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HARMONISATION OF THE ENVIRONMENTAL PRODUCT DECLARATIONS FOR WOOD PRODUCTS

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ABSTRACT: Environmental Product Declarations (EPD) are developed to compare materials and solutions in building level to achieve sustainable choices for the built environment. European standardisation body, CEN/TC 350 Sustainable Construction, have developed harmonised standard EN 15804 to create EPD's for the building products. Although harmonised standards exist, different methodologies and scenarios are used under different EPD operators and countries, which is not supporting sustainability assessment in building level. Identified challenges are e.g. generic background datasets, allocation in modules A1–A3, use of guarantees of origin for purchased energy, scenarios for transportation and installation, and end-of-life scenarios. Different assessment approaches challenge the assessment in the building level to achieve targets for sustainable buildings.

KEYWORDS: Wood products, Life cycle assessment, Environmental product declaration, Harmonisation

1 INTRODUCTION

In this study Environmental Product Declarations (EPDs) of wood products were examinate, looking differences in assessment methods and how those are affecting to the reporting of the results in EPDs. Study was done by using selected EPDs of wood products published by EN 15804 standard. All studied EPDs were third-party verified and published by an EPD operator.
Earlier studies shows the importance of the harmonisation of the EPDs [1–6]. EPDs helps decision making in building level assessment to ensure sustainable choices for the building design and construction. In this perspective, comparison of the products and solution in building level should base on harmonised and verified data [7]. Where assessment methods are aligned and based on same scenarios.

At the moment, differences between data are challenging use of EPDs by designers and decision makers. As result might vary based on selected method to imply in assessment.

2 MATERIALS AND METHODS

In the Environmental product declaration - Core rules for the product category of construction products standard (EN 15804) [8] the life cycle phases are divided in four stages; production stage (A1–A3), construction stage (A4–A5), use stage (B1–B7) and end-of-life stage (C1–4). Also, additional information beyond the product system can be stated in the module D, information module. In this study assessment is following life cycle principle presented in Fig. 1.

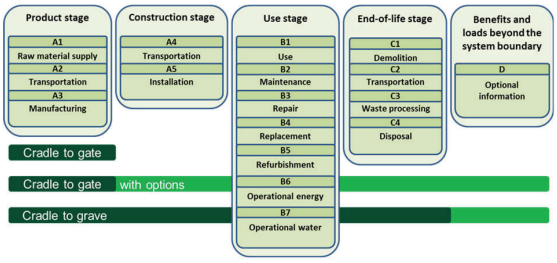

Figure 1: *Life cycle stages and environmental product declaration coverage according EN 15804 standard.*

In this study specific methods for different life cycle stages were studied. From product manufacturing perspective A1–A3 stage is most accuracy, based on annual inventory of raw material supply and production. Following life cycle stages are based on specific scenarios or scenarios recommended by the publishing platform (EPD Operator). For each life cycle module or stage, can be identified typical assessment/methodological options which will have effect on results.

In EN 16485 standard [9], Product Categories Rules are defined for wood-based products. Standard gives

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guidance's how to implement some assessment method specifically for wood products.

For this study data were collected from the published EPDs of wood-based products. All available EPDs or datasets following EN 15804+A1, EN 15804+A2 and ISO 21930 were included to the assessment. Table 1 shows EPDs used for the assessment. CLT data is separated by EPDs and French FDES, as FDES have some specific rules to follow. Study focused to review reported CO_2 eq. emissions from product stage (A1–A3) and the biogenic carbon content of the product. Also, other methodological differences reported in EPDs where assess.

Table 1: *EPDs used for the assessment*

Product	Manufacturer EPDs
Sawn dried timber - EPD	Egger
	Moelven
	SCA Wood
	Swedish Wood
	Trae DK
	Stora Enso
	UPM
Cross Laminated Timber (CLT) - EPD	Artuso Legnami
	Binder
	Cross Timber systems
	Derix (2020)
	Derix (2022)
	Egoin
	Hasslacher
	Holzius
	KLH
	Kuhmo
	L.A. COST
	Nordic X-Lam
	Rubner
	Schilliger
	Setra
	Södra
	Splitkon
	Stabilame glued
	Stabilame nailed
	Stora Enso (2017)
	Stora Enso (2020)
	Studiengemeinschaft
	Trae DK
	Red Stag
	X-LAM Australia
	SmartLam Columbia Falls
	SmartLam Dothan, Alabama
	Terralam
Cross Laminated Timber (CLT) - FDES	Binder
	KLH
	Nordic X-Lam
	Panneau
	Piveteaubois
	Schilliger
	Stabilame glued
	Stabilame nailed
	Stora Enso (2017)
	Stora Enso (2022)
Laminated Veneer Lumber (LVL) - EPD	Kerto LVL
	Nelson Pine Industries
	North American LVL
	Roseburg
	STEICO LVL
	Stora Enso LVL
	Stora Enso LVL G
	Wood for Good LVL

