ENVIRONMENTAL PRODUCT DECLARATION

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

weberpral M colours

PROGRAMME:	The International EPD® System, www.environdec.com
PROGRAMME OPERATOR:	EPD International AB
EPD REGISTRATION NUMBER:	S-P-08211
PUBLICATION DATE:	2023-02-24 Revised: 2023-03-28
VALID UNTIL:	2028-02-23
MULTIPLE PRODUCTS:	*LCA's were carried out for all 24 colour variations of weberpral M. Azure Blue had the largest environmental impact due to the pigment, sand and calcium carbonate ratio. Therefore, this EPD represents all colours of weberpral M, using Azure Blue as the worst-case scenario.*
An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com	

The environmental impacts of this product have been assessed over its whole life cycle. Its Environmental Product Declaration has been verified by an independent third party.

We care about building better for people and the planet

As part of Saint-Gobain, we are committed to ***making the world a better home***, and collectively ***we care about building better for people and the planet*** by reducing the environmental impact of our products and operations.

Weber is a world leader in industrial mortars with expertise and knowledge throughout the world. Weber is made up of 10,000 people in 62 countries and is supported by almost 200 production units with an annual turnover of over €2 billion. Weber's services and solutions aim to help customers save time, feel confident and comfortable, be successful in their work and grow their businesses.

Our brand promises

With our sustainability pillars, we aim to;

Carbon & Climate
Increasing our energy efficiency and use of renewable energies, as well as reducing our embodied carbon emissions.

Resources & Circularity
Reducing the use of non-renewable resources, reducing our freshwater consumption, increasing lifetime and use rate, and reducing the amount of non-recovered construction and demolition waste.

Health & Wellbeing
Developing products that enrich lives and support good health & wellbeing, focusing on reducing business travel by adopting new ways of working and promoting mental health and wellbeing.

GENERAL INFORMATION

PROGRAMME:	**The International EPD® System**
ADDRESS:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
WEBSITE:	www.environdec.com
E-MAIL:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard **EN 15804:2012+A2:2019** [1] serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): ***PCR 2019:14 Construction products version 1.2.5 (2022)*** [2] Other Product Category Rules: ***c-PCR-001 Cement and building lime (EN 16908:2017)*** [3]
PCR review was conducted by: The Technical Committee of the International EPD® System. Chair: Claudia A. Peña. Contact via info@environdec.com.
Life Cycle Assessment (LCA)
LCA Practitioners: ○ Charnett Chau - Saint-Gobain Professional Services ○ Daniel Moss - Saint-Gobain Professional Services
Third-Party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006 [4], via: ☒ EPD verification by individual verifier Third-party verifier: Andrew Norton, Renuables Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third-party verifier: ☒ Yes ☐ No

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

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

The EPD was developed in accordance with the International EPD System's GPI version 4.0 [5].

COMPANY INFORMATION

OWNER OF THE EPD:	**Saint-Gobain Construction Products UK Ltd. t/a Weber**
CONTACTS:	**Saint-Gobain UK&I Professional Services** Gareth Morris – Gareth.morris@saint-gobain.com **Saint-Gobain Construction Products UK Ltd. t/a Weber** James Mead – James.mead@netweber.co.uk
DESCRIPTION OF THE ORGANISATION:	Weber specialises in the manufacture of industrial mortar products including renders and decorative finishes, tile fixing products, floor screeds, technical mortars and external wall insulation systems
PRODUCT-RELATED OR MANAGEMENT SYSTEM-RELATED CERTIFICATIONS:	○ BBA Agrément Certificate, certificate no. 05/4268 [6] ○ NSAI Agrément Certificate, certificate no. 03/0180 [7] ○ ISO 14001 [8] ○ ISO 45001 [9] ○ ISO 9001 [10]
NAME AND LOCATION OF PRODUCTION SITE:	Saint-Gobain Construction Products UK Ltd. t/a Weber Telford Halesfield 25 TF7 4LP

