apply regardless of the geographical coverage of a product system."

For the provision of energy in modules A1-A3, the market-based approach)[2] may be applied in accordance with ISO 14067 and EN 15941, but no offsetting or insetting may be credited.

In accordance with the specific provisions (Clause 0), the input of biogenic carbon (as a CO_2 equivalent) stored in a product is accounted for. The module in which this biogenic carbon is released or exported again from the product system must therefore be declared (typically module C3 or C4). This provision also applies to packaging material (typically affecting module A5).

If the use of packaging material is accounted for in module A3 and the packaging contains >5% biogenic carbon, module A5 should also be included in the assessment as the end-of-life stage of the packaging. The emission of biogenic carbon dioxide from the carbon content of the packaging must be accounted for in module A5. Care must be taken to ensure that the corresponding carbon dioxide emission in module A5 exactly matches the amount taken up in module A3.

However, if the scope of an EPD is limited to modules A1-A3 or the optional module A5 is not declared:

- the packaging accounted for must be quantified by material in the EPD as mandatory technical scenario information;
- the "biogenic carbon balance" for packaging material containing biogenic carbon must be taken into account in A1-A3;
- the EPD must state that module A1-A3 includes the accounting balance between the uptake and release of the biogenic carbon in the packaging as biogenic carbon dioxide.

[2] The **market-based approach** refers to an accounting method that uses contractual instruments, such as guarantees of origin, to describe the electricity actually purchased by a company or consumer.

If the packaging contains <5% biogenic carbon, the "biogenic carbon balance" may in all cases be accounted for directly in module A3 (or module A1-A3 if declared in aggregate).

5.5.2 A4-A5 Information Modules of the Construction Process Stage

[EN 15804+A2, Clause 6.2.3]: "The construction process stage includes:

A4, transport to the construction site;

A5, installation in the building,

including provision of all materials, products and energy, as well as waste processing up to the end-of-waste state or disposal of final residues during the construction process stage. These information modules also include all impacts and aspects related to any losses during this construction process stage (i.e. production, transport, waste processing and disposal of the lost products and materials)."

[EN 15804+A2, Clause 6.3.5.3]: "The construction process stage includes the optional information modules for:

A4, transportation from the production gate to the construction site;

A4-A5, storage of products, including the provision of heating, cooling, humidity control, etc.;

A4-A5, wastage of construction products (additional production processes to compensate for the loss of wastage of products);[3]

A4-A5, waste processing of the waste from product packaging and product wastage during the construction processes up to the end-of-waste state or disposal of final residues;"

[EN 15804+A2, Clause 6.3.5.3]:

"A5, installation of the products in the building, including manufacture and transportation of ancillary materials and any energy or water required for installation or operation of the construction site. It also includes on-site operations to the product."

Module A5 must be declared if relevant environmental impacts arise from the application of the product during installation (e.g. emissions from construction foam or paint).

[3] If the declared product comprises a kit (e.g. an external thermal insulation composite system), including the installation material, the entire manufacture of all components is declared in A1-A3. The manufacture of any offcuts or product residues potentially arising in A5 is also declared in A1-A3. Transportation of the system to the construction site is declared in A4, while installation, including waste processing, is declared in A5.

Offcuts must be declared if required by PCR Part B or the c-PCRs[4].

Otherwise, module A5 may be declared optionally.

5.5.3 B1-B5 Information Modules of the Use Stage Related to the Building Fabric

Unless otherwise specified in the PCR Part B documents, the B modules shall be declared for the entire RSL period.

[EN 15804+A2, Clause 6.2.4]: "The use stage related to the building fabric includes:

- *B1, use or application of the installed product;*
- *B2, maintenance;*
- *B3, repair;*
- *B4, replacement;*
- *B5, refurbishment;*

including provision and transport of all materials, products and related energy and water use, as well as waste processing up to the end-of-waste state or disposal of final residues during this part of the use stage. These information modules also include all impacts and aspects related to losses during this part of the use stage (i.e. production, transport, waste processing and disposal of the lost products and materials)."

[EN 15804+A2, Clause 6.3.5.4]: "The use stage includes the optional information modules covering the period from the handover of the building or construction works to when it is deconstructed or demolished. The duration of the use stage of products may potentially differ from the required service life of a building.

The use stage includes the use of construction products, equipment and services in their proper function. It also includes their use for protecting, conserving, moderating or controlling a building, e.g. modules describing building operation through building-related services such as heating, cooling, lighting, water supply and internal transport (provided e.g. by lifts and escalators). It also includes maintenance (including cleaning), repair, replacement and refurbishment.

It is recognised that it may be difficult to separate all use-stage processes and the connected aspects and impacts into these separate modules. However, any deviation from the categorisation of aspects and impacts into modules B1-B5 and B6-B7 shall be transparently reported and justified."

[EN 15804+A2, Clause 6.3.5.4.2]:

[4] c-PCR, complementary product category rules (definition from EN 15804+A2, 3.5 *complementary product category rules*): product-group-specific or horizontal product category rules that provide additional, consistent and non-contradictory requirements to EN 15804+A2.

"B1 Use of the installed product

The module 'use of the installed product' covers environmental aspects and impacts arising from components of buildings and construction works during their normal (i.e. anticipated) use, which are assigned to module B1.

→ **EXAMPLE 1:** Release of substances from the façade, roof, floor covering and other surfaces (interior or exterior) into indoor air, soil and water.

NOTE 1: *This information does not need to be stated in the EPD if the horizontal standards on measurement of releases of regulated hazardous substances from construction products using harmonised test methods, according to the provisions of the respective technical committees for European product standards, are not available.*

B2 Maintenance

The module 'maintenance' covers the combination of all planned technical and associated administrative actions during the service life to maintain the product installed in a building, construction works or parts thereof in a state in which it can perform its required functional and technical performance, as well as preserve the aesthetic qualities of the product. This includes preventive and regular maintenance activities such as cleaning and planned servicing, replacement or mending of worn, damaged or degraded parts. Water and energy use required for cleaning as part of maintenance shall be included in this module and not in modules B6 and B7.

NOTE 2: *Inspection, maintenance, cleaning, repair and replacement of an entire building Clause as part of a comprehensive measure would be considered 'refurbishment'.*

The boundary of 'maintenance' shall additionally include:

- *production and transportation of any components or ancillary products used for maintenance, including cleaning;*
- *transportation of any waste from maintenance processes or maintenance-related transportation;*
- *end-of-life processes for any waste from transportation and the maintenance process, including any parts of components and ancillary materials removed.*

→ ***EXAMPLE 2:*** *Painting window frames, doors, etc., as well as the annual inspection of an oil or gas boiler and replacement of filters in heat-recovery or air-conditioning systems.*

B3 Repair

The module 'repair' covers the combination of all technical and associated administrative actions during the service life associated with corrective, responsive or reactive treatment of a construction product or its parts installed in a building or construction works to return it to an acceptable condition in which it can perform its required functional and technical performance. It also covers preservation of the product's aesthetic qualities.

Replacement of a broken component or part due to damage should be assigned to 'repair', whereas replacement of an entire element due to damage should be assigned to the module 'replacement'.

The boundary for 'repair' shall include:

a) *repair processes for the repaired component, including:*
   - *production of the repaired part of a component and ancillary materials;*
   - *related energy and water use;*
   - *production- and transport-related aspects and impacts of any material losses during the repair process;*

b) *transportation of the repaired part of a component and ancillary materials, including production-related aspects and impacts of any material losses during repair-related transportation;*

c) *end-of-life processes for any waste from transportation and the repair process, including the removed parts of components and ancillary materials.*

→ ***EXAMPLE 3:*** *For a window with broken glass, this includes the manufacture and transport of a new pane of glass with packaging, all impacts related to the repair process (rubber seal, water for cleaning, etc.) and disposal of the glass waste and any related packaging.*

B4 Replacement

The module 'replacement' covers the combination of all technical and associated administrative actions during the service life associated with returning a construction product to a condition in which it can perform its required functional or technical performance by replacing an entire construction element.

Replacement of a broken component or part due to damage should be included as 'repair', whereas replacement of an entire construction element due to damage should be considered 'replacement'. Replacement of an entire building Clause as part of a coordinated replacement programme for the building should be considered 'refurbishment'.

The boundary for 'replacement' shall include:

- *production of the components and ancillary materials required for replacement;*
- *the replacement process, including the related water and energy use and the production-related aspects and impacts of any material losses during the replacement process;*
- *transportation of the components and ancillary materials used for replacement, including production-related aspects and impacts of any material losses caused by damage during transportation;*
- *end-of-life processes for any losses occurring during transportation and the replacement process, including the components and ancillary materials removed.*

→ ***EXAMPLE 4:*** *For a carpet replaced at the end of its service life, this includes production and transport of the new carpet and its packaging, all impacts related to the replacement process (adhesive, vacuum cleaning, etc.) and disposal of the original carpet, any waste from installation of the replacement carpet, packaging waste and adhesive.*

B5 Refurbishment

The module 'refurbishment' covers the combination of all technical and associated administrative actions during the service life of a product associated with returning a building, other construction works or parts thereof to a condition in which they can perform their required functions. These activities cover a coordinated programme of maintenance, repair and/or replacement activities involving a significant part or an entire Clause of the building.

Restoration activities should be included within refurbishment.

The boundary for 'refurbishment' shall include:

- *production of the components and ancillary materials used for refurbishment;*
- *the refurbishment process and related water and energy use, including production-related aspects and impacts of any material losses during the refurbishment process;*
- *transportation of the components and ancillary materials used for refurbishment, including production-related aspects and impacts of any losses during transportation;*
- *end-of-life processes for any losses occurring during transportation and the refurbishment process, including the components and ancillary materials removed."*

For energy-consuming products installed in construction works, declaration of maintenance (B2) and, where relevant, emissions from use (B1) is mandatory.

It is recognised that assigning maintenance processes and their associated impacts to separate modules may be difficult. All relevant processes required to achieve the stated service life shall therefore be declared and assigned to one or more of these modules. The activities declared in each module shall be described in the EPD.

5.5.4 B6-B7 Information Modules of the Use Stage Related to the Operation of the Building

[EN 15804+A2, Clause 6.2.5]: "The use stage related to the operation of the building includes:

B6, operational energy use (e.g. operation of heating systems and other building-related services);

B7, operational water use.

These information modules include provision and transport of all materials and products, as well as energy and water provision, waste processing up to the end-of-waste state or disposal of final residues during this part of the use stage."

[EN 15804+A2, Clause 6.3.5.4.3]:

"B6 Energy use for the operation of building-integrated technical systems

The boundary of the module 'energy use for the operation of building-integrated technical systems' shall include energy use during operation of the product (the building-integrated technical system), together with its associated environmental aspects and impacts, including processing and transportation of any waste arising on site from the use of energy.

Building-integrated technical systems are installed technical equipment supporting the operation of a building or construction works. This includes technical building systems for heating, cooling, ventilation, lighting, domestic hot water and other systems for sanitation, security, fire safety, internal transport, building automation and control, and IT communications.

Aspects related to the production, transportation and installation of equipment required to supply energy to the building shall be assigned to modules A1-A5. Energy use during inspection, maintenance, repair, replacement or refurbishment activities for the equipment shall be assigned to modules B2-B5. Aspects related to waste processing and final disposal of equipment shall be assigned to modules C1-C4."

The declaration of energy use in module B6 is mandatory for end products that consume energy directly or indirectly[5] and are installed in the construction works. Module B6 shall be reported separately to ensure transparency in the application of the EPD.

If no c-PCR is available for the product group, the programme operator may establish a justified use scenario, including a calculation formula, for each product family (or product category). This is usually published in the PCR Part B document.

Where different regulations apply in a geographical context (e.g. differences between European and local regulations), the scenario resulting in the higher potential environmental impacts shall be applied as the "justified use scenario" for calculating module B6. Multiple scenarios may also be reported.

If the product consumes electricity, the requirements of *EN 50693 (Product category rules for life cycle assessments of electronic and electrical products and systems)* shall be taken into account.

Technical information relevant to the declaration of module B6 shall be included in the EPD.

B7 Operational water use by building-integrated technical systems

The module "operational water use by building-integrated technical systems" covers the period from the handover of the building or construction works until its deconstruction or demolition.

[5] "Indirectly" refers to products that store or transmit energy, such as energy losses through cables, but not to products such as windows or thermal insulation.

The boundary of the module "operational water use by building-integrated technical systems" shall include water use during operation of the product (the building-integrated technical system), together with its associated environmental aspects and impacts, considering the life cycle of the water, including treatment, transport and wastewater treatment.

Building-integrated technical systems are installed technical equipment supporting the operation of a building or construction works. This includes technical building systems for cooling, ventilation, lighting, domestic hot water and other systems for sanitation, security, fire safety and internal transport."

5.5.5 C1-C4 Information Modules of the End-of-Life Stage

[EN 15804+A2, Clause 6.2.6]: "The end-of-life stage includes::

C1, deconstruction and demolition;

C2, transport for waste processing;

C3, waste processing for reuse, recovery and/or recycling;

C4, disposal,

the provision and all transport operations, the provision of all materials and products, and the associated energy and water consumption."

[EN 15804+A2, Clause 6.3.5.5]: "The end-of-life stage of the construction product starts when it is replaced, dismantled or deconstructed from the building or construction works and no longer provides any functionality. Depending on the selected end-of-life scenario for the product, it may also start at the end of life of the building.

During the end-of-life stage of the product or building, all output from dismantling, deconstruction or demolition of the building, from inspection, maintenance, cleaning, repair, replacement or refurbishment processes, all debris, construction products, materials or construction elements, etc. leaving the building are initially considered waste. This output, however, reaches the end-of-waste state when it complies with all the following criteria:

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

***NOTE 1:** The 'specific purpose' in this context is not restricted to the function of a particular product but may also apply to a material serving as input to the production process of another product or to energy generation.*

The criterion for 'overall adverse environmental or human-health impacts' shall refer to the pollutant limit values established by regulations in force at the time and place

of assessment. Where necessary, it shall consider adverse environmental effects. The presence in the waste of any hazardous substance exceeding these limits or displaying one or more properties listed in the applicable legislation, e.g. the European Waste Framework Directive, prevents the waste from reaching the end-of-waste state.

The system boundary between the end-of-life stage and module D is defined as the point at which outputs, i.e. secondary materials or fuels, reach the end-of-waste state.

The end-of-life stage includes the following modules:

C1, deconstruction, including dismantling or demolition of the product from the building, including initial on-site sorting of the materials."

C1 is a mandatory module under the standard. Three cases can be distinguished:

a) The deconstruction/demolition scenario can be calculated: the values are declared accordingly.

b) The scenario causes no environmental loads, or the calculated environmental loads are excluded in accordance with the cut-off criteria: the indicators in C1 are declared as "0".

c) Values for the scenario cannot be calculated even though environmental loads are expected: column C1 is marked with "X" and the indicators in C1 are declared as "ND".

The selected scenario shall be justified and specifically described in the project report.

"C2, transportation of the discarded product as part of waste processing, e.g. to a recycling facility, and transportation of waste, e.g. for final disposal.

C3, waste processing, e.g. collection of waste fractions from deconstruction and waste processing of material flows intended for reuse, recycling and energy recovery. Waste processing shall be modelled and the elementary flows shall be included in the inventory. Materials for energy recovery are identified based on the efficiency of energy recovery, with an efficiency rate higher than 60%, without prejudice to existing legislation. Materials from which energy is recovered with an efficiency rate below 60% are not considered materials for energy recovery.

***NOTE 2:** Only materials that have reached the end-of-waste state can be considered materials for energy recovery, provided that the energy-recovery process demonstrates an efficiency rate of more than 60%.*

C4, waste disposal, including physical pre-treatment and management of the disposal site.

***NOTE 3:** In principle, waste processing is part of the product system under study. In the case of materials leaving the system as secondary materials or fuels, processes such as collection and transport before the end-of-waste state are generally part of the product system under study. However, after the end-of-waste state has been reached, further processes may still be necessary to replace primary materials or fuels in another product system. Such processes are considered to be beyond the system boundary and are allocated to module D. Secondary material that has left the*

system may be declared as substituting primary production in module D when it has reached functional equivalence with the substituted primary material.

The degradation of a product's biogenic carbon content in a solid-waste disposal site, declared as GWP-biogenic, shall be calculated without a time limit. Any remaining biogenic carbon is treated as an emission of biogenic CO_2 from the technosphere to the natural environment. For the time period applicable to all other disposal processes, see [EN 15804+A2] 6.3.8.2.

