Statement of Verification

BREG EN EPD No.: 000148 Issue 1
ECO EPD Ref. No. 00000608

This is to verify that the

Environmental Product Declaration

provided by:

Laminam S.p.A.

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

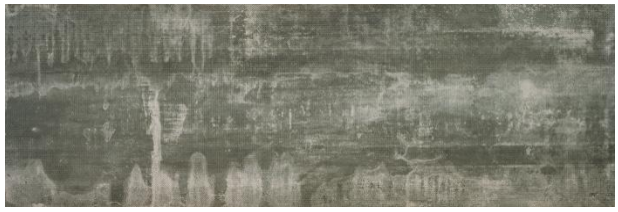
BRE Global Scheme Document SD207

This declaration is for:

1m² of Laminam 5 ceramic tile

Company Address

Via Ghiarola 258
4102 Fiorano Modense (FO)
Italy



LAMINAM®

Signed for BRE Global Ltd	Emma Baker Operator	07 December 2017 Date of this Issue
07 December 2017 Date of First Issue		06 December 2020 Expiry Date

BRE Global Verified EPD

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ECO PLATFORM EPD EN 15804 VERIFIED

Environmental Product Declaration

EPD Number:000148

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
Laminam S.p.A. Via Ghiarola 258 4102 Fiorano Modense (FO) Italy	Fei Zhang BRE Bucknalls Lane Watford WD25 9XX
Declared/Functional Unit	**Applicability/Coverage**
1m^2 of Laminam 5 ceramic tile	Product specific
EPD Type	**Background database**
Cradle to Gate with options	ecoinvent

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Nigel Jones
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life				Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building						
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☐

Note: Ticks indicate the Information Modules declared.

Manufacturing site

Laminam S.p.A
Via Ghiarola 258
4102 Fiorano Modense (FO)
Italy

Construction Product:

Product Description

Laminam products are flat porcelain ceramic tiles manufactured in a range of sizes, thicknesses and surfaces, giving performance in a range of applications. Laminam tiles can be used in the furniture industry and for interior design, as well as used for residential and commercial, wall and flooring applications. Some Laminam tiles with the suffice '+', are structurally reinforced with fibreglass mat attached to the back with adhesive, giving them additional applications in facades and wall coverings. Laminam 5 ceramic tiles do not have such backing. Some of the distinctive values of that Laminam products are marketed as having include being perfectly flat, having high resistances to wear, chemicals, fire, frost and staining. Laminam 5 ceramic tiles are recyclable. Further product specifications can be found on the Laminam website: http://www.laminam.it/en/technology.

Technical Information

Property	Value, Unit
Size	5.6 mm x 1000 mm x 3000 mm
Mass per area	14.0 kg/m^2
Breaking strength (ISO 10545-4 for 200 mm x 300 mm) valid only for a tile of length 3000 mm	1000 N/mm^2
Bending strength (ISO 10545-4 200 mm x 300 mm)	50 N/mm^2

Main Product Contents

The composition in the table below represents a range for a Laminam tile.

Material/Chemical Input	%
Clay	32 - 34
Feldspar (average content of 65% reused material)	49 - 54
Alumina	3
Other components	9 - 16