PRODUCT INFORMATION

PRODUCT NAME:	**weberpral M colours**
PRODUCT REPRESENTATIVENESS:	weberpral M is sold under 24 colours. This EPD covers all colours except chalk. LCAs were carried out for all variations and the environmental performance varied due to the type and amount of pigment used for colouring the product. weberpral M Azure Blue contains a blue pigment and generated the highest environmental impacts. Decisions were made to generate an EPD for multiple products by using the **worst-case scenario,** which is weberpral M Azure Blue – See Annex.
PRODUCT IDENTIFICATION:	51140029
PRODUCT DESCRIPTION:	weberpral M (monocouche) is a weather-resistant exterior render and is ideal for new build or refurbishment projects. Monocouche can be used to produce a range of finishes ○ Scraped ○ Sprayed roughcast ○ Dry dash Can be used to create ashlar and quoin features, and is suitable for use on entire elevations, feature panels or smaller areas such as garden walls with an expected service life of at least 25 years.
UN CPC CODE:	3751
GEOGRAPHICAL SCOPE:	United Kingdom

RAW MATERIAL CATEGORY	AMOUNT, MASS- %
Metals	*<0.1*
Minerals	*>99.0*
Fossil materials	*0.0*
Bio-based	*<0.1*

COMPONENT	BIOGENIC CARBON CONTENT (kg C eq./FU)
Product	*2.85E-3*
Packaging	*2.27E-2*

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2
FU = functional unit; in this case, it is 1 kg of product

Description of the main product components and/or materials

All raw materials contributing more than 5% to any environmental impact are listed in the following table.

PRODUCT COMPONENTS	WEIGHT (%)	POST CONSUMER MATERIAL WEIGHT (%)	RENEWABLE MATERIAL WEIGHT (%)
Sand	*50 – 60%*	*0%*	*0%*
Cement	*10 – 20%*	*0%*	*0%*
Calcium Oxide	*10 – 20%*	*0%*	*0%*
Calcium Carbonate	*10 – 20%*	*0%*	*0%*

PARAMETER	VALUE
Quantity of Mortar:	*1 kg*
Packaging:	*Valve Sacks: 0.0035 g/kg* *Base Sheet: 0.000134 g/kg* *Plastic Wrap: 0.001 g/kg* *Pallet 0.042 g/kg*
Product used for the Installation:	*Water: 0.00022 m^3/kg*

During the life cycle of the product no hazardous substance listed in the ‘Candidate List of Substances of Very High Concern (SVHC) for authorisation’ has been used in a percentage higher than 0.1% of the weight of the product.

The verifier and the program operator do not make any claim nor have any responsibility legally of the product.

Intended Application and Technical Functions

All technical characteristics and properties for any product can be found on the website: https://www.uk.weber/weberpral-m

INTENDED APPLICATION	Formulated to be spray applied by render pump weberpral M has been designed for spray application and can be applied up to 28 mm thick in two passes. Manual application is also possible. Substrates must have a good mechanical key suitable for rendering. weberend aid **[11]** must be used to provide an artificial key on substrates such as smooth concrete.		
TECHNICAL FUNCTIONS	Compressive Strength	Class CSIV ≥6.0MPa	EN 1015-11:1999 [12] (EN 998-1:2016 [13])
	Water Vapour Permeability	μ ≤15	EN 1015-19:1999 [14] (EN 998-1:2016)
	Thermal Conductivity	0.61 W/(m.K)	EN 1745:2012 [15] (EN 998-1:2016)
	Reaction to Fire	Class A1 (<1% organic content)	EN 998-1:2016

LCA CALCULATION INFORMATION

FUNCTIONAL UNIT (FU) / DECLARED UNIT (DU):	**1 kg of weberpral M colours**
REFERENCE SERVICE LIFE (RSL):	25 years
TIME REPRESENTATIVENESS:	July 2021 – June 2022
LCA SOFTWARE:	GaBi Professional v.2022.2 [16]
DATA SOURCES:	Weber GaBi v.2021 database [17] ecoinvent v3.8 database [18]
DESCRIPTION OF SYSTEM BOUNDARIES:	Cradle-to-grave and module D A1-A3, A4-A5, B1-B7, C1-C4 and D
LCA METHODOLOGY:	EN15804:2012 +A2:2019 and PCR 2019:14 version 1.2.5 Compliance with ISO 14040:2006 [19] and ISO 14044:2006 [20] LCIA methods: EN15804 reference package [21]
MODEL COMPLETION:	14th March 2023

