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‘Das Timber’ German Experiences in Timber Assessment and Building Sustainability Rating Tools

Workshop of the Australian Life Cycle Assessment Society (ALCAS)

Sydney, 16 November 2012

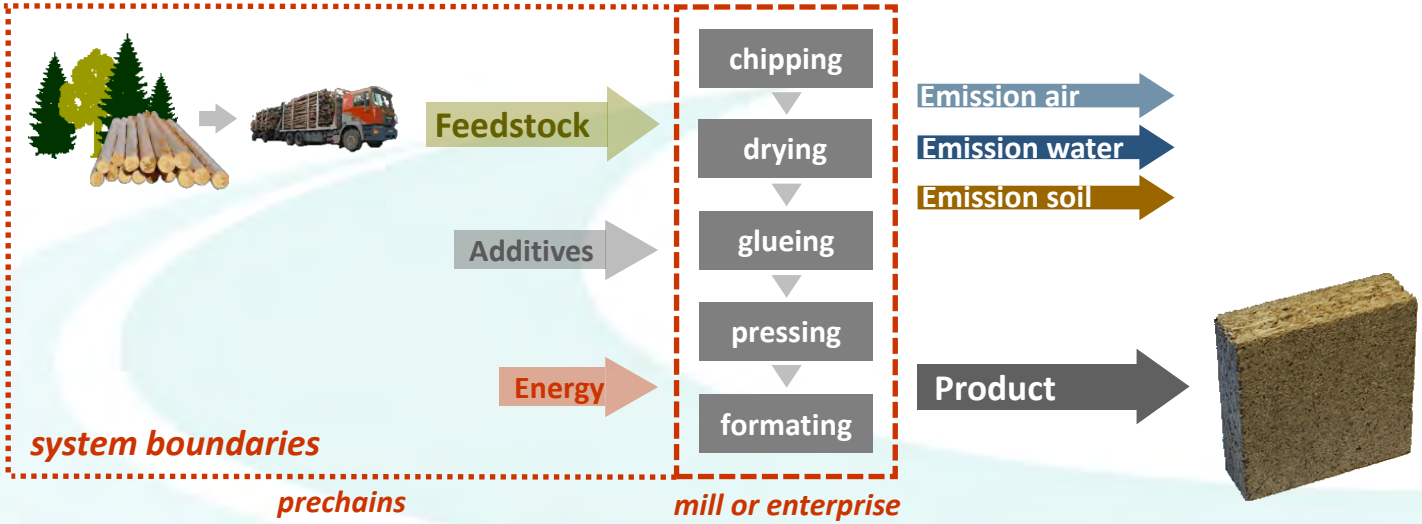
- Life Cycle Assessment
- Sustainability assessment of buildings
- Project on Life Cycle Data for wooden building products
- Wood products carbon balance
- Resume

Life cycle assessment acc. to ISO EN 14040/14044:2006

- **Life cycle assessment sums up all environmentally relevant material and energy flows of a defined product system (functional unit) so that its impact can be assessed**

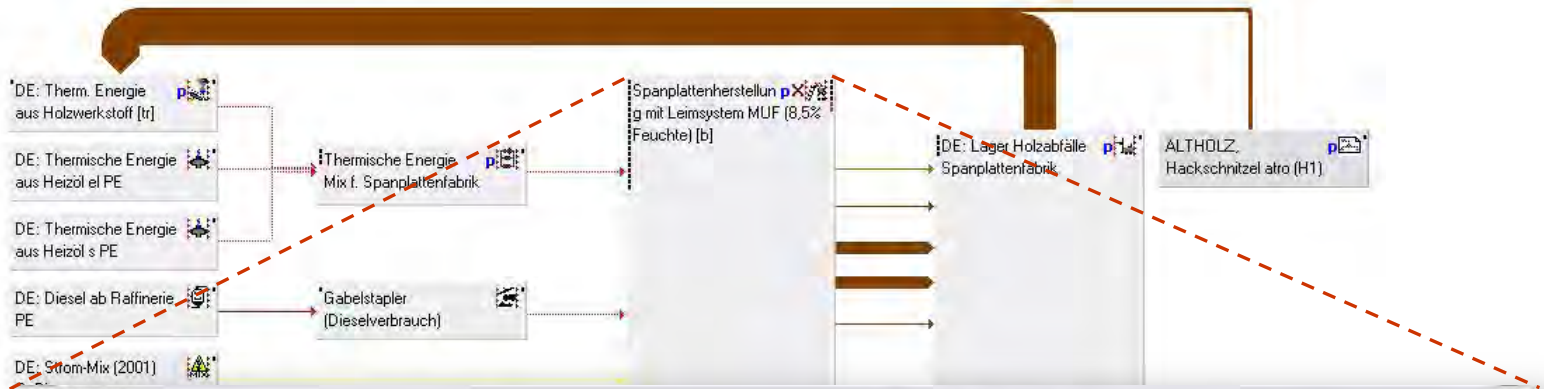
  1. STEP: Definition of the system boundary and the goal

  2. STEP: Life cycle inventory



SPANPLATTE V100 MUF (8,5% Feuchte)

GaBi 4 Prozeßplan: Masse



Fixe Parameter

INPUT OUTPUT

Parameter	Formel	Wert	Stande	Kommentar
chips	wood_in-shavings-used_wood-slabs-ind_timber	80		[kg] atro Hackschnitzel-Input; 79,407
control_boardto	control_woodinp-wood_burn+gluesystem-water_glue-glue_burn+(25*((1-part_glue)*part_glue))+moistproof-wa	7E002		[kg] Kontrollsumme Spanplattengesamtmasse
control_glueinp	((((wood_in-49,95+25*(1-part_glue*part_glue)))*part_glue))*(100/(100-moisture_glue))	1,2E002		[kg] Kontrollsumme Leiminput (feucht)in Prozeß
control_woodinp	pine+spruce+used_wood+slabs+chips+shavings	6,6E002		[kg] Kontrolle: Gesamtholz-Input atro; 625<x<685; Def:657
glue_burn	part_glue_surf*(wood_burn-49,95)	6,1		[kg] Klebesystem atro in zu verbrennendem Schleifstaub, off-cut und Rücklieferungen
gluestandard	((((wood_board*part_glue))+glue_burn+(25*(1-part_glue)*part_glue)))*100/((100-moisture_glue))	1,2E002		[kg] Standardm. Kleber (inkl. H2O) Inp.
gluesystem	gluestandard*factor_glue	1,2E002		[kg]; tatsächliche Klebesystemmenge pro m3 V20

Inputs (Alle Flüsse anzeigen)

Alias	Fluss	Grösse	Menge	Einheit	Werl
water_woodinput	Feuchte (Holz) [Werkstoffe aus nachwachsenden Rohstoffen]	Masse	5E002	kg	X
used_wood	Hackschnitzel atro (Altholz H1, 30% Feuchte) [Werkstoffe aus na	Masse	1,9E002	kg	X
spruce					X
slabs					X
shavings					X
pine					X
moistpro					*
gluesyste					*
chips					*

Outputs (Alle Flüsse anzeigen)

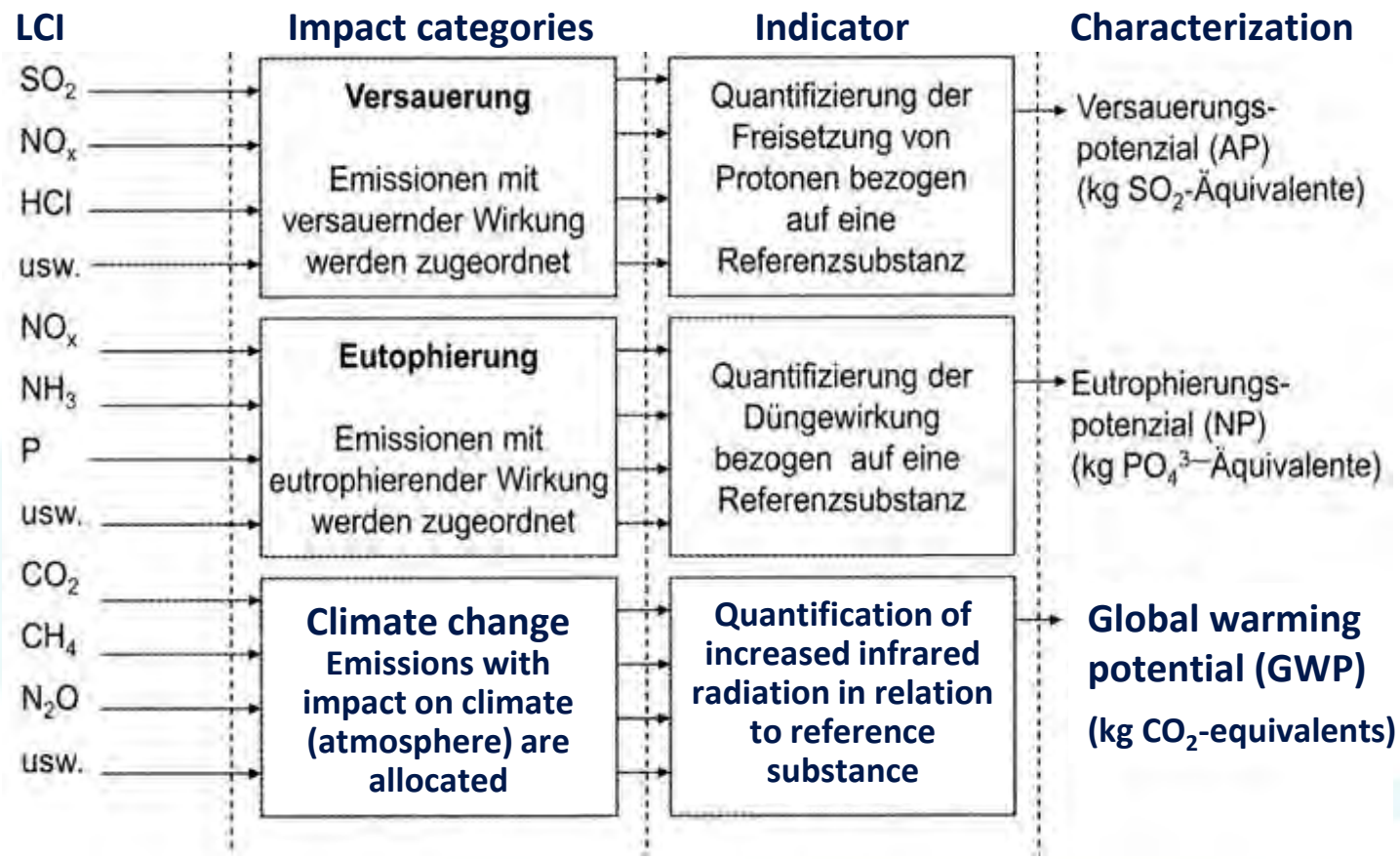
Alias	Fluss	Grösse	Menge	Einheit	Werts
m_altholz	Hackschnitzel atro (Altholz H1, 30% Feuchte) [Werkstoffe aus r	Masse	0,84	kg	X
	Holzpalette (EURO, 40% Feuchte) [Werkstoffe aus nachwachse	Masse	1,6	kg	X
	Stahl Schrott (St) [Abfälle zur Verwertung]	Masse	0,61	kg	*

