



HOLZ
FORSCHUNG
AUSTRIA

Current state of discussion between PEF and EPD as the preferable LCA scheme for wooden construction products

Dr. Franz Dolezal, DI Philipp Boogman

COST Action FP1407 2nd Conference – Innovative production technologies and increased wood products recycling and reuse
Brno, Czech Republic, 29-30 September 2016

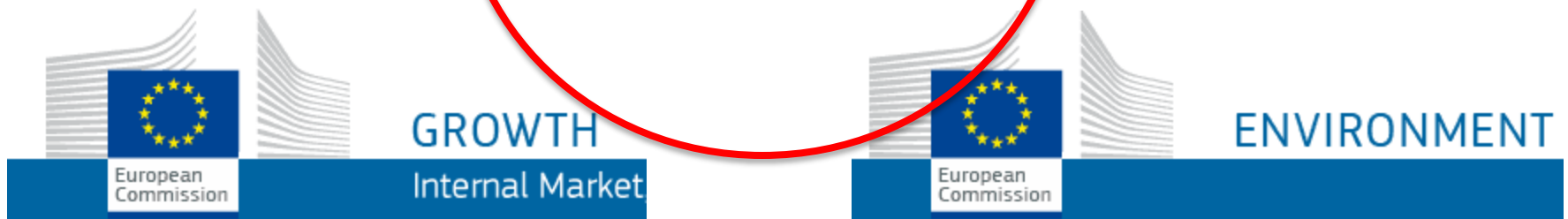


ModWoodLife

Recent developments



EPD
TC 350
buildings \neq PEF
EC
food



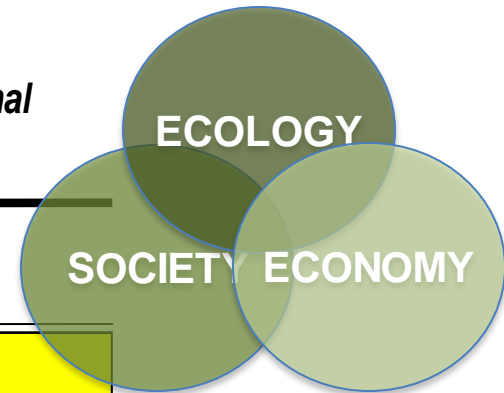
end of 2015

- 1) adoption
- 2) adaptation „immediately“
- 3) liquidation of TC 350 system

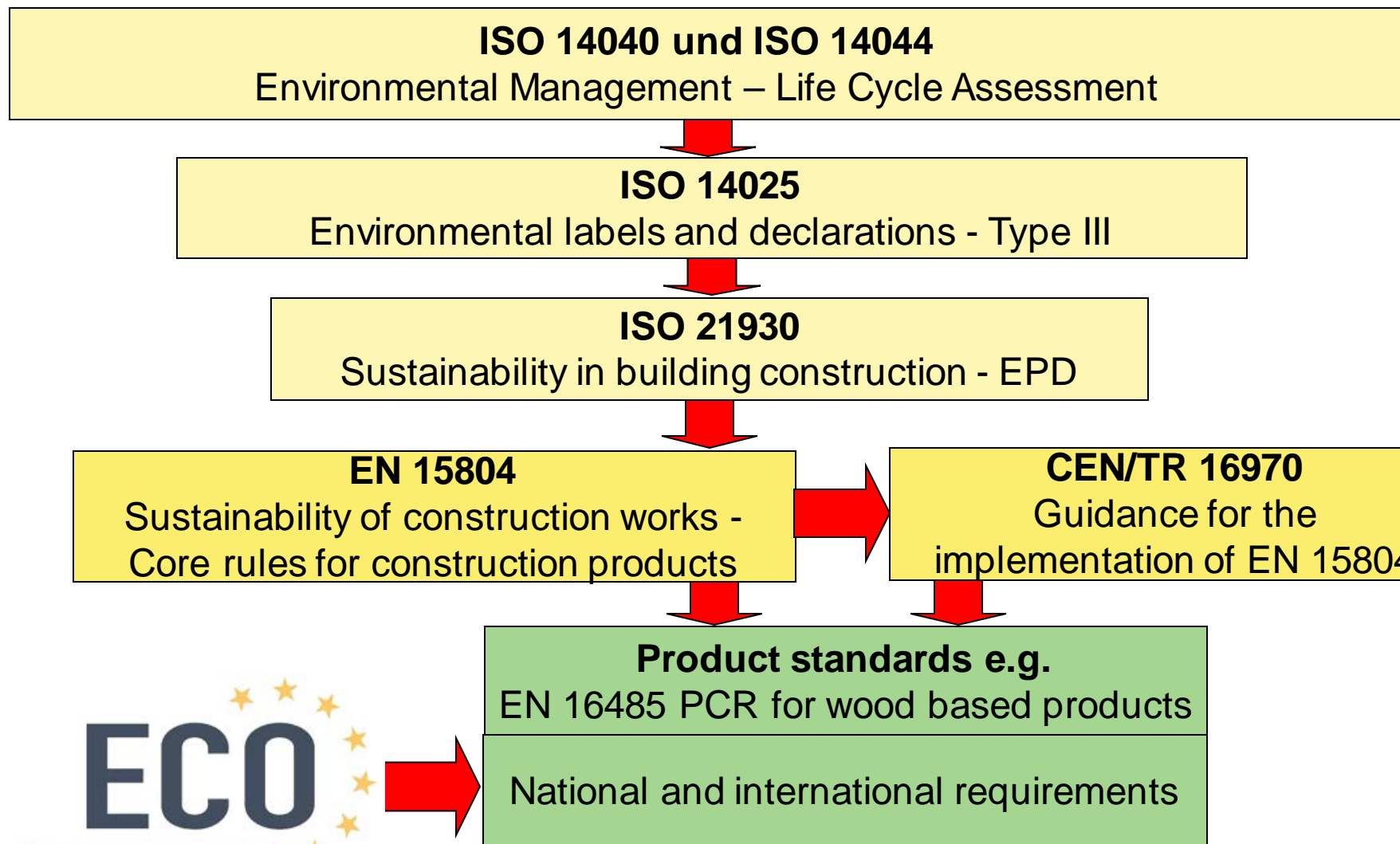
EPD-System



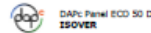
	Environmental	Social	Economic	Technical and Functional Performance
Framework for Assessment of Buildings	Environmental Performance	Health & Comfort Performance	Life Cycle Cost Performance	
Calculation methods for Building level	Assessment of Environmental Performance (local, regional & global)	Assessment of Health & Comfort Performance (Indoor Environment)	Assessment of Life Cycle Cost Performance	<div style="border: 1px dashed black; padding: 5px;">Assessment of Energy Performance of Buildings (CEN/TC89, TC156, TC169, TC228, TC247)</div> <div style="border: 1px dashed black; padding: 5px;">Service Life Estimation of Buildings (ISO/TC59/SC14)</div>
Rules for Product level	Environmental Product Declarations			<div style="border: 1px dashed black; padding: 5px;">Service Life Declarations (ISO/TC59/SC14)</div> <div style="border: 1px dashed black; padding: 5px;">Assessment of Release of Dangerous Substances (CEN/TC351)</div>



