Statement of Verification

BREG EN EPD No.: 000555 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Swish Building Products

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

1kg of Cellular PVC profiles

Company Address

Swish Building Products
Pioneer House,
Mariner,
Lichfield Road Industrial Estate,
Tamworth,
Staffordshire,
B79 7TF

Swish BUILDING PRODUCTS

Signed for BRE Global Ltd	Emma Baker Operator	02 April 2024 Date of this Issue
02 April 2024 Date of First Issue		01 April 2029 Expiry Date

BRE Global Verified EPD

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ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

EPD Number: 000555

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**
Swish Building Products Pioneer House, Mariner, Lichfield Road Industrial Estate, Tamworth, Staffordshire, B79 7TF	LCA Tool: BRE LINA A2 LCA Consultant: Francis Yu
Declared/Functional Unit	**Applicability/Coverage**
1kg of Cellular PVC profiles.	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 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Roger Connick
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
☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑		☑

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Swish Building Products

Pioneer House,
Mariner,
Lichfield Road Industrial Estate,
Tamworth,
Staffordshire,
B79 7TF

Construction Product:

Product Description

Cellular profiles are manufactured by extruding an expanding, or foaming PVC formulation, which produces a strong, lightweight board. During the process a smooth skin is co-extruded onto one side of the board to form the decorative face. Cellular PVC can be cut, drilled, nailed, and routed, using conventional carpentry tools. It is also light and easy to handle and fix. It is also completely weatherproof and has a long service life.

In the Swish manufacturing site, the cellular PVC profiles are extruded and moulded to various designs. In this EPD, 1 kg of Cellular PVC profiles has been modelled. This EPD is solely related to these products - used as fascia, soffit, barge, cladding and small trims (skirtings/architraves and window finishing trims).

Cellular PVC profiles can be installed to Roofline (fascia/soffit barge – eaves and verge), Cladding (external wall coverings) and internal trim (windowboards and trims, skirtings and architraves).

Technical Information

Property	Value, Unit
The density of Swish Cellular PVC	450 kg/m3
Thermal conductivity	The lambda value of Swish Cellular PVC 0.06 W/mK
Thermal movement	The coefficient of linear expansion under test conditions is 5 x 10-5 per ℃
Water resistance	Unaffected by moisture
Chemical stability	Resistant to most acids and alkalis, but can be damaged by ketones, esters and solvents.
Durability	Weathering resistance is tested with equipment complying with BS 2782: Part 5: Method 540B
Colour fastness	Colour fastness assessed in accordance with BS 1006 shows that white Swish Cellular PVC achieves a rating of 7-8 (8 being the test maximum) and that therefore no significant fading or change in whiteness can be expected for a minimum of 20 years.

Note: the technical data can be found in Swish Cladding Design Guide and Roofline Design Guid (www.swishbp.co.uk/library/literature).