Challenge: Allocation of flows and environmental burden from the level of the enterprise or mill to the product portfolio or the defined functional unit (allocation) (e.g. in relation to sound or thermal insulation, flooring area, etc.)

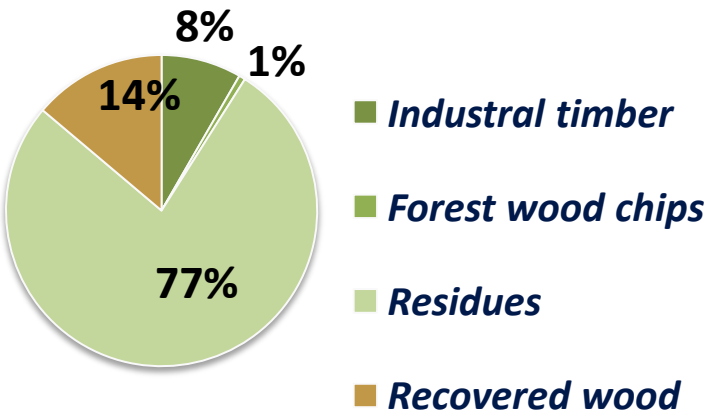
Ökobilanzierung (ISO EN 14040/14044:2006)

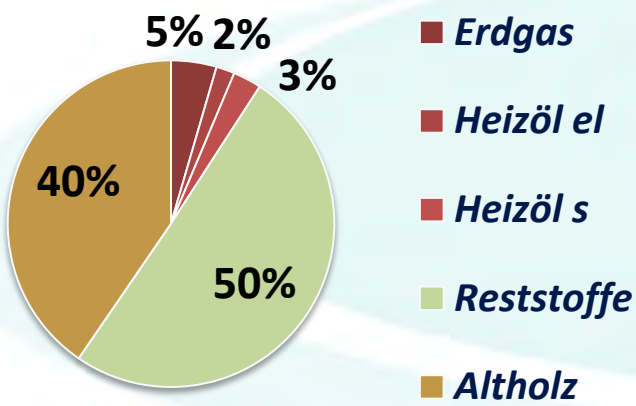
- **Allocation of element flows to indicators of environmental impact**

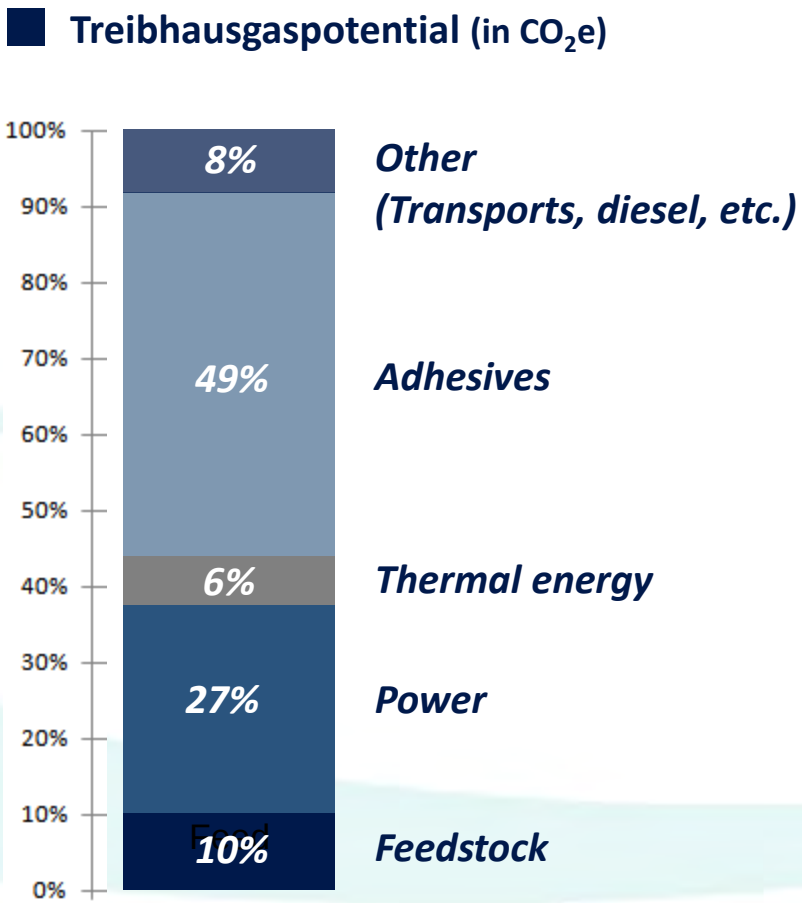
3. STEP: interpretation



Feedstock calculation, e.g. for particle board (Thünen-Institute)







Wood usage in environmental assessment

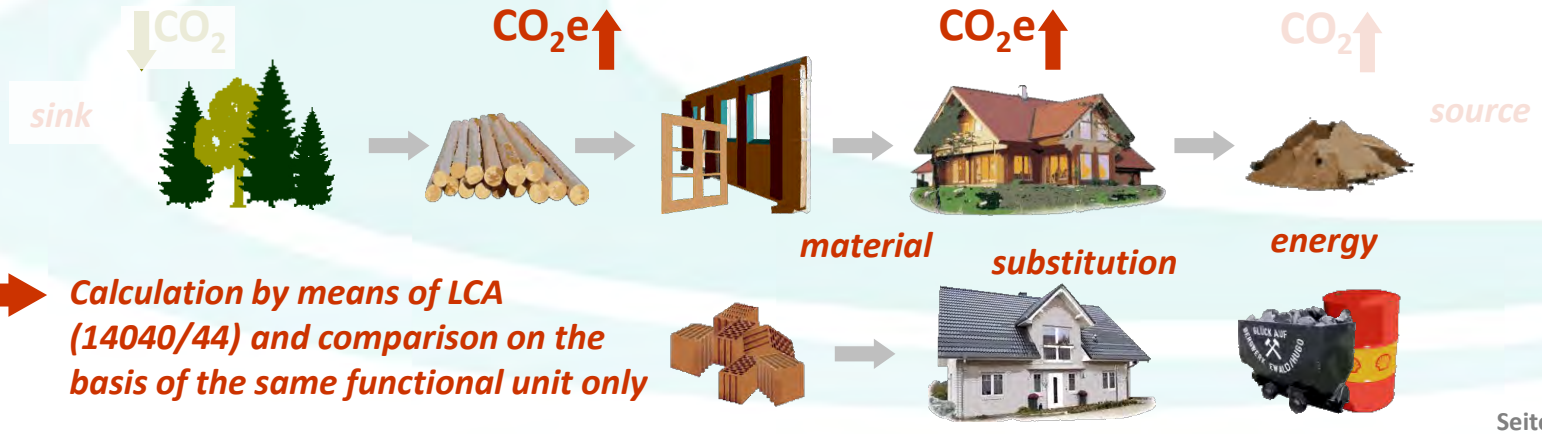
Concept of sustainability was developed and formed mainly in the forest sector

- Forest orders since the middle of 14th century
- Mining: Wood was needed for mining for salt (16th century)
- The term „sustainability“ (DE: *Nachhaltigkeit*) mentioned by Hans Carl von Carlowitz (1713)

Environmentally relevant impacts of wood usage

- Forest management → *Certification (FSC/PEFC, AFS Ltd.)*
- Energy consumption due to the production processes → *Potential substitution effects*
- Forests & wood as part of natural carbon cycle → *Carbon balance and storage*

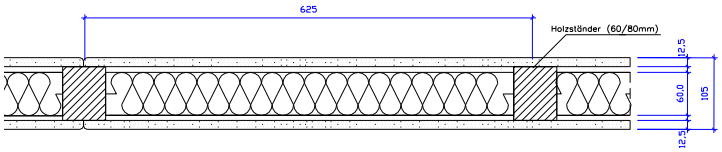
Greenhouse gas emissions along the life cycle of wood products



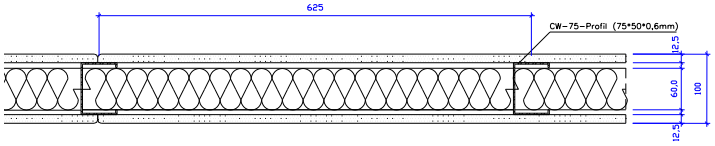
→ *Calculation by means of LCA (14040/44) and comparison on the basis of the same functional unit only*