3 RESULTS

Firstly, production stage data were assessed for Sawn dried timber, CLT and LVL. Results of global warming potential and biogenic carbon content in modules A1–A3 are shown separately for each product. In Figure 2, sawn dried timber results are shown. Major findings for classic sawn goods are:

- Only generic forestry data available – own research field to create more precise data for different regions where logs are felled.
- In some cases, no mentioning of biogenic carbon content. Biogenic carbon content is calculated based on product density by authors.
- Wrong calculation of biogenic carbon content, not following principle of "material inherent properties" - CO_2 biogenic carbon is referred to whole log entering the mill.
- Possible different assumption for utilization rate in A2 transportation and differences in back-and-forth transportation is considered.
- Difference requirements from EPD operators, like "shall declare the emissions for energy mix" kg CO_2/kWh in EPD Norge.

Results of CLT - EPD, CLT - FDES and LVL are shown in Figures 3–5. Major findings for further processed CLT and LVL are:

- Difference between integrated operations (basic and further production in same site) and mills who have purchased timber from external suppliers.
- Primary vs generic data for glues. Modelling of glue data based on supplier information can vary.
- Correct consideration of dry content of glues.

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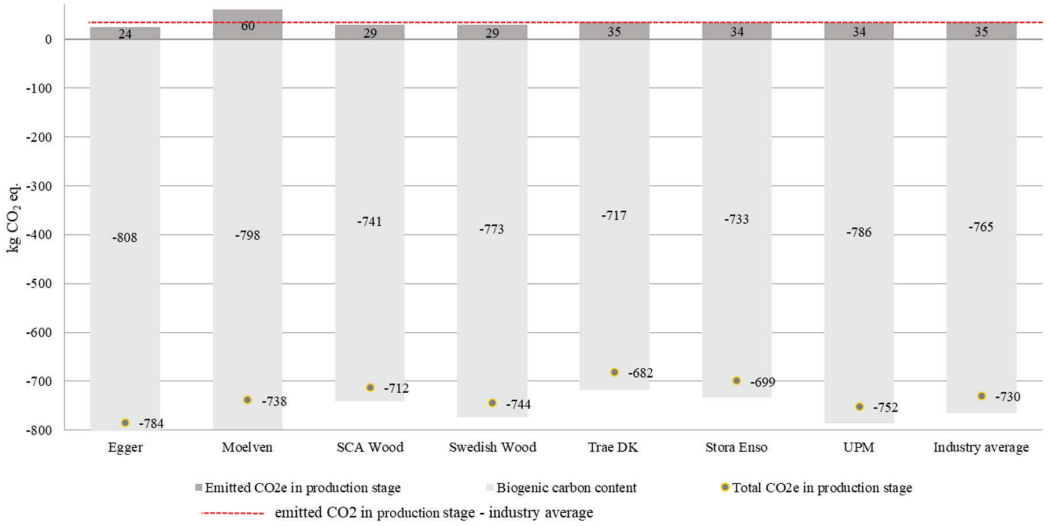

Figure 2: *Global warming potential (GWP) [kg CO_2-eq/m³] of sawn dried timber in modules A1–A3 according EPDs.*