ADDITIONAL INFORMATION

LCA PRACTITIONERS:	LCA Modeller: Charnett Chau EPD prepared by: Charnett Chau & Daniel Moss (SG UK&I Professional Services)
ALLOCATIONS AND CUT-OFF RULES:	Allocation and data cut-off rules applied to the LCA study followed requirements set by EN15804 +A2. This was to ensure that the study can feed into future LCA and EPD generation for Weber products. Generally, allocation by physical property (e.g. mass) was used for assigning flows to co-products. All inputs and outputs were included where possible, in cases of insufficient data, the cut-off criteria used was 1% of energy usage and 1% of the total mass input of a unit process. The team ensured data completion was >95%.
DATA QUALITY:	The LCA project team followed the requirements set by EN15804 +A2. This ensures that our evaluation of the results is reliable, consistent and transparent. Any data we have obtained has been double-checked by industry experts.
SPECIFIC DATA:	Specific data was collected where possible. This was carried out by Weber, with support from Saint-Gobain Professional Services for the reference year July 2021 – June 2022. The data collection period took place in 2022, using internal records and reporting documents to ensure that the LCA is as representative of actual production as possible. Data included materials used, transport details to the site, energy use, electricity mix, water use, waste production, waste treatment and the transport of products off-site. The electricity mix used for manufacturing the product was assumed 100% from renewable sources. This was based on the Guarantee of Origin certificate provided by the electricity supplier.
GENERIC DATA:	Generic data from well-established databases, GaBi v.2021 and ecoinvent v.3.8 have been used where specific data was not available. They were used to model background life cycle processes. This included the sourcing of materials, electricity generation, transport and waste treatment processes.

LIFE CYCLE STAGES

System Boundaries (X = Included, ND = Not Declared)																	
	PRODUCT STAGE (A1 – A3)			CONSTRUCTION STAGE (A4 – A5)		USE STAGE (B1 – B7)							END OF LIFE STAGE (C1 – C4)				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)
	Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	EU-28		GB														EU-28
Specific data used	>90%				-												
Variation – products/sites	N/A					-											

A1-A3: Product Stage

Modules A1-A3 sit within the Product Stage of a building's life cycle, where raw and secondary materials are extracted and processed (A1) before being transported (A2) to manufacturing facilities for the fabrication of building products (A3). Here we detail A1-A3 for product weberpral M colours.

A1: Raw material extraction and processing, processing of secondary material input (e.g., recycling processes)

This module takes into account the extraction and processing of all raw materials and energy which occur upstream of the studied manufacturing process.

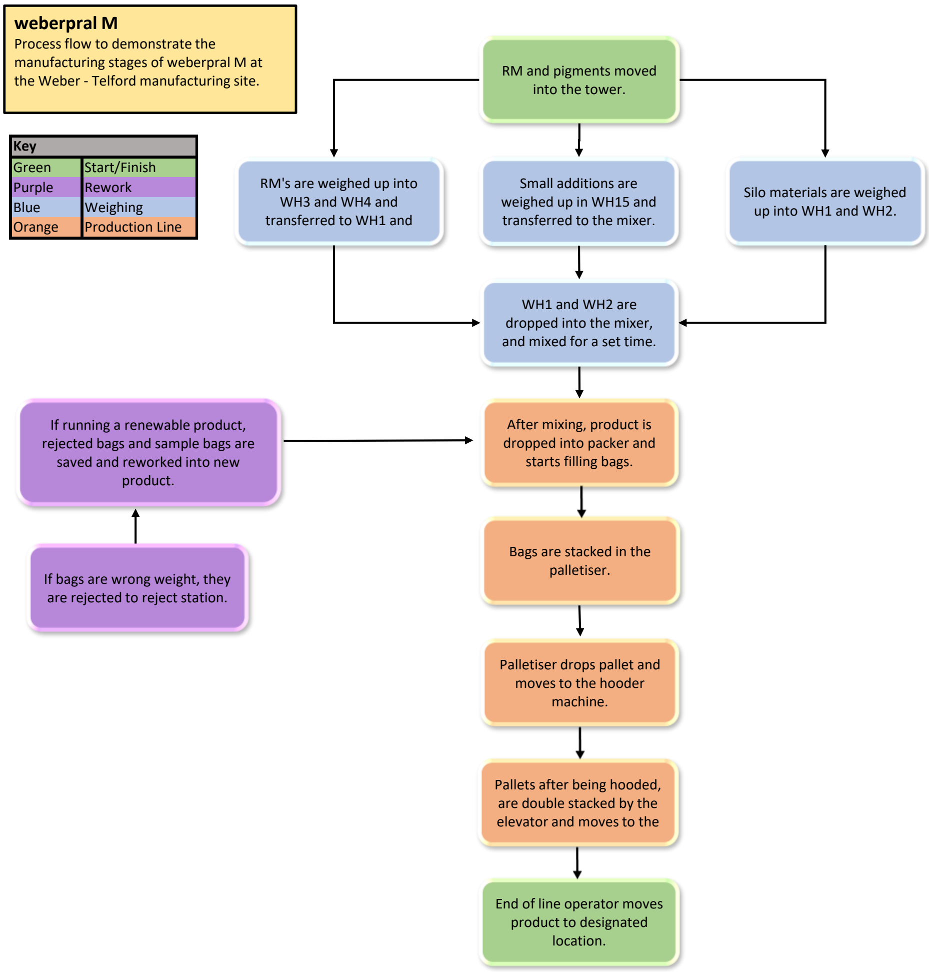
Raw materials that are required to manufacture the weberpral M product are procured from various countries around the world, predominantly in the UK. These raw materials can be categorised as "virgin" materials (e.g. calcium carbonate (limestone)) and "processed" materials (e.g. thickener).