Example: interior wall system

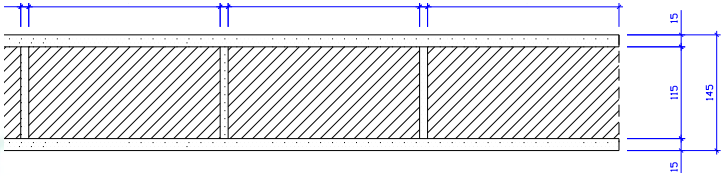
Timber frame wall



Metal frame wall

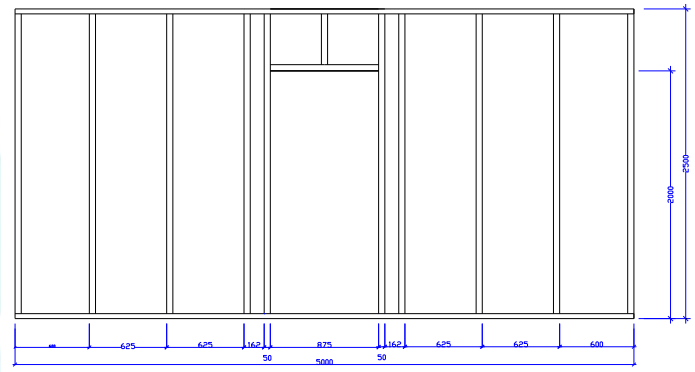


Massiv brick wall



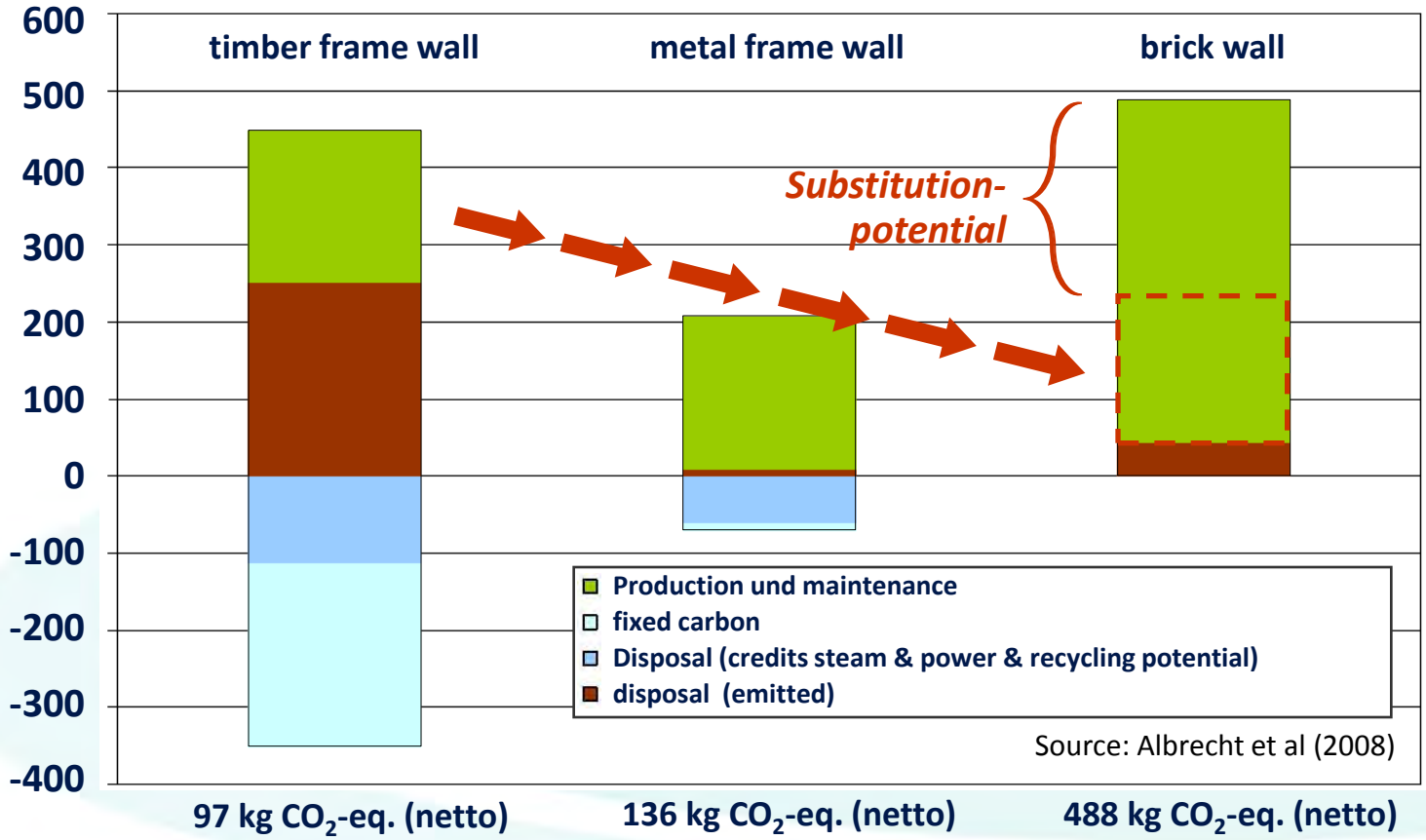
Calculation of substitution potential of a product system <u>only</u> on the basis of the same functional unit /equivalent:

- **Dimensions 5000 x 2500 mm**
- **door way 875 x 2000 mm**
- **Sound reduction index R_w, R = 38 dB**



© Schüco 2010

Interior wall system : GHG-potential (100 years) [in kg CO_2e]



© Schweiz. 2010

Substitution potential

- **By using wood products more energy intensive materials and fossil energy carriers can be substituted**
- **Results of BMBF-Project "ÖkoPot" scaled to 1 m³ of wood** (here: without end of life credits)

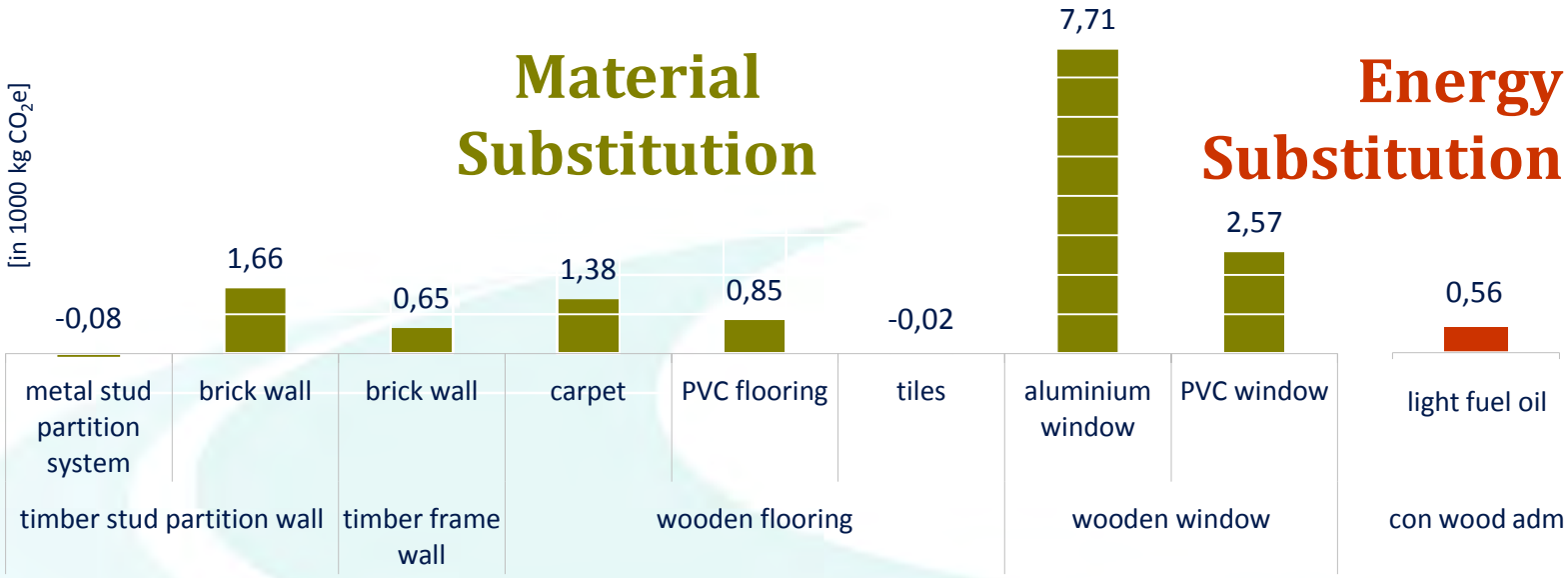


Fig 5-1: Material and energy substitution potential of 1m³ timber as compared to their substitutes (GWP 100)*
(Rüter, 2010 and Albrecht et al., 2008)

* calculated and reviewed acc. to ISO 14040 ff (life cycle assessment)

→ ***Substitution factor** (Meta analysis of SATHRE und O'CONNOR, 2010) derived from 66 single studies: tC/tC (Emission reduction /carbon in wood): ø material = 2,1 und example for energy = 1,7*

- Life Cycle Assessment
- Sustainability assessment of buildings
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- Resume

Construction & use of buildings in Europe is responsible for:

- **Energy consumption and greenhouse gas emissions** **40%**
- **Consumption of raw materials and waste arisings** **30%**
- **Consumption of water** **20%**
- **Land use** **10%**

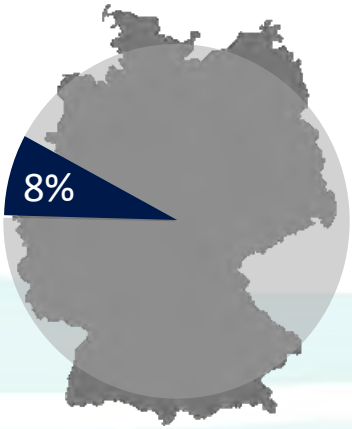
Source: UNEP and OECD (2007)

→ ***Sustainability assessment schemes are currently being developed (ISO/TC 59 and CEN/TC 350)***

