Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

M4

from

Multi-Panels Corp.

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB, EPD is registered through aligned regional hub: EPD North America (www.epdna.com)
EPD registration number:	S-P-12112
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *PCR 2019:14 Construction products (version 1.3.2)* *UN CPC code: 37520*
PCR review was conducted by: *The Technical Committee of the International EPD® System. The review panel could be contacted via info@environdec.com.*
Life Cycle Assessment (LCA)
LCA accountability: *Sally Xie, Intertek* *sally.xie@intertek.com*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *Rui Wang, IVL Swedish Environmental Research Institute* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD:
Multi-Panels Corp.

Contact:
Sten Sorensen
sten@multi-panels.com

Description of the organisation:
Multi-Panels specializes in providing high-quality structural and fire-resistant building panels for various applications such as subfloor, exterior / interior walls, underlayments, fire & water restrictive barriers, roof sheathings and more. Using a proprietary blend of Magnesium Oxysulphate cement with high-strength alkaline resistant mesh our products help build safer, stronger, quieter and more durable buildings in the multi-family residential, commercial, institutional and industrial markets. Backed with testing, certifications and QC controls from market-leading organizations our products have been proven to provide top-level performance and value in each category.

Product-related or management system-related certifications:
UL/QAI/ICC-ES

Name and location of production site(s):
Shandong Province, China

Product information

Product name:
M4

Brand name:
Nocom

Product description:
M4 is a structural panel. It can be used in the construction of a variety of general purpose applications. It can be used as structural subfloor, structural sheathing applied to interior and exterior walls.
It is easy to install, meets strict fire, structural and sound requirements while accepting a variety of popular floor or wall finishes.
In this EPD, the studied M4 is nominally ¾" (19 mm) thick, 4 feet (1220 mm) wide, and 8 feet (2438 mm) long with tongue-and-groove edges along the length of the panel.
Other sizes and square edge panels are also available via special request.

UN CPC code:
37520

Geographical scope:
A1-A3 China; A4 From China to USA; A5 USA; C USA; D USA.

LCA information

Declared unit:

1 m^2 of M4 product

Conversion factor to 1 kg: 0.044

Time representativeness:

1st January 2022 to 31st December 2022 (12 months)

