



Clayworks

ENVIRONMENTAL PRODUCT DECLARATIONS

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Environmental Product Declaration



In accordance with ISO 14025 and EN 15804:2012+A1:2013 for:

Clay Plasters (Rustic, Demi Rustic, Smooth, Tonal)

From

Clayworks

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-02278
Publication date:	2020-11-09
Valid until:	2025-11-08



General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2012:01. Construction Products. Version 2.33 (date 2020-09-18, valid until 2021-12-31). Sub-PCR-A Mortars Applied to a Surface. UN CPC Code 154000 (clays) (date 2020-09-18, valid until 2021-12-31)
PCR review was conducted by: Martin Erlandsson, IVL Swedish Environmental Research Institute
Independent third-party verification of the declaration and data, according to ISO 14025:2006: <input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification
Third party verifier: Dr. Hudai Kara, Metsims Sustainability Consulting [www.metsims.com]
Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

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

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Clayworks Ltd

Contact: Clare Whitney

Description of the organisation: Clayworks was born from a love and belief in natural, sustainable building practices. It stemmed, in 2010, from a decade of restoring old buildings, building new ones and travelling the world to learn about the traditions of clay as a building material. The vision behind, and motivation for our founders' research was to explore the use of natural materials in architecture and earth as a medium to foster the balance in a building that is healthy for the environment and the user and beautiful in its design, structure, technique and use of materials. Clayworks is based on one site on the Lizard Peninsula, Cornwall where all research, development and manufacturing takes place. The company works with architects, designers and individuals around the world to create interior wall finishes and there is an intense focus on developing new colours and textures using only natural materials. The company is also committed to continuous innovation, with experimentation on the formulations ongoing to improve performance, sustainable and health benefits.

Pushing hard at the conventional boundaries of techniques with clay, building on old knowledge in earth architecture, while making use of modern science and testing facilities, our focus became concentrated on creating and delivering natural plasters of the finest quality that speak honestly about the beauty and functionality of raw materials. This culture of learning, discovery and experimentation continues after we launched our own range of natural clay plasters in 2010 and our vision is to play a significant role in the re-imagination of clay as the interior wall finish of the future.

Product-related or management system-related certifications: The product has been tested by BRE Global for fire propagation according to BS 476-6 and for surface spread of flame according to BS 476-7. When tested in accordance with BS 476-6 the products achieved: Fire propagation index (I) = 0.0, with sub-indices $i_1 = 0.0$, $i_2 = 0.0$, $i_3 = 0.0$. The products are classified as Class 1 (BS 476-7). Reports date 15/10/2019.

Name and location of production site(s): Clayworks Limited, Unit 5, Higher Bochym Rural Workshops Cury Cross Lanes, Helston, Cornwall, TR12 7AZ UK

Product information

Product name: Clayworks Clay Plasters

Product identification: Smooth, Tonal, Demi Rustic, Rustic. Classic and Custom finishes, pigmented and non-pigmented.

Product description: Clayworks Clay plasters are unique blends and formulations of unfired clays mixed with minerals and natural pigments to provide a healthy, breathable finish for internal walls and ceilings.

Naturally pigmented, they provide an alternative to the more conventional wall finish of gypsum plaster and paint. They are supplied in a dried form, ready to mix with water and apply with conventional plastering tools and skills.

Manufactured in Cornwall from abundant raw materials, they are amongst the most sustainable wall finishes available. They are recyclable, compostable, re-useable, and contain no toxic ingredients. Or VOCs (harmful chemicals released during and after application).

As well as being 100% natural, Clayworks clay plasters are also high performance. They regulate indoor relative humidity, allow buildings to breathe, and absorb toxins, odours and acoustics, they can also passively regulate temperature and are easily repaired. They are applied with the same skills and tools as other wall plasters.

Manufacturing

Clayworks Clay Plasters are simply blends of raw, readily abundant materials. In a world where building products undergo a long chain of transformation – embedding carbon, toxins and releasing pollutants and waste at every stage – clay plasters remain in a raw state throughout their entire life cycle. There is no water, heat, additives, synthetics or processes used during the blending, only a little energy for mixing. Hence there is zero waste in the process and no pollutants released into the air. Clay plasters contain or release no contaminants including VOCs and formaldehydes. They do not off-gas. There is no waste on construction site: left over material can be kept for repairs or disposed of into the ground contributing to a Zero Construction waste economy. Naturally through-pigmented, clay plasters will never require painting, thereby avoiding the environmental impact associated with paints.



Packaging

Our plasters are sold in brown paper, sewn, sacks which are recyclable or compostable.

