

Statement of Verification

BREG EN EPD No.: 000577

Issue 01

This is to verify that the
Environmental Product Declaration
provided by:
The Millboard Company Ltd



is in accordance with the requirements of:
EN 15804:2012+A2:2019
and
BRE Global Scheme Document SD207

This declaration is for:
1 unit of Millboard Envello Cladding Board

Company Address

The Millboard Company Ltd
Unit A, Castle Court,
Bodmin Road,
Coventry
CV2 5DB



millboard

Live. Life. Outside.

Signed for BRE Global Ltd

Emma Baker
Operator

26 April 2024
Date of this Issue

26 April 2024
Date of First Issue

25 April 2029
Expiry Date



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Environmental Product Declaration

EPD Number: 000577

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE 2023 Product Category Rules (PN 514 Rev 3.1) for Type III environmental product declaration of construction products to EN 15804:2012+A2:2019
Commissioner of LCA study	LCA consultant/Tool
The Millboard Company Ltd Unit A, Castle Court, Bodmin Road, Coventry CV2 5DB	LCA Tool: BRE LINA A2 LCA Consultant: Francis Yu
Declared/Functional Unit	Applicability/Coverage
1 unit of Millboard Envello Cladding Board.	Product Specific.
EPD Type	Background database
Cradle to Gate with Module C and D	Ecoinvent 3.8
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 <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External	
(Where appropriate ^b)Third party verifier: Bala Subramanian	
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+A2:2019. 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+A2:2019 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
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>				

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Ryton Manufacturing Site
Elmdene, Ryton Lodge
Oxford Road
Ryton on Dunsmore
CV8 3EJ

Construction Product:

Product Description

Millboard Envello cladding is a resin-mineral composition, moulded from real timber and created using innovative, patented features. Millboard cladding is designed to mimic the aesthetic of natural wood products but eliminate the disadvantages, such as rotting and maintenance requirements.

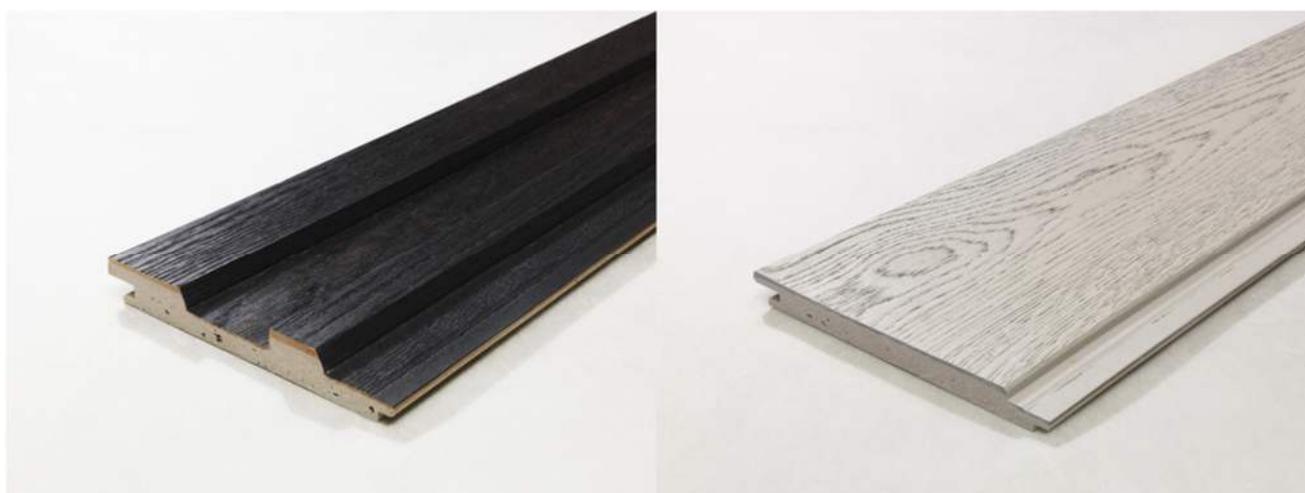
The LCA analysis has been conducted for 1 unit of Millboard Envello Shadow Line Cladding Board, weighing 8 kg/unit, and 1 unit of Millboard Board & Batten Cladding Board, weighing 7.6 kg/unit. The individual results are enclosed in this EPD. In addition, to enable the impacts for per m² of each product, the end-user guidance table is provided at the end of this document.

