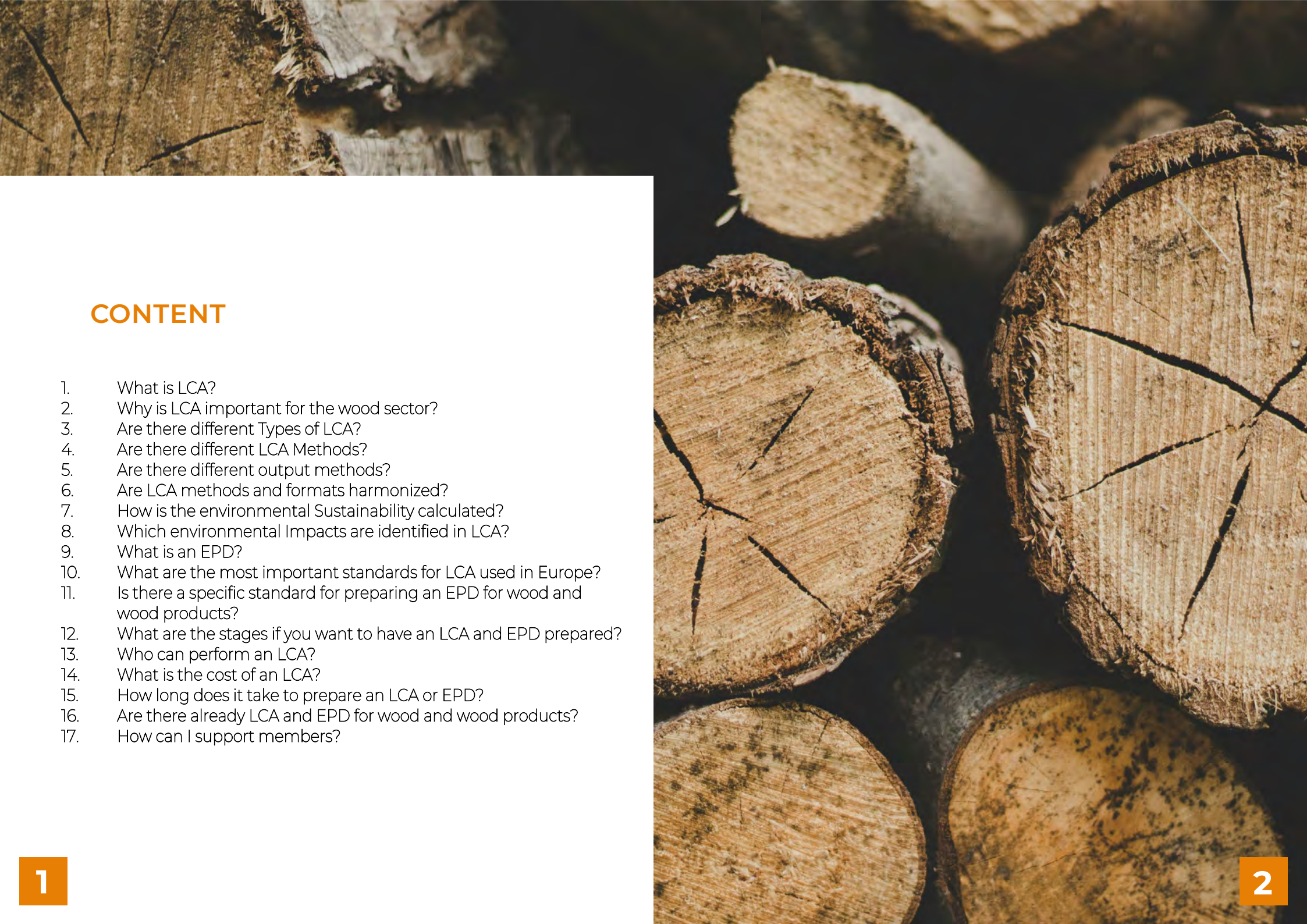
European Timber Trade Federation

LIFE CYCLE ANALYSIS FOR WOOD & WOOD PRODUCTS

An introduction to Environmental Foot Printing, Life Cycle Analysis and Environmental Product Declarations



CONTENT

1. WHAT IS LCA?

Life Cycle Analysis (LCA) is a scientific and internationally recognized method to inventory and calculate the environmental impact on humans and nature of a product or service. Energy use and lifespan are key drivers in this assesment.