GHG-emissions from buildings in Germany:

Construction (incl. manufacturing of building products): **66 M t CO_2e**

∑ = 88 M t CO_2e



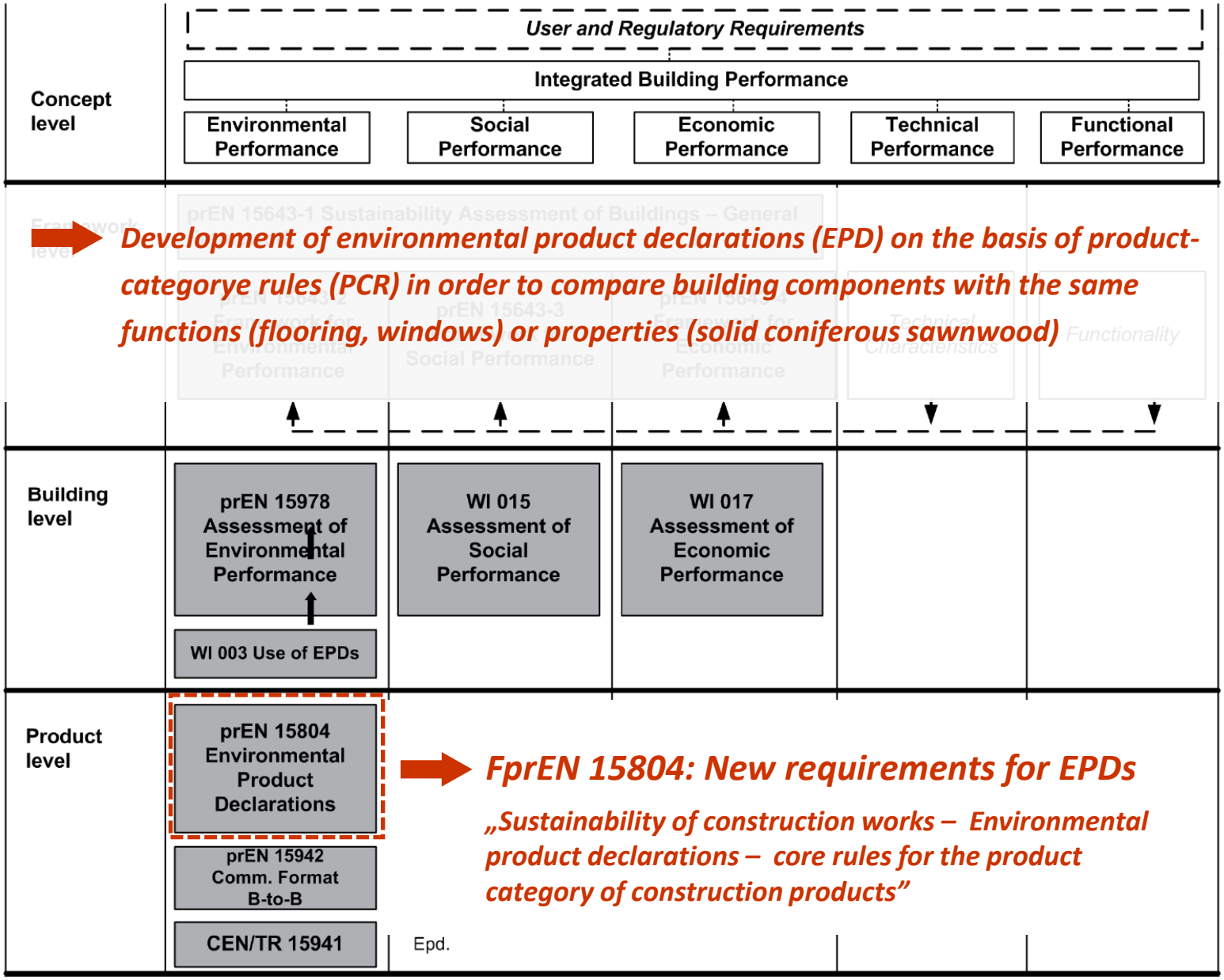
Production and end of life treatment of building products contribute to the total GHG emissions with 8%

Use of building (80y): **342 M t CO_2e**

End of life: **22 M t CO_2e**

derived by energy consumption (PE n.ren.) (UNEP 2007, McKinsey 2007)

CEN/TC 350: Sustainable construction works



Development of environmental product declarations (EPD) on the basis of product-categorye rules (PCR) in order to compare building components with the same functions (flooring, windows) or properties (solid coniferous sawnwood)

FprEN 15804: New requirements for EPDs

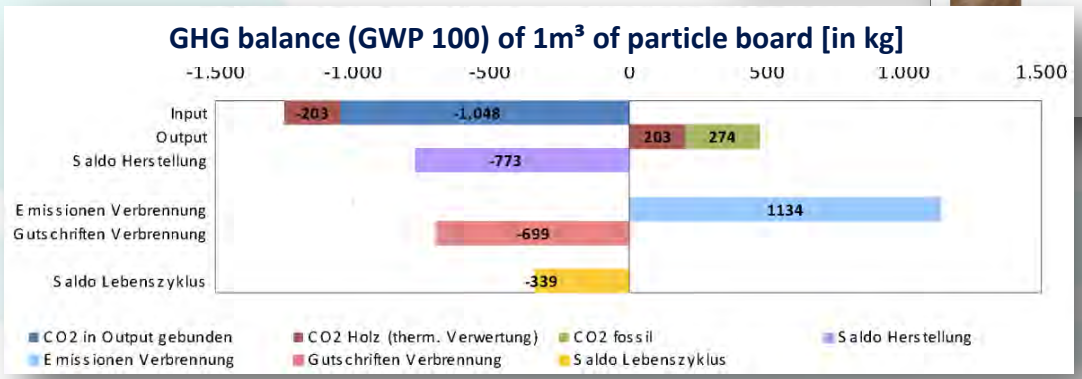
„Sustainability of construction works – Environmental product declarations – core rules for the product category of construction products"

Communication of information on product life cycle

- Standardized method – ecological criteria based on LCA (ISO 14040 and 14044)
- Data is collected on product level and provided by means of Environmental Product Declarations (EPD, i.e. environmental label type III acc. to ISO 14025)
- Building and product life cycle information

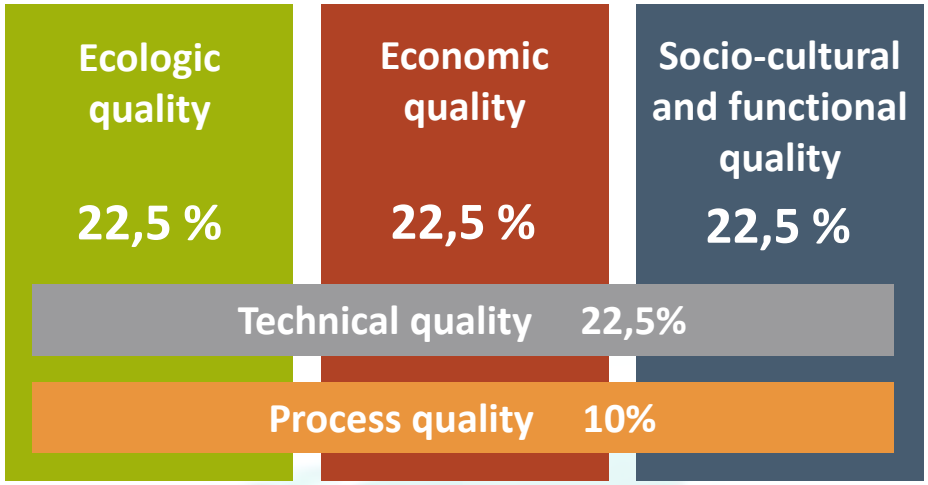
Content of Environmental Product Declaration (EPD)

- Characterization of product
- Used raw material and additives
- Description of production process
- Details on use phase and scenarios
- End-of-life options
- Verification and compliance with standards (e.g. formaldehyde or protection against fire)
- Results of life cycle assessment with documentation of underlying assumptions, constraints and used database



➡ *GHG-balance including stored biogenic carbon*

Scheme for assessing sustainability of federal buildings in Germany by means of selected criteria (BNB)



- About 40 criteria with relevant indicators in line with intended standards (CEN/TC 350)
- Set up of rules for certification including a label for sustainable buildings
- Generic life cycle assessment datasets of building products in public databases

→ www.nachhaltigesbauen.de *(Federal Ministry of Traffic, Buildings and Urban Development)*

→ *Initiative of housing sector and industries* www.dgnb.de

DGNB®
Deutsche Gesellschaft für Nachhaltiges Bauen e.V.
German Sustainable Building Council

Example: rating scale for greenhouse gas potential (GWP 100)

Hauptkriteriengruppe	Ökologische Qualität
Kriteriengruppe	Wirkungen auf die globale und lokale Umwelt
Kriterium	Treibhauspotenzial (GWP)

Bewertungs-maßstab

GHG-emissions per m² floor space

	Anforderungsniveau	
Zielwert Z	100	39,90 [kg CO2- Äqu./ m² NGFa * a]
	90	43,32 [kg CO2- Äqu./ m² NGFa * a]
	80	46,74 [kg CO2- Äqu./ m² NGFa * a]
	70	50,16 [kg CO2- Äqu./ m² NGFa * a]
	60	53,58 [kg CO2- Äqu./ m² NGFa * a]
Referenzwert R	50	57,00 [kg CO2- Äqu./ m² NGFa * a]
	40	62,70 [kg CO2- Äqu./ m² NGFa * a]
	30	68,40 [kg CO2- Äqu./ m² NGFa * a]
	20	74,10 [kg CO2- Äqu./ m² NGFa * a]
Grenzwert G	10	>= 79,80 [kg CO2- Äqu./ m² NGFa * a]
	0	Das Treibhauspotenzial für den Lebenszyklus wurde nicht nachgewiesen.
INTERPOLATION		Zwischenwerte sind abschnittsweise linear zu interpolieren.