Main Product Contents

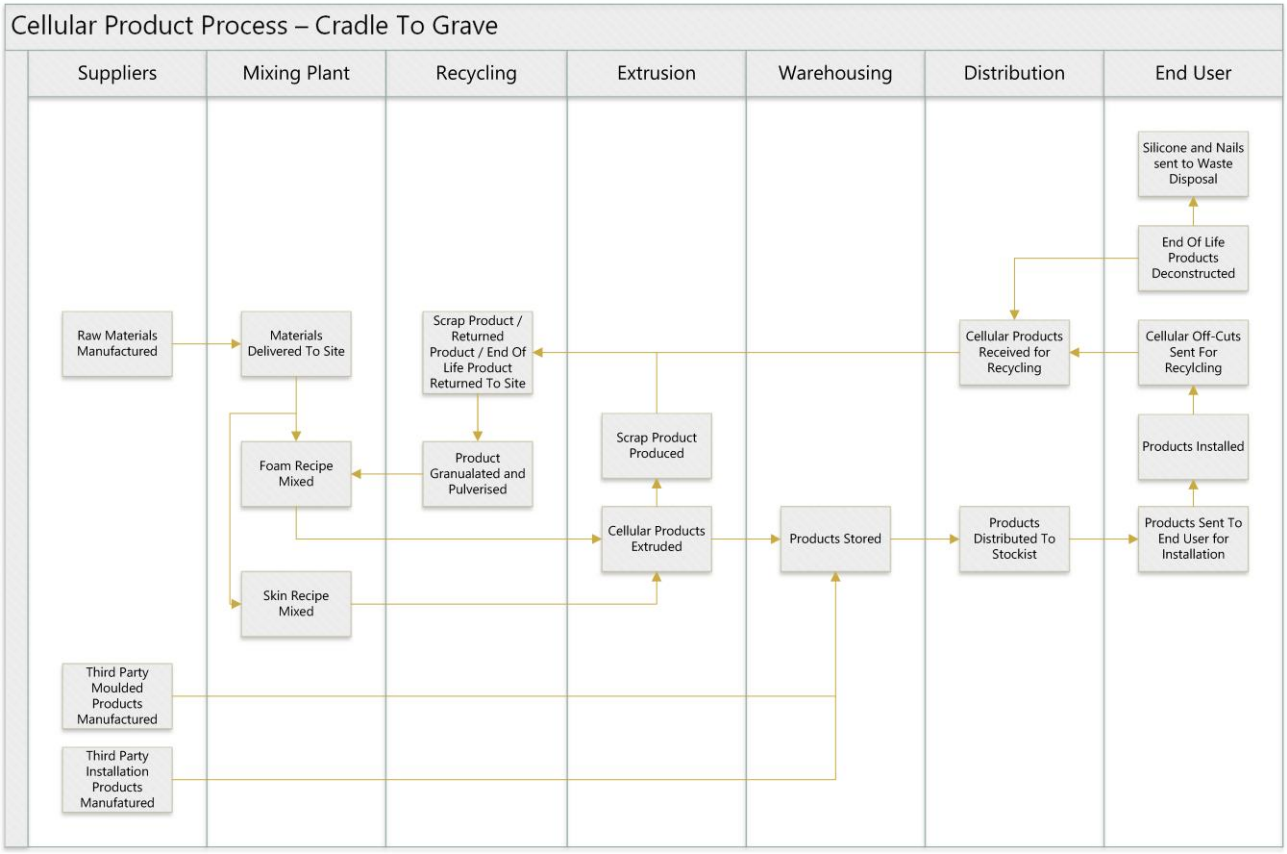
Material/Chemical Input	%
PVC Resin	80-100%
Calcium Carbonate	1-10%
Additives	1-10%

Manufacturing Process

Continuous extrusioin of co-extruded Cellular profiles - produced by the inward foaming process where the PVC formulation includes blowing agent to produce a 'foam' core and a secondary rigid skin is applied creating a homogenous profile. Multiple designs and sizes to allow variation of finished parts for application as Roofline and Cladding Products. System also includes ancillary mouldings (joints, corners and finishing trims) made by injection moulding PVC by a third-party supplier.

Swish Cellular PVC profiles are manufactured in accordance with BS 7619: 2021 Extruded cellular unplasticized white PVC (PVC-UE) profiles – Specification and BS EN 13245-2:2008 Plastics Unplasticized poly (vinyl chloride) (PVC-U) profiles for building applications Part 2: PVC-U profiles and PVC-UE profiles for internal and external wall and ceiling finishes.

Process flow diagram



End of Life

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

1kg of Cellular PVC profiles.

System boundary

This is a Cradle-to-Gate with Options EPD, reporting all production life cycle stages A1 to A3, construction stages A4-A5, use stages B1-B7, 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

Specific primary data derived from Swish's production process in Pioneer House, Mariner, Lichfield Road Industrial Estate, Tamworth, Staffordshire, B79 7TF factory, have been modelled using LINA 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 Swish, covering the period of one year (01/01/2023 – 31/12/2023), has been used for this LCA analysis. During data entry, it was noted that some chemicals were not available in the background database. However, Swish provided the composition of these chemicals, and bespoke datasets were generated and embedded in the background dataset for use in this LCA modeling. Proxiey chemical datasets used in the LCA modeling are additives and pigment. 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.

