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Overview of WLC-GWP approach in 18 European countries

ENBRI overview status spring 2024

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Update 14-10-2024: Slovenia has been added to the results, bringing the total number of participating countries in the research from 17 to 18. This has had a minimal impact on the results and conclusions.

Contents

1 Introduction

With the approval of the revised Energy Performance of Buildings Directive (EPBD) in June 2024 and the required national implementations within the following two years, the Whole Life Cycle – Global Warming Potential (WLC-GWP) will become the primary parameter for assessing the environmental impact of buildings and construction products. This change presents a significant opportunity for the construction sector to adopt more sustainable practices.

Figure 1.1: Whole Life Cycle of construction materials

However, currently large variations exist in the way the different European countries perform their WLC-GWP analysis and the varied national implementations might lead to inconsistent methods and standards, potentially rendering circular solutions from one country inapplicable or even counterproductive in another.

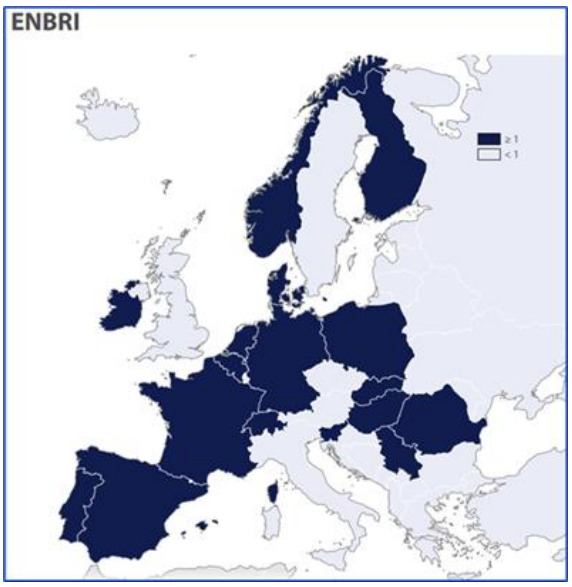
To address this European Network for Building Research Institutes (ENBRI) tasked TNO to develop a questionnaire to investigate how each country applies the Life Cycle Analyze (LCA) methodology for the environmental assessment of their buildings, aiming to identify the differences across countries and identify possible routes for harmonization. Sixteen of the ENBRI members participated in the survey and Sweden was added for reference. EN 15804[1] is used as the norm for comparison of the LCA methods.

This report describes the used approach, it presents the obtained results (status spring 2024) and it will serve as the baseline for further joint ENBRI activities in in the upcoming years.

[1] Reference: EN 15804:2012+A2:2019/AC:2021, IDT. Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

Role ENBRI:

The 17 institutes that form ENBRI play a pivotal role in advocating for policies and initiatives that support the advancement of the building sector in line with environmental, economic and societal goals, both on a national and European level. ENBRI serves as a platform for the national building research institutes to collaborate, innovate and contribute to the development of a more sustainable and resilient built environment in Europe. Through their strong links with industry, standardization and government bodies, ENBRI members play a crucial role in creating, disseminating and implementing new knowledge and assuring impact of construction innovation.



1.1 Approach

The ENBRI members were contacted with a concise questionnaire, as outlined in Appendix a. The members[2] completed the questionnaire, and additional clarifying questions which were addressed via phone or email. An overview of the participants can be found in appendix B.

Based on the completed questionnaires, TNO compiled the initial results and presented these to the ENBRI members in May 2024. Following this presentation, there was a period for feedback and the submission of any amendments.

The current report reflects the status of the WLC-GWP approach in 17 of the ENBRI countries, plus Sweden. The report will form the baseline for next steps towards a European and more harmonized WLC-GWP approach. These activities will be performed in close cooperation with Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW), as part of the High-Level Construction Forum (HLCF) activities 'Transition Pathway for a resilient, greener, and more digital construction ecosystem', in line with the Transition Pathway Actions 3.14 and 3.15, towards a common approach for calculation and disclosure of 'Whole Life Cycle Carbon Emissions'.