Technical Information

Property	Millboard Envello Cladding Shadow Line	Millboard Envello Cladding Board and Batten
Width	200mm	200mm
Installed width	181mm (19mm overlap)	181mm (19mm overlap)
Thickness	18mm	28mm (14mm Board + 14mm Batten)
Length	3600mm	3200mm
Weight per board	8kg*	7.6kg*
Weight per sqm	9.6kg*	12.3kg*

Property	Millboard Envello Cladding Shadow Line	Millboard Envello Cladding Board and Batten
Boards needed per sqm	1.53	1.73
Core composition	Blend of natural minerals bonded in a polymer resin, with long fibre reinforcement.	Blend of natural minerals bonded in a polymer resin, with long fibre reinforcement.
Surface composition	Resilient Lastane® layer chemically melded to the core, with a UV stable 2K coating.	Resilient Lastane® layer chemically melded to the core, with a UV stable 2K coating.
Colours	Antique Oak, Burnt Cedar, Golden Oak, Smoked Oak	Antique Oak, Burnt Cedar, Golden Oak, Smoked Oak

*Approximate



Main Product Contents

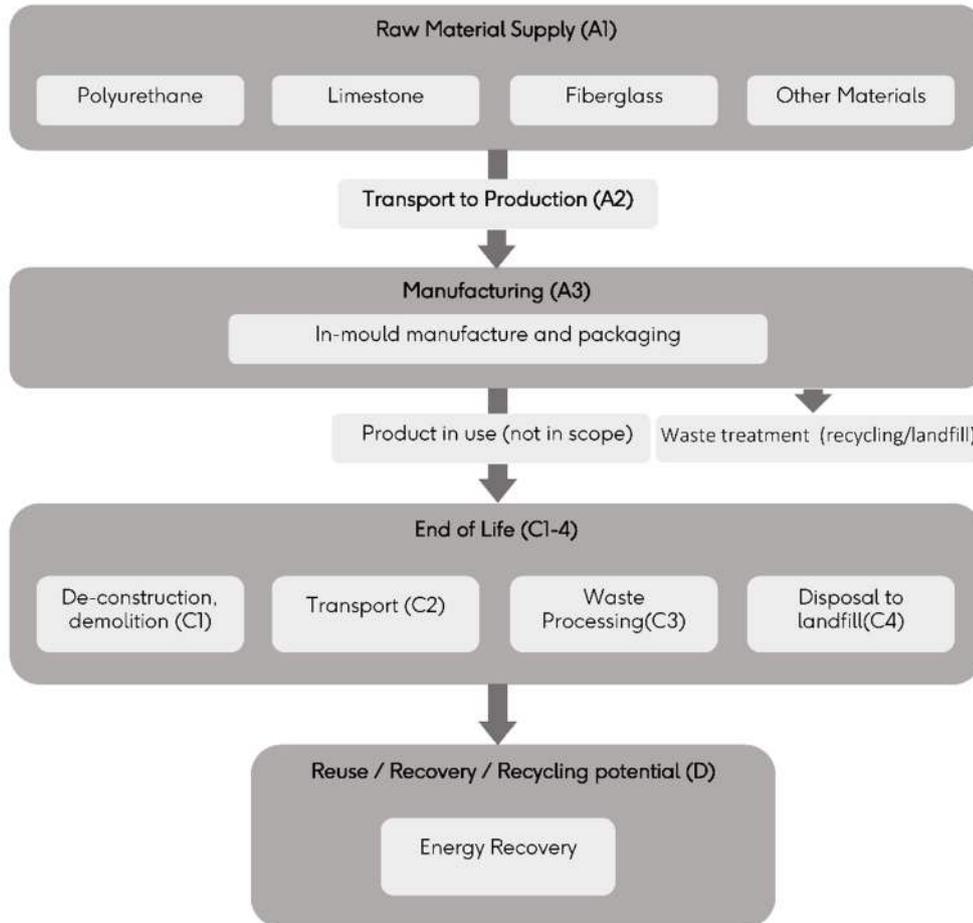
Material Input	%
Polymers and additives	30-65
Limestone	20-45
Aluminium filler	0-15
Fibreglass filler	0-15
Coatings	0-15