2. WHY IS LCA IMPORTANT FOR THE WOOD SECTOR?

Environmental considerations for products and services are becoming increasingly essential. Wood and wood-based products have generally demonstrated a more favorable environmental impact compared to other building materials. As a standardized approach, Life Cycle Assessment (LCA) serves as a valuable tool to:

- Provide insights into the environmental performance of wood and wood-based products.
- Support producers in enhancing production methods, improving efficiency, and reducing costs.
- Guide architects in selecting wood and wood products when choosing materials with similar functional qualities.
- Enable wood products to meet or exceed environmental standards set by government regulations, such as those for sustainable construction and green procurement.
- Assist in marketing and promoting wood products based on their environmental advantages.
- Ensure compliance with regulatory requirements, including CE-marking, government green purchasing policies, and enviromental standards set by housing organizations, investors, and financial institutions.

BUT MOST IMPORTANTLY...

Manufacturers of products with a harmonised standard are obliged to declare Environmental information in the Declaration of Performance and Compliance (DoPC)/Digital Product Passport, as part of the CE-marking obligation (CPR, 2024). As of Januari 1st 2027 Global Warming needs to be declared. By the end of 2030 all 19 indicators need to be declared (see Figure 1). This is compulsory for all products, and new EPD need to be made for variations.

Note: A full Life Cycle Assessment (LCA) is necessary to declare Global Warming Potential (GWP).

