EPD®

THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 for

MAPEI Ultralite Mortar
MAPEI Ultralite Mortar Pro
MAPEI Ultralite S1 Quick
MAPEI Ultralite S2

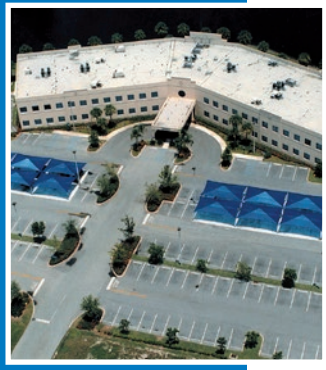
Programme:	Programme operator:	EPD registration number:	Approval date:	Valid until:	Geographical scope:
The International EPD® System; www.environdec.com	**EPD International AB**	**S-P-01102**	**2018-03-09**	**2023-03-08**	**International**

www.mapei.com

MAPEI®

ADHESIVES · SEALANTS · CHEMICAL PRODUCTS FOR BUILDING

1. COMPANY DESCRIPTION / GOAL & SCOPE



Founded in 1937 in Milan, Italy, Mapei produces adhesives and complementary products for laying all types of floor, wall and coating materials, and also specializes in other chemical products used in the building industry, such as waterproofing products, specialty mortars, admixtures for concrete, products for underground constructions and for the restoration of concrete and historical buildings.

There are currently 81 subsidiaries in the Mapei Group, with a total of 73 production facilities located around the world in 34 different countries and in 5 different continents. Mapei also has 18 central laboratories. Most locations are ISO 9001 and ISO 14001 or EMAS-certified.

Mapei's strategy of internationalization is based on two main objectives: being closer to local needs and lowering transportation costs. With the declared objective of being close to buyers and clients, Mapei's presence in the five continents enables the company to comply with the requirements of each location, and to use only locally-based managers and qualified personnel, without changing the approach of Mapei.

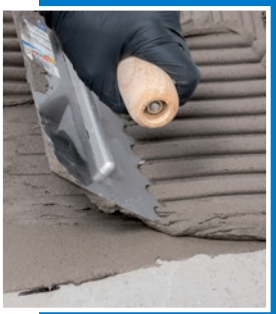
Mapei invests 12% in its company's total work-force and 5% of its turnover in Research & Development; in particular, 70% of its R&D efforts are directed to develop eco-sustainable and environmentally friendly products, which give important contribution to all major green rating systems for eco-sustainable buildings such as LEED and BREEAM.

Furthermore, Mapei has developed a sales and technical service network with offices all over the world and offers an efficient Technical Assistance Service that is valued by architects, engineers, contractors and owners.

The goal of the study is to provide necessary data and documentation to produce an EPD according to the requirements of PCR under EN 15804:2014 and PCR Environdec, version 2.2, date 2017-05-30 and to have more comprehension about the environmental impacts related to **MAPEI Ultralite Mortar**, **MAPEI Ultralite Mortar Pro**, **MAPEI Ultralite S1 Quick** and **MAPEI Ultralite S2** manufactured in Mapei Corp. (US) and Mapei Inc. (CAN) located in 6 different plants (Brampton, Fort Lauderdale, San Bernardino, Fredericksburg, Vancouver and West Chicago), in year 2016, including packaging of the finished products. The primary data used to produce this EPD came from US and global datasets available in the EcoInvent v 3.3 and GaBi database LCA software. Table 32 in the Data Quality section lists the dataset sources and specific geographical references.

Target audiences of the study are customers and other parties with an interest in the environmental impacts of **MAPEI Ultralite Mortar**, **MAPEI Ultralite Mortar Pro**, **MAPEI Ultralite S1 Quick** and **MAPEI Ultralite S2**.

This analysis shall not support comparative assertions intended to be disclosed to the public.



2. PRODUCT DESCRIPTION

MAPEI Ultralite Mortar and **MAPEI Ultralite Mortar Pro** are premium-grade, lightweight, single-component thin-set mortars that can also be used for medium-bed and non-sag applications.
MAPEI Ultralite S1 Quick and **MAPEI Ultralite S2** are premium-grade, rapid-setting, lightweight, single-component thin-set mortars that can also be used as a large-and-heavy-tile mortar (formerly known as "medium-bed mortar") for non-sag applications of large-and-heavy-format tile and stone.