***NOTE 4:** Waste disposal for products containing biogenic carbon declared as GWP-biogenic is modelled as realistically as possible on the basis of current practices.*

Loads, e.g. emissions, from waste disposal in module C4 are considered part of the product system under study in accordance with the 'polluter-pays' principle. If, however, such a process generates energy, such as electricity and heat from waste incineration or landfill gas, the potential benefits from using this energy in the next product system are assigned to module D. The calculation is based on current average substitution processes."

In summary, three different cases can be distinguished for modelling and declaring the energy use of waste:

- Thermal waste processing: The waste flow does not reach the end-of-waste state before incineration and the plant has an R1 value < 0.6. Waste processing and incineration are treated as disposal processes and their environmental impacts are declared in C4. The useful energy produced during waste processing is declared as "exported energy" (EEE or EET) in C4, while the environmental loads avoided through the generated useful energy are declared in module D.
- Energy recovery from waste: The waste flow does not reach the end-of-waste state before incineration and the plant has an R1 value > 0.6. Waste processing and incineration are treated as energy recovery and their environmental impacts are declared in C3. The useful energy produced during energy recovery is declared as "exported energy" (EEE or EET) in C3, while the environmental loads avoided through the generated useful energy are declared in module D.
- Energy use of a secondary fuel: The waste flow reaches the end-of-waste state before incineration or energy use. This waste flow is classified as a secondary fuel. The environmental impacts of processing the waste into a secondary fuel are accounted for in C3, and the material flow of the secondary fuel is declared as material for energy recovery (MER) in C3. The incineration process is combined with the environmental loads avoided through the generated useful energy and accounted for and declared in module D. The EEE and EET indicators are not declared in this case.

When modelling thermal waste processing or energy recovery from waste, it shall be ensured that the modelled incineration plant and the calculated quantities of

recovered energy correspond to the assumed R1 value of the plant, thereby ensuring that the environmental impacts of the incineration process are correctly assigned to module C3 or C4.

The value of 60% referred to in EN 15804+A2 as the "efficiency rate of a material" is interpreted as the R1 plant efficiency factor assumed for the scenario. According to CEWEP Energy Report III (status 2007–2010)[6] the average R1 plant efficiency factor for waste-incineration plants in Europe is 0.69. A typical plant efficiency factor of R1 > 0.6 may also be assumed for Germany.

5.5.6 D Information Module on Benefits and Loads Beyond the System Boundary

[EN 15804+A2, Clause 6.2.7]: "Module D includes:

D, reuse, recovery and/or recycling potentials, expressed as net impacts and benefits."

[EN 15804+A2, Clause 6.3.5.6]: "Information module D aims at transparency for the environmental benefits or loads resulting from reusable products, recyclable materials and/or useful energy carriers leaving a product system, e.g. as secondary materials or fuels.

All declared net benefits and loads from net flows (for calculation of the net amounts, see 6.4.3.3) leaving the product system that have passed the end-of-waste state shall be included in module D, except those which have been allocated as co-products.

Avoided impacts from allocated co-products shall not be included in module D."

Further explanations of the net-flow calculation are provided in Clause 6.6.3.

5.5.7 Accounting for "Mass-Balance" Approaches

Mass-balance approaches (MBAs) and/or "book-and-claim" methods in accordance with *ISO 22095* (e.g. biomass-balance (BMB) and/or recycled-content allocation approaches) shall not be used in connection with ECO EPDs.

At a plant where one or more products are manufactured, contractually specified energy products shall not be virtually allocated to individual products. This means that the energy mix specified in the contract shall be allocated equally to all products. Virtual allocation to individual product lines is not permitted.

Allocation is possible only in the case of a separate energy supply or a separate contract.

5.5.8 CO_2 Certificates from Offsetting

[6] CEWEP Energy Report III (Status 2007-2010) – Results of Specific Data for Energy, R1 Plant Efficiency Factor and NCV of 314 European Waste-to-Energy (WtE9 Plants, December 2012

CO_2 certificates from offsetting projects shall not be credited in EPDs prepared in accordance with the IBU Programme Rules.

5.5.9 Description of the System Boundary in the Project Report

The description of the system boundary in the project report shall include the following:

- a description of the specific processes considered for each declared information module;
- where applicable, a flow chart of the specific process chain;
- a description of any omissions of life-cycle stages, processes or data requirements (see Clause 5.6).

5.6 Criteria for the Exclusion of Inputs and Outputs

[EN 15804+A2, Clause 6.3.6]: "Criteria for the exclusion of inputs and outputs (cut-off rules) in the LCA and information modules and any additional information are intended to support an efficient calculation procedure. They shall not be applied in order to hide data. Any application of the criteria for the exclusion of inputs and outputs shall be documented.

The following procedure shall be followed for the exclusion of inputs and outputs:

- *All inputs and outputs of a (unit) process for which data are available shall be included in the calculation. Data gaps may be filled using conservative assumptions with average or generic data. Any assumptions underlying such choices shall be documented;*
- *In the case of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1% of the renewable and non-renewable primary energy use and 1% of the total mass input of that unit process. The total of neglected input flows per module, e.g. modules A1-A3, A4-A5, B1-B5, B6-B7, C1-C4 or module D […], shall not exceed 5% of energy use and mass. Conservative assumptions combined with plausibility considerations and expert judgement may be used to demonstrate compliance with these criteria;*
- *Particular care should be taken to include material and energy flows known to have the potential to cause significant emissions to air, water or soil in relation to the environmental indicators of this standard. Conservative assumptions combined with plausibility considerations and expert judgement may be used to demonstrate compliance with these criteria."*

Application of the cut-off criteria shall be documented in the project report specifically for the products under assessment:

- description of the application of the above cut-off criteria and assumptions;
- list of the processes not considered and justification for their exclusion.

6 Life Cycle Inventory

6.1 Data Collection and Calculation Procedures

[EN 15804+A2, Clause 6.4.1]: "Data collection shall conform to the guidance given in ISO 14044:2006, 4.3.2."

[EN 15804+A2, Clause 6.4.2]: "The calculation procedures defined in EN ISO 14044 shall be applied. The procedures shall be uniformly applied throughout the study.

Where the inputs and outputs of combustible materials are converted into inputs and outputs of energy, the net calorific value shall be used with scientifically justified and recognised values specific to the combustible material."

The collection of specific data shall be validated by the LCA practitioner by means of a mass balance and/or an energy balance.

Data collection, calculation procedures and the plausibility check shall be documented in the project report in a transparent and traceable manner.

6.2 Development of Product-Level Scenarios

Apart from Modules A1 to A3, which describe the manufacture of a product and are therefore known, the calculation of all other modules is based on assumptions, referred to as scenarios.

[EN 15804+A2, Clause 6.3.9]: "Scenarios shall only be provided to describe environmental performance. A scenario shall be based on the relevant technical information defined in [EN 15804+A2] (see EN 15804+A2, Clauses 5.4 and 7.3 for additional information). Technical information on which the scenarios are based is described in [EN 15804+A2, Clause] 7.3. The predefined indicators of the EPD are calculated using the scenario and applying the rules set out in this standard.

A scenario shall be realistic and representative of one of the most likely alternatives. (For example, if three different applications are possible, either the most likely one or all three scenarios shall be declared.) Scenarios shall not include processes or procedures that are not in current use, or for which practicability has not been demonstrated.

→ ***EXAMPLE 1:*** *A recycling system is not practicable if it is based on a collection system whose logistics are not established.*

→ ***EXAMPLE 2:*** *Energy recovery shall be based on existing technology and current practice.*

Scenarios are communicated in accordance with [EN 15804+A2, Clause] 5.4. For EPDs declaring any or all modules beyond the product stage, the technical information describing the scenarios for these modules shall be provided together with the quantified environmental impacts of the modules based on those scenarios. See also [EN 15804+A2, Clause] 7.3.

[EN 15804+A2, Clause 7.3.1]: For an EPD covering "cradle to gate with options", Modules C1-C4 and Module D (A1-A3 + C + D and additional modules, where the optional modules may be A4 and/or A5 and/or any module from B1-B7), the optional modules shall be calculated and the indicators derived from the life cycle assessment shall be

declared. Alternatively, for this type of EPD, a manufacturer may decide to declare additional technical information without calculating the optional life cycle stages, in order to ensure that the function of a product in a building is adequately understood and thereby support the development of an appropriate scenario at building level.

For the definition of end-of-life scenarios:

For simple products that are not usually separated into individual substances/materials for waste treatment, the following applies:

At least one scenario shall be declared that represents a 100% scenario, e.g. 100% recycling.

Where different scenarios are developed for the information modules C1-C4, the scenarios shall be declared as 100% scenarios. Thus, for example, one scenario each shall be declared for 100% thermal waste treatment, 100% recycling and 100% landfilling. This serves building assessment purposes by enabling an appropriate scenario to be calculated, depending on the use of the product and its deconstruction potential, based on the declared 100% scenarios.

In addition to the 100% scenarios, a country-specific average end-of-life scenario may be declared by specifying the percentage shares of the different end-of-life routes. Example: for Germany, on average x% recycling, y% thermal waste treatment and z% landfilling.

For complex products (consisting of different materials, e.g. composite materials, windows or ETICS), there are two approaches for modelling the end of life, depending on feasible construction-specific deconstruction practices:

1. If the product is not further separated and sorted after deconstruction, an appropriate 100% scenario shall be declared. For example, the product may be completely landfilled; accordingly, a scenario with 100% landfilling shall be calculated. Likewise, a product may be sent 100% to municipal waste incineration.
2. If the product consists of different components that follow different end-of-life routes after dismantling, the end of life may be modelled on a material- or component-specific basis. For example:
   - Deconstruction & separation of the main materials for recycling: the product is dismantled and separated into its constituent materials. For each material, the corresponding typical route to recycling (including the waste treatment of residues arising from the separation and processing of materials) or to waste treatment shall be declared in Modules C1 and C3.
   - Deconstruction & waste treatment of the main materials: if the main constituents of the product are treated as waste, e.g. partially recovered through thermal treatment and partially landfilled, all processes shall be declared, including the possible recycling of residues arising from separation and processing, in Module C3 (for energy recovery from waste) or

Module C4 (for thermal treatment of waste and landfilling), respectively (for differentiation see Clause 5.5.5).

Product-specific combinations of recycling, thermal waste treatment and landfilling are also possible. In such cases, the allocation of processes to modules shall be arranged in a way that enables the calculation of an appropriate product-specific scenario when the EPD is used for building assessment. This also applies to the development of scenarios for products that are partly reused and partly recycled, where the mixed scenarios cannot readily be derived from combinations of 100% scenarios.

In principle, 100% of the material contained in a product shall be considered at the end of life. Assumptions regarding collection rates, sorting rates and recycling rates shall be explicitly described and justified in the project report. Ideally, supporting statistics are available.

6.3 Data Selection / Background Data

[EN 15804+A2, Clause 6.3.7]: "The general rule is that specific data from specific production processes, or average data derived from specific processes, shall take priority in the calculation of an EPD. In addition, the following rules apply:

- *an EPD describing an average product shall be calculated using data that represent a representative average of the products declared by the EPD;*
- *an EPD describing a specific product shall be calculated using specific data, at least for those processes over which the manufacturer has influence. Generic data may be used for processes over which the manufacturer has no influence, e.g. processes related to raw material production, such as raw material extraction or electricity generation, which are often referred to as upstream data […];*
- *a specific EPD covering all life cycle stages (cradle to grave) may be calculated using generic data for certain downstream processes, e.g. waste incineration. To ensure comparability, the calculation of the use stage shall be based on the same additional technical information required in [EN 15804+A2, Clause] 7.3;*
- *where an average product is declared, the additional technical information used for the development of scenarios for the life cycle stages in the building shall either be specific or describe a specific average;*
- *the technological, geographical and temporal representativeness shall be documented in the project report. […]*

NOTE: Generic data are publicly available and may be specific or average data. They are typically used for upstream or downstream processes relative to the actual process. See CEN/TR 15941, *Sustainability of construction works – Environmental Product Declarations – Methodology for selection and use of generic data*.

6.4 Data Quality of Specific Data and Background Data

6.4.1 Data Quality Requirements

The following data quality requirements apply to EPDs prepared in accordance with these PCR:

[EN 15804+A2, Clause 6.3.8.1]: "The quality of the data used for the calculation of an EPD shall be reported in the project report (see Clause 8 and EN ISO 14044:2006, 4.2.3.6)."

[EN 15804+A2, Clause 6.3.8.2]: "The following specific requirements apply:

- *the current ILCD format and nomenclature as specified in the document 'International Reference Life Cycle Data System (ILCD) Handbook – Nomenclature and other conventions' shall be used for the documentation format and for the life cycle inventory data sets used for LCA modelling;*

NOTE 1: *The elementary flow list is available at the following Internet reference: developerEF.xhtml.*

The elementary flow list is available both in ILCD format and as an Excel file and is identified by the designation EN_15804.

Explanation:

(See also Clause 6.4.2 regarding the use of different background databases.)

Increasingly, background data in the form of manufacturer-specific EPDs are available for inputs, outputs or processes within the foreground system. According to *EN 15804+A2, Clause 6.3.7, "the general rule is that specific data from specific production processes [...] shall take priority in the calculation of an EPD".* However, these background data are often not available as a complete life cycle inventory in ILCD format. Where available, the corresponding background dataset should be used on the basis of the life cycle inventory in ILCD format and using ILCD nomenclature.

Where complete life cycle inventory data in ILCD format and with ILCD nomenclature are not available, the indicator results of manufacturer-specific EPDs may also be used under certain conditions.

The following shall be considered in principle:

EPDs created in this way entail certain challenges. For example, changes to characterisation factors cannot be updated automatically but require complete remodelling of the EPD. This also makes integration into EPDs for downstream products more difficult. Furthermore, difficulties may arise in reporting indicator results for the use of secondary materials (SM) and in net flow calculations.

The use of indicator results from manufacturer-specific EPDs is permissible under the following conditions. The criteria listed apply both to individual EPDs and to LCA and EPD tools:

the manufacturer-specific EPDs shall also have been developed in accordance with EN 15804+A2;

in general, the manufacturer-specific EPDs shall also have been developed using the characterisation factors applicable to the EPD being developed and/or to the intended publication or use context (e.g. currently EF 3.1 for publication in ÖKOBAUDAT);

If earlier versions of the characterisation factors are identical or conservative, the EPD based on earlier versions may be used. On this basis, an EPD based on EF 3.0 may be used as an input for an EPD based on EF 3.1. However, the EF 3.0 results for the additional environmental impact indicators freshwater ecotoxicity, human toxicity, cancer effects and human toxicity, non-cancer effects cannot be justified as identical or conservative with respect to EF 3.1. Therefore, EF 3.0 results for these indicators shall not be declared in an EPD based on EF 3.1 (although they may be included in the project report).

Practical application note: Since the specific contributions of individual elementary flows and their characterisation factors can generally not be derived directly from already declared EPD results, this conservative assessment shall be transparently justified and methodologically documented in the project report.

- the manufacturer-specific EPDs shall be verified in accordance with ISO 14025;
- the manufacturer-specific EPDs shall have been published by a programme operator with which IBU maintains a mutual recognition agreement;
- the manufacturer-specific EPDs shall declare the modules that are relevant for the EPD to be developed;
- the manufacturer-specific EPD shall still be valid at the time of data collection for the EPD to be developed;
- where the EPD results are to be used for material flows that are significant for the new EPD, additional life cycle inventory data shall be available, i.e. the type and content of secondary material/recycled content and the biogenic carbon content;
- the EPDs used shall be listed in the bibliography.
- General use of manufacturer-specific EPDs shall be described in the project report.
- “guidance for the selection and use of generic data is provided in CEN/TR 15941;”

Explanation:

The assignment of generic datasets from background databases to (significant)[7] real flows requires justification and reasoning, particularly where approximations are applied.

- "generic data shall be checked for plausibility;

***NOTE 2**: Plausibility may be checked by means of a mass balance, an energy balance, by comparing indicators with those of datasets that have been reviewed or verified in accordance with this standard, or by comparing flows or indicators with other relevant sources of information.*

For further details, see Clause 6.4.2.

