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Statement of Verification

BREG EN EPD No.: 000718   Issue 01

This is to verify that the
Environmental Product Declaration
provided by:
Kilwaughter Minerals Limited

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

This declaration is for:
1 tonne of cement-based polymer modified and self-coloured render

BRE / Global Verified EPD

Company Address

Kilwaughter Minerals Limited,
9 Starbog Road,
Larne,
N Ireland,
BT40 2TJ

Kilwaughter

Signed for BRE Global Ltd	Emma Baker Operator	11 August 2025 Date of this Issue	
11 August 2025 Date of First Issue		10 August 2030 Expiry Date	

BRE / Global Verified EPD

ECO PLATFORM EPD VERIFIED

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Environmental Product Declaration

EPD Number: 000718

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2023 Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 PN 514 Rev 3.1
Commissioner of LCA study	**LCA consultant/Tool**
Kilwaughter Minerals Limited, 9 Starbog Road, Larne, N Ireland, BT40 2TJ	Bala Subramanian/ BRE LINA A2
Declared/Functional Unit	**Applicability/Coverage**
1 tonne of cement-based polymer modified and self-coloured render	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.

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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)

This environmental product declaration is for 1 tonne of cement-based polymer modified and self-coloured render products produced by Kilwaughter Minerals Ltd at the following manufacturing facility

Kilwaughter Minerals Ltd,
9 Starbog Road,
Larne,
N Ireland,
BT40 2TJ

Construction Product:

Product Description

The scope of this EPD incorporates the Environmental Product Declaration for cement-based polymer modified and self-coloured render products. Since the composition and manufacturing process are the same for all renders, an LCA analysis has been conducted for each render product, and the individual product results are included in this EPD. These eight products, detailed below, are manufactured in accordance with a quality system approved to BS EN ISO 9001:2015 by BSI registration number FM 85394.

1. **K REND BRICK REND** is a cement-based, self-coloured and ready-mixed render, requiring only the addition of water. It is applied in two different coloured coats, the topcoat then being cut through to expose the mortar layer, creating a brick effect. K REND BRICK REND is kitemarked and CE marked to BS EN 998:1 and manufactured in accordance with a quality system approved to BS EN ISO 9001:2015 by BSI registration number FM 85394. Brick rend can be applied over any K Rend Base Coat. See separate Product Fact Sheet on K Rend Base Coats or seek technical advice.

2. HPX BASE

K Rend HPX Base coat is a cement based, highly polymer modified, and fibre reinforced base coat. It requires only the addition of water and 5 minutes mixing time. Normally applied in 1 coat as a backing for K Rend finishes or as a trowelled finish for other coatings. It is generally applied manually but can also be spray applied. HPX base coat is kitemarked and CE marked to BS EN 998:1 and manufactured in accordance with a quality system approved to BS EN ISO 9001:2015 by BSI registration number FM 85394.

K Rend HPX Base is recommended for use 4-6mm thick as part of a thin coat system, due to its outstanding flexibility and resistance to cracking.

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K Rend HPX Base is highly polymer modified to provide outstanding flexibility and excellent adhesion onto difficult backgrounds. In some cases, the incorporation of K Rend scrim cloth reinforcement is advised. For work on unusual substrates always seek technical advice.

K Rend HPX Base is fibre reinforced to provide improved resistance to cracking.

Support Backings

- HPX Base can be used over block work masonry or stone backgrounds
- For insulation concrete refurbishment work or any other unusual substrate seek technical advice

Application

- Mix for at least 5 minutes to break down additives
- Add 5-6 litres of clean water per 25kg sack
- Require: 6-9kg / m^2. nominal 4-6mm thickness

3. K MONO:

K Mono is a cement based, polymer modified, through-coloured, one-coat/one pass render, specifically designed with spray application in mind. When applied as per manufacturer's instructions, K Mono provides an attractive, durable and low-maintenance finish with enhanced handling properties for the applicator. K Mono is kitemarked and CE marked to BS EN 998:1 and manufactured in accordance with a quality system approved to BS EN ISO 9001:2015 by BSI registration number FM 85394.

K Mono is designed for use with render spray machines. It acts as a one coat / one pass finish over most moderate to low strength block work, providing a labour-saving and cost-effective solution due to reduced application times.

K Mono has been designed to provide an extended scraping window, providing greater flexibility on-site. The through-coloured render is enhanced with a popular textured finish. This product is also suitable for hand application and can be used on a variety of substrates. Coverage may be reduced if hand applied.

K Mono can be applied to a depth of 25mm in one pass depending on background conditions and final finish required. It is important that a consistent minimum finished thickness is obtained over the whole surface and that the maximum recommended thicknesses are not exceeded.

One Coat Coverage:
- 1.6 kg/mm thick/ m^2
- One Coat Requires: Approximately 1 bag per m^2.
- Nominal 16mm finished thickness

4. K REND LW1, LIGHTWEIGHT RENDER

K Rend LW1 is a lightweight, cement based, and polymer modified self-coloured render, which can be applied directly onto a wide range of masonry and external wall insulation (EWI) substrates. K Rend LW1 offers exceptional coverage due to being a lightweight render and can achieve a variety of finishes.

K Rend LW1 may be applied by machine or by hand. If applied as per manufacturer's instructions, an attractive, low maintenance finish can be achieved. K Rend LW1 iskitemarked and CE marked to BS EN 998:1 and manufactured in accordance with a quality system approved to BS EN ISO 9001:2015 by BSI registration number FM 85394.

K Rend LW1 is a lightweight render specifically designed for application directly onto a range of substrates, including;
- Brickwork
- Blockwork
- Expanded polystyrene insulation (EPS)
- Mineral wool insulation
- Phenolic insulation

K Rend LW1 may be used to provide a range of finishes;

- Textured scraped finish
- Dry Dash finish
- Spray Roughcast finish

One Coat Coverage: 1.25 kg / mm thick / m^2

One Coat Requirements:
- 15 - 20kg/m^2 approx. on insulation substrates.
- Nominal 12 - 16mm thickness for insulation substrates. (Minimum finished render thickness = 12mm).
- 20 - 25 kg/m^2 approx. on masonry substrates.
- Nominal 16 - 20mm thickness for masonry substrates. (Minimum finished render thickness = 16mm)

K Rend LW1 is applied to external wall insulation substrates in two passes using reinforcing mesh embedded into the first pass, with additional mesh at stress points.

K Rend LW1 is applied to masonry substrates in two passes, with reinforcing mesh embedded into the first pass at stress points.

It is important that a consistent minimum finished thickness is achieved over the whole surface and that the maximum recommended thicknesses are not exceeded.

5&6. K REND SILICONE ROUGHCAST & SILICONE FINE ROUGHCAST:

K Rend Silicone Roughcast/ Fine roughcast is a cement based, polymer modifies, self-coloured render, requiring only the addition of water and 10 minutes mixing time. It is applied as an excellent low maintenance alternative to dry dash and traditional painted finishes. K Rend Silicone Roughcast/ Fine Roughcast is kitemarked and CE marked to BS EN 998:1 and manufactured in accordance with a quality system approved to BS EN ISO 9001:2015 by BSI registration number FM 85394.

For general use, normally applied to K Rend Silicone Dash Receiver.

- Coverage: 1.5kg/ mm thick/ m^2
- Required: 12-15kg/ m^2 approx.

K REND SILICONE ROUGHCAST/ FINE ROUGHCAST is specifically designed to incorporate the benefits of silicone water repellents into a cement-based render system.

Silicone adds a high-water repellent quality, while allowing water vapour to pass freely through the render; thus, the amount of dirt adhering to the surface is greatly reduced, ensuring a freshly rendered appearance for a prolonged period of time. This dry surface also improves the resistance of the finished render to algae growth and the natural phenomenon of lime-bloom.

7. STANDARD SPRAY
Standard Spray is an easy to use, reliable, cement based, polymer modified, self-colored render, designed for application through spray machines. If applied as per manufacturer's instructions, Standard Spray will provide an attractive, low-maintenance finish. K Rend Standard Spray is kitemarked and CE marked to BS EN 998:1 and manufactured in accordance with a quality system approved to BS EN ISO 9001:2015 by BSI registration number FM 85394.

Standard Spray is designed for use with most spray machines. Acting as a finish over K Rend Base Coats, it provides a labor-saving application and is cost effective. The self-colored render provides a popular texture finish. This product is also suitable for hand application and can be used on a variety of substrates. Coverage may be reduced if hand applied.

One Coat Coverage:

1.6kg / mm thick / m^2

Standard Spray is normally applied to a minimum thickness of 10mm over a basecoat to provide a total minimum render thickness of 15mm depending on background, environmental conditions and final finish required. It is important that a consistent minimum finished thickness is achieved over the whole surface and that the maximum recommended thicknesses are not exceeded.

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8. SILICONE SPRAY DASH RECEIVER

K Rend Dash Receivers are a family of cement based, polymer modified and through-coloured, requiring only the addition of water followed by 10 minutes mixing time. Normally applied as an excellent background for any dry dash or roughcast finish for new build or refurbishment, all K Rend Dash Receivers is kitemarked and CE marked to BS EN 998:1 and manufactured in accordance with a quality system approved to BS EN ISO 9001:2015 by BSI registration number FM 85394.

Silicone Spray Dash Receiver is a silicone enhanced dash receiver specifically designed for spray application and can be applied on to a K Rend base coat, or as a one- coat finish, where it is applied in two passes. Apply at 6 - 10mm onto a basecoat, or 16 - 20mm in two passes if applied directly to blockwork.

- Coverage:1.5kg/ mm thick/ m^2
- Required:10 – 15kg/m^2 approx., when applied onto a basecoat
- Nominal: 6 – 10 mm thickness, when applied onto a basecoat
- Water required: 4.5 – 5.5L / bag

Technical Information

Property	Standards	K Rend Brick Rend	K Rend HPX Base	K Rend LW1	K Rend Silicone Fine Roughcast/ Roughcast	K Rend Silicone Spray Dash Receiver	Standard Spray	K Rend K Mono
Dry Bulk Density (kg/m3)	EN 1015-10	1300-1510	1150-1270	1000-1200	1330-1960	1400-1650	1350 - 1450	1300-1550
Compressive Strength	EN 1015-11	CS IV	CS II	CS III	CS IV	CS IV	CS IV	CS III
Adhesion (N/mm2 and fracture pattern)	EN 1015-21	-	-	-	-	-	-	0.22 (FP-A)
	EN 1015-12	0.24 (FP-A/B)	0.42 (FP-A/B)	0.27 (FP-B)	0.32 (FP-B)	0.54 (FP-A)	>0.4 (FP A)	-
Capillary water absorption (categories)	EN 1015-18	W$_c$ 2	W$_c$ 2	W$_c$ 2	W$_c$ 2	W$_c$ 2	Wc2	W$_c$ 2
Water vapour permeability coefficient (µ)	EN 1015-19	≤20	≤15	≤15	NPD	≤25	≤15	≤15
Thermal conductivity mean λ10, dry, mat (W/m.K)	EN 1745	0.44	0.36	0.31	0.93	0.63	0.43	0.46
Reaction to fire (class)	EN 13501-1	A1	F	F	A1	A1	A1	A1
Durability	EN 1015-18	NPD	NPD	NPD	NPD	NPD	NPD	-
Durability (K Rend K Mono)	EN 998-1, Para 5.2.3.1	-	-	-	-	-	-	Suitable as a One Coat Render
Water permeability on relevant substrates after weathering (ml/cm2 after 48 h)	EN 1015-21	-	-	-	-	-	-	≤0.1

Note: For information, please contact Kilwaughter technical team.