A2: Transport to the manufacturer

The raw materials are transported to the manufacturing site in Telford. In our case, the modelling included each raw material's road and shipping (average values).

A3: Manufacturing

This module includes the manufacturing of the mortar and the packaging associated with it. The flow diagram below illustrates the process from when the raw materials are first delivered to the end of the production line.



A4-A5: Construction Stage

A4: Transport to the building site

This module includes transport from the production gate to the building site/client. Transport is calculated on the basis of a scenario with the parameters described in the following table.

PARAMETER	VALUE/DESCRIPTION
Vehicle and Fuel Type	**Road:** Truck trailer, Euro 0-6 mix 34-40t gross weight / 27 t payload capacity - Diesel
Distance	163 km
Average Load Weight	13 tonnes
Average Utilisation	46%
Market Destination	100% National

A5: Installation into the building

The scenario for the installation of weberpral M is reflective of the product information and application guide published by Weber for clients [22] [23]. The coverage of the weberpral M product depends on the required finished thickness and aesthetic style, however, through discussions with Saint-Gobain clients and Weber technical specialists, it was deemed that achieving a scraped finish of 15 mm thickness (as per the product guide) is representative of the product's common use. To achieve this finish for a 1 m^2 cover, 25 kg of weberpral M product is mixed with 5.5 L of water, spread at 18 mm thickness before 3 mm off if the product is scraped off [23].

B1-B7: Use Stage

The use stage, related to the building fabric includes:

B1: Use or application of the installed product

B2: Maintenance

B3: Repair

B4: Replacement

B5: Refurbishment

B6: Operational Energy Use

B7: Operational Water Use

The product has a reference service life of 25 years. Our model assumes that the product will last in situ with no requirements for maintenance, repair, replacement or refurbishment throughout this period. In accordance with EN 16757:2022 PCR for concrete and concrete elements [24], the potential carbonation occurring over the product's service life was calculated based on the k-factor, product CaO composition and the thickness of the final concrete after installation.

C1-C4: End of Life Stage

The end-of-life scenario for product weberpral M was developed based on Saint-Gobain's own knowledge and confirmation of customers for the deconstruction and demolition of the product from the building (C1). The worst-case scenario was assumed for the final disposal of the product, which is landfill. Potential carbonation at EoL was also considered following EN16757:2022.

C1: Deconstruction, demolition

The deconstruction and/or dismantling process of weberpral M is assumed to be deconstructed as part of the entire building. These processes mainly use energy for mechanical operations. See below for data used to model diesel consumption during deconstruction. The data on the quantity of diesel consumption used was retrieved from Debacker et al., 2012 [25] and the data regarding the energy consumed for the production of diesel derive from ecoinvent v3.8. This source was consulted as it is suggested in PEFCRs for products in buildings, such as Product Environmental Footprint Category [25] [26].

ASSUMPTIONS FOR THE DEMOLITION AT EOL	AMOUNT PER KG OF DEMOLISHED MATERIAL	UNIT	DATASET	DATABASE
Diesel consumption in construction machine	0,0437	MJ/ kg	Diesel, burned in building machine {GLO}	ecoinvent v3.8

C2: Transport to waste processing

As there is no data for the transport of waste after its use phase, the default distance of 100 km of an average truck used at 85% capacity was assumed.

C3: Waste processing for reuse, recovery and/or recycling

No waste processing for reuse, recovery and recycling was assumed.

C4: Disposal

The worst-case scenario where 100% landfill of the product was assumed. As part of the process of disposing of the product, carbonation at end-of-life was considered in accordance with EN 16757:2022.

