Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Concrete Multi-layer Wall

from

MITAU Prefab

Located on Neretas street 3, Jelgava, Latvia, LV-3002

Programme:	The International EPD® System, www.environdec.com
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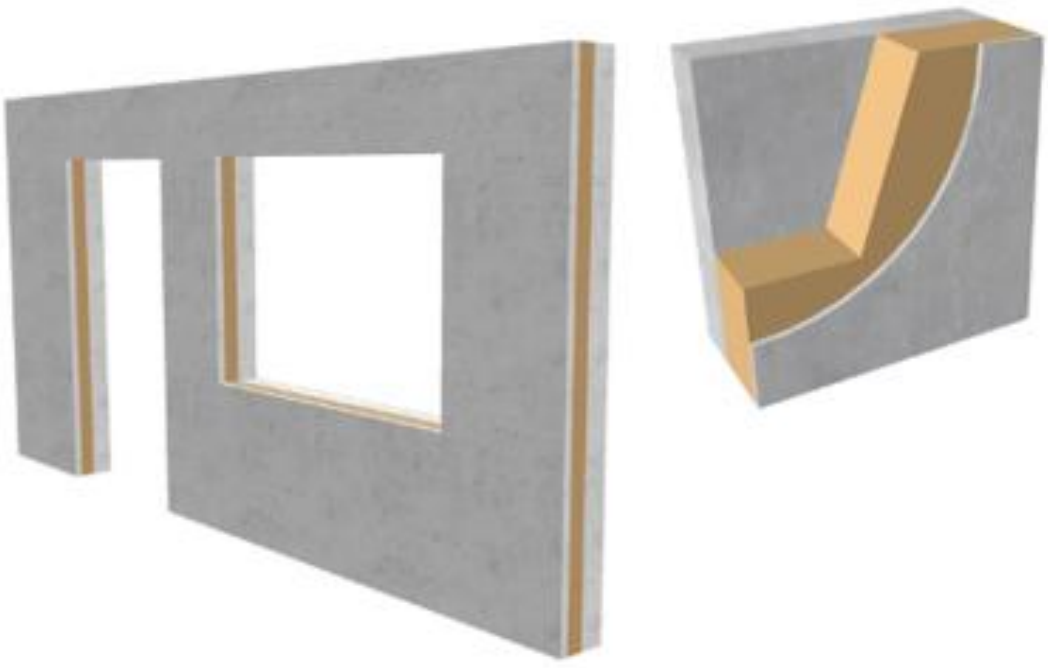

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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CEN standard EN 15804:2012+A2:2019 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): *Construction Products, PCR 2019:14 Version 1.11 and the complementary Product Category Rules c-PCR-003 (TO PCR 2019:14)*
PCR review was conducted by: *The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción (Chile). The review panel may be contacted via the Secretariat info@environdec.com*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: *Marcel Gómez Ferrer, Marcel Gómez Consultoria Ambiental. Email: info@marcelgomez.com* Approved by: The International EPD® System
The EPD has been worked out by: Bureau Veritas Latvia SIA. Email: riga@bureauveritas.com
The procedure for follow-up of data during EPD validity involves a third-party verifier: ☒ Yes ☐ No

The EPD owner has sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be equivalent if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: MITAU PREFAB.

Contact: Maris Gustins, maris.gustins@mitauprefab.com, mob.: +371 28346717

Description of the organization: Mitau Prefab produces high-complexity structures with an architectural value that other manufacturers cannot offer. We offer our customers a full construction cycle - starting with design and production and ending with delivery and assembly services in Europe and beyond. We offer products that reduce construction work amount and, therefore, also the impact of weather conditions on the construction process. We guarantee products that are consistently in high and stable quality and reduce use of human resources and waste. Mitau Prefab produces and supplies reinforced concrete structures for Europe's most beautiful and remarkable construction projects.

