AUSTRIAN EPD-PLATFORM FOR CONSTRUCTION RELATED PRODUCTS AND SERVICES

General Guidelines

PRODUCT CATEGORY RULES FOR BUILDING RELATED PRODUCTS AND SERVICES

For preparation of EPDs (Environmental Product Declarations) according to the EPD programme of the BAU EPD GmbH



PCR Part A:

General Rules for LCA assessment and requirements on the project report Version 2018 April 16th





1. General information

Version 2.4 , Vienna, 2018 April $\mathbf{16}^{th}$

Update of versions:

version	comment	status
V.2.1	Specification chapter 7.6. according to decision of PCR-Gremium on 2016-	2016-04-11
	02-16	
	Changes annex 13 with reference to versions of backround databases	
	(ECOINVENT and GaBi) to be used	
	Changes requirements on result tables in chapter 6.2 following format	
	template of ECO Platform	
V.2.2	Chapter 7.3. cut-off rules: phrasing concerning machines and	2017-05-11
	infrastructure new, text concerning sweet water consumption new, rules	
	for transport and euro classes new, selection of data taken from the last	
	12 months, if possible: no justification needed if not, changes chapter 7.5	
	(eol-)scenarios, indication of variances	
V.2.3		2018-02-12
	Changes chapter 2: Inclusion of CEN TC/TR 16970 Adaptations, chapter	
	6.3 point q deleted (certificates), chapter 8.2 substitution of the term	
	"overall revenue" – now "operating result", chapter 8.4 Allocation ,	
	chapter 10.4 I i Mi Matrix alternative new, chapter 12 annex 1 – special	
	rules for packaging, special rules for emission and disposal of emission:	
	carbonation: annulation of the clause, specific rules for waste water,	
	annex 2: as a system model "cut-off by classification" is determined.	
V.2.4	Deletion of passage about recognition of green certificates on page 30	2018-04-16
	and point 6.3.q recognition of CO2 certificates	

contact:

Bau EPD GmbH

Seidengasse 13/3 A-1070 Vienna Austria <u>http://www.bau-epd.at</u> <u>office@bau-epd.at</u>

© Bau EPD GmbH



CONTENTS

1.	GEN	ERAL INFORMATION
2.	INTE	RODUCTION
3.	ABB	REVIATIONS
4.	APP	LICATION
	4.1	APPLICATION OF THE DOCUMENT AT HAND
	4.2	OBJECTIVES OF THE RULES WORKED OUT
	4.3	DESCRIPTION OF THE PRODUCT
	4.4	PRODUCT CATEGORY RULES
5.	FUN	CTIONAL UNIT, DECLARED UNIT AND REFERENCE UNIT
6.	SYST	rem Boundaries
	6.1	GENERAL
	6.2	LIFE CYCLE STAGES9
	6.3	PRODUCT STAGE
	6.4	CONSTRUCTION PROCESS STAGE
	6.5	USE STAGE, RELATED TO THE BUILDING FABRIC
	6.6	USE STAGE RELATED TO THE OPERATION OF THE BUILDING14
	6.7	END-OF-LIFE STAGE
	6.8	BENEFITS AND LOADS BEYOND THE PRODUCT SYSTEM BOUNDARY
7.	INVI	ENTORY ANALYSIS
	7.1	SELECTION OF DATA FOR USE STAGE
	7.2	GENERIC DATA
	7.3	CUT-OFF RULES AND EXCLUSIONS
	7.4	DATA QUALITY REQUIREMENTS
	7.5	SCENARIOS



	7.6	RULES FOR EPD AS AVERAGE PERFORMANCE
8.	ALL	OCATION RULES
	8.1	CHECK OF PROCESS ALLOCATION AND DIVISION
	8.2	CO-PRODUCT ALLOCATION
	8.3	ALLOCATION IN CASE OF MULTI-INPUT PROCESSES
	8.4	ALLOCATION PROCEDURE OF REUSE, RECYCLING AND RECOVERY
	8.5	DOCUMENTATION
9.	IND	ICATORS
	9.1	PARAMETERS DESCRIBING ENVIRONMENTAL IMPACTS22
	9.2	PARAMETERS DESCRIBING RESOURCE USE
	9.3	PARAMETERS DESCRIBING WASTE CATEGORIES24
	9.4	PARAMETERS DECRIPTION THE POTENTIAL OF FURTHER PROCESSING IN END-OF-LIFE STAGE25
10	. PRE	SENTATION AND PROJECT REPORT
	10.1	UNITS
	10.2	DECLARATION OF ENVIRONMENTAL INDICATORS FROM THE LCA
	10.3	PROJECT REPORT DESCRIBING THE LCA
	10.4	INFORMATION TRANSFER MATRIX
11	. REF	ERENCES
12	. ANI	NEX 1: SPECIFIC RULES WITH REFERENCE TO GENERIC DATA FOR COMMONLY OCCURING
	PRC	DCESSES
13	. ANI	NEX 2: REQUIREMENTS ON APPROVED DATA BASES FOR GENERIC DATA



2. Introduction

The document on hand sets the general rules for LCA preparation of the Austrian programme operator for preparing EPD for construction related products and services.

An LCA based on this document is in compliance with the following standards:

- ÖNORM EN ISO 14040Environmental management -- Life cycle assessment -- Principles and framework ÖNORM EN ISO 14044Environmental management -- Life cycle assessment --Requirements and guidelines
- ÖNORM EN ISO 14025Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
- ÖNORM EN 15804 Sustainability of construction works environmental product declarations. Core rules for the product category of construction products
- CEN/TR 15941 Sustainability of construction works Environmental product declarations Methodology and Data for Generic Data.
- ÖNORM EN 15942 Sustainability of construction works environmental product declarations. Communication format business-to-business,
- EN 15978 Sustainability of construction works Assessment of environmental performance of buildings Calculation method.
- ISO 21930 Building construction Sustainability in building construction Environmental declaration of building products
- CEN/TR 16970 Sustainability of construction works. Guidance for the implementation of EN 15804 (Note: with the following 3 exceptions as per decision of ECO Platform:
 - 1. Programme Operators may define additional indicators and publish the results if marke das "additional information/indicators".
 - 2. Programme Operators may interprete the "Polluter pays"-principle dealing with the use of waste according to their own rules (modelling as disposal or recycling process
 - 3. Default values from CEN TC product-PCRs do not have to be taken automatically.

3. Abbreviations

- EPD Environmental Product Declaration
- PCR Product Category Rules
- RSL Reference Service Life
- ITM Information Transfer Matrix

4. Application



4.1 Application of the document at hand

The document on hand sets the general rules for preparing LCA on the basis of EN 15804 and presentation of the project report that is to work out.



4.2 Objectives of the rules worked out

The LCA prepared in compliance with these rules serve as the basis for the issue of an environmental product declaration under the frame of the EPD programme of the Austrian Bau EPD GmbH. The results are designated to be published in EPD, to enter data into data bases and be used in building assessment programmes. Additional objectives of the LCA must be described in the project report.

4.3 Description of the product

With reference to ÖNORM EN 15804, page 13, clause 5.2, Note 3, an EPD can be developed for a substance or preparation (e.g. cement), for a product (e.g. window), for a construction service (e.g. cleaning service as part of maintenance) and for an assemblage of products and/or a construction element (e.g. wall) for technical equipment (e.g. lift).