In addition, the degradation of the product's biogenic carbon content in a solid waste disposal site, i.e. landfill, is declared as GWP biogenic and has been calculated without time limit. Any remaining biogenic carbon is treated as an emission of biogenic CO2 from the technosphere to nature.

D: Benefits and Loads

D: Reuse, recovery and/or recycling potentials, expressed as net impacts and benefits

Module D describes the net benefits related to exported energy and secondary materials, secondary fuels or secondary products resulting from reuse, recycling and energy recovery that take place beyond the system boundary for both products and buildings.

Input materials for the manufacturing of weberpral M include no secondary materials, and no secondary materials were assumed to arise from the processing waste of Modules A4, A5, B and C. This is because all waste was assumed to either be landfilled or incinerated without energy recovery as a worst-case scenario. All emissions regarding landfill and incineration are accounted for in Module C and no benefits can be shown in Module D. Hence, in Module D, we declare zero benefits and loads beyond the system boundaries.

CORE ENVIRONMENTAL IMPACTS

		Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
Environmental Impacts Indicators	**Unit expressed per function/ declared unit**	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction/ demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Climate Change*	kg CO2 eq.	1.70E-01	1.59E-02	1.62E-03	-1.31E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E-03	5.54E-03	0.00E+00	1.81E-02	0.00E+00
Climate Change (fossil)	kg CO2 eq.	2.29E-01	1.60E-02	1.86E-04	-1.31E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.64E-03	5.57E-03	0.00E+00	1.08E-02	0.00E+00
Climate Change (biogenic)*	kg CO2 eq.	-5.91E-02	-5.63E-05	1.43E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-06	-7.73E-05	0.00E+00	7.26E-03	0.00E+00
Climate Change (land use change)	kg CO2 eq.	1.69E-04	2.82E-07	1.16E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.85E-07	5.09E-05	0.00E+00	3.96E-05	0.00E+00
Ozone depletion	kg CFC-11 eq.	8.72E-09	1.77E-15	7.01E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.79E-10	7.16E-16	0.00E+00	5.10E-17	0.00E+00
Acidification terrestrial and freshwater	mol H+ eq.	2.15E-03	1.60E-04	9.96E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.79E-05	3.30E-05	0.00E+00	9.87E-05	0.00E+00
Eutrophication freshwater	kg P eq.	1.31E-04	3.09E-09	2.32E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-07	2.01E-08	0.00E+00	2.36E-08	0.00E+00
Eutrophication marine	kg N eq.	2.51E-04	4.18E-05	3.97E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-05	1.61E-05	0.00E+00	2.54E-05	0.00E+00
Eutrophication terrestrial	mol N eq.	2.93E-03	4.58E-04	4.47E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-04	1.78E-04	0.00E+00	2.79E-04	0.00E+00
Photochemical ozone formation - human health	kg NMVOC eq.	8.17E-04	1.12E-04	1.05E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E-05	3.04E-05	0.00E+00	7.69E-05	0.00E+00
Resource use, mineral and metals	kg Sb eq.	3.61E-05	2.13E-10	1.30E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.87E-09	3.62E-10	0.00E+00	1.24E-09	0.00E+00
Resource use, energy carriers	MJ, net calorific value	1.94E+00	2.12E-01	2.20E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.98E-02	7.49E-02	0.00E+00	1.81E-01	0.00E+00
Water scarcity	m³ world eq. derived	6.58E-02	1.59E-05	9.90E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-04	6.64E-05	0.00E+00	1.44E-03	0.00E+00

*****The negative Climate Change (biogenic) results in Product Stage can be attributed to carbon sequestration (uptake) during wood production (tree growth) for the manufacture of pallets. Climate Change (total) is the summation of fossil, biogenic and land-use change subcategories. The results show that the use of wooden pallets as packaging has contributed beneficially to weberpral M colours' net cradle-to-factory gate carbon footprint. **ALL** biogenic carbon content within the product and its packaging is modelled to be released at their EoL, mostly, in Modules C4 and A5, respectively (material and product losses, and hence associated carbon releases, are also modelled in Modules A3 and A5). Note: no timeframe was applied to modelling the release of biogenic carbon.