Transportation

Blended in Cornwall, Clayworks Clay Plasters are transported by road and then by ship if going overseas.

Product Use and Maintenance

Clayworks Clay Plasters do not require painting, varnishing or sealing during their lifespan. Once applied they simply require occasional wiping with a non-toxic cleaner. Any damage can simply be replastered.

End of Life & Waste Management

If applied onto sustainable, natural backing boards the surfaces can be composted at end of life, a concept known as Cradle to Grave.

UN CPC code: 154000 (clay)

LCA information

Functional unit / declared unit: 1 kg of packaged clay plaster product

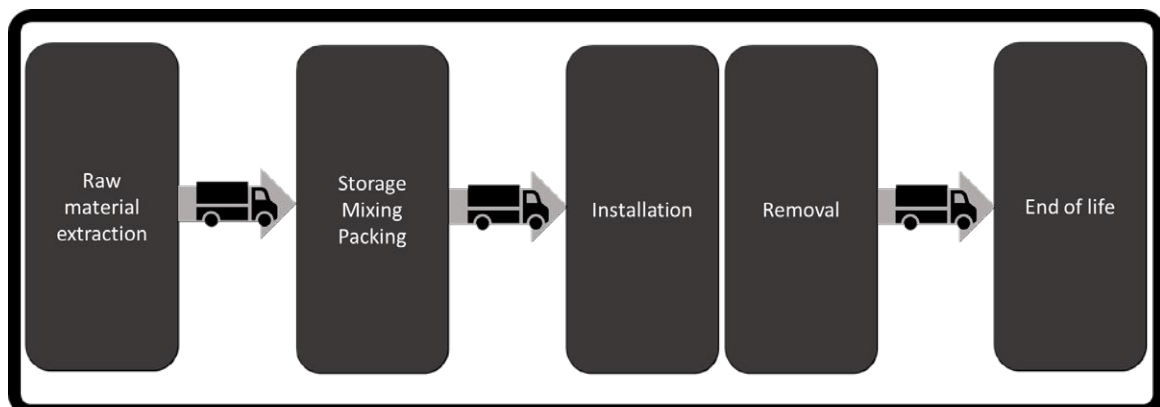
Reference service life: Mortars exposed to minor environmental load are expected to last for the lifetime of the building construction, that for common European buildings is estimated to be 60 years (Referring to ISO 15686-1, based on considered commercial lifetime of domestic, retail, office or industry buildings, indoor use and experiences in Sweden, Norway and France).

Time representativeness: 2019.

Database(s) and LCA software used: Ecoinvent 3.7 was used for the background data with Simapro 9.1.0.7.

Description of system boundaries: Construction product EPD: Cradle to grave with additional modules A1-A5, B1-B7, C1-C4 and module D. The EPD can be used as an information module in any life cycle stage B or C for a construction works. Some modules have nil entries because there is no impact.

System diagram:



More information:

<https://clay-works.com/product-descriptions/>

This EPD is based upon an underlying LCA of the Clayworks manufacturing facility, with operational data obtained for 2019. The underlying LCA was conducted by Dr Andrew Norton, Renuables Ltd (<http://renuables.co.uk/>).

Cut-off criteria were based upon input flows being less than 1% of the total individually, subject to the sum of all flows being less than 5% of the total, and subject to verification that the impacts associated with such flows were not of a magnitude to affect the reported data significantly (less than 5% in total). For characterization factors: the characterization factors stated in EN 15804+A2:2019 were used.

Electricity supply: Scottish Power Green Tariff 100% renewable.

(<https://www.scottishpower.co.uk/about-us/performance/fuel-mix>)

The assumption for module A4 is for transport to construction site of 100 km by logistics company, which is representative. Actual distances should be used as appropriate. Assumptions for Module A5 are adding water according to instructions, mechanical mixing with electric drill.

No maintenance is required during the lifetime of the product and the product will have an expected lifetime equal to that of the building. There is no requirement for operational energy or water. Manual removal at end of life is assumed and no waste processing is necessary. Nil entries are therefore recorded for modules B1-B7, C1 and C3. Disposal scenario for Module D involves transport to a site where the clay product is used as a soil amendment. A transport distance of 10 km is assumed. Other scenarios are possible, the waste clay product at end of life is inert and can be safely added to the soil or as an inert filler for compost.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage		Construction process stage			Use stage							End of life stage				Resource recovery stage	
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Specific data						0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Variation – products						0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Variation – sites						N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Content information

Product components (Rustic, Demi-Rustic)	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Earthen Material	1.0*	0	0
Product components (Smooth, Tonal)	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Earthen Material	1.0*	0	0
Packaging materials	Weight, kg	Weight-% (versus the product)	
Unbleached kraft paper	0.0064	0.64	
TOTAL	0.0064	0.64	

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
None	N/A	N/A	N/A

*Composition of final products has been deemed commercially sensitive information so no further details are provided here.