Until specific documents will be released, the rules can also be applied for buildings and other constructions/structures as well as all components of building services and sanitary facilities.

Declaration of classes of construction products:

The "General Rules for LCA" hold both for collecting data for specific processes and the collection of average data, e.g. when the functional unit is used for a group of similar products from different manufacturers or the same product from different production sites.

It is also possible to declare a reference product describing a specific (typical) product.

If not regulated differently in the PCR Part B documents relevant for the product, the building of product classes and the related declared unit for one or several products can be handled as follows:

The results in the LCA can be deduced from the declared product, over rules that have to be documented, for each product of the class, e.g. for similar products with varying density, or

- → an "average" or "representative" product is declared, or
- → the product with the highest impact on the environment is declared as being representative for a product class.

Possible ways of declaration with reference to grouping of construction products can be chosen as follows:

1. Manufacturer-Declaration:

- 1a) Declaration of a specific product from a production site of a manufacturer,
- 1b) Declaration of an average result of the same specific products from several production sites of a manufacturer
- 1c) Declaration of an average product of a manufacturer,
- 1d) Declaration of an average result of average products from several production sites of a manufacturer

2. Manufacturer-Group-Declaration:

- 2a) Declaration of an average result of the same specific product from several production sites of several manufacturers,
- 2b) Declaration of an average result of average products from several production sites of several manufacturers

The project report must specify:

➔ The type of EPD



- → Calculation rules for building average results in the declaration based on average data, e.g. when the declared/functional unit was defined for:
 - A group of similar products from several manufacturers or
 - the same product from different production sites
- → Data referring to the choice of the reference product
- → Representativity of the reference product resp. average result

4.4 Product Category Rules

The document on hand sets the general rules for LCA valid for all product categories. These rules have to be applied in combination with the product specific rule stated in the related Product Category Rule document (PCR part B). Within the PCR-Part B further specifications are worked out, if necessary, whereby the rules of EN 15804 must be considered.

As described in the basis document in chapter 6, existing PCR documents shall be used for similar product categories if easily available from representative market regions.

Above all, standards of CEN- and ISO-commitees (CEN/TC 350, EPD-PCR documents of CEN Product TCs and ISO/TC 59 SC 17 WG3) shall be considered.

Regarding the procedure of preparing PCR-B documents, ISO 14025 (see clause 6.7.1) recommends preparing the PCR after the definition of the product category by reference to a fitting LCA.

5. Functional unit, declared unit and reference unit

The functional unit is determined in the Product Category Rule following the rule in EN 15804, clause 6.3.1. It is based on:

- the quantified, relevant functional use or performance characteristics of the construction product when integrated into a building, taking into account the functional equivalent of the building;
- the product's Reference Service Life RSL (see EN 15804, clause 6.3.3) or required service life of the building (see EN 15978) under defined in-use conditions.

For a "cradle to grave"-EPD (Declaration of the LCA modules A-C) a reference service life (RSL) shall be declared (see EN 15804, clause7.2.2).

The declared unit is used instead of a functional unit, if the accurate function of the product or scenarios on building level are not declared or unknown. In such cases it is nevertheless possible to indicate a reference or connection to a function.

For the LCA part of the product stage the reference unit and the produced products for which the input and output flows have been gathered have to be declared in addition to the indicators (e.g. per ton or volume product ready for delivery)

The evaluated product must be described accurately according to its technical and functional features (field of application, range of bulk density). The relevant technical and functional features are defined in the related PCR Part B documents.



In most cases the declared unit is linked to the product "from gate". If a system distributed by the manufacturer is declared, the declared unit can also relate to the product "as implemented" (see clause 6.5.2).

It is not accepted to declare proportional shares of a declared/functional unit, e.g. 0.1 m³ insulation materials. However, it is possible to declare commonly used units (e.g. 1 m² of a defined thickness and density of an insulation material). In that case a conversion into the declared/functional unit designed in the PCR Part B document must be possible. Details to that matter are regulated in the related PCR Part B document of the building product.

The chosen declared/functional unit is to be stated in the project report. In any case the mass relation to the declared unit is to declare.

6. System Boundaries

6.1 General

The setting of the system boundaries follows two principles (see EN 15804, 6.3.4.1):

- The "modularity principle": Where processes influence the product's environmental performance during its life cycle, they shall be assigned to the module of the life cycle where they occur; all environmental aspects and impacts are declared in the life cycle stage where they appear;
- The "polluter pays principle": Processes of waste processing shall be assigned to the product system that generates the waste until the end-of-waste state is reached ("complete waste treatment" see clause 6.7).

Principally the system boundaries shall be set in a way that all relevant inputs and outputs can be considered. The time period over which inputs to and outputs from the system shall be accounted for is 100 years from the year for which the data set is deemed representative (see EN 15804 clause 6.3.7), unless important processes happen in a time period outside of that range.

6.2 Life cycle stages

The life cycle of the evaluated product system is to be subdivided according to the modules and life stages in figure 1 in EN 15804.

The LCA based information in an EPD may cover (see EN 15804, 5.2):

- The product stage only (A1-A3, from cradle to gate)
- The product stage and selected further life cycle stages (A1-A3 plus choice from A4-C4, cradle to gate with options)

NOTE: Module D can only be declared, if the information module it is referring to is also declared within the system boundary.

- The life cycle of a product according to the system boundary (A1-C4, from cradle to grave)

LCA results:

The information about the chosen approach must be indicated in the results tables as follows:

The result table

- Shall only contain values or the letters "INA" (Indicator Not Assessed).
- There are no blank cells, hyphens or any other letters but INA.

Seite 9 von 31



- The value 0 is only used for parameters that have been calculated to be 0.
- INA is only used for parameters that are not quantified because no data is available.

Footnotes shall be used to explain any limitation to the result value. Approximations are always better than having an INA result

The choice of modules

- If, e.g. in a "cradle to gate with options" EPD, it is decided to declare modules A and C and D, but not B, the B modules are assigned MND = modules not declared in the Table of Modules.
- If a module is assessed then the indicators shall be quantified.
- If the module is not relevant for a product it should not appear in the result tables. If it does appear in the result table, the parameter results are INA, meaning that they are unknown and not zero. This leaves all options open for a building assessment.
- If no processes can be expected within a declared module, it should be declared with parameter results of value 0, as no mass flows take place. This narrows down the options in a building assessment to a probable scenario. In this case the module should not appear as MND in the Table of Modules

This means that fields can only be filled as this:

MND	Module not declared (= no input of data from the manufacturer)				
Number = Value	Module/Indicator declared, result value available (at the minimum for A1-				
	A3)				
0	Result = Zero (No Input and no Output flows OR Input-Output = Zero),				
	also i.e. for modules from stage B, if they are equivalent to modules from				
	stage C (i.e. considering insulating materials B4 would be the same as				
	End-of-Life of an insulating material).				
INA	Indicator not assessed (Module declared, but a single indicator was not				
	calculateu). Neasons could be. Data not available (= no data sets in				
	software such as GaBi or Ecoinvent, no specific data input from				
	manufacturer). Explanations shall be given in footnotes.				



