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DEPARTMENT OF
AGRICULTURE, FOOD
ENVIRONMENT AND FORESTRY

Wood packaging environmental facts

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- **ISO 14040:2006** Environmental management. Life cycle assessment. Principles and frameworks.;
- **ISO 14044:2006** Environmental management. Life cycle assessment. Requirements and guidelines;



- **EN ISO 14025:2010:** Environmental labels and declarations - Type III environmental declarations - Principles and procedures (ISO 14025:2006).
- **General Programme Instructions (GPI)** of the International EPD® System



- **EPD-NORGE:** NPCR 023 2019 Packaging products and services
- **EPD-INTERNATIONAL:** PCR 2019:13 Packaging product category classification: multiple CPC
- **Product Category Rule (PCR) Guidance for Wooden Pallets,** EPD Requirements, UL 10003



Goal

Develop an EPD for any packaging product and services.



Product category

Valid for any type of packaging carrying or containing packaged or unpackaged goods with or without cooling/freezing, heating, modified atmosphere (MAP) or any other ancillary properties.

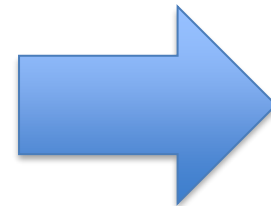
Aim

Develop criteria and methodologies to make a LCA of packaging.

Defines:

- system boundaries
- allocation procedures for reuse
- LCI and LCIA calculation rules
 - guidance and rules for determining reference service life (RSL)
- guidance for default scenarios
- guidance on functional units.