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Product image:

The picture below represents the K Rend and K Mono products.

Main Product Contents

Material/Chemical Input	%
Portland Cement Clinker (White)	≥ 10 – < 25
Calcium Hydroxide	< 3
Sand	<75
Pigments	<1
Others	<2

Note: Please contact the Kilwaughter minerals technical team for more information and please refer the individual product Safety Data sheet for more information on the composition of the product.
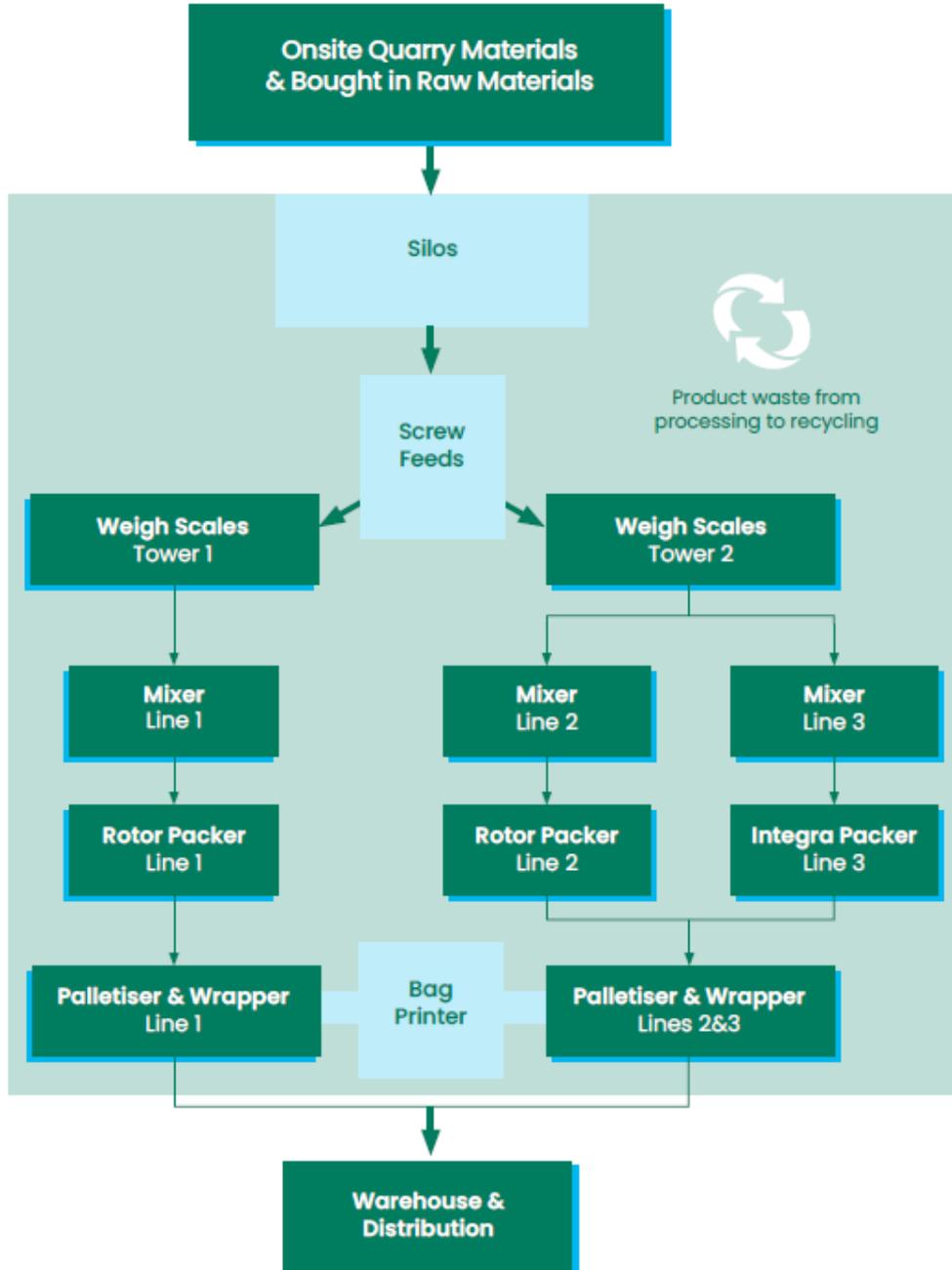
Manufacturing Process

The product is manufactured in a computer-controlled batch mixing plant, which incorporates individual weigh-bins, transfer screw conveyors, and a mixer. A production list is created by the Production Supervisor and issued to the batch mixing plant operator. Using this list, the operator selects the relevant recipe, inputs the required quantity, and the computer then manufactures the product. The system is pre-programmed with the formulations, mixing sequence, and mixing times.

Once the final blend is produced, it is released to an automatic packing machine, which packs it into 25 kg, 3-ply poly-lined paper sacks with weldable external valves. The computer-controlled batch mixing plant includes an alarm system that detects tolerance errors if conditions fluctuate outside the pre-set program. The operator investigates these errors and must acknowledge them on the computer before production can continue. Records are stored electronically. Forty 25 kg sacks are stacked onto a timber pallet and are check-weighed weekly using a weighbridge. The required weight is 1.00 tonne ± 100 kg.

Note: National grid electricity has been used for product manufacturing, and all production waste has been sent for recycling

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Process flow diagram

Render Plant Process

Onsite Quarry Materials & Bought in Raw Materials

→

Silos

↓

Screw Feeds

Product waste from processing to recycling

Weigh Scales Tower 1 ← → Weigh Scales Tower 2

Mixer Line 1 | Mixer Line 2 | Mixer Line 3

Rotor Packer Line 1 | Rotor Packer Line 2 | Integra Packer Line 3

Palletiser & Wrapper Line 1 | Bag Printer | Palletiser & Wrapper Lines 2&3

↓

Warehouse & Distribution

Kllwaughter

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Construction Installation

Many Renders are optimised for application through electric or diesel plastering machines. Guidance on optimal water flow settings and machine setup is available from Kilwaughter Minerals Ltd. For hand application, the product requires approximately 5.3 – 5.5 litres of clean water per 25 kg.

Spray machines are different in that they measure water flow in terms of L/Hr. This varies depending on the rotor and stator used, the machine used and the speed setting on the machine. This should average out to be similar to 5.5L/25kg bag used in hand application as the product is being brought to a similar workability

In this analysis, 5.5 L/25 kg has been used for the LCA analysis. The DU is 1 tonne, therefore the amount of water used for 1 tonne of render is 240 litres. Installation rate of 4% has been taken from BRE PCR EN15804 3.1.

Please contact Kilwaughter Minerals technical team for more information.

End of Life

At the end of its life, cement-based render can be removed mechanically using tools such as chisels and SDS drills. The waste cement render can then be crushed, recycled, and repurposed as aggregate for new concrete, road base, or construction fill. When processed correctly, it may also be reused as a raw material in new construction applications, thereby reducing landfill waste and supporting sustainable building practices. For this analysis, a 100% recovery rate from the demolition site is assumed, with materials sent to a waste processing facility.

In line with BRE PCR 3.1 guidelines, it is projected that 95% of waste cement-based render will be recycled, while the remaining 5% will be directed to landfill.

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Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1 tonne of cement-based polymer modified and self-coloured render

System boundary

This is a Cradle-to-Gate with Options EPD, reporting the upstream processing stages A1 to A3, construction stages A4-A5, 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

This is a product-specific EPD, and the LCA analysis has been conducted for individual products due to their similar composition and manufacturing process, as per BRE PCR EN 15804 V3.1. To maintain transparency and consistency, the following product results are included: HPX Base, K Mono, K Rend LW1, Brick Rend, Standard Spray, Silicone Roughcast, Silicone Fine Roughcast, and Silicone Spray Dash Receiver. The datasets are derived from Ecoinvent v3.8, and the LCA tool used was BRE LINA A2. The LCA analysis is conducted for the 1 tonne of cement-based polymer modified and self-coloured render products manufactured over the period of one year (from 01/05/2023 to 30/04/2024).

In addition to the cement-based polymer modified and self-coloured render, other products are manufactured at the Kilwaughter manufacturing site. Therefore, the allocation of water consumption, diesel, gas canisters, waste, non-production waste, and wastewater discharge has been conducted in accordance with the provisions of BRE PCR PN514 and EN 15804, using mass production quantities as the allocation basis. The manufacturer has confirmed that the wastage is sold as a co-product, and the revenue from it is less than 1%. Therefore, in accordance with the BRE PCR, the impacts have been allocated using physical allocation. Site-wide data for energy, water, waste, non-production waste, and wastewater has been based on actual measured quantities. Electricity consumption has been allocated by calculating the kWh required to produce one tonne of product, converting this to a per-kilogram value, and multiplying it by the total production quantity.

Waste quantities have been accounted for from several sources, including product changeovers, system purges using Mastercal, QA waste (e.g., over/underweight bags, contamination), overproduction (non-stock items or minimum order quantities), outdated finished goods. The manufacturer has confirmed that these wastes are either sold as co-products or rebranded and sold under different product lines. While this may suggest the need for economic allocation, in accordance with BRE EN 15804 +A2 PCR, because the revenue from co-products is less than 25%, physical allocation has been applied instead. Therefore, these waste streams have been allocated to products by mass.

Upon data review, it is noted that the output is slightly higher than the input however the mass balance is within the acceptable range. In addition, during the LCA modelling, some chemicals are not available in the ecoinvent database therefore the most suitable proxy has been selected for the LCA modelling. Figures for the raw materials, ancillary materials and packaging were from actual usages. 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.

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ISO14044 guidance. Quality Level	Geographical representativeness	Technical representativeness	Time representativeness
Very Good	Data from area under study.	Data from processes and products under study. Same state of technology applied as defined in goal and scope (i.e., identical technology).	There is approximately 1-2 years between the Ecoinvent LCI reference year, and the time period for which the LCA was undertaken.

Specific European datasets have been selected from the ecoinvent LCI for this LCA. Manufacturer uses the national grid electricity and natural gas for production, so therefore the national grid electricity dataset has been used for the LCA modelling (Ecoinvent 3.8). The GWP carbon footprint for using 1 kWh of UK consumption mix electricity is 0.239 kgCO2e/kWh and for using 1 kWh of natural gas at industrial furnace (the UK) it is 0.232 kgCO2eq. The quality level of time representativeness is also Very Good as the background LCI datasets are based on ecoinvent v3.8 which was compiled in 2021. Therefore, there is less than 5 years between the ecoinvent LCI reference year and the time period for which the LCA was undertaken.