OVERVIEW OF THE NEW CPR TIMEFRAME

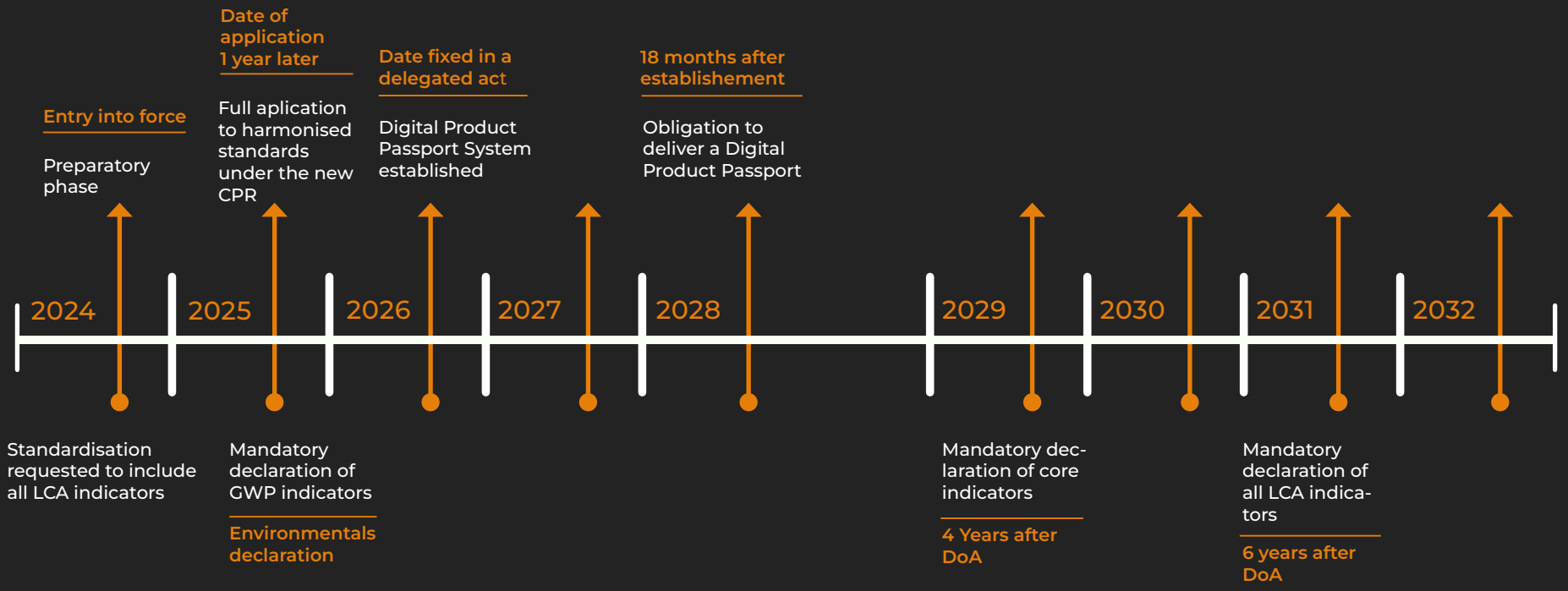
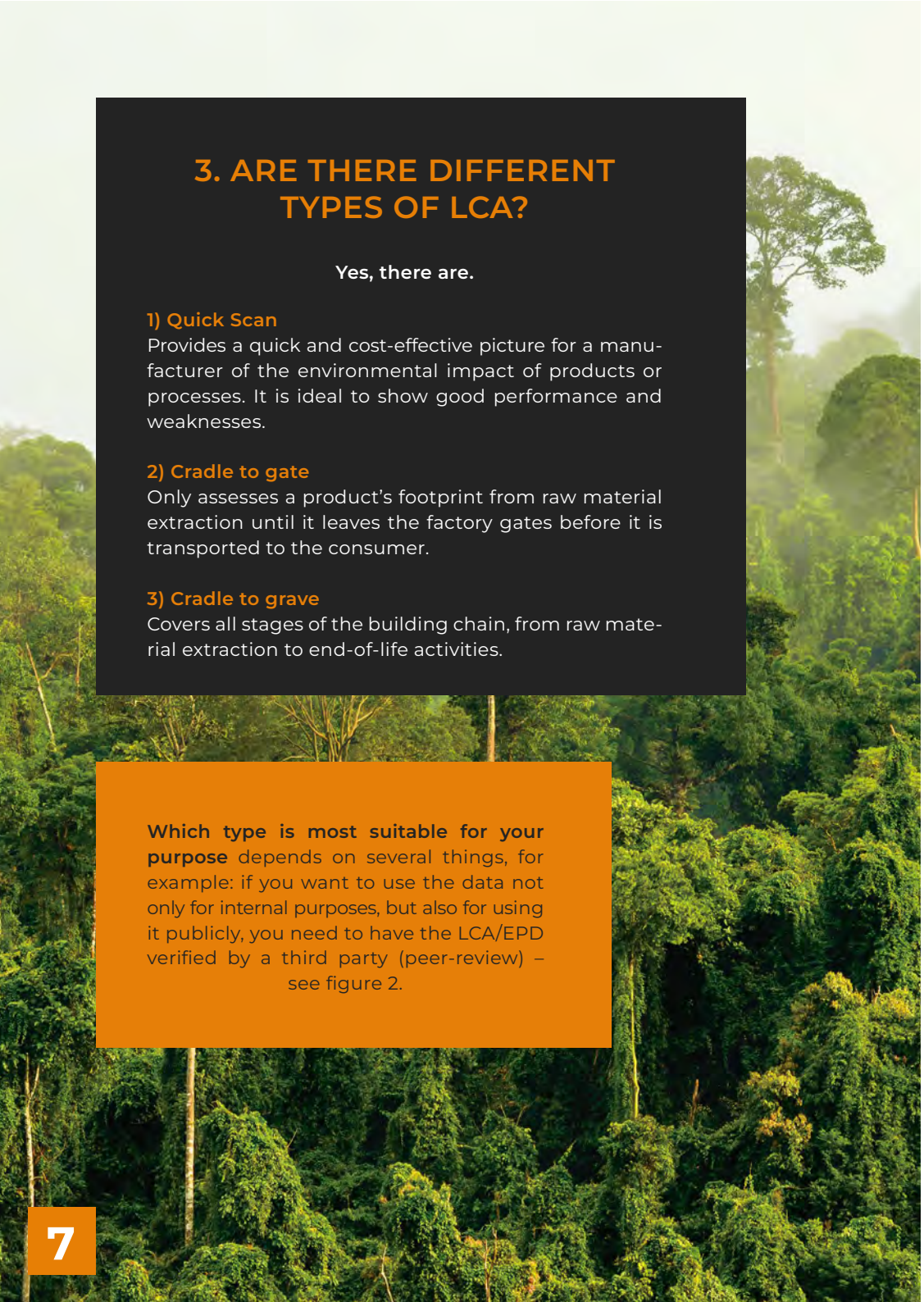


Figure 1. Timeline introduction Environmental Indicators CPR (source: EC, presentation by Oscar Nieto, DG GROW, febr 6, 2024)



3. ARE THERE DIFFERENT TYPES OF LCA?

Yes, there are.