NPCR 023 PACKAGING PRODUCTS AND SERVICES

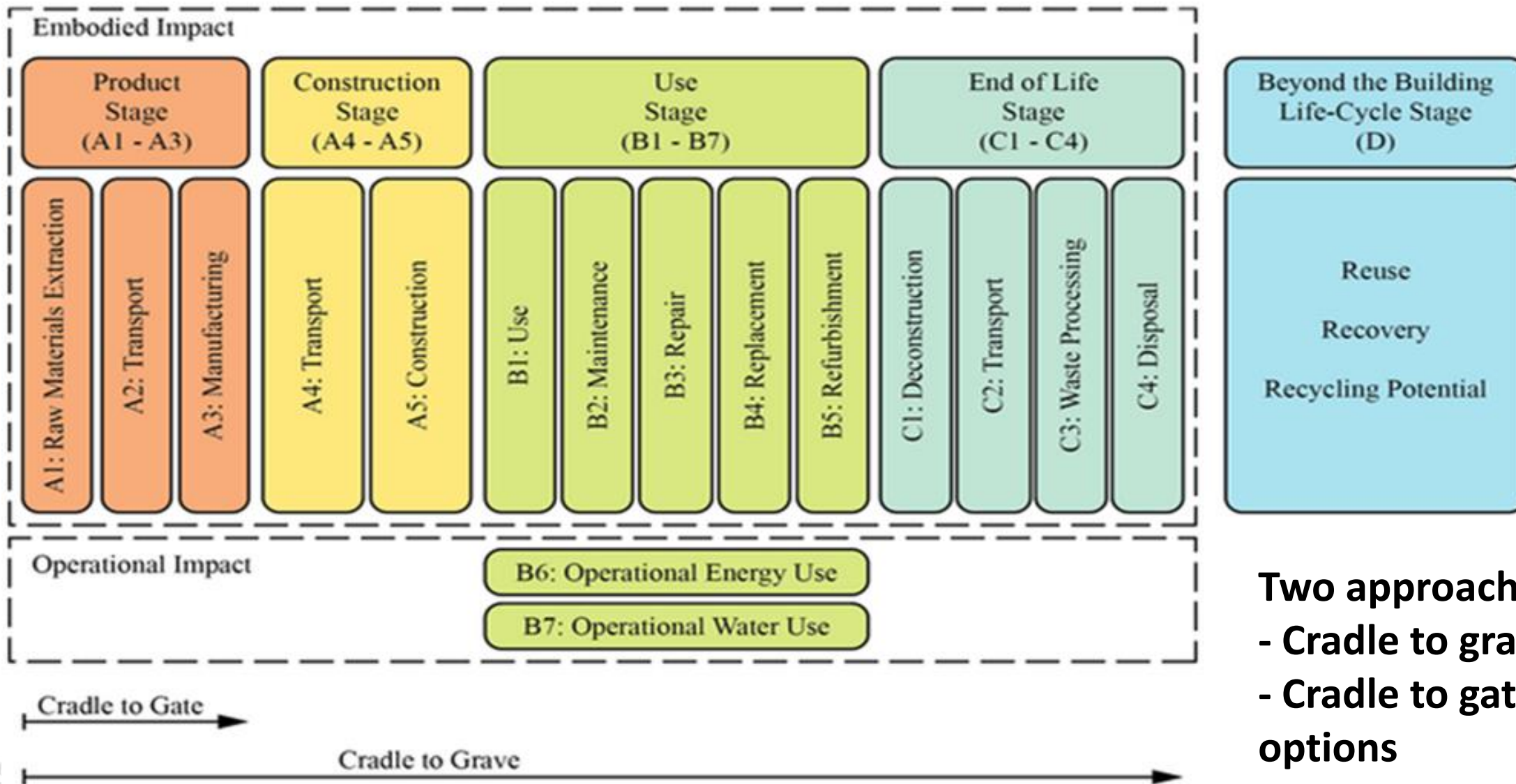


EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works – Environmental Product Declaration – Core rules for the product category of construction products

NPCR PART A: Construction products and services – epd-norge

NPCR 015 Part B for wood and wood based products for use in construction epd-norge

CONSTRUCTION WORKS ASSESMENT INFORMATION																			
CONSTRUCTION WORKS LIFE CYCLE INFORMATION														SUPPLEMENTARY INFORMATION BEYOND CONSTRUCTION WORKS LIFE CYCLE					
A1 - A3			A4 - A5		B1 - B7							C1 - C4				D			
PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY			
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D			
Raw material supply	Transport	Manufacturing	Transport	Construction - Installation process	Use	Maintenance	Repair	Replacement ¹	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery, recycling potential			
scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario	scenario		
Cradle to gate with modules C1-C4 and module D	Mand.	Mand.	Mand.									Mand.	Mand.	Mand.	Mand.	Mandatory			
Cradle to gate with options, modules C1-C4 and module D	Mand.	Mand.	Mand.	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.	Mand.	Mand.	Mand.	Mand.	Mandatory			
Cradle to grave and module D	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mandatory			
Cradle to gate ²	Mand.	Mand.	Mand.																
Cradle to gate with options ²	Mand.	Mand.	Mand.	Opt.	Opt.														



