

Statement of Verification

BREG EN EPD No.: 000650

Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Stormking Plastics Ltd



is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

1 kg of Stormking GRP Insulated product

Company Address

Stormking Plastics Ltd,
Amington Point,
Sandy Way,
Amington Industrial Estate,
Tamworth,
B77 4ED.



Emma Baker
Operator

19 December 2024
Date of this Issue

19 December 2024
Date of First Issue

18 December 2029
Expiry Date



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Environmental Product Declaration

EPD Number: 000650

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
Stormking Plastics Ltd, Amington Point, Sandy Way, Amington Industrial Estate, Tamworth, B77 4ED.	Bala Subramanian/BRE LINA A2
Declared/Functional Unit	Applicability/Coverage
1 kg of Stormking GRP Insulated product	Other (please specify). Product specific
EPD Type	Background database
Cradle to Gate with options	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: Pat Hermon	
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
A1	A2	A3	A4	A5	Related to the building fabric				Related to the building			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 type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>													

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Stormking Plastics Ltd,
Amington Point,
Sandy Way,
Amington Industrial Estate,
Tamworth,
B77 4ED.

Construction Product:

Product Description

Stormking provide GRP products for the building industry.

GRP products are generally a near exact replica of traditional features constructed such that the feature can be reproduced using modern materials and technology many times over with consistency of finish, quality and appearance at a fraction of the cost and time of its traditional counterpart but also achieving strength, thermal, safety benefits associated with modern processes.

Glass reinforced polyester (GRP) products supplied consist of a GRP decorative outer shell produced in one or two parts reinforced with a timber structural inner to give the product the strength and rigidity necessary for the purpose of the product. Some products also receive an insulative fill to satisfy thermal conductivity requirements of the building industry.

Formed in a mould produced to the shape and size of the desired final product, GRP is a lamination process consisting of an outer polyester gel coat finish backed with polyester resin in turn reinforced with randomly directed glass fibre strands. The gel coat finish, sprayed onto the mould, gives the colour and weathering abilities of the laminate and takes on all the textures and features of the mould. The glass reinforced resin is malleable to the shape of the mould and bonds with the gel coat finish providing the strength and rigidity to the profile.

The designs are such to make installation as quick and simple as possible when compared to traditional construction with the lightweight nature making it easier and safer to handle and transport.

The Stormking GRP Insulated product range includes dormers, bay roofs, canopies, pilasters, columns, and other related components. While the composition and manufacturing process for these products are the same, the proportion of raw material inputs varies based on the product size. Therefore, the LCA analysis is conducted for the total production quantity of raw materials used for the GRP Insulated product group has been considered, and the results are calculated per 1 kg of GRP Insulated product. This approach allows the impacts at the end of the EPD to be tailored to specific product sizes.

Technical Information of the GRP insulated product group

Standard	Description
Structural:	Products have sufficient strength and stiffness to sustain associated design loads where no access is provided other than necessary for cleaning and repair.
External Fire Spread:	GRP meets standards for fire resistance of EXT.F.AC to BS476-3:2004 for use as roofing components.
Durability:	Exposure and durability tests indicate the weatherproof GRP outer shell has a service life more than 30 years.
Water resistance:	GRP is unaffected by moisture.
Thermal Properties:	Dormers and bay window canopies are insulated to meet minimum building regulation thermal standards. Surface condensation risk is minimal Interstitial condensation risk is minimal when used with a correctly installed vapour control layer GRP laminate $\lambda = 0.40$ W/mK
Accreditation:	BBA 18/5539 – Smartstack GRP and Brick slip chimneys
	BBA 17/5434 – Prefabricated Roofs including Dormers, Bay Window Roofs and Warm-Dorma
	ISO9001 – Quality Management Systems
	ISO14001 – Environmental Management Systems
Maintenance:	BES6001 – Sustainability
	Minimal maintenance is required for GRP. When necessary, stains or marks can be removed with a damp cloth and household detergent.