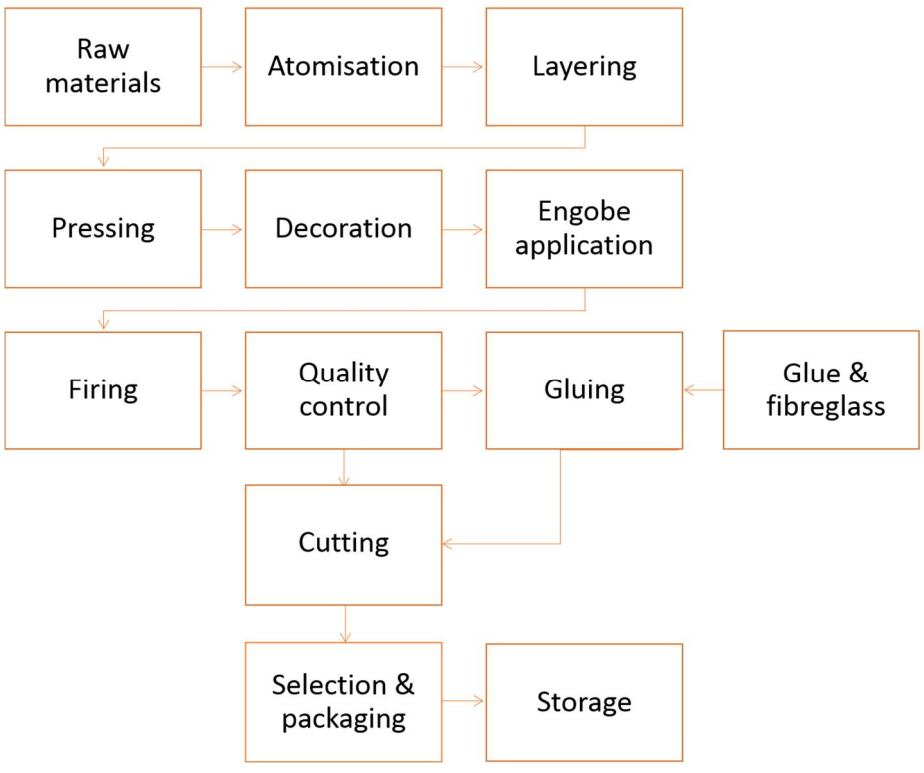
Manufacturing Process

The raw materials, mainly consisting of clay and feldspars, are mixed, ground together and stained. The slip is then sent to the atomisers. At the production line, atomised material is drawn up, pressed and formed into the desired shape and thickness.

After compaction, the surface of the raw slab is decorated using special printing machines and the bottom of the slab is engobed. The decorated tiles are then send through the low-consumption hybrid gas-electric kiln, where they are heated, fired to 1,220°C and finally, cooled.

After quality control, non-backed tiles such as Laminam 5 go to cutting whilst some slabs (with the '+' suffix) have their fibreglass backing applied with adhesive. Backed slabs are then sent to join the rest of production where they are dry cut to the desired size, and packed either for storage or for immediate shipment to customers.

Process flow diagram



N.B: The gluing stage does not apply to Laminam 5.

Construction Installation

Laminam provides installation instructions for its ceramic tiles. For further information on the installation of Laminam tiles, please refer to: Laminam: Technical Guide, section 6 onwards, which is available on request from Laminam.

Use Information

Laminam products are ceramic tiles which are passive and have no emissions associated with their use.

End of Life

Laminam state that their products are 100% recyclable (http://www.laminam.it/en/environmental-policies/)

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

The declared unit is 1m^2 of Laminam 5 ceramic tile modleed over a 25 year study period.

System boundary

In accordance with the modular approach as defined in EN 15804:2012, this cradle-to-gate with options EPD includes the processes covered in the manufacturing sites and product stages A1 to A3, A4, A5, B1, B2, B3, B4, B5, B6, B7, C1, C2, C3 and C4.

Data sources, quality and allocation

Specific primary data derived from the Laminam 5 production process in Italy have been modelled. In accordance with the requirements of EN15804, the most current available data has been used. The manufacturer-specific data from Laminam S.p.A. covers a production period of 1 year (01/01/2014 – 31/12/14). Secondary data has been used for all other upstream and downstream processes that are beyond the control of the manufacturer (i.e. raw material production). SimaPro v8 software was used to carrying out the LCA modelling with background LCI datasets taken from the ecoinvent database v3.2. All ecoinvent datasets are complete within the context used and conform to the system boundary and the criteria for the exclusion of inputs and outputs according to the requirements specified in EN15804. Laminam S.p.A. manufactures other finished ceramic tile products at its production site in addition to the product covered by this EPD. Calculations were performed to enable allocation of total site energy use, water, waste and emissions to the Laminam 5 ceramic tile products. Allocation procedures were by physical allocations and are according to EN 15804 and are based on the ISO14044 guidance.