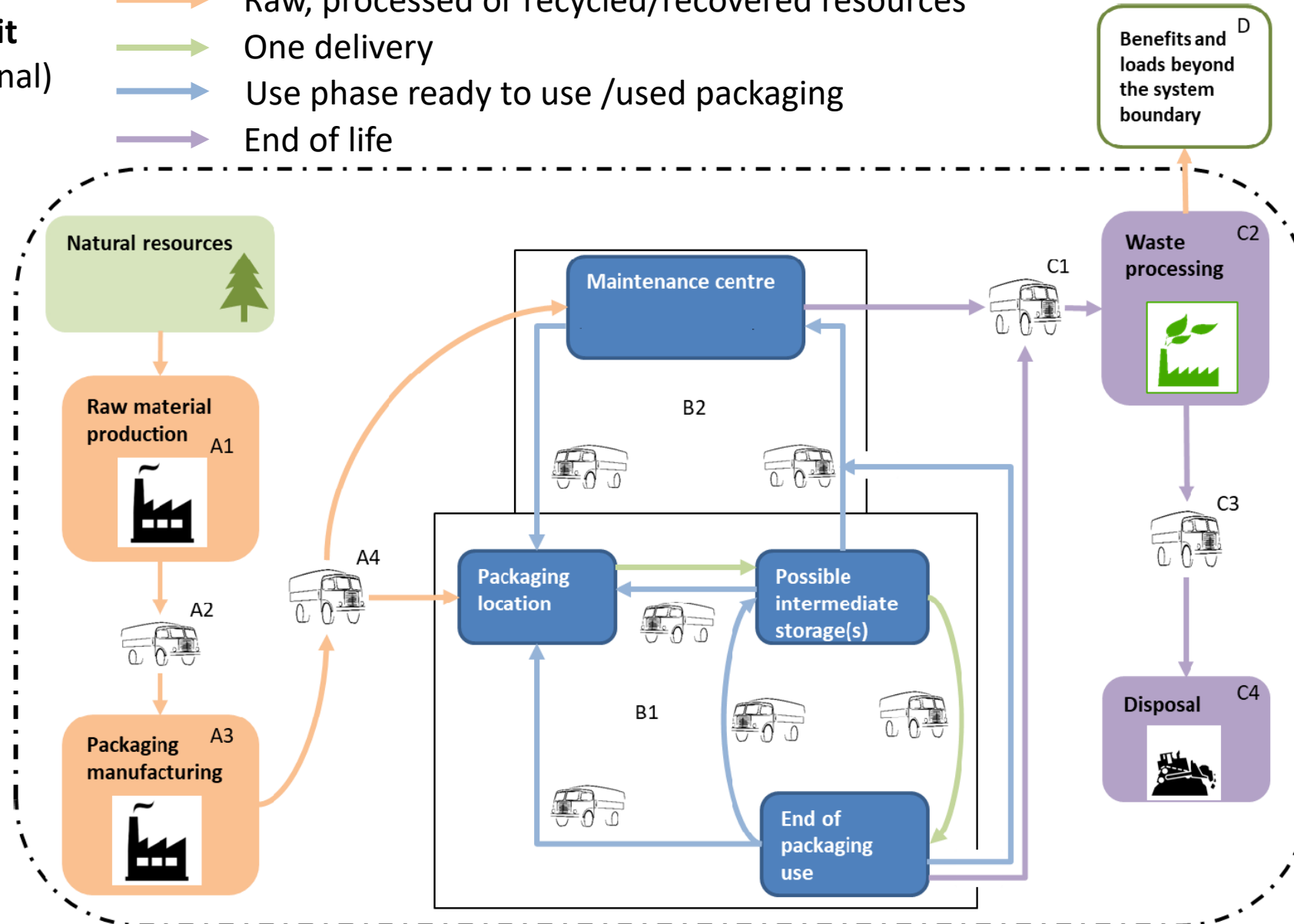
Two approaches:

- Cradle to grave
- Cradle to gate with options

NPCR 023 - Cradle to grave approach

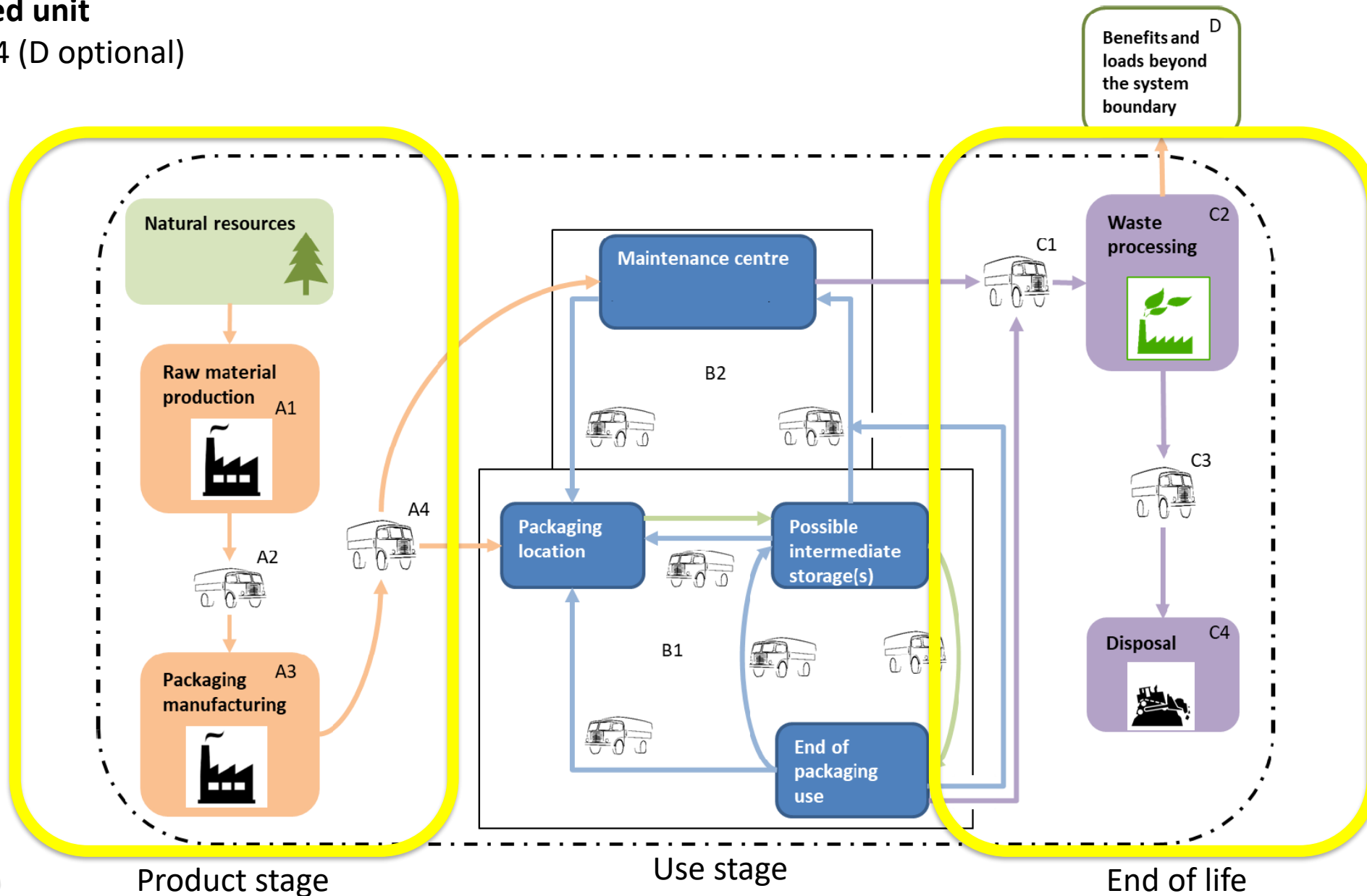
Functional unit
A1 – C4 (D optional)