- **GWP 100 as one of 9 criteria describing the environmental quality of buildings**

Weightage of criteria (e.g. GWP 100) within the overall assessment scheme reflects (or rather should reflect) its relevance for society or stakeholders participating in the process

New standard EN 15804:2012

- New requirement as result of standardization process sustainable construction works: differentiation between life cycle stages
- "This standard (EN 15804) provides the means for developing a Type III environmental declaration of construction products and is part of a suite of standards that are intended to assess the sustainability of construction works."
- Detailed and comprehensive results (Indicators describing environmental impact, resource use, waste categories, and output flows

→ *Potential benefits are to be kept separate (transparency)*

→ *„cradle to gate", „cradle to gate" with options or „total life cycle"*

→ *Coverage of modules A1 – A3 („cradle to gate") are mandatory*

Standard EN 15804:2011

Produktion			Bau		Nutzung							Entsorgung				Potential
Rohstoffversorgung	Transport	Herstellung	Transport zur Baustelle	Einbau ins Gebäude	Nutzung / Anwendung	Instandhaltung	Reparatur	Ersatz[1)]	Erneuerung[1)]	Energieeinsatz für das Betreiben des Gebäudes	Wassereinsatz für das Betreiben des Gebäudes	Rückbau / Abriss	Transport	Abfallbehandlung	Deponierung	Wiederverwendungs-, Rückgewinnungs- oder Recyclingpotenzial
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D

LCA

[IBU2011]

Coverage of modules A1 – A3 („cradle to gate“) are mandatory

Standard EN 15804:2011

Produktion			Bau		Nutzung							Entsorgung				Potential
Rohstoffversorgung	Transport	Herstellung	Transport zur Baustelle	Einbau ins Gebäude	Nutzung / Anwendung	Instandhaltung	Reparatur	Ersatz[1)]	Erneuerung[1)]	Energieeinsatz für das Betreiben des Gebäudes	Wassereinsatz für das Betreiben des Gebäudes	Rückbau / Abriss	Transport	Abfallbehandlung	Deponierung	Wiederverwendungs-, Rückgewinnungs- oder Recyclingpotenzial
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D

LCA | Keine Betrachtung auf Produktebene

[IBU2011]

➡ *No consideration on the production level (Modules A4 to B7) necessary*

Standard EN 15804:2011

Produktion			Bau		Nutzung							Entsorgung				Potential
Rohstoffversorgung	Transport	Herstellung	Transport zur Baustelle	Einbau ins Gebäude	Nutzung / Anwendung	Instandhaltung	Reparatur	Ersatz[1)]	Erneuerung[1)]	Energieeinsatz für das Betreiben des Gebäudes	Wassereinsatz für das Betreiben des Gebäudes	Rückbau / Abriss	Transport	Abfallbehandlung	Deponierung	Wiederverwendungs-, Rückgewinnungs- oder Recyclingpotenzial
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D

Produktökobilanz	Keine Betrachtung auf Produktebene	Ökobilanz Szenario

[IBU2011]

➡ *<u>Scenarios</u> on the basis of up-to-date technology (Modules C1 to C4) are necessary („cradle to gate with options“)*

Standard EN 15804:2011

Systemgrenze

Produktion			Bau		Nutzung							Entsorgung				Potential
Rohstoffversorgung	Transport	Herstellung	Transport zur Baustelle	Einbau ins Gebäude	Nutzung / Anwendung	Instandhaltung	Reparatur	Ersatz[1)]	Erneuerung[1)]	Energieeinsatz für das Betreiben des Gebäudes	Wassereinsatz für das Betreiben des Gebäudes	Rückbau / Abriss	Transport	Abfallbehandlung	Deponierung	Wiederverwendungs-, Rückgewinnungs- oder Recyclingpotenzial
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
LCA			Keine Betrachtung auf Produktebene									Ökobilanz Szenario				Informativ

[IBU2011]

Substitution potentials are informative only (Module D) in order to increase transparency

- Life Cycle Assessment
- Sustainability assessment of buildings
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Life Cycle Assessment Datasets for Wooden Building Products

- **Duration:** 09/2009 – 08/2011 (extended to 04/2012)
- **Financing:** Agency for Renewable Resources
- **Co-operation:**

Supported by all German wood industry associations

- **Objective:** Establishment of LCA database for all relevant wooden building products in Germany

  Provision of averaged LCA datasets in databases (EcoInvent), project reports and websites (BBSR, Thünen-Institut)

  Support for the sector with LCA data in the context of sustainable building (Environmental Product Declarations)

Implementation together with industries

- Final knowledge about normative requirements only since the beginning of 2012 (EN 15804)
- Diversity of products and enterprises as challenge for LCA
  - Solid wood: Kiln-dried) coniferous sawnwood, non-coniferous sawnwood, planed sawnwood, solid structural timber (©KVH), Glulam and cross laminated timber
  - Wood-based panels: Rough and surface-covered particle board, tubular chipboard, medium and high density fibreboard, OSB und plywood, solid wood boards and parquet
- Over 500 enterprises are organized in participating associations
- Implementation by means of questionnaires (overview und details)

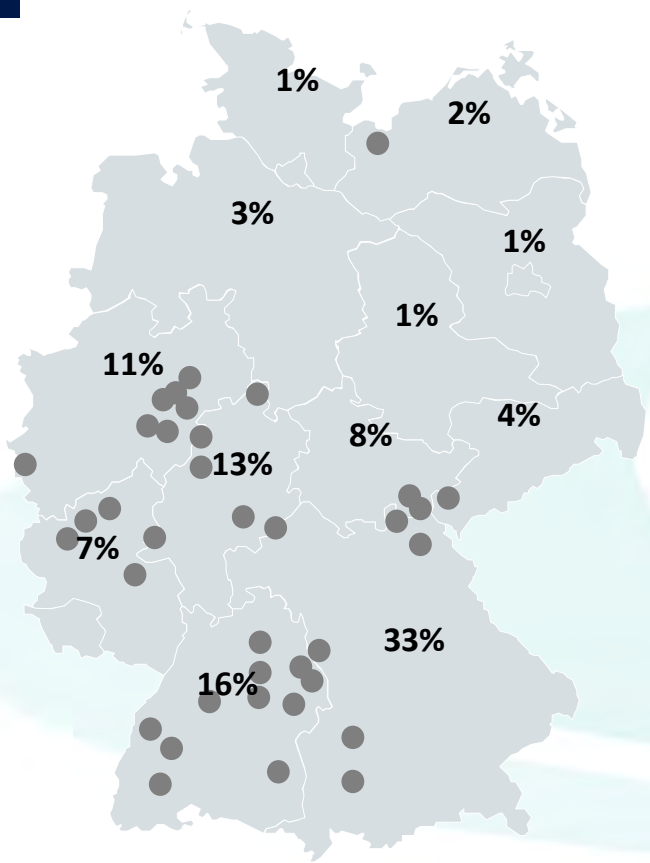
➡ *111 mills and factories were analyzed, thereof 71 with complete LCI*

➡ *Sawnwood: ~9,5 Mio. m³ / Panels: ~5 Mio. m³ / flooring ~10 Mio. m²*

Results for kiln-dried coniferous sawnwood

Raw material supply and transport

38 mills under examination (3,412,790 m³)



Acquisition of feedstock (inquiry) [m³]	
Roundwood, incl. bark	6.646.991
Roundwood, no bark	88.398
fresh sawnwood	80.034

Export markets

Country	Share
Germany	83,51%
Austria	4,20%
Sweden	3,02%
France	1,78%
Baltic countries	1,50%
Tchech Republic	1,42%
Norway	1,22%
Benelux	1,13%
Russia	0,98%
others	1,24%

Average transporting distance 111 km

Indicators of EN 15804:2012

Indicators describing environmental impact

Global warming potential (GWP); Depletion potential of the stratospheric ozone layer (ODP); Acidification potential (AP), Eutrophication potential (EP); Formation potential of tropospheric ozone (POPC); Abiotic depletion potential for non-fossile ressources (ADP-elements); Abiotic depletion potential for fossile ressources (ADP-fossile fuels)

Indicators describing ressource use

Use of renewable primary energy excluding renewable primary energy resources used as raw materials (PERE); Use of renewable primary energy resources used as raw materials (PERM); Total use of renewable primary energy resources (PERT); Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials (PENRE); Use of non renewable primary energy resources used as raw materials (PENRM); Total use of non renewable primary energy resources (PENRT); Use of secondary material (SM); Use of renewable secondary fuels (RSF); Use of non renewable secondary fuels (NRSF); Use of net fresh water (FW)

Indicators describing waste categories

Hazardous waste disposed (HWD); Non hazardous waste disposed (NHWD); Radioactive waste disposed (RWD)

Indicators describing output flows

Components for re-use (CRU); Materials for recycling (MFR); Materials for energy recovery (MER); Exported energy (EE + Medium)

Results acc. to modules (EN 15804:2011)