	BUILDING ASSESSMENT INFORMATION																
		BUILDI	BUILDING LIFE CYCLE INFORMATION									SUPPLEMENTARY INFORMATION BEYOND THE BULDING LIFE CYCLE					
														, i	F		
	A 1 - 3	A 1 - 3 A 4 - 5			B 1 - 7							C 1 - 4					
	PRODUCT stage		PRODUCT CONST stage st			USE STAGE					END OF LIFE stage					Benefits and loads beyond the system boundary	
	A1 A2	A3	A4	A5	B1			B2	B3	B4	B5	C1	C2	C3	C4		
	Rew material supply Transport	Manufacturing	Transport	Construction- installation proces	Lse			Maintenance	Repair	Replacement	Refurbishment	De-construction demolition	Transport	Waste processing	Disposal		Reuse- Recovery- Recycling- potential
			scenario	scenario	scenar	tio		scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario		
					B6		Ope	erational	energy	use						i	
					scenar	rio											
					B7		Ор	erationa	al water u	JSÐ							
					scenar	10										J	
Cradle to gate Declared unit	Mandatory															no RSL	
Cradle to gate with option Declared unit/ Functional unit	Mandatory		Inclusion optional 1) 2)	Inclusion optional 1) 2)	Inclusion optional 1) 2)	Inclusion optional 1) 2)	Inclusion optional 1) 2)	Inclusion optional 1) 2)	Inclusion optional 1) 2)	Inclusion optional 1) 2)	Inclusion optional 1) 2)	Inclusion optional 1)	Inclusion optional 1)	Inclusion optional 1)	Inclusion optional 1)	RSL if all scenarios are given 2)	Inclusion optional
Cradle to grave Functional unit	Mandatory		Mandatory 1) 2)	Mandatory 1) 2)	Mandatory 1) 2)	Mandatory 1) 2)	Mandatory 1) 2)	Mandatory 1) 2)	Mandatory 1) 2)	Mandatory 1) 2)	Mandatory 1) 2)	Mandatory 1)	Mandatory 1)	Mandatory 1)	Mandatory 1)	RSL if all scenarios are given 2)	Inclusion optional

Figure 1:

EPO

Types of EPD with respect to life cycle stages covered and life cycle stages and modules for the building assessment (see EN 15804, figure 1)



6.3 Product Stage

Included processes

The product stage includes the modules A1 (raw material extraction), A2 (transport to the manufacturer) and A3 (manufacturing). The included processes can be taken from EN 15804, clause 6.2.2 and 6.3.4.2. Module A1, A2 and A3 may be declared as one aggregated module A1-3.

Interpretation

Terms and definitions:

- a) Raw materials are source materials that go into intermediate products, upstream products and/or end products (natureplus RL 0000 Basiskriterien 2011)
- b) Upstream products are materials that have been produced in one or several production processes before added in the production of the end product (natureplus RL 0000 Basiskriterien 2011).
- c) Materials and substances are all raw materials, secondary raw materials and upstream materials that are used by the manufacturer with the purpose to reach the demanded product features and remain in the product.
- d) Co-products are any of two or more marketable materials, products or fuels from the same unit process, but which are not the object of the assessment (see EN 15804, clause 3.7).
- e) Secondary raw materials are materials recovered from previous use or from waste which substitute primary materials (see EN 15804 clause 3.29).
- f) Secondary fuel is fuel recovered from previous use or from waste which substitutes primary fuels (see EN 15804 clause 3.28).
- g) Ancillary material is input material or product that is used by the unit process producing the product, but which does not constitute part of the product (see EN 15804 clause 3.2) e.g. formwork oil or catalysators.
- Waste is a substance or object which the holder discards or intends or is required to discard (see EN clause 15804, 3.34). From co-product, by-product and product, waste is the only output to be distinguished as a non-product (see EN 15804 clause 3.7).

Processes:

- a) The product stage is completed with the finalization of the product ready for delivery (including all packages and expenditures for storage on site).
- b) The system boundary is set to include all relevant input and output processes. Therefore all upstream processes shall be traced back without consideration of geographical boundaries.
- c) 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 (see EN 15804 clause 6.3.4.2).
- d) Loads from the upstream product system shall be exclusively transmitted into co-products
- e) Operating supplies (hydraulic oils, cleaning substances etc.) are only calculated, if stated in the cut-off criteria (clause 6.3) or in the PCR defined
- f) Package materials are balanced together with all upstream processes. The deposit is carried out according to the real channel of deposit resp. ARA statistics (Altstoff Recycling Austria AG – leading specialist for recycling of package materials in Austria)



- g) Transport of goods within the production site or between production sites shall be declared for all upstream processes.
- h) Transport of persons does not need to be considered.
- The energy demand for conditioning office buildings does not need to be considered. If included in the manufacturer's data without a chance to substract it out, the data can be used without adaptation if estimated that the effect on the LCA is minimal (see cut-off criteria in clause 6.3)
- j) Emissions into air must be declared either as after filter figures if no filters are implemented as direct emissions (e.g. dust particles). The remaining filter dust is treated as waste.
- k) Industrial waste heat does not need to be declared. It is bilanced indirectly in the energy demand.
- Production waste that is lead back into the production process replaces primary materials and therefore it must be included within the system boundaries. ("closed-loop"). It does not count as secondary material.
- m) Streams that leave the product stage (A1-A3) at the boundary of complete waste treatment must be considered as co-products (see EN 15804 clause 6.4.3.2). Loads and benefits that are allocated to co-products must not be declared in module D. If such an allocation is not possible in a clear way, other methods can be chosen but must be explained. However, for the purpose of a general rule, loads and benefits from A1-A3 are not taken into account in D (see EN 15804 clause 6.3.4.2).
- n) Co-product-allocation: see clause Allocation rules
- Heat and electricity from thermal use of production waste in modules A1-A3 can be calculated as closed loop, but only up to the amount of MJ that respectively is needed as energy quality for production (assumption: whole product stage, A1-A3, considered as one module). For energy gains that go beyond this closed loop a co-allocation must be executed.
- p) For infrastructure and production plants like machinery, wear parts, buildings etc. the cut-off rules shall be considered.

6.4 Construction process stage

Included processes

The construction process stage includes module A4 (Transportation from the production gate to the construction site) and A5 (Installation of the product into the building). The processes included can be taken from EN 15804, clauses 6.2.3, 6.3.4.3 and 7.3.2.2).

Interpretation

- The "transport to the building site" includes an estimation of all transports of goods necessary from the "end of the product stage" to the building site, including any transports to distributors, stores etc.
- Transport of persons does not need to be considered.
- The scenarios and fundamental principles of the calculation must be documented (see EN 15804, clause 7.3.2.1 and 7.3.2.2).

6.5 Use stage, related to the building fabric

Included processes

The use stage related to the building fabric includes modules B1 (use), B2 (maintenance), B3 (repair), B4 (replacement), B5 (refurbishment). The processes to be considered are described in EN 15804, clause 6.2.4 and 6.3.4.4.2.



Interpretation

- The life stage B1 includes according to EN 15804 also emissions into air, water and soil. Emissions, that are not part of the LCA, are regulated in the document "Guidelines for emissions into indoor air and environment".
- B1: In the Product Category Rules scenarios to determine "all emissions into the environment" must be regulated (see "Guidelines for emissions into indoor air and environment".
- B2: The needed water and energy use must be considered like in any other module.
- In EN 15804, clause 6.3.4.4.2, detailed explanations about the activities in modules B1 B5 can be found.