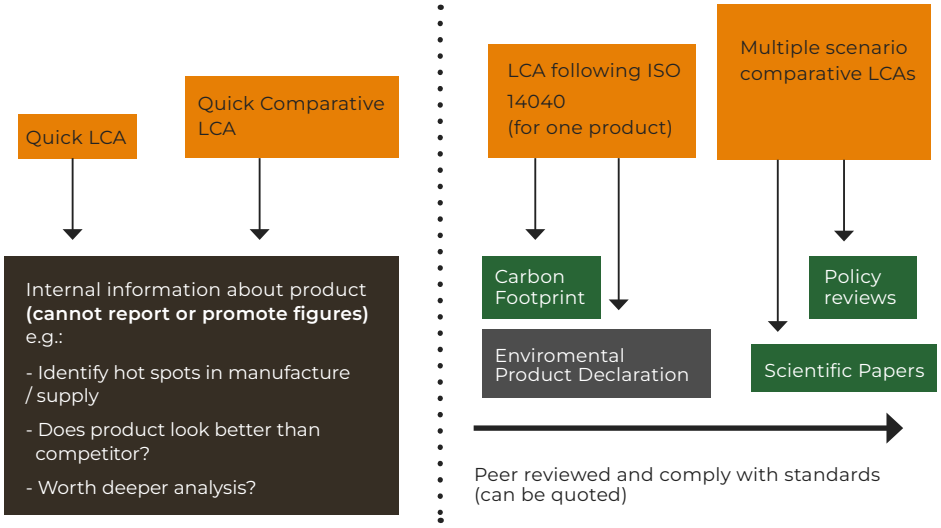
1) Quick Scan
Provides a quick and cost-effective picture for a manufacturer of the environmental impact of products or processes. It is ideal to show good performance and weaknesses.

2) Cradle to gate
Only assesses a product's footprint from raw material extraction until it leaves the factory gates before it is transported to the consumer.

3) Cradle to grave
Covers all stages of the building chain, from raw material extraction to end-of-life activities.

Which type is most suitable for your purpose depends on several things, for example: if you want to use the data not only for internal purposes, but also for using it publicly, you need to have the LCA/EPD verified by a third party (peer-review) – see figure 2.

FIGURE 2. OUTPUTS FROM DIFFERENT LCAS DIFFERENTTYPES OF LCAs



4. ARE THERE DIFFERENT TYPES OF LCA METHODS?

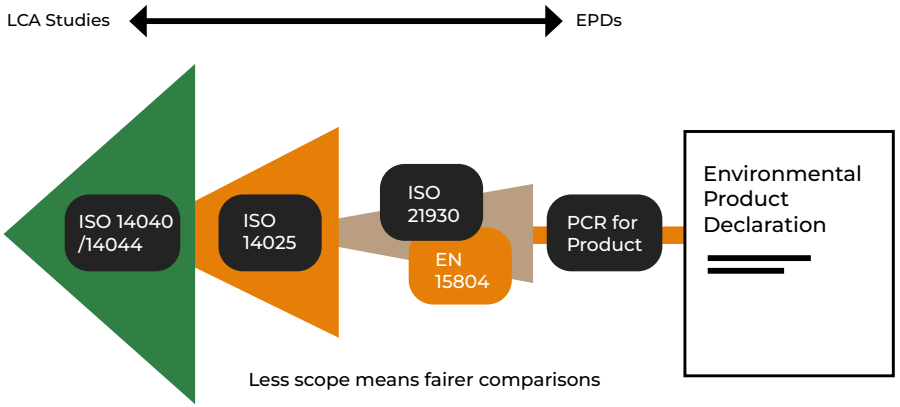
Yes, there are.

Therefor it is important to realise that LCA data can be made comparable if they are based on the same principles, like:

- using the same standards (e.g. ISO 14044 (Generic), EN 15804 (How to make an EPD) and EN 16485 (PCR -Wood Specifics)
- using the latest or harmonised version of the standards
- using similar datasets
- having the LCA/EPD be verified in case of publication (peer-review)

An LCA-operator/expert will help you with above.

Scope of Construction LCAs and EPDs



5. ARE THERE DIFFERENT OUTPUT FORMATS?

Yes, there are.

1) PEF
(Product Environmental Footprint): developed by the European Commission, PEF provides a standardized way to communicate environmental performance for products, not only for building products, but also for consumer products.

2) OEF
(Organizational Environmental Footprint): similar to PEF, but focuses on organizations.

3) EPD
(Environmental Product Declaration): a transparent document that communicates a product's environmental performance based on LCA results, developed by the European Normalisation Institute CEN (Standard: EN15804+A2).