Cut-off criteria

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

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LCA Results Summary:

Summary of Main Indicators (A1-A3)					
Product	**Global warming (GWP-total)**	**Non-renewable consumption (ADPF)**	**Primary energy usage (PERT+PENRT)**	**Waste Production (HWD+NHWD+RWD)**	**Water Consumption (FW)**
Unit – 1 tonne	kg CO2 eq	MJ	MJ	Kg	m3
HPX Base	3.36E+02	4.66E+03	5.62E+03	2.03E+02	4.83E+00
K Mono	2.44E+02	2.62E+03	4.08E+03	2.33E+02	2.18E+00
K Rend LW1	5.30E+02	6.90E+03	9.36E+03	1.22E+03	1.02E+01
Brick Rend	4.00E+02	5.25E+03	1.17E+04	5.35E+02	5.16E+00
Standard Spray	2.55E+02	2.38E+03	4.03E+03	1.77E+02	1.70E+00
Silicone Roughcast	2.18E+02	2.32E+03	3.67E+03	1.58E+02	1.79E+00
Silicone Fine Roughcast	2.18E+02	2.32E+03	3.67E+03	1.58E+02	1.79E+00
Silicone Spray Dash Receiver	2.34E+02	2.55E+03	4.21E+03	2.00E+02	2.09E+00

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LCA Results – HPX Base

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	3.18E+02	3.13E+02	4.46E+00	6.63E-02	1.08E-05	1.25E+00	4.30E-02
	Transport	A2	1.47E+01	1.47E+01	9.63E-03	6.81E-03	3.29E-06	1.47E-01	8.54E-04
	Manufacturing	A3	3.85E+00	3.77E+01	-3.39E+01	5.25E-02	4.02E-06	1.29E-01	5.01E-03
	Total (Consumption grid)	A1-3	3.36E+02	3.65E+02	-2.95E+01	1.26E-01	1.81E-05	1.53E+00	4.89E-02
Construction process stage	Transport	A4	1.71E+01	1.71E+01	1.41E-02	6.87E-03	3.94E-06	8.28E-02	1.09E-03
	Construction	A5	1.39E+01	1.50E+01	-1.13E+00	5.47E-03	9.06E-07	6.43E-02	4.17E-03
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.32E+00	8.31E+00	7.08E-03	3.26E-03	1.92E-06	3.37E-02	5.35E-04
	Waste processing	C3	3.82E+00	3.82E+00	1.35E-03	3.81E-04	8.16E-07	3.97E-02	1.18E-04
	Disposal	C4	2.64E-01	2.63E-01	2.61E-04	2.49E-04	1.07E-07	2.48E-03	2.41E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8.00E+00	-7.88E+00	-1.02E-01	-1.11E-02	-6.36E-07	-5.07E-02	-4.29E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

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LCA Results (continued)

Parameters describing environmental impacts			EP-marine	EP-terrestrial	POCP	ADP-mineral &metal	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	2.99E-01	2.60E+00	8.15E-01	1.39E-03	3.69E+03	1.94E+02	2.25E-05
	Transport	A2	3.87E-02	4.27E-01	1.18E-01	4.54E-05	2.15E+02	8.85E-01	1.10E-06
	Manufacturing	A3	4.80E-02	4.92E-01	1.44E-01	1.56E-04	7.55E+02	9.07E+00	2.54E-06
	Total (Consumption grid)	A1-3	3.85E-01	3.52E+00	1.08E+00	1.59E-03	4.66E+03	2.04E+02	2.61E-05
Construction process stage	Transport	A4	2.41E-02	2.64E-01	7.88E-02	5.84E-05	2.57E+02	1.14E+00	1.45E-06
	Construction	A5	1.64E-02	1.51E-01	4.61E-02	6.56E-05	1.99E+02	1.90E+01	1.10E-06
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.02E-02	1.11E-01	3.40E-02	2.89E-05	1.26E+02	5.65E-01	7.17E-07
	Waste processing	C3	1.76E-02	1.92E-01	5.29E-02	1.96E-06	5.24E+01	1.21E-01	8.13E-06
	Disposal	C4	8.61E-04	9.42E-03	2.74E-03	6.01E-07	7.35E+00	3.37E-01	4.99E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.17E-02	-1.41E-01	-3.63E-02	-7.45E-05	-1.16E+02	-1.52E+01	-6.41E-07

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

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

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LCA Results (continued)

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	1.02E+01	1.12E+04	3.29E-07	7.39E-06	5.10E+02
	Transport	A2	1.08E+00	1.61E+02	6.36E-09	1.60E-07	1.26E+02
	Manufacturing	A3	1.21E+01	5.05E+02	5.51E-08	3.30E-07	3.20E+03
	Total (Consumption grid)	A1-3	2.34E+01	1.18E+04	3.90E-07	7.88E-06	3.84E+03
Construction process stage	Transport	A4	1.32E+00	2.00E+02	6.63E-09	2.08E-07	1.73E+02
	Construction	A5	1.02E+00	5.92E+02	2.60E-08	6.69E-07	1.92E+02
95%- Recycling and 5% to landfill							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.46E-01	9.81E+01	3.18E-09	1.03E-07	8.63E+01
	Waste processing	C3	2.36E-01	3.06E+01	1.19E-09	2.22E-08	6.67E+00
	Disposal	C4	3.27E-02	4.64E+00	1.18E-10	3.05E-09	1.54E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.80E+00	-1.34E+02	-7.81E-09	-1.41E-07	-1.07E+02

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.

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LCA Results (continued)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.98E+02	2.30E+01	2.21E+02	2.71E+03	9.54E+02	3.67E+03
	Transport	A2	2.75E+00	0.00E+00	2.75E+00	2.11E+02	0.00E+00	2.11E+02
	Manufacturing	A3	3.10E+02	3.40E+02	6.50E+02	8.39E+02	2.93E+01	8.68E+02
	Total (Consumption grid)	A1-3	5.11E+02	3.63E+02	8.74E+02	3.76E+03	9.83E+02	4.75E+03
Construction process stage	Transport	A4	3.58E+00	0.00E+00	3.58E+00	2.53E+02	0.00E+00	2.53E+02
	Construction	A5	2.03E+01	1.49E+01	3.52E+01	1.53E+02	3.93E+01	1.92E+02
95%- Recycling and 5% to landfill								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.77E+00	0.00E+00	1.77E+00	1.23E+02	0.00E+00	1.23E+02
	Waste processing	C3	2.93E-01	0.00E+00	2.93E-01	5.14E+01	0.00E+00	5.14E+01
	Disposal	C4	6.27E-02	0.00E+00	6.27E-02	7.22E+00	0.00E+00	7.22E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.09E+01	0.00E+00	-1.09E+01	-1.16E+02	0.00E+00	-1.16E+02

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

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LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m³
Product stage	Raw material supply	A1	2.46E+00	0.00E+00	0.00E+00	4.54E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	2.19E-02
	Manufacturing	A3	1.31E+00	2.79E-04	0.00E+00	2.68E-01
	Total (Consumption grid)	A1-3	3.78E+00	2.79E-04	0.00E+00	4.83E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	2.84E-02
	Construction	A5	1.51E-01	1.12E-05	0.00E+00	4.47E-01
95%- Recycling and 5% to landfill						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.40E-02
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	2.99E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-3.58E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

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LCA Results (continued)

Other environmental information describing waste categories			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	9.88E+00	1.60E+02	4.65E-03
	Transport	A2	2.47E-01	3.89E+00	6.66E+00
	Manufacturing	A3	1.38E+00	2.15E+01	4.29E-03
	Total (Consumption grid)	A1-3	1.15E+01	1.85E+02	6.67E+00
Construction process stage	Transport	A4	2.85E-01	4.99E+00	1.74E-03
	Construction	A5	4.80E-01	7.90E+00	2.67E-01
95%- Recycling and 5% to landfill					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.39E-01	2.46E+00	8.50E-04
	Waste processing	C3	6.87E-02	4.83E-01	3.62E-04
	Disposal	C4	7.65E-03	1.08E-01	4.82E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.68E-01	-2.03E+01	-5.93E-04

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

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LCA Results (continued)

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	-1.16E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
	Total (Consumption grid)	A1-3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	-1.10E+00	-1.02E+01
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	5.84E-03	1.73E-04	9.39E-03	-4.41E-02	-4.08E-01
95%- Recycling and 5% to landfill								
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	6.84E-05	1.09E-06	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

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LCA Results - K Mono

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	2.30E+02	2.27E+02	2.31E+00	7.25E-02	2.04E-05	7.85E-01	3.76E-02
	Transport	A2	1.10E+01	1.09E+01	7.06E-03	5.55E-03	2.41E-06	1.38E-01	6.44E-04
	Manufacturing	A3	3.80E+00	3.77E+01	-3.39E+01	5.24E-02	4.02E-06	1.29E-01	5.01E-03
	Total (Consumption grid)	A1-3	2.44E+02	2.76E+02	-3.16E+01	1.31E-01	2.69E-05	1.05E+00	4.33E-02
Construction process stage	Transport	A4	1.71E+01	1.71E+01	1.41E-02	6.87E-03	3.94E-06	8.28E-02	1.09E-03
	Construction	A5	1.02E+01	1.15E+01	-1.22E+00	5.66E-03	1.25E-06	4.53E-02	3.95E-03
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.32E+00	8.31E+00	7.08E-03	3.26E-03	1.92E-06	3.37E-02	5.35E-04
	Waste processing	C3	3.82E+00	3.82E+00	1.35E-03	3.81E-04	8.16E-07	3.97E-02	1.18E-04
	Disposal	C4	2.64E-01	2.63E-01	2.61E-04	2.49E-04	1.07E-07	2.48E-03	2.41E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8.00E+00	-7.88E+00	-1.02E-01	-1.11E-02	-6.36E-07	-5.07E-02	-4.29E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

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LCA Results (continued)

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	m³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	1.60E-01	1.72E+00	4.72E-01	1.34E-03	1.71E+03	7.98E+01	7.13E-06
	Transport	A2	3.58E-02	3.96E-01	1.08E-01	3.21E-05	1.58E+02	6.49E-01	7.64E-07
	Manufacturing	A3	4.79E-02	4.91E-01	1.44E-01	1.56E-04	7.54E+02	9.06E+00	2.54E-06
	Total (Consumption grid)	A1-3	2.44E-01	2.61E+00	7.23E-01	1.53E-03	2.62E+03	8.95E+01	1.04E-05
Construction process stage	Transport	A4	2.41E-02	2.64E-01	7.88E-02	5.84E-05	2.57E+02	1.14E+00	1.45E-06
	Construction	A5	1.07E-02	1.15E-01	3.20E-02	6.32E-05	1.17E+02	1.45E+01	4.73E-07
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.02E-02	1.11E-01	3.40E-02	2.89E-05	1.26E+02	5.65E-01	7.17E-07
	Waste processing	C3	1.76E-02	1.92E-01	5.29E-02	1.96E-06	5.24E+01	1.21E-01	8.13E-06
	Disposal	C4	8.61E-04	9.42E-03	2.74E-03	6.01E-07	7.35E+00	3.37E-01	4.99E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.17E-02	-1.41E-01	-3.63E-02	-7.45E-05	-1.16E+02	-1.52E+01	-6.41E-07

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

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

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LCA Results (continued)

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	1.06E+01	4.46E+03	1.48E-07	3.39E-06	4.41E+02
	Transport	A2	7.99E-01	1.17E+02	5.07E-09	1.12E-07	8.49E+01
	Manufacturing	A3	1.21E+01	5.05E+02	5.51E-08	3.30E-07	3.20E+03
	Total (Consumption grid)	A1-3	2.35E+01	5.08E+03	2.08E-07	3.83E-06	3.73E+03
Construction process stage	Transport	A4	1.32E+00	2.00E+02	6.63E-09	2.08E-07	1.73E+02
	Construction	A5	1.02E+00	3.22E+02	1.87E-08	5.07E-07	1.88E+02
95%- Recycling and 5% to landfill							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.46E-01	9.81E+01	3.18E-09	1.03E-07	8.63E+01
	Waste processing	C3	2.36E-01	3.06E+01	1.19E-09	2.22E-08	6.67E+00
	Disposal	C4	3.27E-02	4.64E+00	1.18E-10	3.05E-09	1.54E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.80E+00	-1.34E+02	-7.81E-09	-1.41E-07	-1.07E+02

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.