Product-related or management system-related certifications:

1.Nordcert Certificate with technical specification: EN 13369:2004 + EN 13369:2004/A1:2006 together with supplementary Swedish requirements

2. CE certification according EN 14992:2007+A1:2012

3. UKCA certification according EN 14992:2007+A1:2012

Name and location of production site(s): Latvia, Jelgava

Product information

Product name: Multi-Layer wall element with facade decoration
Product identification: CSW
Product description: Multi-layer wall elements with facade decoration, thermal insulation, and electrical networks. Facade solutions can use bricks, clinker tiles, pigmented facade concrete layers, or matrix-cast facade layers, achieving exciting and unique shapes and appearances.

UN CPC code: 6810910000| Prefabricated structural components for building or civil engineering

LCA information

Declared unit: The declared unit is 1 square meter of a Multi-layer wall. The nominal weight is 786.98 kg/m^2 of multilayer wall

Reference service life: The reference service life for the Multi-layer Wall is 50 years.

Time representativeness: The primary data was gathered internally. All production data corresponds to values for the year 2021.

Scope of the EPD: This EPD has a Global Scope, as installation activities and main raw materials are independent of the region where the products are to be installed. Nonetheless, it must be clarified that transport distances to installation sites (Stage A4) in the model under study correspond to several construction sites located in different parts of Europe. The scope of this EPD is Business to Business.

Database(s) and LCA software used: The Ecoinvent 3.8v was used to conduct the quantitative evaluation in this study. This database provided the background system's life cycle inventory data for raw and processed materials. The LCA software was SimaPro 9.4. To obtain the results following the provisions of EN 15804:2012+A2:2019, the "EN 15804:A1+A2:2019 method", "EDIP 2003", "CED (LHV)" and "IPCC GWP100a" methodologies have been used for environmental impacts, waste generation, use of resources and biogenic carbon content respectively.

Description of system boundaries:
Cradle to gate with options. The LCA was carried out considering the product stage A1-A3, modules C1–C4, module D, and the additional optional modules A4-A5.

Data quality: The foreground data was collected internally, considering the latest available average production amounts and measures during the last year. Data regarding waste processes and scenarios were taken from waste scenarios for Europe contained in Ecoinvent 3.8.

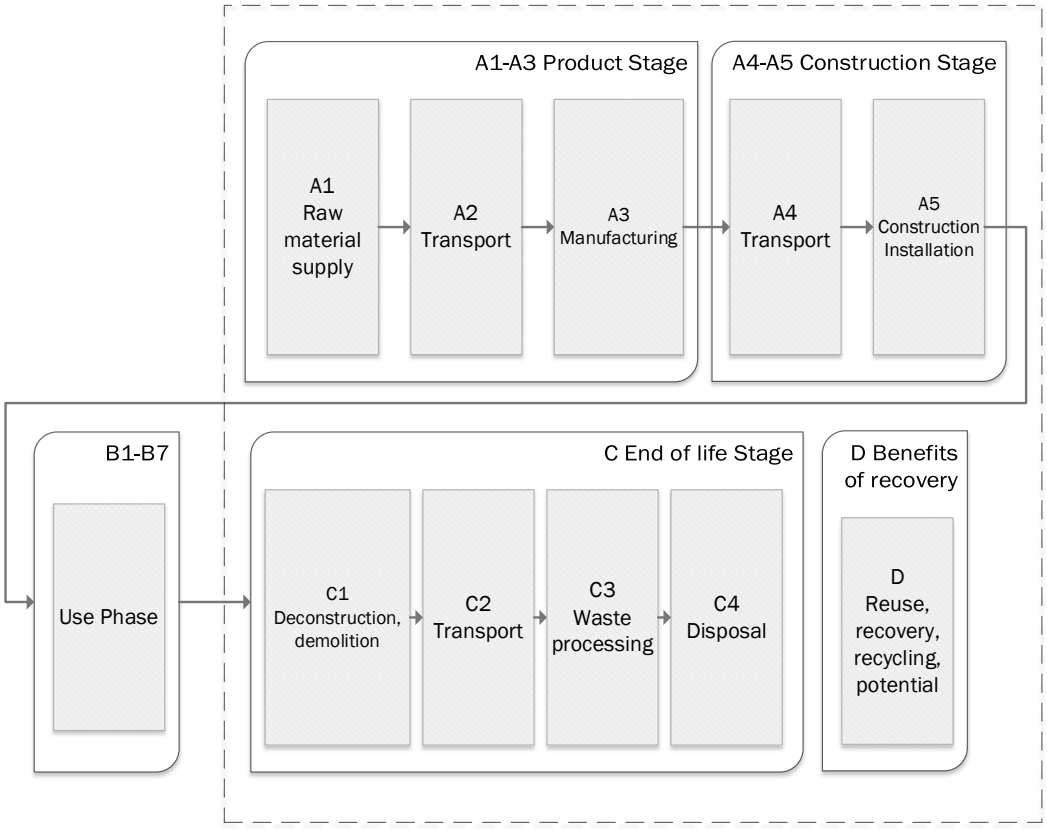
According to the UN Environment Global Guidance criteria on LCA database development, the quality level is defined as very good. Data is geographically representative as it comes from the area of study. It is technically representative as it comes from processes and products under study using the same state of technology defined in goal and scope. It is also time representative as data was collected less than three years between the reference year, according to the documentation.
A data quality rating was performed using a rating system where one means excellent, and five are poor. An average for each criterion is presented as follows:

Technological Representativeness, TeR	Geographic representativeness, GeR	Time Representativeness, TiR	Precision, P	Average DQR
2.23	2.11	1.97	1.71	2.01

Cut-off criteria: All primary raw materials and processes have been considered. Only less than 1% of total material and energy flows were excluded, and 5% of materials and energy per module.

Allocation: Following the recommendations in the EN 15804 and PCR 2019:14, allocation has been avoided when possible. For the required cases, a physical allocation based on mass was considered. However, no allocation was performed in this study.

System diagram:



More information: During this LCA, the *polluters pay,* and modularity principles have been followed. Double counting has been avoided.

The processes related to infrastructure, construction and production of equipment and tools that are not directly consumed in the production process have been excluded. Activities personnel-related, such as transportation to and from work, have been excluded. Long-term emissions are also excluded from the impacts.

Stages and Production description

Product Stage

A1 – Raw material supply: This stage considers the extraction and processing of all raw materials.

A2 - Transport: This stage accounts for the transport activities of raw materials to the facilities in Latvia. This stage includes road transport by lorry and water transport by ferry.

A3 - Manufacturing: This stage includes the manufacturing process conducted in the facilities before the transport to the different locations worldwide. The operations included in this stage are following: assembly of the mould, reinforcement placement, laydown of the concrete, form removal, and element finishing works. The use of packaging materials is considered in this stage.

Construction Stage

A4 – Transport to the construction site: This stage stands for transporting materials from the production site to the construction site. Different destination scenarios have been modeled in this stage to obtain an average impact considering the average distribution of sales during the last year.

	Destination	Destination
Final country or region	Estonia	London
Multi-layer Wall	10.52%	89.48%
Transport mode	Truck	Truck and ferry
Distance	220 km by road	2200 km by road and 45 km by sea

A5 – Construction/Installation: This stage includes the activities related to the installation of the multi-layer wall. It is assumed that no energy or minimal energy is required for installation. Therefore no energy consumption is modeled in this module. Activities related to the recycling and waste disposal of packaging materials are accounted for in this module. The end-of-life processes for such materials correspond to the typical waste treatment scenario for the specific materials under the European geography in the following quantities per declared unit:

Material	Recycling (kg)	Incineration (kg)	Landfilling (kg)
Wood	4.0	-	-

Use Stage:

During a regular-use scenario, it is assumed that no maintenance, repair, replacement and/or refurbishment is required, hence this optional stage is not considered (B1–B5). Energy or water consumption is not required (referred to the declared unit), and hence not declared for the building operation (B6-B7).

End of Life Stage:

C1 – Deconstruction/Demolition: The consumption of fuel during the deconstruction and dismantling process is considered using as a reference the background process available in Ecoinvent 3.8 for conducting this specific activity. Air emissions related to these activities are included.

C2 - Transport: The transport of the dismantled multi-layer wall is considered in this stage. A distance of 50 km is assumed to the disposal facility.