- Raw, processed or recycled/recovered resources
- One delivery
- Use phase ready to use /used packaging
- End of life



Declared unit

A1–A4 + C1-C4 (D optional)



Cradle to grave Functional unit (FU)

For single or multiple use packaging

- One delivery of one unit of packaging for a defined good or group of goods.
- If declared per 1000 kg or 1000 litres a conversion factor showing the required number of packaging units for the delivery.
- Results should be displayed both per functional unit and per life cycle module A1-A3, A4, B1-B2, C1-C4 and D



Cradle to gate Declared unit

One produced unit of packaging ready to leave the factory gate.

Technical properties :e.g. net inner volume (m³), total external volume (m³), maximum load strength (kg/m²), stacking strength (kg/unit)

Product application/use: e.g. single or multiple use, container use purpose, packaging design scenario (primary, secondary,...)

Level of recyclability: e.g., number of recycling processes before downgrading or recycling

Description of substances on the **REACH list**



Cut-off must be declared.....

- Production of machinery used in the production of packaging
- Production of machinery used in the production of raw materials
- Production, construction and demolition of facilities, warehouses, and other infrastructure.
- Impacts and resource consumption associated with employees, temporal employees or other additional visiting personnel's food consumption and travel to and from the associated workplaces covered by the system boundary

A list of hazardous and toxic materials and substances shall be included in the inventory. The general cut-off rules do not apply to such substances.

However, substances included in amounts below the limits for chemical product's health and environment hazard classification do not have to be declared.

Exceptions apply for substances on the REACH candidate list and Norwegian priority list, whereby a cut-off of 0.1 weight% applies.

Table 3 — Core environmental impact indicators

Impact category	Indicator	Unit (expressed per functional unit or per declared unit)
Climate change - total ^a	Global Warming Potential total (GWP-total)	kg CO ₂ eq.
Climate change - fossil	Global Warming Potential fossil fuels (GWP-fossil)	kg CO ₂ eq.
Climate change - biogenic	Global Warming Potential biogenic (GWP-biogenic)	kg CO ₂ eq.
Climate change - land use and land use change ^b	Global Warming Potential land use and land use change (GWP-luluc)	kg CO ₂ eq.
Ozone Depletion	Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.
Acidification	Acidification potential, Accumulated Exceedance (AP)	mol H ⁺ eq.
Eutrophication aquatic freshwater	Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	$\langle AC \rangle$ kg P eq. $\langle AC \rangle$
Eutrophication aquatic marine	Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine)	kg N eq.
Eutrophication terrestrial	Eutrophication potential, Accumulated Exceedance	mol N eq.