- "Datasets shall be complete and comply with the system boundaries and the criteria for the exclusion of inputs and outputs (see EN 15804+A2, Clause 6.3.6);
- data shall be as current as possible. Datasets used for calculations shall be valid for the current year and shall represent a reference year within the last 10 years for generic data and within the last 5 years for manufacturer-specific data[8];
- the reference year relates to the year that best represents the entire assessment, taking into account the age and representativeness of the various specific data and background data included, i.e. not automatically the year of modelling, calculation or publication. The validity of datasets refers to the date until which the assessment, with its documented technological and geographical representativeness, is still considered sufficiently valid;"

***NOTE 3:** For the assessment of data quality, only the reference year specified in the dataset documentation is relevant. The validity date merely provides an indication of the potential usability of the dataset according to the dataset developer.*

- *datasets shall be based on the average of one year; deviations shall be justified;*
- *the period over which inputs to and outputs from the system shall be considered is 100 years from the year for which the dataset is considered representative. However, see EN 15804+A2, Clause 6.3.5.5 for the solid waste disposal of products containing biogenic carbon that is declared as biogenic greenhouse gas potential;*
- *the technological coverage shall, as far as possible, reflect the physical reality of the declared product or declared product group, taking into account:*

[7] See Clause 6.4.2

[8] Data that are more than 5 years old may be used if their validity is demonstrated in the project report, e.g. by reference to a sensitivity analysis or by identifying and analysing the main drivers of the LCA.

- *the representativeness of the technology mix and the type of location specified in the documentation;*

- *the geographical coverage shall, as far as possible, reflect the physical reality of the declared product or declared product group, taking into account:*
  - *the representativeness of the technology for the region/country;*
  - *the representativeness of the input materials for the region/country;*
  - *the representativeness of the input energy for the region/country."*

6.4.2 Data Quality Assessment

[EN 15804+A2, Clause 6.3.8.3]: "Generic data shall contain information for the assessment of data quality in accordance with EN ISO 14044:2006, 4.2.3.6. The information for the assessment of data quality shall cover at least the following elements:

- *the temporal coverage;*
- *the geographical coverage;*
- *the technological coverage.*

They shall be based on one of the two systems described in EN 15804+A2, Annex E.

The quality of the life cycle inventory data established for the EPD shall also be assessed accordingly.

For the significant generic datasets used in the EPD, as well as for the significant life cycle inventory data established for the EPD, the type of system used for data quality assessment and the results of the data quality assessment shall be documented in the project report."

Explanation:

In this context, the term "life cycle inventory data" is understood to mean "foreground data". These shall also be assessed with regard to the type of data collection as well as their temporal, geographical and technological coverage.

The assessment of the quality of foreground data shall be carried out on the basis of the following information (for this purpose, the guidance provided in Clause 12 (Annex 2: Guidance for assessing the quality of foreground data)

		Data collection	**Representativeness**		
Material/Energy (real flow) Structured by documented unit processes	Chemical designation / CAS	Measured / calculated / estimated	temporal	technological	geographical

The quality assessment of background data shall be based on the following information (for this purpose, the guidance provided in Annex E of EN 15804+A2 should be used).

					Representativeness		
Material / Energy (real flow + country) Structured by documented unit processes	Chemical designation / CAS	Data-set name	Source	Reference year[9]	temporal	technological	geographical

The classification of technological representativeness is based on the assessment carried out by the LCA practitioner and includes:

- both the evaluation contained in the dataset documentation;
- and the degree of correspondence between the dataset and the actual material/energy flow (specific match/approximation).

"The term 'significant data' refers to data with a larger contribution that together account for at least 80 % of the absolute impact of each core indicator included in the EPD, considering the entire life cycle excluding Module D, or those life cycle modules covered by the EPD. The data quality of Module D shall also be assessed.

Where future production conditions are to be included at the time the EPD is prepared, the following applies: if processes affect the manufacturing process (e.g. a new furnace), data shall be collected over a period that allows the creation of a representative dataset for the new process. This does not need to cover a complete year; 3 to 4 months are often sufficient.

Any use of significant data that are rated as poor or very poor in terms of temporal, geographical or technological representativeness in accordance with 7.1 and EN 15804:2012+A2:2019, 6.3.8.3, shall be described, including the reasons for their quality level and for the selection of the dataset. Any measures taken to compensate for or improve the data in order to enhance data representativeness or compliance with the requirements of EN 15804+A2 shall also be described.

The relevance of these datasets with regard to their contribution to the core indicator results shall also be described.

Any use of significant data assessed as adequate in terms of temporal, geographical and technological representativeness in accordance with 7.1 and EN 15804:2012+A2:2019, 6.3.8.3, and contributing more than 30 % to any core indicator,

[9] The LCA practitioner shall derive the most accurate possible estimate of the reference year or reference period from the documentation of the background datasets used.

shall also be described, including the justification for their quality level and for the selection of the dataset."

The relevance of these datasets with regard to their contribution to the core indicator results shall also be described.

Furthermore, the accuracy, consistency and completeness of the significant data used shall be reported, and any deviations from the requirements of EN 15804+A2 shall be stated and justified. For example, the use of upstream data that do not comply with the allocation principles described in EN 15804+A2 shall be clearly stated and justified in the project report; see EN 15804:2012+A2:2019, Clause 6.4.3.1.

The data quality shall be qualitatively described and reported in the EPD on the basis of the information provided in the project report. See EN 15941, 7.3.3 and Annex C.

Until generic datasets pre-verified in accordance with EN 15804+A2 or EN 15941 become available, the following rules shall apply for the selection of background databases:

- In principle, consistent[10] background data shall be used in order to ensure comparability of results;

The following databases may be used:

- the Sphera Managed LCA Content (MLC) database (formerly GaBi) for energy, transport and auxiliary materials as the reference database of ÖKOBAUDAT[11];
- ecoinvent (www.ecoinvent.ch)[12],
- European / International Life Cycle Database (http://lca.jrc.ec.europa.eu/lcainfohub/datasetArea.vm). The comparability of EPDs calculated using different databases is limited.

6.5 Requirements for Energy Supply

The LCA calculation rules in accordance with ECO PLATFORM (*LCA Calculation Rules and Specifications for EPDs*, Version 2.0, December 2024, ECO Platform) shall be applied.

6.5.1 Accounting for Electricity Supply

The Institut Bauen und Umwelt accepts the use of contractual instruments ("contractual instruments") such as Guarantees of Origin (GoOs) or Power Purchase

[10] That means: consistent allocation and cut-off rules, combinations of data from the same sources and with the same level of accuracy, identical methodological approaches for identical modelling situations, etc.
[11] https://www.oekobaudat.de
[12] The cut-off [100:0] LCA method "cut-off by classification" or "cut-off, EN 15804+A2" shall be used.

Agreements (PPAs) for electricity accounting. Therefore, the market-based approach[13] as well as the rules in accordance with ISO 14067 and EN 15941 shall be applied to all EPDs published by IBU.

Results calculated using the location-based[14] electricity mix may be reported as additional information or in an EPD annex.

Contractual instruments can only function under the condition of a reliable and transparent "book-and-claim" registry in order to avoid double counting.

Definition of a "reliable and transparent book-and-claim registry"

The registry shall be operated by an independent organisation, cover a geographical region and serve as the sole registry within that region. Within the transparently defined geographical boundary (not necessarily a national boundary), electricity suppliers shall list the electricity volumes produced (kWh) exclusively in the respective registry and not in multiple unconnected registries worldwide. Only under this condition can it be verified which entity declares which quantities at which location. Double counting can thereby be ruled out.

The use of a single, reliable and transparent book-and-claim registry for a country or region makes it possible to calculate and disclose the national/regional residual mix. If a published residual mix is available, this shall be classified as case 3a) in Table 1 below; if no residual mix has been published, it shall be classified as case 3b).

Use of contractual instruments

The validity of contractual instruments shall be demonstrated for the entire validity period of the EPD. Where contractual instruments are applied, they shall be available together with the corresponding tracking number/control number. To avoid double counting, the tracking number shall be cancelled in the relevant Guarantee of Origin registry. If no such registry exists, the contractual instruments shall not be considered valid.

Specific interpretation for production sites in Germany

In principle, the electricity consumed in Germany is recorded by its generation technology by the Association of Issuing Bodies (AIB). However, the residual mix published by AIB does not include electricity volumes that fall under support schemes pursuant to the German Renewable Energy Sources Act (EEG).

[13] The **market-based approach** refers to an accounting method that uses contractual instruments, such as guarantees of origin, to describe the electricity actually purchased by a company or consumer.
[14] The **location-based approach** refers to a method for reporting greenhouse gas emissions from purchased electricity in which the emissions intensity is calculated using the average emission factor of the electricity grid in the specific geographic region where the electricity is consumed.

For Germany, contractual instruments include Guarantees of Origin (GoOs), long-term Power Purchase Agreements (PPAs) and the procurement of renewable electricity supported under the EEG.

The **electricity bill and the electricity disclosure information contained therein in accordance with Clause 42 of the German Energy Industry Act (EnWG), as well as agreements under a Power Purchase Agreement (PPA),** shall serve as the supporting document and basis for the electricity mix to be applied. The proportional allocation with regard to electricity generation technology and, where available, geographical origin, shall follow the information provided in the electricity disclosure for the tariff actually purchased or the information provided under the PPA.

Detailed information on electricity from renewable sources supported by Guarantees of Origin (GOs) shall be taken from the **certificates issued through the Guarantees of Origin Register** maintained by the German Environment Agency (Umweltbundesamt, UBA).

If no direct publication on the **proportional composition of electricity volumes supported under the EEG or electricity generated from fossil sources** can be found, the proportional allocation of total consumed electricity from renewable energy sources[15] or non-renewable energy sources[16] may be used as a proxy. The sources used shall be specified.

Evidence shall be provided for the reference year or the most recent production year. In addition, a contractual agreement for an electricity tariff shall be in place that guarantees, for the next five years, a share of electricity from renewable sources at least equivalent to that of the reference year or the most recent production year.

In the case of a declaration renewal, evidence for the preceding five years shall be requested in order to enable renewal of the declaration.

The presence of the following information in the documentation of the contractual instruments shall be verified:

Mandatory information

- Electricity supplier
- Manufacturer, including production site
- Supplied electricity mix, including electricity attributes (e.g. renewable, fossil, nuclear)
- Supplied quantity of electricity for the reference year or most recent production year
- Period of issue and validity

[15] E.g. statistics on electricity from renewable energy sources are published by the German Federal Ministry for Economic Affairs and Energy:
https://www.bundeswirtschaftsministerium.de/Redaktion/DE/Dossier/erneuerbare-energien.html
[16] E.g. AIB Residual Mix, Germany:
https://www.aib-net.org/facts/european-residual-mix

Optional information (If information is not available, a justification shall be provided)

- Addresses of the power plants
- Tracking numbers
- (Direct) electricity coupling: yes/no

NOTE 1: *Direct coupling certifies that the Guarantee of Origin is directly linked to electricity generation and that the energy producer (installation) provides the certificate together with the electricity supply to the electricity supplier.*

NOTE 2: *Confirmations issued by external verification bodies (accredited bodies) may contain less information than the details listed above. In such cases, additional verification may be required.*

NOTE 3: *Tracking numbers are usually cancelled automatically in national systems. In some cases, electricity suppliers can provide Excel files listing the quantities supplied and the number of certificates.*

Solution: *Evidence of traceability shall be provided; alternatively, a justification shall be given explaining why this is not possible.*

In some cases, only electricity volumes consisting of a 100 % renewable electricity mix are cancelled in the registry. A mixed electricity supply from renewable and non-renewable sources is, in some cases, not cancelled. (Example: electricity suppliers state that they supply a certain share of electricity from renewable energy sources within their electricity mix, but no Guarantees of Origin (GOs) are available). As no contractual instrument exists in such cases, the residual mix shall be used.

Tracking numbers may in some cases only be provided by national energy regulatory authorities. These systems are fully digitalised; consequently, the "book-and-claim" method is also fully automated. Once the electricity supplier has booked the transaction, the cancellation of the sold electricity volume is carried out in the AIB system within a short period of time. This is done per MWh and documented through evidence, for example in the form of Excel spreadsheets. Such evidence shall only be requested in cases of justified doubt arising from the other documents provided by the electricity supplier or certification body.

Where tracking numbers are not available (for Germany: or where electricity disclosure information is missing), or where contractual instruments are not traceable or lack transparency, the contractual instruments shall not be accepted and the residual mix shall be applied.

Transitional solution in cases where GOs are available but confirmation of the cancellation of the electricity volume is not available: evidence that the manufacturer has requested confirmation of cancellation shall be considered sufficient throughout the entire validity period of the EPD, e.g. through annual checks.

Table 1 – Requirements for the use of market-based[17] and location-based approaches for electricity accounting

	Situation of Contractual Instruments for the Market-Based Approach	**Foreground data [**see **NOTE 1]**	
		Market-based approach – Foreground data	**Location-based approach – Foreground data**
Case 1a) The manufacturer generates electricity on-site and consumes it on-site.	No contractual instruments have been sold.	Own generation mix	Own generation mix
	Contractual instruments have been sold.	Residual Mix	
Case 1b) The manufacturer generates electricity on-site and exports it.	Electricity from renewable energy sources is exported with or without contractual instruments.	Accounting of direct self-consumption in accordance with Case 1a). Electricity purchased from external sources (imports) shall be accounted for using the residual mix, unless contractual instruments have been purchased; in such cases, the contractually secured electricity mix shall be applied.	Accounting of direct self-consumption using the own generation mix; Electricity purchased from external sources (imports) shall be accounted for using the consumption mix / consumer mix.
Case 1c) Direct connection	with contractual instruments	Strommix gemäß Direktlieferung mit vertraglichen Instrumenten abgesichert	Electricity mix from direct supply
	without contractual instruments, no contractual instruments sold	Electricity mix from direct supply	
	Sale of contractual instruments to third parties	Residual Mix	
Case 2 Country with mandatory electricity disclosure, e.g. Austria		Utility mix, **see NOTE 2**	

[17] The **market-based approach** refers to an accounting method that uses contractual instruments such as Guarantees of Origin to describe the electricity actually purchased by a company or consumer.

	Situation of Contractual Instruments for the Market-Based Approach	Foreground data [see NOTE 1]	
		Market-based approach – Foreground data	**Location-based approach – Foreground data**
Case 3a) Country or region with a single registry and a published residual mix, e.g. the EU or the UK	with contractual instruments	Electricity mix according to supporting documentation [contractual instruments]	Consumption mix / consumer mix
	without contractual instruments	Residual mix	
Case 3b) Country or region with a single, reliable and transparent book-and-claim registry outside the EU, with no published residual mix	with contractual instruments	Electricity mix according to supporting documentation [contractual instruments]	Consumption mix / consumer mix
	without contractual instruments	Consumption mix excluding electricity from renewable energy sources [conservative approach]	
Case 4a) EU Member State without a registry or with more than one registry	In the EU, all countries are covered by the AIB registry.		
Case 4b) Country without a registry	No contractual instruments available	Consumption mix [it shall be verified whether contractual instruments have already been issued in the country concerned; if this is the case, Case 4c) shall be applied].	Consumption mix / consumer mix
Case 4c) Country with one or more registries, but without a "single, reliable and transparent book-and-claim registry", outside the EU, e.g. Türkiye, USA	with contractual instruments	Mix of contractual instruments	Consumption mix / consumer mix
	without contractual instruments	Consumption mix excluding electricity from renewable energy sources [conservative approach]	

NOTE 1: *Foreground data may in some cases also relate to Modules A4 and A5 (e.g. ready-mixed concrete).*

NOTE 2: *In Case 2, energy suppliers shall provide a Guarantee of Origin (mandatory: contractual documentation including the names and addresses of the contracting parties; currently optional: addresses of installations and sites). The energy quantities derived from contracts/accounting records shall correspond to the energy consumption reported in the life cycle assessment.*

NOTE 3: *Where electricity from renewable sources is generated at the production site and used for the production of the declared product (Cases 1a and 1b), a balance sheet shall be provided indicating: a) the amount of electricity generated during the most recent production year, b) the amount of the total electricity generated that was fed into the grid, and c) the amount used directly for on-site production processes.*

Table 2 – Recommendations for Background Data in the Market-Based and Location-Based Approaches for Electricity Accounting

	Market-based approach – Background data	**Location-based approach – Background data**
Background data – actual use known, e.g. a sector EPD for which the manufacturers' data collection provided evidence of the use of self-generated electricity, a direct connection, or contractual instruments.	Actual electricity mix, including self-generated electricity, direct supply, contractual instruments and residual mix, where applicable.	Actual electricity mix, including self-generation, direct supply and the consumption mix.
Background data – actual situation unknown	Pragmatic approach: Although generic datasets should be based on the actual electricity mix (self-generation/direct supply/contractual instruments/residual mix), background data based on the consumption mix may be used where consistent databases are not available. The use of the consumption mix in background data should be stated in the EPD when the market-based approach is applied.[18]	Consumption mix / consumer mix

[18] This shall include specifying the database used and stating that consumption mixes are applied within that database.