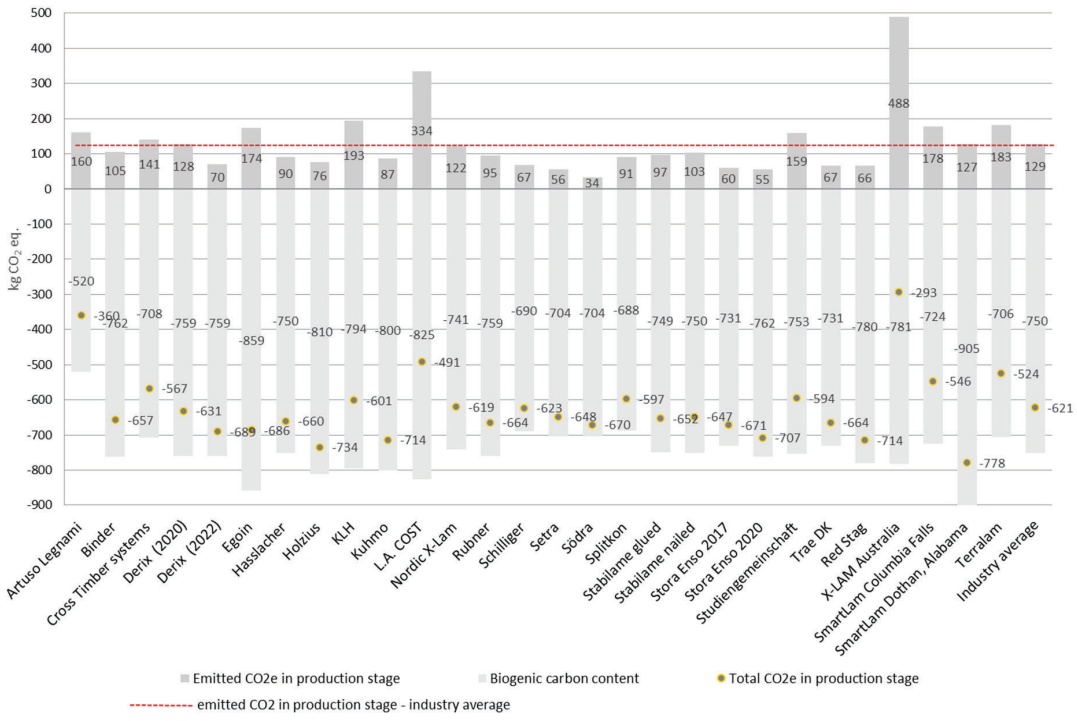

Figure 3: *Global warming potential (GWP) [kg CO_2-eq/m³] of CLT in modules A1–A3 according EPDs.*

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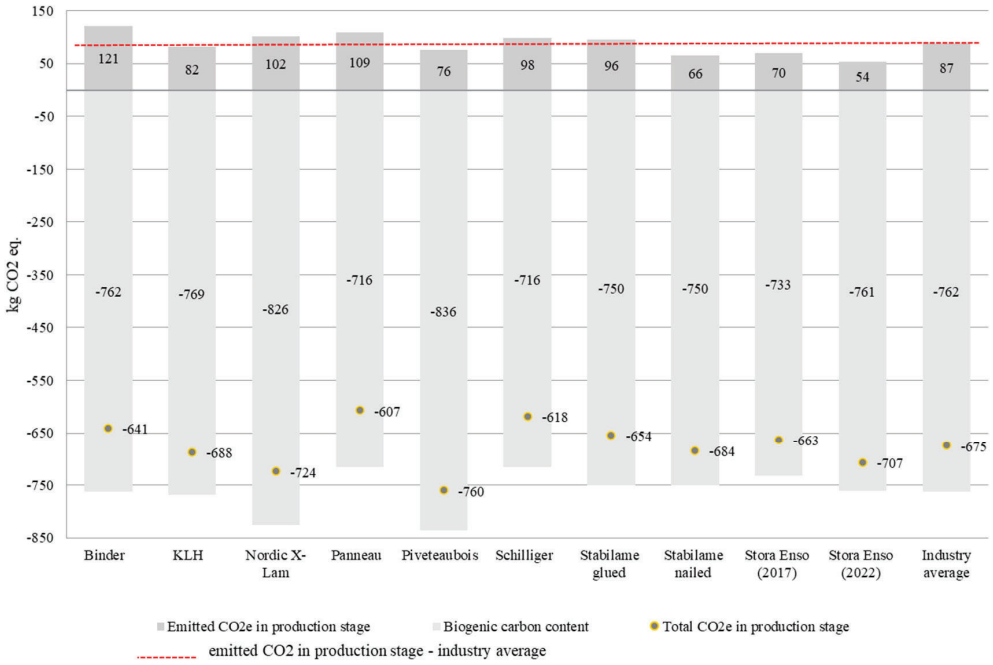

Figure 4: *Global warming potential (GWP) [kg CO_2-eq/m³] of CLT in modules A1–A3 according FDESs.*