Impact category	Indicator	Unit (expressed per functional unit or per declared unit)
	(EP-terrestrial)	
Photochemical ozone formation	Formation potential of tropospheric ozone (POCP);	kg NMVOC eq.
Depletion of abiotic resources - minerals and metals ^{c d}	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	kg Sb eq.
Depletion of abiotic resources - fossil fuels ^c	Abiotic depletion for fossil resources potential (ADP-fossil)	MJ, net calorific value
Water use	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	m ³ world eq. deprived



Carbon
dioxide

Water

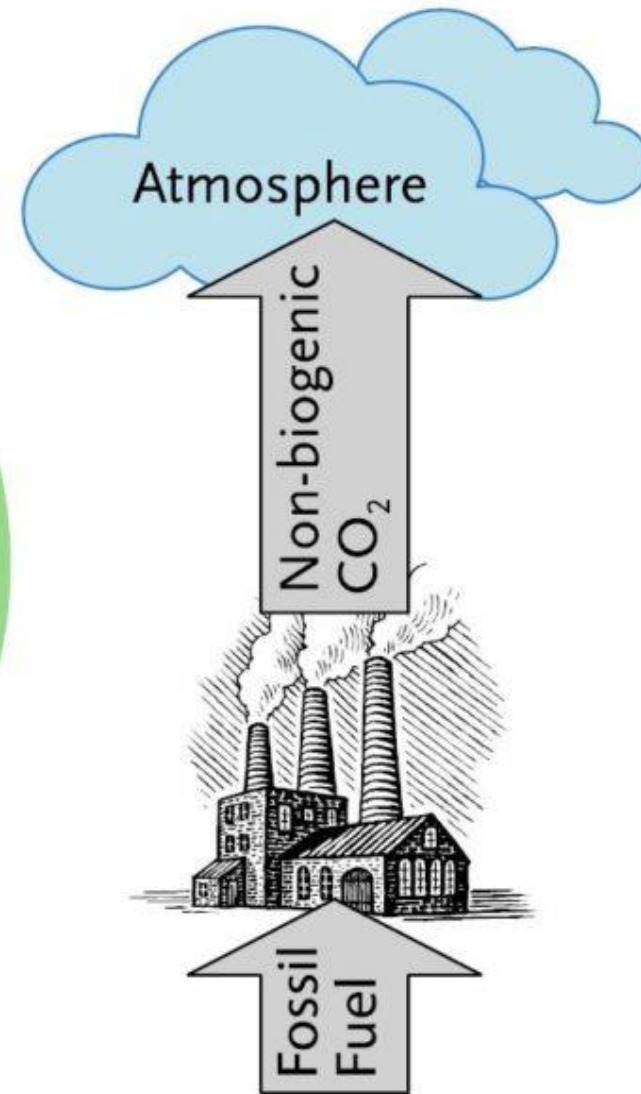
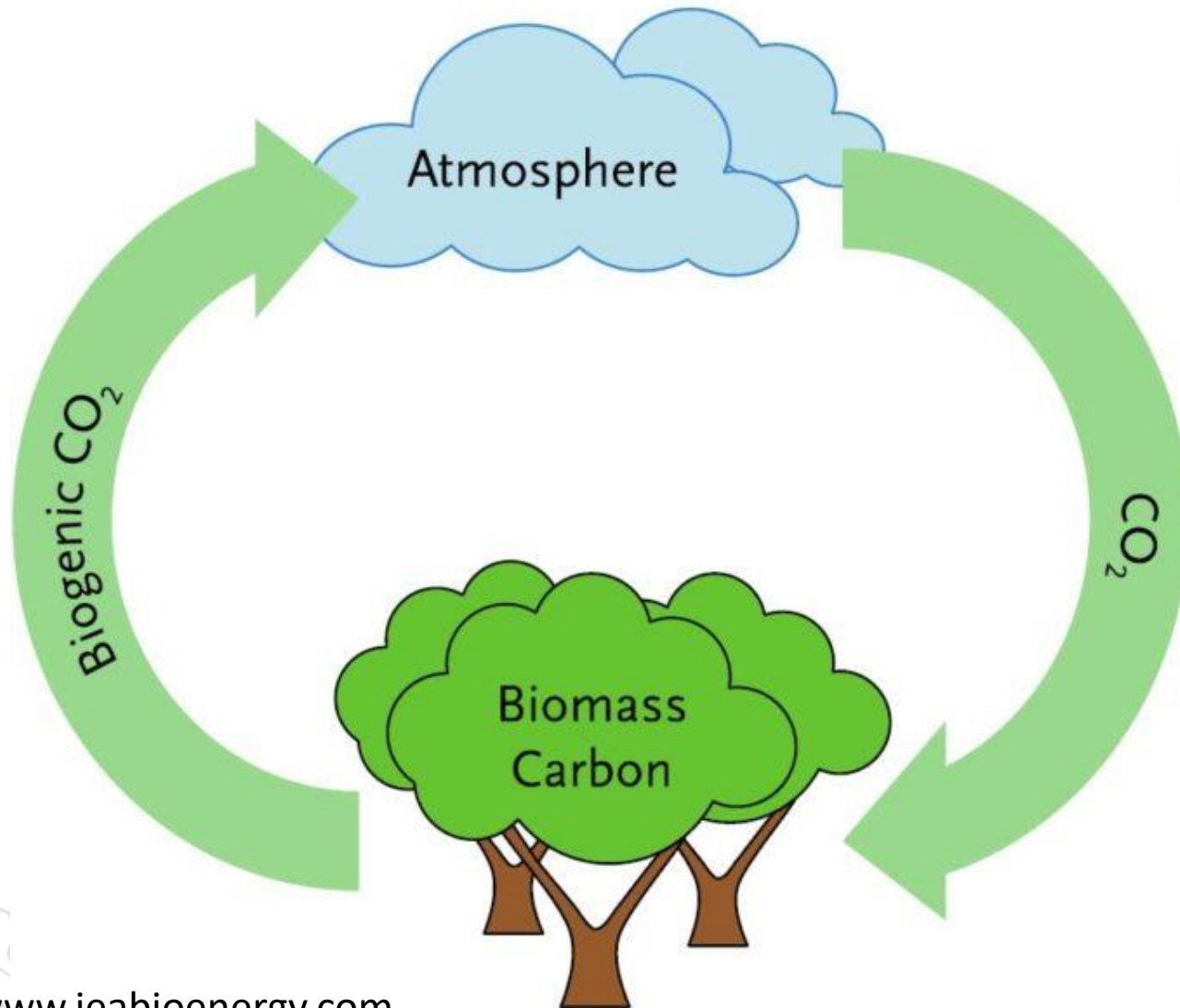
Light