C3 – Waste processing: Waste incineration of 6% of the recovered steel (3.0%) is modeled following average waste treatment scenarios in Europe.

C4 - Disposal: The waste disposal scenario corresponds to the inert landfilling of 97% of the total product plus 94% of steel recovered.

The main assumptions during the end-of-life stage are summarized in the following table:

PARAMETER	VALUE/DESCRIPTION
Collection process specified by type	Deconstruction and demolition of the building and MITAU products
Recovery system specified by type	Municipal incineration of 0.6% of the estimated recovered steel (3.0% of DU) after dismantling the products.
Disposal specified by type	Inert material landfilling of 97% of the product plus 99.4% of recovered steel.
Assumptions for scenario development (e.g., transportation)	Municipal waste collection service by 21 metric ton lorry, 50 km to the disposal site

Benefits and loads beyond the system boundaries:

D – Benefits or recovery: Benefits of recycled packaging materials (wood) and steel used in the product are considered in module D. It is assumed the total amount of wood used as accompanying material to the concrete massive slab is recycled after the reference product is used in the construction/installation module (A5). Additionally, 47% of the steel incinerated in the waste treatment module (C3) is recovered and used as scrap steel to obtain sorted and pressed iron scrap. This value is obtained from 3.8.

Modules declared, geographical scope, the share of specific data (in GWP-GHG indicator), and data variation:

	Product stage			Construction process stage		Use stage							End-of-life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EUR	EUR	LV	GLO	GLO	ND	ND	ND	ND	ND	ND	ND	GLO	GLO	GLO	GLO	GLO
Specific data used	> 90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	NOT RELEVANT					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	NOT RELEVANT					-	-	-	-	-	-	-	-	-	-	-	-

Description of the system boundary (X = Included in LCA; ND = Not declared; NR = Not relevant)

Content information

Product components	Weight, kg	Post-consumer material, weight	Renewable material, weight
Cement	120 - 130	0.00%	0.00%
Gravel	500 - 510	0.00%	0.00%
Reinforced steel	65 - 75	35.73%	0.00%
Additives and ancillaries	< 1.0	0.00%	0.00%
Water	40 - 45	0.00%	0.00%
Insulation material	25 - 35	0.00%	0.00%
Clay bricks	25 – 30	0.00%	0.00%
TOTAL	786.9	2.67%	0.00%
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Renewable material, weight-%**
Wood	3.5 – 4.5	0.5	100
TOTAL	3.5 – 4.5	0.5	100

No dangerous substances from the candidate list of SVHC are contained in the product.

Note: The biogenic carbon content in the product leaving the factory gate is less than 5%; hence, the declaration of biogenic carbon content has been omitted.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

Environmental Information

Data results are now presented for the Multi-layer wall in its declared unit of 1 m^2.

Potential environmental impact – mandatory indicators according to EN 15804:2012+A2 2019