[2] For the complete list see Appendix B

2 Results

This chapter presents the results of the survey. The similarities and differences between the countries were examined for each theme/section.

2.1 General question

The following questions were posed, to understand how they approach the formulation of Life Cycle Assessments (LCA) for their buildings:

1. Is there current legislation mandating the use of LCAs for buildings?
2. Is the European LCA standard for construction products being applied?
3. Is this standard applied in its entirety or only partially?
4. Can LCAs conducted in other countries be utilized?

This survey aimed to gather insights into the regulatory landscape, the adoption of European standards, and the interoperability of LCAs across national borders. Understanding these aspects is crucial for assessing the potential for harmonization and improving the consistency of LCA practices globally. The table below shows the answers on these questions.

Table 2.1: Table with the general questions

	Is there currently an legislation on LCA's for buildings?	Does your country use the EN 15804+A2 or national standard based on it?	Is EN15804 or a national implementation of this standard applied as a whole (both normative and informative)?	Are Non-Country-Specific LCAs valid?	Comment
Belgium	Yes	Yes	Yes	No	
Denmark	Yes (1)	Partially (2)	Yes	No	1) only for carbon impact, 2) Partly because also the EN-15804-A1 & A2 is used
Finland	No (1)	Yes	Yes	No	1) not yet but will be implemented in 2026
France	Yes	Yes	Yes	No	
Germany	Yes	Yes	Yes	Yes (1)	1) in the country's DK, FI, FL, DE, AT, SE, FR
Hungary	No	Yes	Yes	Yes (1)	LCA prepared in accordance EN ISO 14044:2022
Ireland	No	Yes	Yes	Yes (1)	Methodologies are in line EN15804 and in line with Levels(s)
Netherlands	Yes	Yes	Yes	No	
Norway	Yes	No (1)	No	No (2)	1) Based on the EN-158978 which for product lca's again refers to the EN15804. 2) Building LCA's follow the national standard (NS3720). However, construction product LCA's follow EN 15804, and these results are mainly communicated via EPDs.
Poland	No (1)	Yes	Yes	Yes	1) But on non obligatory bases ITB is the national program operator of EPD system for construction products.
Portugal	No	Yes	Yes	Yes	
Romania	No	No	No	No	
Serbia	Yes	Yes	Yes	Yes	
Slovakia	Yes	Yes	Yes	Yes (1)	1) in the country's DK, FI, FL, DE, AT, SE, FR
Slovenia	No	Yes	No	Yes (1)	1) LCAs can be prepared in any way, but for EPD, they need to be aligned with EN15804+A2.
Spain	Yes (1)	Yes	No	No (2)	1) only for carbon, 2) It's not yet regulatory
Sweden	Yes	Yes	No	(1)	1) Unclear question
Switzerland	Yes	No	No	No	

Observations

Most countries have or will have legislation on performing an LCA's for buildings. The majority (12 out of 18 countries) use EN 15804 as the basis for calculations. Some countries supplement this with country-specific calculations, with most countries using the complete EN15804 as a basis, with both the normative and informative parts in force. In most countries, only LCA prepared in accordance with the specific national rules are valid. Some of the countries do approve LCA prepared according to (a limited number of) other specific national standards.

2.2 Phases that are mandatory by country

The module classification according to EN15804 is used for this purpose. The following phases are described below:

- A1-3 - production of the product (A1 raw material supply, A2 transport of raw material to manufacturer, A3 manufacturing of the product)
- A4 – transport of construction products to the building site
- A5 – the building installation/ construction
- B1 – use of the installed product, service or appliance (emissions and leaching during the use phase)
- B2 – maintenance of the product
- B3 – repair of the product
- B4 – replacement of the product
- B5 – refurbishment of the construction product
- B6 – operational energy
- B7 – operational water use
- C1 – demolition of the building/building product
- C2 – transport of the demolition waste or the end-of-life construction product to waste processing facility
- C3 – waste processing operations for reuse, recovery or recycling
- C4 – Final waste
- D – Benefits and burdens from Reuse, recycling or energy recovery potential

