# ENVIRONMENTAL PRODUCT DECLARATION

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

# weberwall brick

| | |
|---|---|
| **VERSION** | 1 |
| **DATE OF PUBLICATION** | 2023/05/05 |
| **VALID UNTIL** | 2028/05/05 |
| **SCOPE OF THE EPD** | Cradle-to-gate with options |
| **MULTIPLE PRODUCTS** | Covers multiple products (colour range) |

THE INTERNATIONAL EPD® SYSTEM

Registration number
The International EPD® System:
**S-P-09133**

# General information

## Company information

**Manufacturer:** Saint-Gobain Construction Products UK Limited t/a Weber
**Production plant: Pontypool**
**Management system-related certifications:** ISO 9001, BBA Certified 91/2691 & 20/5790 [10]
**Programme used:** International EPD System https://www.environdec.com/home
***PCR 2019:14 Construction products version 1.2.5 (2022)*** for Construction products and Construction services
**PCR identification: EN 15804:2012+A2:2019** Sustainability of construction works – Environmental product declaration - core rules for the product category of construction product and The International EPD® System
**PCR Prepared by:** IVL Swedish Environmental Research Institute, EPD International Secretariat
**UN CPC CODE:** 3735
**Owner of the declaration:** Saint-Gobain Construction Products UK Limited t/a Weber
Dickens house, Enterprise Way, Flitwick, Bedford MK45 5BY
**Product name:** weberwall brick
**EPD® prepared by:** Daniel Moss (daniel.moss@saint-gobain.com) and Charnett Chau (Charnett.chau@saint-gobain.com)
**Geographical scope of the EPD®:** United Kingdom
**EPD® registration number:** S-P-09133
**Declaration issued:** 2023-05-05 **Valid until:** 2028-05-05
**Demonstration of verification:** An independent verification of the declaration was made, according to EN ISO 14025:2010. This verification was external and conducted by a third party, based on the PCR mentioned above (see information below).

## Programme 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 |

CEN standard EN 15804:2012 + A2:2019 serves as the Core Product Category Rules (PCR)
**Product category rules (PCR):** PCR 2019:14 Construction Products, version 1.2.5
**PCR review was conducted by:** The Technical Committee of the International EPD® System
**Chair of PCR Review: Claudia A. Peña**
**Independent third-party verification of the declaration and data, according to ISO 14025:2006:**
☐ EPD process certification ☒ EPD verification
**Third party verifier:** Viktor Hakkarainen, Vast LCA
email : Viktor@vastlca.se
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 the 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.

# Product description

## Product description and description of use

weberwall brick is a fast-fix, lightweight brick system which is suitable for internal and external use with an expected service life of at least 30 years. Mainly formulated from minerals bound in cross-linked polymers, this brick system is weather resistant and flexible whilst allowing existing structures, wall systems or new buildings to freely breathe beneath its surface.

weberwall brick (an alternative to brick effect cladding) can be used on various substrates including:

- Brick and blockwork
- All types of concrete surfaces
- Weberwall insulation systems
- Approved render carrier boards
- Sound and suitably prepared internal plaster

This EPD applies to the weberwall brick product range (12 colour variations) manufactured in Pontypool. The LCA was carried out on one colour variation deemed to be the worst-case scenario, weberwall brick sanded black. The selection of this worst-case was based on the amount of pigments (shade mix) required for producing the different variations to achieve the desired aesthetics. Sanded black was found to require the most pigment compared to all other colours. Hence, this EPD is developed to use the worst-case scenario to represent all 12 colours of weberwall brick.