EPD-System



European Harmonization



BRE Certification Limited

Approved Environmentally

Characterised and Normalised
1 square metre of Installed
Ltd Nylon tufted carpet tile
Origin/oratorio, Barrier)

Quality of Data for Certified Material (Data for other constituent materials)
 Start Date: 1 January 2005
 End Date: 31 December 2005
 Source of Data: Company Records
 Geography: UK
 Representativeness: 1 site representing 100% of Burmatex Ltd Proteus, Mission, Origin/oratorio, Barrier)

LCA Methodology
 Allocation: BRE Environmental Profiles Methodology
 Date of Data Entry: 100% to product
 Boundary: 18 July 2006
 Comments: Cradle to Installation on Site

Issue **Characteristics**

Climate Change: 12
 Acid Deposition: 0.081
 Ozone Depletion: 0.001
 Pollution to Air: H: 0.001
 Pollution to Air: F: 0.001
 Pollution to Water: 0.001
 Pollution to Water: 0.001
 Pollution to Water: 0.001
 Fossil Fuel Depletion: 0.001
 Minerals Extracted: 0.001
 Water Extraction: 0.001
 Waste Disposal: 0.001
 Transport Pollution: 0.001

Primary Energy
BRE Ecopoints Score

Appendix No: :
 Issue No: :
 Signed on behalf of: BRE Certification
 This cert

DECLARACIÓN AMBIENTAL DE PRODUCTO
DAPc.001.001



PRODUCTO
ECO 50



EMPRESA
ISOVER

DESCRIPCIÓN DEL PRODUCTO
El producto es un panel de fibra de vidrio compacto de 135 mm de espesor, 135 mm de ancho

Mur en maçonnerie de blocs en béton.