6.6 Use stage related to the operation of the building

Included processes according to EN 15804, clause 6.2.5

The use stage related to the operation of the building includes modules B6 (use of energy for operating of the (product in the) building) and B7 (use of water operating of the (product in the) building).

Further details can be found in EN 15804, clause 6.3.4.4.2.

Interpretation

Exclusively energy and water demand that goes hand in hand with the direct use of the construction material evaluated can be considered (e.g. the heat energy saved by implementing insulation material is NOT to be declared.)

Emissions, that come out due to operating a product (e.g. emissions of nitrous gases) must be allocated to this use stage module.

Note:

The difference between the two use stage modules can be shown by taking the example of a "bio mass boiler plan":

Use stage related to the building fabric includes e.g. use of lubricants, repair work, VOC-emissions from the coating of the boiler.

The use stage related to the operation of the building includes electricity demand and bio mass demand for operating the boiler, nitrous gas emissions as a consequence of operating the boiler.

If the indicator figures are declared in the EPD, the scenario for the use of energy in the building must be described.

6.7 End-of-life stage

Included processes (see EN 15804, clause 6.2.6 and 6.3.4.5)

The end-of-life stage includes modules C1 (deconstruction, demolition), C2 (Transport), C3 (waste processing), C4 (disposal):

Interpretation

During the end-of-life stage of the product or the building, all output from dismantling, deconstruction
or demolition of the building, from maintenance, repair, replacement or refurbishing processes, all
debris, all construction products, materials or construction elements, etc. leaving the building, are at



first considered to be waste. This output however reaches the end-of-waste state when it complies with all of 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;
- use of the recovered material, product or construction element will not lead to overall adverse environmental or human health impacts (see EN 15804, clause 6.3.4.5).
- 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, such processes as collection and transport before the end-of-waste state are, as a rule, part of the waste processing of the system. However, after having reached the "end-of-waste" state, further processing may also be necessary in order to replace primary materials or fuel input in another product system. Such processes are considered to be beyond the system boundary and are assigned to module D. Secondary material having left the system can be declared as substituting primary production in module D, when it has reached functional equivalence of the substituted primary material (see EN 15804, clause 6.3.4.5 NOTE 2).

Loads (e.g. emissions) from waste disposal in module C4 are considered part of the product system under study, according to the "polluter pays principle". If this process generates energy such as heat and power from waste incineration or landfill the potential benefits from utilisation of such energy in the next product system are assigned to module D and are calculated using current average substitution processes.

6.8 Benefits and loads beyond the product system boundary

Included processes

Module D includes reuse, recovery and/or recycling potentials and is described in EN 15804, clause 6.2.7.

Interpretation

- "Module D recognizes the "design for reuse, recycling and recovery" concept for buildings by indicating the potential benefits of avoided future use of primary materials and fuels while taking into account the loads associated with the recycling and recovery processes beyond the system boundary" (see EN 15804, clause 6.4.3.3).
- To receive benefits from recycling/further processing of the product in module D, the treatment of the product must be declared in module C.
- "Any 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 not been allocated as co-products and that have passed the end-of-waste state shall be included in module D. Avoided impacts from allocated co-products shall not be included in Module D." (see EN 15804, clause 6.3.4.6).
- "Module D also contains benefits from exported energy from waste disposal processes declared in module C4" (see EN 15804, clause 6.4.3.3, NOTE 1).



- "Indicators in module D must [...] declare the avoided net-loads on the environment. These come from the flows leaving the system (that means mainly from modules A5 and C3) minus the flows that enter the system (mainly module A1) (see EN 15978, clause 8.8).

7. Inventory analysis

7.1 Selection of data for use stage

Data for product stage must be evaluated by the LCA practitioner on the production site. This rule includes all kind of data that can be influenced by the manufacturer, and with that also data allocated to modules A1, A2 or A3.

The energy and material flows shall be based on 12 months averaged data sets. Continuous measurements, regulations for dosage or metering, energy monitoring, purchase lists or waste lists can be taken as a data basis.

Outputs, e.g. emissions, that do not undergo any continuous measurement, can be collected via representative single measurements. These measurements shall be executed in the same reference year as the collected energy and material flow data and shall be executed with representative amounts of products. If no measurements exist and it is allowable by scientific and technical view, emissions can be estimated by using stoichiomectric equations.

As per EN 15804, the evaluated 12 months shall correspond with the last completely balanced business year. Accidents and extraordinary incidents do not have to be considered.

The procedure of data collection must be described in the project report.

If the manufacturer wants to consider future production conditions already when preparing the EPD, the following rules are mandatory: (see IBU, 2011, clause 7.4, pag 18f):

- a) Processes that do not influence the process of production (e.g. adaptation of delivery) can be integrated into the declaration. The declaration must not be issued before the exact date of adaptation of the process.
- b) For processes that do influence the process of production (e.g. a new kiln), the data collection must be documented for a representative period of time for the new process. This does not need to be a whole year, 3-4 months can be sufficient.

7.2 Generic data

Generic data is information that is not specific for the evaluated system. It can represent a specific process or average data.

As per EN 15804, clause 6.3.2 the use of generic data is allowed for upstream and downstream processes. Processes the manufacturer can influence must be calculated with specific data.

Generic data must fulfil the following criteria:

- a) Principally, generic data should be considered just as any other data in the LCA there is no need of treating generic data differently than specific data.
- b) Generic data shall be taken from reliable sources and worked out in a scientific exemplary manner.



- c) The data shall be plausible and representative.
- d) Data shall be as current as possible. Data sets used for calculations shall be updated within the last 10 years for generic data and within the last 5 years for producer specific data (see EN 15804, clause 6.3.7).
- e) Data sets shall be complete according to the system boundary within the limits set by the criteria for the exclusion of inputs and outputs (see EN 15804, 6.3.7).
- f) The data shall be freely accessible and have a very good price/performance ratio. Further information for choice and use of generic data can be found in CEN/TR 15941.

Generic data for scenarios shall be chosen as realistic as possible and documented clearly (see CEN/TR 15941). The considered processes shall be state of the art and in compliance with current legal standards. This is also mandatory for future processes like e.g. end-of-life processes.

Data shall be as current as possible, representative and of sufficient quality for LCA practitioning (see EN/TR 15941).

One of the main conditions for preparing consistent EPD is the use of consistent data for general processes like energy systems, transport systems, basis material, forestry, disposal and package materials. Until preverified data sets are available, an EPD must be based on a consistent data base. That means only ONE database can be chosen. Mixing data sets from different data bases shall be avoided. Missing or old data sets can be added from other sources if justified (see annex 2 "requirements on approved data bases")

The used generic data must be declared in the project report in a comprehensible way stating the exact source.

The used data base and version must be marked prominently on the EPD (e.g. "EPD on basis of ecoinvent data"). In the middle resp. long term the consistent use of preverified data is to achieve.

The general rule is, that specific data from specific production processes or average data deduced from specific processes must be given priority to when preparing the EPD.