All technical characteristics and properties for any product could be found on the website https://www.uk.weber/weberwall-brick.

| **Technical data/physical characteristics:** | | |
|---|---|---|
| Reaction to fire | A2-S1, d0 | BS EN 13501-1:2007+A1:2009 [12] |
| Thickness (mm) | 4 – 6 | |
| Mass of declared unit (kg/m$^2$) | 5.8 | |

## Declaration of the main product components and/or materials

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

| PRODUCT | WEIGHT (kg/m$^2$) | Post-consumer recycled material, weight % |
|---|---|---|
| weberwall brick | 5.8 | 0 |
| **PRODUCT COMPONENTS** | **WEIGHT (%)** | **Post-consumer recycled material, weight %** |
| Sand | 70 - 90 | 0 |
| Polymer | 5 – 15 | 0 |
| Pigment | 0 - 10 | 0 |
| **PACKAGING MATERIALS** | **WEIGHT kg/m$^2$** | **WEIGHT (%)** |
| Cardboard | 0.0952 | 22.0 |
| Plastic Wrap | 0.0015 | 0.34 |
| Pallet | 0.337 | 77.7 |

During the life cycle of the product any hazardous substance listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorization” has been used in a percentage higher than 0.1% of the weight of the product. The verifier and the programme operator do not make any claim nor have any responsibility for the legality of the product.

# LCA calculation information

| | |
|---|---|
| **TYPE OF EPD** | Cradle-to-gate with options, Module C and Module D |
| **FUNCTIONAL UNIT** | 1 $m^2$ |
| **SYSTEM BOUNDARIES** | A1-A3, A4-A5, B1-B7, C1-C4 & D |
| **REFERENCE SERVICE LIFE (RSL)** | 30 years |
| **ALLOCATIONS & 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.<br><br>The manufacturing facility produces only one product in a range of different colours. Meaning, no allocation was necessary, and all manufacturing inputs and outputs are relevant to weberwall brick.<br><br>The cut-off criterion used in this EPD is:<br>• Taking into account all input and output flows in a unit process i.e., taking into account the value of all flows in the unit process and the corresponding LCI whenever available<br>• The study does not exclude any hazardous or toxic materials or substances where the cut-off rules do not apply.<br>• The use of the cut-off criterion on mass inputs and primary energy at the unit process level (1%) and at the information module level (5%)<br>• No simplification of the LCI by additional exclusions of material flows<br>• The LCA specifies worker activities, machines, buildings as well as production of incoming supplier packaging |
| **GEOGRAPHICAL COVERAGE AND TIME PERIOD** | Geographical Scope: United Kingdom<br>Data is collected from one production site Pontypool located in South Wales, United Kingdom<br>Data collected for the year: June 2021 – June 2022 |
| **BACKGROUND DATA SOURCE** | ecoinvent v.3.8<br>One Click LCA |
| **SOFTWARE** | One Click LCA v1.3 |