This LCA is for 1kg Cellular PVC System (fascia, soffit, barge, cladding and small trims), which account for 75% of the site's total production. The factory also produces other products in addition to Cellular PVC System. All energy, water and waste has been allocated to the product by mass in line with the provisions of the BRE PCR PN514 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.

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 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.

UK Consumption mix is used for electricity with an emissions factor of 0.239kgCO2e/kWh.

Cut-off criteria

All processes associated with the manufacturing process have been included. The reprocessed input material – Pulver, is an internally recycled waste. Such a feedback loop as both an input and output has been excluded in the LCA. All other 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

(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 CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	kg $(PO_4)^{3-}$ eq
Product stage	Raw material supply	A1	1.89E+00	1.87E+00	1.87E-02	1.35E-03	9.42E-07	8.53E-03	6.04E-04
	Transport	A2	5.57E-02	5.57E-02	4.72E-05	2.19E-05	1.29E-08	2.35E-04	3.57E-06
	Manufacturing	A3	3.08E-01	3.08E-01	2.05E-05	2.65E-04	4.00E-08	1.01E-03	6.09E-05
	Total (of product stage)	**A1-3**	**2.26E+00**	**2.24E+00**	**1.88E-02**	**1.63E-03**	**9.95E-07**	**9.78E-03**	**6.68E-04**
Construction process stage	Transport	A4	6.17E-02	6.16E-02	5.05E-05	2.54E-05	1.41E-08	2.51E-04	4.16E-06
	Construction	A5	2.78E-01	2.76E-01	2.30E-03	2.21E-04	8.63E-08	1.30E-03	8.37E-05
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	1.61E-04	1.11E-04	5.01E-05	1.49E-07	8.64E-12	1.29E-06	2.59E-07
	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	2.60E+00	2.57E+00	2.11E-02	1.88E-03	1.09E-06	1.13E-02	7.56E-04
	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
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	6.17E-02	6.16E-02	5.05E-05	2.54E-05	1.41E-08	2.51E-04	4.16E-06
	Waste processing	C3	2.11E+00	2.11E+00	4.56E-03	2.92E-04	6.65E-08	1.57E-03	9.23E-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	-5.76E-01	-5.68E-01	-7.42E-03	-6.01E-04	-4.01E-08	-3.30E-03	-3.13E-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	1.49E-03	1.40E-02	5.18E-03	3.11E-05	4.77E+01	1.41E+00	6.53E-08
	Transport	A2	7.01E-05	7.67E-04	2.34E-04	1.92E-07	8.41E-01	3.78E-03	4.81E-09
	Manufacturing	A3	2.25E-04	2.36E-03	7.69E-04	2.04E-06	6.79E+00	1.43E-01	9.32E-09
	Total (of product stage)	**A1-3**	**1.78E-03**	**1.71E-02**	**6.18E-03**	**3.34E-05**	**5.53E+01**	**1.56E+00**	**7.94E-08**
Construction process stage	Transport	A4	7.48E-05	8.18E-04	2.50E-04	2.27E-07	9.26E-01	4.25E-03	5.19E-09