Note: the product as supplied contains dry powder and it is essential to wear an appropriate mask when opening the packaging and mixing the product.

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

Results per 1 kg of Rustic or Demi-Rustic clay plaster																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	6.44 E-03	4.35 E-02	7.59 E-03	5.75 E-02	8.74 E-03	2.29 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	8.74 E-04	0.00 E+00	2.04 E-03	-1.03 E-02
GWP-biogenic	kg CO ₂ eq.	4.62 E-05	2.58 E-05	-9.28 E-03	-9.21 E-03	5.20 E-06	5.24 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	5.20 E-07	0.00 E+00	-4.26 E-05	6.33 E-05
GWP-luluc	kg CO ₂ eq.	4.47 E-06	1.47 E-05	6.31 E-05	8.22 E-05	2.95 E-06	4.26 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.95 E-07	0.00 E+00	7.91 E-07	-1.18 E-05
GWP-total	kg CO ₂ eq.	6.49 E-03	4.35 E-02	-1.63 E-03	4.84 E-02	8.75 E-03	2.35 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	8.75 E-04	0.00 E+00	2.00 E-03	-1.02 E-02
ODP	kg CFC 11 eq.	1.24 E-09	1.06 E-08	7.65 E-10	1.26 E-08	2.14 E-09	2.10 E-10	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.14 E-10	0.00 E+00	4.08 E-10	-1.54 E-09
AP	mol H ⁺ eq.	4.94 E-05	1.41 E-04	5.45 E-05	2.45 E-04	2.80 E-05	1.29 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.80 E-06	0.00 E+00	2.01 E-05	-9.17 E-05
EP-freshwater	kg PO ₄ ³⁻ eq.	1.05 E-05	2.46 E-05	2.06 E-05	5.57 E-05	4.92 E-06	6.12 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.92 E-07	0.00 E+00	3.66 E-06	-2.29 E-05
EP-marine	kg N eq.	1.63 E-05	3.16 E-05	1.34 E-05	6.13 E-05	6.29 E-06	2.51 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	6.29 E-07	0.00 E+00	8.49 E-06	-2.53 E-05
EP-terrestrial	mol N eq.	1.88 E-04	3.45 E-04	1.37 E-04	6.70 E-04	6.86 E-05	2.35 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	6.86 E-06	0.00 E+00	9.29 E-05	-3.10 E-04
POCP	kg NMVOC eq.	5.01 E-05	1.34 E-04	3.66 E-05	2.21 E-04	2.68 E-05	7.26 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.68 E-06	0.00 E+00	2.50 E-05	-7.91 E-05
ADP-minerals&metals*	kg Sb eq.	4.75 E-07	7.17 E-07	1.72 E-07	1.36 E-06	1.44 E-07	6.69 E-08	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.44 E-08	0.00 E+00	7.32 E-08	-1.68 E-06
ADP-fossil*	MJ	9.64 E-02	7.02 E-01	9.99 E-02	8.99 E-01	1.41 E-01	3.76 E-02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.41 E-02	0.00 E+00	2.73 E-02	-1.27 E-01
WDP	m ³	2.56 E-03	2.43 E-03	1.35 E-02	1.85 E-02	4.88 E-04	2.80 E-01	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.88 E-05	0.00 E+00	7.40 E-05	-1.92 E-03
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; 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; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption																		

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Use of resources

Results per 1 kg of Rustic or Demi-Rustic clay plaster																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	1.09 E-02	9.35 E-03	3.94 E-01	4.14 E-01	1.88 E-03	5.33 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.88 E-04	0.00 E+00	1.01 E-03	-6.87 E-03
PERM	MJ	1.77 E-03	1.83 E-03	1.73 E-01	1.76 E-01	3.68 E-04	9.81 E-04	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	3.68 E-05	0.00 E+00	5.27 E-04	-2.16 E-03
PERT	MJ	1.27 E-02	1.12 E-02	5.67 E-01	5.91 E-01	2.25 E-03	6.31 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.25 E-04	0.00 E+00	1.54 E-03	-9.04 E-03
PENRE	MJ	9.83 E-02	6.90 E-01	1.16 E-01	9.05 E-01	1.39 E-01	4.35 E-02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.39 E-02	0.00 E+00	2.71 E-02	-1.36 E-01
PENRM	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
PENRT	MJ	9.83 E-02	6.90 E-01	1.16 E-01	9.05 E-01	1.39 E-01	4.35 E-02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.39 E-02	0.00 E+00	2.71 E-02	-1.36 E-01
SM	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
RSF	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
NRSF	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
FW	m ³	1.27 E-03	6.54 E-05	3.23 E-04	1.65 E-03	1.32 E-05	5.16 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.32 E-06	0.00 E+00	4.50 E-06	-4.56 E-05
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water																		