	Market-based approach – Background data	Location-based approach – Background data
Black-box background data – the user has no insight into the electricity consumption underlying the models.	Background data based on the consumption mix may be used; however, their use should be reported in the EPD when the market-based approach is applied.[19]	Consumption mix / consumer mix
Background data – upstream data, e.g. EPD	For products where the electricity consumed in upstream processes has a significant influence on the LCA results, it shall be assessed whether the approach used to model electricity in these upstream data is consistent with the approach of the EPD programme or whether it is conservative. Where no information on the approach used is available, a justification shall be provided in the EPD.	
Background data – downstream data	Consumption mix / consumer mix Only where the manufacturer has direct control over a process in one or more of Modules B and/or C (which may, for example, be the case for energy contracting, construction services or recycling) may the electricity generation used in that process be modelled using a contractual instrument or the residual mix.	Consumption mix / consumer mix

[19] This shall include specifying the database used and stating that consumption mixes are applied within that database.

Reporting Requirements

The declaration of an additional set of results presenting outcomes based on the electricity modelling approach (market-based or location-based) that was not used for the EPD is recommended for the project report.

If an additional set of results is documented in the project report, various options exist for presenting these results in the EPD:

- No declaration of the additional results in the EPD
- Preparation of an EPD Annex document for the declaration of the additional results
- Optional: Additional interpretation of the additional results

Calculation of the Consumption Mix

The consumption mix corresponds to national (or subnational) electricity generation, taking into account electricity imports and excluding electricity exports. The national consumption mix shall be used, except for Australia, Brazil, Canada, China, India and the USA, for which the subnational consumption mix shall be applied.

Calculation of the Residual Mix

Available datasets from background databases may be used. Transmission and distribution losses shall be taken into account in the same way as for the consumption mix. Where no datasets are available or applicable, the residual mix shall be calculated as follows:

For countries that are members of the Association of Issuing Bodies (AIB) system, the AIB methodology for calculating the residual mix shall be applied (https://www.aib-net.org/facts/european-residual-mix). The use of residual mix datasets provided by database suppliers is recommended.

The method used in the life cycle assessment (year and title of the document) shall be referenced both in the EPD and in the project report.

The modelling of the European residual mix[20] shall follow the latest AIB methodology.

For countries that are not members of the AIB system and for which no residual mix is available in background databases, modelling shall be based on the calculated residual mix and the datasets for each electricity generation mix; transmission and distribution losses shall be taken into account in the same way as for the consumption mix.

[20] https://www.aib-net.org/facts/european-residual-mix

The residual mix should, wherever possible, be taken from consistently developed and documented background databases. Where the residual mix is developed specifically by the LCA practitioner, the documentation for this dataset shall be attached to the project report. In addition, a comparison with the AIB results shall be carried out.

For production sites located in several European countries, the applicable electricity mix (residual mix) shall be modelled separately for each country or weighted according to the production volumes in the respective countries.

Calculation of the Electricity Mix for Production Sites in Germany

Available datasets from background databases may be used. **Transmission and distribution losses shall be taken into account in the same way as for the consumption mix.**

The proportional allocation with regard to electricity generation technology and, where available, geographical origin, shall follow the information provided in the electricity disclosure of the tariff actually purchased (fossil share, renewable share with Guarantees of Origin issued via the Guarantees of Origin Register, renewable share under the EEG) or the information provided under the PPA.

For electricity purchased within the foreground system, transparent and traceable documentation in the project report is required.

NOTE 4: *No explicit rules for electricity modelling in upstream data of purchased materials are specified in this document. The recommendations provided in Table 2 2 shall be taken into account.*

For substitution processes related to the generation of useful energy from thermal waste treatment in the end-of-life stage, the country-specific/European consumption mix shall be used for electricity and the country-specific/European process for the generation of thermal energy from natural gas shall be used for heat.

6.5.2 Accounting for Biogas

Contractual evidence for biogas is accepted by the Institut Bauen und Umwelt. The following rules shall be observed:

Biogas from the gas network

Biogas certificates/Guarantees of Origin (GOs) shall be used if the supplier can guarantee that the biogas fulfils the traceability requirements (see EN 15941, E.2.1). For gas purchased without certificates, the residual mix shall be used.

Biogas from a directly connected supplier

Life cycle data for the supplied biogas may be used if there is a dedicated pipeline or supply connection between the manufacturer and the biogas plant from which the life cycle data originate, and no contractual instruments have been sold to a third party for the biogas consumed. Otherwise, the residual mix shall be used.

Internally generated biogas

For biogas that is generated and consumed internally and for which no contractual instruments have been sold to third parties, the life cycle data for the biogas used in this product shall be applied. Otherwise, the residual mix shall be used.

Residual gas mix

The use of a residual mix only becomes relevant when gas from both biogenic and fossil sources is present in the public gas grid. As long as the AIB system does not provide guidance and/or datasets for residual gas mixtures and suitable datasets are also not available from background databases, the residual mix shall be calculated as accurately as possible based on the AIB guidance for green electricity. Otherwise, a dataset based on 100 % natural gas shall be used as the residual mix.

NOTE 1: *The rules for green electricity shall apply accordingly to tracking and traceability.*

NOTE 2: *In the case of biogas, it is not always clear at which geographical point in the gas network the biogas is injected into the pipeline system, nor are pipeline systems interconnected in the same way as electricity grids. Until further notice, a physical connection between gas networks shall be required for the recognition of GOs for biogas.*

NOTE 3: *The above rules apply only to injection as an energy carrier (not as an input material).*

Reporting requirements

The declaration of an additional set of results in the project report is recommended:

Market-based approach: use of GOs and the residual mix;

- Location-based approach: use of the actual consumption mix (= national/subnational production + imports – exports).

If an additional set of results is documented in the project report, various options exist for presenting these results:

- No declaration of the additional results in the EPD;
- Preparation of an EPD Annex document for the declaration of the additional results;
- Optional: Additional interpretation of the additional results.

6.5.3 Transparency Requirements for Energy Supply

Mandatory requirements

- The use of the market-based or location-based approach shall be stated for all results reported in the EPD.
- For electricity used in foreground processes and other processes under the direct control of the manufacturer, the "GWP-total" emission factor of the electricity supply in kg CO_2-e/kWh shall be stated **in the EPD**.
- For thermal energy from biogas, or thermal energy containing a share of biogas, used in foreground processes and other processes under the direct control of the manufacturer, the "GWP-total" emission factor of the specific gas mix applied, expressed in kg CO_2-e/MJ, shall be stated **in the project report.**
- For electricity used in foreground processes and other processes under the direct control of the manufacturer, the "GWP-total" emission factor of the electricity supply in kg CO_2-e/kWh shall be stated in the EPD. For thermal energy from biogas, or thermal energy containing a share of biogas, the "GWP-total" emission factor of the specific gas mix applied, expressed in kg CO_2-e/MJ, shall be stated in the project report. NOTE: These disclosures serve to fulfil the harmonised transparency requirements of ECO Platform, although their direct relevance for the assessment of building product performance remains the subject of debate in practice.
- Missing information shall be justified in the project report.
- Where the market-based approach has been used, the EPD shall declare how electricity and/or biogas used in foreground processes and those processes over which the manufacturer has direct control were modelled (e.g. using a residual mix, an electricity mix demonstrated by contractual instruments, self-consumption of electricity generated on-site, direct connection, etc.).
- Any use of contractual instruments for the modelling of biogas or electricity shall be declared in the EPD.

6.6 Allocations

[EN 15804+A2, Clause 6.4.3.1]: "Most industrial processes produce more than the intended product. Typically, more than one input flow is required to manufacture a product, and sometimes products are the co-products of other products (co-production). In general, the allocation of material flows to these products (in this case, the main product and co-product) is not straightforward. Intermediate products and waste can be recycled and used as inputs to other processes. Where product systems involving multiple products and recycling processes are dealt with, allocation should be avoided wherever possible. Where allocation cannot be avoided, it should be carefully considered and justified.

[…]

The application of data from upstream processes ('upstream' data) that do not comply with the allocation principles of this standard shall be clearly presented and justified in the project report. The data shall be in accordance with the rules of EN ISO 14044.

The principle of modularity shall be maintained. Processes that influence the environmental quality of the product during its life cycle shall be assigned to the module in which they occur […].

The sum of the inputs and outputs of a unit process after allocation shall equal the sum of the inputs and outputs of the unit process before allocation. This means that double counting or omission of inputs or outputs through allocation is not permitted.

Regardless of the allocation approach selected for a co-production process or for secondary flows crossing the system boundary between product systems, certain inherent properties of such co-products or flows, such as calorific value and composition [biogenic carbon content, $CaO/Ca(OH)_2$ content, etc.], shall not be allocated but shall always reflect the physical flows."

6.6.1 Allocation of Co-products

The project report shall transparently describe the assignment of plant data (resource consumption and emissions) to products (allocation within the plant) with regard to the following aspects:

- distinction from other products manufactured at the same plant;
- allocation of co-products in multi-output processes (joint co-production).

[EN 15804+A2, Clause 6.4.3.2]: "Allocation shall be avoided wherever possible by dividing the processes to be allocated into different sub-processes that can be assigned to the co-products and by collecting the input and output data relating to these sub-processes.

- Where a process can be subdivided but the relevant data are not available, the inputs and outputs of the system under study should be partitioned between its different products or functions in a way that reflects the underlying physical relationships between them; i.e. it shall reflect the manner in which the inputs and outputs are changed by quantitative changes in the products or functions delivered by the system."

For the assignment of plant data to the declared products, this means that energy carriers, auxiliary materials and operating materials used within the plant that cannot be unequivocally assigned to a specific product on the basis of processes or formulation shall be allocated according to physically or process-engineering relevant criteria. The assignment of plant data to the declared products shall be documented.

[EN 15804+A2, Clause 6.4.3.2]: "In the case of joint co-production, where the processes are not independent of each other and cannot be separated, allocation shall take into account the main purpose of the processes and shall appropriately assign them to all relevant products and functions. The purpose of a production facility and, consequently, of the associated processes is generally stated in the permit

and should be taken into account. Processes making a very small contribution to operating income may be neglected. Allocation in joint co-production shall be carried out as follows:

- *allocation shall be based on physical properties (e.g. mass, volume) where the difference in operating income generated by the co-products is small;*
- *in all other cases, allocation shall be based on economic values;*
- *material flows carrying specific inherent properties, such as energy content or elemental composition (e.g. biogenic carbon content), shall always be assigned according to the physical flows, irrespective of the allocation principle selected for the processes.*

NOTE 1: *Contributions to operating income in the order of 1 % or less are considered to be very low. A difference in operating income of more than 25 % is considered to be significant.*

NOTE 2*: A common position on the most appropriate allocation rule with other relevant sectors shall be defined.*

NOTE 3: *Products and functions are outputs or services provided by the process that have a positive economic value.*

NOTE 4: *In industrial processes, a wide range of different types of materials may be produced in connection with the intended product. In technical terminology, these may be referred to as by-products, co-products, intermediate products, non-core products or sub-products. In this standard, these terms are regarded as equivalent (synonyms). For the allocation of environmental aspects and impacts, however, this standard distinguishes between co-products and products.*

Due to the lack of consistent and standardised requirements, economic allocation for the attribution of environmental burdens between main products and co-products shall be mandatory until further notice for the following processes/products when used as input materials in the cement and concrete industries, for example:

-steel production and granulated blast furnace slag (GGBFS) / blast furnace slag or LD slag;

-coal-fired electricity generation and fly ash, synthetic gypsum, as well as other processes in which synthetic gypsum is produced;

-silicon and ferrosilicon alloys and silica fume; and

-alumina-containing sources from aluminium and alumina production.

For these by-products, economic allocation shall be applied even where their contribution to the total revenue of the process is very low (< 1 %). This serves to determine the environmental impacts of these by-products, even where those impacts are very small.

For economic allocation, market prices averaged over a defined period, as specified in ISO 14044 Amd2:2022 (Clause D4.3), shall be used.

When calculating the impacts of high-value co-products such as steel, electricity, silicon, etc., economic allocation of environmental burdens to the low-value by-products used in the cement and concrete industries may be omitted as a conservative approach. Other forms of allocation, such as physical partitioning, system expansion or physical allocation, shall not be applied in order to avoid assigning impacts to the low-value by-products used in the cement and concrete industries.

Where by-products used in the cement and concrete industries are used for the manufacture of other construction products, the same rules shall apply.

6.6.2 Allocation in Multi-Input Processes

Different products are processed jointly within a single process, such as in a municipal waste incineration plant, a biomass power plant or a landfill. Allocation shall be based on a physical allocation of the material flows. Where appropriate, the environmental impacts associated with the inputs shall be distributed in accordance with the manner in which they influence the subsequent production process.

6.6.3 Allocation Procedures for Reuse, Recycling and Recovery

[EN 15804+A2, Clause 6.4.3.3]: "The system boundary of the product system after disposal is drawn at the point where the outputs of the system under study, e.g. materials, products or construction elements, reach the end-of-waste state. Consequently, waste processing operations of the output flows (e.g. recovery or recycling) for each module of the product system (e.g. during manufacture, use or disposal) are within the system boundary of the respective module as defined above.

Where relevant […], Module D shall declare potential loads and benefits arising from secondary materials, secondary fuels or recovered energy leaving the product system. Module D recognises the concept of 'design for reuse, recycling and recovery' for buildings by showing the potential benefits of future avoided use of primary materials and primary fuels, while taking into account the loads associated with recycling and recovery processes beyond the system boundary.

***NOTE:** Module D also includes benefits from exported energy from waste disposal processes declared in Module C4[21].*

Where a secondary material or secondary fuel leaves the system boundary, e.g. at the end of the disposal stage, and replaces other materials or fuels in a subsequent product system, the potential benefits or avoided loads may be calculated on the basis of a specified scenario that is consistent with other waste treatment or disposal scenarios and is based on common average technology or practice.

[21] Or also the benefits from exported energy arising from waste disposal processes that are declared in Module C3.

If these current average data are not available for quantifying the potential benefits or avoided loads, a conservative approach shall be used.[22]

The impacts of the net flows in Module D shall be calculated:

- *by adding all output flows of a secondary material or secondary fuel and subtracting all input flows of that secondary material or secondary fuel, first within each sub-module (e.g. B1-B5, C1-C4, etc.), then within the modules (e.g. B, C), and finally across the entire product system. In this way, the output net flows of secondary materials or secondary fuels leaving the product system are obtained;*
- *by adding the impacts associated with the recycling or recovery processes beyond the system boundary (after end-of-waste status has been reached) up to the point of functional equivalence where the secondary material or secondary fuel replaces primary production, and subtracting from these the impacts associated with the substituted production or substituted energy generation from primary materials;*
- *by introducing a justified value correction factor reflecting the difference in functional equivalence where the output flow does not achieve the functional equivalence of the substitution process.*

In Module D, substitution effects shall only be calculated for the resulting output net flows.

The quantity of output secondary material that is actually capable of substituting, on a one-to-one basis, the input of secondary material in a closed loop is part of the product system under study and shall not be assigned to Module D.

***NOTE:** Avoided impacts from co-products are not part of the information reported under Module D […]."*

The calculation of net flows shall follow the principles below:

a. If the secondary material in the output from Module C is qualitatively comparable to the secondary material input in A1-A3, a net flow calculation shall be performed. The gross output quantity shall be declared in Module C as CRU or MFR. The calculated net quantity shall be declared in Module D as SM. The net quantity shall be substituted in Module D using life cycle inventory data for the production of this secondary material.

b. If the net quantity results in a negative value, i.e. where the demand for secondary material in A1-A3 exceeds the supply of secondary material in Module C, the gross output quantity shall be declared in Module C as CRU or MFR as a positive value, while the net quantity shall be declared for the indicator SM in Module D as a negative value. The negative net quantity shall be declared in Module D using life cycle inventory data for the production of that net quantity as a burden, i.e. as positive environmental indicators in another system.