For more information, please contact Stormking technical team or visit <https://stormking.co.uk/technical-hub/>



Installed GRP Insulated Dormers in the building

Average composition of the GRP insulated product group

Material/Chemical Input	%
Unsaturated polyester resin	25-30%
Glass mat	15-20%
Softwood	35-40%
Gelcoat	5-10%
Polyurethane	5-10%
Other additives	0-5%

Manufacturing Process

Initially, a mould would be required that is a reverse impression of the feature needing replication.

Firstly, the mould is prepared for manufacture.

Secondly, the gel coat finish, a liquid material, is either hand brushed or sprayed onto the mould to the profile of the mould



Thirdly and once semi cured, the gelcoat facing is backed up with a glass fibre reinforcement impregnated with a catalysed polyester resin. Immediately after application, the glass fibre and resin mix are consolidated and pressed onto the gel coat finish to which it chemically bonds to form a single composite panel.



The parts are left to cure and once all elements have completed the curing cycle, the parts are released from the mould. The mould is then cleaned and prepared for repeating the process.

These GRP parts, along with structural framing and insulation are assembled and fixed together to produce the final product. An insulated spray foam is sprayed into the void.

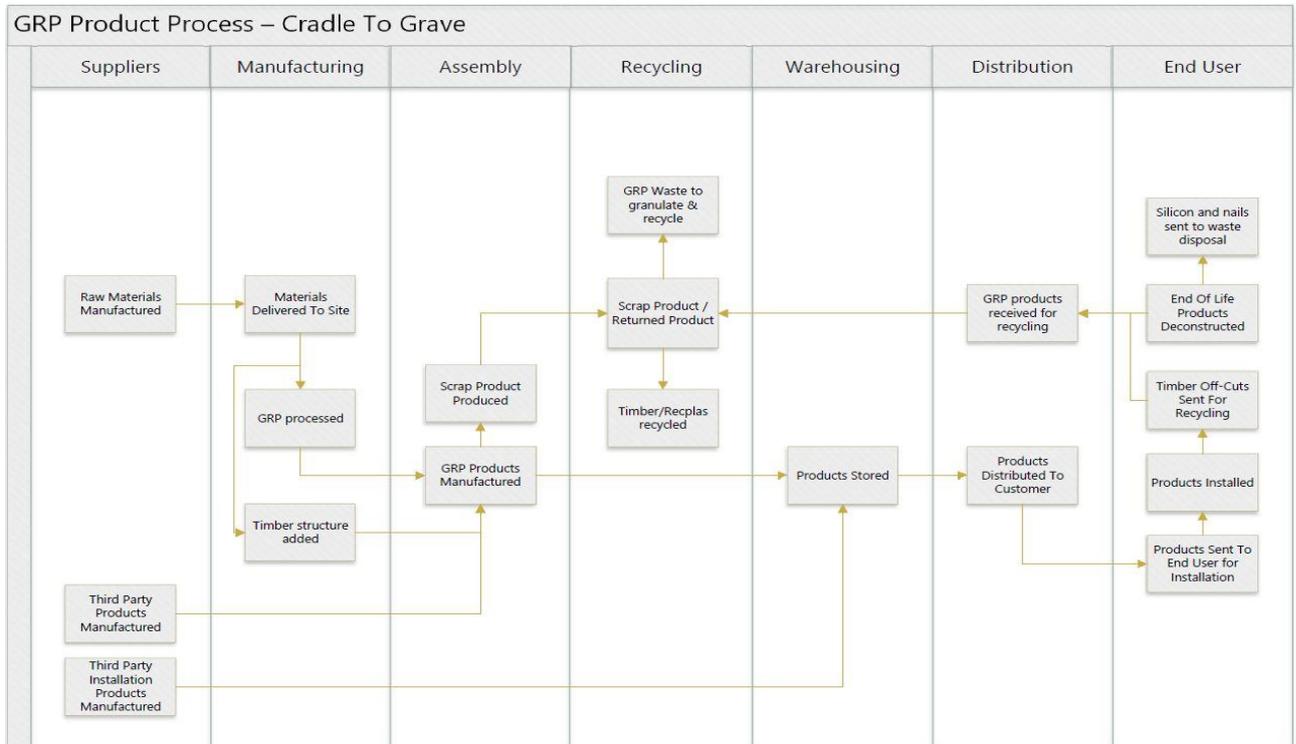


Due to the complicated shapes and profiles of the products being replicated, there may be the need for more than 1 GRP part to form the final product.