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	4.0E+02	2.5E+02	3.5E-02	4.3E+00	6.4E+00	1.1E-03	4.0E+00	-2.4E+00
GWP-biogenic	kg CO_2 eq.	-3.2E+00	2.1E-01	4.2E-05	1.5E-03	5.4E-03	3.7E-06	4.0E-03	5.2E+00
GWP-luluc	kg CO_2 eq.	1.8E-01	1.0E-01	1.6E-05	4.3E-04	2.5E-03	9.6E-07	3.8E-03	-1.0E-02
GWP-total	kg CO_2 eq.	3.9E+02	2.5E+02	3.5E-02	4.3E+00	6.4E+00	1.1E-03	4.1E+00	2.9E+00
ODP	kg CFC 11 eq.	1.6E-05	5.8E-05	8.0E-09	9.2E-07	1.5E-06	2.2E-10	1.6E-06	-3.3E-07
AP	mol H^+ eq.	1.5E+00	1.1E+00	2.0E-04	4.5E-02	2.6E-02	6.5E-06	3.8E-02	-2.1E-02
EP-freshwater	kg P eq.	8.7E-02	1.6E-02	2.8E-06	1.3E-04	4.1E-04	1.7E-06	3.7E-04	-1.2E-03
EP-marine	kg N eq.	3.6E-01	3.3E-01	7.3E-05	2.0E-02	7.8E-03	2.0E-06	1.3E-02	-7.1E-03
EP-terrestrial	mol N eq.	3.8E+00	3.6E+00	8.0E-04	2.2E-01	8.5E-02	2.2E-05	1.4E-01	-7.9E-02
POCP	kg NMVOC eq.	1.8E+00	1.1E+00	2.3E-04	6.0E-02	2.6E-02	7.4E-06	4.2E-02	-2.2E-02
ADP-minerals &metals*	kg Sb eq.	1.0E-03	8.7E-04	1.2E-07	2.2E-06	2.2E-05	4.0E-09	9.2E-06	-2.3E-05
ADP-fossil*	MJ	5.0E+03	3.8E+03	5.4E-01	5.9E+01	9.7E+01	2.0E-02	1.1E+02	-5.1E+01
WDP*	m^3	9.1E+03	1.1E+01	1.9E-03	9.3E-02	2.9E-01	-1.8E-03	5.1E+00	-4.1E+00
Acronyms	**GWP-fossil** = Global Warming Potential fossil fuels; **GWP-biogenic** = Global Warming Potential biogenic; **GWP-luluc** = Global Warming Potential land use and land use change; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential, Accumulated Exceedance; **EP-freshwater** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-marine** = Eutrophication potential, fraction of nutrients reaching marine end compartment; **EP-terrestrial** = Eutrophication potential, Accumulated Exceedance; **POCP** = Formation potential of tropospheric ozone; **ADP-minerals&metals** = Abiotic depletion potential for non-fossil resources; **ADP-fossil** = Abiotic depletion for fossil resources potential; **WDP** = Water (user) deprivation potential, deprivation-weighted water consumption								

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

The estimated impact results are only relative statements, which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

Use of resources

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.76E+02	4.01E+01	-7.29E-03	2.58E-01	1.0E+00	3.11E-04	6.54E-01	-3.55E+00
PERM	MJ	1.62E+02	1.34E+01	-2.20E-03	7.62E-02	3.4E-01	1.29E-04	3.11E-01	-1.25E+02
PERT	MJ	3.38E+02	5.34E+01	-9.48E-03	3.34E-01	1.4E+00	4.40E-04	9.65E-01	-1.29E+02
PENRE	MJ	4.96E+03	3.81E+03	-5.37E-01	5.94E+01	9.7E+01	1.98E-02	1.13E+02	-5.09E+01
PENRM	MJ.	4.12E-01	1.59E-01	-2.74E-05	8.45E-04	4.0E-03	4.22E-06	1.98E-02	-9.52E-03
PENRT	MJ	4.96E+03	3.81E+03	-5.37E-01	5.94E+01	9.7E+01	1.98E-02	1.13E+02	-5.09E+01
SM	kg	1.48E-01	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	6.19E+01	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	3.02E+02	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.15E+00	3.95E-01	-6.80E-05	2.99E-03	1.0E-02	-4.05E-05	1.20E-01	-1.06E-01
Acronyms	**PERE** = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM** = Use of renewable primary energy resources used as raw materials; **PERT** = Total use of renewable primary energy resources; **PENRE** = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM** = Use of non-renewable primary energy resources used as raw materials; **PENRT** = Total use of non-renewable primary energy re-sources; **SM** = Use of secondary material; **RSF** = Use of renewable secondary fuels; **NRSF** = Use of non-renewable secondary fuels; **FW** = Use of net fresh water								

Waste production and output flows

Waste production

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	2.12E-02	9.89E-03	-1.36E-06	1.63E-04	2.5E-04	4.34E-08	1.71E-04	-6.56E-05
Non-hazardous waste disposed	kg	6.22E+01	1.94E+02	-3.48E-02	7.92E-02	5.0E+00	9.73E-04	7.69E+02	-4.50E-01
Radioactive waste disposed	kg	7.75E-03	2.58E-02	-3.61E-06	4.10E-04	6.5E-04	1.02E-07	7.41E-04	-2.16E-04