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LCA Results (continued)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.36E+02	1.07E+01	1.47E+02	2.07E+03	1.88E+02	2.25E+03
	Transport	A2	1.90E+00	0.00E+00	1.90E+00	1.53E+02	0.00E+00	1.53E+02
	Manufacturing	A3	3.10E+02	3.40E+02	6.50E+02	8.44E+02	2.38E+01	8.68E+02
	Total (Consumption grid)	A1-3	4.48E+02	3.51E+02	7.99E+02	3.06E+03	2.12E+02	3.28E+03
Construction process stage	Transport	A4	3.58E+00	0.00E+00	3.58E+00	2.53E+02	0.00E+00	2.53E+02
	Construction	A5	1.78E+01	1.44E+01	3.23E+01	1.25E+02	8.49E+00	1.34E+02
95%- Recycling and 5% to landfill								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.77E+00	0.00E+00	1.77E+00	1.23E+02	0.00E+00	1.23E+02
	Waste processing	C3	2.93E-01	0.00E+00	2.93E-01	5.14E+01	0.00E+00	5.14E+01
	Disposal	C4	6.27E-02	0.00E+00	6.27E-02	7.22E+00	0.00E+00	7.22E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.09E+01	0.00E+00	-1.09E+01	-1.16E+02	0.00E+00	-1.16E+02

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

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LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m³
Product stage	Raw material supply	A1	1.96E-02	0.00E+00	0.00E+00	1.90E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	1.61E-02
	Manufacturing	A3	1.31E+00	2.79E-04	0.00E+00	2.68E-01
	Total (Consumption grid)	A1-3	1.33E+00	2.79E-04	0.00E+00	2.18E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	2.84E-02
	Construction	A5	5.33E-02	1.12E-05	0.00E+00	3.41E-01
95%- Recycling and 5% to landfill						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.40E-02
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	2.99E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-3.58E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

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LCA Results (continued)

Other environmental information describing waste categories			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.14E+01	1.88E+02	5.16E-03
	Transport	A2	1.83E-01	2.71E+00	6.66E+00
	Manufacturing	A3	1.38E+00	2.15E+01	4.29E-03
	Total (Consumption grid)	A1-3	1.30E+01	2.13E+02	6.67E+00
Construction process stage	Transport	A4	2.85E-01	4.99E+00	1.74E-03
	Construction	A5	5.40E-01	9.00E+00	2.67E-01
95%- Recycling and 5% to landfill					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.39E-01	2.46E+00	8.50E-04
	Waste processing	C3	6.87E-02	4.83E-01	3.62E-04
	Disposal	C4	7.65E-03	1.08E-01	4.82E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.68E-01	-2.03E+01	-5.93E-04

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

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LCA Results (continued)

			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
Other environmental information describing output flows – at end of life								
			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	4.71E-03	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
	Total (Consumption grid)	A1-3	0.00E+00	4.71E-03	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	1.15E-03	1.73E-04	9.39E-03	2.50E-03	-4.08E-01
95%- Recycling and 5% to landfill								
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	6.84E-05	1.09E-06	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

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LCA Results - K Rend LW1

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	4.94E+02	4.89E+02	5.27E+00	2.30E-01	4.77E-05	5.51E+00	1.36E-01
	Transport	A2	3.21E+01	3.21E+01	2.30E-02	1.42E-02	7.28E-06	2.61E-01	1.93E-03
	Manufacturing	A3	3.51E+00	3.73E+01	-3.39E+01	5.15E-02	3.99E-06	1.27E-01	4.78E-03
	Total (Consumption grid)	A1-3	5.30E+02	5.58E+02	-2.86E+01	2.96E-01	5.89E-05	5.90E+00	1.42E-01
Construction process stage	Transport	A4	1.71E+01	1.71E+01	1.41E-02	6.87E-03	3.94E-06	8.28E-02	1.09E-03
	Construction	A5	2.17E+01	2.28E+01	-1.10E+00	1.23E-02	2.54E-06	2.39E-01	7.91E-03
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.32E+00	8.31E+00	7.08E-03	3.26E-03	1.92E-06	3.37E-02	5.35E-04
	Waste processing	C3	3.82E+00	3.82E+00	1.35E-03	3.81E-04	8.16E-07	3.97E-02	1.18E-04
	Disposal	C4	2.64E-01	2.63E-01	2.61E-04	2.49E-04	1.07E-07	2.48E-03	2.41E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8.00E+00	-7.88E+00	-1.02E-01	-1.11E-02	-6.36E-07	-5.07E-02	-4.29E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

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LCA Results (continued)

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	m³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	5.04E-01	4.66E+00	1.56E+00	2.21E-03	5.68E+03	4.18E+02	3.48E-05
	Transport	A2	7.03E-02	7.75E-01	2.18E-01	1.03E-04	4.75E+02	2.01E+00	2.52E-06
	Manufacturing	A3	4.73E-02	4.85E-01	1.43E-01	1.54E-04	7.48E+02	8.75E+00	2.53E-06
	Total (Consumption grid)	A1-3	6.22E-01	5.92E+00	1.92E+00	2.46E-03	6.90E+03	4.29E+02	3.99E-05
Construction process stage	Transport	A4	2.41E-02	2.64E-01	7.88E-02	5.84E-05	2.57E+02	1.14E+00	1.45E-06
	Construction	A5	2.58E-02	2.47E-01	8.00E-02	1.00E-04	2.88E+02	2.80E+01	1.65E-06
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.02E-02	1.11E-01	3.40E-02	2.89E-05	1.26E+02	5.65E-01	7.17E-07
	Waste processing	C3	1.76E-02	1.92E-01	5.29E-02	1.96E-06	5.24E+01	1.21E-01	8.13E-06
	Disposal	C4	8.61E-04	9.42E-03	2.74E-03	6.01E-07	7.35E+00	3.37E-01	4.99E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.17E-02	-1.41E-01	-3.63E-02	-7.45E-05	-1.16E+02	-1.52E+01	-6.41E-07

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

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

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LCA Results (continued)

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	3.10E+01	1.74E+04	1.54E-06	1.85E-05	1.63E+03
	Transport	A2	2.40E+00	3.61E+02	1.34E-08	3.64E-07	2.94E+02
	Manufacturing	A3	1.20E+01	4.87E+02	5.49E-08	3.23E-07	3.18E+03
	Total (Consumption grid)	A1-3	4.54E+01	1.82E+04	1.61E-06	1.92E-05	5.11E+03
Construction process stage	Transport	A4	1.32E+00	2.00E+02	6.63E-09	2.08E-07	1.73E+02
	Construction	A5	1.90E+00	8.47E+02	7.46E-08	1.12E-06	2.43E+02
95%- Recycling and 5% to landfill							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.46E-01	9.81E+01	3.18E-09	1.03E-07	8.63E+01
	Waste processing	C3	2.36E-01	3.06E+01	1.19E-09	2.22E-08	6.67E+00
	Disposal	C4	3.27E-02	4.64E+00	1.18E-10	3.05E-09	1.54E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.80E+00	-1.34E+02	-7.81E-09	-1.41E-07	-1.07E+02

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.

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LCA Results (continued)

Parameters describing resource use, primary energy									
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	3.77E+02	1.99E+01	3.97E+02	6.33E+03	6.44E+02	6.98E+03
	Transport	A2	6.27E+00	0.00E+00	6.27E+00	4.66E+02	0.00E+00	4.66E+02
	Manufacturing	A3	3.13E+02	3.33E+02	6.46E+02	8.33E+02	2.93E+01	8.62E+02
	Total (Consumption grid)	A1-3	6.96E+02	3.53E+02	1.05E+03	7.63E+03	6.73E+02	8.31E+03
Construction process stage	Transport	A4	3.58E+00	0.00E+00	3.58E+00	2.53E+02	0.00E+00	2.53E+02
	Construction	A5	2.77E+01	1.45E+01	4.23E+01	3.08E+02	2.69E+01	3.35E+02
95%- Recycling and 5% to landfill								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.77E+00	0.00E+00	1.77E+00	1.23E+02	0.00E+00	1.23E+02
	Waste processing	C3	2.93E-01	0.00E+00	2.93E-01	5.14E+01	0.00E+00	5.14E+01
	Disposal	C4	6.27E-02	0.00E+00	6.27E-02	7.22E+00	0.00E+00	7.22E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.09E+01	0.00E+00	-1.09E+01	-1.16E+02	0.00E+00	-1.16E+02

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

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LCA Results (continued)

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	8.41E-02	0.00E+00	0.00E+00	9.85E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	4.99E-02
	Manufacturing	A3	1.31E+00	2.79E-04	0.00E+00	2.60E-01
	Total (Consumption grid)	A1-3	1.40E+00	2.79E-04	0.00E+00	1.02E+01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	2.84E-02
	Construction	A5	5.59E-02	1.12E-05	0.00E+00	6.60E-01
95%- Recycling and 5% to landfill						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.40E-02
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	2.99E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-3.58E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

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LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.83E+02	1.00E+03	1.65E-02
	Transport	A2	5.38E-01	8.81E+00	6.66E+00
	Manufacturing	A3	1.36E+00	2.05E+01	4.25E-03
	Total (Consumption grid)	A1-3	1.85E+02	1.03E+03	6.68E+00
Construction process stage	Transport	A4	2.85E-01	4.99E+00	1.74E-03
	Construction	A5	7.42E+00	4.17E+01	2.67E-01
95%- Recycling and 5% to landfill					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.39E-01	2.46E+00	8.50E-04
	Waste processing	C3	6.87E-02	4.83E-01	3.62E-04
	Disposal	C4	7.65E-03	1.08E-01	4.82E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.68E-01	-2.03E+01	-5.93E-04

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

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LCA Results (continued)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.04E+01
	Total (Consumption grid)	A1-3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.04E+01
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	5.84E-03	1.73E-04	9.39E-03	2.50E-03	-4.17E-01
95%- Recycling and 5% to landfill								
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	6.84E-05	1.09E-06	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

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LCA Results - Brick Rend

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	3.83E+02	3.79E+02	3.44E+00	1.36E-01	4.52E-05	1.43E+00	1.09E-01
	Transport	A2	1.32E+01	1.31E+01	8.76E-03	6.06E-03	2.95E-06	1.28E-01	7.69E-04
	Manufacturing	A3	3.85E+00	3.77E+01	-3.39E+01	5.25E-02	4.02E-06	1.29E-01	5.01E-03
	Total (Consumption grid)	A1-3	4.00E+02	4.30E+02	-3.05E+01	1.94E-01	5.21E-05	1.69E+00	1.15E-01
Construction process stage	Transport	A4	1.71E+01	1.71E+01	1.41E-02	6.87E-03	3.94E-06	8.28E-02	1.09E-03
	Construction	A5	1.65E+01	1.76E+01	-1.17E+00	8.22E-03	2.27E-06	7.07E-02	6.82E-03
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.32E+00	8.31E+00	7.08E-03	3.26E-03	1.92E-06	3.37E-02	5.35E-04
	Waste processing	C3	3.82E+00	3.82E+00	1.35E-03	3.81E-04	8.16E-07	3.97E-02	1.18E-04
	Disposal	C4	2.64E-01	2.63E-01	2.61E-04	2.49E-04	1.07E-07	2.48E-03	2.41E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8.00E+00	-7.88E+00	-1.02E-01	-1.11E-02	-6.36E-07	-5.07E-02	-4.29E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