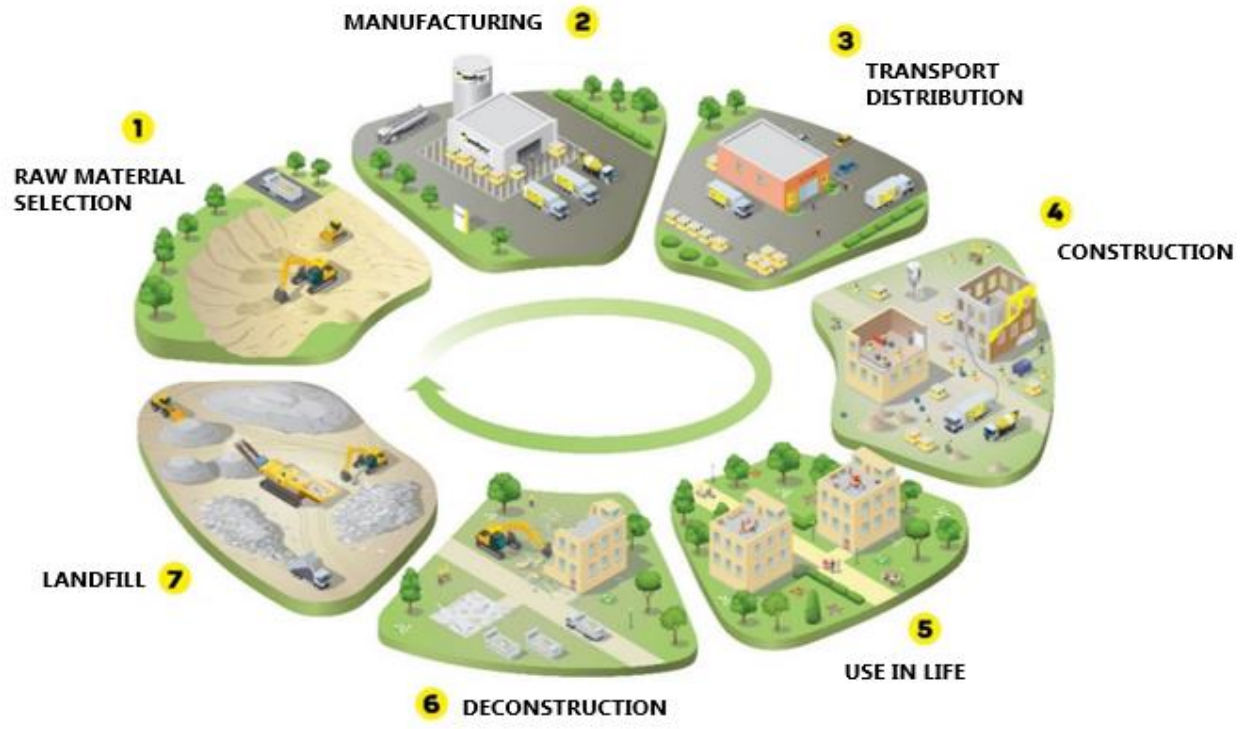
According to EN 15804:2012+A2:2019, EPDs of construction products may not be comparable if they do not comply with this standard. According to ISO 21930:2017, EPDs might not be comparable if they are from different programmes.

## LCA scope

System boundaries (X=included. ND=not declared)

| | PRODUCT STAGE | | | CONSTRUCTION STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | GB | | | GB | | | | | | | | | | | | | GB |
| Specific data used | <10% | | | | | | | | | | | | | | | | |
| Variation - products | 0.1% | | | | | | | | | | | | | | | | |
| Variation - sites | N/A | | | | | | | | | | | | | | | | |

# Life cycle stages



## 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 the product weberwall brick.

**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 weberwall brick product are procured from various countries around the world, predominantly in the UK. These raw materials can be categorised as "virgin" materials (e.g., Sand) and "processed" materials (e.g., polymer).

**A2: Transport to the manufacturer**

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

**A3: Manufacturing**

This module includes the manufacturing of weberwall brick and the packaging associated with it. The flow diagram below illustrates the process starting from when the raw materials are delivered to the site and finishing at the end of the production line.