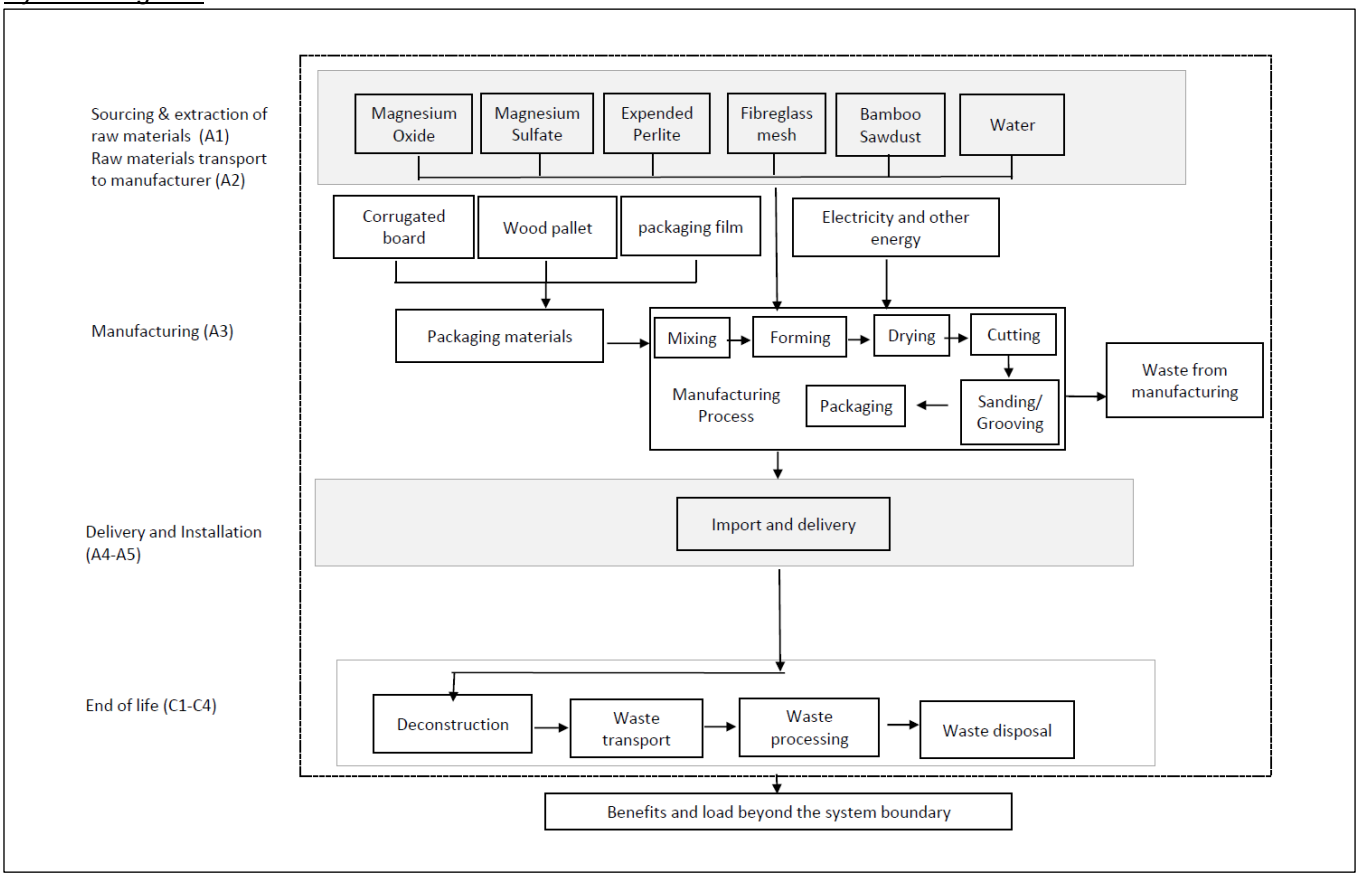
Database(s) and LCA software used:

Ecoinvent 3.8 (Allocation, cut-off, EN 15804) and One Click LCA databases. One Click LCA Pre-Verified EPD Generator for Construction products.

Description of system boundaries:

The system boundary is cradle to gate (A1-A3) with options (A4 and A5), module C1-C4, and module D. The life cycle stages are analysed in the study, including: A1-A3 product stage, A4-A5 construction process stage, C1-C4 end-of-life stage, and D benefits and loads beyond the system boundary.

System diagram:



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

	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	De-construction 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	CN	CN	CN	CN to US	US	-	-	-	-	-	-	-	US	US	US	US	US
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

More information:
Electricity data source used in the manufacturing process in A3: Market group for electricity, medium voltage, China, Ecoinvent 3.8 (2021)
Climate impact: 1.06 kg CO_2 eq./kWh

Product stage (A1-A3)

A1, Raw material supply takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process. Specifically, raw material supply covers sourcing of magnesium oxide, magnesium sulfate, expended perlite, fibreglass mesh, and bamboo Sawdust.

A2, Transport to the manufacturer. The transportation of the raw materials to the manufacturing site is studied in this module.

A3, Manufacturing.

Mixing all the above raw materials with water to create a cementious slurry. This slurry is then formed to wet panels and the fiberglass mesh is applied to both sides of the panel. These panels are then stored in the drying room under proper conditions to fully cure. The cured panels are then sent for cutting, sanding and groving. The finished panels are stacked on the wood pallet with corrugated board on top and coner for protection, and wrapped around with packaging film. Electricity and natural gas are consumed during the manufacturing process.

Quality checks are made at each step of the production process.

Packaging-related flows in the production process are included in the manufacturing module, i.e. packaging film, wood pallet and corrugated board. Apart from production of packaging material, the supply and transport of packaging material are also considered in the LCA model.

Construction process stage (A4-A5)

A4, Transport to the building site. This module includes transport from the production gate to the building site. Transport is calculated on the basis of a scenario with the parameters described. The average transportation distance from production plant to building site is 1167 km transported by lorry and 10541 nautical miles (i.e., 19522 km) transported by ship.