Note: For manufacturing the national grid electricity has been used and the waste from the processing will be sent to the recycling.

Process flow diagram.



Construction Installation

Installation is as per BBA certificates.

Note: Please refer BBA certificate or contact Stormking technical team for more information. More information please reach out <https://stormking.co.uk/technical-hub/>

Use stage

Insulated products are ones which are being installed into part of the building itself, where thermal values need to be retained, ensuring no loss of thermal integrity. Insulation is added to the required specification levels to ensure they remain thermally efficient. These products are still lightweight and virtually maintenance free, requiring only a wipe down to remove any surface dirt/dust periodically.

End of Life

Glass reinforced polyester (GRP) is made up of unsaturated polyester resin, gelcoat, wood, plywood, and OSB board. The components are bonded together and formed in a mould shaped and sized according to the desired final product. At the end of its life, the product will be deconstructed or dismantled during building demolition using power tools. Once removed, the waste product will be sent to a waste processing unit for final disposal.

Life Cycle Assessment Calculation Rules

Declared unit description.

1 kg of Stormking GRP Insulated product

System boundary

This is a Cradle-to-Gate with Options EPD, reporting the upstream processing stages A1 to A3, construction stages A4-A5, use stages B1-B5, end-of-life stages C1-C4 and D in accordance with EN 15804:2012+A2:2019 and BRE 2023 Product Category Rules (PN 514 Rev 3.1).

Data sources, quality and allocation

The datasets are derived from Ecoinvent v3.8, and the LCA tool used was BRE LINA A2. The LCA analysis is conducted for the 1 kg of GRP Insulated product, and it includes the total amount of polyester resins, polyurethane foam, softwood, coating, and ancillary mouldings used to manufacture the Stormking GRP product over the period of one year (from 01/01/2023 to 31/12/2023). The Stormking GRP Insulated product range includes dormers, bay roofs, canopies, pilasters, columns, and other related components. While the composition and manufacturing process for these products are the same, the proportion of raw material inputs varies based on the product size. Therefore, the LCA analysis is conducted for the total production quantity of raw materials used for the GRP Insulated product group has been considered, and the results are calculated per 1 kg of GRP Insulated product. This approach allows the impacts at the end of the EPD to be tailored to specific product sizes.

In addition to the Stormking GRP product, other products are manufactured. Therefore, the allocation of electricity, fuel, waste, water consumption, and discharge are required. This allocation has been done according to the provisions of BRE PCR PN514 and EN 15804, using the mass production quantity. 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. No proxy datasets were used for the modelling, and no data uplift was applied to the inputs or outputs. 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.

ISO14044 guidance. 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 approximately 1-2 years between the Ecoinvent LCI reference year, and the time period for which the LCA was undertaken.

Specific European datasets have been selected from the ecoinvent LCI for this LCA. Manufacturer uses the national grid electricity for production, so therefore the national grid electricity dataset has been used for the LCA modelling (Ecoinvent 3.8). The GWP carbon footprint for using 1 kWh of electricity, GB kWh is 0.239 kgCO₂e/kWh and for the UK natural gas carbon footprint for using 1 kWh is 0.232 kgCO₂e. The quality level of time representativeness is also Very 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.

Cut-off criteria

All raw materials and energy input to the manufacturing process have been included, except for direct emissions to air, water, and soil, which are not measured. The inventory process in this LCA includes all data related to raw material, packaging material and consumable items.