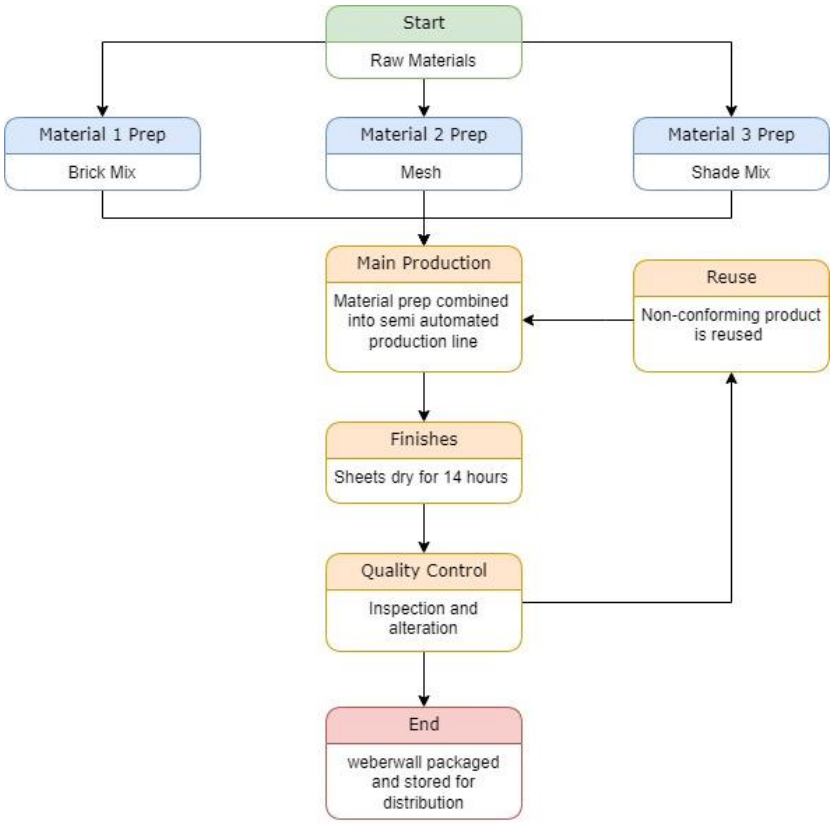



***Figure 2: Manufacturing Process***

The flow diagram above depicts the manufacturing process for weberwall brick at the Pontypool site. Raw materials are transported to the manufacturing site and split into three preparation areas. Once all three material components are prepared, they advance to the main production where the three materials are combined in production. Upon completion, weberwall brick is dried for 14 hours (or longer) to ensure quality and strength. Once the product has dried it is inspected for quality. If quality requirements are

not met the product is repurposed at the main production stage. If the product meets quality requirements weberwall brick is packaged and stored for distribution.

## 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 based on a scenario with the parameters described in the following table.

| PARAMETER | VALUE |
|---|---|
| **Fuel type and consumption of vehicle or vehicle type used for transport e.g., long-distance truck, boat, etc.** | - EU-28: Market for transport, freight, lorry, unspecified<br>- GB: Diesel production, petroleum refinery operation |
| **Distance** | 299 km |
| **Capacity utilisation (including empty returns)** | 80% of the capacity in mass<br>30% of empty returns |
| **Volume capacity utilisation factor** | 1 (by default) |

**A5: Installation into the building**
The scenario for the installation of weberwall brick is reflective of the product information and application guide published by the manufacturer for clients. The surface was assumed sound, clean and dry before the first layer of adhesive was applied at 3 mm. A glass fibre mesh cloth is laid on top of this layer of adhesive. The mesh was then assumed to be fully encapsulated with a second layer of adhesive mortar to produce a sandwich approximately 6 mm thick.

The adhesive was assumed to be levelled and spatula flatted. From this point, weberwall brick can be applied to the adhesive. To complete installation, the product must be left to dry over a 24-hour period before the pointing mortar is applied.

Waste processing of packaging was also considered in this module. The worst-case scenario where waste is landfilled (biogenic materials) and incinerated without energy recovery (fossil materials) was assumed.

Note: Beading (Base Rail) encapsulates the fixed components in the weberwall brick system, external adhesive, mesh, weberwall brick and pointing mortar. However, this has not been included in the LCA calculation as the base rail is optional, due to the large number of variables. Such as, type of substrate used, movement and compression joint location, material type, layout and design.

## 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 30 years, which is outlined by the BBA certificate [10]. Our model assumes that the product will last in situ with no requirements for maintenance, repair, replacement, or refurbishment throughout this period.

Any maintenance involving repointing mortar or damages usually occur after the 30-year period. Additionally, it is very uncommon for brick cleaning to occur in the UK; therefore, we have not included any cleaning or maintenance measures during this 30-year period.

**C1-C4: End of Life Stage**

The end-of-life scenario for weberwall brick was developed based on the manufacturer's own knowledge and customer's experience 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.

**C1: Deconstruction, demolition**

The deconstruction and/or dismantling process of weberwall brick 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 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.

| 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 for an average truck.

**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.

## 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 weberwall brick include no secondary materials, hence, 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 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, no calculations were required as no secondary input material recovered from a previous system to be subtracted from the zero amount of output materials recovered to be used in a subsequent system before any benefits can be calculated.