Cut-off criteria

All raw materials and consumable item inputs, and associated transport to the plant, process energy and water use, direct production waste and wastewater are included. Transportation of installation wastage to end-of-life has been omitted from module A5 and is assumed to be negligible

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	19.0	3.04E-06	0.107	0.0266	0.0113	8.95E-05	332
Construction process stage	Transport	A4	7.00E-01	1.29E-07	2.32E-03	6.17E-04	4.08E-04	1.85E-06	10.6
	Construction	A5	8.66	9.36E-07	0.0572	0.0162	6.75E-03	5.26E-05	143
Use stage	Use	B1	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Maintenance	B2	0.189	1.30E-08	1.06E-03	3.62E-04	3.54E-04	1.12E-06	5.63
	Repair	B3	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Replacement	B4	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Refurbishment	B5	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR	MNR	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Transport	C2	0.117	2.15E-08	3.87E-04	1.03E-04	6.81E-05	3.09E-07	1.76
	Waste processing	C3	4.84E-03	5.63E-10	2.39E-05	1.45E-05	1.76E-06	7.37E-09	0.0750
	Disposal	C4	0	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND	MND

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

LCA Results (continued)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	51.8	5.00E-05	51.8	338	0	338
Construction process stage	Transport	A4	0.144	5.41E-07	0.144	10.5	0	10.5
	Construction	A5	11.4	2.21E-03	11.4	151	0	151
Use stage	Use	B1	MNR	MNR	MNR	MNR	MNR	MNR
	Maintenance	B2	1.02	2.72E-06	1.02	5.71	0	5.71
	Repair	B3	MNR	MNR	MNR	MNR	MNR	MNR
	Replacement	B4	MNR	MNR	MNR	MNR	MNR	MNR
	Refurbishment	B5	MNR	MNR	MNR	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	MNR	MNR	MNR	MNR	MNR	MNR
	Transport	C2	0.0240	9.02E-08	0.0240	1.75	0	1.75
	Waste processing	C3	0.0140	1.52E-08	0.0140	0.108	0	0.108
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	6.82	0	0	0.258
Construction process stage	Transport	A4	0	0	0	2.32E-03
	Construction	A5	0.444	0	0	0.276
Use stage	Use	B1	MNR	MNR	MNR	MNR
	Maintenance	B2	0	0	0	0.0222
	Repair	B3	MNR	MNR	MNR	MNR
	Replacement	B4	MNR	MNR	MNR	MNR
	Refurbishment	B5	MNR	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	MNR	MNR	MNR	MNR
	Transport	C2	0	0	0	3.86E-04
	Waste processing	C3	0	0	0	7.35E-05
	Disposal	C4	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	1.52	10.6	1.12E-03
Construction process stage	Transport	A4	4.45E-03	0.495	7.32E-05
	Construction	A5	0.879	2.09	3.87E-04
Use stage	Use	B1	MNR	MNR	MNR
	Maintenance	B2	5.07E-03	0.0155	6.38E-06
	Repair	B3	MNR	MNR	MNR
	Replacement	B4	MNR	MNR	MNR
	Refurbishment	B5	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	MNR	MNR	MNR
	Transport	C2	7.42E-04	0.0824	1.22E-05
	Waste processing	C3	2.94E-05	1.85E-04	6.55E-07
	Disposal	C4	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.251	6.24E-03	0	0.0455
Construction process stage	Transport	A4	0	0	0	0
	Construction	A5	0.0163	0.910	0	2.96E-03
Use stage	Use	B1	MNR	MNR	MNR	MNR
	Maintenance	B2	0	0	0	0
	Repair	B3	MNR	MNR	MNR	MNR
	Replacement	B4	MNR	MNR	MNR	MNR
	Refurbishment	B5	MNR	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	MNR	MNR	MNR	MNR
	Transport	C2	0	0	0	0
	Waste processing	C3	0	0	0	0
	Disposal	C4	0	14.0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Laminam products are sold worldwide. The average default transport distances used for national distribution as used in the Confindustria Ceramica EPD (EPD-COI-20160202-ICG1-EN), has been assumed.		
	Lorry – diesel	Fuel consumption (g/tkm)	2.5
	Distance	km	300
	Capacity utilisation (incl. empty returns)	%	24