Fiche descriptive | Unité fonctionnelle | Indicateurs environnementaux | Documents & Images

Unité fonctionnelle simplifiée
 1 m² de mur en blocs béton de 20 cm d'épaisseur incluant produits complémentaires et emballages (durée de vie typique de 100 ans)

Impact environnemental	Valeur total cycle de vie/UF par année	Valeur total cycle de vie/UF pour toute la DVT	Unité
Consommation de ressources énergétiques - énergie primaire totale	1,642	164,2	MJ
Consommation de ressources énergétiques - énergie renouvelable	0,16	16	MJ



ENVIRONMENTAL PROFILES

UNIT	AMOUNT
jr ⁻¹	6,0 x 10 ³
MJ	1,8 x 10 ⁴
jr ⁻¹	5,2 x 10 ²
kg	0,00002
kg	
-	

MEASURES

Produktion	End of Life
918	-915
980	-10
-15,9	16,8
03E-06	-2,13E-06
55E-01	-2,50E-02
71E-02	-4,07E-03
2E-02	-4,02E-03

Institut Bauen und Umwelt e.V.

PEF - Product Environmental Footprint



Building block of the Flagship initiative of the Europe 2020 Strategy –

“A Resource-Efficient Europe”

The Europe Commissions proposes the Product Environmental Footprint (PEF) and Organisation Environmental Footprint (OEF) methods as a **harmonised** way of **assessing** and displaying and **benchmarking** the **environmental performance of products**, services and companies based on a comprehensive assessment of environmental impacts over the **life-cycle** ('environmental footprint').

What is PEF ?



- Harmonised Life cycle assessment methodology (PEF-Method)
- PEF specific impact categories
- PEFCR Provide specific rules to calculate the environmental footprint for a certain product group
- including benchmarks for a defined product category with respect to their environmental impact and, if appropriate, performance grades
- A declaration compliant with a PEFCR can be used to make comparisons and comparative assertions.

Methodological differences between PEF and EN 15804



	PEF	EN 15804
aim	Comparisons between products following specific PEFCR	Comparisons between construction products only in the context of their application in the building



data quality	Strict requirements for PEF studies destined for external communication	Data shall be as current as possible (generic data updated within the last 10 years, specific data within 5 years) and base on 1 year average. The technological coverage shall reflect the physical reality.
specific data	Obligatory for all upstream and downstream processes if applicable	First choice: specific or average data derived from specific production process. Generic data may be used for up- and downstream processes (see CEN/TR 15941)
generic data	Only for upstream processes. If applicable, industry-specific generic data instead of generic multi-sector data; the data should meet the PEF quality requirements.	Generic data may be used for the processes the producer cannot influence. Documentation of technological, geographical and time related representativeness for generic data shall be provided in the project report.
cut-off rules	not allowed in general	1 % of renewable / non-renewable primary energy usage and 1 % of the total mass input of that unit process. The total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass.
dealing with data gaps	All data gaps need to be closed by using the best available generic or extrapolated data. The total shouldn't contribute to each impact category more than 10%.	Data gaps may be filled by conservative assumptions with average or generic data following the cut off rules
End-of-Life (EoL) allocation	Must be included: Until the product is brought back to nature as waste or where it enters another product life cycle. The currently proposed EoL allocation is based on the 50/50 approach. Other distribution keys and combined approaches are currently being tested.	The EoL system boundary is set, the same as in PEF, where the end of waste state is reached. Environmental benefits or loads resulting from reusable products, recyclable materials and/or useful energy carriers leaving a product system e.g. as secondary materials or fuels will be declared in an extra modul D.



impact categories	15	7
normalisation	in evaluation during pilot phase	no normalisation
weighting	in evaluation during pilot phase	no weighting
evaluation	Identification of hotspots, conclusions, recommendations, restrictions are mandatory	Generally, no identification of hotspots or recommendations necessary.