[22] Explanation: Conservative means that the process used tends to generate higher environmental impacts than the actual process assumed to occur, for which no life cycle inventory data are available.

c. Even where the secondary material in the output from Module C cannot be used in the same application but is nevertheless considered a recoverable material, a net flow calculation shall be performed and declared as described under a. or b.

d. If the material in the output is assessed as waste rather than as secondary material, no net flow calculation shall be performed. The entire gross output quantity shall be sent for waste disposal. See the explanations in 5.5.5. However, no declaration of "lost" material shall be made as described under b.

e. If the output from Module C is a secondary fuel, i.e. end-of-waste status has been reached before combustion, a net flow calculation shall be performed if the system also uses secondary fuels as input to A1-A3 (analogous to a. and b.). Otherwise, no net flow calculation shall be performed, in accordance with d. The gross quantity shall be declared in Module C under the indicator MER, while the net quantity shall be declared in Module D under RSF or NRSF.

NOTE 1: *The programme operator is aware that Rule d. may be perceived as a certain inconsistency in relation to Rule b. However, the declaration of waste disposal sufficiently documents the interruption of a closed-loop cycle.*

NOTE 2: *The net flow calculation shall be presented transparently and in a step-by-step manner throughout the entire life cycle in the project report, for example in tabular form.*

For the selection of substituted processes in the energy recovery of packaging, the following shall apply:

- for production sites in Germany, the current average German electricity mix (consumption mix) shall be used for electricity and "thermal energy from natural gas" shall be used for heat, with the reference year stated;
- for production sites outside Germany, the respective location at which the energy is supplied shall be taken into account, e.g. electricity from France, or, where a European electricity mix is used, the electricity mix of the UCTE (Union for the Co-ordination of Transmission of Electricity) or, respectively, the ENTSO (ENTSO-E, European Network of Transmission System Operators for Electricity).

For the selection of substituted processes in the energy recovery of the product in the end-of-life scenario, the following shall apply:

- where the main market is Germany, the current average German electricity mix (consumption mix) shall be used for electricity and "thermal energy from natural gas" shall be used for heat, with the reference year stated;
- where there is a significant market share in Europe, the corresponding European processes shall be selected.

6.6.4 Presentation of Allocation Procedures in the Project Report

The allocations applied shall be described in the project report, including at least the following, where relevant:

- allocations for the use of waste and/or secondary materials as raw materials and waste and/or secondary fuels as fuels for production;
- allocations within the plant (distinction from other products manufactured at the same plant);
- allocation of co-products (multi-output processes);
- allocation of multi-input processes, where applied in the modelling;
- allocations related to reuse, recycling and energy recovery.

The allocation procedures selected shall be justified, and the allocation factors used, such as recycling rates, shall be substantiated by independent sources.

The consistent application of the allocation rules shall be documented.

6.7 Presentation of Unit Processes in the Project Report

The modelling of the unit processes underlying the life cycle assessment shall be documented in the project report in a transparent manner, taking into account the confidentiality provisions of ISO 14025. This may, for example, be done in tabular form or by means of flowcharts (e.g. screenshots from LCA software showing clearly identifiable mass and energy flows).

For all unit processes, the following shall be evident:

- the assignment of company-specific data to datasets from LCA software;
- the assignment of process data to the (sub-)Clauses of the life cycle in the life cycle assessment;
- where several products are declared in one EPD, or where a product is manufactured at several production sites, the corresponding modelling approach shall be described and justified.

7 Inventory Analysis and Impact Assessment

The results of the life cycle assessment shall be presented in the project report in tabular form for all modules A1 to D (excluding modules B3 to B5, see also Clause 5.5). The inventory analysis and impact assessment indicators to be declared are specified below (see also Clause 5.5).

Identification of non-declared indicators within a declared module:

If, for methodological reasons or due to data gaps, an indicator cannot be determined robustly for a declared module, this indicator shall be reported as "ND" (Not Declared). The use of zero and ND shall not be confused:

- 0 calculated value is 0
- 0 assumption resulting from the modelling that excludes all flows (e.g. manual installation)
- ND in cases where the inventory data do not support the calculation of the specific indicator, ND shall be applied.

7.1 Inventory Indicators According to EN 15804+A2

The inventory indicators shall be reported both for the product and, in the corresponding modules, for the packaging.

For all inventory indicators, either the calculation methodology used shall be specified or, in the case of individual inventory values, their derivation shall be explained on a case-by-case basis. (Example: PERM and PENRM are typically not generated directly by software models; the same applies to EEE, EET and SM, among others.)

7.1.1 Indicators Describing Resource Use

For the definition of calorific value, primary energy content and primary energy, see Clause 11 (Annex 1: Explanations and calculation rules for the result indica-tors).

"[EN 15804+A2, Clause 7.2.4.2]: 'Table 6' [here:

Table 3] *contains indicators describing resource use that shall be included in every module declared in the EPD."*

Table 3 – *Parameters describing resource use* (identical to Table 6 of EN 15804+A2, Clause 7.2.4.2)

Parameter[23]	***Unit***[24]
Use of renewable primary energy excluding renewable primary energy resources used as raw materials (PERE)	*MJ, net calorific value (lower heating value)*
Use of renewable primary energy resources used as raw materials (material use) (PERM)	*MJ, net calorific value (lower heating value)*
Total use of renewable primary energy (primary energy and renewable primary energy resources used as raw materials) (energy use + material use) (PERT)	*MJ, net calorific value (lower heating value)*
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE)	*MJ, net calorific value (lower heating value)*
Use of non-renewable primary energy resources used as raw materials (material use) (PENRM)	*MJ, net calorific value (lower heating value)*
Total use of non-renewable primary energy (primary energy and non-renewable primary energy resources used as raw materials) (energy use + material use) (PENRT)	*MJ, net calorific value (lower heating value)*
Use of secondary materials (SM)	*kg*
Use of renewable secondary fuels (RSF)	*MJ, net calorific value (lower heating value)*
Use of non-renewable secondary fuels (NRSF)	*MJ, net calorific value (lower heating value)*
Net use of fresh water resources (FW)	m^3

[23] In this document, the term "indicator" is used synonymously with "parameter."
[24] expressed per functional unit / declared unit

7.1.2 Requirements for the Calculation of the Different Primary Energy Resources and Secondary Materials and Fuels

For the definition of raw material, see Clause 11 (Annex 1: Explanations and calculation rules for the result indicators).

Renewable and non-renewable primary energy resources used as raw materials (material use, feedstock) shall be accounted for using the lower heating value (net calorific value) of the material (PERM and PENRM, respectively).

Examples of renewable primary energy resources used as raw materials (material use, feedstock) include:

- Wood in wood products, cellulose in paper;
- Wool or cotton;
- Linseed oil in linoleum, sunflower oil in PVC products.

Examples of non-renewable primary energy resources used as raw materials (material use, feedstock) include:

- Petroleum-based plastics, paints, textiles made from synthetic fibres, etc.

The indicator for the use of primary energy (renewable or non-renewable) from materials used *as primary energy resources* (PERE and PENRE, respectively) may be calculated as the difference between the total primary energy use (PERT and PENRT, respectively) and the primary energy use used as raw material (feedstock) (PERM and PENRM, respectively). Total primary energy use is provided by most LCA software tools.

The calculation of the indicators PERM and PENRM shall be documented in the project report by providing an overview of the data relating to the mass considered and the calorific value used (including source references).

The term "use of renewable/non-renewable primary energy excluding renewable/non-renewable primary energy resources used as raw materials" (PERE and PENRE, respectively) refers to primary energy resources used in the processes of the system for energy generation, as distinct from primary energy resources that remain as material in the product and its processing stages.

Secondary fuels (RSF and NRSF) are all combustible materials (renewable or non-renewable) recovered from a previous use or from waste from another product system and used as fuel in the product system under consideration. Typical examples are waste materials (e.g. RSF: sewage sludge or NRSF: plastic waste) commonly used in cement production.

Secondary materials (SM) are materials or substances recovered from a previous use or from waste from another product system and used as raw materials in the product system under consideration. Residual materials generated within the manufacturer's own production in A1-A3 and reused in the production process shall not be considered secondary materials.

Secondary materials used in the product under study shall be declared as "use of secondary materials" (SM) and not as "use of renewable primary energy resources used as raw materials (material use) (PERM)" or "use of non-renewable primary energy resources used as raw materials (material use) (PENRM)".

As long as the LCA software used does not enable quantification of secondary materials (SM) or secondary fuels (RSF/NRSF) throughout the entire process chain, it is recommended that these indicators be calculated as a minimum value based on information from the foreground system (manufacturer-provided data). The project report shall explain which secondary materials (SM) or secondary fuels (RSF/NRSF) contribute to the respective indicator results.

7.1.3 Requirements for the Calculation of Energy-Related Indicators in the End-of-Life Stage

The following cases may be distinguished for the end-of-life stage:

- Recycling (use as secondary material)
- Use as secondary fuel
- Energy recovery from waste in a facility with an efficiency of R1>0.6
- Thermal waste treatment in a facility with an efficiency of R1<0.6:
- Landfilling

Detailed rules for the calculation and declaration of energy-related indicators in the end-of-life stage (as well as for all modules in which materials with a calorific value occur as waste) are provided in Clause 11 (Annex 1: Explanations and calculation rules for the result indicators) including illustrative examples.

7.1.4 Calculation of the Indicator "Use of Fresh Water Resources"

The net use of fresh water resources is considered to be water consumption[25].

EN 15804+A2 uses the term "net" as opposed to "gross" with regard to fresh water to express two aspects:

- Only water consumption is taken into account, i.e. water that is lost to the local catchment area through evaporation, transpiration, incorporation into a product, or discharge to another catchment area or to the sea.

→ **EXAMPLE:** If, in an agricultural process, water from irrigation evaporates through plant evapotranspiration or is incorporated into a product (e.g. watermelons), this is accounted for as water consumption. If, by contrast, rainwater is evapotranspired or incorporated into

[25]DIN EN ISO 14046:2016: 3.2.1 Water use, Note 2 to entry:
The term "water consumption" is often used to describe water that is withdrawn from a catchment area but not returned to the same catchment area. Water consumption can result from evaporation, transpiration, incorporation into a product, or discharge to another catchment area or to the sea.

a product, this is considered consumption of so-called green water[26] and is therefore not considered when accounting for the blue water[27] measured here.

- Water that is withdrawn but not consumed is not part of the net use.

→ **EXAMPLE:** Water withdrawn from a river as cooling water and returned to the same catchment area after use is not taken into account in the calculation. However, the fraction of the cooling water that evaporates is considered water consumption and shall be included in the calculation of net use.

- Water that is not withdrawn is not included in the calculation of net consumption.

→ **EXAMPLE:** Water on which shipping takes place, or water that drives the turbines of a hydropower plant, is not taken into account in the calculation. In contrast, evaporation from a reservoir is considered water consumption because this water is lost to the local catchment area.

For each process, water flows are determined and described with regard to the volume withdrawn, the volume returned, and the source (e.g. surface water, groundwater, seawater)[28].

If tap water is withdrawn (e.g. from the public water supply), the treatment and distribution of the water shall be considered as upstream processes with their respective resource consumption and emissions. Likewise, water discharged into the wastewater system shall be linked to wastewater treatment and distribution processes as downstream processes.

Other water flows, such as evaporated water or water incorporated into the product, should ideally be included in the process inventories in order to establish a complete water balance.

For each process, water consumption is the sum of the water lost from the catchment area and is often calculated as the difference between all freshwater inputs and all water outputs discharged back to the environment.

7.1.5 Waste and Other Output Flows

[EN 15804+A2, Clause 7.2.4.3]: "Table 7 [here: Table 4] *contains indicators describing waste categories derived from the life cycle inventory. These shall be included in every module declared in the EPD:"*

[26] Green water: The portion of precipitation that does not contribute to surface runoff or groundwater recharge but is stored in the soil or temporarily retained on the soil surface or vegetation. Green water is only available for local vegetation and, unlike blue water, cannot be transported or pumped.
[27] Groundwater and surface water, see TheWaterFootprintAssessmentManual_English.pdf
[28] DIN EN ISO 14046:2016: 3.2.2 Water withdrawal:
Anthropogenic withdrawal of water from any water body (3.1.7) or any catchment area (3.1.8), either permanently or temporarily.
NOTE to entry: The term "water abstraction" is sometimes used for this concept.

Table 4 - *Other environmental information describing different waste categories* (identical to Table 7 of *EN 15804+A2, Clause 7.2.4.3*)

Parameter	***Unit***[29]
Hazardous waste disposed of	*kg*
Non-hazardous waste disposed of (municipal waste)	*kg*
Radioactive waste	*kg*

NOTE: *The properties that cause waste to be classified as hazardous waste are described in the applicable legislation, e.g. in the European Waste Framework Directive."*

"Hazardous waste disposed of" is the amount of hazardous waste disposed of in a landfill of landfill class III or IV in accordance with the German Landfill Ordinance (DepV) of 27 April 2009. Radioactive waste is not included.

"Non-hazardous waste disposed of (municipal waste)" is the amount of non-hazardous waste disposed of in a landfill of landfill class 0, I or II in accordance with the German Landfill Ordinance (DepV) of 27 April 2009.

"Radioactive waste" is the amount of radioactive waste that is disposed of.

The declaration of waste refers to the foreground and background system under consideration.

[EN 15804+A2, Clause 7.2.4.4]: "Table 8 [here Table 5] *contains indicators describing output flows derived from the life cycle inventory. They shall be included in every module declared in the EPD."*

Table 5 - *Environmental information describing output flows* (identical to *Table 8 of EN 15804+A2, Clause 7.2.4.4)*

Indicator	***Unit***[30]
Components for re-use (CRU)	*kg*
Materials for recycling (MFR)	*kg*
Materials for energy recovery (MER)	*kg*
Exported energy (EEE and EET)	*MJ, per energy carrier*

[29] expressed per functional unit or declared unit
[30] expressed per functional unit or declared unit

Definition of CRU according to the German Circular Economy Act (KrWG), Clause 3, Paragraph 21:

"Re-use within the meaning of this Act means any operation by which products or components that are not waste are used again for the same purpose for which they were originally intended."

NOTE 1: *The indicators in Table 8 [here: Table 5] are also part of the additional information on end-of-life, see [EN 15804+A2] 7.3.4, Table 15.*

NOTE 2: *The indicators in Table 8 [here: Table 5] when they have reached the end-of-waste state as described in Annex B [EN 15804+A2] and leave the system, are calculated using gross quantities.*

NOTE 3: *The declaration of "components for re-use" and "materials for recycling" fulfils the conditions of [EN 15804+A2] 6.3.5.5, End-of-life stage.*

NOTE 4: *The indicator "materials for energy recovery" does not include materials for waste incineration. Waste incineration is considered a waste treatment operation and remains within the system boundaries. Waste incineration plants have a lower energy efficiency than power plants using secondary fuels. "Materials for energy recovery" are materials used in power plants with an efficiency of at least 60% or 65% for thermal energy. In accordance with the distinction made by the European Commission, this applies to installations that entered into operation after 31 December 2008."*

NOTE 4 of EN 15804+A2 cannot be interpreted unambiguously, either on its own or in context. Rules on this topic are described in Clause 5.5.5.

NOTE 5: *"Exported energy" refers to energy exported from waste incineration plants and landfills."*

Output material flows shall be declared in the module in which they cross the module boundary, i.e. generally when the end-of-waste status has been achieved.

The indicators "components for re-use" (CRU), "materials for recycling" (MFR), "materials for energy recovery" (MER) and "exported energy" (EEE and EET) refer to the foreground system and represent non-elementary output flows from the various modules.

7.1.6 Calculation and Declaration of Biogenic Carbon Content

[EN 15804+A2, Clause 7.2.5]: "Table 9 [here: Table 6] *contains information on biogenic carbon content that shall be included in the EPD as follows:*

Table 6 - *Information describing the biogenic carbon content at the factory gate* (identical to *Table 9* of *EN 15804+A2, Clause 7.2.5*)

Indicator	**Unit**[31]
Biogenic carbon content in the product	*kg C*
Biogenic carbon content in the associated packaging	*kg C*
NOTE: 1 kg of biogenic carbon corresponds to 44/12 kg CO2.	