	Bulk density of transported products	kg/m^3	2500
A5 – Installation in the building	Based on average data from different manufacturers of ceramic tiles in Europe, as per the sector average Confindustria Ceramica EPD this scenario assumed that 6 kg of cementitious adhesive per 1 m^2 of ceramic tile is used to install the Laminam 5. A ceramic material loss of 6.5% installation wastage was also assumed on a similar basis, with the additional production, transport and waste of this 6.5% accounted for in A5.		
	Cementitious adhesive	kg/m^2	6
	Installation wastage	%	6.5
B1 – Use	Once installed, ceramic tiles do not have any emissions associated with their use. Therefore, module B1 is not relevant to this product (MNR).		
B2 – Maintenance	Based on average data from different manufacturers of ceramic tiles in Europe, as per the sector average Confindustria Ceramic EPD, this scenario assumes that 0.3 ml of detergent and 0.002 litres of water are used to wash 1m^2 of ceramic tile. It has been assumed that the tile is washed in this manner once a week.		
	Detergent	ml/m^2	0.3
	Water	l/m^2	0.002
	Maintenance frequency	Cycles per year	52
B3 – Repair	No potential repair scenario has been specified by Laminam during the 25 year study period of this LCA. Therefore, this module is not relevant (MNR).		
B4 – Replacement	No replacements are expected during the 25 year study period of this LCA – the service life is 25 years. Therefore, this module is not relevant (MNR).		
B5 – Refurbishment	For Laminam 5 ceramic tiles, no refurbishments have been assumed during the 25 year study period of this LCA. Therefore, this module is not relevant (MNR).		
Reference service life	The reference service life of the Laminam 5 ceramic tiles is documented by the 25 year warranty supplied on request.		
	Service life	years	25
B6 – Use of energy; B7 – Use of water	For Laminam 5 ceramic tiles, no energy or water is used to 'operate' the product during its use. Therefore, these modules are not relevant (MNR).		

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
C1 - Deconstruction	For ceramic tiles, it is assumed that when a building is deconstructed at the end-of-life, no additional processes are required to deconstruct the tiles. This is also in agreement with the PCR developed by the European Ceramic Tile Manufacturers' Federation (CET PCR 2014). Therefore, this module is not relevant (MNR).		
C2 – End-of-life transport	It has been assumed that the ceramic tile waste resulting from deconstruction is transported from the site to a processing facility by lorry for 20km. The distance by lorry from the processing facility to end-of-life disposal is 30km. This is in line with the C2 scenario of the sector average Confindustria Ceramica EPD.		
	Lorry – diesel	Fuel consumption (g/tkm)	2.5
	Distance	km	50
	Capacity utilisation (incl. empty returns)	%	24
	Bulk density of transported products	kg/m^3	2500
C3 – End-of-life pre-processing	It has been assumed that as all the Laminam 5 ceramic tile waste goes to recycling, and the only pre-processing required was crushing of the tile after deconstruction, to aggregate.		
C4 – End-of-life disposal	Laminam 5 ceramic tiles can be recycled. Therefore, it is assumed that 100% of the product waste goes to recycling as per scenario 1 for C4 in the sector average Confindustria Ceramica EPD.		
	Landfill	kg/m^2	14.0

Summary, comments and additional information

Figure 1 below provides analysis of the relevant modules in the cradle-to-gate with options LCA study for Laminam 5 ceramic tile (14 kg) across the Global Warming Potential Impact Category.