		Product stage	Construction stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
Environmental Impacts Indicators	Unit expressed per function /declared unit	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction/demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
GWP-GHG	kg CO2 eq.	2.29E-01	1.60E-02	1.87E-04	-1.31E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E-03	5.62E-03	0.00E+00	1.08E-02	0.00E+00

RESOURCE USE

		Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
Resource Use indicators	**Unit expressed per function/declared unit**	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction/ demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Use of renewable primary energy (PERE)	MJ, net calorific value	1.26E+00	9.81E-03	6.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-04	5.45E-03	0.00E+00	2.36E-02	0.00E+00
Primary energy resources used as raw materials (PERM)	MJ, net calorific value	8.77E-01	0.00E+00	4.39E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (PERT)	MJ, net calorific value	1.26E+00	9.81E-03	6.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-04	5.45E-03	0.00E+00	2.36E-02	0.00E+00
Use of non-renewable primary energy (PENRE)	MJ, net calorific value	1.94E+00	1.77E-01	1.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.98E-02	7.52E-02	0.00E+00	1.81E-01	0.00E+00
Non-renewable primary energy resources used as raw materials (PENRM)	MJ, net calorific value	1.17E-01	0.00E+00	5.86E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (PENRT)	MJ, net calorific value	1.94E+00	1.77E-01	1.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.98E-02	7.52E-02	0.00E+00	1.81E-01	0.00E+00
Input of secondary material (SM)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels (RSF)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non renewable secondary fuels (NRSF)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water (FW)	m^3	1.59E-03	7.60E-07	3.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-06	5.97E-06	0.00E+00	4.55E-05	0.00E+00