If the mass of the biogenic carbon-containing materials in the product accounts for less than 5% of the mass of the product, the declaration of the biogenic carbon content may be omitted.

If the mass of the biogenic carbon-containing materials in the packaging accounts for less than 5% of the total mass of the packaging, the declaration of the biogenic carbon content of the packaging may be omitted."

If the mass of biogenic carbon in the product is >5%, the conversion factor into "kg CO_2 equivalents" shall also be declared.

Further explanations regarding the balancing of biogenic carbon in bio-based packaging can be found in Clause 5.5.1.

The calculation of the biogenic carbon content in the product and packaging shall be documented in the project report, including the mass considered and the carbon contents used (with source references).

This calculation refers to the actual material, i.e. both the uptake of CO_2 in the primary material and the biogenic carbon content in secondary material are considered as GWP-biogenic. At the end of life, all CO_2 stored as carbon is declared as emitted again in Module C3 or C4 (GWP-biogenic).

The CO_2 contained as carbon in secondary material/secondary fuel and taken up in the preceding system is not declared in Module D (GWP-biogenic), since the import of biogenic CO_2 in secondary material/secondary fuel is offset by the biogenic CO_2 emissions resulting from the combustion of the secondary fuel or through the substitution of biogenic materials from primary sources.

[31] *expressed per functional unit or declared unit*

7.2 Environmental Impact Indicators According to EN 15804+A2

[EN 15804+A2, Clause 6.5.2]: "For all indicators listed in Annex C, the characterisation factors of the EC-JRC shall be applied. The characterisation factors are available at the following website:

http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml.

The characterisation factors are available both in ILCD format and as an Excel file and are identified by the designation EN_15804."

The project report and the verification report shall confirm that the characterisation factors have been applied in accordance with the standard. The corresponding reference (including version) to the characterisation factors shall be specified in both the project report and the EPD.

Long-term emissions >100 years shall not be considered in the impact assessment.

In addition to the impact assessment results, the following shall be reported in the project report:

- Reference to all characterisation models and factors used as specified in this document;

A statement that the impact assessment results are relative expressions only and do not predict impacts on category endpoints, the exceeding of threshold values, safety margins, or risks.

For all indicators listed in Table 7 the characterisation factors of the European Commission's Joint Research Centre (JRC) shall be applied. The specific version of the characterisation factors is not prescribed in this PCR Part A in order to ensure the programme's ability to adapt to technological developments. The version applied (e.g. EF 3.1) shall be clearly and mandatorily declared in both the project report and the EPD. From the official publication date of a new version of the characterisation factors by the JRC, a uniform transition period of 12 months shall apply. This transition period is binding both for software implementation in LCA/EPD tools and for the regular manual preparation and submission of EPDs.

7.2.1 Core Indicators

[EN 15804+A2, Clause 7.2.3.1]: Table 3 [here:] *contains information on environmental impacts expressed by the indicators of the impact categories of an impact assessment using characterisation factors. These core environmental impact indicators shall be included in every module declared in the EPD.*

Table 7 - *Core environmental impact indicators* (identical to Table 3 of *EN 15804+A2, Clause 7.2.3.1*)

Impact category	***Indicator***	***Unit*[32]**
Climate change – total[a]	*Global warming potential total (GWP-total)*	*kg CO_2 eq.*
Climate change – fossil	*Global warming potential, fossil (GWP-fossil)*	*kg CO_2 eq.*
Climate change – biogenic	*Global warming potential, biogenic (GWP-biogenic)*	*kg CO_2 eq.*
Climate change – land use and land use change[b]	*Global warming potential from land use and land-use change (GWP-luluc)*	*kg CO_2 eq.*
Ozone depletion	*Depletion potential of the stratospheric ozone layer (ODP, Ozone Depletion Potential)*	*kg CFC 11 eq.*
Acidification	*Acidification potential, accumulated exceedance (AP, Acidification Potential)*	*mol H^+ eq.*
Eutrophication, freshwater	*Eutrophication potential, fraction of nutrients reaching freshwater (EP-freshwater)*	*kg P eq.*
Eutrophication, marine	*Eutrophication potential, fraction of nutrients reaching marine water (EP-marine)*	*kg N eq.*
Eutrophication, terrestrial	*Eutrophication potential, accumulated exceedance (EP-terrestrial)*	*mol N eq.*
Photochemical ozone formation	*Photochemical ozone formation potential (POCP, Photochemical Ozone Creation Potential)*	*kg NMVOC eq.*
Abiotic resource depletion – minerals and metals[c d]	*Abiotic resource depletion potential for non-fossil resources (ADP-minerals and metals)*	*kg Sb eq.*
Abiotic resource depletion – fossil fuels[c]	*Abiotic resource depletion potential for fossil resources (ADP-fossil fuels)*	*MJ, net calorific value*
Water use	*Water deprivation potential (user), deprivation-weighted water consumption (WDP)*	*m^3 world eq. deprived*

[32] *expressed per functional unit or declared unit*

a The total global warming potential (GWP-total) is the sum (see C.2) of:

— *GWP-fossil,*

— *GWP-biogenic,*

— *GWP-luluc.*

b GWP-luluc may be omitted as separate information if its contribution is < 5% of GWP-total across the declared modules, excluding Module D.

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

— *ADP-minerals and metals, which includes all non-renewable abiotic material resources (i.e. excluding fossil energy carriers);*

— *ADP-fossil fuels, which includes all fossil energy carriers and uranium.*

d Total reserves model for the ADP-minerals and metals model."

7.2.2 Additional Optional Environmental Impact Indicators

[EN 15804+A2, Clause 7.2.3.2]: "Table 4 [here Table 8] *contains information on environmental impacts expressed by the indicators of the impact categories of an impact assessment using characterisation factors. These additional environmental impact indicators shall be calculated and included in the project report for each declared module and may be included in the EPD.*

Table 4 [here Table 8] *shall be included in the EPD for the additional environmental indicators declared. If additional indicators are not declared, this shall be indicated in the EPD, e.g. by the entry "ND" in Table* [here Table 8] *or as text."*

Table 8 – *Additional environmental impact indicators* (identical to *Table 4* of *EN 15804+A2, Clause 7.2.3.2*)

Impact category	***Indicator***	***Unit***[33]
Particulate matter emissions	*Potential incidence of disease due to particulate matter emissions (PM)*	*Incidence of disease*
Ionising radiation, human health	*Potential human exposure efficiency relative to U235 (IRP)*	*kBq U235 eq.*
Ecotoxicity (freshwater)	*Comparative toxic unit for ecosystems (ETP-fw)*	*CTUe (Comparative Toxic Unit for ecosystems)*
Human toxicity, carcinogenic effects	*Comparative toxic unit for humans (HTP-c)*	*CTUh (Comparative Toxic Unit for humans)*
Human toxicity, non-carcinogenic effects	*Comparative toxic unit for humans (HTP-nc)*	*CTUh (Comparative Toxic Unit for humans)*
Land-use related impacts / soil quality	*Soil quality index (SQP)*	*dimensionless*

[33] *expressed per functional unit or declared unit*

[EN 15804+A2, Clause 6.5.3]: "The additional environmental impact indicators are listed in Table 4 [here Table 8]. *Table C.2 lists these indicators together with their units and the characterisation models to be applied. For all indicators listed in Annex C, the characterisation factors of the EC-JRC shall be applied. The characterisation factors are available at the following website:*

http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml. The characterisation factors are available both in ILCD format and as an Excel file and are identified by the designation EN_15804."

[EN 15804+A2, Clause 7.2.3.3]: "Table 5 [here:

Table ***9***] *contains limitation statements that shall be declared in the project report and in the EPD with regard to the declaration of relevant core and additional environmental impact indicators in accordance with the following classification."*

Table 9 – *Classification of limitation statements for the declaration of core and additional environmental impact indicators* (identical to *Table 5* of *EN 15804+A2, Clause 7.2.3.3*)

ILCD classification	***Indicators***	***Limitation statement***
ILCD Type 1	*Global warming potential (GWP)*	*none*
	Ozone depletion potential (ODP)	*none*
	Potential incidence of disease due to particulate matter emissions (PM, particulate matter)	*none*
ILCD Type 2	*Acidification potential, accumulated exceedance (AP, Acidification Potential)*	*none*
	Eutrophication potential, fraction of nutrients reaching freshwater (EP-freshwater)	*none*
	Eutrophication potential, fraction of nutrients reaching marine water (EP-marine)	*none*
	Eutrophication potential, accumulated exceedance (EP-terrestrial)	*none*
	Photochemical ozone formation potential (POCP, Photochemical Ozone Creation Potential)	*none*
	Potential human exposure efficiency relative to U235 (IRP, ionising radiation potential)	*1*
ILCD Type 3	*Abiotic resource depletion potential for non-fossil resources (ADP-minerals and metals)*	*2*

	Abiotic resource depletion potential for fossil resources (ADP-fossil)	*2*
	Water deprivation potential (user), deprivation-weighted water consumption (WDP, Water Deprivation Potential)	*2*
	Comparative toxic unit for ecosystems (ETP-fw)	*2*
	Comparative toxic unit for humans (HTP-c)	*2*
	Comparative toxic unit for humans (HTP-nc)	*2*
	Soil quality index (SQP)	*2*
Limitation statement 1 — *This impact category mainly addresses the potential human health effect of low-dose ionising radiation associated with the nuclear fuel cycle. It does not consider effects arising from possible nuclear accidents, occupational exposure, or the disposal of radioactive waste in underground facilities. Potential ionising radiation originating from soil, radon, and certain construction products is also not measured by this indicator.*		
Limitation statement 2 — *The results of this environmental impact indicator shall be used with caution because the uncertainties associated with these results are high or because experience with the indicator is limited.*		

7.3 Optional Additions to the EPD Within the Scope of Verification

Within the framework of the mutual recognition of EPDs between IBU and UL[34] for the North American market, an additional assessment using the characterisation factors according to TRACI (Version 2.1) (Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts; United States Environmental Protection Agency) may be carried out.

An assessment of the same EPD using different characterisation models shall be based on the same LCA calculation model, i.e. the same set of life cycle inventory data shall be used without modification of the background database. This shall be confirmed accordingly in both the project report and the EPD.

8 Interpretation

The aggregated inventory results and the impact assessment indicators should, wherever possible, be interpreted in the project report by means of a dominance analysis related to the declared unit, including the specification of factors that significantly influence the results, and shall cover at least the following \[EN 15804+A2, Clause 8.2]:

- *"the results;*
- *assumptions and limitations relating to the evaluation of the results declared in the EPD and the results of the additional impact indicators, both with regard to methodology and data;*
- *deviations from the average impact assessment results should be presented where generic data from multiple sources are used or where the results relate to a number of similar products;"*

The possibilities and requirements regarding deviations in average EPDs are explained in detail in Clause 5.3. Such deviations shall be documented in the project report.

- *"assessment of data quality;*
- *full transparency regarding value choices, justifications and* expert judgements."

This concerns, for example, assumptions, estimates and scenarios and may lead to limitations that should be explained here.

The inventory indicators and the impact assessment indicators should preferably be interpreted in the project report on the basis of a dominance analysis related to the declared unit.

The following points are recommended for consideration when interpreting the LCA and EPD results in the project report.

[34] UL: https://www.ul.com/services/environmental-product-declaration-epds-certification

1. Uncertainty/accuracy?

- Which sensitivity analyses were carried out? Did they have a significant influence on the results?
- Are there significant gaps or inconsistencies? If so, what influence do they have on the results?

2. Drivers?

- Relationship between the different modules over the life cycle?
  - e.g. if manufacturing is relevant: What is the relationship between upstream processes (A1) and manufacturing (A3)? What are the main drivers during the production stage (A1-A3)?
  - Which elementary flows have a significant influence on the results of the individual indicators? At which point would it be useful to determine further details in the future?
- For an average EPD: Which factors influence the robustness of the results with regard to the range of selected impact categories?

3. Impact assessment?

- Are correlations/patterns identifiable between the impact assessment results in the different impact categories? Are they plausible, based on the product system under study and the foreground data used?
- Are the impact assessment results comparable with the results of existing EPDs for similar products?

4. Updates?

- For updates: What explains the changes in the results with regard to foreground and background data?

5. Data quality?

- What is the data quality assessment for the drivers according to the dominance analysis (together accounting for at least 80 % of the absolute impacts of the core environmental indicators)? Are data selected that do not comply with the data quality requirements in EN 15804+A2 and EN 15941?
- Are the model and the applied data quality consistent with the PCR in terms of their geographical, temporal and technological scope?

9 Documentation of Additional Information

Requirements for additional information that does not form part of the EPD content in accordance with EN 15804+A2 are specified in ISO 14025. In ECO EPDs, every type of additional information shall be verified.

Additional information may be included in the main body of the EPD (i.e. in separate Clauses or separate tables) or in annexes to EPD documents. An annex is considered part of the EPD and shall be fully verified together with the EPD. Additional information shall not be included in the tables containing the mandatory information required by EN 15804+A2.

An EPD may include additional environment-related information that is not derived from the life cycle assessment. Any additional environmental information declared shall be derived using appropriate methods and shall be specific, accurate, non-misleading and relevant to the specific product; it shall be justified as part of the project report and reviewed as part of the EPD verification. Any quantitative information on emissions shall be supported by test results from external testing laboratories or by links to the studies on which the emission data are based.

Where indicators are used that do not comply with EN 15804+A2, the source documenting the methodology shall be specified.

Examples of permissible content elements for additional information:

- Site and address lists;
- Additional information for mutual recognition;
- Scaling tables or results including different additional elements, for example for insulation boards;
- The release of hazardous substances to indoor air, soil and water during the use stage:
    - Instructions for the proper use of the product, for example to minimise energy or water consumption or to improve the durability of the product;
    - Instructions for the proper maintenance and servicing of the product, for example to minimise energy or water consumption or to improve the durability of the product;
    - Information on important parts of the product that determine its durability;
    - Information on recycling, for example suitable procedures for recycling the entire product or selected parts thereof and the associated potential environmental benefits;
    - Information on an appropriate method for the reuse of the product (or parts of the product) and procedures for disposal as waste at the end of the life cycle;

- Information on the disposal of the product or its inherent materials, as well as any other information deemed necessary to minimise the impacts of the product at the end of its life cycle; and
- A more detailed description of an organisation's overall environmental activities, in addition to the information on the EPD owner specified in ISO 14025, Clause 7.2.3, such as the existence of organised environmental activities of any kind;
- Information on where interested parties can find further details regarding the organisation's environmental activities.

In an EPD, additional environment-related information derived from the life cycle assessment may be reported, for example:

- Additional indicator results using other characterisation methods, e.g. TRACI, as required for the North American market in accordance with ISO 21930.

An ECO EPD (including its annexes) shall not contain any LCA results that are not compliant with the LCA rules of EN 15804+A2 or the ECO Platform standards.

Examples of LCA results that are not permitted in ECO EPDs include results based on a mass balance approach (see 5.5.7), results based on offsets or insets, and results showing the effects of multiple recycling in Module D.

All additional information, including environmental information derived from the life cycle assessment, shall be clearly identified as such, particularly where it is presented in an annex rather than in the main body of the EPD. The format and layout of annexes shall be designed so that they are clearly recognisable as additional information and explain both the approach used and where the original EPD can be found.

9.1 Laboratory Test Results and Scenario-Related Information

[EN 15804+A2, Clause 8.3]: "The project report shall include all documentation relating to the additional environmental information declared in the EPD in accordance with this standard. Such documentation may, for example, be provided as copies or references:

- *laboratory test results/measurements relating to the declaration of content;*
- *laboratory test results/measurements relating to functional/technical performance;*
- *documentation relating to declared technical information for individual life cycle stages that are not considered in the life cycle assessment of the construction product but are used in the assessment of the building (e.g. transport distances, RSL in accordance with Annex A, energy consumption during the use stage, cleaning cycles, etc.);*

- *laboratory test results/measurements relating to declared emissions to indoor air, soil or water during the use stage of the product."*

In the case of an industry-wide EPD, a justification of the representativeness of the evidence relating to emissions (Clause 7 of an IBU EPD) shall be provided for all manufacturers in the project report accompanying the EPD.

The corresponding supporting documents shall be uploaded to the IBU EPD online tool.