Table 2.2: The LCA stages conform the EN-15804

Product stage			Construction stage		Use stage							End of life				Benefits and loads beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw/ materials supply	Transport	Manufacturing	Transport to construction site	Construction stage	Emissions in the use stage	Maintenance	Repair	Replacement	Refurbishment	Operational Energy use	Operational Water use	Deconstruction/ demolition	Transport to EOL	Waste processing	Disposal	Reuse, Recovery and/or Recycling potential

The next table shows the phases that are mandatory per country when preparing a building calculation.

Table 2.3: Table with the mandatory phases per country

	Belgium	Denmark	Finland	France	Germany	Hungary	Ireland	Netherlands	Norway	Poland	Portugal	Romania	Serbia	Slovakia	Slovenia	Spain	Sweden	Switzerland	% yes
A1-3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes	No	Yes	No	No	Yes	Yes	Yes	83%
A4	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No	No	Yes	No	No	No	Yes	Partially	50%
A5	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Partially	No	No	No	Yes	No	No	No	Yes	Partially	44%
B1	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No	17%
B2	Yes	No	No	Yes	No	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No	22%
B3	No	No	No	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	11%
B4	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	No	No	No	No	Yes	No	Yes	44%
B5	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	6%
B6	No	Yes	Yes	Yes	No	No	Yes	No	No	Yes	No	No	No	No	No	Yes	No	No	33%
B7	No	No	No	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	11%
C1	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	yes	No	Yes	No	No	No	No	Yes	61%
C2	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	yes	No	Yes	No	No	No	No	Yes	61%
C3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	yes	No	Yes	No	No	No	No	Yes	67%
C4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	yes	No	Yes	No	No	No	No	Yes	67%
D	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	yes	No	Yes	No	No	No	No	No	56%

Observations

Nearly all countries include phases A1-3, except for Slovakia (Slovakia will implement this in 2026) and Romania (Note: the standard EN 15804 was translated for use in Romania for ASRO (Asociația de Standardizare din România) by researchers of URBAN-INCERC[3] in 2015, however it is not yet mandatory). These phases (A1-3) typically account for the most significant impact and are the stages where manufacturers have the most information.

The inclusion of other phases varies greatly. Specifically, the B-phases (use phases) are largely excluded. Some phases are partially included, meaning that only certain aspects are considered. For example, in phase A5, construction waste might be included while the use of construction equipment is not.
No country takes all phases into account, so no country takes the Whole Life Cycle of a building into account at this time.
Only Germany and Serbia take exactly the same phases into account. They take all modules of phase A, C and D into account, but exclude module B entirely.

[3] National Institute for Research and Development in Constructions, Urbanism and Sustainable Spatial Development

2.3 Additional environmental effects

EN 15804 prescribes several environmental effects as mandatory and some additional environmental effects that can be voluntarily listed. In the questionnaire we asked which of the non-committal environmental impacts countries make mandatory.

According to EN15804, the follow environmental effects must be calculated but are not required to be declared:

- Particulate Matter emissions, in the unit of "disease incidence"
- Ionizing radiation, human health, in the unit of "kBq U235 eq."
- Eco-toxicity (freshwater), in the unit of "CTUe"
- Human toxicity, cancer effects, in the unit of "CTUh"
- Human toxicity, non-cancer effects, in the unit of "CTUh"
- Land use related impacts/ Soil quality, environmental effect is dimensionless

Table 2.3 shows which additional environmental effects are mandatory when preparing a building calculation.