If an upstream product induces more than 10 % impact (e.g. cement in concrete), specific data must be collected. If this is impossible, e.g. due to lack of cooperation of the manufacturer of the upstream product, reasons have to explained in the project report. For generic data either an excellent representativity for the specific product or a worst-case-scenario for generic data must be calculated.

Documentation (see IBU, 2011, clause 7.4, page 19):

- a) The used data sets and their sources have to be declared (e.g. name of the data base, source of literature),
- b) The representativity of the used data sets must be documented,
- c) The handling of missing data sets must be documented,
- d) The data quality must be evaluated.

7.3 Cut-off rules and exclusions

 a) "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" (see EN 15804, clause 6.3.5)



- All inputs and outputs to a (unit) process for which data are available shall be included in the calculation. Data gaps may be filled by conservative assumptions with average or generic data. Any assumptions for such choices shall be documented;
- In case of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1°% of renewable and non-renewable primary energy usage and 1 % of the total mass input of that unit process. The total of neglected input flows per module, e.g. per module A, B, C or D (see Figure°1) shall be a maximum of 5 % of energy usage and mass. Conservative assumptions in combination with plausibility considerations and expert judgement can be used to demonstrate compliance with these criteria;
- b) For inputs with known potential for significant influence on the considered indicators (e.g. use of HFC as foaming agent) additional cut-off criteria is binding:
 - A maximum 1 % of the total mass input of that unit process and
 - A maximum of 5 % considering all processes related to that input
- c) In case of incomplete end-of-life data the cut-off criteria is binding as below:
 - A maximum of 10% of the waste of the process and
 - A maximum of 5% of the total mass input in the indicators describing the impact categories
- In case of incomplete emission data the cut-off criteria of a maximum of 5% of the indicator values describing the impact categories is mandatory.

Consideration of machines and infrastructure in manufacturer's sites: principally the inputs of machines and infrastructure do not need to be considered. In some backround data sets figures for machinery and infrastructure can be included, specific indications can be given by the manufacturer. In any case the chosen approach must be described in the EPD and data sets with included values for this must be listet.

7.4 Data quality requirements

The completeness, availability, up-to-dateness and accuracy of the data will be different despite all meticulous attempt of collection. To ensure the required data quality the following specific requirements apply for construction products:

- a) Data shall be as current as possible. Data sets used for calculations shall have been updated within the last 10 years for generic data and within the last 5 years for producer specific data (see EN 15804, clause 6.3.7);
- b) Criteria concerning data collection and generic data must be followed strictly. Data sets shall be complete according to the system boundary within the limits set by the criteria for the exclusion of inputs and outputs.
- c) A data evaluation according to ISO 14044 is to execute.
- d) Generic data shall be checked for plausibility, in case of strong deviation to comparison figures (other projects, literature, similar products) the manufacturer has to justify the data or correct it.
- e) The completeness of data will be checked on. In exceptional cases a comparison with plausible data from literature will be carried out if data is missing.
 The data quality must be documented. The representativity of data is to discuss. The handling of missing data or models must be explained.

7.5 Scenarios

A scenario shall be realistic and representative of one of the most probable alternatives (see EN 15804 clause 6.3.8).



Scenarios concerning End of Life: It is possible to describe several scenarios for modules C and D in the same EPD document. Each scenario must be calculated and described separately.

Example: For waste wood two different end-of-life scenarios can be calculated:

Scenario 1: "Recycling" and Scenario 2 "energetic utilization" (whereas scenario 1 also includes energetic utilization of waste wood materials that cannot be recycled). Each Scenario must be described separately. In addition mixed scenarios (i.e. scenario 3: "80% recycling (scenario 1) and 20% energetic utilization (scenario 2)" can be described.

7.6 Rules for EPD as average performance

Average EPD describe the case of a functional unit defined for a group of similar products of different manufacturers or the same product from one manufacturer but from different production sites ("Branch-EPD", "Group EPD" or "EPD from Associations"). The data of an Average EPD must be representative for the average of the declared products.

Average EPD must include the following information in the project report as well as on the last page of the EPD document:

- a) The market related to the Average EPD;
- b) A list of all production sites and products that were evaluated;
- c) A note if the list of evaluated sites is incomplete, e.g. if individual sites or countries of a manufacturer were not evaluated;

It is also to explain, whether the EPD is valid resp. representative ONLY for the sites and locations that provided data OR if it is stated to be representative for other market or branch segments. A detailed explanation must be given (i.e. used technologies, market situation...). If further representativity is given, this shall be described in a separate clause below the list of sites participating in the study.

Further tips concerning required documentation in the project report and EPD document:

- a) Technical and functional features: Declaration of ranges AND average values used for calculation in the LCA (for those the approach of building the average must be explained).
- b) Composition, base materials: Declaration of ranges AND average values used for calculation in the LCA (for those the approach of building the average must be explained)
- c) Application field, use: listing of all products as a separate clause or table
- d) Information on representativity in project report: Declaration of shares of a single product with reference to overall average

Variances for products (from different manufacturers and/or from different production sites) as far as indication is possible for the processes in scope. The data of Average EPD should be averaged relating to the production mass. It is to declare on what product masses indicators have been calculated.

The production of "Model EPD" (individual EPD on the basis of generic data, like "templates", Worst-Case-EPD) is not in the focus of this EPD Programme.



8. Allocation rules

8.1 Check of process allocation and division

In compliance with ISO 14044 a consistent question order to check on different possibilities of allocation of coproducts is followed (see step 1 to 3 in "General Principles of LCA"). In the first step the possibility of dividing a process into different parts is checked (1st step point 1). If that is possible, it is no process with co-products and no allocation is needed.

8.2 Co-product allocation

According to EN 15804, clause 6.4.3.2, the allocation between joint co-products must consider the main purpose of the process.

Contributions to the operating result enue of the order of 1% or less are regarded as very low and can be neglected. A difference in result of more than 25 % is regarded as high.

Joint co-product allocation shall be allocated as follows:

- a) Allocation shall be based on physical properties (e.g. mass, volume) when the difference in operating result from the co-products is low;
- b) In all other cases allocation shall be based on economic values;
- c) Material flows carrying specific inherent properties, e.g. energy content, elementary composition (e.g. biogenic carbon content), shall always be allocated reflecting the physical flows, irrespective of the allocation chosen for the process.

Heat and electricity from thermal use of production waste in modules A1-A3 can be calculated as closed loop, but only up to the amount of MJ that respectively is needed as energy quality for production (assumption: whole product stage, A1-A3, considered as one module). For energy gains that go beyond this closed loop a co-°allocation must be executed. (IBU, 2011, clause 6.5.1, page 7).

In Product Group Panels it is to check, whether the definition of unison allocation procedures in compliance with EN 15804 makes sense for the product category in question.

8.3 Allocation in case of multi-input processes

In multi-input-processes different products are manufactured together within one process e.g. in a waste incineration plant, a biomass plant or a disposal site. The allocation is done on the basis of physical attribution of material flows. If necessary, the environmental impact related to the inputs is allocated in a way referring to the influence on the following production process (see IBU, 2011, clause 7.5.2 page 21).