Parameter	Einheit	Bereitstellung der Rohstoffe (A1)	Transport (A2)	Herstellungs-prozess (A3)	Summe cradle to gate (A1 - A3)	maximale Abweichung +%/-%	Transport zum Entsorger (C2)	Abfallwirtschaft (C3)	energetische Verwertung (D)	stoffliche Verwertung (D)	Verrechnung von A1 nach ILCD
Ergebnisse Umweltauswirkung											
GWP	[kg CO2-Äqv.]	-7,78E+02	5,34E+00	3,76E+01	**-7,35E+02**	+82/-35	4,34E-01	7,97E+02	-3,60E+0[illegible]	-1,23E+01	-5,44E+00
ODP	[kg CFC11-Äqv.]	4,93E-07	2,17E-08	6,45E-06	**6,96E-06**	+141/-86	8,67E-10	1,19E-06	-8,22E-0[illegible]	-1,03E-06	-4,95E-07
AP	[kg SO2-Äqv.]	8,21E-02	2,37E-02	2,69E-01	**3,75E-01**	+279/-47	1,86E-03	6,98E-03	-3,71E-0[illegible]	-5,15E-02	-2,22E-02
EP	[kg PO43--Äqv.]	1,83[illegible]	[illegible]	[illegible]-02	**7,86E-02**	+297/-50	4,32E-04	5,89E-04	-3,73E-0[illegible]	-1,05E-02	-4,[illegible]E-03
POCP	[kg Ethen-Äqv.]	1,13E-02	[illegible]	8,28E-02	**9,65E-02**	+136/-23	2,02E-04	4,64E-04	-2,50E-0[illegible]	-6,44E-03	-2,[illegible]E-03
ADPE	[kg Sb-Äqv.]	8,01E-06	1,77E-07	1,12E-03	**1,13E-03**	+143/-97	9,16E-09	1,23E-07	-2,81E-0[illegible]	-2,23E-05	-2,37E-05
ADPF	[MJ]	1,92E+02	7,42E+01	4,05E+02	**6,71E+02**	+7[illegible]35	6,12E+00	4,62E+01	-4,06E+0[illegible]	-1,77E+02	-9,[illegible]E+01
Ergebnisse Ressourceneinsatz											
PERE	[MJ]	3,10E+00	1,30E-01	1,75E+03	**1,76E+03**		8,11E-03	4,70E+00	-3,30E+0[illegible]	-8,34E+03	-6,[illegible]E-01
PERM	[MJ]	8,34E+03	0,00E+00	3,36E+01	**8,3[illegible]+03**		0,00E+00	0,00E+00	0,00E+0[illegible]	[illegible]00E+00	-1,[illegible]E+03
PERT	[MJ]	8,34E+03	1,30E-01	1,79E+03	**1,01E+04**		8,11E-03	4,70E+00	-3,30E+0[illegible]	-8,34E+03	-1,[illegible]E+03
PENRE	[MJ]	2,09E+0[illegible]	[illegible]	[illegible]4E+02	**9,08E+02**		6,16E+00	8,78E+01	-7,01E+0[illegible]	-3,36E+02	-4,[illegible]E+01
PENRM	[MJ]	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**		0,00E+00	0,00E+00	0,00E+0[illegible]	0,00E+00	0,[illegible]+00
PENRT	[MJ]	2,09E+02	7,50E+01	6,24E+02	**9,08E+02**		6,16E+00	8,78E+01	-7,01E+0[illegible]	-3,36E+02	-4,[illegible]E+01
SM	[kg]	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**		0,00E+00	0,00E+00	0,00E+0[illegible]	2,18E+02	0,[illegible]+00
RSF	[MJ]	0,00E+00	0,00E+00	1,51E+02	**1,51E+02**		0,00E+00	0,00E+00	4,20E+0[illegible]	0,00E+00	0,[illegible]+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**		0,00E+00	0,00E+00	0,00E+0[illegible]	0,00E+00	0,00E+00
FW	[m³]	5,17E+02	1,87E+00	4,01E+02	**9,20E+02**		1,15E-01	4,99E+01	3,36E+0[illegible]	-2,24E+02	-9,46E+01
Ergebnisse Outputflüsse und Abfallkategorien											
HWD	[kg]	5,18E-04	0,00E+00	2,57E-02	**2,62E-02**		0,00E+00	0,00E+00	1,48E+0[illegible]	1,44E-02	1,43E-02
NHWD	[kg]	3,[illegible]	[illegible]	[illegible]-02	**2,52E-02**		0,00E+00	0,00E+00	2,27E-02	2,26E-02	2,25E-02
RWD	[kg]	6,13E-03	2,71E-04	7,82E-02	**8,46E-02**		1,08E-05	1,49E-02	-1,03E+00	-8,08E-03	-1,33E-03
CRU	[kg]	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**		0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Production phase

Environmental impact

Energy- and resource use

Waste and extras

Sums

Min / Max

Disposal

Credits and debits for material and/or energy use

Szenarios according to ILCD

Results acc. to modules (EN 15804:2011)

Parameter	Einheit	Bereitstellung der Rohstoffe (A1)	Transport (A2)	Herstellungs-prozess (A3)	Summe cradle to gate (A1 - A3)	maximale Abweichung +%/-%	Transport zum Entsorger (C2)	Abfallwirtschaft (C3)	energetische Verwertung (D)	stoffliche Verwertung (D)	Verrechnung von A1 nach ILCD
Ergebnisse Umweltauswirkung											
GWP	[kg CO2-Äqv.]	-7,78E+02	5,34E+00	3,76E+01	**-7,35E+02**	+82/-35	4,34E-01	7,97E+02	-3,60E+02	-1,23E+01	-5,44E+00
ODP	[kg CFC11-Äqv.]	4,93E-07	2,17E-08	6,45E-06	**6,96E-06**	+141/-86	8,67E-10	1,19E-06	-8,22E-05	-1,03E-06	-4,95E-07
AP	[kg SO2-Äqv.]	8,21E-02	2,37E-02	2,69E-01	**3,75E-01**	+279/-47	1,86E-03	6,98E-03	-3,71E-01	-5,15E-02	-2,22E-02
EP	[kg PO43--Äqv.]	1,83E-02	5,42E-03	5,49E-02	**7,86E-02**	+297/-50	4,32E-04	5,89E-04	-3,73E-03	-1,05E-02	-4,30E-03
POCP	[kg Ethen-Äqv.]	1,13E-02	2,37E-03	8,28E-02	**9,65E-02**	+136/-23	2,02E-04	4,64E-04	-2,50E-02	-6,44E-03	-2,92E-03
ADPE	[kg Sb-Äqv.]	8,01E-06	1,77E-07	1,12E-03	**1,13E-03**	+143/-97	9,16E-09	1,23E-07	-2,81E-05	-2,23E-05	-2,37E-05
ADPF	[MJ]	1,92E+02	7,42E+01	4,05E+02	**6,71E+02**	+78/-35	6,12E+00	4,62E+01	-4,06E+03	-1,77E+02	-9,02E+01
Ergebnisse Ressourceneinsatz											
PERE	[MJ]	3,10E+00	1,30E-01	1,75E+03	**1,76E+03**		8,11E-03	4,70E+00	-3,30E+02	-8,34E+03	-6,74E-01
PERM	[MJ]	8,34E+03	0,00E+00	3,36E+01	**8,37E+03**		0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,81E+03
PERT	[MJ]	8,34E+03	1,30E-01	1,79E+03	**1,01E+04**		8,11E-03	4,70E+00	-3,30E+02	-8,34E+03	-1,81E+03
PENRE	[MJ]	2,09E+02	7,50E+01	6,24E+02	**9,08E+02**		6,16E+00	8,78E+01	-7,01E+03	-3,36E+02	-4,55E+01
PENRM	[MJ]	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**		0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	2,09E+02	7,50E+01	6,24E+02	**9,08E+02**		6,16E+00	8,78E+01	-7,01E+03	-3,36E+02	-4,55E+01
SM	[kg]	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**		0,00E+00	0,00E+00	0,00E+00	2,18E+02	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	1,51E+02	**1,51E+02**		0,00E+00	0,00E+00	4,20E+03	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**		0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m³]	5,17E+02	1,87E+00	4,01E+02	**9,20E+02**		1,15E-01	4,99E+01	3,36E+03	-2,24E+02	-9,46E+01
Ergebnisse Outputflüsse und Abfallkategorien											
HWD	[kg]	5,18E-04	0,00E+00	2,57E-02	**2,62E-02**		0,00E+00	0,00E+00	1,48E+00	1,44E-02	1,43E-02
NHWD	[kg]	3,38E-04	0,00E+00	2,49E-02	**2,52E-02**		0,00E+00	0,00E+00	2,27E-02	2,26E-02	2,25E-02
RWD	[kg]	6,13E-03	2,71E-04	7,82E-02	**8,46E-02**		1,08E-05	1,49E-02	-1,03E+00	-8,08E-03	-1,33E-03
CRU	[kg]	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**		0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

