ENVIRONMENTAL PRODUCT DECLARATION

Big Tile and Stone - Mortar

NSF

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Program Operator	NSF Certification LLC 789 N. Dixboro, Ann Arbor, MI 48105 www.nsf.org
General Program Instructions and Version Number	Program Operator Rules v 2.7 2022
Manufacturer Name and Address	Bostik, Inc. Paulsboro New Jersey Plant, 2000 Nolte Drive, Paulsboro, NJ, 08066
Declaration Number	EPD10886
Declared Product and Functional Unit	Big Tile and Stone manufactured at Paulsboro, NJ. Mortar required for 1 m^2 of installed 450mm x 450mm tile with a 3mm joint width for a period of 75 years
Reference PCR and Version Number	Cement-based Grout, Adhesive Mortar and Self-Leveling Underlayment EPD Requirements (UL Environment V1.0, 2022)
Product's intended Application and Use	Flooring and Wall Applications
Product RSL	75 years
Markets of Applicability	North America
Date of Issue	11/22/2023
Period of Validity	5 years from date of issue
EPD Type	Product Specific
Range of Dataset Variability	N/A
EPD Scope	Cradle to Grave
Year of reported manufacturer primary data	2019
LCA Software and Version Number	GaBi 10.6.1.265
LCI Database and Version Number	GaBi Database Service Pack 2022.1
LCIA Methodology and Version Number	TRACI 2.1 IPCC AR6
The sub-category PCR review was conducted by:	Thomas Gloria, PhD Bill Stough Dr. Michael Overcash

This declaration was independently verified in accordance with ISO 14025: 2006. The UL Environment "Part A: Life Cycle Assessment Calculation Rules and Report Requirements" v3.2 (December 2018), and ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017) ☐ **Internal** ☒ **External**	Jack Geibig - EcoForm jgeibig@ecoform.com
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Jack Geibig - EcoForm jgeibig@ecoform.com

Limitations:
Environmental declarations from different programs (ISO 14025) may not be comparable.
Comparison of the environmental performance of mortars using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR.

Product Definition and Information

Description of Company

Bostik is a world-class leader in sealing and bonding technologies. We create smart adhesive solutions for both industries and consumers, covering a broad range of markets such as construction, packaging, automotive, high tech, hygiene products, etc. The adhesive division of the Arkema Group, a specialty materials leader, Bostik benefits from unique research & development capabilities to help build a world that is safer, more sustainable, and adaptive. With over 2 billion USD annual sales and over 6,000 people, Bostik is present in more than 50 countries.

Product Description

Bostik Big Tile & Stone is a polymer-modified, large and heavy tile mortar used for interior or exterior installations to set large format tiles and can also be used for vertical applications. Big Tile & Stone may be used for uneven tile and stone thicknesses; or to minimize lippage. Big Tile & Stone white formulation is approved for non-sag applications for tiles up to 12" x 24". The product codes for this product are 30850792, 30850784.

Application

Bostik Big Tile and Stone is a polymer-modified mortar, used for interior or exterior installations.

Declaration of Methodological Framework

This LCA follows an attributional approach and is a cradle to grave study.

Technical Requirements

Table 1 shows the technical specification of Bostik Big Tile and Stone, including any testing data as appropriate. This product exceeds ANSI 118.7 – superior, long-term performance.

Table 1: Technical Data

Big Tile and Stone		
Mass (when installed)	18.49	kg
Density (when installed)	1,600	kg/m^3
Compressive Strength	2,391,044	kg/m^2 @ 28 days
Adhesive Shear Strength	281,299	kg/m^2
Pot Life	210	Minutes
Mixture Proportion	0.23	Liters liquid/kg power

Properties of Declared Product as Delivered

Mortars are traditionally packaged in paper bags or pails, which in turn are packaged into carboard boxes. These cardboard boxes and shrink wrapped and loaded onto wooden pallets which are then delivered to the customer or job site.

Material Composition

Typical product composition provided by Bostik is summarized in Table 2.