LCA Results - 1 kg of Stormking GRP Insulated product

(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	2.41E+00	3.23E+00	-8.34E-01	2.58E-03	2.86E-07	1.52E-02	6.96E-04
	Transport	A2	1.56E-02	1.56E-02	1.33E-05	6.39E-06	3.59E-09	6.39E-05	1.07E-06
	Manufacturing	A3	1.67E+00	1.63E+00	3.90E-02	5.70E-04	6.58E-08	1.21E-02	6.53E-04
	Total (Consumption grid)	A1-3	4.09E+00	4.88E+00	-7.95E-01	3.16E-03	3.55E-07	2.74E-02	1.35E-03
Construction process stage	Transport	A4	4.59E-02	4.59E-02	3.91E-05	1.80E-05	1.06E-08	1.86E-04	2.95E-06
	Construction	A5	3.42E+00	3.38E+00	3.93E-02	3.49E-04	7.15E-07	3.48E-02	1.09E-04
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life									
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	8.32E-03	8.31E-03	7.08E-06	3.26E-06	1.92E-09	3.37E-05	5.35E-07
	Waste processing	C3	2.54E+00	1.91E+00	6.28E-01	9.86E-06	2.84E-09	4.88E-04	5.97E-06
	Disposal	C4	2.64E-07	2.63E-07	2.61E-10	2.49E-10	1.07E-13	2.48E-09	2.41E-11
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8.57E-01	-8.44E-01	-1.13E-02	-1.02E-03	-5.78E-08	-4.62E-03	-4.59E-04

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	3.02E-03	2.95E-02	1.12E-02	2.81E-05	5.60E+01	2.22E+00	2.21E-07
	Transport	A2	1.90E-05	2.08E-04	6.51E-05	5.22E-08	2.37E-01	1.13E-03	1.49E-09
	Manufacturing	A3	9.66E-04	1.03E-02	3.14E-03	6.48E-04	1.53E+01	5.49E-01	5.02E-08
	Total (Consumption grid)	A1-3	4.01E-03	4.00E-02	1.44E-02	6.76E-04	7.15E+01	2.77E+00	2.73E-07
Construction process stage	Transport	A4	5.61E-05	6.13E-04	1.88E-04	1.60E-07	6.94E-01	3.12E-03	3.96E-09
	Construction	A5	1.54E-02	1.69E-01	4.64E-02	2.04E-06	4.61E+01	1.22E-01	9.31E-07
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life									
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	1.02E-05	1.11E-04	3.40E-05	2.89E-08	1.26E-01	5.65E-04	7.17E-10
	Waste processing	C3	3.05E-04	2.52E-03	6.06E-04	8.95E-08	3.37E-01	2.21E-02	2.40E-09
	Disposal	C4	8.61E-10	9.42E-09	2.74E-09	6.01E-13	7.35E-06	3.37E-07	4.99E-14
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-7.12E-04	-7.07E-03	-1.95E-03	-7.43E-07	-1.48E+01	-3.54E-01	-3.01E-08

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	2.22E-01	1.04E+02	3.51E-09	1.07E-07	9.79E+01
	Transport	A2	1.19E-03	1.92E-01	5.99E-12	1.99E-10	2.00E-01
	Manufacturing	A3	1.63E-01	1.00E+02	6.81E-09	5.48E-07	7.59E+00
	Total (Consumption grid)	A1-3	3.86E-01	2.04E+02	1.03E-08	6.56E-07	1.06E+02
Construction process stage	Transport	A4	3.57E-03	5.41E-01	1.75E-11	5.68E-10	4.76E-01
	Construction	A5	2.08E-01	2.72E+01	1.28E-09	1.98E-08	5.96E+00
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.46E-04	9.81E-02	3.18E-12	1.03E-10	8.63E-02
	Waste processing	C3	5.92E-04	2.14E+00	1.52E-10	5.52E-09	8.45E-02
	Disposal	C4	3.27E-08	4.64E-06	1.18E-16	3.05E-15	1.54E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3.05E-01	-1.17E+01	-2.04E-10	-6.34E-09	-4.43E+00