6. ARE LCA METHODS AND FORMATS HARMONISED?

The European Commission aims to harmonize LCA methods. The focus is on PEF and OEF, as it has been developed by the commission. The widely used standard EN 15804 of CEN has therefor been harmonised with the PEF standard in 2019. As the European Commission, through the CPR, has appointed CEN standards for declaring Environmental Sustainability, the EN 15804 and EN 16585 will be leading documents for wood and wood products.

7. HOW IS THE ENVIRONMENTAL SUSTAINABILITY CALCULATED?

The following steps can be defined in preparing Environmental data:

1) Chain modelling: first the whole product chain is modelled from harvesting to demolition and reuse/recycling to see where in- and outputs could take place.

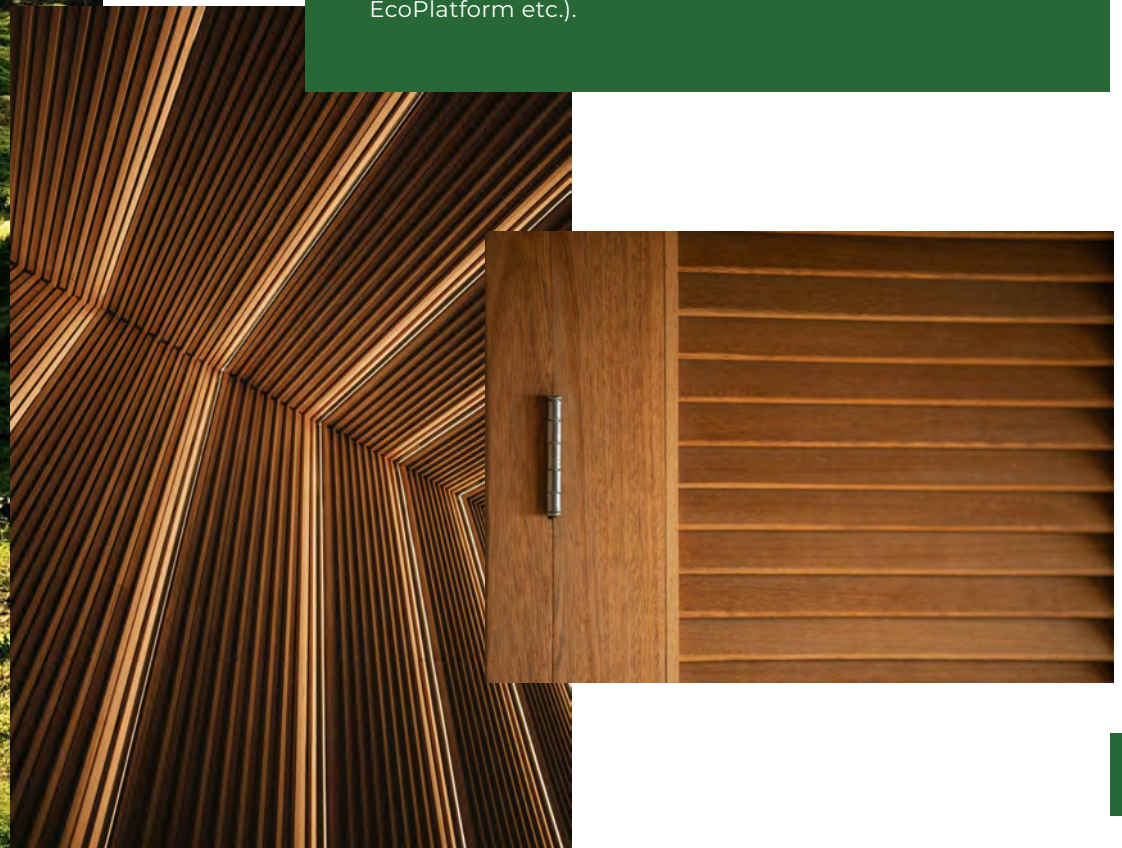
2) In- and outputs: all inputs (energy, water, chemicals etc.) and outputs (emissions, dust, waste water etc.) are inventoried in each of the four different phases (Modules: A, B, C and D).

3) Calculation tool: the in- and outputs are entered in a calculation tool (e.g. Simapro etc.) to calculate the different impacts as defined in separate ''environmental impact categories''. For common background information/processes (energy mix, heating values wood, transport, etc.) data from Environmental databases can be used (as Gabi, EcoInvent or Corrim). Harmonisation is advisable as outcome differ (significantly) per data source.