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Waste production and output flows

Waste production

Results per 1 kg of Rustic or Demi-Rustic clay plaster																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Non-hazardous waste disposed	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Radioactive waste disposed	kg	2.04 E-08	2.43 E-08	2.53 E-08	7.00 E-08	4.88 E-09	2.39 E-08	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.88 E-10	0.00 E+00	6.57 E-10	-9.56 E-09

Output flows

Results per 1 kg of Rustic or Demi-Rustic clay plaster																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Material for recycling	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Materials for energy recovery	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Exported energy, electricity	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Exported energy, thermal	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00

Information on biogenic carbon content

Results per 1 kg of Rustic or Demi-Rustic clay plaster		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0.0032

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Potential environmental impact – mandatory indicators according to EN 15804

Results per 1 kg of Smooth Finish or Tonal clay plaster																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	9.65 E-03	5.96 E-02	7.59 E-03	7.68 E-02	8.74 E-03	3.52 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	8.74 E-04	0.00 E+00	2.04 E-03	-1.03 E-02
GWP-biogenic	kg CO ₂ eq.	-5.42 E-04	3.53 E-05	-9.28 E-03	-9.79 E-03	5.20 E-06	8.06 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	5.20 E-07	0.00 E+00	-4.26 E-05	6.33 E-05
GWP-luluc	kg CO ₂ eq.	6.54 E-04	2.01 E-05	6.31 E-05	7.37 E-04	2.95 E-06	6.55 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.95 E-07	0.00 E+00	7.91 E-07	-1.18 E-05
GWP-total	kg CO ₂ eq.	9.76 E-03	5.96 E-02	-1.63 E-03	6.78 E-02	8.75 E-03	3.61 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	8.75 E-04	0.00 E+00	2.00 E-03	-1.02 E-02
ODP	kg CFC 11 eq.	1.40 E-09	1.46 E-08	7.65 E-10	1.67 E-08	2.14 E-09	3.23 E-10	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.14 E-10	0.00 E+00	4.08 E-10	-1.54 E-09
AP	mol H ⁺ eq.	9.43 E-05	1.93 E-04	5.45 E-05	3.42 E-04	2.80 E-05	1.99 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.80 E-06	0.00 E+00	2.01 E-05	-9.17 E-05
EP-freshwater	kg PO ₄ ³⁻ eq.	2.34 E-05	3.37 E-05	2.06 E-05	7.76 E-05	4.92 E-06	9.42 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.92 E-07	0.00 E+00	3.66 E-06	-2.29 E-05
EP-marine	kg N eq.	3.33 E-05	4.33 E-05	1.34 E-05	9.01 E-05	6.29 E-06	3.86 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	6.29 E-07	0.00 E+00	8.49 E-06	-2.53 E-05
EP-terrestrial	mol N eq.	3.69 E-04	4.72 E-04	1.37 E-04	9.79 E-04	6.86 E-05	3.62 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	6.86 E-06	0.00 E+00	9.29 E-05	-3.10 E-04
POCP	kg NMVOC eq.	6.86 E-05	1.84 E-04	3.66 E-05	2.89 E-04	2.68 E-05	1.12 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.68 E-06	0.00 E+00	2.50 E-05	-7.91 E-05
ADP-minerals&metals*	kg Sb eq.	4.89 E-07	9.81 E-07	1.72 E-07	1.64 E-06	1.44 E-07	1.03 E-07	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.44 E-08	0.00 E+00	7.32 E-08	-1.68 E-06
ADP-fossil*	MJ	1.33 E-01	9.62 E-01	9.99 E-02	1.19 E+00	1.41 E-01	5.79 E-02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.41 E-02	0.00 E+00	2.73 E-02	-1.27 E-01
WDP	m ³	8.06 E-03	3.32 E-03	1.35 E-02	2.49 E-02	4.88 E-04	4.31 E-01	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.88 E-05	0.00 E+00	7.40 E-05	-1.92 E-03
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; 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; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption																		