Table 2.3: Additional environmental effects by country

	Belgium	Denmark	Finland	France	Germany	Hungary	Ireland	Netherlands	Norway	Poland	Portugal	Romania	Serbia	Slovakia	Slovakia	Spain	Sweden	Switzerland	% yes
Particulate matter	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	No	No	No	No	39%
Ionising radiation, human health	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	No	No	No	No	39%
Ecotoxicity (freshwater)	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	No	No	No	No	39%
Human toxicity, cancer effects	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	No	No	No	No	39%
Human toxicity, non-cancer effects	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	No	No	No	No	39%
Land use related impacts	Yes	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	No	No	No	No	39%
others environmental effects	Yes	No	No	No	Yes	Yes	No	No	No	No	No	No	Yes	No	No	No	No	No	22%

Observations

In addition to the mandatory environmental impacts specified by EN15804-A2, there are optional environmental impacts that can also be reported. The inclusion of these optional impacts varies significantly among countries, with 39% incorporating them and 61% not doing so. Notably, when these optional impacts are mandatory reported all of them are mandatory so there is no country which makes a selection of the extra environmental impacts. Furthermore, some countries take into account supplementary environmental impacts. While these additional impacts are not always explicitly defined, they occasionally relate to aspects of circularity (for example a Circularity index score), this shows a growing awareness and integration of circular economy principles in environmental impact assessments. Aligning these impact factors across borders would create more value for circular products and could stimulate an enlarged offset market of circular products.

2.4 Additional requirements of the LCA's

In order to gain insight in how comparable LCAs are and thereby interchangeable between countries, the following additional questions were asked:

- Is the use of a specific background database mandatory? Note, if this is not the case, (large) differences can arise due to different background databases.
- Are there mandatory agreements on matters outside the scope of the manufacturer, such as production waste and transport to the building site?
- What is the mandatory building life span, important especially for the phases of the use phase where any replacements and maintenance must take place depending on the life of the building?
- Are there mandatory end of life scenarios to be used?
- Is there a way how the CO_2 storage of construction material is included in the calculation?

In the next table you find the answers on these questions per country.

Table 2.4: Table with the requirements of the LCA's by country

	Belgium	Denmark	Finland	France	Germany	Hungary	Ireland	Netherlands	Norway	Poland	Portugal	Romania	Serbia	Slovakia	Slovakia	Spain	Sweden	Switzerland	% yes
Mandatory use of a specific background database (e.g. ecoinvent incl. version)	Yes	Yes	Yes	Partially(1)	Yes	No	ND	Yes	Partially	Yes	No	ND	Yes	Yes	No	No	No	Yes	50%
Require use of fixed values for e.g. transport or construction waste percentage	Yes	No	Yes	Partially(2)	Yes	No	Yes	Yes	No	No	No	ND	Yes	ND	No	No	No	No	33%
Standardization lifetime of building types	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No	ND	No	Yes	No	No	ND	Yes	56%
Obligation of fixed end of life scenarios	Yes	Yes	No	Partially	Yes	No	Yes	No	No	No	No	ND	No	No	No	No	No	No	22%
Are there calculation rules for including stored CO2 in construction materials	No	No	Yes	Yes	Yes	No	Yes	No	No	No	No	ND	Yes	No	No	No	No	No	28%

Comments: ND = NOT DECLARED. (1) some environmental data relating to the impact of energy supply, transport, waste, site construction processes, drinking water supply and sewerage are mandatory conventional data that the user cannot change. All the data for products and building services come from Inies, les données environnementales et sanitaires (INIES) www.inies.fr, other data are not allowed to use (2) Indirectly and partially from EPD data in the French national complement NF EN 15804 A2 /CN + PEP PCR ed 4, default values are defined for transport distances and end-of-life scenarios. It is possible to use specific data, but in practice this is rare for end-of-life scenarios.

Observations

Several additional questions were included in the questionnaire, addressing the methodology and potential effects on the outcomes of the Life Cycle Assessment (LCA). Differences can arise from using different databases. Many respondents specified a database (either the ecoinvent, GABI or a local database), but there were variations in the versions used.