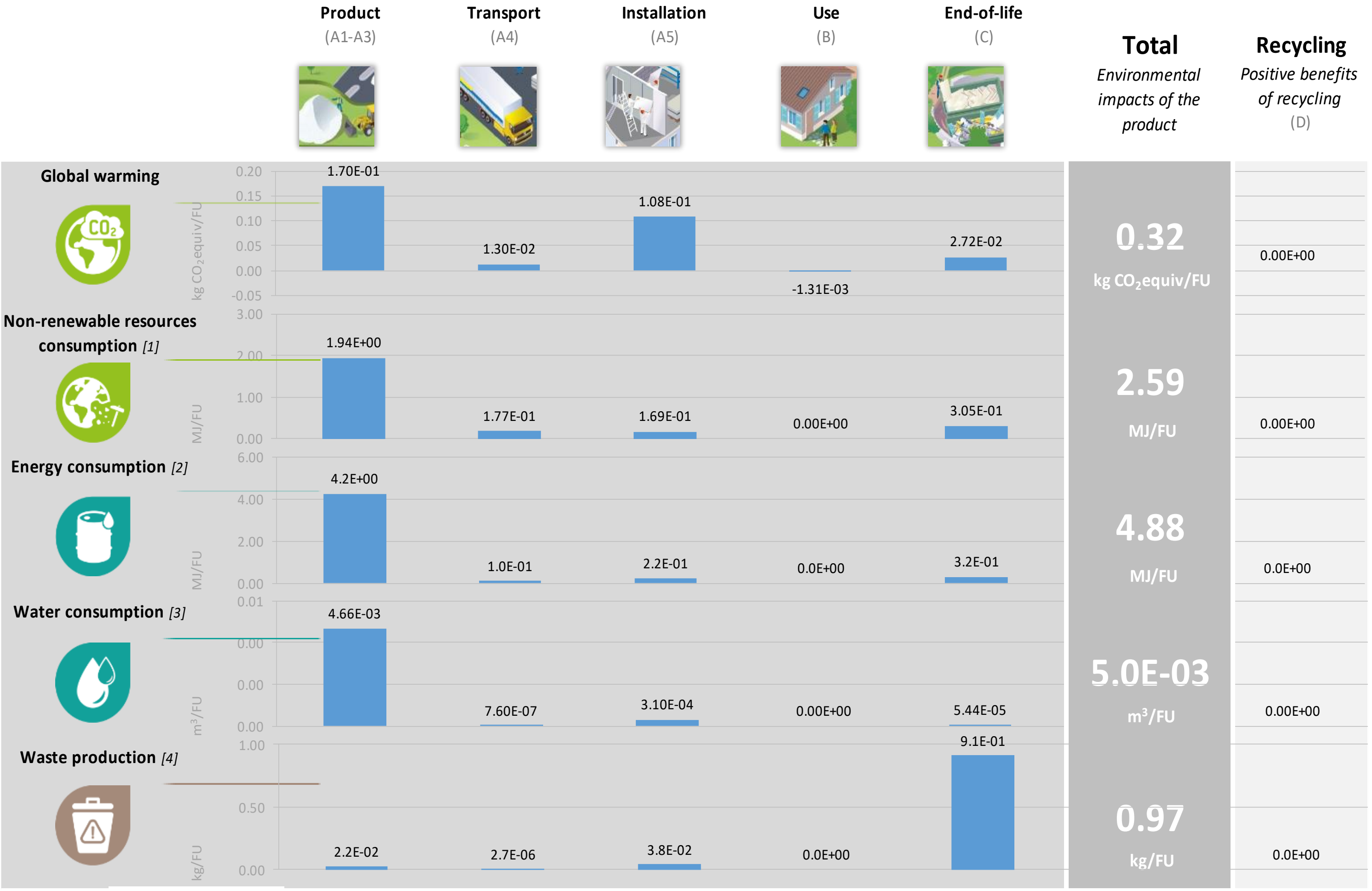
WASTE CATEGORY & OUTPUT FLOWS

		Product stage	Construction stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
Output flows and waste category	**Unit expressed per function/ declared unit**	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction/demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (HWD) [kg]	kg	6.02E-06	3.95E-14	3.02E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-13	0.00E+00	2.75E-09	0.00E+00
Non-hazardous waste disposed (NHWD) [kg]	kg	4.66E-03	5.22E-06	2.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-05	0.00E+00	9.08E-01	0.00E+00
Radioactive waste disposed (RWD) [kg]	kg	2.74E-05	2.03E-07	-1.88E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-07	0.00E+00	2.06E-06	0.00E+00
Components for re-use (CRU) [kg]	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for Recycling (MFR) [kg]	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for Energy Recovery (MER) [kg]	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy (EEE) [MJ]	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy (EET) [MJ]	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

OPTIONAL IMPACT INDICATORS

		Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
Optional indicators	**Unit expressed per function/ declared unit**	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction /demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Respiratory inorganics	Disease incidences	1.57E-08	1.32E-10	1.19E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-09	1.97E-10	0.00E+00	1.22E-09	0.00E+00
Ionising radiation - human health	kBq U235 eq.	1.14E-02	2.02E-05	7.01E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-04	2.10E-05	0.00E+00	2.11E-04	0.00E+00
Ecotoxicity freshwater	CTUe	1.63E+01	3.73E-02	8.93E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-02	5.32E-02	0.00E+00	1.03E-01	0.00E+00
Cancer human health effects	CTUh	4.14E-10	7.31E-13	2.58E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-12	1.09E-12	0.00E+00	1.53E-11	0.00E+00
Non-cancer human health effects	CTUh	2.28E-08	3.79E-11	1.69E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-11	6.72E-11	0.00E+00	1.68E-09	0.00E+00
Land Use	Pt	6.54E+00	8.27E-04	3.35E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.26E-03	3.13E-02	0.00E+00	3.76E-02	0.00E+00

LCA INTERPRETATION



[1] This indicator corresponds to the abiotic depletion potential of fossil resources.

[2] This indicator corresponds to the total use of primary energy.

[3] This indicator corresponds to the use of net fresh water.

[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

Global Warming Potential (Climate Change) (GWP)

The figure above breaks down the GWP of weberpral M colours into clear categories to understand the modules which cause the largest environmental impact. It's clear that the majority of the environmental impact stems from the product modules (A1 – A3). This is due to the embodied carbon within the raw materials. Materials such as cement and GGBS are energy intensive to extract and process, resulting in the majority of carbon produced during A1. While other modules contribute to the total GWP, the product modules account for ~50% of the total GWP generated due to weberpral M colours. At the Installation Stage (A5), carbon emissions derive mainly from the biogenic carbon release from the disposal of biogenic packaging materials (i.e. wooden pallet - 0.0813 kgCO2eq/kg).

Non-Renewable Resources Consumptions

The consumption of non-renewable resources has the highest value during the product stage. Once again, this is due to the embodied resource consumption within the raw materials. Our further analysis shows that it is during the extraction and processing of raw materials that the majority of non-renewable resources are consumed. During the manufacturing stage, the total contribution of non-renewable resource consumption is low. This is particularly true as minimal fossil-based materials are consumed during the manufacturing process.

Energy Consumption

Illustrated in the figure above we can see that the product stage contributes the largest to the total energy consumption. The total use of energy derives from the extraction and processing of raw materials. Raw materials such as cement require an energy-intensive process which includes crushing and burning in a kiln. Through our contributional analysis, we know that the largest percentage of energy consumption stems from raw materials.