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Use of resources

Results per 1 kg of Smooth Finish or Tonal clay plaster																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	3.25 E-02	1.28 E-02	3.94 E-01	4.39 E-01	1.88 E-03	8.20 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.88 E-04	0.00 E+00	1.01 E-03	-6.87 E-03
PERM	MJ	3.00 E-03	2.50 E-03	1.73 E-01	1.78 E-01	3.68 E-04	1.51 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	3.68 E-05	0.00 E+00	5.27 E-04	-2.16 E-03
PERT	MJ	3.55 E-02	1.53 E-02	5.67 E-01	6.17 E-01	2.25 E-03	9.71 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.25 E-04	0.00 E+00	1.54 E-03	-9.04 E-03
PENRE	MJ	1.38 E-01	9.45 E-01	1.16 E-01	1.20 E+00	1.39 E-01	6.69 E-02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.39 E-02	0.00 E+00	2.71 E-02	-1.36 E-01
PENRM	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
PENRT	MJ	1.38 E-01	9.45 E-01	1.16 E-01	1.20 E+00	1.39 E-01	6.69 E-02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.39 E-02	0.00 E+00	2.71 E-02	-1.36 E-01
SM	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
RSF	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
NRSF	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
FW	m ³	1.02 E-03	8.96 E-05	3.23 E-04	1.43 E-03	1.32 E-05	7.95 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.32 E-06	0.00 E+00	4.50 E-06	-4.56 E-05
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water																		

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Waste production and output flows

Waste production

Results per 1 kg of Smooth Finish or Tonal clay plaster																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Non-hazardous waste disposed	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Radioactive waste disposed	kg	2.16 E-08	3.32 E-08	2.53 E-08	8.01 E-08	4.88 E-09	3.68 E-08	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.88 E-10	0.00 E+00	6.57 E-10	-9.56 E-09

Output flows

Results per 1 kg of Smooth Finish or Tonal clay plaster																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00
Material for recycling	kg	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00
Materials for energy recovery	kg	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00
Exported energy, electricity	MJ	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00
Exported energy, thermal	MJ	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00	0.0 0E+00

Information on biogenic carbon content

Results per 1 kg of Smooth Finish or Tonal clay plaster		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0.0032

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Additional information

The global warming potential (GWP-total) for A1-A3 of the Rustic or Demi Rustic product is 0.048 kg CO₂e per kg of dry product. The GWP of the Smooth or Tonal product is 0.068 kg CO₂e per kg of dry product.

The finished product after application and cure has a density of approximately 1550 kg per m³. Assuming an applied thickness of 1.5 mm, this gives a weight of 2.3 kg per m² of wall. Based on the above information, the GWP-total for the installed product is:

$$\begin{aligned}\text{Smooth/Tonal} &= 0.136 \text{ kg CO}_2\text{e/m}^2 \\ \text{Rustic/Demi-Rustic} &= 0.185 \text{ kg CO}_2\text{e/m}^2\end{aligned}$$

Transportation from raw materials and delivery transport is the biggest contributor to the overall environmental impact for both product types studied. So little impact (GWP-total) stems from the renewable energy use that it is more than covered by the biogenic carbon stored in the paper bags used so a minus figure is produced in the total for A3.

Information related to Sector EPD

N/A

Differences versus previous versions

N/A

References

- General Programme Instructions of the International EPD® System. Version 3.01 Construction Products. Version 2.33 (date 2020-09-18, valid until 2021-12-31).
- Sub-PCR-A Mortars Applied to a Surface. UN CPC Code 154000 (clays) (date 2020-09-18, valid until 2021-12-31)
- ISO 14040: 2006 Environmental management - Life cycle assessment – Principles and Framework
- ISO 14044: 2006 Environmental management - Life cycle assessment - Requirements and guidelines
- ISO 14025: 2005 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
- EN 15804: 2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- EN 15942:2011 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- CEN /TR 15941:2010 Sustainability of construction works – Environmental product declarations – Methodology for the selection and use of generic data
- Construction Products Regulation, Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011





Environmental Product Declaration



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

Clayworks Exterior/Hybrid Exterior Finish from

Clayworks

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-03276
Publication date:	2023-11-26
Valid until:	2028-11-25

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification

Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR): PCR 2019:14 Construction Products and Services ver 1.2.5 and c-PCR 001: Cement and building lime (EN 16908:2017+A1:2022)

PCR review was conducted by: The Technical Committee of the International EPD® System. See [<https://environdec.com/about-us/the-international-epd-system-about-the-system>] for a list of members.