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LCA Results (continued)

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	m³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	2.88E-01	2.89E+00	8.89E-01	1.77E-03	4.30E+03	2.06E+02	1.45E-05
	Transport	A2	3.38E-02	3.73E-01	1.03E-01	4.10E-05	1.93E+02	7.98E-01	9.91E-07
	Manufacturing	A3	4.80E-02	4.92E-01	1.44E-01	1.56E-04	7.55E+02	9.07E+00	2.54E-06
	Total (Consumption grid)	A1-3	3.70E-01	3.75E+00	1.14E+00	1.97E-03	5.25E+03	2.16E+02	1.80E-05
Construction process stage	Transport	A4	2.41E-02	2.64E-01	7.88E-02	5.84E-05	2.57E+02	1.14E+00	1.45E-06
	Construction	A5	1.57E-02	1.60E-01	4.85E-02	8.06E-05	2.22E+02	1.95E+01	7.76E-07
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.02E-02	1.11E-01	3.40E-02	2.89E-05	1.26E+02	5.65E-01	7.17E-07
	Waste processing	C3	1.76E-02	1.92E-01	5.29E-02	1.96E-06	5.24E+01	1.21E-01	8.13E-06
	Disposal	C4	8.61E-04	9.42E-03	2.74E-03	6.01E-07	7.35E+00	3.37E-01	4.99E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.17E-02	-1.41E-01	-3.63E-02	-7.45E-05	-1.16E+02	-1.52E+01	-6.41E-07

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

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

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LCA Results (continued)

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	2.78E+01	7.47E+03	3.64E-07	6.37E-06	7.14E+02
	Transport	A2	9.70E-01	1.45E+02	5.68E-09	1.44E-07	1.14E+02
	Manufacturing	A3	1.21E+01	5.05E+02	5.51E-08	3.30E-07	3.20E+03
	Total (Consumption grid)	A1-3	4.09E+01	8.12E+03	4.25E-07	6.85E-06	4.03E+03
Construction process stage	Transport	A4	1.32E+00	2.00E+02	6.63E-09	2.08E-07	1.73E+02
	Construction	A5	1.71E+00	4.43E+02	2.74E-08	6.28E-07	2.00E+02
95%- Recycling and 5% to landfill							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.46E-01	9.81E+01	3.18E-09	1.03E-07	8.63E+01
	Waste processing	C3	2.36E-01	3.06E+01	1.19E-09	2.22E-08	6.67E+00
	Disposal	C4	3.27E-02	4.64E+00	1.18E-10	3.05E-09	1.54E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.80E+00	-1.34E+02	-7.81E-09	-1.41E-07	-1.07E+02

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.

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LCA Results (continued)

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	5.21E+02	1.89E+01	5.40E+02	8.77E+03	6.29E+02	9.40E+03
	Transport	A2	2.48E+00	0.00E+00	2.48E+00	1.89E+02	0.00E+00	1.89E+02
	Manufacturing	A3	3.10E+02	3.40E+02	6.50E+02	8.39E+02	2.93E+01	8.68E+02
	Total (Consumption grid)	A1-3	8.33E+02	3.59E+02	1.19E+03	9.80E+03	6.58E+02	1.05E+04
Construction process stage	Transport	A4	3.58E+00	0.00E+00	3.58E+00	2.53E+02	0.00E+00	2.53E+02
	Construction	A5	3.32E+01	1.47E+01	4.80E+01	3.95E+02	2.63E+01	4.21E+02
95%- Recycling and 5% to landfill								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.77E+00	0.00E+00	1.77E+00	1.23E+02	0.00E+00	1.23E+02
	Waste processing	C3	2.93E-01	0.00E+00	2.93E-01	5.14E+01	0.00E+00	5.14E+01
	Disposal	C4	6.27E-02	0.00E+00	6.27E-02	7.22E+00	0.00E+00	7.22E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.09E+01	0.00E+00	-1.09E+01	-1.16E+02	0.00E+00	-1.16E+02

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

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LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	5.18E-02	0.00E+00	0.00E+00	4.87E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	1.98E-02
	Manufacturing	A3	1.31E+00	2.79E-04	0.00E+00	2.68E-01
	Total (Consumption grid)	A1-3	1.37E+00	2.79E-04	0.00E+00	5.16E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	2.84E-02
	Construction	A5	5.46E-02	1.12E-05	0.00E+00	4.60E-01
95%- Recycling and 5% to landfill						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.40E-02
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	2.99E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-3.58E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

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LCA Results (continued)

Other environmental information describing waste categories			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.45E+01	4.87E+02	9.85E-03
	Transport	A2	2.21E-01	3.50E+00	6.66E+00
	Manufacturing	A3	1.38E+00	2.15E+01	4.29E-03
	Total (Consumption grid)	A1-3	1.61E+01	5.12E+02	6.67E+00
Construction process stage	Transport	A4	2.85E-01	4.99E+00	1.74E-03
	Construction	A5	6.64E-01	2.10E+01	2.67E-01
95%- Recycling and 5% to landfill					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.39E-01	2.46E+00	8.50E-04
	Waste processing	C3	6.87E-02	4.83E-01	3.62E-04
	Disposal	C4	7.65E-03	1.08E-01	4.82E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.68E-01	-2.03E+01	-5.93E-04

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

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LCA Results (continued)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
	Total (Consumption grid)	A1-3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
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	5.83E-03	1.70E-04	9.39E-03	2.72E-03	-4.08E-01
95%- Recycling and 5% to landfill								
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	6.84E-05	1.09E-06	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

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LCA Results - Standard Spray

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	2.10E+02	2.07E+02	2.32E+00	4.86E-02	1.10E-05	5.90E-01	3.14E-02
	Transport	A2	1.02E+01	1.02E+01	5.39E-03	5.19E-03	2.24E-06	1.41E-01	5.52E-04
	Manufacturing	A3	3.85E+00	3.77E+01	-3.39E+01	5.25E-02	4.02E-06	1.29E-01	5.01E-03
	Total (Consumption grid)	A1-3	2.24E+02	2.55E+02	-3.16E+01	1.06E-01	1.73E-05	8.60E-01	3.70E-02
Construction process stage	Transport	A4	1.71E+01	1.71E+01	1.41E-02	6.87E-03	3.94E-06	8.28E-02	1.09E-03
	Construction	A5	9.42E+00	1.06E+01	-1.22E+00	4.69E-03	8.71E-07	3.76E-02	3.70E-03
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.32E+00	8.31E+00	7.08E-03	3.26E-03	1.92E-06	3.37E-02	5.35E-04
	Waste processing	C3	3.82E+00	3.82E+00	1.35E-03	3.81E-04	8.16E-07	3.97E-02	1.18E-04
	Disposal	C4	2.64E-01	2.63E-01	2.61E-04	2.49E-04	1.07E-07	2.48E-03	2.41E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8.00E+00	-7.88E+00	-1.02E-01	-1.11E-02	-6.36E-07	-5.07E-02	-4.29E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

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LCA Results (continued)

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	m³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	1.40E-01	1.45E+00	4.12E-01	5.40E-04	1.48E+03	5.95E+01	5.54E-06
	Transport	A2	3.61E-02	3.99E-01	1.08E-01	2.89E-05	1.46E+02	5.64E-01	6.88E-07
	Manufacturing	A3	4.80E-02	4.92E-01	1.44E-01	1.56E-04	7.55E+02	9.07E+00	2.54E-06
	Total (Consumption grid)	A1-3	2.24E-01	2.34E+00	6.63E-01	7.25E-04	2.38E+03	6.92E+01	8.78E-06
Construction process stage	Transport	A4	2.41E-02	2.64E-01	7.88E-02	5.84E-05	2.57E+02	1.14E+00	1.45E-06
	Construction	A5	9.91E-03	1.04E-01	2.96E-02	3.08E-05	1.07E+02	1.36E+01	4.06E-07
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.02E-02	1.11E-01	3.40E-02	2.89E-05	1.26E+02	5.65E-01	7.17E-07
	Waste processing	C3	1.76E-02	1.92E-01	5.29E-02	1.96E-06	5.24E+01	1.21E-01	8.13E-06
	Disposal	C4	8.61E-04	9.42E-03	2.74E-03	6.01E-07	7.35E+00	3.37E-01	4.99E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.17E-02	-1.41E-01	-3.63E-02	-7.45E-05	-1.16E+02	-1.52E+01	-6.41E-07

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

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

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LCA Results (continued)

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	9.79E+00	2.91E+03	1.00E-07	2.53E-06	3.11E+02
	Transport	A2	7.23E-01	1.07E+02	4.75E-09	1.01E-07	7.54E+01
	Manufacturing	A3	1.21E+01	5.05E+02	5.51E-08	3.30E-07	3.20E+03
	Total (Consumption grid)	A1-3	2.26E+01	3.52E+03	1.60E-07	2.96E-06	3.59E+03
Construction process stage	Transport	A4	1.32E+00	2.00E+02	6.63E-09	2.08E-07	1.73E+02
	Construction	A5	9.85E-01	2.59E+02	1.68E-08	4.72E-07	1.82E+02
95%- Recycling and 5% to landfill							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.46E-01	9.81E+01	3.18E-09	1.03E-07	8.63E+01
	Waste processing	C3	2.36E-01	3.06E+01	1.19E-09	2.22E-08	6.67E+00
	Disposal	C4	3.27E-02	4.64E+00	1.18E-10	3.05E-09	1.54E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.80E+00	-1.34E+02	-7.81E-09	-1.41E-07	-1.07E+02

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.