# LCA results

As specified in EN 15804:2012+A2:2019 and the Product-Category Rules, the environmental impacts are declared and reported using the baseline characterisation factors from EC-JRC. Specific data has been supplied by the plant, and generic data come from the ecoinvent database.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks. All emissions to air, water, and soil, and all materials and energy used have been included.

LCA data results are detailed on the following tables, and they refer to a declared unit of 1 $m^2$.

Description of the system boundary, X = Included in LCA, ND = Not Declared

# Environmental Impacts

| Environmental indicators | PRODUCT STAGE | CONSTRUCTION STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | REUSE, RECOVERY RECYCLING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 $CO_2$ eq.] | 4.55E+00 | 2.38E-01 | 8.98E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.02E-03 | 1.99E-01 | 0 | 7.98E-02 | 0 |
| Climate Change (fossil) [kg $CO_2$ eq.] | 5.04E+00 | 2.37E-01 | 2.51E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.02E-03 | 1.98E-01 | 0 | 7.96E-02 | 0 |
| Climate Change (biogenic) [kg $CO_2$ eq.] | -4.92E-01 | 8.42E-04 | 6.46E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.65E-06 | 7.02E-04 | 0 | 2.03E-04 | 0 |
| Climate Change (land use change) [kg $CO_2$ eq.] | 3.52E-03 | 9.50E-05 | 5.61E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.00E-07 | 8.07E-05 | 0 | 7.51E-05 | 0 |
| Ozone depletion [kg CFC-11 eq.] | 8.13E-07 | 7.19E-08 | 2.42E-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.59E-10 | 4.65E-08 | 0 | 3.22E-08 | 0 |
| Acidification terrestrial and freshwater [Mole of H+ eq.] | 4.17E-02 | 1.42E-03 | 8.32E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.17E-05 | 1.12E-03 | 0 | 7.48E-04 | 0 |
| Eutrophication freshwater [kg P eq.] | 1.37E-04 | 1.75E-06 | 7.35E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.33E-08 | 1.46E-06 | 0 | 8.34E-07 | 0 |
| Eutrophication marine [kg N eq.] | 4.89E-03 | 4.79E-04 | 2.51E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.85E-05 | 4.05E-04 | 0 | 2.59E-04 | 0 |
| Eutrophication terrestrial [Mole of N eq.] | 4.87E-02 | 5.26E-03 | 2.82E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.03E-04 | 4.45E-03 | 0 | 2.85E-03 | 0 |
| Photochemical ozone formation - human health [kg NMVOC eq.] | 1.76E-02 | 1.53E-03 | 7.81E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.57E-05 | 1.27E-03 | 0 | 8.29E-04 | 0 |
| Resource use, mineral and metals [kg Sb eq.][1] | 4.28E-05 | 7.88E-07 | 1.18E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.04E-09 | 6.78E-07 | 0 | 1.83E-07 | 0 |
| Resource use, energy carriers [MJ][1] | 1.02E+02 | 4.53E+00 | 2.05E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.41E-02 | 3.00E+00 | 0 | 2.18E+00 | 0 |
| Water deprivation potential [$m^3$ world equiv.][1] | 3.66E+00 | 1.78E-02 | 1.18E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.45E-04 | 1.44E-02 | 0 | 6.92E-03 | 0 |