The manufacturing (A1 – A3) stage has the highest impact of all modules over the 25 year study period. Installation (A5) is responsible for the next highest GWP contributions. By comparison, the transport to site (A4), maintenance (B2) and the end-of-life modules C2 and C3 have relatively low total values in this Impact Category. As Laminam 5 is sent to be used as a recycled material after processing, this module does not contribute to the total GWP Impact Category value.

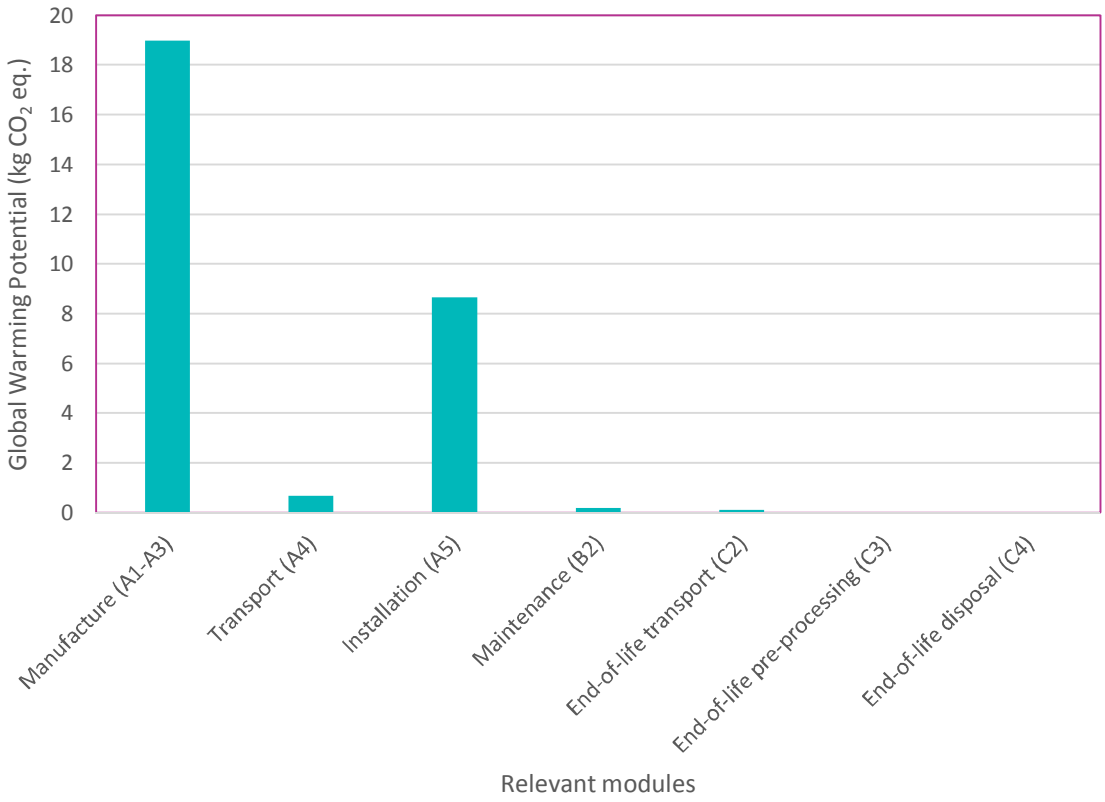


Figure 1: Global Warming Potential Impact Category results per module for Laminam 5 over the 25 year study period. Note that MNR modules have not been included.

Application of results to other Laminam ceramic tiles

It should be noted that the LCA results in this EPD per m^2 can be related to Laminam 3 ceramic tiles using a conversion factor of 0.536. Similarly, results per m^2 can be applied to Laminam 12 ceramic tiles by multiplying values by a conversion factor of 2.14

References

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