4) Impact categories: there are different types of environmental impacts that can be caused by the in- and output. Examples are influence on resource depletion, impact on the quality of the Ozone layer and Global Warming (greenhouse gas emissions like CO2), human health or the quality of soils and water. Most of the impact categories are described in different units. See for an overview of the impact categories paragraph 8.

5) Life stages (Modules): 4 stages are used, A to D. See figure 2.

6) Outcome Environmental Impact: after all environmental impacts are calculated for all modules, they can be totalled. A matrix with these data can be found in EPD. These EPD can either be put in EPD databases (Inies.fr, EPDNorge, EcoPlatform etc.).



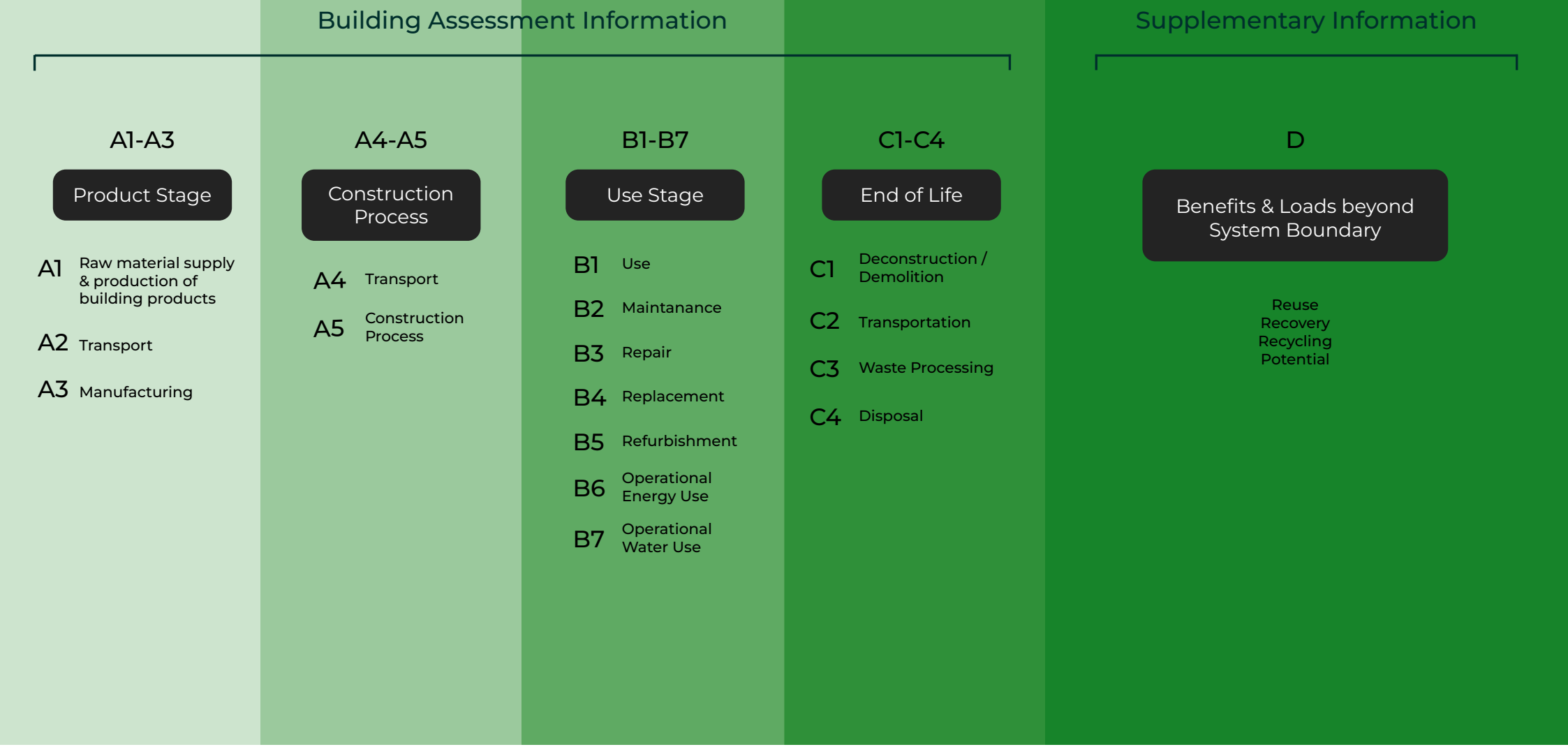


Figure 3. Modules A to D with what process is analysed. A1 for raw material supply, A2 for transport to the factory and Module D for reuse and recycling processes (source: EN 15804+A2).