[1] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

# Resources Use

| Resources Use indicators | PRODUCT STAGE | CONSTRUCTION STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | D REUSE, RECOVERY, RECYCLING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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] | 6.38E+00 | 5.24E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.09E-04 | 4.38E-02 | 0 | 1.89E-02 | 0 |
| Primary energy resources used as raw materials (PERM) [MJ] | 6.25E+00 | 0 | 7.44E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total use of renewable primary energy resources (PERT) [MJ] | 1.26E+00 | 5.24E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.09E-04 | 4.38E-02 | 0 | 1.89E-02 | 0 |
| Use of non-renewable primary energy (PENRE) [MJ] | 7.18E+01 | 3.57E+00 | 4.31E+01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.41E-02 | 3.00E+00 | 0 | 2.18E+00 | 0 |
| Non-renewable primary energy resources used as raw materials (PENRM) [MJ] | 3.37E+01 | 9.63E-01 | 4.18E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total use of non-renewable primary energy resources (PENRT) [MJ] | 1.05E+02 | 4.53E+00 | 4.35E+01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.41E-02 | 3.00E+00 | 0 | 2.18E+00 | 0 |
| Input of secondary material (SM) [kg] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of renewable secondary fuels (RSF) [MJ] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of non-renewable secondary fuels (NRSF) [MJ] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of net fresh water (FW) [$m^3$] | 1.15E-01 | 4.85E-04 | 2.27E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.28E-06 | 3.99E-04 | 0 | 2.39E-03 | 0 |

# Waste Category & Output flows

| | PRODUCT STAGE | CONSTRUCTION STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | D REUSE, RECOVERY, RECYCLING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Waste Category & Output Flows** | 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] | 4.29E-01 | 4.21E-03 | 3.11E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7.23E-05 | 3.46E-03 | 0 | 0 | 0 |
| Non-hazardous waste disposed (NHWD) [kg] | 1.05E-01 | 7.32E-02 | 1.53E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.08E-04 | 6.14E-02 | 0 | 1.51E+01 | 0 |
| Radioactive waste disposed (RWD) [kg] | 2.13E-04 | 3.15E-05 | 9.22E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.81E-07 | 2.06E-05 | 0 | 0 | 0 |
| Components for re-use (CRU) [kg] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Materials for Recycling (MFR) [kg] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Material for Energy Recovery (MER) [kg] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported energy (EE) [MJ] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# Additional voluntary indicators from EN 15804 (according to ISO 21930:2017)

| | PRODUCT STAGE | CONSTRUCTION STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | REUSE, RECOVERY RECYCLING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Environmental indicators** | 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 $CO_2$ eq.][2] | 5.04E+00 | 2.37E-01 | 6.47E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.02E-03 | 1.98E-01 | 0 | 7.96E-02 | 0 |

[2] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

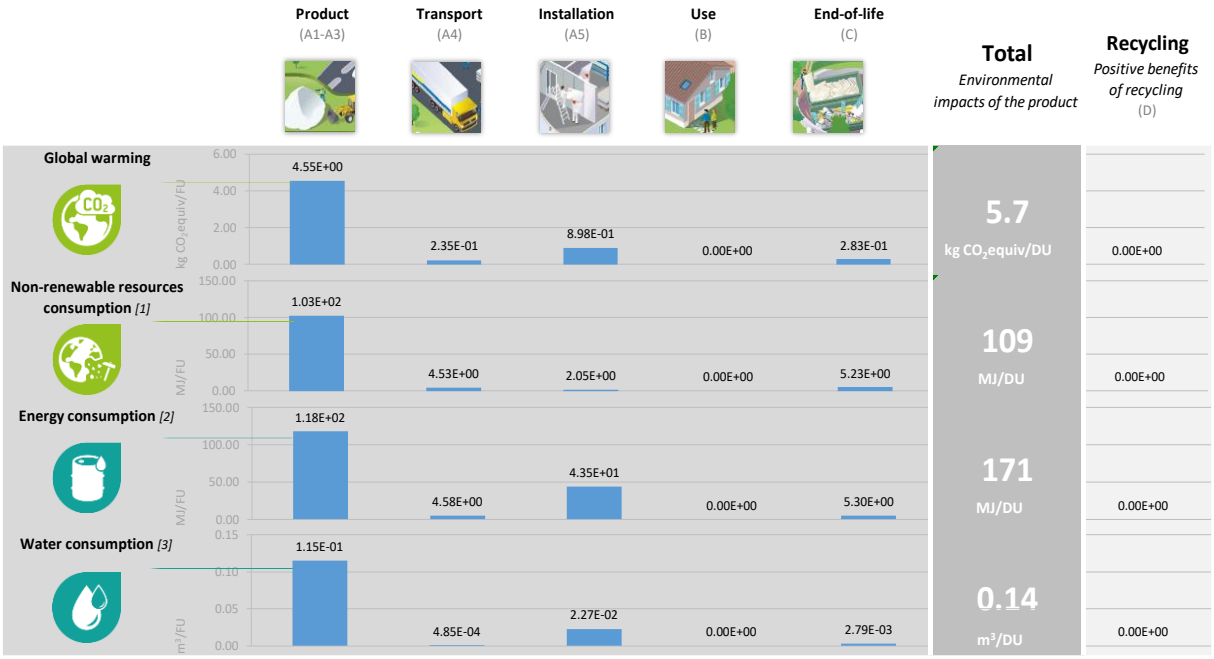
## Information on biogenic carbon content