Water Consumption

The water consumption for weberpral M colours is heavily linked to the product stage. However, no water is consumed during the manufacturing process as Telford is a dry plant. Therefore, with this understanding, we know the water consumption is mostly down to the raw materials extraction and the transport/shipping of the materials. It must be noted that water is directly consumed during the installation of the product, however, the level of contribution over the product's lifecycle is low.

Waste Production

Waste production doesn't follow the same trend as the other environmental impacts. The largest contributor is the end-of-life module. This is because weberpral M colours are assumed to be sent to landfill once it reaches their end-of-life state. However, there is still an impact associated with the product modules since waste is generated on-site and also during the extraction and processing of the raw materials. Additionally, waste is associated with the installation phase as a result of the installation process.

DIFFERENCES WITH PREVIOUS VERSIONS OF THE EPD

This EPD corrects the error found in the initial version. A raw material used to manufacture the product was mistranslated to calcium oxide and is now corrected to calcium carbonate.

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ANNEX

Environmental impact differences of pigments.

The weberpral M product range has 24 colours: chalk, earth, buff, silver pearl, ivory, cream, beige, light beige, sand, parchment, pearl grey, ocre rose, stone grey, brick red, rose, light blue, earth red, cornish, granite grey, sage green, limestone, mushroom graphite and azure blue. Weberpral M chalk has a greater difference in its product composition to other colours due to not needing pigments in its formulation – hence a separate EPD is created for weberpral M chalk. The product composition of the weberpral M colour range differs mainly on the type and amount of pigments in the formulation. The tables below show the pigments used, including their average chemical makeup (assumed using technical data sheets), and their “cradle-to-factory gate” (raw materials to end of production) environmental impacts using [17] and ecoinvent v3.8 [18] (red = highest impact value, green = lowest impact value). As the blue pigment generates the highest impact in the most impact categories, it is deemed that weberpral M azure blue is the worst-case.

	Azure Blue	Weberpral M Range	Unit
Red/Yellow/Black/Brown Pigment (30% iron oxide, 70% limestone) [27] [28] [29] [30]	0.000	0 - 0.016	Kg
Green Pigment (30% chromium oxide, 70% limestone) [31]	0.000	0 - 0.005	Kg
Blue Pigment (30% copper carbonate, 70% limestone) [32]	0.015	0 - 0.015	Kg

	Pigment Comparison, environmental performance per maximum mass in 1 kg product		
	EU-28: Ferrous oxide (FeO) (via iron) ts (Sphera)	RER: chromium oxide production, flakes ecoinvent 3.8	RER: copper carbonate production ecoinvent 3.8
01 EN15804+A2 Climate Change - total [kg CO2 eq.]	1.10E-02	9.21E-03	2.06E-02
02 EN15804+A2 Climate Change, fossil [kg CO2 eq.]	1.10E-02	8.81E-03	2.03E-02
03 EN15804+A2 Climate Change, biogenic [kg CO2 eq.]	6.42E-06	3.99E-04	3.29E-04
04 EN15804+A2 Climate Change, land use and land use change [kg CO2 eq.]	4.87E-06	4.79E-06	3.99E-05
05 EN15804+A2 Ozone depletion [kg CFC-11 eq.]	2.30E-17	4.62E-10	1.17E-09
06 EN15804+A2 Acidification [Mole of H+ eq.]	2.98E-05	6.21E-05	1.53E-03
07 EN15804+A2 Eutrophication, freshwater [kg P eq.]	9.24E-09	2.51E-06	1.17E-04
08 EN15804+A2 Eutrophication, marine [kg N eq.]	6.48E-06	6.84E-06	7.34E-05
09 EN15804+A2 Eutrophication, terrestrial [Mole of N eq.]	7.08E-05	9.44E-05	1.03E-03
10 EN15804+A2 Photochemical ozone formation, human health [kg NMVOC eq.]	2.18E-05	2.16E-05	2.82E-04
11 EN15804+A2 Resource use, mineral and metals [kg Sb eq.]	6.12E-10	6.35E-07	3.57E-05
12 EN15804+A2 Resource use, fossils [MJ]	1.06E-01	8.91E-02	3.05E-01
13 EN15804+A2 Water use [m³ world equiv.]	3.52E-04	4.34E-03	3.14E-02