Impact categories PEF / EPD



PEF Impact category	Unit	EF Impact Assessment Model	Source	EN 15804 Impact Category	Unit	EN 15804 Impact Assessment Method	Source
Climate change	kg CO ₂ eq	Bern model	IPPC 2007	Global warming (GWP100)	kg CO ₂ eq	CML –IA version 3.9, baseline	Leiden 2010
Ozone depletion	kg CFC-11 eq	EDIP model	WMO, 1999	ozone depletion	kg CFC 11 eq	CML –IA version 3.9, baseline	Leiden 2010
Photochemical ozone formation	kg NMVOC eq	LOTOS-EUROS model	Van Zelm et al., 2008	photochemical ozone creation	kg Ethen eq	CML –IA version 3.9, baseline	Leiden 2010
Acidification	mol H ⁺ eq	Accumulated exceedance model	Seppälä et al.,2006; Posch et al., 2008	acidification of soil and water	kg SO ₂ eq	CML –IA version 3.9, baseline	Leiden 2010
Eutrophication - terrestrial	mol N eq	Accumulated Exceedance model	Seppälä et al.,2006; Posch et al., 2008	eutrophication	g (PO ₄) ₃₋ eq	CML –IA version 3.9, baseline	Leiden 2010
Eutrophication - aquatic	fresh water: kg P eq marine: kg N eq	EUTREND model	Struijs et al., 2009				
Resource depletion - water	m ³ water eq	Swiss Ecoscarcy model	Frischknecht et al., 2008	depletion of abiotic resources (elements)	kg Sb eq	CML –IA version 3.9, baseline	Leiden 2010
Resource depletion – mineral, fossil	kg Sb eq	CML2002 model	van Oers et al., 2002	depletion of abiotic resources (fossil)	MJ, unterer Heizwert	CML –IA version 3.9, baseline	Leiden 2010

additional PEF - Indicators



PEF Impact category	Unit	EF Impact Assessment Model	Source
Human toxicity - cancer effects	CTUh	USEtox model	Rosenbaum et al.,
Human toxicity - non-cancer effects	CTUh	USEtox model	Rosenbaum et al.,2008
Particulate matter	kg PM2.5 eq	RiskPoll model	Humbert, 2009
Ionizing radiation HH	Kbq U235 eq	Human Health effect model	Dreicer et al., 1995
Ecotoxicity - freshwater	CTUe	USEtox model	Rosenbaum et al., 2008
Land use	kg C deficit	Soil Organic Matter (SOM) model	Milà i Canals et al., 2007

CO₂ - Storage



The PEF guide (2013) indicates that credits associated with *temporary* (carbon) storage or delayed emissions shall not be considered in the calculation of the default EF impact categories and *may be included as additional environmental information*".

Guidance and requirements for biogenic carbon modelling in PEFC's Version 2.2 (De Schryver et al. 2016):

The impact category 'climate change' covers three sub-indicators:

- 1) Climate change – fossil
- 2) Climate change – biogenic
- 3) Climate change – land use and land transformation