Note: The above product content is for all the products covered in this EPD

Manufacturing Process

The materials that create the product are added to a mould, in reverse order (with the paint surface layer being applied first, then a layer of elastomer, followed by a foam). These materials combine and cure under pressure (without the use of additional heat) to create a solid board.

Process flow diagram



End of Life

The product has a warranty for up to 15 years and a structural capability to potentially outlast this timeframe. There is currently no process in place to deconstruct the product. Therefore, an industrial average end-of-life data has been used according to BRE 2023 Product Category Rules (PN 514 Rev 3.1), which is 100% of waste to energy-recovery incineration.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1 unit of Millboard Envello Cladding Board.

System boundary

This is a Cradle-to-Gate with Module C & D LCA, reporting all production life cycle stages of modules A1 to A3 and end-of-life stages C1-C4, and D in accordance with EN 15804:2012+A2:2019 and BRE 2023³⁴ Product Category Rules (PN 514 Rev 3.1).

Data sources, quality and allocation

Specific primary data derived from Millboard' production process in Elmdene, Ryton Lodge, Oxford Road, Ryton on Dunsmore, CV8 3EJ factory, have been modelled using the LINA LCA A2 software A2 and the ecoinvent 3.8 database. In accordance with the requirements of EN 15804:2012+A2:2019, the most current available data has been used. The manufacturer-specific data from Millboard covers a period of one year (01/01/2021 – 31/12/2021). Secondary data has been obtained for all other upstream and downstream processes that are beyond the control of the manufacturer (i.e. raw material production) from the ecoinvent 3.8 database. 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 EN 15804:2012+A2:2019.

The LCA studies include Millboard Envello Shadow Line Cladding Board and Millboard Envello Board & Batten Cladding Board, which account for 2.8% and 1% of the site's total production respectively. As both products have the similar composition and are processed through the manufacturing line, the LCA analysis is conducted for both products, and the individual results are enclosed in this EPD. The factory also produces other products in addition to the cladding board therefore the allocation of energy, water, waste, and waste water is required and these has been allocated by unit production according to the provisions of the BRE PCR PN514 Rev 3.1 and EN 15804:2012+A2:2019. Site wide values for energy, water and wastewater have been taken from bills. Figures for the raw materials, ancillary materials and packaging were from actual usages.

The raw material inputs of all LCA studies have been uplifted by 5% for balancing the mass ratio. Proxy datasets are used for additives such as pigment, biocide and stabiliser, which account for less than 1% of the total input mass.

Quality Level	Geographical representativeness	Technical representativeness	Time representativeness
Very Good	Data from area under study.	Data from processes and products under study. Same state of technology applied as defined in goal and scope (i.e. identical technology).	There is less than 5 years between the ecoinvent LCI reference year, and the time period for which the LCA was undertaken.

Specific UK datasets have been selected from the ecoinvent LCI for this LCA. The quality level of geographical and technical representativeness is therefore very good. The quality level of time representativeness is good as the background LCI datasets are based on ecoinvent v3.8 which was compiled in 2021. Therefore, there is less than 5 years between the ecoinvent LCI reference year and the time period for which the LCA was undertaken.

UK Consumption mix was used for electricity with an emissions factor of 0.312kgCO₂e/kWh. Global Natural gas data (at industrial furnace) was used with an emissions factor of 0.232 kgCO₂eq/kWh.

Cut-off criteria

All processes associated with the manufacturing process have been included. All inputs or outputs have been included and all raw materials, packaging and transport, energy, water use, emissions, and wastes, are included, except for direct emissions to air, water and soil, which are not measured. Upstream extraction and/or processing of inputs are included within the use of the background datasets within LINA.