| Component | | Biogenic Carbon Content (kg C eq./DU) |
|---|---|---|
|  | Product [kg] | 0 |
|  | Packaging [kg] | 1.95E-01 kg C eq. |

*Note: 1 kg biogenic carbon is equivalent to 44/12 kg $CO_2$.*
*DU = declared unit; 1 $m^2$ of product*

# LCA Interpretation

The following figure refers to a declared unit of weberwall brick.




**Global Warming Potential (Climate Change) (GWP)**

The figure above breaks down the GWP associated with weberwall brick into individual categories to understand the modules which cause the largest environmental impact. The majority of the environmental impact stems from the product stage (A1-A3), accounting for 4.55 kg/$CO_2$e/DU out of the total 5.7 kg/$CO_2$e/DU (i.e., 79.8% of the total GWP). The reason for the large amount of carbon emitted during the product stage is mostly due to the raw materials used, the highest contributor being the adhesive and plastic materials. The second most impactful life cycle stage is the installation module (A5). To install weberwall brick, a cementitious adhesive mortar and pointing mortar is required. The mortars contain a large quantity of cement, a high embodied carbon material, thus causing a large amount of the total GWP during A5.

**Non-Renewable Resources Consumption**

The largest consumption of non-renewable resources occurs at the product stage (A1-A3), accounting for 94.5% of the total non-renewable resources. This can be attributed mainly to the selection of raw materials. The production of raw materials such as: adhesives and additives require an energy-intensive process for its manufacture; this tends to cause high non-renewable resource consumption due to fossil resources in the energy mix. Hence, non-renewable resource consumption can be attributed to the level of energy used to supply raw materials and manufacture the product itself. Note that the Pontypool site does not operate with a green energy supplier.

**Energy Consumption**

The figure above illustrates that the product stage (A1-A3) and the installation stage (A5) contributed the highest and second highest, respectively, to the total energy consumption, a total of 171 MJ/DU. The total use of energy mainly derives from the extraction and supply of materials, particularly during A1-A3 (69.0% (118 MJ/DU). From the documentation of the LCI datasets used, we know that the energy used to extract and manufacture some of the raw materials are high due to their fossil content and high embodied carbon process. The installation stage consumes 26.25% (43.5 MJ/DU) of the total energy consumption. Since no energy is required during the installation process, energy consumption can be attributed to the generation and supplying of additional materials required of the installation.

**Water Consumption**

The water consumption for weberwall brick is linked between the product stage (A1-A3) and the installation stage (A5). The largest consumption of water, 0.115 $m^3$/DU is consumed during the product stage, this is linked to the extraction and processing of the raw materials required to manufacture weberwall brick (A1), as well as the water used on-site at Pontypool (A3) – note that the latter contributes 2.12% only. As the manufacturing site is not sub-metered the water used for office facilities is also included in this figure. The second largest contributor to water consumption is during the installation stage, at 0.0227 $m^3$/DU. The reason for this is because the adhesive and mortar require water for product application.