8. WHICH ENVIRONMENTAL IMPACTS ARE IDENTIFIED IN LCA?

Up to 2021 11 categories were calculated (set A1), currently 11 + 8 categories are compulsory under the EN 15804+A2: 2029. Below the name, explanation and unit of the 19 environmental impact categories:

1. Global Warming Potential (GWP): measures greenhouse gas emissions (e.g., CO_2, CH_4) over the product's life cycle.
2. Ozone Depletion Potential (ODP): assesses substances' impact on the ozone layer.
3. Acidification Potential (AP): quantifies acid rain formation due to emissions.
4. Eutrophication Potential (EP): evaluates nutrient runoff and water body pollution.
5. Photochemical Ozone Creation Potential (POCP): considers volatile organic compounds' impact on air quality.
6. Resource Depletion (Abiotic and Biotic): accounts for resource extraction.
7. Water Depletion: Measures water consumption.
8. Land Use: Considers land area required for production.
9. Human Toxicity Potential (HTP): Assesses health impacts.
10. Ecotoxicity Potential (ETP): Evaluates harm to ecosystems.
11. Particulate Matter Formation Potential (PMFP): Measures emissions contributing to particulate matter in the atmosphere.
12. Freshwater Ecotoxicity Potential (FETP): Assesses the impact of pollutants on freshwater ecosystems.
13. Marine Ecotoxicity Potential (METP): Evaluates the impact on marine ecosystems.
14. Terrestrial Ecotoxicity Potential (TETP): Considers harm to terrestrial ecosystems.
15. Abiotic Resource Depletion (Minerals and Metals): Accounts for mineral and metal extraction.
16. Abiotic Resource Depletion (Fossil Fuels): Measures fossil fuel extraction.
17. Renewable Energy Depletion: Considers the use of renewable energy resources.
18. Non-Renewable Energy Depletion: Assesses non-renewable energy consumption.
19. Ionizing Radiation: Evaluates exposure to ionizing radiation.

9. WHAT IS AN EPD?

The Life Cycle Inventory and analysis are documented in an LCA report. An Environmental Product Declaration (EPD) is a summary of this report, declaring the environmental performance of a specific product or a range of comparable products. It includes brief descriptions of the product and assessed processes, without revealing confidential producer data. The key feature of an EPD is the matrix of environmental impact data. An independently verified EPD is a comprehensive and internationally recognized document.

10. WHAT ARE THE MOST IMPORTANT STANDARDS FOR LCA USED IN EUROPE?

There are several standards* that LCA practitioners need to abide. The most important are:

ISO 14025: 2006 - Environmental labels and declarations — Type III environmental declarations - Principles and procedures

ISO 14040: 2006: - Life cycle assessment — Principles and framework

ISO 14044: 2006: - Life cycle assessment — Requirements and guidelines

EN 15804: 2019 + A2 - Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products

EN 16485: 2014: - Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction

*Always use the standard that is active.

11. IS THERE A SPECIFIC STANDARD FOR PREPARING EPD FOR WOOD AND WOOD PRODUCTS?

The EN 15804 is the generic standard to be used as format for all building materials. As materials can differ in many ways, specific standards for guidance are developed on how to interpret the rules in EN 15804 for those materials. The EN 16485: 2014* provides general Product Category Rules (PCR) for Type III environmental declarations related to wood and wood-based products used in construction and related processes.

*Currently under revision.

12. WHAT ARE THE STAGES IF I WANT TO HAVE AN LCA AND EPD PREPARED?

The stages in timely order, are:

1. **Select the product(s):** Identify the products for which you need EPDs prepared.
2. **Choose an accredited LCA practitioner:** This can be from your country or abroad.
3. **Collect data:** Your LCA practitioner may provide checklists; schedule a free consultation in advance if possible.
4. **Data analysis and report preparation:** The LCA practitioner will analyze the data, model it, and prepare the LCA report and data-sets for the EPD. Ask your LCA practitioner to review and validate the generic process data to ensure it fits your specific situation.
5. **Peer-review of LCA report and EPD:** this is the second opinion of a third party with LCA expertise for validation of the processes and data content. Currently the peer-review is done by another (pre-selected) accredited LCA practitioner. Under the CPR a Notified Body will need to approve the data, the LCA tool and database used and the final EPD.
6. **Publication:** Publish the EPD through an EPD program.
7. **Use the EPD:** Share the EPD on your website (linked to your DoPC) and optionally upload it to a national or international EPD database. This ensures your product is accessible to other LCA practitioners and sustainability calculators or share it directly with customers to support sales.