LCA Results - Millboard Envello Shadow Line Cladding Board

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

Parameters describing environmental impacts			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO ₂ eq	kg CFC11 eq	mol H ⁺ eq	kg (PO ₄) ³⁻ eq			
Product stage	Raw material supply	A1	2.31E+01	2.27E+01	3.25E-01	1.42E-02	1.27E-05	1.36E-01	7.64E-03
	Transport	A2	4.00E-01	4.00E-01	3.19E-04	1.64E-04	9.18E-08	2.26E-03	2.50E-05
	Manufacturing	A3	1.39E+00	1.42E+00	-4.06E-02	8.61E-03	1.86E-07	4.84E-03	2.24E-04
	Total (of product stage)	A1-3	2.49E+01	2.46E+01	2.85E-01	2.29E-02	1.29E-05	1.43E-01	7.89E-03
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
100% to Incineration Scenario									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.17E-01	1.17E-01	9.97E-05	4.59E-05	2.71E-08	4.75E-04	7.54E-06
	Waste processing	C3	1.90E+01	1.90E+01	1.79E-03	1.62E-04	4.18E-08	4.40E-03	5.67E-05
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	4.36E+00	4.29E+00	-6.15E-02	-4.90E-03	-2.98E-07	-2.49E-02	-2.49E-03

GWP-total = Global warming potential, total;
 GWP-fossil = Global warming potential, fossil;
 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; and
 EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

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

Parameters describing environmental impacts			EP-marine	EP-terrestrial	POCP	ADP-mineral & metals	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m ³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	3.46E-02	2.43E-01	8.90E-02	2.28E-04	4.79E+02	2.34E+01	2.00E-06
	Transport	A2	6.39E-04	7.02E-03	2.06E-03	1.34E-06	5.99E+00	2.64E-02	3.33E-08
	Manufacturing	A3	3.85E-03	1.40E-02	3.88E-03	4.64E-06	2.96E+01	6.13E-01	5.79E-08
	Total (of product stage)	A1-3	3.91E-02	2.64E-01	9.49E-02	2.34E-04	5.14E+02	2.41E+01	2.09E-06
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
100% to Incineration Scenario									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.43E-04	1.56E-03	4.79E-04	4.07E-07	1.77E+00	7.96E-03	1.01E-08
	Waste processing	C3	2.47E-03	2.11E-02	5.12E-03	1.35E-06	3.56E+00	1.21E+00	2.14E-08
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3.67E-03	-3.61E-02	-1.01E-02	-2.65E-06	-6.94E+01	-1.89E+00	-1.68E-07

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
 EP-terrestrial = Eutrophication potential, accumulated exceedance;
 POCP = Formation potential of tropospheric ozone;
 ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;

ADP-fossil = Depletion potential of the stratospheric ozone layer;
 WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
 PM = Particulate matter.

LCA Results (continued)

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

Parameters describing environmental impacts			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U ²³⁵ eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	2.18E+00	1.57E+03	2.23E-07	2.37E-06	4.64E+01
	Transport	A2	3.06E-02	4.63E+00	1.58E-10	4.78E-09	3.96E+00
	Manufacturing	A3	7.93E-01	2.97E+01	7.39E-10	1.42E-08	1.36E+01
	Total (of product stage)	A1-3	3.00E+00	1.60E+03	2.24E-07	2.39E-06	6.39E+01
Construction process stage	Transport	A4	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND
100% to Incineration Scenario							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	9.09E-03	1.38E+00	4.47E-11	1.45E-09	1.22E+00
	Waste processing	C3	1.09E-02	3.98E+01	1.71E-09	6.47E-08	1.19E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.19E+00	-6.10E+01	-1.03E-09	-3.23E-08	-2.02E+01

IRP = Potential human exposure efficiency relative to U235;
 ETP-fw = Potential comparative toxic unit for ecosystems;
 HTP-c = Potential comparative toxic unit for humans;

HTP-nc = Potential comparative toxic unit for humans; and
 SQP = Potential soil quality index.