Moreover, discrepancies can occur due to the use of different fixed values (for transport, end-of-life phases, or construction waste). Significant differences in the prescribed values across various countries are observed, which might partly be attributed to the size of the country.
Due to the numerous differences that can significantly impact the outcomes of LCA's, it is essential to harmonize these factors to ensure the comparability of LCA results.

2.5 Anticipated lifespan of building and is CO_2 awarded

Furthermore, specific questions were raised regarding the anticipated lifespan considered by different countries and whether carbon storage is accounted for in the LCA methodology. Both aspects are relevant due to the extended lifespan of building products.

Table 2.52.4: Table with the information of the anticipated lifespan and if CO_2 storage is awarded

	Anticipated lifespan	Is CO2 awarded
Belgium	60	No
Denmark	50	No
Finland	50	No
France	50	Yes (1)
Germany	50	No
Hungary	30-50	No
Ireland	50	Yes (2)
Netherlands	50-75 (3)	No
Norway	50	No
Poland	50	No
Portugal	50 to 60	No
Romania	No set lifespan	No
Serbia	(4)	No
Slovenia	(5)	No
Slovakia	100	No
Spain	50	No
Sweden	50	No
Switzerland	60	No
LEVELS (EU) (5)	50	No

Comments: [1)] CO_2 storage is accounted via the dynamic LCA method. [2)] Sequestration is reported separately when only Upfront Carbon (modules A1-5) is being considered. However, it is included in the Whole Life Carbon assessment, as the deconstruction scenario will indicate the fate of carbon-sequestering elements at the End of Life. [3)] 50 year for offices, 75 year for houses. [4)]For anticipated lifespan of construction products Serbia is using data information from Sustainable Building Information Portal, German Federal Institute for Building, Urban Affairs and Spatial Development (BBSR).[5)] Its not defined. [6)] According to the Levels recommendations table, link: https://environment.ec.europa.eu/topics/circular-economy/levels_en

Observations

Most countries (9 out of 18) assume a building lifespan of 50 years. However, there are several exceptions, with lifespans extending upwards to 60, 75, and 100 years, and one exception where the lifespan is shorter (Hungary, between 30 and 50 years). The EU- levels framework calculates a reference life of 50 years Regarding CO2 storage, only one country (France) accounts for this through the dynamic LCA method, recognizing the value in CO2 sequestration.

3 Conclusions

Significant differences exist in how countries apply the LCA methodology for buildings. While most countries adopt the LCA methodology, there are considerable variations in its detailed application. These differences include the phases considered, the fixed values used, and the specific database requirements. To achieve harmonization among countries, general methodological agreements need to be established and centrally maintained, including the assignment and management of background databases.

These existing differences between countries may necessitate accounting for variations such as different transport distances and end-of-life scenarios. Variations in national implementations can lead to inconsistent methods and standards, which can affect the applicability and effectiveness of circular/sustainable solutions across different countries. This inconsistency may negatively impact the accelerated adoption of sustainable construction products.

Apart from France, the storage of CO_2 in construction elements is not yet directly acknowledged in national assessment methods.

Parallel to the implementation of the Energy Performance of Buildings Directive (EPBD) recast, harmonization of the Whole Life Cycle - Global Warming Potential (WLC-GWP) methodology is recommended. This harmonization is essential to assure the formation of a robust and open European market for circular construction products.

4 Next steps

Based on the performed survey, it became clear that significant differences exist between countries, differences that might hamper the formation of a robust and open European market for circular construction products. Based on the performed study and subsequent discussions with the ENBRI members and DG GROW, it was decided to start an ENBRI WLC-GWP Working Group, which will work in close cooperation with DG GROW, as part of the HLCF activities 'Transition Pathway for a resilient, greener, and more digital construction ecosystem'. The WG WLC-GWP will start in Autumn 2024 and will also be open for non - ENBRI members.