9.2 Documentation of the Reference Service Life (RSL)

[EN 15804+A2, Clause 6.3.4.1]: "The manufacturer shall provide the RSL information that is required to be declared in an EPD covering the use stage. The RSL shall be established under specified reference conditions of use. The RSL shall refer to the declared technical and functional performance of the product in the building. The RSL shall be determined in accordance with any specific rules given in European product standards or, where none are available, in accordance with a c-PCR, and shall take into account ISO 15686-1, -2, -7 and -8. Where guidance for deriving the RSL from European product standards or a c-PCR is available, such guidance shall take precedence.

Information on the RSL of a product requires the specification of appropriate scenarios for the product stage, the construction process stage and the use stage. The RSL depends on the properties of the product and the reference conditions of use. The RSL shall be declared together with the reference conditions of use, and it shall be stated that the RSL applies only to those reference conditions of use.

The reference conditions of use for achieving the declared technical and functional performance and the declared RSL shall, where relevant, include the following:

- *declared product characteristics (at the factory gate) and after completion, etc.;*
- *application parameters for the construction works (where specified by the manufacturer), including references to all relevant requirements and application instructions;*
- *the assumed quality of execution;*
- *external conditions (for external applications), e.g. weathering, pollutants, UV and wind exposure, building orientation, shading and temperature;*
- *internal conditions (for internal applications), e.g. temperature, humidity and chemical exposure;*
- *conditions of use, e.g. frequency of use and mechanical loading;*
- *maintenance, e.g. required frequency, type and quality, as well as replacement of replaceable parts.*

The RSL shall be justified and verifiable.

Requirements and guidance for the RSL are provided in normative Annex A [of EN 15804+A2]."

[EN 15804+A2, Clause 6.3.4.2]: "Where the EPD is based on a functional unit, the reference conditions of use used for determining the RSL shall be consistent with the functional unit and all scenarios."

If a Reference Service Life (RSL) cannot be determined in accordance with ISO 15686, or if the RSL is not relevant for the LCA calculation, this shall be explicitly stated in the EPD. In such cases, the service life specified in the BBSR table **"Service Lives of Building Components for Life Cycle Assessment according to BNB"** may be reported, taking into account the explanatory document accompanying the BBSR table ([Service Lives of Building Components] (http://www.nachhaltigesbauen.de/baustoff-und-gebaeudedaten/nutzungsdauern-von-bauteilen.html)). The declaration of such a service life shall be explicitly distinguished from the declaration of an RSL according to ISO 15686.

For building services installations, the required information shall be taken from VDI 2067 Part 1.

As an alternative to the BBSR table, manufacturer-specific values may also be provided. Such values shall be supported by a justified derivation in both the project report and the EPD (e.g. simulation, testing, manufacturer assessment, or statistical values related to a specified application).

In general, the declaration of a service life remains the responsibility of the manufacturer.

10 References

AIB	Association of Issuing Bodies (AIB): *European Residual Mix*. Methodology and annual publication of the European residual mixes, in each case in the current version, available at [European Residual Mix](https://www.aib-net.org/facts/european-residual-mix).
BBSR	Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR): Nutzungsdauern von Bauteilen zur Lebenszyklusanalyse nach BNB. Informationsportal Nachhaltiges Bauen. Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR): *Service Lives of Building Components for Life Cycle Assessment according to BNB*. Sustainable Building Information Portal.
CEN/TR 15941	CEN/TR 15941:2010, Sustainability of construction works – Environmental product declarations – Methodology for selection and use of generic data.
CEN/TR 16970	CEN/TR 16970:2016, Sustainability of construction works – Guidance for the implementation of EN 15804.
CEWEP	CEWEP Energy Efficiency Report (Status 2007–2010): Results of Specific Data for Energy, R1 Plant Efficiency Factor and Net Calorific Value (NCV) of 314 European Waste-to-Energy (WtE) Plants. Published 15 January 2013.
DepV	Verordnung über Deponien und Langzeitlager (Deponieverordnung – DepV) vom 27. April 2009 (BGBl. I S. 900), die zuletzt durch Artikel 3 des Gesetzes vom 3. Juli 2024 (BGBl. 2024 I Nr. 225) geändert worden ist. Ordinance on Landfills and Long-Term Storage Facilities (Landfill Ordinance – DepV) of 27 April 2009 (Federal Law Gazette I, p. 900), as last amended by Article 3 of the Act of 3 July 2024 (Federal Law Gazette 2024 I No. 225).
DIN EN 15804	DIN EN 15804:2022-03, *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products; German version EN 15804:2012+A2:2019 + AC:2021.*
DIN EN 15941	DIN EN 15941:2024-10, *Sustainability of construction works – Data quality for the assessment of environmental quality of products and construction works – Selection and use of data; German version EN 15941:2024.*
DIN EN 16757	DIN EN 16757:2023-03, *Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements; German version EN 16757:2022.*

DIN EN 16908	DIN EN 16908:2022-06, *Sustainability of construction works – Environmental product declarations – Product Category Rules complementary to EN 15804 for cement and building lime; German version EN 16908:2017+A1:2022.*
DIN EN 50693	DIN EN 50693:2022-08, *Product category rules for life cycle assessments and environmental declarations of electrical and electronic products; German version EN 50693:2019.*
DIN EN ISO 14025	DIN EN ISO 14025:2011-10, *Environmental labels and declarations – Type III environmental declarations – Principles and procedures (ISO 14025:2006); German and English version EN ISO 14025:2011.*
DIN EN ISO 14044	DIN EN ISO 14044:2021-02, *Environmental management — Life cycle assessment — Requirements and guidelines (ISO 14044:2006 + Amd 1:2017 + Amd 2:2020); German and English version EN ISO 14044:2006 + A1:2018 + A2:2020.*
DIN EN ISO 14046	DIN EN ISO 14046:2016-07, *Environmental management — Water footprint — Principles, requirements and guidelines (ISO 14046:2014); German and English version EN ISO 14046:2016.*
DIN EN ISO 14067	DIN EN ISO 14067:2019-02, *Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification (ISO 14067:2018); German and English version EN ISO 14067:2018.*
ECO Platform	ECO Platform: LCA Calculation Rules and Specifications for EPDs. Version 2.0, December 2024.
European Commission, Joint Research Centre	European Commission, Joint Research Centre: International Reference Life Cycle Data System (ILCD) Handbook – Nomenclature and other conventions. First edition. Luxembourg: Publications Office of the European Union, 2010.
ISO 15686-1	ISO 15686-1:2011-05, *Buildings and constructed assets — Service life planning — Part 1: General principles and framework.*
ISO 15686-2	ISO 15686-2:2012-05, *Buildings and constructed assets — Service life planning — Part 2: Service life prediction procedures.*
ISO 15686-7	ISO 15686-7:2017-04, *Buildings and constructed assets — Service life planning — Part 7: Performance evaluation for feedback of service life data from practice.*
ISO 15686-8	ISO 15686-8:2008-06, *Buildings and constructed assets — Service-life planning — Part 8: Reference service life and service-life estimation.*

ISO 21930	ISO 21930:2017-07, *Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.*
ISO 22095	ISO 22095:2020-10, *Chain of custody — General terminology and models.*
Richtlinie 2008/98/EG	Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Waste Framework Directive; Text with EEA relevance).
VDI 2067 Blatt 1	VDI 2067 Blatt 1:2012-09, Wirtschaftlichkeit gebäudetechnischer Anlagen – Grundlagen und Kostenberechnung. VDI 2067 Part 1:2012-09, *Economic efficiency of building installations — Fundamentals and cost calculation.*
Zampori, L.; Pant, R.	Zampori, L.; Pant, R. (2019): Suggestions for updating the Product Environmental Footprint (PEF) method. EUR 29682 EN. Luxembourg: Publications Office of the European Union. ISBN 978-92-76-00654-1. doi:10.2760/424613. JRC115959.

11 Annex 1: Explanations and calculation rules for the result indicators (and for Clause 7.1.3)

Preliminary remarks on understanding the information modules and system boundaries

In accordance with EN 15804+A2, the life cycle of a product is declared using information modules (also referred to as modules in the text) A to C. Information module D must be regarded as supplementary information on the benefits and loads outside the system under review.

Definition of terms

Elementary flow [ISO 14040]:

Material or energy entering the system under review that has been drawn from the environment without previous human transformation, or material or energy leaving the system under review that is released into the environment without subsequent human transformation. The environmental impacts are determined using characterisation factors for the elementary flows. [35]

Non-elementary flow

Material or energy flows that are changed in quantity and, where applicable, quality (mass, energy or chemical properties) by industrial processes within the system under review and are therefore subject to human transformation.

Input and output flows

Each process has both input and output flows. These may be elementary flows or non-elementary flows.

Foreground system

The foreground system comprises the processes/process chains that can be directly influenced by the owner of the Environmental Product Declaration. Specific data collection usually relates to the foreground system.

Background system

The background system comprises the processes/process chains upstream and/or downstream of the foreground system. These are usually represented by data inventories from databases.

[35] Resource-related elementary flows referring to properties inherent in the materials of input/output flows can be passed across system boundaries or may require specific rules for co-product allocation to ensure consistent flows throughout the product system under review, irrespective of the allocation selected for the process.

Balance value

Result of the impact assessment for an impact category; the equivalent values resulting from the characterisation factors of the input and output elementary flows are offset against each other (i.e. only all contributions to GWP, for example).

Calorific value and primary energy content

The calorific value is a property of a combustible material. It is expressed as MJ/mass. When modelling combustion processes, the calorific value refers to the available/declared material, taking into account the actual or assumed moisture content of the material.

When calculating the primary energy content of fuels containing water, the (net) calorific value H_i and the mass based on absolutely dry material are used.

Primary energy

Primary energy is a measure of energy use/consumption from primary energy carriers, i.e. energy carriers extracted from nature within the product system.

When calculating the indicators "Use of non-renewable/renewable primary energy resources used as raw materials (material use)", the calorific value [MJ/kg] of the product is multiplied by the mass of the product's combustible components (or packaging), assuming absolutely dry mass and the corresponding calorific value where applicable (see above).

***NOTE**: The energy content of secondary fuels in the input is not declared as part of the primary energy indicators, but as the use of renewable or non-renewable secondary fuels (RSF/NRSF).*

The energy content of secondary materials (used as materials) is not declared as primary energy content; the mass of the secondary materials used is reported under the SM indicator (Clause 7.1.2).

Similarly, the mass of secondary fuels (used for energy purposes) is not included in the indicator for the use of secondary materials.

Raw material

According to ISO 14044 (3.15), a raw material is a "*primary or secondary material that is used to manufacture a product*." In accordance with the definition of primary energy, the primary energy content is calculated only for primary material.

Description of the indicators in the EPD table "Results of the LCA – Environmental impacts"

This table presents the balance values (environmental impacts) derived from the elementary flows.

These are reported separately according to the information modules to which one or more processes are assigned.

The values of information modules A1 to C4 are generally positive; human activities cause environmental impacts. The values of module D are generally negative: Energy is recovered from the product system under review, resulting in avoided energy generation in the subsequent system, or secondary materials or secondary fuels result from the product system under review, avoiding the extraction of new primary materials or the use of primary fuels in the subsequent system.

Description of the indicators in the EPD table "Results of the LCA – Resource use"

In order to:

- ensure that the use of energy carriers, considered as consumption over the A1–C4 life cycle, is reported consistently and without double counting across the various energy-related indicators,
- in particular, consistently report the primary energy used as material or for energy purposes over the A1–C4 life cycle, and
- ensure that the substance and material balance in module D lies outside the product life cycle,

reclassifications must be made at the life-cycle system boundary for modules C3 and C4 (or all modules A4–C4, where applicable) for individual energy-related indicators. The other indicator values, e.g. the impact-assessment or waste indicators resulting from the life-cycle assessment of the processes in modules C3, C4 (or all modules A4–C4, where applicable) and D, remain unchanged.

As a general principle, the indicators report gross amounts (total output) for material and energy flows leaving modules C3 or C4 (or all modules A4–C4, where applicable) as outputs. By contrast, net amounts (output minus input) are generally reported for material and energy flows entering module D. (See also Clause 6.6.3)

As a general rule:

- The indicators representing primary energy are determined from the elementary flows (input) for renewable/non-renewable primary energy and the calorific values of the product (and its packaging); see the definitions of calorific value and primary energy above.
- The use of secondary materials or secondary fuels is not included in the calculation of the primary energy indicators.
- In the absence of consistent information in commonly used data inventories,

the SM, RSF and NRSF indicators primarily relate to the foreground system, i.e. the mass/energy of non-elementary flows. They represent the input flows of the respective processes in the modules with regard to their use in the product system. Secondary material used as material is therefore not additionally reported as an input of renewable or non-renewable secondary fuel. The same applies to the use of secondary fuels, which is not additionally accounted for as an input of secondary material.

- The PERT and PENRT indicators represent the value of the characterised input elementary flows of the respective information module (reclassifications may be necessary in specific cases; see below).

The following additional calculation rules apply in detail:

1. In **module A1-A3**, the PERM and PENRM indicators relate to the primary energy content of the product's combustible components. The sum of the values of the PERM or PENRM indicator and PERE or PENRE gives the values for the PERT or PENRT indicator.

2. For the **transport process in module A4**, a numerical value for PERM and PENRM generally cannot be specified (except when accounting for transport losses); the value "0" is entered here. The PERE or PENRE value corresponds to the PERT or PENRT value.

3. **If (packaging) material is incinerated in a waste incineration plant in module A5** or **compostable material is disposed of in a landfill**[36], the primary energy content of the material is recorded as a negative value in PERM or PENRM because the material is no longer used as material. For the PERE or PENRE indicator, it is recorded as a positive value (consumption).

The primary energy required to operate the plant (input, consumption) is reported in PERT/PENRT and added to PERE/PENRE.

In **module D, in the case of incineration or landfilling with energy recovery** (in A5), the avoided use of primary energy for generating the exported energy is reported under PERT/PENRT and PERE/PENRE as a negative value. In the absence of a suitable indicator, the input of "exported energy" is not reported in module D. For a tabular presentation of the modelling relating to modules C3/C4, see below.

4. **If non-compostable (packaging) material that has a primary energy content is disposed of in a landfill in module A5**, the primary energy content of the material is not recorded as a negative value in PERM or PENRM, as it is assumed that the material remains physically bound within the structure of the landfill body. The

[36] Landfill gas can only be generated if the materials are compostable, i.e. if they can be degraded by biological processes within a foreseeable period. This does not generally apply to conventional plastics under landfill conditions.

primary energy content is therefore **not** recorded as a positive value (consumption) in the PERE or PENRE indicator. Consequently, no primary energy is derecognised when non-compostable material is disposed of in a landfill. The primary energy required to operate the plant (input, consumption) is reported in PERT/PENRT, which corresponds to the value in PERE/PENRE.

5. If **(packaging) material is recycled in module A5**, the primary energy content of the material is taken into account in A5 as a negative value in PERM/PENRM and PERT/PENRT.
   At the same time, the mass of the recycled material (gross amount) is reported as MFR in A5.
   The energy required for the recycling process is reported in PERT/PENRT and PERE/PENRE.
   The input of this material for calculating the potential loads and benefits is recorded in module D as SM (net amount) (for a tabular presentation of the modelling relating to modules C3/C4, see below).

6. If **(packaging) material is processed into secondary fuel in module A5** (which leaves the product system), the energy required for processing is reported in PERT/PENRT and PERE/PENRE. The primary energy content of this material is taken into account as a negative value in PERM/PENRM and PERT/PENRT. At the same time, the mass of the secondary fuel is reported in MER (gross amount) in A5. The input of this material for calculating the potential loads and benefits is recorded in module D as RSF or NRSF (net amount) (for a tabular presentation of the modelling relating to modules C3/C4, see below).

7. If **material is produced in module A5 (e.g. installation offcuts, including packaging) and is also disposed of in A5**, the primary energy content is calculated. This is included as a positive value in the PERE or PENRE indicator. The PERM or PENRM indicator has a value of "0" as a result of adding the positive and negative calorific values. In this case, PERT or PENRT corresponds to PERE or PENRE. At the same time, the exported energy generated in the waste incineration plant or from landfill gas is reported as EEE or EET in A5. In the absence of an indicator, the input of this energy in module D is not declared (for a tabular presentation of the modelling relating to modules C3/C4, see below).
   If the material is recycled at end of life or used elsewhere as a secondary fuel, the rules for the C modules apply accordingly.