LCA Results (continued)

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

Parameters describing resource use, primary energy			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	2.47E+01	0.00E+00	2.47E+01	3.61E+02	1.15E+02	4.76E+02
	Transport	A2	8.23E-02	0.00E+00	8.23E-02	5.88E+00	0.00E+00	5.88E+00
	Manufacturing	A3	4.90E+00	3.44E-01	5.25E+00	-8.12E+00	3.74E+01	2.93E+01
	Total (of product stage)	A1-3	2.97E+01	3.44E-01	3.00E+01	3.59E+02	1.52E+02	5.11E+02
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
100% to Incineration Scenario								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	2.49E-02	0.00E+00	2.49E-02	1.74E+00	0.00E+00	1.74E+00
	Waste processing	C3	1.38E-01	0.00E+00	1.38E-01	-2.42E+02	2.46E+02	4.34E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.04E+01	0.00E+00	-1.04E+01	-6.97E+01	0.00E+00	-6.97E+01

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)

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

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	0.00E+00	0.00E+00	0.00E+00	5.53E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	6.53E-04
	Manufacturing	A3	2.87E-03	7.69E-08	0.00E+00	1.47E-02
	Total ((of product stage)	A1-3	2.87E-03	7.69E-08	0.00E+00	5.68E-01
Construction process stage	Transport	A4	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
100% to Incineration Scenario						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.97E-04
	Waste processing	C3	3.15E-03	0.00E+00	0.00E+00	2.82E-02
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-4.71E-02

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)

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

Other environmental information describing waste categories			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.90E+00	2.72E+01	8.23E-04
	Transport	A2	6.67E-03	1.15E-01	4.06E-05
	Manufacturing	A3	1.13E-01	1.98E+00	2.15E-04
	Total (of product stage)	A1-3	2.02E+00	2.93E+01	1.08E-03
Construction process stage	Transport	A4	MND	MND	MND
	Construction	A5	MND	MND	MND
Use stage	Use	B1	MND	MND	MND
	Maintenance	B2	MND	MND	MND
	Repair	B3	MND	MND	MND
	Replacement	B4	MND	MND	MND
	Refurbishment	B5	MND	MND	MND
	Operational energy use	B6	MND	MND	MND
	Operational water use	B7	MND	MND	MND
100% to Incineration Scenario					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.95E-03	3.46E-02	1.20E-05
	Waste processing	C3	2.91E-01	8.40E+00	8.08E-06
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2.81E-01	-1.51E+01	-3.55E-04

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

LCA Results (continued)

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

			Other environmental information describing output flows – at end of life					
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	1.21E-01	4.67E-09	1.52E-04	0.00E+00	-1.13E-05
	Total (of product stage)	A1-3	0.00E+00	1.21E-01	4.67E-09	1.52E-04	0.00E+00	-1.13E-05
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
100% to Incineration Scenario								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	8.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

LCA Results - Millboard Envello Board & Batten Cladding Board

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

Parameters describing environmental impacts			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO ₂ eq	kg CFC11 eq	mol H ⁺ eq	kg (PO ₄) ³⁻ eq			
Product stage	Raw material supply	A1	2.25E+01	2.22E+01	3.22E-01	1.37E-02	1.22E-05	1.32E-01	7.44E-03
	Transport	A2	3.54E-01	3.54E-01	2.80E-04	1.46E-04	8.12E-08	2.06E-03	2.21E-05
	Manufacturing	A3	1.51E+00	1.56E+00	-5.87E-02	9.84E-03	2.47E-07	5.55E-03	2.67E-04
	Total (of product stage)	A1-3	2.44E+01	2.41E+01	2.64E-01	2.37E-02	1.25E-05	1.40E-01	7.73E-03
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
100% to Incineration Scenario									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.11E-01	1.11E-01	9.48E-05	4.36E-05	2.57E-08	4.51E-04	7.16E-06
	Waste processing	C3	1.81E+01	1.81E+01	1.70E-03	1.54E-04	3.97E-08	4.18E-03	5.38E-05
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	4.24E+00	4.18E+00	-5.98E-02	-4.76E-03	-2.89E-07	-2.42E-02	-2.42E-03

GWP-total = Global warming potential, total;
 GWP-fossil = Global warming potential, fossil;
 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; and
 EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