	Construction	A5	2.70E-04	2.36E-03	8.09E-04	4.92E-06	5.43E+00	1.66E-01	1.36E-08
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	4.75E-06	3.67E-06	5.31E-07	1.48E-09	1.29E-03	-8.91E-03	2.09E-11
	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	2.13E-03	2.03E-02	7.24E-03	3.85E-05	6.17E+01	1.73E+00	9.82E-08
	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
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	7.48E-05	8.18E-04	2.50E-04	2.27E-07	9.26E-01	4.25E-03	5.19E-09
	Waste processing	C3	4.55E-04	4.17E-03	1.16E-03	2.26E-06	3.26E+00	3.98E+00	1.25E-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	-4.82E-04	-4.78E-03	-1.34E-03	-3.35E-07	-8.97E+00	-2.39E-01	-2.31E-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	2.59E-01	3.13E+01	1.45E-09	3.77E-08	4.37E+00
	Transport	A2	4.32E-03	6.56E-01	2.13E-11	6.87E-10	5.81E-01
	Manufacturing	A3	1.29E-01	5.06E+00	1.76E-10	3.25E-09	1.82E+00
	Total (of product stage)	**A1-3**	**3.92E-01**	**3.71E+01**	**1.64E-09**	**4.17E-08**	**6.78E+00**
Construction process stage	Transport	A4	4.72E-03	7.40E-01	2.43E-11	7.64E-10	6.20E-01
	Construction	A5	3.74E-02	6.10E+00	1.98E-09	5.52E-09	1.08E+00
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	1.53E-05	9.30E-02	8.78E-13	2.30E-11	1.67E-03
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	4.35E-01	4.39E+01	3.64E-09	4.79E-08	8.48E+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
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	4.72E-03	7.40E-01	2.43E-11	7.64E-10	6.20E-01
	Waste processing	C3	2.21E-02	1.18E+02	4.27E-10	3.28E-08	1.85E+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	-1.45E-01	-8.21E+00	-1.35E-10	-4.23E-09	-2.73E+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	2.57E+00	0.00E+00	2.57E+00	3.35E+01	2.14E+01	5.49E+01
	Transport	A2	1.18E-02	0.00E+00	1.18E-02	8.26E-01	0.00E+00	8.26E-01
	Manufacturing	A3	9.84E-01	1.27E-02	9.97E-01	6.32E+00	1.57E+00	7.89E+00
	Total (of product stage)	**A1-3**	**3.56E+00**	**1.27E-02**	**3.57E+00**	**4.07E+01**	**2.30E+01**	**6.36E+01**
Construction process stage	Transport	A4	1.20E-02	0.00E+00	1.20E-02	8.33E-01	0.00E+00	8.33E-01
	Construction	A5	5.01E-01	9.92E-04	5.02E-01	2.20E+00	3.86E+00	6.06E+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	8.79E-04	0.00E+00	8.79E-04	0.00E+00	2.25E-04	2.25E-04
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	4.07E+00	1.37E-02	4.09E+00	4.37E+01	2.69E+01	7.05E+01
	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
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	1.20E-02	0.00E+00	1.20E-02	8.33E-01	0.00E+00	8.33E-01
	Waste processing	C3	2.99E-01	0.00E+00	2.99E-01	-1.83E+01	2.15E+01	3.23E+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	-1.32E+00	0.00E+00	-1.32E+00	-9.01E+00	0.00E+00	-9.01E+00