Life Cycle Assessment (LCA)

LCA accountability: Callum Hill (Renueables Ltd) [www.renuables.co.uk]

Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

EPD verification by individual verifier

Third-party verifier Dr. Hudai Kara, Metsims Sustainability Consulting [www.metsims.com]

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes No

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

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

Company information

Owner of the EPD: Clayworks

Contact: Clare Whitney

Description of the organisation: Clayworks was born from a love and belief in natural, sustainable building practices. It stemmed, in 2010, from a decade of restoring old buildings, building new ones and travelling the world to learn about the traditions of clay and other natural finishes such as lime, as building materials. The vision behind, and motivation for our founders' research was to explore the use of natural materials in architecture to foster the balance in a building that is healthy for the environment and the user and beautiful in its design, structure, technique and use of materials. Clayworks is based on one site on the Lizard Peninsula, Cornwall where all research and development takes place. The company works with architects, designers and individuals worldwide to create interior wall finishes. There is an intense focus on developing new colours and textures using only natural materials. The company is also committed to continuous innovation, with experimentation on the formulations ongoing to improve performance, sustainable and health benefits.

Pushing hard at the conventional boundaries of techniques with clay and lime, our focus is concentrated on creating and delivering plasters of the finest quality that speak honestly about the beauty and functionality of natural materials. This culture of learning, discovery and experimentation continues after we launched our own range of natural clay plasters in 2010 and our vision is to play a significant role in the re-imagination of clay as the interior wall finish of the future.

Clayworks was a winner of the 2023 Kings Award for Enterprise – Sustainability.

Name and location of production site(s): Clayworks Limited, Unit 5, Higher Bochym Rural Workshops, Cury Cross Lanes, Helston, Cornwall, TR12 7AZ UK

Product information

Product name: Clayworks Exterior /Hybrid Exterior Finish

Product identification:

Clayworks Exterior Finish natural, mineral wall finish made from Natural Hydraulic Lime (NHL). Cement free render for external application. The active NHL ingredient conforms with British Standard EN 459-1: 2015 'Building Lime'

Clayworks Hybrid Exterior Finish mineral wall finishes made from Hydrated Natural Hydraulic Lime (NHL), white cement CEM 1 and additives as per EN/BS 459.1. Pre-mixed with sand. Cement enhanced render for external application. The active NHL ingredient conforms with British Standard EN 459-1: 2015 'Building Lime'.

Product description: Clayworks Exterior and Hybrid Exterior Finishes are building limes for masonry, rendering and plastering. The products' special composition allows the product to breathe and also permits constant hygrometric exchange between the substrate and the environment. The lime binders (NHL or NL) are pre-mixed with sands and packed in 25 kg bags ready to mix with water and apply on site. The finishes have been formulated to work with Clayworks mineral pigment mixes which are supplied separately. This EPD represents the Life Cycle Analysis of the basic mixes without pigments.

UN CPC code: 374 Plaster. lime and cement

Geographical scope: Modules A1-A3 modelled for UK, A4 represents delivery from Cornwall to London (UK), all other modules modelled using UK scenarios.

LCA information

Functional unit / declared unit: 1 m² of Clayworks exterior product (15 mm thickness) including the packaging.

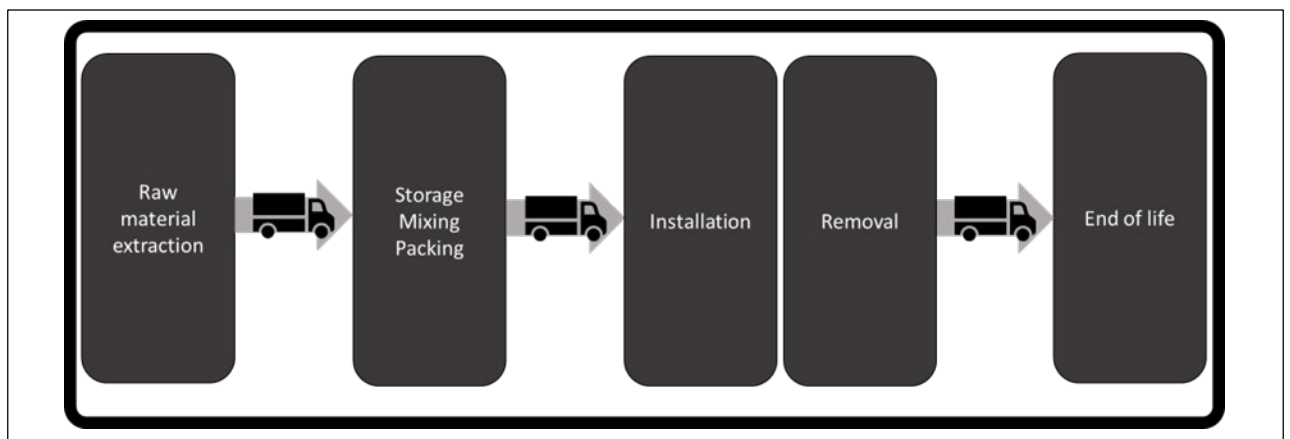
Reference service life: This is assumed to be the reference service life of the building (default 60 years).