Carbohydrates

Oxygen



<http://en.wikipedia.org>



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

Case where the carbon neutrality can NOT be assumed – Non certified forests

Characterization factor for import impact assessment: 0 kg CO₂-eq/Kg CO₂

Characterization factor for export impact assessment: 1 kg CO₂-eq/Kg CO₂

277 kg of wood at $\omega = 15\%$

Biogenic Carbon	Contribution to GWP
Import	
241 kg of dry wood	0 kg CO ₂ -eq
Export	
153 kg product	281 kg CO ₂ -eq
88 kg chips	161 kg CO ₂ -eq
Balance	
0 kg	442 kg CO ₂ -eq

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

Case where the carbon neutrality can be assumed – Certified forests

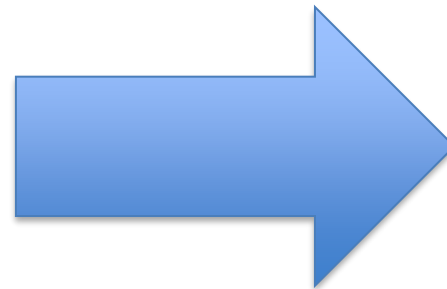
Characterization factor for import impact assessment: $-1 \text{ kg CO}_2\text{-eq/Kg CO}_2$

Characterization factor for export impact assessment: $1 \text{ kg CO}_2\text{-eq/Kg CO}_2$