8.4 Allocation procedure of reuse, recycling and recovery

EN 15804, clause 6.4.3.3:

- a) Benefits and loads from reuse, recycling and recovery can be declared in module D.
- b) "Where a secondary material or fuel crosses the system boundary e.g. at the end-of-waste state and if it substitutes another material or fuel in the following product system, the potential benefits or avoided loads can be calculated based on a specified scenario which is consistent with any other



scenario for waste processing and is based on current average technology or practice. If today's average is not available for the quantification of potential benefits or avoided loads, a conservative approach shall be used."

- c) "In module D substitution effects are calculated only for the resulting net output flow. The amount of secondary material output, which is for all practical purposes able to replace one to one the input of secondary material as closed loop is allocated to the product system under study and not to module D"
- d) "NOTE 2: Avoided impacts from allocated co-products are not part of Module D information, see EN 15804, clause 6.3.4.6"

Specification

- a) Secondary materials
- The collection and sorting of waste must be allocated to the system of waste disposal of the previous product system.
- Secondary materials /raw materials and fuels from external sources that do not evoke costs for the producer (transport costs not considered) must be declared as value neutral products.
- For all other recycling materials that are bought in, an economical allocation must be carried out (e.g. broken glass from flat glass production or recycled laminated glass from vehicles).
- The preparation of waste with the intention of using it later as a secondary material in the product system for which the LCA is carried out must be allocated to this product system assessed.
- Expenses for transport from the location of treatment and possible recycling steps must be calculated without allocation, meaning that they must be allocated to the secondary materials/recycling materials in question.

Example: Collection of used glass and sorting of it must be allocated to the previous system, the treatment and preparation as a secondary material for the production of mineral wool must be allocatd to the new system.

- b) Production waste
- Production waste that is brought back to production does not need allocation for it can be seen as closed loop. The waste substitutes primary material and is therefore included in the inventory analysis.
- Flows leaving the system at the end-of-waste boundary of the product stage (A1-A3) shall be allocated as co-products (Loads and benefits from allocated co-products shall not be declared in Module D (see EN 15804, clause 6.3.4.6).
- Production waste for which a sales revenue can be achieved must be considered as co-products.
 Production waste that cannot be sold on the market must be calculated as waste, even if transferred to extern recycling or energy recovery processes. In no case benefits are given for the substitution of other energy carriers.
- Waste from one-way packages, that accumulate in production and are disposed must be treated as waste even if transferred to an extern recycling or energy recovery process.



- c) Waste on building site
- Waste from the building site that is brought back into production can be considered as closed loop and does not need any allocation. In that case waste substitutes primary materials and therefore is included in the inventory analysis.
- Waste from the building site that cannot be sold on the market must be calculated as waste, even if transferred to extern recycling or energy recovery processes. In no case benefits are given in module D.
- d) Package waste coming from other modules than A1-A3 must be calculated as waste, even if transferred to extern recycling or energy recovery processes.
- e) Product waste
- For reuse and recycling of construction materials after end-of-life stage no closed loop procedure can be applied due to the long service life. Benefits and loads from recycling are allocated to module D.
- f) Energy recovery
- In case of energy recovery of electricity the average Austrian electricity mix must be applied (ecoinvent: "Electricity, medium voltage, at grid/AT"; GaBI: "Electricity grid mix" for Austria), for heat "thermal energy from natural gas" (ecoinvent: "Heat, at cogen 1MWe lean burn, allocation exergy/RER"; GaBi: " thermal energy from natural gas " for the region in question) is to be applied. For markets abroad the respective country specific electricity mix must be applied.

8.5 Documentation

The use of upstream data, which does not respect the allocation principles described in this standard shall be clearly stated and justified in the project report. These data shall be in line with EN ISO 14044 allocation rules (see EN 15804, clause 6.4.3.1). Allocations, that exceed the General Principles for LCA or Product Category Rules, must be documented.

9. Indicators

According to EN 15804 the LCA must include the following parameters for all evaluated life stages:

9.1 Parameters describing environmental impacts

The impact assessment is carried out for impact categories and characterization factors described in the following table in compliance with EN 15804 + A1. The charakterization factors are described in the normative annex C. If characterization factors are developed for materials for which no figures can be found in Annex C, these figures shall be developed on the methodical basics quoted in annex C. This must be declared in the project report.

Parameters	Parameter unit
global warming potential (GWP);	kg CO2 equivalent
ozone depletion potential (ODP);	kg CFC 11 equivalent
acidification of land and water potential (AP);	kg SO2 equivalent
eutrophication potential (EP)	kg (PO4) ³⁻ equivalent
photochemical ozone creation potential (POCP);	kg Ethen equivalent
depletion of abiotic resources (elements) (ADP material)	kg Sb equivalent
depletion of abiotic resources (fossil) (ADP fossile energy carriers)	MJ



9.2 Parameters describing resource use

The parameters describing resource use must be calculated with the lower heating value of the flammable materials.

Parameters	Parameter unit
Use of renewable primary energy excluding renewable primary energy	MJ
resources used as raw materials	
Use of renewable primary energy resources used as raw materials	MJ
Total use of renewable primary energy resources (primary energy and primary	MJ
energy resources used as raw materials)	
Use of non renewable primary energy excluding non renewable primary	MJ
energy resources used as raw materials	
Use of non renewable primary energy resources used as raw	MJ
materials	
Total use of non renewable primary energy resources (primary	MJ
energy and primary energy resources used as raw materials)	
Use of secondary material	kg
Use of renewable secondary fuels	MJ
Use of non renewable secondary fuels	MJ
Use of net fresh water	m ³

If the solid contingent in primary energy cannot be taken from the inventory analysis, it can be calculated from the product composition. Any requirements concerning the lower heating value are defined in the Product Category Rules Part B.

Erläuterung zur Berechnung des Süßwasserverbrauchs:

For each process the water flows are determined and described with reference to the taken volume, the water emissions and the origin (i.e. surface water, ground water, sea water).

If drinking water i staken (i.e.from public water supply), treatment and distribution of the water must be considered as upstream processes with their own individual ressource consumption and emissions. According to this, water that is lead to the waste water system must be connected to processes of waste water treatment and distribution as downstream processes.

Other water flows, i.e. evaporated water or water that is incorporated into the product, must be stated in the inventory of the processes, so that a complete water bilance is the result.

For each process the water consumption the sum of water that is lost to the drainage area. This can be calculated easier than the sum of water that is evaporating, transpiring from biomass, incorporated into a product or transfered to another drainage area. Doing so, as mentioned above, water is not bilanced, if it would have left the drainage area in a natural system before implementation of the technical system.



9.3 Parameters describing waste categories

Parameters	Parameter unit
Hazardous waste disposed	kg
Non hazardous waste disposed	kg
Radioactive waste disposed	kg



9.4 Parameters describing the potential of further processing in end-of-life stage

Parameters	Parameter unit	Method
Components for re-use	kg	gross amounts leaving the system boundary
		when they have reached the end-of-waste
		state
Materials for recycling	kg	
Materials for energy recovery	kg	
Exported energy	MJ	Per energy carrier, exported energy relates
		to energy exported from waste incineration

Exported energy from landfills is NOT evaluated as potential for further processing –contradicting the statement in EN 15804 (In Austria the deposit of organic matter into landfills is not allowed, exceptions only for impurities).

10. Presentation and project report

10.1 Units

SI units shall be used (see EN 15804, 6.3.9).