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	2.14E-04	0.00E+00	0.00E+00	3.37E-02
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	9.36E-05
	Manufacturing	A3	1.65E-03	3.06E-06	0.00E+00	3.96E-03
	Total (of product stage)	**A1-3**	**1.87E-03**	**3.06E-06**	**0.00E+00**	**3.78E-02**
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	1.05E-04
	Construction	A5	9.11E-03	2.39E-07	0.00E+00	4.17E-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	-2.07E-04
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	1.10E-02	3.30E-06	0.00E+00	4.20E-02
	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
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	1.05E-04
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	9.28E-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	-5.94E-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	2.17E-01	3.69E+00	1.06E-04
	Transport	A2	9.28E-04	1.64E-02	7.53E-02
	Manufacturing	A3	1.96E-02	2.86E-01	3.49E-05
	Total (of product stage)	**A1-3**	**2.37E-01**	**3.99E+00**	**7.54E-02**
Construction process stage	Transport	A4	9.36E-04	1.66E-02	5.74E-06
	Construction	A5	9.74E-02	5.59E-01	5.89E-03
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	1.65E-05	2.03E-04	5.49E-09
	Repair	B3	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	3.35E-01	4.56E+00	8.13E-02
	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
100% to Incineration Scenario					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	9.36E-04	1.66E-02	5.74E-06
	Waste processing	C3	5.52E-01	1.35E+00	1.61E-05
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3.68E-02	-1.95E+00	-4.40E-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	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	3.75E-03	2.71E-08	2.45E-03	1.08E-05	3.94E-04
	Total (of product stage)	**A1-3**	**0.00E+00**	**3.75E-03**	**2.71E-08**	**2.45E-03**	**1.08E-05**	**3.94E-04**
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	2.93E-04	2.11E-09	1.91E-04	8.42E-07	3.07E-05
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	4.05E-03	2.92E-08	2.63E-03	1.16E-05	4.24E-04
	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
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	4.12E-07	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
A4 – Transport to the building site	The average distance travelled is 337.5km to the stockist, plus an additional 10km to the site, plus average 6 km by ferry to Ireland, France, Holland, Channel Islands, Isle of Man and Isle of Wight.		
	Road: 17. 5T HGV to Stockist	km	337.5
	Road: 3.5T LGV to site	km	10
	Sea: Ferries to Ireland, France, Jersey and IOM	km	6
	Bulk density of transported products	kg/m^3	450
A5 – Installation in the building	Installation of cellular PVC products on to a typical 3 bed semi-detached house.		
	Poly-top nails	kg/declared unit	4 x 0.004kg
	Silicone sealant	kg/declared unit	0.5m X 5mm (0.003kg)
B2 – Maintenance	No requirement for ongoing maintenance - occasional cleaning.		
	Potential to clean every 5 years with water.	L/declared unit	0.01932
B3 – Repair	Once installed products are generally out of scope of contact and therefore will require no repair.		
B4 – Replacement	As the Reference Service Life is 35 years, so assume 1 replacement is required during the 60-year Study Period of the LCA.		
B5 – Refurbishment	No refurbishment required.		
B6 – Use of energy; B7 – Use of water	No operational energy and water required.		
Reference service life	Swish Cellular PVC profiles have a reference service life of 35 years according to BRE PCR Rev 3.1 and BBA certificates for Swish PVC Roofline System (No. 91/2620) and PVC Cladding System (No. 91/2622).		
C1 – Deconstruction	Cellular PVC profiles have been manufactured since the mid 70's and early products remain in service to this date - it has yet to reach the point where products are regularly replaced (end of service life) but when this occurs the replacement would be the same as the original installation. At the point of deconstruction, this will be achieved by manual labour - careful removal with crow-bar/claw hammer to minimise disruption to the underlying building structure.		
C2 – Transport from site to pre-processing facility or landfill	This involves the reverse process of the initial delivery. Once removed the profiles can be returned to the manufacturing factory (on similar vehicles as those that delivered to construction site) for reprocessing/regrind and ultimately added back into the core formulation at appropriate levels.		
	Road: 17. 5T HGV to Stockist	km	337.5
	Road: 3.5T LGV to site	km	10
	Sea: Ferries to Ireland, France, Jersey and IOM	km	6