Table 2: Product Composition

Ingredient Category	% of product by mass
Portland Cement	29.3%
Gypsum	0.62%
Calcium Carbonate	4%
Quartz	61.5%
Vinyl Acetate Ethylene Polymer	1.74%
Proprietary Additives	2.83%

This product contains no regulated substances.

Manufacturing

Raw materials, including quartz, silica, calcium carbonate, portland cement and other additives are stored until required for production. To manufacture mortar, these materials are batch mixed based on formulation and packaged in bags and then palletized. After this, they are transported to customer locations or job sites. No substances required to be reported as hazardous are associated with the production of this product.

Packaging

Bostik Big Tile and Stone is primarily packaging is either a paper/plastic composite, plastic, or paper bag, with secondary/tertiary packaging of shrink film and pallets.

Transportation

In this stage, the product is transported from the manufacturing site to the distributor, and finally to the application site. The product is delivered to the customer via truck and transportation distances were calculated based on sales records provided by Bostik.

Production Installation

Cement mortar for tile installation is primarily installed by hand, with potential limited use of machines to mix the mortar prior to application. Due to its material composition, mortar is typically quite alkaline and, as such, eye and skin contact should be avoided, especially for prolonged periods and within small spaces. Additionally, precautions should be taken to reduce dust emissions and inhalation during the installation process. The installation safety instructions of a given mortar product should be followed during application. During installation, mortar is applied at approximately 19.3 kg/m² with around 4.5% of the total material lost as waste. Although some of this waste could be recycled, this scrap is modeled as being disposed of in a landfill.

Use

Mortar does not have significant use phase inputs, and thus does not need water for cleaning purposes, since this product is concealed behind surface materials such as tile.

Reference Service Life and Estimated Building Service Life

According to Part A of the PCR, the Estimated Service Life (ESL) of the building is assumed to be 75 years. Since mortar is expected to last as long as the building itself, the Reference Service Life (RSL) of mortar is taken to be 75 years.

Reuse, Recycling, and Energy Recovery

Mortar is typically not reused, recovered, and recycled.

Disposal

As mortar is bound to the tile during application, it is typically disposed with the tile and as such, can be used in multiple applications—for example, clean fill material in land reclamation/contouring projects, base or substrate material for roadways and/or parking lots, replacement for raw materials used in cement or brick kilns, etc.

However, for purposes of this EPD, the analysis adopts the most conservative approach and assumes that 100% of all mortar waste is disposed of in a landfill. Distance to end-of-life facilities is assumed to be 100 km.

Life Cycle Assessment Background Information

Functional Unit

The functional unit for mortars, according to the UL PCR is the amount of mortar required to install 1 m² of 450mm x 450mm tile with a 3mm joint width, which is 19.3 kg/m². This product requires no accessories to meet the requirements of the functional unit.

System Boundary

This LCA is a Cradle-to-Grave study. An overview of the system boundary is shown in Figure 1.