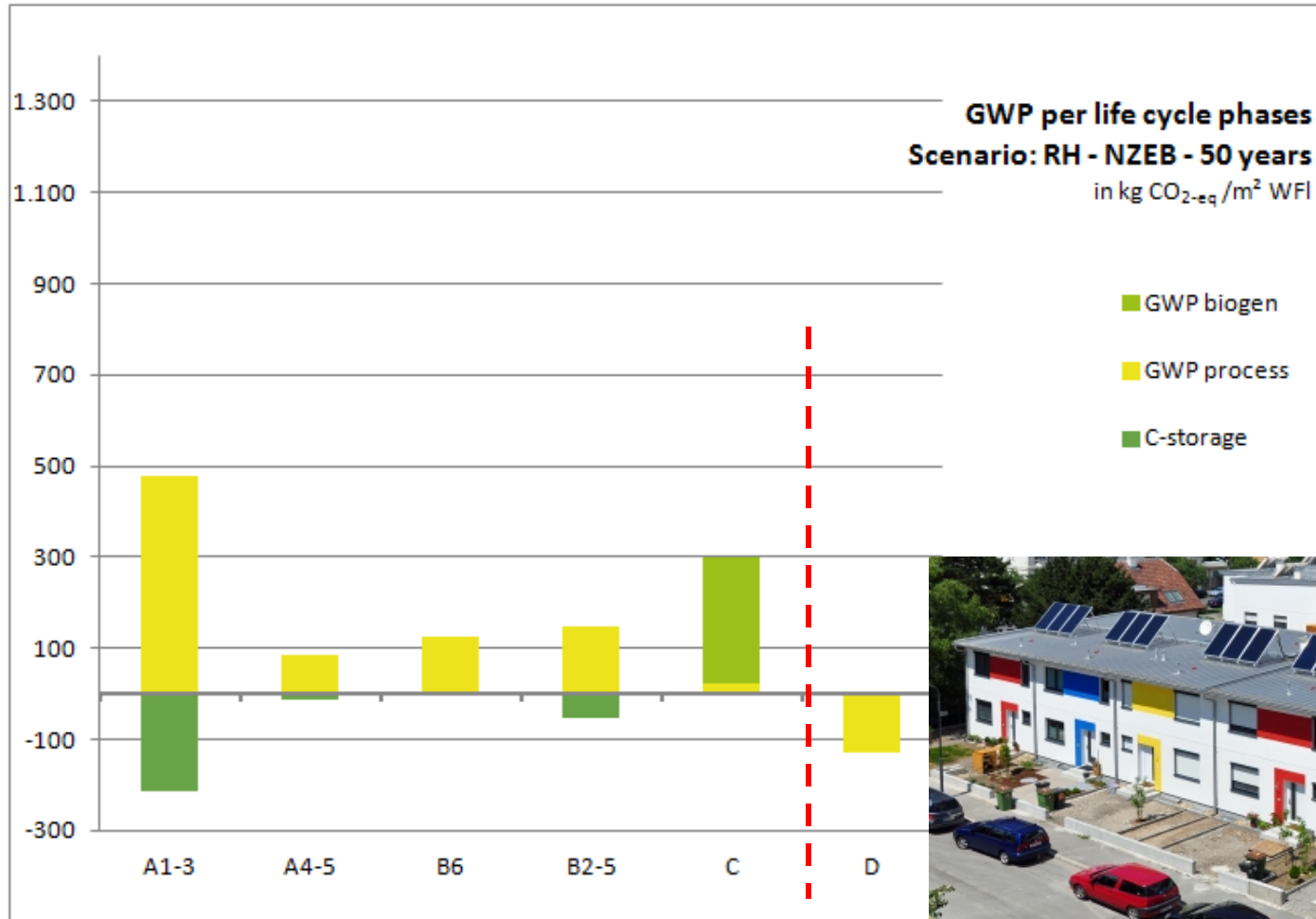
characterisation factors GWP 100	PEF [CO ₂ -eq.]
CO ₂	
CO ₂ (fossil)	1
CO ₂ (biogenic) uptake	-1
CO ₂ (biogenic) emissions	1

Table 1: CFs (in CO₂-equivalents, with carbon feedbacks) when modelling biogenic carbon uptakes and emissions as separate flows.