Time representativeness: Production data for the calendar year 2022 was used.

Database(s) and LCA software used: Ecoinvent 3.9 and Simapro 9.5.

Description of system boundaries: Cradle to grave and module D (A + B + C + D).

System diagram:



More information:

The data is an average of the two products – variation between the two products is less than 10%.

This EPD is based upon an underlying LCA of the Clayworks manufacturing facility, with operational data obtained for 2022. The underlying LCA was conducted by Callum Hill, Senior Consultant, Renewables Ltd (<http://renewables.co.uk/>). Primary data is assessed as being of high quality for factory parameters and medium quality for materials.

Cut-off criteria were based upon input flows being less than 1% of the total individually, subject to the sum of all flows being less than 5% of the total, and subject to verification that the impacts associated with such flows were not of a magnitude to affect the reported data significantly (less than 5% in total). For characterization factors: the characterization factors stated in EN 15804+A2:2019/AC:2021 were used.

A1-A3

Delivery of ingredients to mixing site in Cornwall. Lime products (NHL5, NL5) delivered from St Astier a distance of 859 km by road and 50 km by rail (channel tunnel). Processing energy and fuel use (drying of sand, on-site transport, electricity use). Wet sand is delivered in bulk bags that contain 1

tonne of wet sand (average distance 274 km) – the bag weighs 0.85 kg and is disposed to landfill after delivery. Assumed distance to disposal facility is 20 km. Electricity supply: Octopus – based on average standard UK grid mix for 2022.

A4

The assumption for module A4 is for transport to construction site in London from production site in Cornwall (a distance of 475 km).

A5

Assumptions for Module A5 are based upon a typical scenario for application:

A 25 kg bag of ingredients is mixed with 8 litres of water and mixed with an electric mixer (2600 W paddle mixer) for 20 minutes. Application is manual, 15 mm thickness, resulting in dry weight of product of 3.18 kg per m² coverage. The density of the cured product is 2120 kg/m³.

B1

The carbonation calculation is based upon the following reference:

[<https://www.eula.eu/politecnico-di-milano-literature-review-on-the-assessment-of-the-carbonation-potential-of-lime-in-different-markets-and-beyond/>]

It is assumed that 80% of the Ca(OH)₂ in the lime is carbonated during the lifetime of the product. This is because the render is typically approximately 15 mm thick and open to the atmosphere (including rain) and a building lifetime of 60 years is assumed. The carbonation was calculated to be -1.97 kg CO₂e/FU.

B2-B7

No maintenance, no operational energy, not replaced during building lifetime.

C1

Use of an electric jack hammer is assumed for removal of render from building prior to demolition. It is assumed that a 1500 W demolition hammer is used for a render coat of 15 mm thickness (density of 2120 kg/m³), 1 m² is removed in 10 minutes.

C2

Transport to waste facility is assumed (20 km).

C3

Waste is processed for disposal. It is assumed that 100% of this material is waste and disposed to landfill.

C4

100% of end of life product disposed to landfill.

D

There is no re-use of the material and therefore there are nil entries for module D.

[<https://clay-works.com/product-descriptions/>]

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage	
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	EUR	EUR	UK	UK	UK	UK	UK	UK	UK	UK	UK	UK	UK	UK	UK	UK	UK	
Specific data used	30%			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	N/A			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Content information (per FU, 31.8 kg)

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Sand	27.67	0.0	0.0
Hydraulic lime	4.13	0.0	0.0
TOTAL	31.8	0.0	0.0
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Kraft paper	0.146	0.48	0.073
Polyethylene liner	0.015	0.02	0.0000
TOTAL	0.161	0.50	0.0073