Output flows

Results per functional or declared unit									
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.0E+00	0.0E+00	4.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Material for recycling	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-01	0.0E+00	0.0E+00
Materials for energy recovery	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Exported energy, electricity	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Exported energy, thermal	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Global warming calculated as in previous standards (Global warming potential - GWP100a)

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – 100a	kg CO_2 eq.	3.9E+02	2.5E+02	3.5E-02	4.3E+00	6.3E+00	1.0E-03	4.0E+00	-2.3E+00

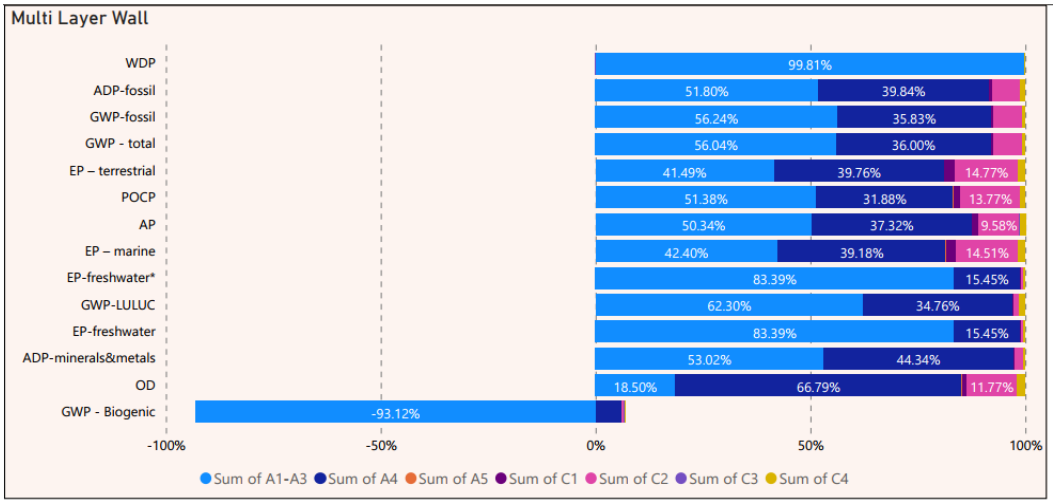
LCA Interpretation

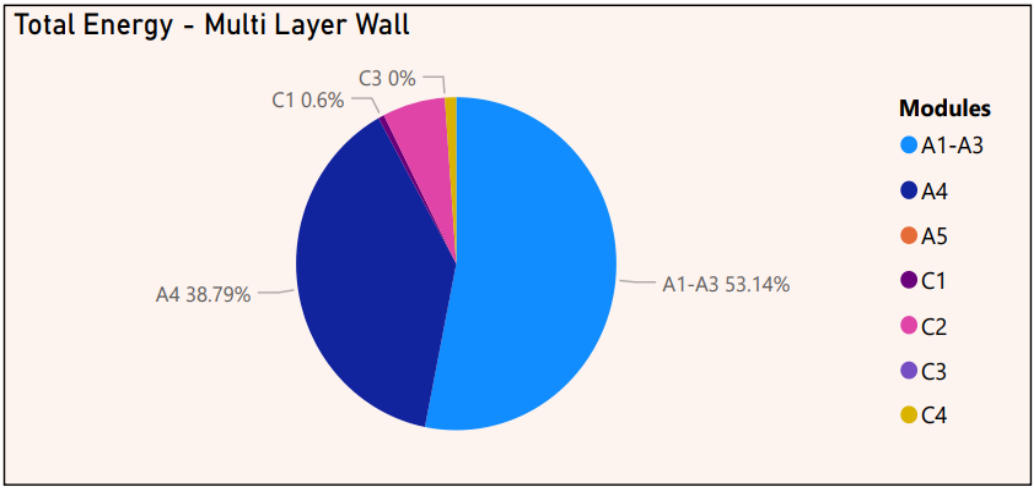
Individual Life Cycle Assessments have been carried out for the Multi-layer wall under the scope to identify their environmental impact following the framework described in ISO 14025 (2006), ISO 21930 (2007), and EN 15804:2012+A2:2019. Additionally, PCR and sub-PCR were considered during this study. The LCAs were performed assuming a declared unit of 1 m2 with an RSL of 50 years.