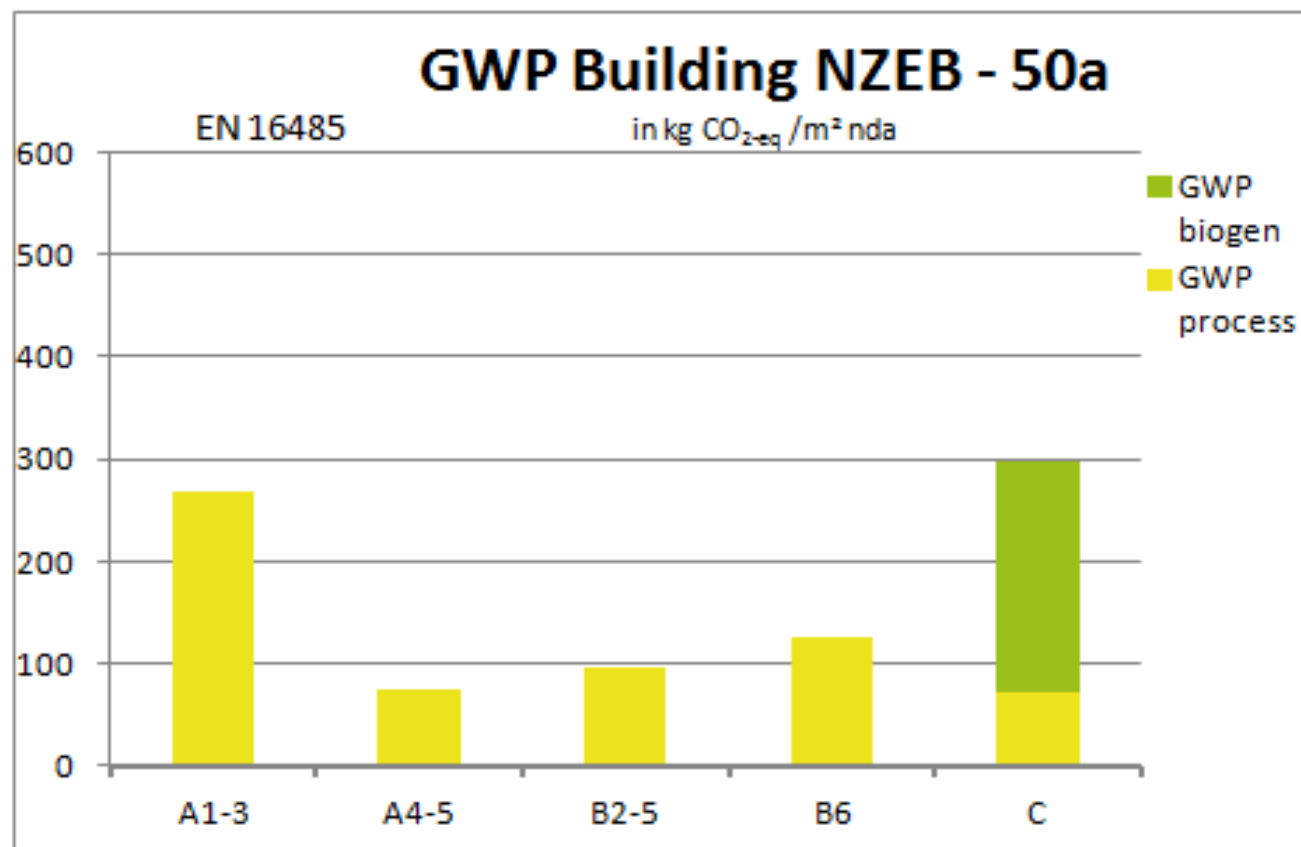
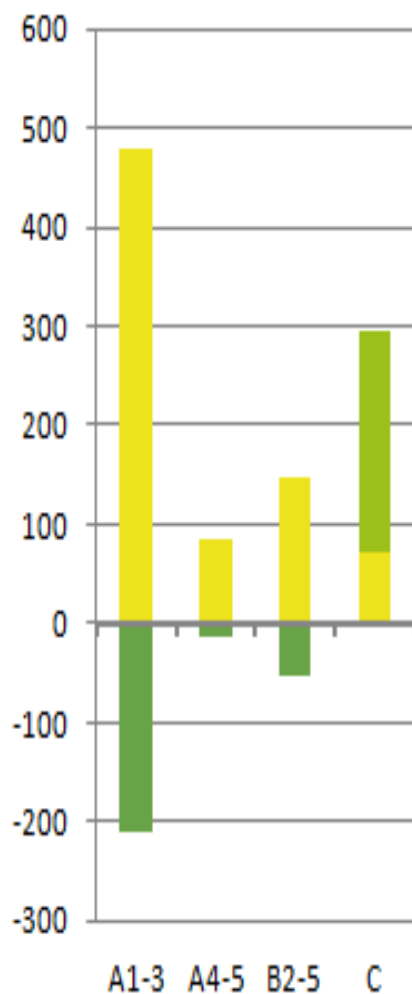
Temporary:

It is decided that carbon emitted later than three centuries after its uptake is considered as permanent carbon storage. In other words, emissions emitted within three centuries shall all be counted as emitted "now".