The following follow-up steps were formulated:

The WG WLC-GWP will:

- Deepen the current overview as obtained through the survey. Questions that may reflect interesting differences between countries, such as:
  - Is it mandatory for any type of type of constructions, such as:
    - New construction and renovation;
    - Different type of building types: residential and offices;
    - Different kind of building owners: governments/ individuals/ project developers/Housing agencies?
- Are there maximum value requirements for the environmental impact of buildings (for example GWP)?
- Share best practices, e.g. "how to award CO2 storage, how to include re-use of materials, how to deal with EoL, etc.) and built towards common definitions
- Discuss ongoing national developments/questions & assist in national implementation strategies
- Share results to the broader community
- Develop an open BIM based methodology for automated WLC-GWP assessment and (optionally) digitally translate "national values" into other nations values. Possibly in collaboration with Building Smart International
- Interact with the EC, DG GROW (input to Transition pathways)
- Develop a proposed harmonized approach (Pre-normative, hand-over to CEN or other body after 2+ years)

Signature

TNO ⟩ Energy & Materials Transition ⟩ Utrecht, 17 oktober 2024

ValidSigned by Sanne Huveneers
on 2024-10-17 13:24:13

Sanne Huveneers
Research Manager (a.i.)

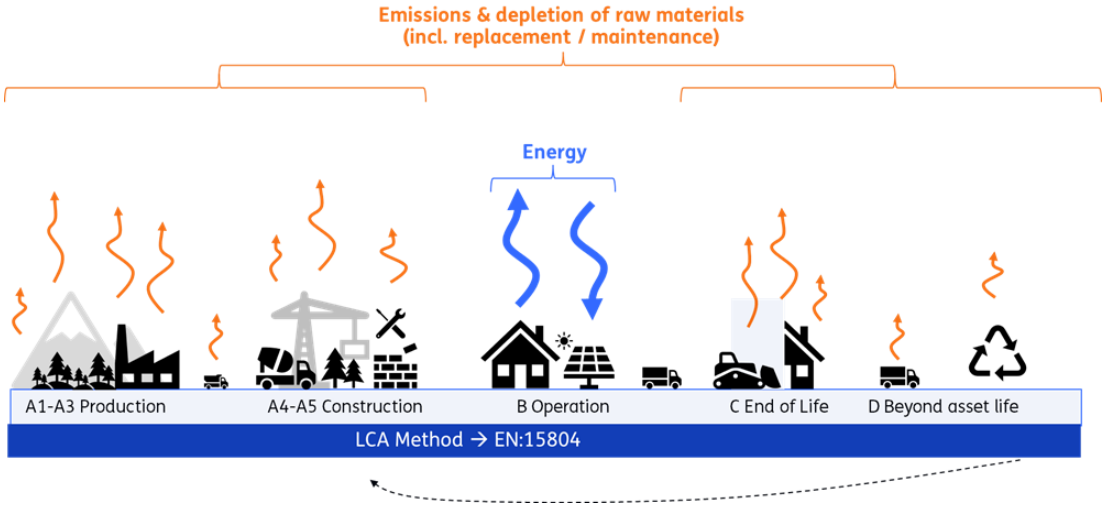
ValidSigned by Arjan van Horssen
on 2024-10-17 13:33:51

Arjan van Horssen
Project Manager

Appendix A
The questionnaire, send by mail on 27 February 2024

To: ENBRI members
From: H. Keizers (TNO)
Dear ENBRI members, colleagues,

With the finalization and formal approval of the EPDB recast, expected for March-June 2024, and the national implementation in the following 2 years, the Whole Life Cycle – Global Warming Potential will be introduced as the main parameter to assess the environmental impact of buildings and construction products. This will constitute a big change and also a great opportunity for the construction sector to accelerate the uptake of more sustainable construction method, products and processes.
Looking to the anticipated implementation route however, the risk exists that a large variation of national exceptions will lead to a variety of methods and awarding systems, by which circular solution from one country might not be applicable in other countries and/or even contra-productive signals will be given to the market.
As part of the ENBRI High Level Summit, planned for May 2024, we would like to present the current status within the ENBRI countries and propose a possible way forward for further harmonization.
In order to be able to present this overview on the 29th of May, I would like to obtain through the fellow Board members the responses of the appropriate persons/organizations within your country to the following questionnaire. Based on your input we will draft an overview, with suggestions for further harmonization, to be discussed at the ENBRI May event.
May we please ask you to respond to this questionnaire before the 31th of March.