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LCA Results (continued)

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.28E+02	1.20E+01	1.40E+02	2.04E+03	1.85E+02	2.23E+03
	Transport	A2	1.74E+00	0.00E+00	1.74E+00	1.43E+02	0.00E+00	1.43E+02
	Manufacturing	A3	3.10E+02	3.40E+02	6.50E+02	8.39E+02	2.93E+01	8.68E+02
	Total (Consumption grid)	A1-3	4.40E+02	3.52E+02	7.92E+02	3.02E+03	2.14E+02	3.24E+03
Construction process stage	Transport	A4	3.58E+00	0.00E+00	3.58E+00	2.53E+02	0.00E+00	2.53E+02
	Construction	A5	1.75E+01	1.45E+01	3.20E+01	1.23E+02	8.58E+00	1.32E+02
95%- Recycling and 5% to landfill								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.77E+00	0.00E+00	1.77E+00	1.23E+02	0.00E+00	1.23E+02
	Waste processing	C3	2.93E-01	0.00E+00	2.93E-01	5.14E+01	0.00E+00	5.14E+01
	Disposal	C4	6.27E-02	0.00E+00	6.27E-02	7.22E+00	0.00E+00	7.22E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.09E+01	0.00E+00	-1.09E+01	-1.16E+02	0.00E+00	-1.16E+02

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

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LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m³
Product stage	Raw material supply	A1	2.03E-02	0.00E+00	0.00E+00	1.42E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	1.40E-02
	Manufacturing	A3	1.31E+00	2.79E-04	0.00E+00	2.68E-01
	Total (Consumption grid)	A1-3	1.33E+00	2.79E-04	0.00E+00	1.70E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	2.84E-02
	Construction	A5	5.33E-02	1.12E-05	0.00E+00	3.22E-01
95%- Recycling and 5% to landfill						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.40E-02
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	2.99E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-3.58E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

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LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	4.77E+00	1.40E+02	4.51E-03
	Transport	A2	1.72E-01	2.49E+00	6.66E+00
	Manufacturing	A3	1.38E+00	2.15E+01	4.29E-03
	Total (Consumption grid)	A1-3	6.32E+00	1.64E+02	6.67E+00
Construction process stage	Transport	A4	2.85E-01	4.99E+00	1.74E-03
	Construction	A5	2.73E-01	7.04E+00	2.67E-01
95%- Recycling and 5% to landfill					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.39E-01	2.46E+00	8.50E-04
	Waste processing	C3	6.87E-02	4.83E-01	3.62E-04
	Disposal	C4	7.65E-03	1.08E-01	4.82E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.68E-01	-2.03E+01	-5.93E-04

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

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LCA Results (continued)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
	Total (Consumption grid)	A1-3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
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	5.84E-03	1.73E-04	9.39E-03	2.50E-03	-4.08E-01
95%- Recycling and 5% to landfill								
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	6.84E-05	1.09E-06	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

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LCA Results - Silicone Roughcast

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	2.05E+02	2.02E+02	3.10E+00	4.28E-02	1.97E-05	5.69E-01	2.74E-02
	Transport	A2	8.94E+00	8.93E+00	5.29E-03	4.36E-03	1.98E-06	1.07E-01	5.02E-04
	Manufacturing	A3	3.85E+00	3.77E+01	-3.39E+01	5.24E-02	4.02E-06	1.29E-01	5.01E-03
	Total (Consumption grid)	A1-3	2.18E+02	2.48E+02	-3.08E+01	9.96E-02	2.57E-05	8.06E-01	3.29E-02
Construction process stage	Transport	A4	1.71E+01	1.71E+01	1.41E-02	6.87E-03	3.94E-06	8.28E-02	1.09E-03
	Construction	A5	9.18E+00	1.04E+01	-1.19E+00	4.43E-03	1.21E-06	3.54E-02	3.53E-03
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.32E+00	8.31E+00	7.08E-03	3.26E-03	1.92E-06	3.37E-02	5.35E-04
	Waste processing	C3	3.82E+00	3.82E+00	1.35E-03	3.81E-04	8.16E-07	3.97E-02	1.18E-04
	Disposal	C4	2.64E-01	2.63E-01	2.61E-04	2.49E-04	1.07E-07	2.48E-03	2.41E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8.00E+00	-7.88E+00	-1.02E-01	-1.11E-02	-6.36E-07	-5.07E-02	-4.29E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

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LCA Results (continued)

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	m³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	1.37E-01	1.42E+00	4.04E-01	4.96E-04	1.44E+03	6.36E+01	5.52E-06
	Transport	A2	2.78E-02	3.08E-01	8.38E-02	2.66E-05	1.29E+02	5.16E-01	6.35E-07
	Manufacturing	A3	4.80E-02	4.92E-01	1.44E-01	1.56E-04	7.55E+02	9.07E+00	2.54E-06
	Total (Consumption grid)	A1-3	2.13E-01	2.22E+00	6.32E-01	6.79E-04	2.32E+03	7.32E+01	8.70E-06
Construction process stage	Transport	A4	2.41E-02	2.64E-01	7.88E-02	5.84E-05	2.57E+02	1.14E+00	1.45E-06
	Construction	A5	9.47E-03	9.89E-02	2.83E-02	2.90E-05	1.05E+02	1.38E+01	4.03E-07
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.02E-02	1.11E-01	3.40E-02	2.89E-05	1.26E+02	5.65E-01	7.17E-07
	Waste processing	C3	1.76E-02	1.92E-01	5.29E-02	1.96E-06	5.24E+01	1.21E-01	8.13E-06
	Disposal	C4	8.61E-04	9.42E-03	2.74E-03	6.01E-07	7.35E+00	3.37E-01	4.99E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.17E-02	-1.41E-01	-3.63E-02	-7.45E-05	-1.16E+02	-1.52E+01	-6.41E-07

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

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

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LCA Results (continued)

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	8.81E+00	2.84E+03	1.00E-07	2.38E-06	2.22E+02
	Transport	A2	6.46E-01	9.57E+01	4.05E-09	9.28E-08	7.10E+01
	Manufacturing	A3	1.21E+01	5.05E+02	5.51E-08	3.30E-07	3.20E+03
	Total (Consumption grid)	A1-3	2.16E+01	3.45E+03	1.59E-07	2.80E-06	3.49E+03
Construction process stage	Transport	A4	1.32E+00	2.00E+02	6.63E-09	2.08E-07	1.73E+02
	Construction	A5	9.42E-01	2.56E+02	1.68E-08	4.66E-07	1.79E+02
95%- Recycling and 5% to landfill							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.46E-01	9.81E+01	3.18E-09	1.03E-07	8.63E+01
	Waste processing	C3	2.36E-01	3.06E+01	1.19E-09	2.22E-08	6.67E+00
	Disposal	C4	3.27E-02	4.64E+00	1.18E-10	3.05E-09	1.54E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.80E+00	-1.34E+02	-7.81E-09	-1.41E-07	-1.07E+02

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.

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LCA Results (continued)

Parameters describing resource use, primary energy			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.10E+02	0.00E+00	1.10E+02	1.73E+03	1.80E+02	1.91E+03
	Transport	A2	1.60E+00	0.00E+00	1.60E+00	1.27E+02	0.00E+00	1.27E+02
	Manufacturing	A3	3.10E+02	3.40E+02	6.50E+02	8.39E+02	2.93E+01	8.68E+02
	Total (Consumption grid)	A1-3	4.21E+02	3.40E+02	7.62E+02	2.70E+03	2.09E+02	2.91E+03
Construction process stage	Transport	A4	3.58E+00	0.00E+00	3.58E+00	2.53E+02	0.00E+00	2.53E+02
	Construction	A5	1.68E+01	1.40E+01	3.08E+01	1.10E+02	8.37E+00	1.19E+02
95%- Recycling and 5% to landfill								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.77E+00	0.00E+00	1.77E+00	1.23E+02	0.00E+00	1.23E+02
	Waste processing	C3	2.93E-01	0.00E+00	2.93E-01	5.14E+01	0.00E+00	5.14E+01
	Disposal	C4	6.27E-02	0.00E+00	6.27E-02	7.22E+00	0.00E+00	7.22E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.09E+01	0.00E+00	-1.09E+01	-1.16E+02	0.00E+00	-1.16E+02

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

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LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m³
Product stage	Raw material supply	A1	1.94E-02	0.00E+00	0.00E+00	1.51E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	1.28E-02
	Manufacturing	A3	1.31E+00	2.79E-04	0.00E+00	2.68E-01
	Total (Consumption grid)	A1-3	1.33E+00	2.79E-04	0.00E+00	1.79E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	2.84E-02
	Construction	A5	5.33E-02	1.12E-05	0.00E+00	3.25E-01
95%- Recycling and 5% to landfill						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.40E-02
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	2.99E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-3.58E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

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LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	4.60E+00	1.21E+02	4.19E-03
	Transport	A2	1.51E-01	2.28E+00	6.66E+00
	Manufacturing	A3	1.38E+00	2.15E+01	4.29E-03
	Total (Consumption grid)	A1-3	6.13E+00	1.45E+02	6.67E+00
Construction process stage	Transport	A4	2.85E-01	4.99E+00	1.74E-03
	Construction	A5	2.65E-01	6.29E+00	2.67E-01
95%- Recycling and 5% to landfill					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.39E-01	2.46E+00	8.50E-04
	Waste processing	C3	6.87E-02	4.83E-01	3.62E-04
	Disposal	C4	7.65E-03	1.08E-01	4.82E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.68E-01	-2.03E+01	-5.93E-04

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

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LCA Results (continued)

			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
Other environmental information describing output flows – at end of life								
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
	Total (Consumption grid)	A1-3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
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	5.84E-03	1.73E-04	9.39E-03	2.50E-03	-4.08E-01
95%- Recycling and 5% to landfill								
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	6.84E-05	1.09E-06	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

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LCA Results - Silicone Fine Roughcast

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	2.05E+02	2.02E+02	3.10E+00	4.28E-02	1.97E-05	5.69E-01	2.74E-02
	Transport	A2	8.94E+00	8.93E+00	5.28E-03	4.36E-03	1.98E-06	1.07E-01	5.02E-04
	Manufacturing	A3	3.85E+00	3.77E+01	-3.39E+01	5.25E-02	4.02E-06	1.29E-01	5.01E-03
	Total (Consumption grid)	A1-3	2.18E+02	2.48E+02	-3.08E+01	9.96E-02	2.57E-05	8.06E-01	3.29E-02
Construction process stage	Transport	A4	1.71E+01	1.71E+01	1.41E-02	6.87E-03	3.94E-06	8.28E-02	1.09E-03
	Construction	A5	9.18E+00	1.04E+01	-1.19E+00	4.43E-03	1.21E-06	3.54E-02	3.53E-03
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.32E+00	8.31E+00	7.08E-03	3.26E-03	1.92E-06	3.37E-02	5.35E-04
	Waste processing	C3	3.82E+00	3.82E+00	1.35E-03	3.81E-04	8.16E-07	3.97E-02	1.18E-04
	Disposal	C4	2.64E-01	2.63E-01	2.61E-04	2.49E-04	1.07E-07	2.48E-03	2.41E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8.00E+00	-7.88E+00	-1.02E-01	-1.11E-02	-6.36E-07	-5.07E-02	-4.29E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

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LCA Results (continued)

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	m³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	1.37E-01	1.42E+00	4.04E-01	4.96E-04	1.44E+03	6.36E+01	5.52E-06
	Transport	A2	2.78E-02	3.08E-01	8.38E-02	2.66E-05	1.29E+02	5.16E-01	6.35E-07
	Manufacturing	A3	4.80E-02	4.92E-01	1.44E-01	1.56E-04	7.55E+02	9.07E+00	2.54E-06
	Total (Consumption grid)	A1-3	2.13E-01	2.22E+00	6.32E-01	6.79E-04	2.32E+03	7.32E+01	8.70E-06
Construction process stage	Transport	A4	2.41E-02	2.64E-01	7.88E-02	5.84E-05	2.57E+02	1.14E+00	1.45E-06
	Construction	A5	9.47E-03	9.89E-02	2.83E-02	2.90E-05	1.05E+02	1.38E+01	4.03E-07
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.02E-02	1.11E-01	3.40E-02	2.89E-05	1.26E+02	5.65E-01	7.17E-07
	Waste processing	C3	1.76E-02	1.92E-01	5.29E-02	1.96E-06	5.24E+01	1.21E-01	8.13E-06
	Disposal	C4	8.61E-04	9.42E-03	2.74E-03	6.01E-07	7.35E+00	3.37E-01	4.99E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.17E-02	-1.41E-01	-3.63E-02	-7.45E-05	-1.16E+02	-1.52E+01	-6.41E-07

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

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

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LCA Results (continued)

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	8.81E+00	2.84E+03	1.00E-07	2.38E-06	2.22E+02
	Transport	A2	6.45E-01	9.57E+01	4.05E-09	9.27E-08	7.09E+01
	Manufacturing	A3	1.21E+01	5.05E+02	5.51E-08	3.30E-07	3.20E+03
	Total (Consumption grid)	A1-3	2.16E+01	3.45E+03	1.59E-07	2.80E-06	3.49E+03
Construction process stage	Transport	A4	1.32E+00	2.00E+02	6.63E-09	2.08E-07	1.73E+02
	Construction	A5	9.42E-01	2.56E+02	1.68E-08	4.66E-07	1.79E+02
95%- Recycling and 5% to landfill							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.46E-01	9.81E+01	3.18E-09	1.03E-07	8.63E+01
	Waste processing	C3	2.36E-01	3.06E+01	1.19E-09	2.22E-08	6.67E+00
	Disposal	C4	3.27E-02	4.64E+00	1.18E-10	3.05E-09	1.54E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.80E+00	-1.34E+02	-7.81E-09	-1.41E-07	-1.07E+02

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.