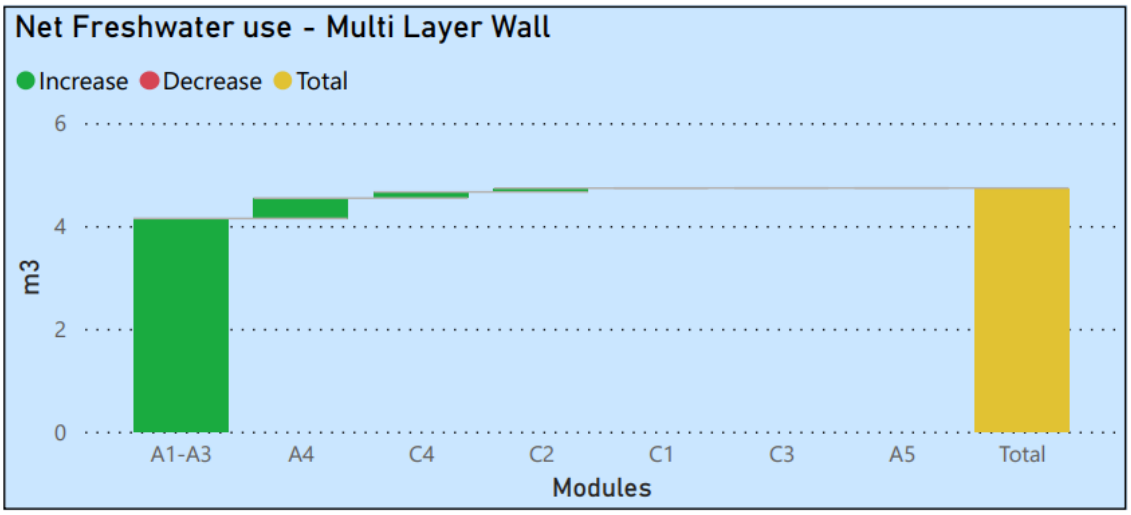
The impact on the various environmental impact categories in the life cycle of 1 declared unit of MITAU's Multi-layer wall is primarily driven by the production stage (A1-A3). The production stage accounts for more than 50% of the overall impact in most categories, especially in the freshwater eutrophication, water depletion potential, and global warming potential resulting from land use and land use changes. The production stage also primarily influences the total impact on global warming potential.

In terms of primary energy demand, the production phase is the main driver, followed by modules A4 and C2, which correspond to transport activities. From the End-of-Life stage, module C2 is the most significant contributor, showing again the impact transport activities in this value chain can play if not handled correctly. Similar behavior is observed in the net freshwater use category.

Module D, accounting for benefits or loads beyond the system boundaries, shows a small benefit from recycling packaging materials according to the modeled waste treatment scenario within the time boundaries, with average values of 1.0%.







Information related to the EPD Sector

This EPD® is individual.

Differences with previous versions

This document is the first version of EPD®.

Additional information

Pease follow MITAU PREFAB guidelines on the webpage for products indoor or outdoor storage conditions!

For more detailed information before and after installation, please visit: *www.mitauprefab.com*.

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www.mitauprefab.com

References

- General Programme Instructions of the International EPD® System. Version 3.01.
- PCR 2019:14. Construction Products. Version 1.11
- Complementary Product Category Rules c-PCR-003 (TO PCR 2019:14)
- EN 15804:2012+A2:2019 Sustainability of construction works. Environmental product Declarations. Core rules for the product category of construction products
- ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework
- ISO 14044:2006/Amd 2:2020 Environmental management. Life Cycle Assessment. Requirements and guidelines
- ISO 14025:2010 Environmental labels and declarations. Type III environmental declarations. Principles and procedures
- Ecoinvent v3.8 Database
- Baitz M. and Bos U. (2020). Impact Methods, Data Collection and Data Requirements. Webinar: Environmental Footprint (EF) Transition Phase (2020)

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