8. If material with a primary energy content is newly introduced in the **B modules**, it is reported as a positive value for PERM/PENRM; if the material is disposed of, it is taken into account in the corresponding module as a negative value in PERM/PENRM and simultaneously as a positive value in PERE/PENRE (except

when non-compostable material is disposed of in a landfill). PERT and PENRT describe additional primary energy introduced into the process as material and/or energy.

At the same time, the **exported energy generated in the waste incineration plant/from landfill gas is reported as EEE or EET in the respective B module**. In the absence of an indicator, the input of this energy in module D is not declared (for a tabular presentation of the modelling relating to modules C3/C4, see below).
If the material is recycled at end of life or used elsewhere as a secondary fuel, the rules for the C modules apply to these outputs.

9. The same rules apply to **module C1** as to the B modules.

10. The same rules apply to **module C2** as to module A4.

11. If the **product is incinerated in a waste incineration plant in the end-of-life scenario (C3, C4)** or—in the case of compostable materials (see the explanations concerning module A5)—disposed of in a landfill, the primary energy content of the product is recorded as a negative value in PERM or PENRM because the material is no longer used as material. In the PERE or PENRE indicator, it is recorded as a positive value (consumption); allocation to module C3 or C4 depends on the R1 value of the incineration plant in the scenario; module C4 always applies to landfilling.

    The primary energy required to operate the plant (input, consumption) is reported in PERT/PENRT and added to PERE/PENRE.

    At the same time, the **energy recovered in the waste incineration plant or from landfill gas is reported in C3/C4 as EEE and EET**.
    If the product (or packaging) contains secondary material, PERM or PENRM is recorded as a negative value in C3 or C4 (or A5) only for the primary-material portion. EEE and EET are declared for the entire amount (primary and secondary material) of exported energy generated in the waste incineration plant. For the benefits in module D, the avoided use of primary energy or the environmental impacts associated with generating the substituted energy are reported under PERT/PENRT and PERE/PENRE (and for all other indicators) as a negative value only for the primary-material portion.

    In **module D, in the case of waste incineration or landfilling with energy recovery** (in C3/C4), the avoided use of primary energy for generating the exported energy is reported under PERT/PENRT and PERE/PENRE as a negative value.

In the absence of a suitable indicator, the input of the "exported energy" is not reported in module D.

When **non-compostable products or product components that have a primary energy content are landfilled [PH3],** the primary energy content of the material is not recorded as a negative value in PERM or PENRM, as it is assumed that the material continues to exist in material form. The primary energy content is therefore **not** recorded as a positive value (consumption) in the PERE or PENRE indicator.

Explanation: The energy content of the product remains unused and is lost.

The primary energy required to operate the plant (input, consumption) is reported in PERT/PENRT and added to PERE/PENRE.

→ **EXAMPLE:** Figure 1 illustrates the corresponding reclassifications in the case of energy recovery from waste in a plant with an efficiency of R1>0.6, using a plastic with 20% recycled content and a primary energy content of Hi = 40 MJ/kg as an example. The other indicator values, e.g. the impact-assessment or waste indicators resulting from the life-cycle assessment of the processes in modules C3, C4 and D, remain unchanged. In the case of a plant with an efficiency of R1<0.6, the values would be reported in C4 instead of C3 (with a lower energy yield).

Figure 1 - Reclassifications of energy-related indicators at end of life: Energy recovery from waste in a plant with an efficiency of R1>0.6

Energy recovery from 1 kg of plastic made from 20% recycled material and Hu=40 MJ/kg at an efficiency of 75% (of which 10% electricity)

Resource use\use of fresh water\PE renewable:						
Parameter			A1 - A3	C3	C4	D
Non renewable primary energy as energy carrier	PENRE	[MJ]	...	32.0 + ...		- ....
Non renewable primary energy as material utilization	PENRM	[MJ]	32.0	- 32.0		0
Total use of non renewable primary energy resources	PENRT	[MJ]	32.0 + ...	... + 0		- ....
Use of secondary material	SM	[kg]	0.2			
Use of renewable secondary fuels	RSF	[MJ]				
Use of non renewable secondary fuels	NRSF	[MJ]				
Output flows\waste categories:						
Parameter		unit	A1 - A3	C3	C4	D
Components for re-use	CRU	[kg]				
Materials for recycling	MFR	[kg]				
Materials for energy recovery	MER	[kg]				
Exported electrical energy	EEE	[MJ]		3		
Exported thermal energy	EET	[MJ]		27		

12. If the **product is recycled in the end-of-life scenario**, the primary energy content of the material is taken into account in C3 as a negative value in PERM/PENRM and PERT/PENRT.

At the same time, the mass is reported under MFR (as a gross amount) in C3.

In **module D, in the case of recycling** the product, the primary energy required for the recycling process under PERT/PENRT and PERE/PENRE is added as a positive amount to the avoided values for PERT/PENRT and PERE/PENRE—negative values resulting from the avoided production of new material. The input of the recycled material in D is declared as SM (as a net amount).

→ **EXAMPLE**: Figure 2 illustrates the corresponding reclassifications in the case of material recycling, using a plastic with 20% recycled content and a primary energy content of H_i = 40 MJ/kg as an example. The other indicator values, e.g. the impact-assessment or waste indicators resulting from the life-cycle assessment of the processes in modules C3, C4 and D, remain unchanged:

Figure 2 - Reclassifications of energy-related indicators at end of life: Recycling

Recycling of 1 kg of plastic made from 20% recycled material and Hu=40 MJ/kg

Resource use\use of fresh water\PE renewable:						
Parameter			A1 - A3	C3	C4	D
Non renewable primary energy as energy carrier	PENRE	[MJ]	...	...		- ....
Non renewable primary energy as material utilization	PENRM	[MJ]	32.0	-32.0		0
Total use of non renewable primary energy resources	PENRT	[MJ]	32.0 + ...	... -32.0		- ....
Use of secondary material	SM	[kg]	0.2			0.8
Use of renewable secondary fuels	RSF	[MJ]				
Use of non renewable secondary fuels	NRSF	[MJ]				
Output flows\waste categories:						
Parameter		unit	A1 - A3	C3	C4	D
Components for re-use	CRU	[kg]				
Materials for recycling	MFR	[kg]		1.0		
Materials for energy recovery	MER	[kg]				
Exported electrical energy	EEE	[MJ]				
Exported thermal energy	EET	[MJ]				

13. If the **product is declared as a secondary fuel in the end-of-life scenario**, the primary energy content of the material is taken into account in C3 as a negative value in PERM/PENRM and PERT/PENRT.
At the same time, the mass is reported under MER (as a gross mass) in C3.

In **module D, in the case of secondary fuel**, the avoided primary energy under PERT/PENRT and PERE/PENRE is reported as a negative value corresponding to a thermal recovery plant.
The input of the recovered secondary fuel in D is declared as RSF or NRSF (as a net amount).

→ **EXAMPLE:** Figure 3 illustrates the corresponding reclassifications in the case of use as a secondary fuel, using a plastic with 20% recycled content and a primary energy content of H_i = 40 MJ/kg as an example. The other indicator values, e.g. the impact-assessment or waste indicators resulting from the life-

cycle assessment of the processes in modules C3, C4 and D, remain unchanged.

Figure 3 - Reclassifications of energy-related indicators at end of life: Use as a secondary fuel

Use as a secondary fuel of 1 kg of plastic made from 20% recycled material and Hu=40 MJ/kg

Resource use\use of fresh water\PE renewable:						
Parameter			A1 - A3	C3	C4	D
Non renewable primary energy as energy carrier	PENRE	[MJ]	...	...		- ....
Non renewable primary energy as material utilization	PENRM	[MJ]	32.0	-32.0		0
Total use of non renewable primary energy resources	PENRT	[MJ]	32.0 + ...	... -32.0		- ....
Use of secondary material	SM	[kg]	0.2			
Use of renewable secondary fuels	RSF	[MJ]				
Use of non renewable secondary fuels	NRSF	[MJ]				40.0
Output flows\waste categories:						
Parameter		unit	A1 - A3	C3	C4	D
Components for re-use	CRU	[kg]				
Materials for recycling	MFR	[kg]				
Materials for energy recovery	MER	[kg]		1.0		
Exported electrical energy	EEE	[MJ]				
Exported thermal energy	EET	[MJ]				

Description of the indicators in the EPD table "Results of the LCA – Output flows and waste categories"

- The **HWD and NHWD waste indicators** cover the entire life cycle, i.e. all hazardous and non-hazardous waste flows to a landfill[37], both in the upstream system and in the influenceable foreground system, broken down by module.
- The **RWD indicator** represents the sum of the flows in each module that describe radioactive waste (radioactive ore-processing residues, high-level radioactive waste, intermediate-level radioactive waste and low-level radioactive waste).
- The **CRU, MFR, MER, EEE and EET indicators** relate to the foreground system, i.e. non-elementary flows, and represent output flows from the respective processes in the modules.
- For further information on special cases involving incineration and recycling, see above.

Note: The calculation rules described above are based on standardisation rules (including sector-specific c-PCRs), but may lead to inconsistencies in primary energy calculations when considered as a whole. This situation is already being

[37] Sphera Managed LCA Content (MLC, formerly GaBi database): Hazardous waste = hazardous waste disposed of (landfilled waste [tailings]); non-hazardous waste = waste disposed of (landfilled waste [tailings])

discussed in standardisation. As soon as more extensive or amended rules are adopted, the calculation rules will be adjusted accordingly.

12 Annex 2: Guidance for assessing the quality of foreground data

(Zampori, L., Pant, R. 2019: Suggestions for updating the Product Environmental Footprint (PEF) method, p. 99)

The term 'activity data' used in the following Table 10 means, in the context of this PCR Part A document, 'foreground system life cycle inventory (LCI) data'

Quality level	Collection of **activity data and direct elementary flows**	Temporal representativeness **for activity data and direct elementary flows**	Technological representativeness **for activity data and direct elementary flows Geographical representativeness for activity data and direct elementary flows**	Technological representativeness **for activity data and direct elementary flows Geographical representativeness for activity data and direct elementary flows**
1	Measured/calculated and externally verified	The data relate to the most recent annual accounting period in relation to the date of the EPD's publication	The elemental fluxes and activity data correspond exactly to the methodology used in the newly developed dataset	The activity data and element fluxes correspond exactly to the geographical location at which the process for the newly developed dataset takes place or is modelled.
2	Measured/calculated and verified internally; plausibility check carried out by an auditor	The data relate to an annual reporting period that extends back a maximum of two years from the date of publication of the EPD	The elemental fluxes and activity data represent an estimate based on the technology used in the newly developed dataset	The activity data and element fluxes correspond, in part, to the geographical location where the process for the newly developed dataset takes place or is modelled.
3	Measured/calculated/value from the literature, with no plausibility check by the Verifier OR Qualified estimate based on calculations, with a plausibility check by the Verifier	The data relate to an annual reporting period that extends back a maximum of three years from the date of publication of the EPD	Not applicable	Not applicable

4-5	Not applicable	Not applicable	Not applicable	Not applicable

13 Annex 3: ReUse: Calculation rules for ReUse products

[CEN/TC 350/WG 1]: "[ReUse is the] process by which products or components that have reached the end of their service life are reused without further processing, but including preparation for further use."

NOTE 1: *entry: Preparation for reuse means, where required, inspecting, cleaning, loosening of connections, trimming, removing coatings and/or other restoration measures or repairs, by which products or components that have reached end of life are prepared so they can be reused without further processing.*

NOTE 2: *entry: Reuse in the sense of ReUse means reuse for the same purpose for which they were originally intended."*

13.1 System Boundaries

ReUse products are deemed, pursuant to Article 3 point (1) of Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Waste Framework Directive, WFD), to be waste at the time of removal and, after completion of processing, to achieve end-of-waste status under Article 6 point (1) WFD.

[Article 3 point (1) WFD]:

"Definitions

For the purposes of this Directive, the following definitions shall apply:

1. 'waste' means any substance or object which the holder discards or intends or is required to discard;"

[Article 6 point (1) WFD]:

"End-of-waste status

(1) Certain specified waste shall cease to be waste within the meaning of point (1) of Article 3 when it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the following conditions:

a. the substance or object is commonly used for specific purposes;

b. a market or demand exists for such a substance or object;

c. the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and

d. the use of the substance or object will not lead to overall adverse environmental or human health impacts."

Accordingly, ReUse products enter the system burden-free, and only the benefits and burdens from the new product system are included in the calculation.

13.2 A1-A3, product stage, information modules

The accounting of ReUse products is subject to the same accounting rules as other construction products or components.

All inputs and emissions relating to the waste flow from the product's prior use, up to the point at which end-of-waste status is reached, are allocated to the predecessor system in the predecessor system's theoretical Module C. This applies even if the product's EPDs have not previously reported such an EoL scenario with a ReUse option.

Modules A1–A3:

- After end-of-waste status, any further processing with material and energy inputs is assigned to Module A1 of the ReUse product (e.g., coatings for new colouring).
- Transport processes that arise after end-of-waste status (e.g., transport from the waste management operator to further processing/sales location).
- Benefits and burdens from processing additionally carried out after end-of-waste status (e.g., VOC emissions from a new paint application).

All remaining modules are calculated as usual.

14 Annex 4: Additional Explanations for Specific Rules Applicable to Individual Product Groups

14.1 Gross and net emissions for significant quantities of secondary fuels

For a fully transparent presentation of the environmental impacts of a product system, it is essential to include, as additional information in the EPD, any potentially contentious environmental burdens that are not captured and declared by the core environmental impact indicators.

For products in whose manufacture secondary fuels are used, and for products whose direct upstream chain uses significant quantities of secondary fuels, these are reported with the indicators RSF and NRSF.

Greenhouse gases from the combustion of verified wastes, which in these cases may exceptionally be declared as secondary fuels, are not attributed to the product system. Accordingly, the "net values" are declared in the results table for the GWP indicators in A1–A3.

The emissions from the wastes that in these cases may exceptionally be declared as secondary fuels must nevertheless be calculated as "gross values" and declared below the results table. Biogenic and non-biogenic greenhouse gas emissions shall be distinguished.

The following standard text shall be used below the results table:

For all GWP indicators in A1–A3, the net values are declared. The waste status of the fuels, which in these cases may exceptionally be declared as secondary fuels, has been verified.

The gross emissions (i.e., including the greenhouse gas emissions from the combustion of the secondary fuels) amount to:

GWP total:	x1 kg CO_2-eq.
GWP fossil:	x2 kg CO_2-eq.
GWP biogenic:	x3 kg CO_2-eq.

All corresponding calculations shall be documented in the project report.

This provision applies, for example, to cement and to products that include cement directly in their formulation.

15 Annex 5: Carbonation

Carbonation describes the reaction of atmospheric carbon dioxide with products containing calcium oxide or calcium hydroxide to form calcium carbonate. Carbonation can occur in various life cycle stages of the product, but primarily during the use stage and at end-of-life (EoL, "end-of-life"). Other compounds, such as magnesium oxide or calcium silicate, can also bind atmospheric CO2 in a humid environment and act as a CO2 sink.

The carbonation effect may be reported as a negative value for GWP-fossil and shall be calculated in accordance with DIN EN 16757 for concrete and concrete elements. For other product groups, the applicable product-specific c-PCR as a European standard shall be chosen as the calculation basis; if a valid product-specific c-PCR is not yet available, the calculation may be performed in accordance with DIN EN 16757. In doing so, the temporal dynamics and/or allocation of carbonation to the life cycle modules as well as the type and duration of exposure shall be taken into account.

Carbonation strongly depends on factors such as the type of material, surface characteristics, strength, and the surrounding air and/or soil. Therefore, the exact application case for the declared product shall be described in the EPD. If the application case is not precisely described, no carbonation shall be credited. If the exact calculation cannot be substantiated or justified, no carbonation shall be credited either.

Furthermore, all information or factors required to determine the carbonation effect in the building — including the content of carbonation-capable constituents — shall be stated in the project report and in the EPD. The cut-off rule of EN 15804+A2 applies to the level of detail of the information, according to which a maximum of 5 % of the total mass per module group may remain unconsidered *[EN 15804+A2, Clause 6.3.6].*

It is also permissible to report carbonation effects not quantitatively in the result tables, but only as additional information in the EPD, unless otherwise defined in a relevant c-PCR.

It is also permissible not to consider carbonation effects, unless otherwise defined in a relevant c-PCR.

If carbonation is not considered, this shall also be stated in the EPD.

Institut Bauen und Umwelt e.V. | Hegelplatz 1, DE-10117 Berlin