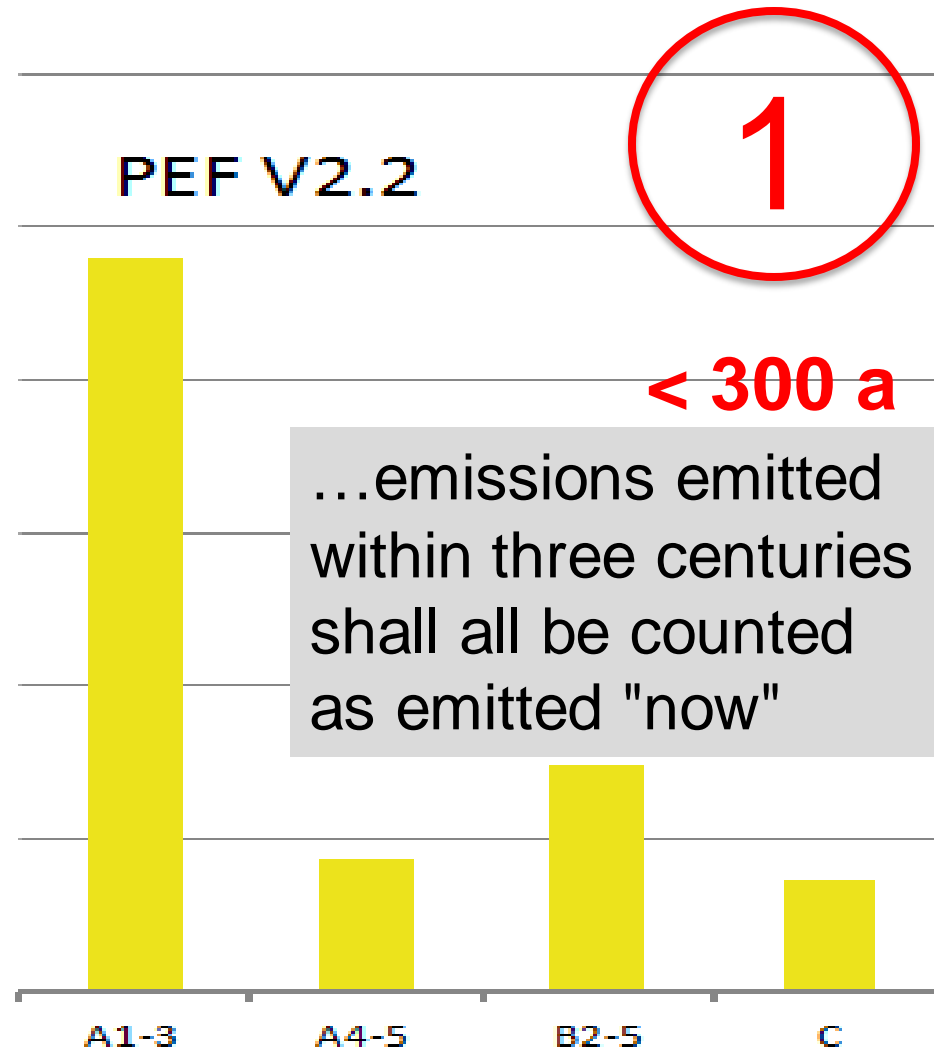
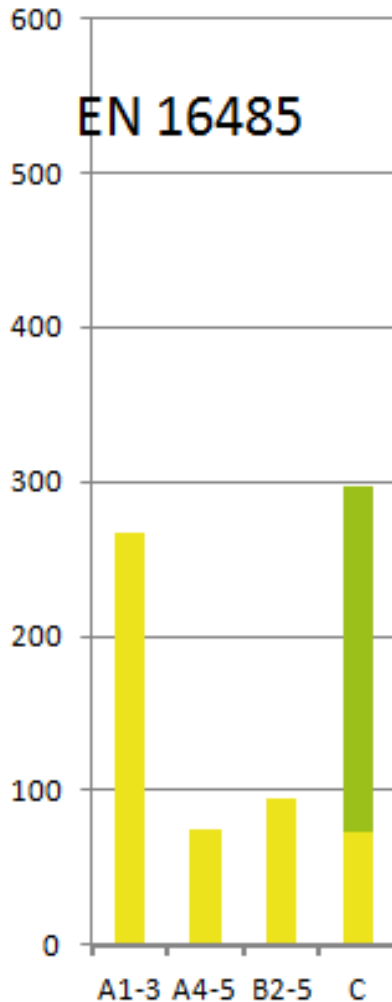
Carbon storage e.g. row house