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LCA Results (continued)

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.10E+02	0.00E+00	1.10E+02	1.73E+03	1.80E+02	1.91E+03
	Transport	A2	1.60E+00	0.00E+00	1.60E+00	1.27E+02	0.00E+00	1.27E+02
	Manufacturing	A3	3.10E+02	3.40E+02	6.50E+02	8.39E+02	2.93E+01	8.68E+02
	Total (Consumption grid)	A1-3	4.21E+02	3.40E+02	7.62E+02	2.70E+03	2.09E+02	2.91E+03
Construction process stage	Transport	A4	3.58E+00	0.00E+00	3.58E+00	2.53E+02	0.00E+00	2.53E+02
	Construction	A5	1.68E+01	1.40E+01	3.08E+01	1.10E+02	8.37E+00	1.19E+02
95%- Recycling and 5% to landfill								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.77E+00	0.00E+00	1.77E+00	1.23E+02	0.00E+00	1.23E+02
	Waste processing	C3	2.93E-01	0.00E+00	2.93E-01	5.14E+01	0.00E+00	5.14E+01
	Disposal	C4	6.27E-02	0.00E+00	6.27E-02	7.22E+00	0.00E+00	7.22E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.09E+01	0.00E+00	-1.09E+01	-1.16E+02	0.00E+00	-1.16E+02

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

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LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m³
Product stage	Raw material supply	A1	1.94E-02	0.00E+00	0.00E+00	1.51E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	1.28E-02
	Manufacturing	A3	1.31E+00	2.79E-04	0.00E+00	2.68E-01
	Total (Consumption grid)	A1-3	1.33E+00	2.79E-04	0.00E+00	1.79E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	2.84E-02
	Construction	A5	5.33E-02	1.12E-05	0.00E+00	3.25E-01
95%- Recycling and 5% to landfill						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.40E-02
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	2.99E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-3.58E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

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LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	4.60E+00	1.21E+02	4.19E-03
	Transport	A2	1.51E-01	2.28E+00	6.66E+00
	Manufacturing	A3	1.38E+00	2.15E+01	4.29E-03
	Total (Consumption grid)	A1-3	6.13E+00	1.45E+02	6.67E+00
Construction process stage	Transport	A4	2.85E-01	4.99E+00	1.74E-03
	Construction	A5	2.65E-01	6.29E+00	2.67E-01
95%- Recycling and 5% to landfill					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.38E-01	2.46E+00	8.50E-04
	Waste processing	C3	6.87E-02	4.83E-01	3.62E-04
	Disposal	C4	7.65E-03	1.08E-01	4.82E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.68E-01	-2.03E+01	-5.93E-04

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

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LCA Results (continued)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
	Total (Consumption grid)	A1-3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
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	5.84E-03	1.73E-04	9.39E-03	2.50E-03	-4.08E-01
95%- Recycling and 5% to landfill								
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	6.84E-05	1.09E-06	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

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LCA Results - Silicone Spray Dash Receiver

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	2.21E+02	2.18E+02	2.75E+00	5.68E-02	2.19E-05	6.74E-01	3.50E-02
	Transport	A2	9.54E+00	9.53E+00	5.71E-03	4.63E-03	2.12E-06	1.12E-01	5.38E-04
	Manufacturing	A3	3.85E+00	3.77E+01	-3.39E+01	5.25E-02	4.02E-06	1.29E-01	5.01E-03
	Total (Consumption grid)	A1-3	2.34E+02	2.65E+02	-3.12E+01	1.14E-01	2.80E-05	9.15E-01	4.06E-02
Construction process stage	Transport	A4	1.71E+01	1.71E+01	1.41E-02	6.87E-03	3.94E-06	8.28E-02	1.09E-03
	Construction	A5	2.16E+01	5.53E-01	2.10E+01	4.96E-04	9.90E-08	1.31E-02	3.07E-04
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.32E+00	8.31E+00	7.08E-03	3.26E-03	1.92E-06	3.37E-02	5.35E-04
	Waste processing	C3	3.82E+00	3.82E+00	1.35E-03	3.81E-04	8.16E-07	3.97E-02	1.18E-04
	Disposal	C4	2.64E-01	2.63E-01	2.61E-04	2.49E-04	1.07E-07	2.48E-03	2.41E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8.00E+00	-7.88E+00	-1.02E-01	-1.11E-02	-6.36E-07	-5.07E-02	-4.29E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

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LCA Results (continued)

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	m³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	1.51E-01	1.58E+00	4.49E-01	8.01E-04	1.66E+03	7.63E+01	6.27E-06
	Transport	A2	2.91E-02	3.22E-01	8.78E-02	2.85E-05	1.38E+02	5.53E-01	6.82E-07
	Manufacturing	A3	4.80E-02	4.92E-01	1.44E-01	1.56E-04	7.55E+02	9.07E+00	2.54E-06
	Total (Consumption grid)	A1-3	2.28E-01	2.40E+00	6.81E-01	9.86E-04	2.55E+03	8.59E+01	9.50E-06
Construction process stage	Transport	A4	2.41E-02	2.64E-01	7.88E-02	5.84E-05	2.57E+02	1.14E+00	1.45E-06
	Construction	A5	5.94E-03	6.67E-02	1.78E-02	2.51E-06	8.04E+00	1.13E+01	1.19E-07
95%- Recycling and 5% to landfill									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.02E-02	1.11E-01	3.40E-02	2.89E-05	1.26E+02	5.65E-01	7.17E-07
	Waste processing	C3	1.76E-02	1.92E-01	5.29E-02	1.96E-06	5.24E+01	1.21E-01	8.13E-06
	Disposal	C4	8.61E-04	9.42E-03	2.74E-03	6.01E-07	7.35E+00	3.37E-01	4.99E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.17E-02	-1.41E-01	-3.63E-02	-7.45E-05	-1.16E+02	-1.52E+01	-6.41E-07

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

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

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LCA Results (continued)

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	1.05E+01	3.25E+03	1.22E-07	2.81E-06	3.33E+02
	Transport	A2	6.90E-01	1.02E+02	4.29E-09	9.95E-08	7.64E+01
	Manufacturing	A3	1.21E+01	5.05E+02	5.51E-08	3.30E-07	3.20E+03
	Total (Consumption grid)	A1-3	2.33E+01	3.85E+03	1.81E-07	3.24E-06	3.61E+03
Construction process stage	Transport	A4	1.32E+00	2.00E+02	6.63E-09	2.08E-07	1.73E+02
	Construction	A5	5.47E-02	1.67E+01	1.22E-08	3.01E-08	5.67E+00
95%- Recycling and 5% to landfill							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.46E-01	9.81E+01	3.18E-09	1.03E-07	8.63E+01
	Waste processing	C3	2.36E-01	3.06E+01	1.19E-09	2.22E-08	6.67E+00
	Disposal	C4	3.27E-02	4.64E+00	1.18E-10	3.05E-09	1.54E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.80E+00	-1.34E+02	-7.81E-09	-1.41E-07	-1.07E+02

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.

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LCA Results (continued)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.41E+02	7.39E+00	1.48E+02	2.21E+03	1.96E+02	2.41E+03
	Transport	A2	1.72E+00	0.00E+00	1.72E+00	1.35E+02	0.00E+00	1.35E+02
	Manufacturing	A3	3.10E+02	3.40E+02	6.50E+02	8.39E+02	2.93E+01	8.68E+02
	Total (Consumption grid)	A1-3	4.52E+02	3.48E+02	8.00E+02	3.19E+03	2.25E+02	3.41E+03
Construction process stage	Transport	A4	3.58E+00	0.00E+00	3.58E+00	2.53E+02	0.00E+00	2.53E+02
	Construction	A5	-9.41E-02	3.79E-01	2.85E-01	2.57E+00	5.32E-03	2.57E+00
95%- Recycling and 5% to landfill								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.77E+00	0.00E+00	1.77E+00	1.23E+02	0.00E+00	1.23E+02
	Waste processing	C3	2.93E-01	0.00E+00	2.93E-01	5.14E+01	0.00E+00	5.14E+01
	Disposal	C4	6.27E-02	0.00E+00	6.27E-02	7.22E+00	0.00E+00	7.22E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.09E+01	0.00E+00	-1.09E+01	-1.16E+02	0.00E+00	-1.16E+02

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

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LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m³
Product stage	Raw material supply	A1	1.96E-02	0.00E+00	0.00E+00	1.81E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	1.37E-02
	Manufacturing	A3	1.31E+00	2.79E-04	0.00E+00	2.68E-01
	Total (Consumption grid)	A1-3	1.33E+00	2.79E-04	0.00E+00	2.09E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	2.84E-02
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	2.63E-01
95%- Recycling and 5% to landfill						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.40E-02
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	2.99E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	7.88E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-3.58E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

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LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	6.05E+00	1.62E+02	4.80E-03
	Transport	A2	1.61E-01	2.44E+00	6.66E+00
	Manufacturing	A3	1.38E+00	2.15E+01	4.29E-03
	Total (Consumption grid)	A1-3	7.59E+00	1.86E+02	6.67E+00
Construction process stage	Transport	A4	2.85E-01	4.99E+00	1.74E-03
	Construction	A5	1.99E-02	4.95E-01	9.85E-06
95%- Recycling and 5% to landfill					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.38E-01	2.46E+00	8.50E-04
	Waste processing	C3	6.87E-02	4.83E-01	3.62E-04
	Disposal	C4	7.65E-03	1.08E-01	4.82E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.68E-01	-2.03E+01	-5.93E-04

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

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LCA Results (continued)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
	Total (Consumption grid)	A1-3	0.00E+00	1.22E-01	2.62E-06	2.35E-01	6.26E-02	-1.02E+01
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	9.60E-04	1.73E-04	0.00E+00	0.00E+00	2.21E-04
95%- Recycling and 5% to landfill								
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	6.84E-05	1.09E-06	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