13. WHO CAN PERFORM AN LCA?

While anyone can perform an LCA, it requires significant expertise. Therefore, it's often advisable—and in many cases compulsory—to consult an accredited LCA practitioner. Many governments and environmental databases (such as EcoInvent, GaBi, EcoPlatform, EPDNorge, and EPD-Denmark) require EPDs to be developed and validated by accredited parties.

However, manufacturers can also perform their own EPDs by using licensed LCA tools (such as One Click LCA, Ecochain, OpenLCA, ReThink, and EPDNorge), sometimes with support from the tool provider. These tools must be approved by a Notified Body or other institute with LCA expertise, and the resulting EPDs need peer review or validation from an accredited practitioner. The most widely used tools integrate with EcoInvent, a Swiss-managed database focused on European products.

These programs are not free and can be costly, but for organizations needing frequent EPDs or LCAs, investing in these tools can be worthwhile.

14. WHAT ARE THE COST OF LCA?

The cost of an LCA can vary significantly depending on the number and complexity of your products, as well as the choice of LCA practitioner. If you can build on existing data or a previous LCA, the costs will likely be lower. As such, it is challenging to provide a fixed price range, but it typically falls between €10,000 and €25,000.

If you have in-house expertise and access to an EPD generator, the costs can be significantly reduced. However, additional expenses should be considered, such as validation of your LCA or EPD and registration in a national or member-state database. These costs may also vary depending on the country.

15. HOW LONG DOES IT TAKE TO PREPARE AN LCA OR EDP?

An LCA practitioner typically takes about six months to prepare an LCA report and EPD. However, data collection—especially if reliant on information from international suppliers—can extend this timeline to as long as 12 months. Validation adds another two months.

With the rising demand for LCA data, practitioners in many countries are experiencing high workloads, leading to long waiting lists. Support options include member agreements with selected LCA practitioners for set pricing and contracts for EPD Generator access.

16. ARE THERE ALREADY LCA AND EPD FOR WOOD AND WOOD PRODUCTS?

Yes, there are many EPD available already. These can be generic, general EPD for example for ''Softwood, planed, kiln dried'', or product specific/branded products. Please find links to some EPD databases in ''Links''.

17. HOW CAN I SUPPORT MEMBERS?

Explain LCA and EPD: Provide clear and concise information about Life Cycle Assessment (LCA) and Environmental Product Declarations (EPD).

Highlight the Importance of LCA: Emphasize its relevance for marketing, Green Purchasing, and compliance with the upcoming CPR Environmental Sustainability rules (effective from 2027).

Host Educational Sessions: Organize meetings or webinars featuring LCA experts, governmental organizations, or experienced members to offer detailed insights into LCA.

Offer Member Support: Facilitate additional support, such as negotiated pricing agreements with selected LCA practitioners and contracts for access to an EPD generator.

LINKS

EPD DATABASES

IBU (DE): https://ibu-epd.com/en/published-epds/
Inies (FR): www.inies.fr/en/inies-for-building/product-lca/
EcoPlaform: www.eco-platform.org
B-EPD (BE): www.health.belgium.be/nl/het-belgische-epd-programma-b-epd
Environdec (SE): www.environdec.com/library
EPDNorge (NO): www.epd-norge.no/#googtrans%28no%7Cen%29
EPDDenmark (DK): www.epddanmark.dk/uk/epd-database/
Nationale Milieudatabase (NMD) (NL): www.milieudatabase.nl
Sphera (US): www.lcadatabase.sphera.com
GaBi: www.lcacommons.gov/lca-collaboration/search

ENVIRONMENTAL DATABASES FOR PROCESS DATA

EcoInvent: https://ecoinvent.org/
GaBi: provides datasets of Gabi-software is used: example datasets:
www.lcacommons.gov/lca-collaboration/search
Corrim: www.corrim.org (CA)

EPD GENERATORS (SOME EXAMPLES)

One-Click LCA: www.oneclicklca.com
OpenLCA: www.openlca.org
Rethink: www.rethink-environmental-software-and-services.com/
EPDNorge: https://lca.no/en/epd-generator-2/

CONSTRUCTION PRODUCT REGULATION (CPR)

General: https://single-market-economy.ec.europa.eu/sectors/construction/construction-products-regulation-cpr_en

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