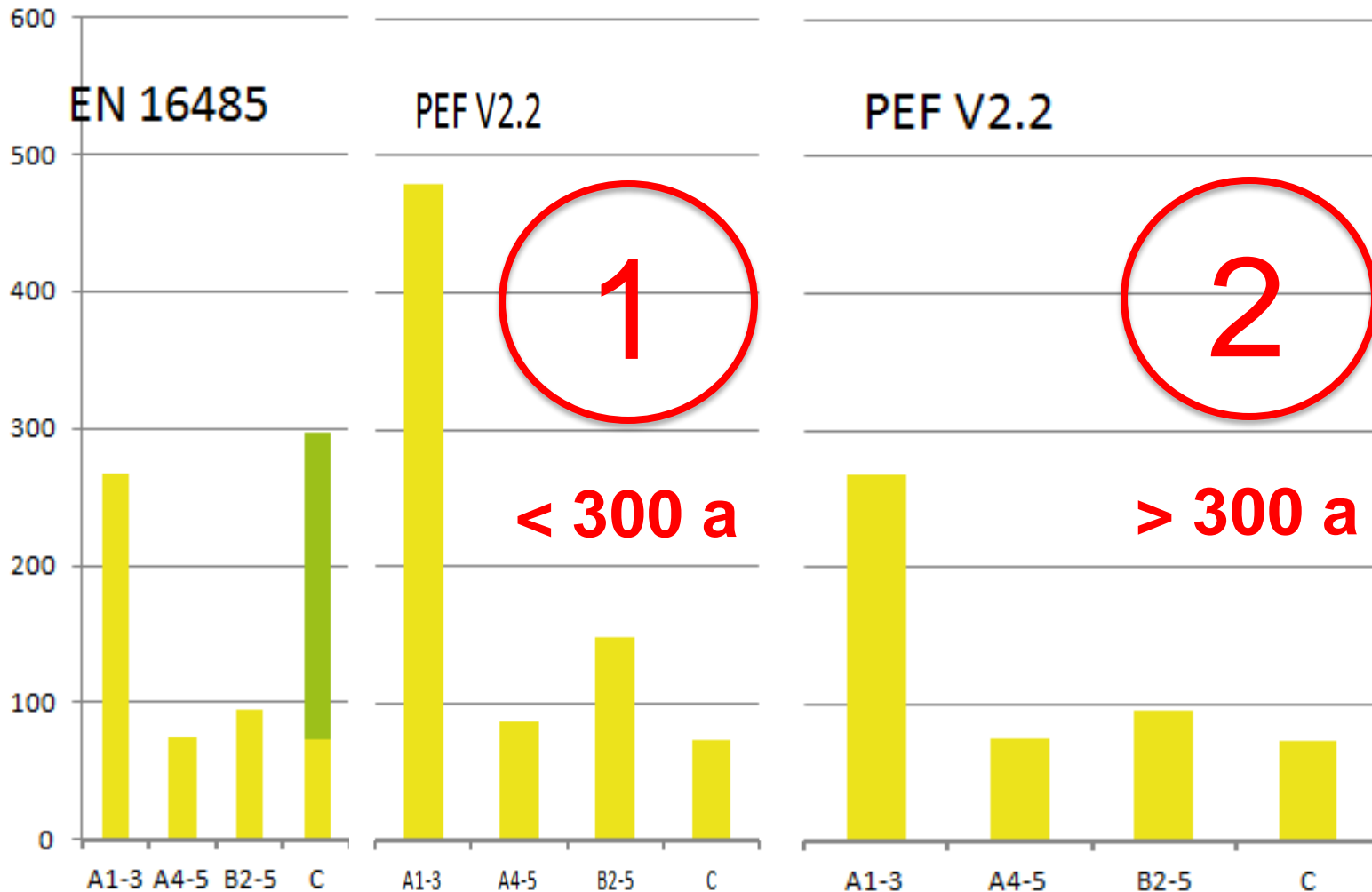
Carbon storage



Carbon storage



Carbon storage



Intended harmonization



European Commission study on an EU common framework of indicators for the environmental performance of buildings

July 2016

A number of national initiatives have reached the conclusion that although EN 15978 provides a solid methodological basis for calculations, wider adoption would require a **more tightly defined, common set of rules** to ensure that the standard is consistently applied.

The **availability of data** is an issue that requires particular attention. For example, in many cases generic life cycle inventory databases used for LCA may have to be used initially. This brings inherent problems with the **quality and age of data**, with comparative studies indicating a **significant potential for variance in the results**.....

This situation may change for some building materials if, under a new draft mandate from DG GROW, the end of life and **biogenic CO2 rules from the European Commission's Product environmental Footprint methodology are introduced into EN 15978.**

Take home messages



- PEF methodology draft for biogenic carbon modelling at the moment is not very clear
- PEF methodology draft for biogenic carbon modelling is not consistent to any already existing standard like EN15804, EN 16485, EN 15978 ISO/TS 14067, PAS 2050
- PEF methodology draft for biogenic carbon modelling distinguishes between carbon storage for more or less than 300 years
- PEF methodology draft for biogenic carbon modelling shall replace existing methodology in 15804 and EN 15978 according European Commission study
- PEF methodology draft for biogenic carbon modelling **is still under construction**



**HOLZ
FORSCHUNG
AUSTRIA**

DI Philipp Boogman

philipp.boogman@ibo.at

Tel.+43-1-319 20 05

www.ibo.at

Dr. Franz Dolezal

f.dolezal@holzforschung.at

Tel. +43-1-798 26 23

www.holzforschung.at