Exceptions can be made for time, which is expressed in practical units depending on the assessment scale: minutes, hours, days, years.

10.2 Declaration of environmental indicators from the LCA

The declaration of the environmental indicators from the LCA in the EPD must be done in compliance with the "Basis-document for preparation of environmental product declarations Type III, clause 9.1.4".

10.3 Project report describing the LCA

The project report is the systematic and comprehensive summary of the project documentation supporting the verification of an EPD. The project report shall record that the LCA based information and the additional information as declared in the EPD meet the requirements of this document.

The project report should contain any data and information of importance for the data published in the EPD. Special care is necessary to demonstrate in a transparent way how the data and information declared in the EPD results from the LCA study and how the reference RSL has been established.

The structure of the project report shall lean to EN 15804 as well es the structure proposed in the document on hand.

The project report shall be made available to the verifier with the requirements on confidentiality stated in EN°ISO°14025. The project report is not part of the public communication.



The project report shall give the following data:

a) General aspects:

- commissioner of the LCA study, internal or external practitioner of the LCA study;
- date of report;
- statement that the study has been conducted according to the requirements of EN 15804

Further, the project report must contain the elements stated in EN 15804, clause 8.2 (page 43ff). In the following only specifications and additional requirements are summarized:

b) Goal of the study:

The reasons for carrying out the study and its intended application are to declare:

"The LCA on hand is the basis for the issue of an environmental product declaration (EPD). It was prepared in compliance with the rules of the Bau EPD GmbH as Austrian programme operator for EPDs and with that in compliance with EN 15804. The results are designated to be published in an EPD. The data is provided for business-to-business and/or business-to-consumer communication".

If other reasons for doing the study exist, they are to declare.

c) Scope of the study: (corresponding to EN 15804):

- descripton of product system evaluated, including relevant technical and functional specification(s)
- if average EPD are declared: calculation rule for averaging data and representativity of the average data (geographic reference, time reference, technological scope)
- system boundary according to the modular approach as outlined in figure 1 including omissions of life cycle stages
- a simple flow chart showing the processes evaluated in the LCA.

d) Life cycle inventory analysis:

- qualitative/quantitative description of unit processes necessary to model the life cycle stages of an
 optional module
- declared unit and products, for which input and output flows were evaluated (e.g. per ton or volume product XY ready for delivery)
- documentation of data collection and method of assessment
- sources of generic data or literature used to conduct the LCA,
- allocation principles and procedures, especially those in addition to the LCA rules on hand, including documentation and justification and unison application of those allocation rules.

f) Interpretation

- sensitivity analysis to influence of assumptions due to missing data or other insecurities, it these assumptions are relevant for the result.
- Comparison of different construction materials in an EPD is not accepted.



The aggregation quantities in the inventory analysis and the indicators in the impact assessment shall be interpreted with reference to the declared unit stating specifications that influence the results significantly, namely at least (IBU, 2011, clause 9, page 26):

- The interpretation of results based on a dominance analysis of selected indicators (for the relevant modules
- The ratio of results of the inventory analysis and impact assessment

10.4 Information Transfer Matrix

The information of the LCA is to declare in the position of the Information Transfer Matrix (ITM) defined in Annex°A of EN 15942 or is to declare with the alternative template in xlsx-format provided by Bau EPD GmbH.

11. References

	Centre of Environmental Science, Leiden University (Guinée, M.;					
	Heijungs, Huppes, G.; Kleijn, R.; de Koning, A.; van Oers, L.; Wegener					
	Seeswijk, S.; de Haes, U.); School of Systems Engineering, Policy					
CMI 2001	Analysis and Management, Delft University of Technology (Bruijn, H.);					
CML 2001	Fuels and Materials Bureau (von Duin, R.); Interfaculty Department of					
	Environmental Science, University of Amsterdam (Huijbregts, M.): Life					
	Cycle assessment: operational guide to the ISO standards. Final Report,					
	May 2001.					
EC- JRC 2011	ILCD Handbook. Recommendations for Life Cycle Impact assessment in the European context – based on existing environmental impact assessment models and factors. p181. Available at http://lct.jrc.ec.europa.eu					
	Frischknecht R. et al. (2007), Overview and Methodology. Final report					
Frischknecht et al 2007	ecoinvent v2.0 No. 1, Swiss Centre for Life Cycle Inventories,					
	Duebendorf, CH.					
	Hischier R. et al. (2009), Implementation of Life Cycle Impact					
Hischier et al. 2009	Assessment Methods. Final report ecoinvent v2.1 No. 3, Swiss Centre					
	for Life Cycle Inventories, St. Gallen, CH.					
	IBO (Hrsg): IBO-Referenzwerte für Baumaterialien – Wesentliche					
	methodische Annahmen. Boogman Philipp, Mötzl Hildegund. Version					
IBO 2010	2.2, Stand Juli 2007, mit redaktionellen Überarbeitungen am 9.10.2009					
	und 24.02.2010, URL:					
	http://www.ibo.at/documents/LCA_Methode_Referenzdaten_kurz.pdf					
	Produktkategorieregeln für gebäudebezogene Produkte und					
	Dienstleistungen. Aus dem Programm für Umwelt-					
IBU 2011	Produktdeklarationen des Instituts Bauen und Umwelt e.V. (IBU). Teil A:					
	Rechenregeln für die Ökobilanz und Anforderungen an den					
	Hintergrundbericht. 27.09.2011					



	Idemat 2001 database: Data collection from various sources supervised						
Idemat 2001	by Dr. Han Remmerswaal, Faculty of Industrial Design						
	Engineering, Delft Technical University, The Netherlands.						
IPCC 2007	IPCC Climate Change Fourth Assessment Report: Climate Change 2007.						
	http://www.ipcc.ch/ipccreports/assessments-reports.htm						
	Pladerer C., Mötzl H. (Projektleiterin) et al: Anhang 1						
	"Entsorgungsprozesse – Grundlagenrecherche" zur Studie "ABC-						
	Disposal – Maßzahlen für die Entsorgungseigenschaften von Gebäuden						
Pladerer / Mötzl 2009	und Konstruktionen für die Lebenszyklusbewertung". IBO -						
	Österreichisches Institut für Baubiologie und -ökologie und						
	Österreichisches Ökologie-Institut. Gefördert von BMVIT/Haus der						
	Zukunft. FFG-Projektnr. 813974. Wien, Dezember 2009						
Deech M. Conselle I. Hottolingh	The role of atmospheric dispersion models and ecosystem sensitivity in						
Posch, M., Seppaia, J., Hettelingh,	the determination of characterisation factors for acidifying and						
J.P., Jonansson, M., Margni M.,	eutrophying emissions in LCIA. International Journal of Life Cycle						
Joinet, O. (2008).	Assessment (13) pp.477–486						
	The ReCiPe method was created by RIVM, CML, PRé Consultants,						
ReCiPe 2008 v1.05	Radboud Universiteit Nijmegen and CE Delft. More information on the						
	method via www.lcia-ReCiPe.net.						
	Country-dependent Characterisation Factors for Acidification and						
Seppälä, J., Posch, M., Johansson,	Terrestrial Eutrophication Based on Accumulated Exceedance as an						
M., Hettelingh, J.P. (2006).	Impact Category Indicator. International Journal of Life Cycle						
	Assessment 11(6): 403-416.						
	Van Zelm, R., Huijbregts, M.A.J., Den Hollander, H.A., Van Jaarsveld,						
	H.A., Sauter, F.J., Struijs, J., Van Wijnen, H.J., Van de Meent, D. (2008):						
Van Zelm et al. 2008	European characterization factors for human health damage of PM10						
	and ozone in life cycle impact assessment. Atmospheric Environment						
	42, 441-453.						
	World Metereological Organisation 1999, Scientific Assessment of						
WMO 1999	Ozone Depletion: 1998. Global Ozone Research and Monitoring Project						
	- Report No. 44, ISBN 92-807-1722-7, Geneva.						