277 kg of wood at $\omega = 15\%$

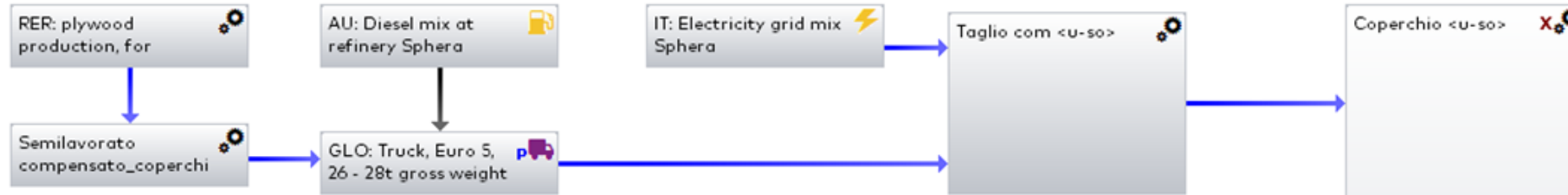
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Balance	
0 kg	0 kg CO ₂ -eq

The packaging – declared unit
consists of 3 parts:



Fir 4-way pallet base

SP 1: Taglio compensato



SP 2: Creazione bordi in acciaio



SP 3: Pressatura bordi in acciaio su compensato

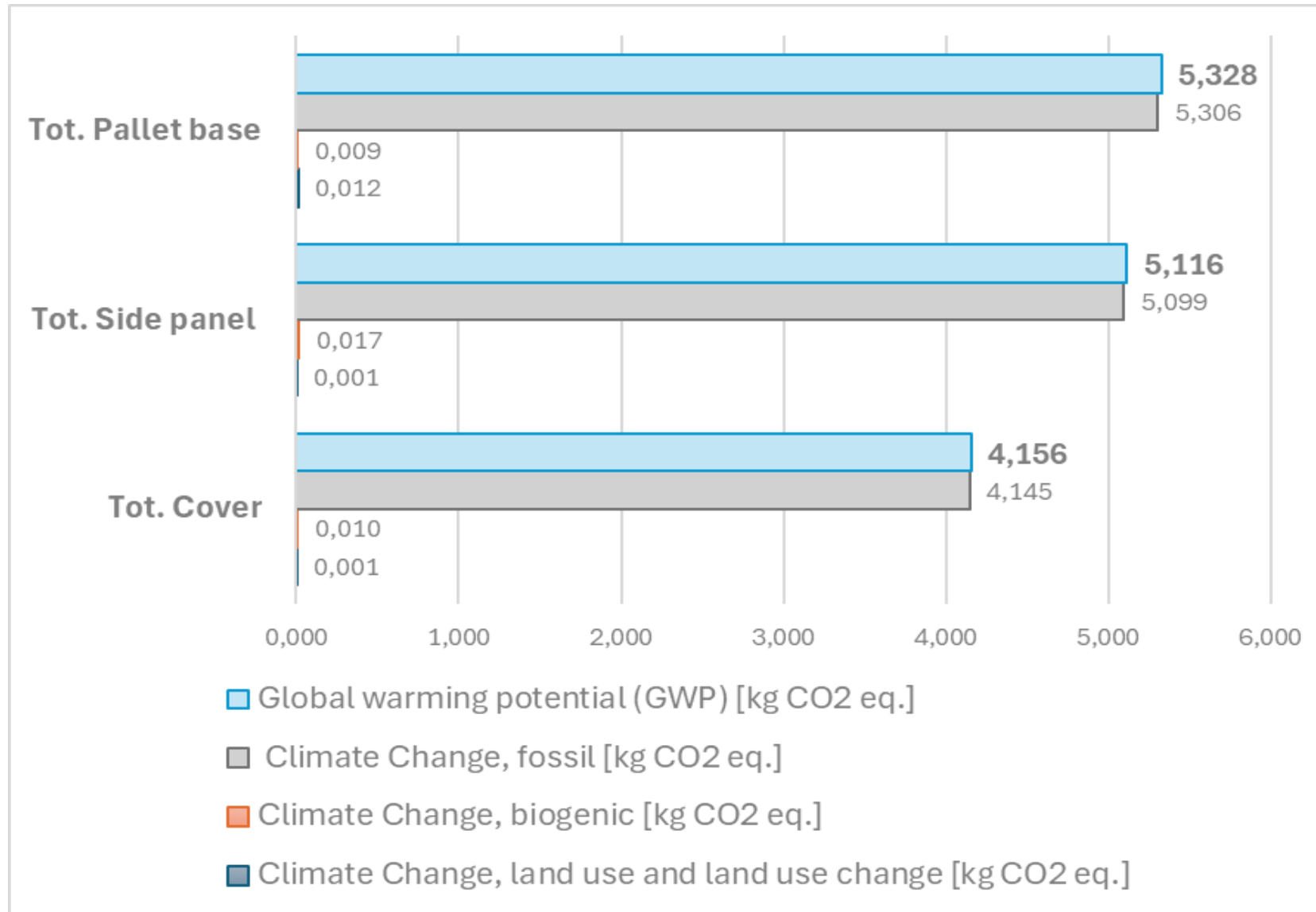


Impact categories		Unit	Total
Global warming potential (GWP)	Fossil	Kg CO ₂ eq.	1.45E+01
	Biogenic	Kg CO ₂ eq.	3,57E-02
	Land use and land trasformation	Kg CO ₂ eq.	1,39E-02
	TOTAL	Kg CO₂ eq.	1,46E+01
Ozone depletion		Kg CFC-11eq.	7,03E-07
Acidification		Mol H ⁺ eq.	1,05E-01
Eutrophication	Freshwater	Kg P eq.	1,67E-03
	Marine	Kg N eq.	1,98E-02
	Terrestrial	Mol N eq.	2,51E-01
Photochemical ozone formation		Kg NMVOC	6,42E-02
Resource use	Fossil resources	MJ	1,67E+02
	Metals and minerals	Kg Sb eq.	2,88E-05
Water use		m³ worl eq. deprived	7,07E+00

LCIA - Environmental Footprint 3.1. - Production

Impact categories		Unit	Cover	Side panel	Pallet base
Global warming potential (GWP)	Fossil	Kg CO ₂ eq.	4,14E+00	5,10E+00	5,31E+00
	Biogenic	Kg CO ₂ eq.	9,69E-03	1,68E-02	9,27E-03
	Land use and land transformation	Kg CO ₂ eq.	9,99E-04	8,63E-04	1,20E-02
	TOTAL	Kg CO₂ eq.	4,16E+00	5,12E+00	5,33E+00
Ozone depletion		Kg CFC-11eq.	1,71E-07	3,44E-07	1,88E-07
Acidification		Mol H ⁺ eq.	2,44E-02	3,95E-02	4,08E-02
Eutrophication	Freshwater	Kg P eq.	4,06E-04	8,12E-04	4,48E-04
	Marine	Kg N eq.	3,90E-03	6,01E-03	9,94E-03
	Terrestrial	Mol N eq.	5,07E-02	8,19E-02	1,18E-01
Photochemical ozone formation		Kg NMVOC	1,32E-02	2,05E-02	3,05E-02
