



Use of LCA/EPD information

How to declare and how to compare the ecological footprint of construction products (LCA, EPD, PEF)

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References

- ⇒ LCA practitioner for many decades (since 1996)
- ⇒ LCA for insulation materials (published in Springer 2000)
- ⇒ Editor of LCA data for construction products (www.baubook.info)
- ⇒ Project leader to initiate the Austrian EPD programme Bau EPD
Member of CEN/TC 350 WG, vice chair of Austrian mirror group
- ⇒ Auditor of ECO platform
- ⇒ Data quality evaluation for German data base ÖKOBAUDAT
- ⇒ Reviewer of JLCA
- ⇒ Application of LCA on building

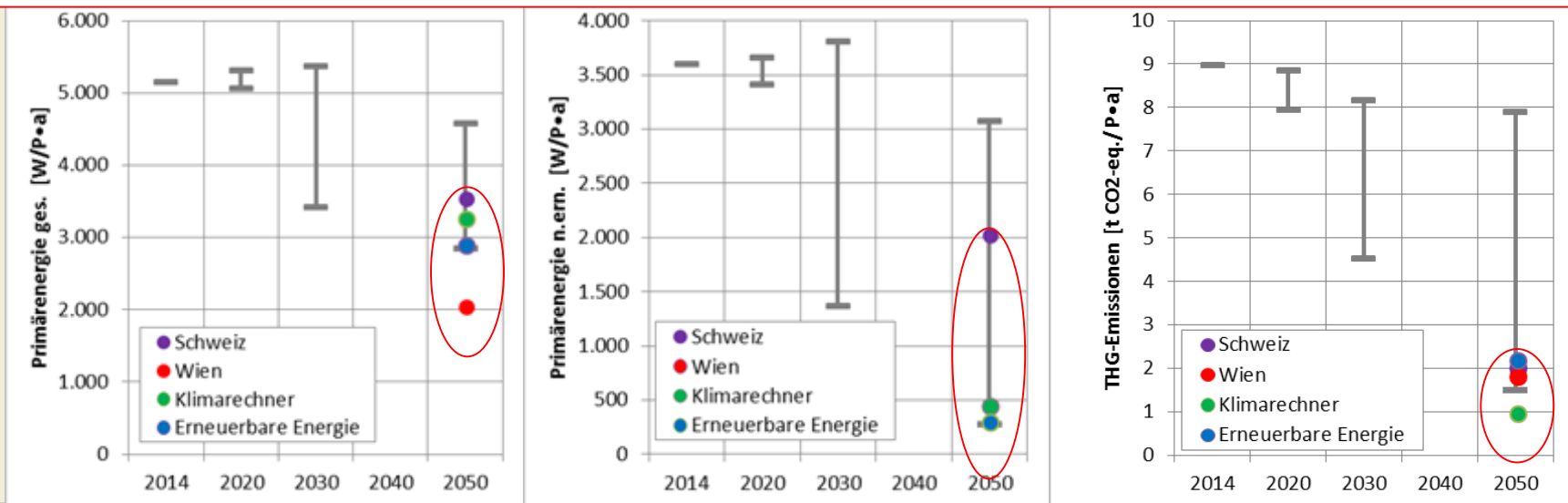


Why is LCA important for construction products ?

Reduction factor for Austria until 2050

- Primary energy total: 1,8
- Primary energy non renewable: 13,0
- THG-Emissionen: 4,2

Source: Urban Area Parameters



Environmental product declaration (EPD)

EN 15804 Sustainability of construction works – Environmental product declarations
– Core rules for the product category of construction products