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	1.24E+01	6.86E+00	1.93E+01	4.24E+01	9.88E+00	5.23E+01
	Transport	A2	2.78E-03	0.00E+00	2.78E-03	2.03E-01	0.00E+00	2.03E-01
	Manufacturing	A3	1.29E+00	2.72E-01	1.56E+00	7.54E+00	9.10E+00	1.66E+01
	Total (Consumption grid)	A1-3	1.37E+01	7.13E+00	2.08E+01	5.02E+01	1.90E+01	6.91E+01
Construction process stage	Transport	A4	9.77E-03	0.00E+00	9.77E-03	6.81E-01	0.00E+00	6.81E-01
	Construction	A5	2.59E-02	2.60E-01	2.86E-01	4.41E+01	1.05E+00	4.52E+01
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life								
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	1.77E-03	0.00E+00	1.77E-03	1.23E-01	0.00E+00	1.23E-01
	Waste processing	C3	-5.45E+00	5.46E+00	4.38E-03	-1.99E+01	2.01E+01	1.96E-01
	Disposal	C4	6.27E-08	0.00E+00	6.27E-08	7.22E-06	0.00E+00	7.22E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2.32E+00	0.00E+00	-2.32E+00	-1.48E+01	0.00E+00	-1.48E+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	5.41E-03	0.00E+00	0.00E+00	5.25E-02
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	2.79E-05
	Manufacturing	A3	6.66E-04	3.20E-06	0.00E+00	1.36E-02
	Total (Consumption grid)	A1-3	6.08E-03	3.20E-06	0.00E+00	6.62E-02
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	7.73E-05
	Construction	A5	1.88E-02	0.00E+00	0.00E+00	3.01E-03
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life						
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	1.40E-05
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	5.18E-04
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-09
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-8.84E-03

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	1.27E-01	2.99E+00	7.76E-05
	Transport	A2	2.23E-04	3.92E-03	6.36E-01
	Manufacturing	A3	1.17E-01	1.26E+00	5.91E-05
	Total (Consumption grid)	A1-3	2.43E-01	4.25E+00	6.36E-01
Construction process stage	Transport	A4	7.65E-04	1.36E-02	4.69E-06
	Construction	A5	7.04E-02	4.49E-01	3.16E-04
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00
End of life					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.39E-04	2.46E-03	8.50E-07
	Waste processing	C3	1.21E-02	9.39E-01	3.14E-07
	Disposal	C4	7.65E-09	1.08E-07	4.82E-11
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-5.46E-02	-2.74E+00	-8.64E-05

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	-3.20E-01	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	7.14E-03	2.06E-01	3.11E-03	1.61E-03	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	7.14E-03	2.06E-01	3.11E-03	-3.18E-01	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	1.87E-02	4.73E-03	0.00E+00	0.00E+00	0.00E+00
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	4.22E-01	9.99E+00	1.23E-03	-9.74E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life								
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	0.00E+00	0.00E+00	1.90E-01	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