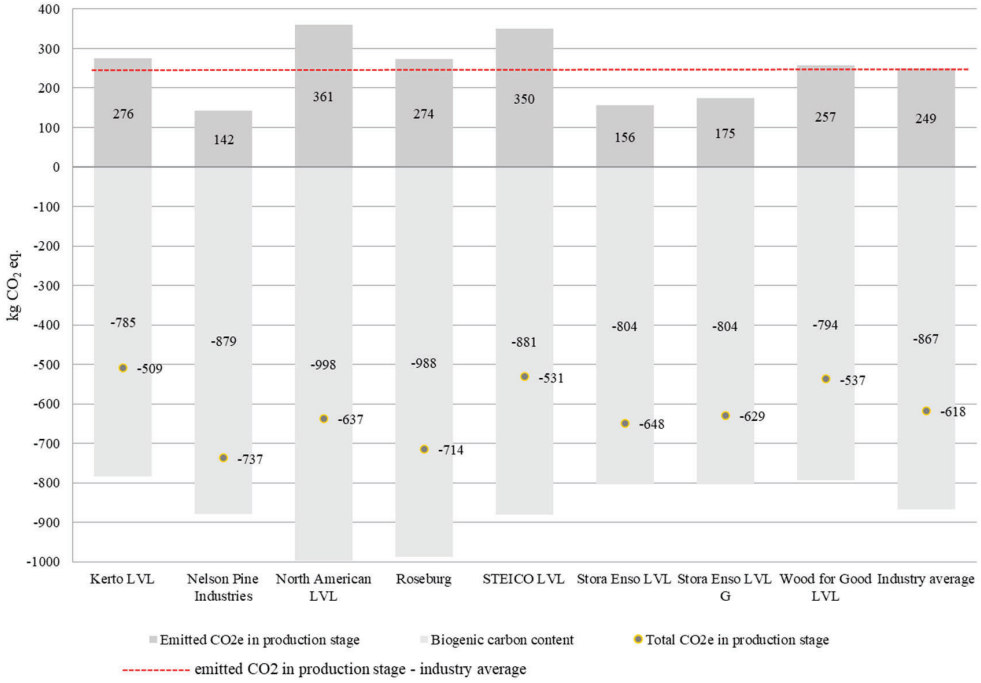

Figure 5: *Global warming potential (GWP) [kg CO_2-eq/m³] of LVL in modules A1–A3 according EPDs.*

Other identified findings based on EPD reporting data are:

- Energy consumption in A1 (EN 15804) vs. A3 (ISO 21930). Is guarantees of origin of purchased energy allowed to be used.
- By-product's allocation and interpretation:
    - Everything is allocated to sawmill residues and products according economic values without considering different level of processing ("Blackbox").
    - Allocation acc. Economic values separated by different product stages.
- Volatility of prices and effect on results, depending on reference year of data [10].
- Product transportation and installation (modules A4–A5):
    - Back-and-forth transportation.
    - Installation can vary depending on final application. Functional unit vs. declared unit.
    - Lack of specific installation data or estimate.
- End-of-life scenarios (modules C1–C4 and D):
    - Reference scenario for the end-of-life.
    - Lower Heating Values for wood and glue end-of-life scenarios.
    - Thermal and electrical burning efficiencies.
    - Database version used for assessment (e.g. ecoinvent version).
    - Used data for the substituted fuel in module D.

4 CONCLUSION

Based on the data collection more and more EPDs on wood-based products are available. This is highlighting the importance to have an EPD to claim the environmental impacts of a construction products. Many European countries have established regulation for embodied carbon or whole life carbon of building [10]. Building level assessments are depending on product level data.

Results indicate that EPDs are more harmonised in reporting and data quality than earlier. Non-harmonised methods are leading lack of comparability of EPDs in building level assessment. Many questions are arising by EPD users when there are major differences in the results of EPDs. Some differences are explained by the background datasets (generic data) and different energy mixes by countries. But some differences exist by the different assessment approaches, like by-products allocation influenced by volatility of prices [10].

To be able to calculate construction products environmental impacts harmonised approach is needed. As the complexity of the life cycle assessment modelling and different standard existing guiding the modelling in European (EN standards) and international (ISO standards) levels.

As shown in this study, choice of the assessment method can have a significant effect to the CO_2 emissions of the wood-based products. It is recommended in EPD standard [8] to use harmonised assessment methods, but it gives some freedom to do the assessment. Also, verification process of the EPDs differ by EPD Operators and individual verifiers.

A practical solution is that Product Category Rules of wood-based products [9] are revised to support common assessment method. This would harmonise environmental impacts assessments in woodworking industry field and provide more comparative datasets of wood-based building products.

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