Respondent: name, institute
Email address: xxxxx
Date: xx-xx-xx

1. Is there currently already any legislation in your country aimed at reducing the environmental impact of buildings based on the Life Cycle Analysis, LCA, method?

   Answer: Yes / No
   If yes, please specify reference to the legislation.

2. Does your country use the EN 15804+A2 (Sustainability of construction works - Environmental product declarations - Core rules the product category of construction products) or a national implementation of this standard for assessing construction materials?

   Answer: Yes / No
   If yes, please specify the appropriate reference.

3. Is EN15804 or a national implementation of this standard applied as a whole (both normative and informative) or only the normative part?

   Answer: Yes / No

   In case a national implementation of EN15804, in what way is the EN15804+A2 supplemented in your country. Please fill in the Table in Annex I:

4. Are LCA's prepared in accordance with EN15804, but not according to your country-specific determination method, valid / applicable in your country?

   Answer: Yes / No

If yes, which EU countries LCA's are applicable: .....

5. What is the anticipated lifespan of buildings applied in your national assessment method?

   Answer: ... years

6. Is storage of CO_2 in construction element awarded in your national assessment method?

   Answer: Yes / No

If yes, at what rate/value: ..... Euro / ton CO_2

Annex I. Details on National implementation (part of Question 3)

Which phases from the LCA are mandatory?	Answer Yes/No
A1-3	
A4	
A5	
B1	
B2	
B3	
B4	
B5	
B6	
B7	
C1	
C2	
C3	
C4	
D End of life	
Are additional environmental impacts mandatorily included?	Answer (Yes/No)
Particulate matter emissions	
Ionising radiation, human health	
Ecotoxicity (freshwater)	
Human toxicity, cancer effects	
Human toxicity, non- cancer effects	
Land use related impacts / soil quality	
others environmental effects	
Additional requirements:	
Are the environmental impacts normalisation or weighted back to a 1 point score?	
Mandatory use of a specific background database (e.g. ecoinvent incl. version)	
Require use of fixed values for e.g. transport or construction waste percentage	
Standardization lifetime of building types	
Obligation of fixed end of life scenarios	
Are there calculation rules for including stored CO_2 in construction materials	

Appendix B
Survey participants

Table appendix 2: the parties who participated in the survey

Land	Company	Website
Belgium	Buildwise	www.buildwise.be
Denmark	Department of Civil Engineering, Aalborg University	ww.en.build.aau.dk
Finland	VTT Technical Research Centre of Finland Ltd,	www.vttresearch.com
France	CSTB	www.cstb.fr
Germany	BAM	www.bam.de
Hungary	ÉMI	www.emi.hu
Ireland	Ireland's national centre for construction technology & innovation	www. constructinnovate.ie
Netherlands	TNO	www.tno.nl
Norway	SINTEF Community	www.sintef.no
Poland	ITB	www.itb.pl
Portugal	LNEC National Laboratory for Civil Engineering, Lisbon, Portugal	www.lnec.pt
Romania	URBAN-INCERC	www. iafor.org/
Serbia	Institute for testing materials-IMS Institute, Republic of Serbia	www. eng.institutims.rs
Slovakia	TSUS / Building Testing and Research Institute, NPO	www.tsus.sk
Slovenia	Slovenian National Building and Civil Engineering Institute	www.zag.si
Spain	Instituto Eduardo Torroja de ciencias de la Construcción. IETcc-CSIC	www.ietcc.csic.es
Sweden	RISE	www.ri.se
Switzerland	EMPA	www.empa.ch