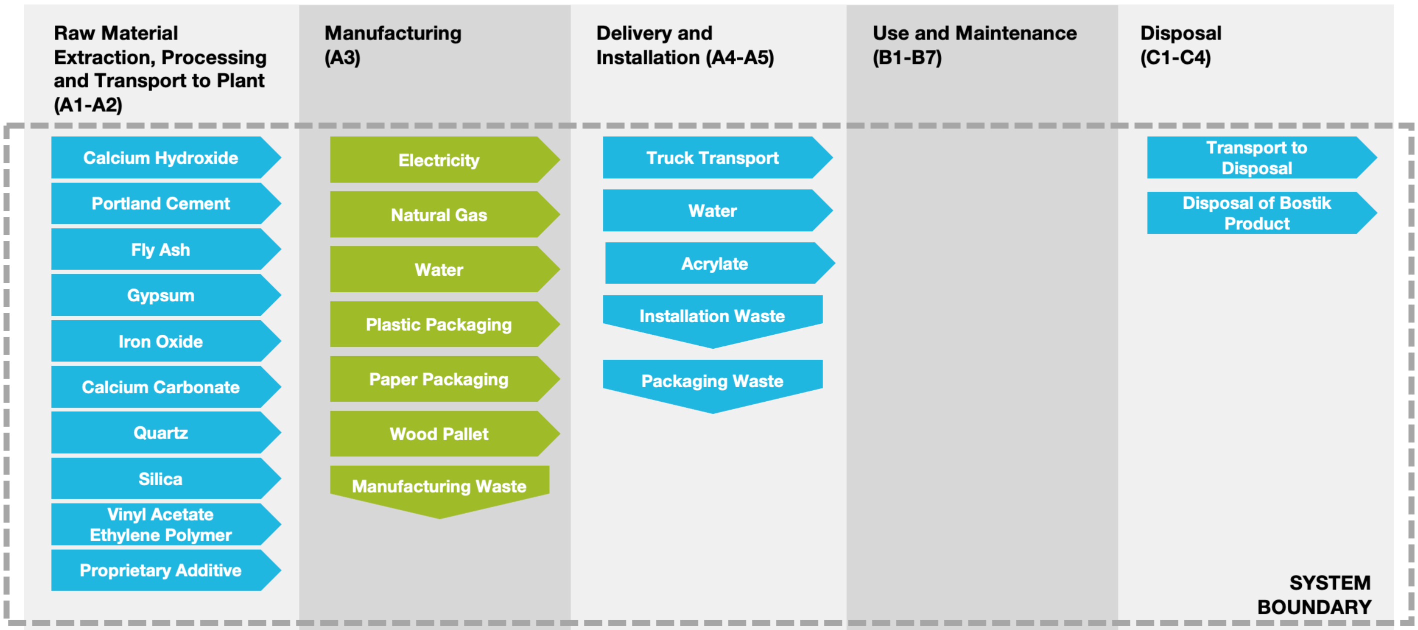

Figure 1: System Boundary

Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The majority of the estimations are within the primary data. The primary data was collected as annual totals including all utility usage and production information. For the LCA, the usage information was divided by the production volume to create an energy use per declared unit. Other assumptions are listed below:

- Availability of geographically more accurate datasets would have improved the accuracy of the study.
- Since this LCA uses the cut-off approach to recycled material in the product, no credit is given to product system but rather is exempted from the burden of extracting virgin material in place of using recycled material.
- Only known and quantifiable environmental impacts are considered.
- Due to the assumptions and value choices listed above, these do not reflect real-life scenarios and hence they cannot assess actual and exact impacts, but only potential environmental impacts.

Cut-off Criteria

Material and energy inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material/ energy input was thought to have significant environmental impact. Cumulative excluded material/ energy inputs and environmental impacts are less than 5% based on total weight of the functional unit. No known flows are deliberately excluded from this EPD.

The list of excluded materials and energy inputs include:

- Some minor additives have been excluded (0.2%). The exclusion of these materials has no major impacts on the overall results. However, to account for this difference, the inputs were scaled up to fill in the missing additives to total the composition to 100%.
- As the tools used during the installation of the product are multi-use tools and can be reused after each installation, the per-declared unit impacts are considered negligible and therefore are not included.
- Some material inputs may have been excluded within the GaBi datasets used for this project. All GaBi datasets have been critically reviewed and conform to the exclusion requirement of ISO 21930.

Data Sources

Primary data was collected by facility personnel and from utility bills and was used for all manufacturing processes. Whenever available, supplier data was used for raw materials used in the production processes. When primary data did not exist, secondary data for raw material production was utilized from GaBi Database Version 10.6.1.35, Service Pack, 2021.2.

Data Quality Assessment

The overall data quality is considered very good.

Geographical Coverage

The geographical scope of the manufacturing portion of the life cycle is Paulsboro, NJ. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent.

The geographical scope of the raw material acquisition is the United States. Customer distribution, site installation, and use portions of the life cycle is mostly the United States.

In selecting secondary data (i.e. GaBi Datasets), priority was given to the accuracy and representativeness of the data. When available and deemed of significant quality, country-specific data were used. However, priority was given to technological relevance and accuracy in selecting secondary data. This often led to the substitution of regional and/or global data for country-specific data. Overall geographic data quality is considered good.