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
C3 - Pre-processing of uninstalled product (if relevant)	Ultimate aim is end of life recovery and waste material returned to Production site for granulation/pulverised prior to re-use in new production. However, this is yet to be regularly achieved as end of life not achieved. Therefore, industrial average scenario for PVC products is used according to BRE PCR (100% to incineration with energy recovery).		
	100% of waste to energy-recovery incineration	kg/declared unit	1
C4 – Disposal	No current data for end-of-life stage. Therefore, industrial average scenario for PVC products is used according to BRE PCR. No waste goes to landfill.		
Module D	The benefits of Module D include the energy credits from waste incineration of product at end-of-life.		
	Recovered for energy	kg/declared unit	1

Individual product calculations:

The LCA results listed in the EPD are for of 1kg of Cellular PVC profiles. The end-user of this EPD can therefore use these results to calculate the impacts for each Swish Cellular PVC System with different components by using the total weight per system.

The tables below show several generic house types and the quantity of materials required to achieve a full installation. These indicative values are for house types commonly built as there will be a vast number of variations, so these give a flavour of weights/house types. Please contact Swish (www.swishbp.co.uk) for more products/variations and their weights.

Average House type	Total weight Kg's
2 bed semi	84.04
4 bed semi	92.78
2 bed mid terrace	21.72
3 bed hipped detached	86.68
4 bed gabled detached	109.46

Interpretation

Out of the total mass of input materials, averagely, PVC resin makes up 80-100%, followed by calcium carbonate of 0-10% and additives of 0-10%. 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, PVC resin ranks first in terms of overall environmental impacts and is responsible for the greatest impact on all environmental impact indicators except SM. Additives ranks second in terms of overall environmental impacts. Calcium carbonate has negligible impacts in the product.

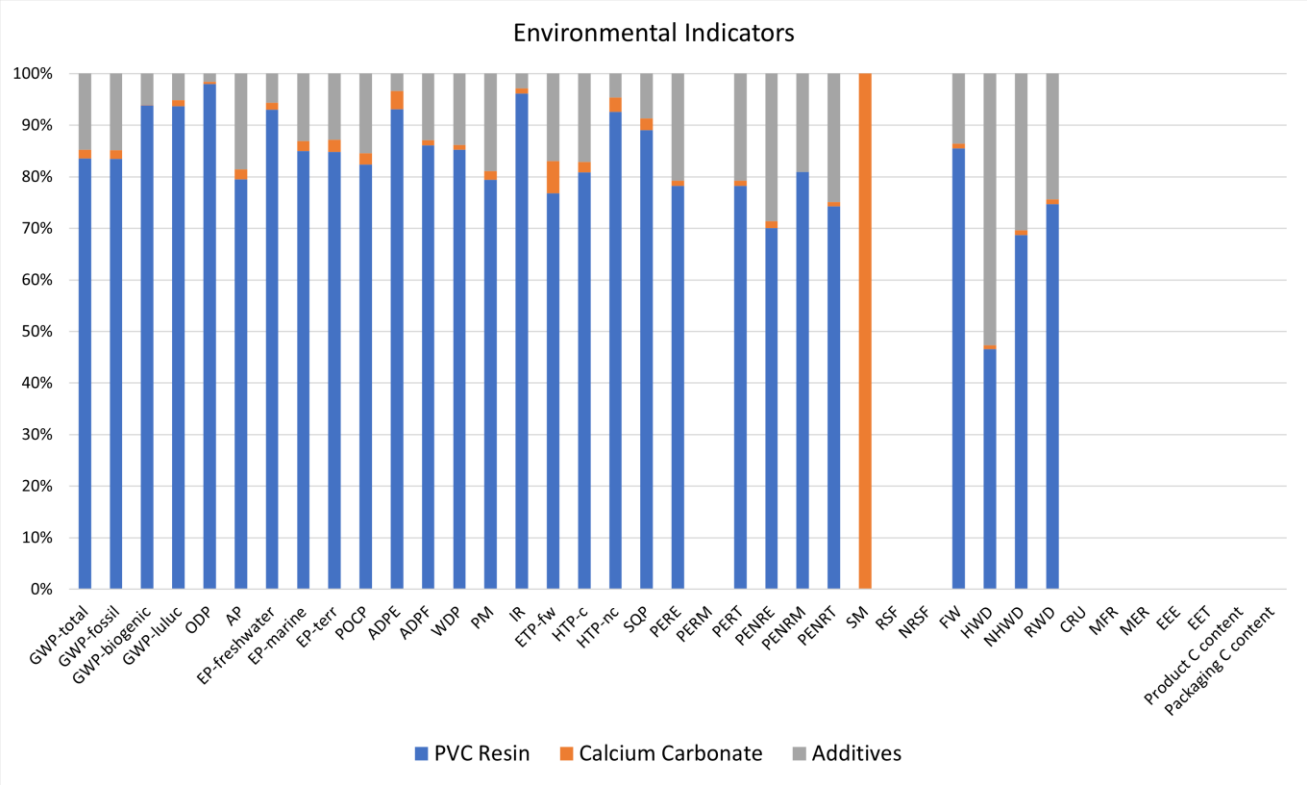


Figure 1

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