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

Parameters describing environmental impacts			EP-marine	EP-terrestrial	POCP	ADP-mineral & metals	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m ³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	3.38E-02	2.35E-01	8.66E-02	2.20E-04	4.68E+02	2.31E+01	1.97E-06
	Transport	A2	5.81E-04	6.38E-03	1.86E-03	1.18E-06	5.30E+00	2.32E-02	2.93E-08
	Manufacturing	A3	4.04E-03	1.55E-02	4.39E-03	5.63E-06	3.27E+01	8.02E-01	7.33E-08
	Total (of product stage)	A1-3	3.84E-02	2.57E-01	9.28E-02	2.27E-04	5.06E+02	2.39E+01	2.07E-06
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
100% to Incineration Scenario									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.36E-04	1.48E-03	4.55E-04	3.87E-07	1.68E+00	7.56E-03	9.59E-09
	Waste processing	C3	2.35E-03	2.00E-02	4.87E-03	1.28E-06	3.38E+00	1.15E+00	2.04E-08
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3.57E-03	-3.51E-02	-9.81E-03	-2.57E-06	-6.75E+01	-1.84E+00	-1.63E-07

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
 EP-terrestrial = Eutrophication potential, accumulated exceedance;
 POCP = Formation potential of tropospheric ozone;
 ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;

ADP-fossil = Depletion potential of the stratospheric ozone layer;
 WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
 PM = Particulate matter.

LCA Results (continued)

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

Parameters describing environmental impacts			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U ²³⁵ eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	2.09E+00	1.55E+03	2.21E-07	2.33E-06	4.47E+01
	Transport	A2	2.71E-02	4.09E+00	1.40E-10	4.22E-09	3.49E+00
	Manufacturing	A3	8.02E-01	3.87E+01	1.02E-09	1.92E-08	1.56E+01
	Total (of product stage)	A1-3	2.92E+00	1.59E+03	2.22E-07	2.36E-06	6.39E+01
Construction process stage	Transport	A4	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND
100% to Incineration Scenario							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.64E-03	1.31E+00	4.25E-11	1.38E-09	1.15E+00
	Waste processing	C3	1.03E-02	3.78E+01	1.62E-09	6.14E-08	1.13E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.16E+00	-5.94E+01	-9.97E-10	-3.14E-08	-1.96E+01

IRP = Potential human exposure efficiency relative to U235;
 ETP-fw = Potential comparative toxic unit for ecosystems;
 HTP-c = Potential comparative toxic unit for humans;

HTP-nc = Potential comparative toxic unit for humans; and
 SQP = Potential soil quality index.

LCA Results (continued)

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

Parameters describing resource use, primary energy			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	2.41E+01	0.00E+00	2.41E+01	3.52E+02	1.13E+02	4.65E+02
	Transport	A2	7.26E-02	0.00E+00	7.26E-02	5.20E+00	0.00E+00	5.20E+00
	Manufacturing	A3	5.26E+00	5.16E-01	5.77E+00	-5.99E+00	3.81E+01	3.21E+01
	Total (of product stage)	A1-3	2.94E+01	5.16E-01	2.99E+01	3.51E+02	1.51E+02	5.02E+02
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
100% to Incineration Scenario								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	2.37E-02	0.00E+00	2.37E-02	1.65E+00	0.00E+00	1.65E+00
	Waste processing	C3	1.32E-01	0.00E+00	1.32E-01	-2.30E+02	2.34E+02	4.12E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.01E+01	0.00E+00	-1.01E+01	-6.78E+01	0.00E+00	-6.78E+01

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)

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

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	0.00E+00	0.00E+00	0.00E+00	5.44E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	5.76E-04
	Manufacturing	A3	3.41E-03	7.69E-08	0.00E+00	1.91E-02
	Total ((of product stage)	A1-3	3.41E-03	7.69E-08	0.00E+00	5.64E-01
Construction process stage	Transport	A4	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
100% to Incineration Scenario						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.87E-04
	Waste processing	C3	2.99E-03	0.00E+00	0.00E+00	2.68E-02
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-4.58E-02

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)