Time Coverage

Primary data were provided by the manufacturer and represent all information for calendar year 2019. The project commenced in 2021. Due to deviation from business-as-usual manufacturing in 2020, attributed to the COVID-19 pandemic, utility data from 2019 were used. Using these data meets the PCR requirements. Time coverage of these primary data is considered good.

Data necessary to model cradle-to-gate unit processes was sourced from Sphera GaBi LCI datasets. Time coverage of the GaBi datasets varies from approximately 2017 to present. All datasets rely on at least one 1-year average data. Other than GaBi datasets, the study also utilizes three additional external studies. Though the studies are beyond a 5-year period, efforts have been made to mitigate the impact: only unit processes were extracted from the studies and up-to-date datasets from GaBi are used to represent the intermediate flows and to replace the obsolete datasets. Overall time coverage of the datasets is considered good and meets the requirement of the PCR.

Technological Coverage

Primary data provided by the manufacturer is specific to the technology the company uses in manufacturing their product. It is site-specific and considered of good quality. It is worth noting that the energy used in manufacturing the product includes overhead energy such as lighting, heating, and sanitary use of water. Sub-metering was not available to extract process-only energy use from the total energy use. Sub-metering would improve the technological coverage of data quality.

Data necessary to model cradle-to-gate unit processes was sourced from GaBi LCI datasets. Technological coverage of the datasets is considered good relative to the actual supply chain of the manufacturer. While improved life cycle data from suppliers would improve technological coverage, the use of lower-quality generic datasets does meet the goal of this LCA.

Period under Review

The period under review is calendar year 2019.

Allocation

General principles of allocation were based on ISO 14040/44. To derive per-unit values for manufacturing inputs, allocation based on total production by mass was adopted.

Comparability

This study was not completed with the intent that comparative assertion with external objects or public disclosures (i.e., comparative marketing claims) would be made. Full conformance with the PCR for grout, mortar, and SLU allows EPD comparability only when all stages of a life cycle have been considered.

Life Cycle Assessment Scenarios

Table 3: Transport to the building site (A4)

Name	Value	Unit
Fuel Type	Diesel	-
Fuel Efficiency	44.7	L/100km
Vehicle Type	US: Truck-Heavy Heavy-duty Diesel Truck / 53,333 lb payload	-
Transportation Distance	500	km
Capacity utilization (including empty runs, mass based)	67	%
Weight of products transported (if gross density not reported)	19.3	kg
Capacity utilization volume factor (factor: =1 pr <1 or ≥1 for compressed or nested packaging products)	1	1

Table 4: Installation into the building (A5)

Name	Value	Unit
Polymer modifier [kg]	0.33	kg
Net Freshwater Consumption [m3]	2.90	m3
Product loss per functional unit sent to landfill [kg]	0.83	kg
Pulp PKG waste to incineration [kg]	0.26	kg
Pulp PKG waste to landfill [kg]	1.06	kg
Pulp PKG waste to recycle [kg]	3.96	kg
Plastic PKG waste to incineration [kg]	0.17	kg
Plastic PKG waste to landfill [kg]	0.66	kg
Plastic PKG waste to recycle [kg]	0.15	kg
Total waste materials resulting from on-site waste processing [kg]	7.08	kg
Biogenic carbon contained in packaging [kg CO2]	8.5	kg CO_2

Table 5: Reference Service Life

Name	Value	Unit
Reference Service Life (RSL)	75	years

Table 6: End of life (C1-C4)

Name		Value	Unit
Assumptions for scenario development (description of deconstruction, collection, recovery, disposal method, and transportation)		-	-
Collection process (specified by type)	Collected separately	-	kg
	Collected with mixed construction waste	22.6	kg
Recovery (specified by type)	Reuse	-	kg
	Recycling	-	kg
	Landfill	22.6	kg
	Incineration	-	kg
	Incineration with energy recovery	-	kg
	Energy conversation efficiency rate	-	-
Disposal (specified by type)	Product of material for final deposition	22.6	kg
Removals of biogenic carbon (excluding packaging)		0.0465	kg CO_2

Note that maintenance (B2), repair (B3), replacement (B4), refurbishment (B5), Operational energy use (B6), Operational water use (B7), and reuse, recovery, and/or recycling potentials (D) has been removed from this section as they are not material to this investigation.