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
N/A	-	-	-

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per 1 m ² 15 mm thickness including packaging																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	6.35E+00	1.33E+00	3.28E-01	-1.97E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.34E-02	5.58E-02	1.74E-01	1.74E-01	0.00E+00
GWP-biogenic	kg CO ₂ eq.	2.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.78E-05	2.26E-05	8.18E-05	2.68E-01	0.00E+00
GWP-luluc	kg CO ₂ eq.	6.28E-03	4.66E-04	2.36E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.22E-05	1.95E-05	9.59E-05	9.59E-05	0.00E+00
GWP-total	kg CO ₂ eq.	6.09E+00	1.33E+00	3.28E-01	-1.97E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.35E-02	5.58E-02	1.74E-01	4.42E-01	0.00E+00
ODP	kg CFC 11 eq.	5.31E-07	2.63E-07	3.20E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.16E-09	1.10E-08	5.70E-08	5.70E-08	0.00E+00
AP	mol H ⁺ eq.	2.12E-02	4.39E-03	8.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-04	1.84E-04	1.67E-03	1.67E-03	0.00E+00
EP-freshwater	kg P eq.	7.06E-04	1.03E-04	4.59E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.81E-06	4.30E-06	2.03E-05	2.03E-05	0.00E+00
EP-marine	kg N eq.	4.92E-03	8.95E-04	1.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.89E-05	3.75E-05	5.48E-04	5.48E-04	0.00E+00
EP-terrestrial	mol N eq.	5.42E-02	9.74E-03	1.39E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E-04	4.08E-04	5.99E-03	5.99E-03	0.00E+00
POCP	kg NMVOC eq.	1.49E-02	2.59E-03	4.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.38E-05	1.09E-04	1.50E-03	1.50E-03	0.00E+00
ADP-minerals&metals*	kg Sb eq.	7.63E-06	2.57E-06	3.03E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E-08	1.08E-07	1.95E-07	1.95E-07	0.00E+00
ADP-fossil*	MJ	5.39E+01	2.13E+01	4.89E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	8.91E-01	4.78E+00	4.78E+00	0.00E+00
WDP*	m ³	2.44E+00	1.53E-01	3.83E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	6.40E-03	2.28E-01	2.28E-01	0.00E+00
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; 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; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption															

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Additional mandatory and voluntary impact category indicators

Results per 1 m ² 15 mm thickness (31.8 kg)																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ¹	kg CO ₂ eq.	6.36E+00	1.33E+00	3.28E-01	-1.97E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.35E-02	5.58E-02	1.74E-01	1.74E-01	0.00E+00

Resource use indicators

Results per 1 m ² 15 mm thickness (31.8 kg)																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	7.94E+00	3.12E-01	1.20E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-01	1.31E-02	1.27E-01	1.27E-01	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.94E+00	3.12E-01	1.20E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-01	1.31E-02	1.27E-01	1.27E-01	0.00E+00
PENRE	MJ	5.96E+01	2.31E+01	6.72E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E+00	9.66E-01	5.16E+00	5.16E+00	0.00E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.02E+03	2.31E+01	6.72E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E+00	9.66E-01	5.16E+00	5.16E+00	0.00E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	0.00E+00	0.00E+00	1.02E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources 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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water															

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¹ This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.

Waste indicators

Results per 1 m ² 15 mm thickness (31.8 kg)																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	6.91E-05	1.18E-05	4.38E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.59E-07	4.95E-07	3.33E-06	3.33E-06	0.00E+00
Non-hazardous waste disposed	kg	1.76E+00	1.85E+00	5.98E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-03	7.74E-02	0.00E+00	3.18E+01	0.00E+00
Radioactive waste disposed	kg	3.04E-04	1.50E-04	4.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.24E-06	6.30E-06	3.22E-05	3.22E-05	0.00E+00

Output flow indicators

Results per 1m ² 15 mm thickness (31.8 kg)																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional environmental information

Using a density of the cured product of 2120 kg m⁻³ = 2.12 kg for 1 mm thickness of 1 m². The EPD data refers to a functional unit of 1 m² of exterior render of 15 mm thickness including packaging (31.8 kg of dry ingredients). In order to convert to a coverage of 1 m² for different thicknesses, please use the conversion factors listed in the table below:

Thickness (mm)	Weight (kg)	Multiply by
5	10.6	0.33
10	21.2	0.66
15	31.8	1.00
20	42.4	1.33
25	53.0	1.66

Additional social and economic information

N/A

Information related to Sector EPD

N/A

Differences versus previous versions

N/A

References

General Programme Instructions of the International EPD® System. Version 4.0.

PCR 2019:14 Construction Products and Services ver 1.2.5

c-PCR 001: Cement and building lime (EN 16908:2017+A1:2022)

EN 15804:2012+A2:2019/AC:2021. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

EN 16908:2017+A1:2022. Cement and building lime – Environmental product declarations – Product category rules complementary to EN 15804.