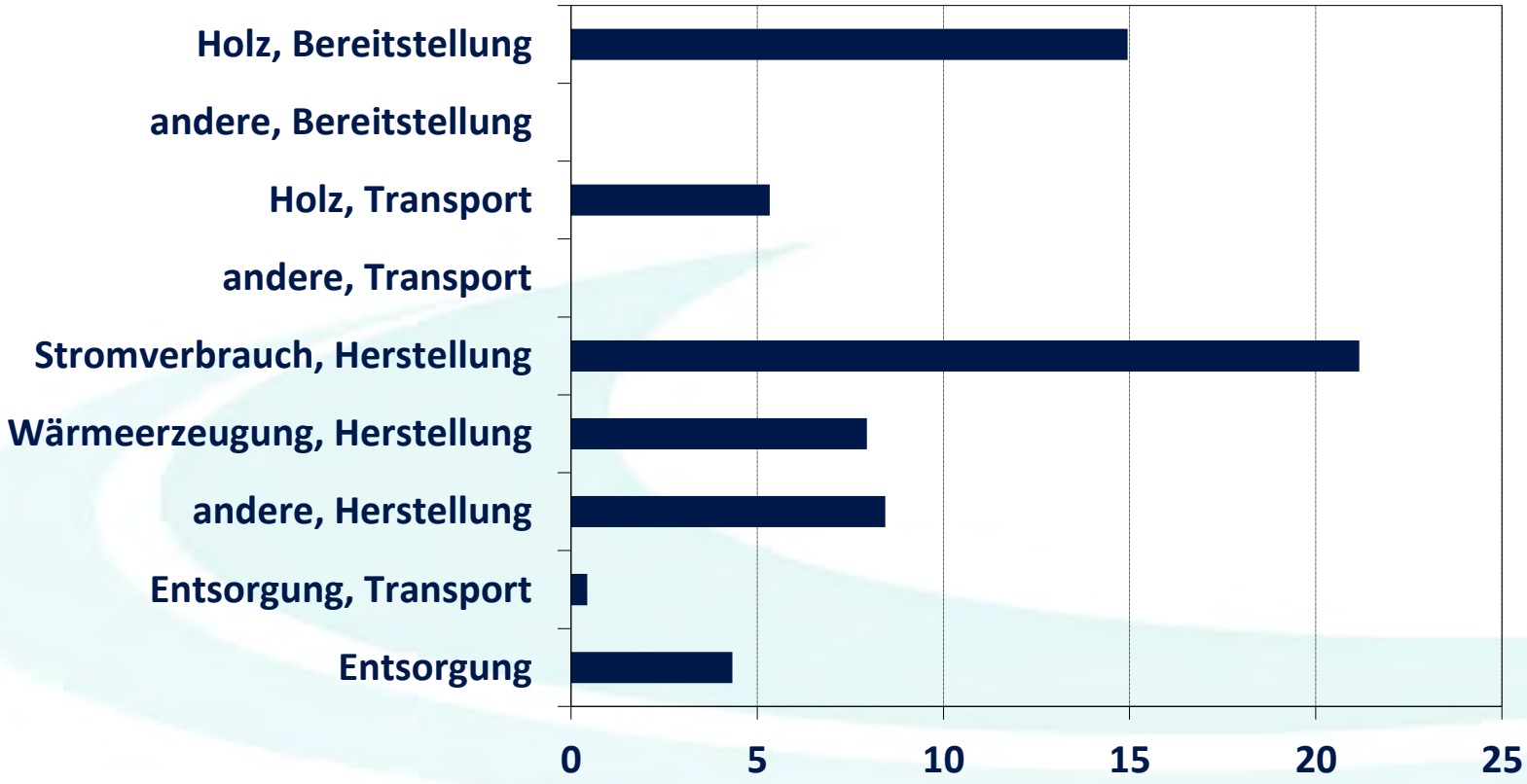
Results for kiln-dried coniferous sawnwood

- **Main drivers for the results of the three most relevant impact categories (after standardization) [kg/m³]**

No.	Indicator	∑ (A1 to A3)	Main drivers
1	**AP** *Acidification potential [SO_2-Äqv.]*	**0,375**	50,3% - Thermal heat produktion ; 21,1% - Roundwood prechains; 11,5% - Logistics ; 6,2% - Transport Roundwood; 5% - Power Drying ; 2,7% - Power Cutting
2	**POCP** *Ozonbildungspotential [Ethen-Äqv.]*	**0,096**	51,6% - Process Drying; 25,1% - Thermal heat produktion ; 11,3% - Roundwood prechains ; 5,8% - Logistics ; 2,4% - Transport Roundwood ; 1,3% - Power Drying
3	**GWP** *Global warming potential – fossil [CO_2-Äqv.]*	**57,835**	25,4% - Rundholzvorkette ; 20,7% - Strom Trocknung; 14,5% - Wärmeproduktion ; 11% - Strom Einschnitt; 9,3% - Transport Rundholz ; 8,4% - Werkslogistik

Results for kiln-dried coniferous sawnwood

- Treibhausgasemissionen aus fossilen Quellen nach Modulen A1 bis A3, C2 und C3 (energetisch) [kg CO_2-Äqv./m³ Produkt]



Environmental product declarations for industries as result

- **Preparation on the basis of project report**
  - Review acc. to ISO 14044 and conformity check for EN 15804:2012
  - Will be published in English by the end of 2012
- **EPDs for associations acc. to EN 15804 (19 units)**
  - (Kiln-dried) coniferous sawnwood
  - Non-coniferous sawnwood
  - Planed sawnwood
  - Solid structural timber (©KVH), Glulam and Cross laminated timber
  - Rough and surface-covered particle board
  - Tubular chipboard
  - Medium and high density fibreboard
  - OSB und plywood
  - Solidwood boards and parquet

Further use of the knowledge on environmental impact

- **Base for further projects**
  - Life cycle assessment of wooden buidlings
  - Life cycle assessment of furniture
- **Use in LCA databases**
  - EcoInvent, databases of the building ministry, DGNB

→ *Use in buidling assessment*

- **Use by the Thünen-Institute**
  - Monitoring, updates and maintenance of LCA database
  - Energy- und sector analyses
  - Data supply via the website
  - Reporting and accounting of HWP carbon pool

vTI
Johann Heinrich von Thünen-Institut

Bundesforschungsinstitut für Ländliche Räume, Wald und Fischerei
Institut für Holztechnologie und Holzbiologie (HTB)

Ökobilanz-Basisdaten für Bauprodukte aus Holz

Abschlussbericht

Projektträger: Fachagentur Nachwachsende Rohstoffe e.V. (FNR)
Förderkennzeichen: 22028808
Laufzeit des Vorhabens: 01.08.2009 – 31.10.2011
Gefördert durch: Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz (BMELV)

Projektleitung: Dipl.-Ing. Silv. Univ. Sebastian Rüter
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Projektbearbeitung: Dipl.-Ing. (FH) Stefan Diederichs

In Kooperation mit: Deutscher Holzwirtschaftsrat e.V. (DHWR)
Bundesverband Säge- und Holzindustrie Deutschland (BSHD)
Studiengemeinschaft Holzleimbau e.V. (BS-Holz)
Überwachungsgemeinschaft Konstruktionsvollholz e.V.
Verband der Deutschen Holzwerkstoffindustrie e.V. (VHI)
Verband der Deutschen Parkettindustrie e.V. (vdp)
Verband der Deutschen Säge- und Holzindustrie e.V. (vds)

Critical Review: Dr. Frank Werner
Umwelt & Entwicklung, Idaplatz 3, 8003 Zürich, Schweiz

Hamburg, Februar 2012

Energy management acc. to ISO 50001 (EnMS)

- **Objectiv of EnMS: Tapping the full potential of energy efficiency within industries by means of regular assessment of energy flows and its mitigation potential in the particular production processes** → ***Data being assessed in LCA***

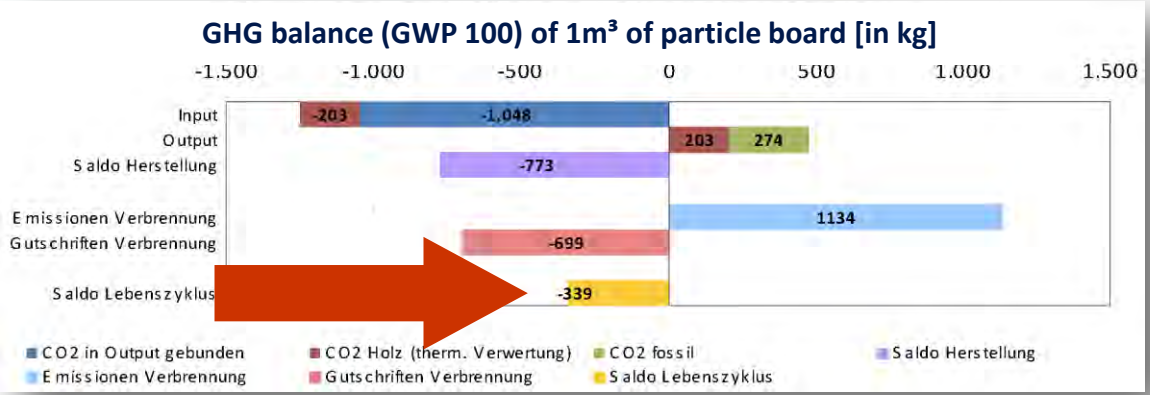
- **Energy management systems contain of (Energy policy and regular checks):**
  - **Introduction of energy policy with commitment to operational and strategic energy targets**
  - **Obligation to continuously improve energy efficiency**
  - **Assure availability of all relevant pieces of information and resources that are needed to meet the objectives**
  - **Assessment and review of current and previous energy consumption**
  - **Identification of areas with extensive energy demand, improvement opportunities in relation to energy efficiency and conservation (list)**

- **Renewable energy sources act (EEG 2012) (contribution to energy policies in DE)**

- Life Cycle Assessment
- Sustainability assessment of buildings
- Project on Life Cycle Data for wooden building products
- Wood products carbon balance
- Resume

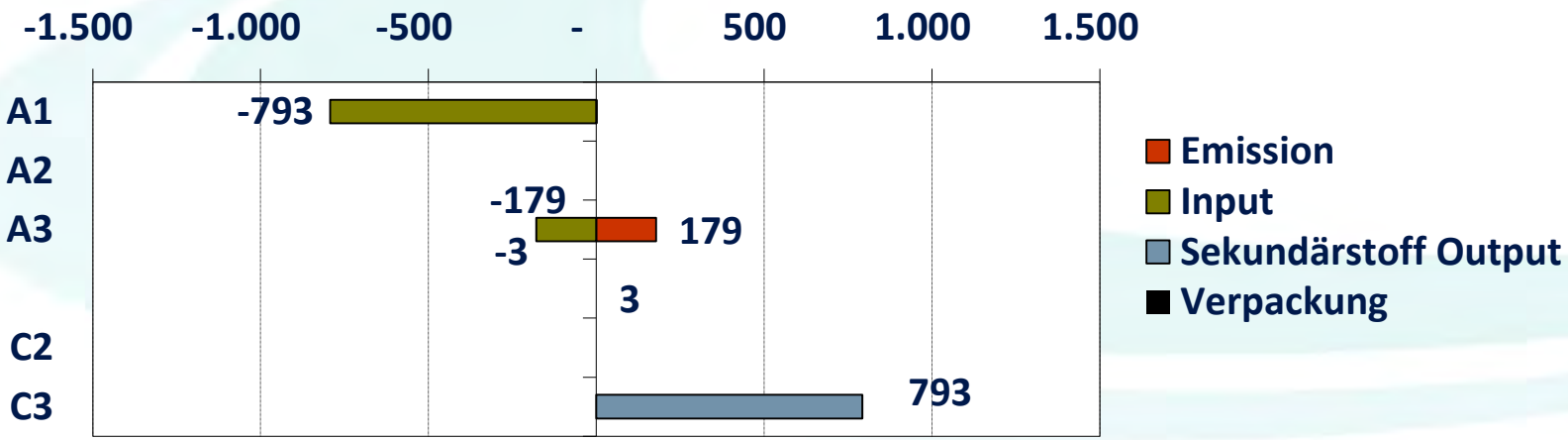
➡ *"Old" GWP balances sometimes were negative (here: particle board)*