12. Annex 1: Specific rules with reference to generic data for commonly occuring processes

In the following part different rules for specific processes from existing LCA methods (primarily IBO, 2010) are collected for discussion. These rules shall be discussed on a European level, and in processes of mutual recognition, to begin with IBU (Institut für Bauen und Umwelt – Deutschland) and the European Eco-Platform. In the middle term specific rules shall be substituted with pre-verified basis data sets.

For the generic data sets in line for that process it is still open to define, if they comply in all relevant aspects with the defined method.

Special rules for chemicals

If neither specific nor generic data exist for a chemical substance, it is recommended to try – following the cutoff rules – to model the chemical either stoichiometrically over the basis chemicals or with basis data from the data base "ecoinvent – chemicals, organic" resp. "chemicals, inorganic". The plausibility of the assumptions must be controlled by persons with respective special knowledge.

Special rules for energy supply

If domestic electricity is used in a process, the specific data for domestic electricity must be used. If electricity is taken from the grid and no exact, specific information for the location in question is available from the local energy supplier (meaning including buying-in and selling electricity), the local country specific average energy mix must be taken. In case of using the energy mix of a local supplier, the consumption must be documented over the last 3 years.

The ecoinvent-data for raw materials contain – depending on the production site – mainly European or Swiss energy data. For generic data of raw material it is recommended to use the actual or European (RER) energy mix. For ecoinvent data with other country specific energy carriers it is necessary to substitute it with the actual or European energy mix (RER) if the influence on the indicators is relevant (see cut-off criteria).

Special rules for transport

As basis data the ecoinvent-transport processes following SPIELMANN (2007) must be chosen. If manufacturers do not provide specific lorry sizes, the module "Transport, lorry 16-32t, EURO4" must be chosen. In GaBi database the data set "Truck [diesel driven, Euro 4, cargo] [consumption mix] [20 - 26t gross weight / 17,3t payload capacity] GLO" must be chosen.

The transport data is primarily to declare with reference to masses. If materials with great aviation concerning bulk density are used, a sensitivity analysis is to be executed and if necessary another reference unit (e.g. areference to volume) or fuel consumption must be chosen.

If the manufacturer does not provide data concerning transport distances, the distances within Europe can be calculated with route planners. Distances to locations not included in these route planners can be estimated by distances to the next bigger location with a respective addition. Results must be rounded up by 5 km steps. Distances of shipping overseas can be taken from http://www.dataloy.com, or the software "google earth".

Principally the origin of raw materials should be known. In some cases this cannot be found out (purchase on commodities exchange, origin of raw materials in upstream products not traceable...). If the exact origin of raw



materials or transport routes is unknown, the relevance of raw material transport is to estimate with a sensitivity analysis.

Generic data sets mostly include assumptions for transport distances. These can be taken, if the relevance of the transport is minimal (see cut-off criteria) or if the Product Category Rules determine it that way.

For product specific modelling of raw material transports realistic szenarios shall be made and they must be described transparently in the project report. The scenarios shall include:

- Description of the transport goods,
- Transport distances,
- Means of transport (if known: load capacity, loading factor, fuel use, emission values resp. EURO emission class)
- Assumptions concerning empty runs

Special rules for packages

The following basis data sets from ecoinvent Database are used for different materials:

- Polyethylen package → packaging film, low density polyethylene//[RER] packaging film production, low density polyethylene, S
- cardboard \rightarrow corrugated board box//[RER] corrugated board box production
- Paper \rightarrow kraft paper, unbleached//[RER] kraft paper production, unbleached
- wood→ sawnwood, softwood, raw, dried (u=10%)//[RER] sawnwood production, softwood, raw, dried (u=10%).
- If no specific datasets can be found, for reusable standard Euro-Pallets 10 circulations are defined.
- Metal \rightarrow steel, low-alloyed, hot rolled//[RER] steel production, low-alloyed, hot rolled

The following basis data sets from GaBi Database are used for different materials:

- Polyethylen package \rightarrow Polyethylene film (PE-LD) [technology mix] [production mix, at producer] RER
- Cardboard → Corrugated board (2012) [technology mix] [production mix, at plant] [paper input grade per kg corrugated board changeable] EU-27
- Paper → Kraft paper (EN15804 A1-A3) [technology mix] [production mix, at plant] [1 kg] EU-27

Packages from renewable raw materials are balanced CO₂-neutrally.

Special rules for emissions and disposal of emissions

For all construction products showing essential thermic fractions and/or process specific emissions and for which a measurement of emissions is required by law, the product specific emissions must be collected.

For processes with emissions of low ecological impact without specific data, generic data might be used.

Special rules for waste treatment

The waste treatment or deposition process must be oriented to modern state of the art.

For waste treatment or deposition the ecoinvent data sets mentioned in the ecoinvent report°1, page18 must be used.

The ecoinvent processes for waste treatment or deposition of construction waste (in Switzerland) are applicable on Austrian circumstances (system boundaries, technical data, emission values for pollutants into air, soil and water) (PLADERER, MÖTZL et al, 2009).



The ecoinvent modell of a domestic waste incineration plant is corresponding to the version of the swiss waste incineration plants in the year 2000. It references to one kg waste input as a functional unit.

The user might alter the following parameters:

- Waste fractions
- Fractions of organic or fossil C in waste
- Fractions of magnetic iron in waste
- Used DeNOx-technique (SCR, SNCR etc.)

Special rules for waste water

If the size of a waste water treatment plant is not defined for the treatment of occurring waste water, in case of an ecoinvent LCA the worst-case-scenario "wastewater, average//[CH] treatment of wastewater, average, capacity 1.6E8l/year" must be used. In case of a GaBi LCA the data set must be used

Special rules for infrastructure

For infrastructure and production plants like e.g. machinery, wear parts or buildings respective ecoinvent modules or data from literature must be used, if relevant.

Special rules for landfill gases

Landfill gases being a very inefficient form of energy generation must not be considered.

13. Annex 2: requirements on approved data bases for generic data

As a system model "cut-off by classification" is defined. Generic data can be taken from the following data bases (only with the stated minimum version):

database 1: ecoinvent

In any case the newest version of an ecoinvent data set provided by established tools for LCA assessment (SimaPro, GaBi, Umberto etc.) must be used. Use of single data sets from previous versions is allowed only in special cases (see 7.2 generic data) and only if an explanation is given. Effective date is the date of the order of the EPD.

database 2: GaBi

The newest version provided by the host of the database on the effective date (date of order of EPD) must be used