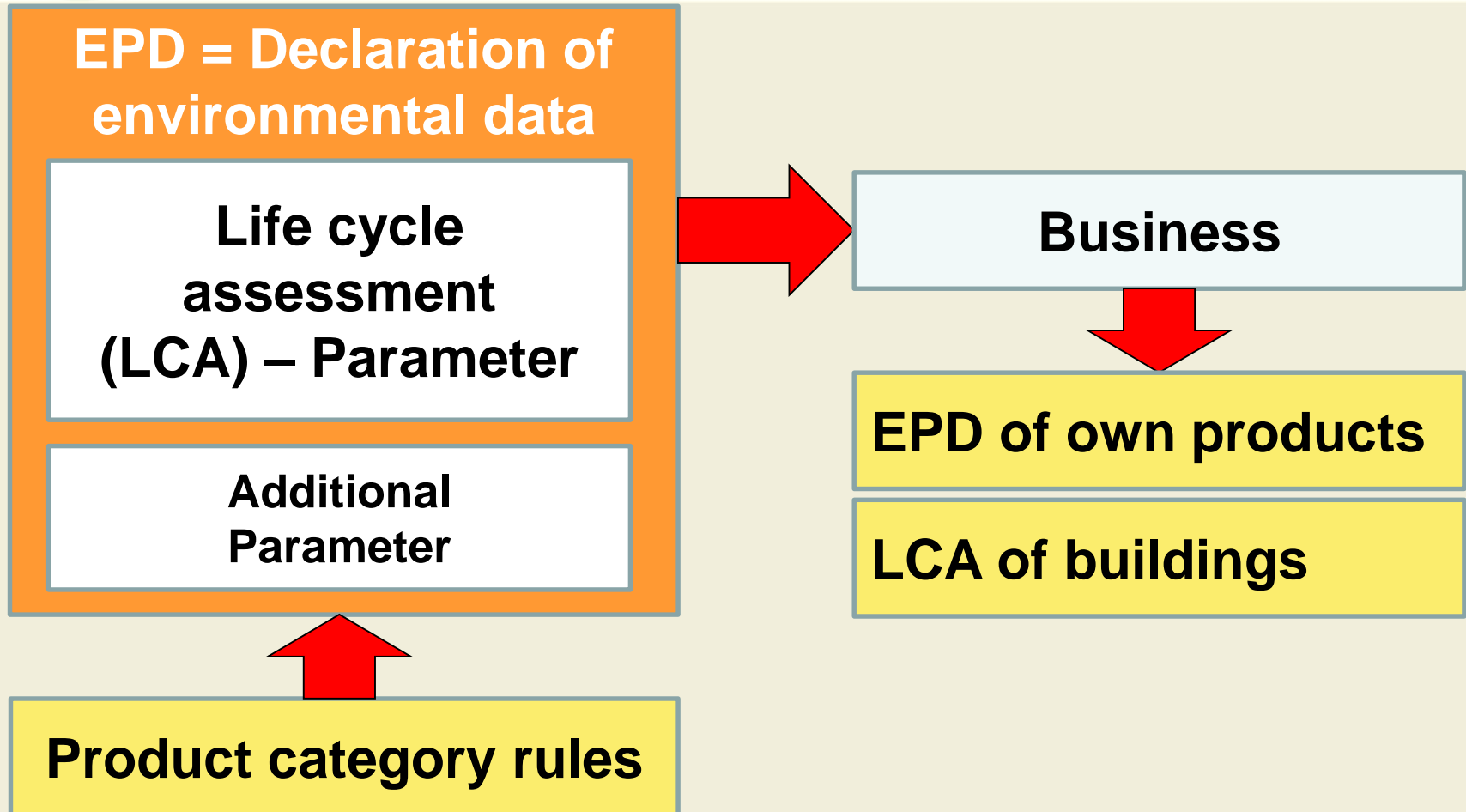
Product standards, e.g.
EN 16485 PCR for wood
products

National requirements
e.g. France

**Specific EPD
programmes**, e.g.
International EPD system

“An EPD according to these standards **provides quantified environmental information for a construction product** or service on a harmonized and scientific basis. [...] provide the basis for assessing buildings and other construction works.”