➡ *unreliable*



Results for kiln-dried coniferous sawnwood

■ **Bilanz der Kohlenstoffflüsse in der Holzbiomasse [kg CO_2]**



Standard currently being developed on carbon storage

- **Objective is to clarify how to treat biogenic carbon in EN 15804**

DIN

NA 042-01-14 AA N 1066

NA 042 Normenausschuss Holzwirtschaft und Möbel (NHM)
NA 042-01-14 AA Arbeitsausschuss Rund- u. Schnittholz - SpA zu CEN/TC 175 & ISO/TC 218
E-Mail des Bearbeiters im DIN: florian.zeller@din.de

E DIN EN 16485 "Rund- und Schnittholz - Produkt-Kategorie-Regeln für Holz und Holz-Werkstoffe zur Umwelt-Produkt-Deklaration"

Datum des Dokumentes	2012-10-25
Aktion Antworttermin	Stellungnahme 2012-12-29

Sehr geehrte Damen und Herren,

mit Ausgabe Oktober 2012 liegt der europäische Norm-Entwurf

E DIN EN 16485 "*Rund- und Schnittholz - Produkt-Kategorie-Regeln für Holz und Holz-Werkstoffe zur Umwelt-Produkt-Deklaration*" vor.

Wir erbitten Ihre Stellungnahme in der dafür vorgesehenen Tabelle (Formular abrufbar unter: www.din.de/stellungnahme) an den Normenausschuss Holzwirtschaft und Möbel (NHM) im DIN, 10772 Berlin (nhm@din.de) bis zum

2012-12-29

Im Falle der Annahme als Europäische Norm durch die Mitgliedsländer des CEN ist diese unverändert in das Deutsche Normenwerk zu übernehmen. Vom CEN sind wir aufgefordert, das Deutsche Votum abzugeben.

Im Schriftstück N 1067 finden Sie die englische Referenzfassung. Wir bitten Sie hiermit, die Übersetzung zu prüfen.

Wir möchten Sie darüber hinaus darauf hinweisen, dass die deutsche Fassung dieses Norm-Entwurfes auch im **Norm-Entwurfs-Portal** des DIN verfügbar ist. Dieser Online-Service bietet auch Experten, die nicht Mitarbeiter des Arbeitsausschusses sind, die Möglichkeit, sofort **kostenfrei** Inhalte von aktuellen Norm-Entwürfen zu lesen und zu kommentieren.

Mit freundlichen Grüßen

Deutsches Institut für Normung e. V.
Normenausschuss Holzwirtschaft und Möbel (NHM)

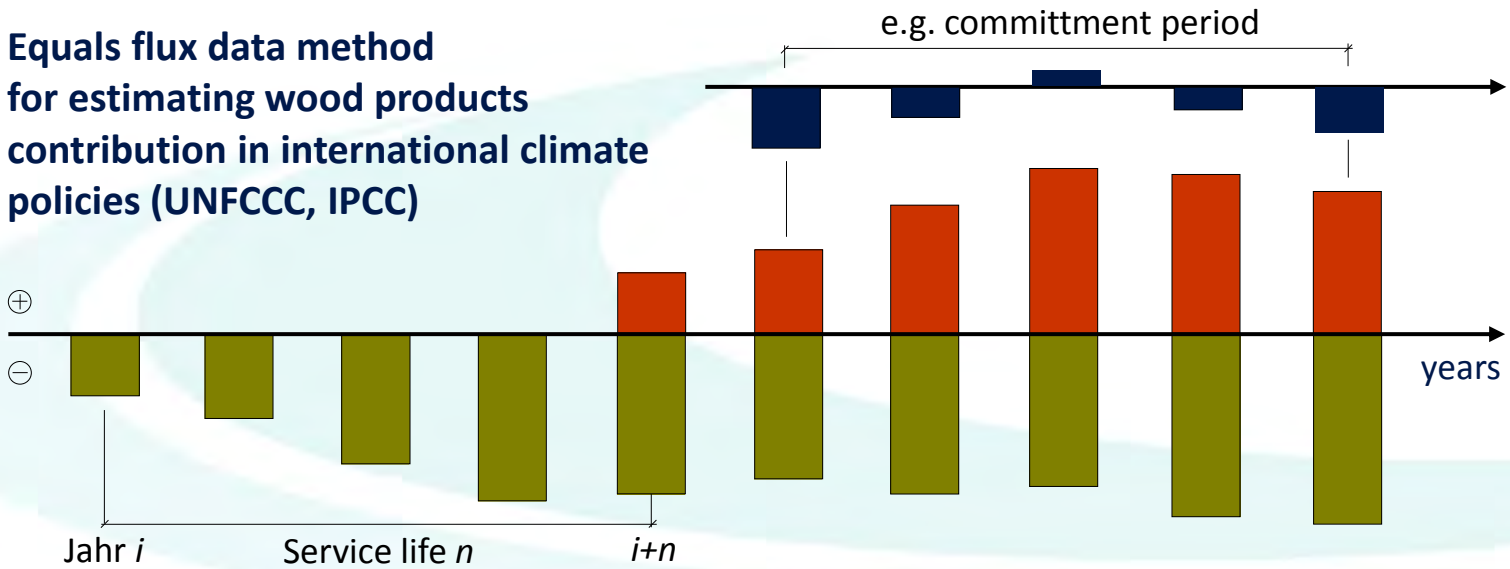
i. A. Florian Zeller
Projektmanager

Estimating delayed emissions (storage effect)

- **Wood products constitute a pool of carbon delaying emissions of biogenic carbon**

→ ***Zero sum game over the products' entire life cycle***

- **Equals flux data method for estimating wood products contribution in international climate policies (UNFCCC, IPCC)**



- **Annual pool change on national level for estimating net-emissions** (***here***: **Inflow – Outflow**)

Decision 2/CMP.7 on harvested wood products accounting

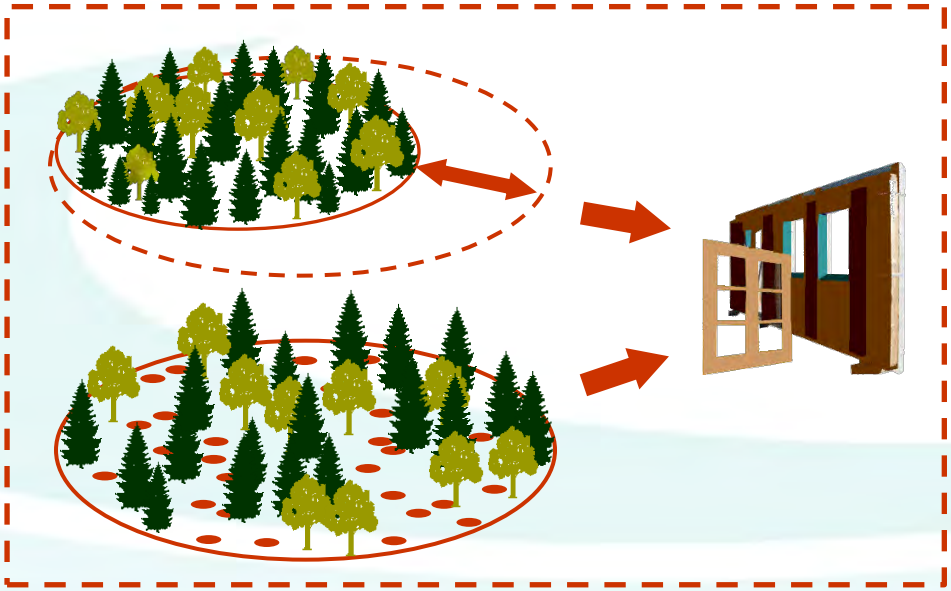
- ***Para 27:*** *Emissions from harvested wood products removed from forests which are accounted for by a Party under Article 3, paragraphs 3 and 4, shall be accounted for by that Party only. Imported harvested wood products, irrespective of their origin, shall not be accounted by the importing Party.*
- ***Para 30:*** *Harvested wood products resulting from deforestation shall be accounted for on the basis of instantaneous oxidation*

Article 3.3 (since 1990)

- afforestation
- reforestation
- ~~deforestation~~

Article 3.4

- forest management



wood products producing country

- Life Cycle Assessment
- Sustainability assessment of buildings
- Project on Life Cycle Data for wooden building products
- Wood products carbon balance
- Summary

Only timber from sustainable sources is „climate friendly“!

- Carbon balance of the whole forest wood chain if relevance
- Wood product accounting (national) only in conjuction with forest carbon balances
- Indicator sustainability of wood (building assessment schemes)

Life cycle assessment as basis for environmental assessment of buildings

- Core element of Environmental product declarations (EPD)
- Use of EPD is mandatory for federal buildings in Germany
- EPD possible for companies and/or associations
- Project results (semi-finished products) are going to be used in public and commercial LCA databases

Additional value of environmental information for companies

- EPD as certificate of a „sustainable use of natural resources“ according to the new construction products regulation
- LCA informationen can be used for energy management systems in companies
- Optimazation (efficient energy and material use)

Material usage of wood can positively contribute to climate change mitigation

- LCA shows advantages for wooden building products (but: substitution effect is relative)
- Accounting for wood products (UNFCCC) creates room for maneuver for national policies to incentivies those potential benefits

Johann Heinrich von Thünen-Institut
Bundesforschungsinstitut für Ländliche Räume, Wald und Fischerei

Thank you for your attention

More information

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