# Additional information:

## Electricity information

| TYPE OF INFORMATION | DESCRIPTION |
|---|---|
| **Location** | Pontypool |
| **Geographical representativeness description** | Biomass – 2.73%<br>Solar – 2.08%<br>Nuclear – 24.15%<br>Fossil Unspecified (Oil) – 4.61%<br>Lignite – 2.46%<br>Oil – 0.80%<br>Natural Gas – 63.17% |
| **Reference year** | 2021-2022 |
| **Type of dataset** | ecoinvent 3.8 |
| **Source** | AIB Residual Electricity Mix GB 2021 |
| **$CO_2$ emission kg $CO_2$ eq. / kWh** | 0.48 kg of $CO_2$ eq /kWh (based on Climate Change (fossil) indicator) |

## Data quality

Inventory data quality is judged by geographical, temporal, and technological representativeness. To cover these requirements and to ensure reliable results, first-hand industry data crossed with LCA background datasets were used. The data was collected from internal records and reporting documents from Weber. After evaluating the inventory, according to the defined ranking in the LCA report, the assessment reflects fair inventory data quality.

## Environmental impacts according to EN 15804:2012 + A1

The following tables present the results of weberwall brick according to EN 15804 +A1.

| | PRODUCT STAGE | CONSTRUCTION STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | REUSE, RECOVERY, RECYCLING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Environmental impacts** | 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 |
| Global Warming Potential (GWP) [kg $CO_2$eq.] | 5.00E+00 | 2.35E-01 | 2.72E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.97E-03 | 1.97E-01 | 0 | 7.79E-02 | 0 |
| Ozone depletion (ODP) [kg CFC 11eq.] | 7.63E-07 | 5.70E-08 | 1.36E-07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.80E-10 | 3.69E-08 | 0 | 2.55E-08 | 0 |
| Acidification potential (AP) [kg SO2eq.] | 3.62E-02 | 1.08E-03 | 1.09E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.98E-05 | 8.43E-04 | 0 | 5.65E-04 | 0 |
| Eutrophication potential (EP) [kg (PO4)3-eq.] | 6.19E-03 | 2.39E-04 | 1.63E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.90E-06 | 1.97E-04 | 0 | 1.22E-04 | 0 |
| Photochemical ozone creation (POCP) - [kg Ethylene eq.] | 1.86E-03 | 3.59E-05 | 7.59E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.51E-07 | 2.74E-05 | 0 | 2.37E-05 | 0 |
| Abiotic depletion potential for non-fossil resources (ADP-elements) [kg Sb eq.] | 3.67E-05 | 7.68E-07 | 5.09E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.00E-09 | 6.62E-07 | 0 | 1.80E-07 | 0 |
| Abiotic depletion potential for fossil resources (ADP-fossil fuels) [MJ] | 1.05E+02 | 4.53E+00 | 4.07E+01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.41E-02 | 3.00E+00 | 0 | 2.18E+00 | 0 |



17

# References


1. EPD International (2021) General Programme Instructions for the International EPD® System. Version 4.0. www.environdec.com.
2. The International EPD System PCR 2019:14 version 1.2.5 Construction products
3. EN 15804:2012 + A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
4. ISO 14 025: environmental labels and declarations – type III Environmental Declarations Principles and procedure (2009)
5. ISO 14 040: Environmental management – Life Cycle Assessment – Principles and framework (2006)
6. ISO 14 044: Environmental management – Life Cycle Assessment – Requirements and guidelines (2006)
7. ISO 14020:2000 Environmental labels and Declarations - General principles
8. EN 15978 Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method
9. FprEN 16757:2016 Sustainability of construction works - Environmental product declarations - Product Category Rules for concrete and concrete elements
10. BBA Saint-Gobain Weber. Weberend MT Systems, https://source.thenbs.com/third-party-certification/certificate-912691/piYXpDdVXA4iEbkpupj2Se/piYXpDdVXA4iEbkpupj2Se
11. EN 15804:2012 +A1 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
12. BS EN 13501-1:2007+A1:2009 Fire classification of construction products and building elements. Classification using data from reaction to fire tests