EPD according to EN 15804



Core information of an EPD = LCA

Life stages →

Tabelle 8: Parameter zur Beschreibung der Wirkungsabschätzung für Baustrohballen pro m³

Parameter	Einheit in Äquiv.	A1	A2	A3	Summe A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D	
Rohdichte	kg/m ³	100												
GWP-Prozess	kg CO ₂	6,074	0,369	1,349	7,79	2,213	1,098	0	0	3,319	134,3	0	-30,486	
GWP C-Gehalt ¹	kg CO ₂	-134,914	0	-0,013	-134,927	0	0	0	0	0	0	0	0	
GWP Summe	kg CO ₂	-128,840	0,369	1,336	-127,13	2,213	1,098	0	0	3,319	134,3	0	-30,486	
ODP	kg CFC-11	3,40E-07	4,40E-08	1,31E-07	5,15E-07	3,47E-07	3,48E-08	0	0	5,20E-07	1,23E-07	0	-2,83E-6	
AP	kg SO ₂	8,60E-02	2,06E-03	8,03E-03	9,61E-02	8,28E-03	5,99E-03	0	0	1,24E-02	2,14E-02	0	-3,98E-2	
EP	kg PO ₄ ³⁻	1,00E-01	6,27E-04	2,24E-03	1,03E-01	2,19E-03	6,76E-03	0	0	3,28E-03	2,95E-02	0	-5,69E-2	
POCP	kg C ₂ H ₄	1,42E-03	2,94E-04	1,39E-03	3,11E-03	1,12E-03	3,56E-04	0	0	1,68E-03	3,66E-03	0	-5,86E-3	
ADPE	kg Sb	1,03E-05	7,06E-07	3,05E-06	1,40E-05	3,91E-06	7,58E-07	0	0	5,87E-06	5,14E-07	0	-1,23E-6	
ADPF	MJ H ₂	30,503	5,152	22,945	58,60	31,949	3,972	0	0	47,923	15,103	0	-449,300	
Legende	GWP = Globales Erwärmungspotenzial; ODP = Abbaupotenzial der stratosphärischen Ozonschicht; AP = Versauerungspotenzial von Boden und Wasser; EP = Eutrophierungspotenzial; POCP = Bildungspotenzial für troposphärisches Ozon; ADPE = Potenzial für den abiotischen Abbau nicht fossiler Ressourcen; ADPF = Potenzial für den abiotischen Abbau fossiler Brennstoffe													

24 parameters





natureplus eco-label (Type I)

Assessment parameters

Technical product information

Ingredients

Life cycle assessment

Qualitative criteria

Emissions to indoor air

Emissions to the environment

Assessment

Documentation

Link to EPD -
Cooperation with Bau EPD GmbH



product
information



LCA in natureplus and EPD

	LCA in natureplus	Additional elements for EPD
Methodology	EN 15804 + specifications	EN 15804 + specifications
Indicators	Selection of indicators	24 indicators
System borders	Cradle to gate (G2G)	+ C2G with options + Cradle to grave
Verification	Approval by awarding commission	Comprehensive verification

An EPD can be piled on the natureplus certification and vice versa:
Existing EPDs can be accepted! **But ...**



We have to evaluate EPDs

Because of potential

- errors

Example: Flooring system with particle board as main component

		EPD	my estimation
Indicator	unit	A1-A3	A1-A3
PERE	MJ/m2	6	6
PERM	MJ/m2	188	188
PERT	MJ/m2	194	194
PENRE	MJ/m2	207	207
PERNM	MJ/m2	0	20-30 MJ
PENRT	MJ/m2	207	227-237 MJ

Glue?

10 % Difference!

Why do we have to evaluate EPDs?