Resource use	Fossil resources	MJ	4,66E+01	6,44E+01	5,64E+01
	Metals and minerals	Kg Sb eq.	5,71E-06	1,13E-05	1,18E-05
Water use		m ³ worl eq. deprived	1,64E+00	3,20E+00	2,24E+00

Focus - Global warming potential (GWP) results



- **EN standards:**

1. UNI EN 15804:2021-Sostenibilità delle costruzioni - Dichiarazioni ambientali di prodotto - Regole quadro di sviluppo per categoria di prodotto;
2. UNI EN 16485:2014-Legno tondo e segati - Dichiarazioni Ambientali di Prodotto - Regole per categoria di prodotto per il legno e i prodotti a base di legno per l'impiego nelle costruzioni;
3. UNI EN 16449:2014 Wood and wood-based products – Calculation of the biogenic carbon content of wood and conversion to carbon dioxide.

- **Product Category rules:**

1. Product category rules-NPCR 023-PACKAGING PRODUCTS AND SERVICES;
2. Product category rules -PART A: Construction products and services;
3. Product category rules-NPCR 015-Part B for wood and wood-based products;

- **Norme ISO Standard:**

1. ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures;
2. ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.;
3. ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines;

- **Environmental Product Declarations:**

1. EPD wooden packaging from Kronus SIA- in accordance with ISO 14025:2006;
2. General Program Instructions -Version 1.1 – 6 June 2022 -EPD Hub Limited;

A detailed close-up photograph of cork bark, showing its characteristic layered, porous structure with vertical ridges and grooves. The colors range from dark brown to light tan.

Thank you for your attention