Life Cycle Assessment Results

Table 7: Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT-ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use	Building Operational Water Use During	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
Cradle to Grave	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	ND

Note: LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. Third party verified ISO 14040/44 secondary LCI data sets contribute more than 67% of total impacts to the required impact categories.

Life Cycle Impact Assessment Results

Table 8: North American Impact Assessment Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
TRACI LCIA Impacts and IPCC AR6 (North America)															
AP [kg SO_2 eq]	6.40E-02	4.79E-03	1.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E-04	0.00E+00	8.35E-03	ND
EP [kg N eq]	6.82E-03	4.27E-04	1.48E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.41E-05	0.00E+00	6.28E-03	ND
GWP [kg CO_2 eq]	1.15E+01	1.03E+00	3.16E+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	1.82E-01	0.00E+00	1.92E+00	ND
ODP [kg CFC 11 eq]	8.99E-13	1.95E-15	8.96E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-16	0.00E+00	6.14E-14	ND
Resources [MJ]	3.32E+01	1.92E+00	4.97E+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	3.40E-01	0.00E+00	3.70E+00	ND
SFP [kg O_3 eq]	1.18E+00	1.11E-01	1.09E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-02	0.00E+00	1.47E-01	ND
IPCC AR5 GWP [kg CO_2 eq]	1.17E+01	1.04E+00	3.29E+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	1.83E-01	0.00E+00	1.94E+00	ND
ADPF [MJ]	1.83E+02	1.21E+01	3.26E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E+00	0.00E+00	2.24E+01	ND
Carbon Emissions and Uptake															
BCRP [kg CO_2]	4.29E-02	0.00E+00	1.93E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND
BCEP [kg CO_2]	0.00E+00	0.00E+00	2.46E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-02	0.00E+00	ND
BCRK [kg CO_2]	9.97E+00	0.00E+00	4.49E-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	ND
BCEK [kg CO_2]	0.00E+00	0.00E+00	7.45E+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	ND
BCEW [kg CO_2]	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	ND
CCE [kg CO_2]	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	ND
CCR [kg CO_2]	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	ND
CWNR [kg CO_2]	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	ND

Note: Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate and could lead to erroneous selection of materials or products which are higher impact, at least in some impact categories.

Life Cycle Inventory Results

Table 9: Resource use, waste, and output flow results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Resource Use Indicators															
RPR_E [MJ]	1.32E+02	5.65E-01	7.68E+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	9.98E-02	0.00E+00	2.74E+00	ND
RPR_M [MJ]	1.05E+02	0.00E+00	4.71E+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	ND
RPR_T [MJ]	2.37E+02	5.65E-01	1.24E+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	9.98E-02	0.00E+00	2.74E+00	ND
$NRPR_E$ [MJ]	2.86E+02	1.45E+01	3.93E+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	2.57E+00	0.00E+00	2.92E+01	ND
$NRPR_M$ [MJ]	4.81E+01	0.00E+00	2.17E+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	ND
$NRPR_T$ [MJ]	3.34E+02	1.45E+01	4.14E+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	2.57E+00	0.00E+00	2.92E+01	ND
SM [kg]	9.66E-01	0.00E+00	4.35E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND
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	ND
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	ND
RE [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	ND
FW [m^3]	1.26E-01	2.03E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.59E-04	0.00E+00	4.19E-03	ND
Output Flows and Waste Categories															
HWD [kg]	4.25E-08	6.04E-11	3.22E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-11	0.00E+00	1.10E-09	ND
NHWD [kg]	7.83E-01	1.25E-03	3.63E+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	2.20E-04	0.00E+00	4.55E+01	ND
HLRW [kg]	1.78E-05	4.77E-08	1.14E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.43E-09	0.00E+00	2.92E-07	ND
ILLRW [kg]	1.50E-02	4.02E-05	1.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E-06	0.00E+00	2.56E-04	ND
CRU [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	ND
MR [kg]	6.19E-02	0.00E+00	4.15E+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	ND
MER [kg]	6.38E-02	0.00E+00	4.36E-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	ND
EEE [MJ]	1.23E-01	0.00E+00	5.54E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND
EET [MJ]	2.23E-02	0.00E+00	1.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND

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LCA Interpretation

Overall, the dominance analysis shows that the vast majority of the impacts for all products are in the aggregated A1-A3 phase. A1-A3 includes raw material sourcing, transportation, and manufacturing. Following the A1-A3 phase in magnitude is the A5 phase which includes installation of the product. Global warming impacts from the installation phase are due to the use of materials for installation of mortar.