A5, Installation into the building. The products covered by this EPD are designed to be mechanically fastened to steel framing or other framing members. The electricity usage for drilling screws and sawing panels is 0.015kwh per declared unit.Total 12 pieces of screws per declared unit are used, the total mass of the screws is 0.041kg, which is less than 0.2% of the mass input. The input of the screws is considered to be cut-off flow.

During installation, approximately 3-5% of the product is lost as off-cuts. For conservative calculation, 5% loss is taking for study. The additional production processes to compensate the loss is considered in this study. All product losses are collected for landfill disposal.

The impacts associated with packaging disposal are included with the installation phase. The packaging waste includes wood pallet, packaging film, and corrugated board in A5. The end of life of packaging scenario is reference to U.S. Environmental Protection Agency latest Facts and Figures about Materials, Waste and Recycling (2018 data is followed).

Packaging	Recycling	Landfill	Incineration
Wood pallet	17%	67%	16%
Packaging film	9%	75%	16%
Corrugated board	68%	26%	6%

End-of-Life Stage (C1-C4):

C1, De-construction. According to the owner, the product can be manually removed from the building/construction. Hence no impact is considered during demolition (C1).

C2, Transport to waste processing. It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed that it has the same weight with the declared product. All of the end-of-life product is assumed to be transported as separate construction waste to the closest facilities. Transportation distance to the closest disposal area is estimated as 100 km and the transportation method is lorry which is the most common.

C3, Waste processing for reuse, recovery and/or recycling. It is assumed 100% of the deconstructed products (C1) to be sent to landfill. Hence, no waste processing is required.
C4, Disposal. The 100% of the deconstructed products are assumed to be sent to landfill.

Resource Recovery Stage (D)
D, Reuse/recovery/recycling potential.
100% of the products are assumed to be sent to landfill.
No benefit or load resulting from reuse/recovery/recycling beyond the product system boundary.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.
The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.
In this study, as per EN 15804, allocation is conducted in the following order;
1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g., mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

Allocation used in Ecoinvent 3.8 environmental data sources follows the methodology ‘allocation, cut-off by classification’. This methodology is in line with the requirements of the EN 15804 standard.

In this study one allocation occurs on product production, in allocating the input and output, i.e. energy within the production site such as electricity, natural gas and auxiliary material such as water, and waste water, among the various series of panel products, allocation is done via total production (panel area with the unit as m^2) of all panel products produced on a yearly average.

During the production process of the product, there are no other by-products produced from the production line, hence there is no occasion that requires allocation for multi-output processes.

For this project, there is only one production site. So, there is no allocation among plants.

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Magnesium Oxide	8.257	0%	0%
Magnesium Sulfate	5.799	0%	0%
Expended Perlite	0.885	0%	0%
Fibreglass mesh	0.591	0%	0%
Water	6.958	0%	0%
Bamboo Sawdust	0.110	0%	100%, 0.494 kg C/kg
TOTAL	22.600	0%	0.487%, 0.002 kg C/kg
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Wood pallet	0.300	1.327%	0.391
Corrugated board	0.054	0.239%	0.398
Packaging film	0.042	0.186%	0
TOTAL	0.396	1.752%	0.350