Why do we have to evaluate EPDs? Because of potential

- errors
- Incompleteness, e.g. GWP of carbon uptake is included in GWP total but not declared
- not compliant with EN 15804 and complementary PCR's
- **Other methodological specifications than natureplus, e.g.**
 - electricity mix
 - generic data (background database)



Ecoinvent (EI) versus GaBi results

		1 m3 Straw Bale			1 ton Brick		
		FASBA			Austrian Brick Industry		
		EI	GaBi	%dev	EI	GaBi	%dev
GWP proc	kg CO ₂ -eq	6,07	5,46	10%	173	189	-9%
AP	kg SO ₂ -eq	0,086	0,064	26%	0,3	0,255	15%
EP	kg PO ₄ ³⁻ -eq	0,1	0,1	0%	0,11	0,03	73%
POCP	kg Ethen	0,0014	0,0017	-21%	0,0042	0,0027	36%
PERE	MJ	2,4	0,62	74%	508	376	26%
PENRE	MJ	28,4	30,19	-6%	2040	1990	2%



We have to evaluate EPDs

Why do we have to evaluate EPDs? Because of

- errors
- Incompleteness, e.g. GWP of carbon uptake is included in GWP total but not declared
- not compliant with EN 15804 and complementary PCR's
- other methodological specifications than natureplus
 - electricity mix
 - generic data (background database)
- Mean values, sector EPD etc <-> natureplus:
 - at least plant specific EPD need, if possible: product specific

natureplus product database



A lot of information on the labeled products – among these also

English | Deutsch

EPD data of products

[back to natureplus-website](#)

[natureplus-database](#)

[companies](#)

▼ [Building products](#)

▶ [Ceiling and roof elements](#)

▶ [Wall elements](#)

▼ [Masonry](#)

[Aerated concrete masonry](#)

▼ [Brick masonry](#)

[Brick with integrated insulation materials](#)

[Facing brick](#)

[Filled bricks](#)

[Horizontally perforated brick masonry](#)

[Vertically perforated brick masonry](#)

▶ [Solid wood, untreated](#)

▶ [Constructive \(solid\) wood](#)

▶ [Roof claddings](#)

▶ [Facade claddings](#)

▶ [Building slabs](#)

▶ [Wall and plastering mortar](#)

▶ [External thermal insulation composite system](#)

▶ [Thermal insulation systems \(glued\) for internal use](#)

▼ [Environmental product declaration](#)

[Manufacturing phase \(A1 - A3 in accordance with EN 15804\)](#)

PERE Primary energy renewable, energy resources: 0,508 MJ/kg

PERM Primary energy renewable, materials: 0 MJ/kg

PERT Primary energy renewable, total: 0,508 MJ/kg

PENRE Primary energy non-renewable, energy resources: 2,04 MJ/kg

PENRM Primary energy non-renewable, material: 0 MJ/kg

PENRT Primary energy non-renewable, total: 2,04 MJ/kg

GWP100 process Global warming potential: 0,173 kg CO₂ equ./kg

GWP100 C-Content Global warming potential: 0 kg CO₂ equ./kg

GWP100 total Global warming potential: 0,173 kg CO₂ equ./kg

AP Acidification potential: 0,000303 kg SO₂ equ./kg

ODP Ozone depletion potential: 0,0000000175 kg CFC-11/kg

POCP Photochemical ozone creation: 0,0000417 kg C₂H₄/kg

EP Eutrophication potential: 0,000112 kg PO₄³⁻/kg

Further parameters and life-cycle phases:

- [EPD_AT_GeschMauerDeckenziegel_20141011](#) (MB)
- [ITM_Initiative_Ziegel_Mauerziegel_20141201](#)

Third party verified natureplus LCA data are transferred to calculation tools e.g. for residence subsidies

Third party verified LCA
data from natureplus



Calculation tools
e.g. energy performance of buildings -software





building "EFH Brunn: Variante OSB und KVH": overview

general information

[edit](#)

title: EFH Brunn: Variante OSB und KVH

consider **useful life:** nein

GFA: 370,56 m²

method of calculation: OIB

remark:

Tatsächlich umgesetzt wurde das Gebäude in Vollholz (siehe Variante Vollholz). Da heute im Holzbau in der Regel KVH und OSB verwendet wird, wurde zum Vergleich diese Variante ebenfalls berechnet.

building elements



[edit](#)

5 solid
1 transparent

PEC non-renew.	GWP100	AP
kWh	kgCO ₂ equ.	kgSO ₂ equ.
per m ² GFA		
380,83	-224,9146	0,465463

HVAC



PEC non-renew.	GWP100	AP
kWh	kgCO ₂ equ.	kgSO ₂ equ.
per m ² GFA		
0,00	0,000000	0,000000

Verified naturplus data are used in calculation tools

useful life, transportation and disposal

useful life, transportation, disposal: Currently disabled!

Can be activated in [general information](#).

other elements



[edit](#)

1 other elements
0 chosen references

PEC non-renew.	GWP100	AP
kWh	kgCO ₂ equ.	kgSO ₂ equ.
per m ² GFA		
0,00	0,0000	0,000000





PEF versus EPD

	EPD / EN 15804	PEF
responsible	CEN/TC 350	JRC (EU Commission)
Aim	Declare LCA data of products	Compare products based on LCA data
Focus group	Business (and consumers)	(Business and) consumers
Scores	Multicriterial	Single score
Methods	Different → Mandate to adapt EN 15804 to PEF method	

EPD ... Environmental product declaration

PEF ... Product environmental footprint

EN 15804 System boundaries (working draft according to Malta Oct 2017)

mandatory

new: mandatory

BUILDING LIFE CYCLE INFORMATION													BEYOND BUILD. LIFE CYCLE	
A 1-3			A 4-5		B 1-7					C 1 - 4				D
PRODUCT stage			CONSTRUCTION stage		USE stage					END OF LIFE stage				Benefits and load
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	
Raw material supply	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Deconstruction	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-Potential
					B6 Operational energy use									
					B7 Operational water use									

Other changes in order to harmonise EPD and PEF

- ⇒ New indicators according to PEF, e.g. human toxicity
 - 👎 Data availability!!! methods still in discussion
 - Problem for LCA practitioner (not so relevant for users)
- ⇒ New methodology for „old indicators“
 - Acidification (AP), eutrophication (AP), photochemical oxidant formation (POCP)
 - 👍 Scientific profound indicators
 - 👎 Old and new not comparable (users won't understand)
- ⇒ New approach concerning Global Warming Potential (GWP)
 - 👎 carbon uptake and emissions is no longer part of LCA-indicators



Status of PEF

- PEF is still in its **pilot phase**
 - There are only **5 PCRs available** so far: Thermal Insulation, Metal sheets, Hot und Cold water supply piping systems, Photovoltaic Systems, Decorative Paints
- ⇒ PCRs for most construction products are missing!
- ⇒ EN 15804 has to be adapted to a method which is still in progress!



Summary

1. LCA is an important part of natureplus assessment
2. EPD can be accepted in natureplus after evaluation.
 - I recommend evaluation in general
3. Extensive changes are going on in CEN/TC 350
 - Assessment schemes will have to adapt their methodologies / benchmarks (natureplus as well as building assessment tools)



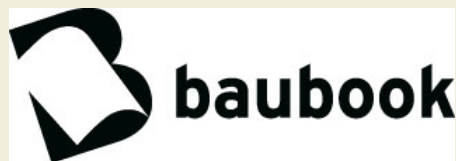
IBO – Austrian Institute for Healthy and Ecologic Building: <http://www.ibo.at/>



Bau EPD - Austrian EPD-platform for construction products: <http://www.bau-epd.at/>



natureplus – International Ecolabel for building products: <http://natureplus.org/>



Baubook – Online-database for building products: <http://www.baubook.info/>