For mortar, in the sourcing and extraction stage, the largest contributors to the impacts in terms of raw materials are portland cement (51%), colorants (8.3%), sand (3.7%) and copolymer (2.3%). Within manufacturing, electricity contributes to 20.2% of overall GWP impacts while thermal energy from natural gas contributes to 5.1%.

Shipping to customer contributes around 4% of total GWP impacts, while installation contributes around 6.3% of GWP impacts. Finally, disposal of the product to landfill contributes 6.74% to total GWP impacts.

Additional Environmental Information

Environmental and Health During Manufacturing

Bostik is governed by federal and local requirements for dust control. Where applicable, dust collection systems are incorporated in processes to optimize material usage and mitigate airborne dust and particulate matter with the factory.

Environment and Health During Installation

Refer to SDS for any PPE requirements. Contact manufacturer for OSHA Respirable Silica compliance information.

Extraordinary Effects

Fire

Once cured, mortar is fire resistant.

Water

Once cured, mortar is non-sensitive to moisture.

Mechanical destruction

Tile should not be installed until any and all structural damage to the building has been adequately repaired and determined to be code compliant. Surface must be structurally sound, stable, and rigid enough to support grout, mortar, and title, in additional to any other ancillary tile installation products.

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Environmental Activities and Certifications

Big Tile & Stone has a Health Product Declaration (HPD) which can be found at https://www.hpd-collaborative.org/hpd-public-repository/.

These products also have FloorScore certificates that can be found here: https://www.scsglobalservices.com/certified-green-products-guide?q=bostik&program=301.

More information on Bostik's products can be found on their website.

Supporting Documentation

The full text of the acronyms are found in Table 10.

Table 10: Acronym Key

Acronym	Text	Acronym	Text
LCA Indicators			
ADP-elements	Abiotic depletion potential for non-fossil resources	**GWP**	Global warming potential
ADP-fossil	Abiotic depletion potential for fossil resources	**OPD**	Depletion of stratospheric ozone layer
AP	Acidification potential of soil and water	**POCP**	Photochemical ozone creation potential
EP	Eutrophication potential	**Resources**	Depletion of non-renewable fossil fuels
These six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development, however the EPD users shall not use additional measures for comparative purposes.			
LCI Indicators			
RPR$_E$	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	**RPR$_M$**	Use of renewable primary energy resources used as raw materials
NRPR$_E$	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	**NRPR$_M$**	Use of non-renewable primary energy resources used as raw materials
SM	Use of secondary materials	**FW**	Net use of fresh water
RSF	Use of renewable secondary fuels	**NRSF**	Use of non-renewable secondary fuels
HWD	Disposed-of-hazardous waste	**MR**	Materials for recycling
NHWD	Disposed-of non-hazardous waste	**MER**	Materials for energy recovery
HLRW	High-level radioactive waste, conditioned, to final repository	**ILLRW**	Intermediate- and low-level radioactive waste, conditioned, to final repository
CRU	Components for reuse	**EE**	Exported energy
RE	Recovered Energy		
Biogenic Carbon Indicators			
BCRP	Biogenic Carbon Removal from Product	**BCEW**	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes
BCEP	Biogenic Carbon Emission from Product	**CCE**	Calcination Carbon Emissions

BCRK	Biogenic Carbon Removal from Packaging	**CCR**	Carbonation Carbon Removals
BCEK	Biogenic Carbon Emission from Packaging	**CWNR**	Carbon Emissions from Combustion of Waste from Non- Renewable Sources used in Production Processes

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