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

Other environmental information describing waste categories			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.83E+00	2.63E+01	7.88E-04
	Transport	A2	5.91E-03	1.01E-01	1.47E-02
	Manufacturing	A3	1.21E-01	2.10E+00	2.18E-04
	Total (of product stage)	A1-3	1.95E+00	2.85E+01	1.57E-02
Construction process stage	Transport	A4	MND	MND	MND
	Construction	A5	MND	MND	MND
Use stage	Use	B1	MND	MND	MND
	Maintenance	B2	MND	MND	MND
	Repair	B3	MND	MND	MND
	Replacement	B4	MND	MND	MND
	Refurbishment	B5	MND	MND	MND
	Operational energy use	B6	MND	MND	MND
	Operational water use	B7	MND	MND	MND
100% to Incineration Scenario					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.85E-03	3.29E-02	1.14E-05
	Waste processing	C3	2.77E-01	7.98E+00	7.68E-06
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2.74E-01	-1.47E+01	-3.45E-04

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

LCA Results (continued)

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

			Other environmental information describing output flows – at end of life					
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	1.21E-01	4.67E-09	1.52E-04	0.00E+00	-2.15E-05
	Total (of product stage)	A1-3	0.00E+00	1.21E-01	4.67E-09	1.52E-04	0.00E+00	-2.15E-05
Construction process stage	Transport	A4	MND	MND	MND	MND	MND	MND
	Construction	A5	MND	MND	MND	MND	MND	MND
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
100% to Incineration Scenario								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	7.60E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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
Reference service life	Millboard Cladding Boards have a reference service life of 15 years.		
C1 – Deconstruction	The product comes with a warranty for up to 15 years and has a structural capability that may potentially exceed this timeframe. Once it reaches the end of its life, it will be manually deconstructed or deconstructed using power tools from the building. We assume a 100% recovery rate of the product at its end of life, and the recovered product will be sent to an incineration facility for waste treatment.		
C2 – Transport from site to pre-processing facility or landfill	An industrial average end-of-life transport data has been used according to BRE PCR PN 514 Rev 3.1.	km	88
C3 - Pre-processing of uninstalled product	The Millboard cladding products typically consists of 30-65% plastic and polymer, along with 20-45% limestone. Therefore, the most appropriate end-of-life scenario has been selected by referencing BRE PCR EN15804 3.1. An industrial average end-of-life data for glass reinforced plastic (GRP) panel has been used, with 100% waste to energy recovery.		
	100% Millboard Envello Shadow Line Cladding Board incinerated for energy recovery	kg/unit	8
	100% of Millboard Envello Board & Batten Cladding board incinerate for energy recovery	kg/unit	7.6
C4 – Disposal	100% of product will be incinerate at the waste processing unit, therefore no end-of-life waste will be landfilled in C4		
Module D	The benefits of Module D include the energy credits from incineration of waste product at end-of-life. Only combustible content will be accounted for in Module D. Non-combustible contents (limestone and glass fibres) have been excluded from per unit of cladding board, only the remaining combustible content are accounted for in Module D energy recovery calculation, i.e. 62% for Millboard Envello Shadow Line Cladding Board and 64% for Millboard Envello Board & Batten Cladding Board.		
	Recovered for energy - Millboard Envello Shadow Line Cladding Board	Kg	4.98
	Recovered for energy - Millboard Envello Board & Batten Cladding Board	Kg	4.84

Individual product calculations:

The LCA results listed in the EPD are for 1 unit of Millboard Envello Shadow Line Cladding Board and Envello Board & Batten Cladding Board. Millboard Cladding Boards can also be sold by m2 on Millboard’s website. The end-user of this EPD can therefore use these results and the conversion factors listed below to calculate the impacts for 1m2 of the Millboard Cladding Boards.

	kg/unit	kg/m2	Conversion factor
Millboard Envello Shadow Line Cladding Board	8	9.6	1.2
Millboard Envello Board & Batten Cladding Board	7.6	12.3	1.62

Interpretation

For 1 unit of Millboard Envello Shadow Line Cladding Board and Millboard Board & Batten Cladding Board, the composition and proportions are very similar and differ by less than 1%. Therefore, the average will be used in this interpretation section.