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Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	**Parameter**	**Units**	**Results**
A4 – Transport to the building site	Transportation of the product to the site has been modelled as an average scenario consisting of: 100 km by road (Lorry 16-32 tonne) 50 km by water (ship/barge) These distances represent the assumed average transport routes and are used to calculate the environmental impacts associated with the delivery of the product in Module A4. Capacity utilisation (incl. empty returns) - 26% Bulk density of transported products - 1000 (kg/m3)		
	Vehicle type	Lorry, 16-32 tonne	Diesel
	Distance:	km	100
	Vehicle type	Ship/barge	-
	Distance:	km	50
	Capacity utilisation (incl. empty returns)	%	26
	Bulk density of transported products	kg/m³	1000
A5 – Installation in the building	Render is optimised for application through electric or diesel plastering machines. Guidance on optimal water flow settings and machine setup is available from Kilwaughter Minerals Ltd. For hand application, the product requires approximately 5.3 – 5.5 litres of clean water per 25 kg. Spray machines are different in that they measure water flow in terms of L/Hr. This varies depending on the rotor and stator used, the machine used and the speed setting on the machine. It should all average out to be similar to the 5.5 L/25 kg bag though as you are bringing it to a similar work ability. In this analysis, 5.5 L/25 kg has been used for the LCA analysis. The DU is 1 tonne, therefore the amount of water used for 1 tonne of render is 240 litres. Installation rate of 4% has been taken from BRE PCR EN15804 3.1		
	Installation wastage rate	%	4
	Water usage for mixing (worst case scenario)	litres	240
Packaging waste	Wood waste to recycling	kg	0.0266
	Plastic waste to incineration	kg	0.00017
	Paper/cardboard waste to recycling	kg	0.00049

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Scenarios and additional technical information

Scenario	Parameter	Units	Results
C1 - Deconstruction	At the end of its life, cement-based render can be removed mechanically using tools such as chisels and SDS drills. The waste cement render can then be crushed, recycled, and repurposed as aggregate for new concrete, road base, or construction fill. When processed correctly, it may also be reused as a raw material in new construction applications, thereby reducing landfill waste and supporting sustainable building practices. For this analysis, a 100% recovery rate from the demolition site is assumed, with materials sent to a waste processing facility. In line with BRE PCR EN15804 3.1 guidelines the Render, cement: sand (1:4) end of life scenario is used, it is projected that 95% of waste cement-based render will be recycled, while the remaining 5% will be directed to landfill. Note: The end-of-life scenario used in the analysis is generic and applies to all products included in the study		
C2 – Transportation	50km by road has been modelled for module C2 as a typical distance from the demolition site to the disposal unit. However, end-users of the EPD can use this information to calculate the impacts of a bespoke transport distance for module C2 if required.		
	Transportation of waste to the waste processing plant by Road	Lorry 16-32 tonne	Diesel
	Distance	km	50
C3 – Waste processing	At a recycling plant, waste cement render is first sorted and screened to remove contaminants. Large pieces are crushed into smaller aggregates, which are then further processed to ensure a consistent size and quality. Any metals or other impurities are separated out, often using magnets or additional screening. The processed material is then washed to remove dust and fine particles, after which it may be tested for quality before being repurposed as aggregate for new concrete, road base, or other construction materials. The separation processes have not been included in Module C3 because they are assumed to be very small and effectively negligible. In line with BRE PCR EN15804 3.1 guidelines the Render, cement: sand (1:4) end of life scenario is used, it is projected that 95% of waste cement-based render will be recycled, while the remaining 5% will be directed to landfill.		
C3 – Waste processing	Concrete waste to recycling	kg	950
C4 – Disposal	5% is assumed as unrecoverable during the recycling process and it will end up in landfill.		
	Concrete waste to landfill	kg	50
Module D	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. Since the renders cannot be separated from the final construction waste therefore it will be treated as a concrete waste, at the waste processing facility the 95% of the concrete waste will be recycled therefore recycling the concrete will replace the virgin aggregates in the new system. It is assumed, 100% yield during the recycling process. Benefits due to recycling of concrete = 950 kg		

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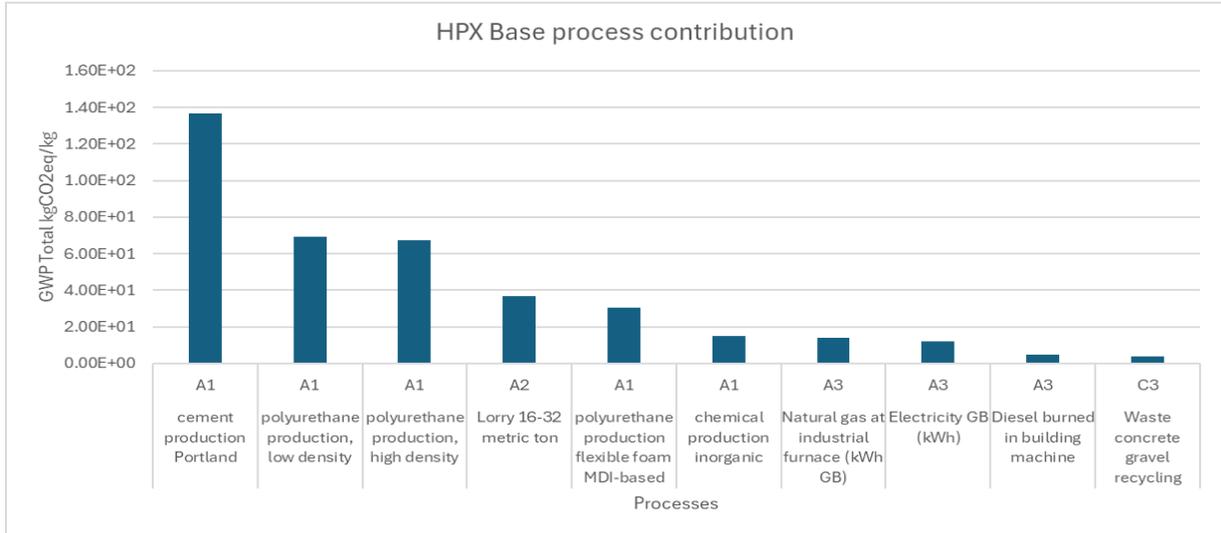
Summary

Interpretation of results

HPX base render has been chosen randomly for the interpretation analysis shown below:

The bulk of the environmental impacts and primary energy demand are attributed to the upstream manufacturing process of the render products, covered by information modules A1-A3 of EN15804:2012+A2:2019. The figure below breaks down the GWP of HPX - Base render (taken as a representative product from the group) 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). Stage A1 (raw material) accounts for nearly all emissions, with a minor contribution from A2 (transportation). Stage A3 (manufacturing) shows a significant negative value, indicating a reduction in CO_2 equivalent emissions from biogenic sources due to the use of wooden pallets for packaging. The carbon stored in the pallets is expected to be released at installation (A5). In A4 transportation), there are some impacts during the transportation of the final product to the construction installation site.
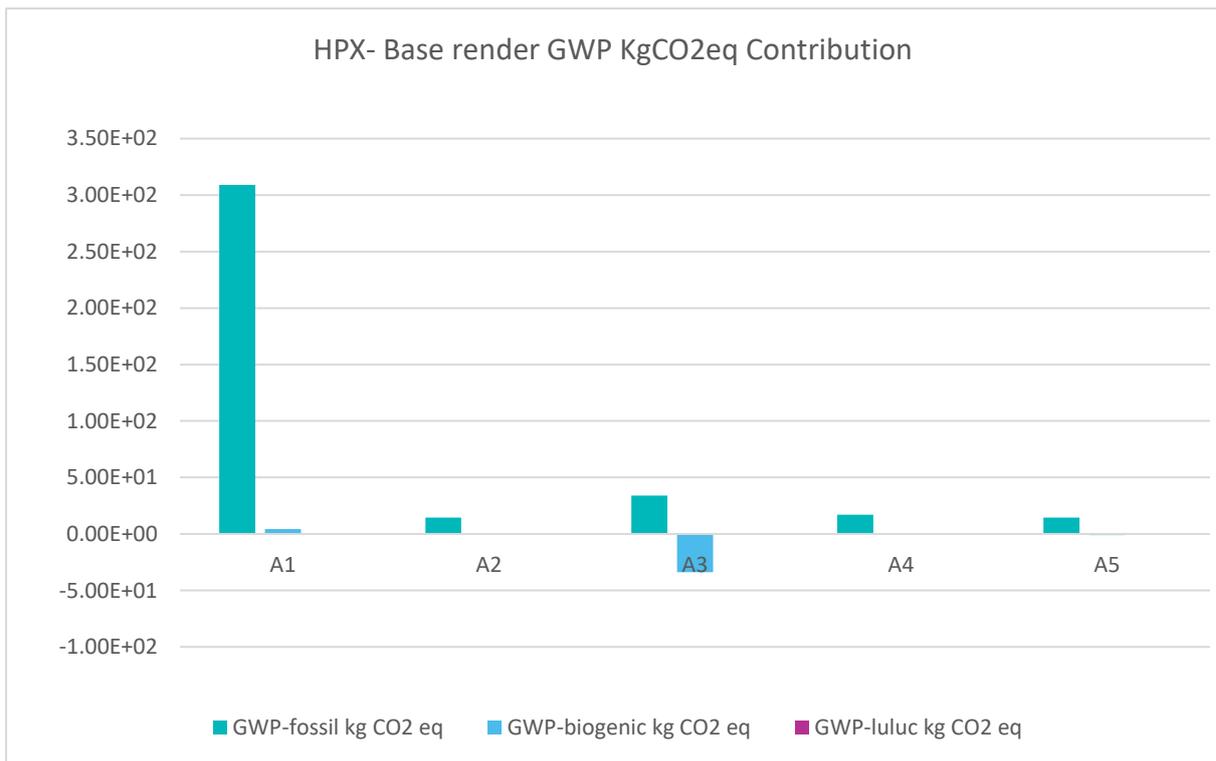
The chart titled "HPX Base process contribution" shows the total Global Warming Potential (GWP) in kg CO_2 equivalent per kg for various processes across different life cycle stages (A1–A3, C3). Cement production (A1) is the highest emitter by far, at approximately 135 kg CO_2e/kg, followed by polyurethane production (both low and high density, A1) with emissions around 65–70 kg CO_2e/kg. These are the most carbon-intensive processes in the HPX base. Transportation (A2) and flexible foam production (A1) are mid-range contributors, while chemical production (A1), natural gas and electricity use (A3), and diesel combustion (A3) show lower

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emissions. Waste concrete recycling (C3) has the lowest GWP impact. This indicates that early-stage material production, particularly cement and polyurethane, dominates the carbon footprint of the HPX base.

HPX Base process contribution

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EN 1015-11 Methods of test for mortar for masonry - Part 11: Determination of flexural and compressive strength of hardened mortar

EN 1015-12 - Methods of test for mortar for masonry - Part 12: Determination of adhesive strength of hardened rendering and plastering mortars on substrates

EN 1015-21 Methods of test for mortar for masonry - Part 21: Determination of the compatibility of one-coat rendering mortars with substrates

EN 1015-18 Methods of test for mortar for masonry - Part 18: Determination of water absorption coefficient due to capillary action of hardened mortar

EN 1015-19 Methods of test for mortar for masonry - Part 19: Determination of water vapour permeability of hardened rendering and plastering mortars

EN 1745 Masonry and masonry products - Methods for determining thermal properties

BS EN 13501-1 Fire classification of construction products and building elements - Classification using data from reaction to fire tests

EN 1015-18 Methods of test for mortar for masonry - Part 18: Determination of water absorption coefficient due to capillary action of hardened mortar

EN 998-1 Specification for mortar for masonry - Part 1: Rendering and plastering mortar

EN 1015-21 Methods of test for mortar for masonry - Part 21: Determination of the compatibility of one-coat rendering mortars with substrates

BS-5262 - Code of practice for external renderings

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