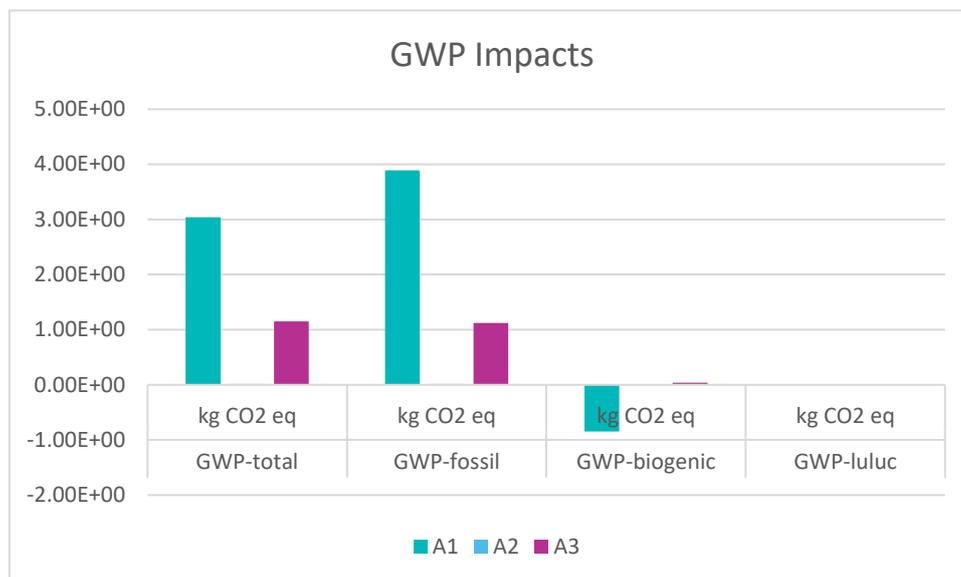
Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	The average distance travelled to the customer site		
	Road transport - Lorry 16-32 metric ton to Stockist	km	276
	Capacity utilisation (incl. empty returns)	%	26%
	Fuel consumption	l/km	0.227
	Bulk density of transported products	kg/m ³	1240
A5 – Installation in the building	Installation as per BBA certificates.		
	Installation waste percentage	%	0
	Nylon	kg	0.001
	Fixings	kg	0.002
	Diesel	kg	0.8
B1 – Use	Roofline and cladding installations on a house (see installation guide) are durable, finished products designed to withstand exposure to environmental conditions without the need for additional inputs.		
B2- Maintenance	There is no requirement for ongoing maintenance, though occasional cleaning is necessary, requiring only a minimal amount of water and the impacts are negligible		
	Mains water - Washing down surfaces	Litre	0.01932
B3 – Repair	Once installed products are generally out of scope of contact and therefore will require no repair required.		
B4 – Replacement	No replacement required unless the building is refurbished.		
B5 – Refurbishment	No refurbishment required		
B6 – Use of energy; B7 – Use of water	No operational energy and water required.		
Reference service life	Exposure and durability tests indicate the weatherproof GRP outer shell has a service life more than 30 years (BBA 18/5539)		
C1 - Deconstruction	Insulated Glass reinforced polyester (GRP) is made up of unsaturated polyester resin, fibre glass, polyurethane, gelcoat, wood, plywood, and OSB board. The components are bonded together and formed in a mould shaped and sized according to the desired final product. At the end of its life, the product will be deconstructed or dismantled during building demolition using power tools. Once removed, the waste product will be sent to a waste processing unit for final disposal. The electricity used to dismantle the product is not included in the analysis because it is assumed to be negligible when compared to the overall electricity consumption during building demolition.		
C2 – Transportation to waste processing facility	50km by road has been modelled for module C2 as a typical distance from the demolition site. However, end-users of the EPD can use this information to calculate the impacts of a bespoke transport distance for module C2 if required.		
	Road transport - Lorry 16-32 metric ton	km	50

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
C3 – Pre-processing	The GRP Insulated panels are moulded as a single part, with unsaturated polyester resin, wood, glass mat, and polyurethane as the main component. These materials are fully bonded together and cannot be separated. According to the Composite UK Trade Association, 100% of the composite waste will be sent for incineration with energy recovery.		
	Fixing used to install the product is made up of steel and it will remove and sent to recycling.		
	100% of the Polyester resin waste to incineration	kg	0.52
	100% of Softwood waste to incineration with energy recovery	kg	0.39
	100% of the Polyurethane waste to incineration	kg	0.09
C4 – Disposal	Steel waste 95% recycling		
	kg		0.00086
C4 – Disposal	Unrecoverable steel waste to landfill		
	5% steel wastes	kg	0.00005
Module D	The benefits of Module D include energy credits derived from the waste incineration of wood and polyurethane for energy generation at the end of life. Since the product is sold across Europe and the UK, the dataset used to calculate the avoided impacts of heat generation and electricity consumption in a future system was "Heat average Europe".		
	Polyester Resin = 100% incinerated for energy and heat recovery = 0.52 kg Softwood, incinerated for energy and heat recovery = 0.39 kg Polyurethane waste to incineration for energy and heat recovery = 0.09 kg Additionally, the benefit of recycling steel is that it replaces virgin products in the new system. Recycling steel benefits has been calculated for the virgin content only Stainless steel = 0.00004 kg		

Interpretation of results:

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. The global warming potential (GWP) impacts broken down into different categories such as GWP-total, GWP-fossil, GWP-biogenic, and GWP-luluc, with data for three variables or scenarios (A1, A2, and A3). A1 - raw material manufacturing has the highest GWP impact in terms of kg CO2 equivalent.



References

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BBA 18/5539 – Smartstack GRP and Brick slip chimneys

BBA 17/5434 – Prefabricated Roofs including Dormers, Bay Window Roofs and Warm-Dorma

ISO 9001 – Data quality management

ISO 14001: Environmental Management systems

BES 6001 Framework Standard for Responsible Sourcing