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
None	None	None	0%

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	2.23E+01	6.74E+00	1.52E+00	ND	0.00E+00	2.12E-01	0.00E+00	1.19E-01	0.00E+00
GWP-biogenic	kg CO_2 eq.	-7.59E-01	0.00E+00	5.08E-01	ND	0.00E+00	0.00E+00	0.00E+00	2.51E-01	0.00E+00
GWP-luluc	kg CO_2 eq.	1.35E-02	4.01E-03	9.14E-04	ND	0.00E+00	7.82E-05	0.00E+00	1.12E-04	0.00E+00
GWP-total	kg CO_2 eq.	2.16E+01	6.75E+00	2.02E+00	ND	0.00E+00	2.12E-01	0.00E+00	3.70E-01	0.00E+00
ODP	kg CFC 11 eq.	8.11E-07	1.42E-06	1.19E-07	ND	0.00E+00	4.88E-08	0.00E+00	4.81E-08	0.00E+00
AP	mol H^+ eq.	7.96E-02	1.48E-01	1.16E-02	ND	0.00E+00	8.98E-04	0.00E+00	1.12E-03	0.00E+00
EP-freshwater	kg P eq.	4.04E-04	3.57E-05	2.29E-05	ND	0.00E+00	1.74E-06	0.00E+00	1.25E-06	0.00E+00
EP-marine	kg N eq.	1.58E-02	3.69E-02	2.73E-03	ND	0.00E+00	2.67E-04	0.00E+00	3.87E-04	0.00E+00
EP-terrestrial	mol N eq.	1.79E-01	4.10E-01	3.02E-02	ND	0.00E+00	2.94E-03	0.00E+00	4.26E-03	0.00E+00
POCP	kg NMVOC eq.	5.16E-02	1.08E-01	8.22E-03	ND	0.00E+00	9.42E-04	0.00E+00	1.24E-03	0.00E+00
ADP-minerals&metals*	kg Sb eq.	6.98E-04	1.17E-05	3.56E-05	ND	0.00E+00	4.97E-07	0.00E+00	2.73E-07	0.00E+00
ADP-fossil*	MJ	1.42E+02	9.08E+01	1.23E+01	ND	0.00E+00	3.19E+00	0.00E+00	3.26E+00	0.00E+00
WDP*	m^3	2.84E+00	3.27E-01	1.68E-01	ND	0.00E+00	1.43E-02	0.00E+00	1.04E-02	0.00E+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.*

Additional mandatory impact category indicators

Results per declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	2.23E+01	6.74E+00	1.52E+00	ND	0.00E+00	2.12E-01	0.00E+00	1.19E-01	0.00E+00

Resource use indicators

Results per declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.59E+01	7.90E-01	8.62E-01	ND	0.00E+00	3.59E-02	0.00E+00	2.83E-02	0.00E+00
PERM	MJ	5.63E+00	0.00E+00	-4.46E+00	ND	0.00E+00	0.00E+00	0.00E+00	-1.17E+00	0.00E+00
PERT	MJ	2.16E+01	7.90E-01	-3.60E+00	ND	0.00E+00	3.59E-02	0.00E+00	-1.14E+00	0.00E+00
PENRE	MJ	1.39E+02	9.08E+01	1.21E+01	ND	0.00E+00	3.19E+00	0.00E+00	3.26E+00	0.00E+00
PENRM	MJ	3.13E+00	0.00E+00	-2.04E+00	ND	0.00E+00	0.00E+00	0.00E+00	-1.09E+00	0.00E+00
PENRT	MJ	1.42E+02	9.08E+01	1.01E+01	ND	0.00E+00	3.19E+00	0.00E+00	2.17E+00	0.00E+00
SM	kg	8.97E-02	3.48E-02	6.41E-03	ND	0.00E+00	8.84E-04	0.00E+00	6.86E-04	0.00E+00
RSF	MJ	1.07E-01	1.71E-04	5.34E-03	ND	0.00E+00	8.92E-06	0.00E+00	1.79E-05	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	8.11E-02	8.28E-03	4.83E-03	ND	0.00E+00	4.13E-04	0.00E+00	3.57E-03	0.00E+00
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									

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Waste indicators

Results per declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7.89E-01	1.23E-01	4.70E-02	ND	0.00E+00	4.22E-03	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	1.92E+01	1.41E+00	2.51E+00	ND	0.00E+00	6.94E-02	0.00E+00	2.26E+01	0.00E+00
Radioactive waste disposed	kg	3.98E-04	6.28E-04	5.33E-05	ND	0.00E+00	2.13E-05	0.00E+00	0.00E+00	0.00E+00

Output flow indicators

Results per declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

References

General Programme Instructions of the International EPD® System. Version 4.0.

PCR 2019:14 Construction products, version 1.3.2 (2023-12-08)

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

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

Ecoinvent database v3.8 (2021) and One Click LCA database.

Multi-Panels LCA background report.

EPD®

www.environdec.com