Out of the total mass of input materials, averagely, polymers and additives make up 30-65%, followed by limestone of 20-45%, aluminium filler make up 0-15%, fibreglass filler 0-15%, coatings make up the remaining of 0-15%. The bulk of the environmental impacts and primary energy demand are attributed to the manufacturing phase, covered by information modules A1-A3 of EN15804:2012+A2:2019.

As a result, polymers and additives rank first in terms of overall environmental impacts and is responsible for the greatest impact on all environmental impact indicators. Fibreglass filler and coatings rank second and third in terms of overall environmental impacts. Although the total mass and environmental impact of the aluminium filler is very small, it contributes 34% of the impact on HWD. Limestone has negligible impacts in the 2 products.

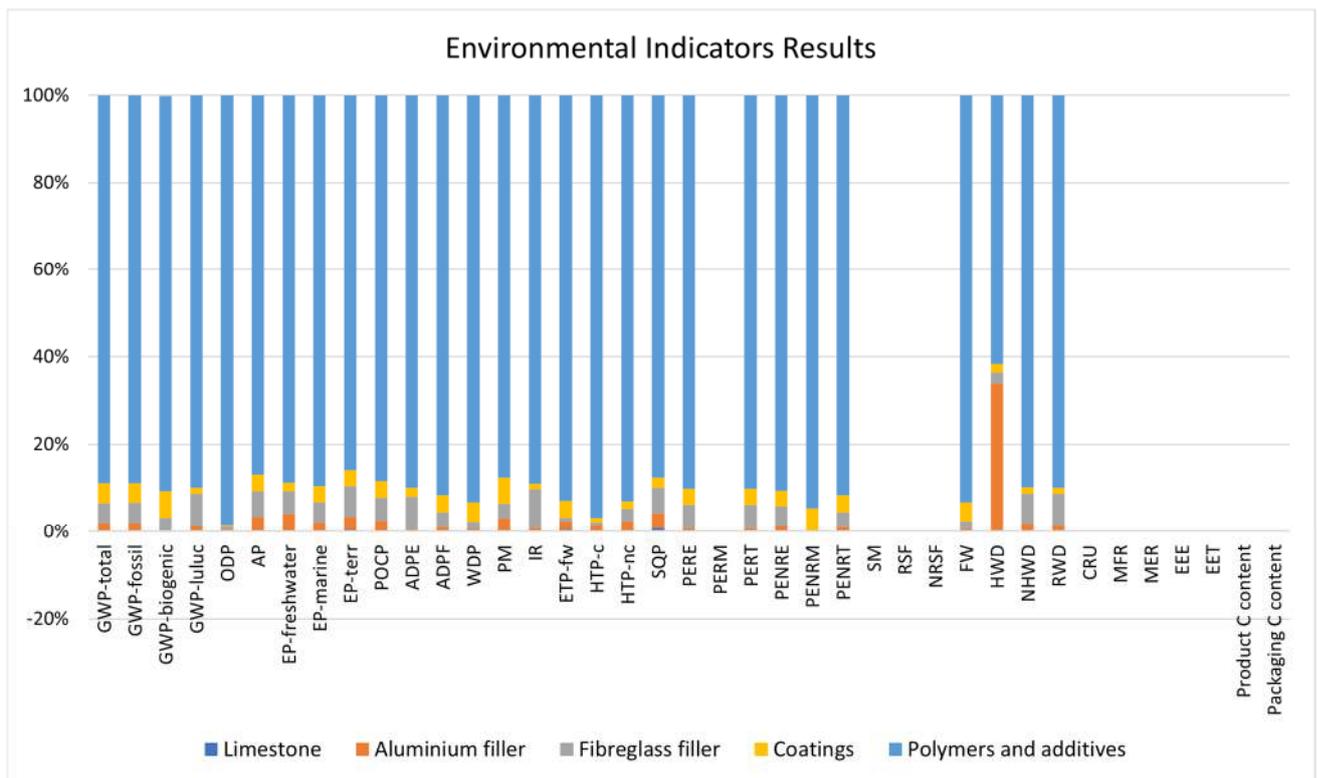


Figure 1

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