3. CONTENT DECLARATION

The main components and ancillary materials of **MAPEI Ultralite Mortar**, **MAPEI Ultralite Mortar Pro**, **MAPEI Ultralite S1 Quick** and **MAPEI Ultralite S2** are the following:

Table 1: Composition

Materials	Percentage (%)
Binders	30 – 60
Fillers	20 – 40
Recycled materials (post-consumer)	15 – 25
Additives	0 – 15
Packaging	< 1
Other (additives & packaging)	< 5

4. DECLARED UNIT AND REFERENCE SERVICE LIFE

The declared unit is 1 kg of powder, packaging included.

	Value	Unit
Declared unit	1	kg*
Application rate	3.625	kg/m^2

*: packaging included

As regards the application rate, several trowels with different consumptions are described in the TDS (Technical Data Sheet) according to the different usage of the products.

1/2" x 1/2" x 1/2"
(12x12x12 mm)

The considered application rate is the average consumption value with a trowel 12x12x12 mm (see the detail in the image above).

The products considered in this EPD meet or exceed the following Technical Specifications:

- ANSI A118.1 – American National Standard Specifications for Dry-Set Cement Mortar
- ANSI A118.4/11 – American National Standard Specifications for Modified Dry-Set Cement Mortar
- ANSI A118.15 – American National Standard Specifications for Improved Modified Dry-Set Cement Mortar
- ISO 13007 – Terms, Definitions and Specifications for Ceramic Tile Grouts and Adhesives.

The products considered are classified as follows:

- **MAPEI Ultralite Mortar**: C2TE S1 P1
- **MAPEI Ultralite Mortar Pro**: C1TE S1
- **MAPEI Ultralite S1 Quick**: C2TF S1 P1
- **MAPEI Ultralite S2**: C2E S2 P2

Additionally the products have been certified to meet the following Sustainability Specification:

- ANSI A138.1 – Green Squared® American National Standard Specifications for Sustainable Ceramic Tiles, Glass Tiles, and Tile Installation Materials

The finished products studied are delivered as follows:

- 11.3 kg plastic bags (25 lbs)
- LDPE (wrapping material)
- Wooden pallet

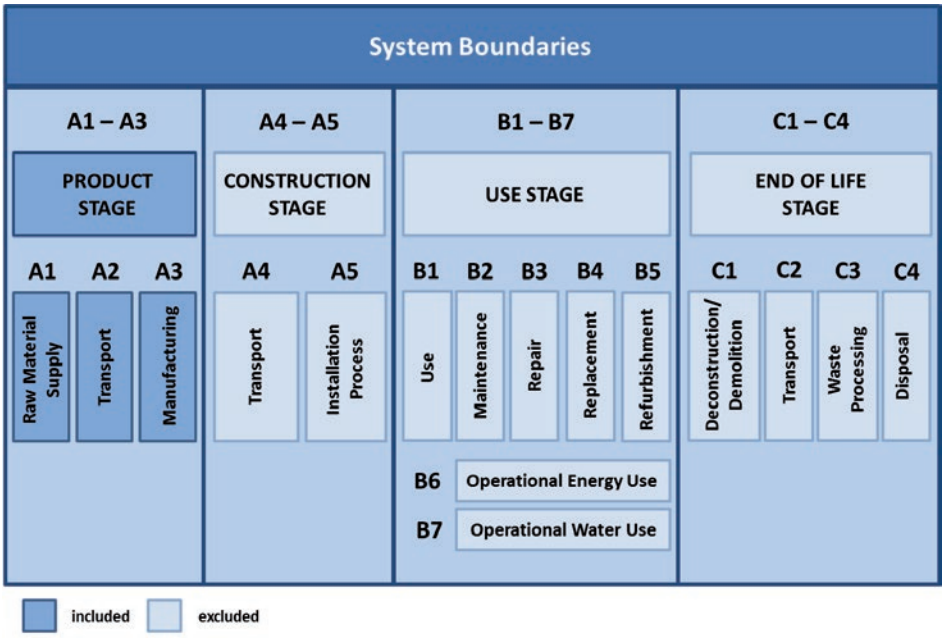
The service life of mortar is unique in that it does not depend on the amount of floor traffic nor on the type and frequency of maintenance. Mortar is replaced only when the ceramic tiles are replaced. Since tiles are assumed to have a service life equivalent to that of a building (TCNA, 2014) – that is 60 years – the mortar is thus assumed to have a 60-year RSL.

5. SYSTEM BOUNDARIES & ADDITIONAL TECHNICAL INFORMATION

The approach is “cradle to gate”. The following modules have been considered:

- A1-A3 (Product stage): extraction and transport of raw materials, packaging included, production process.

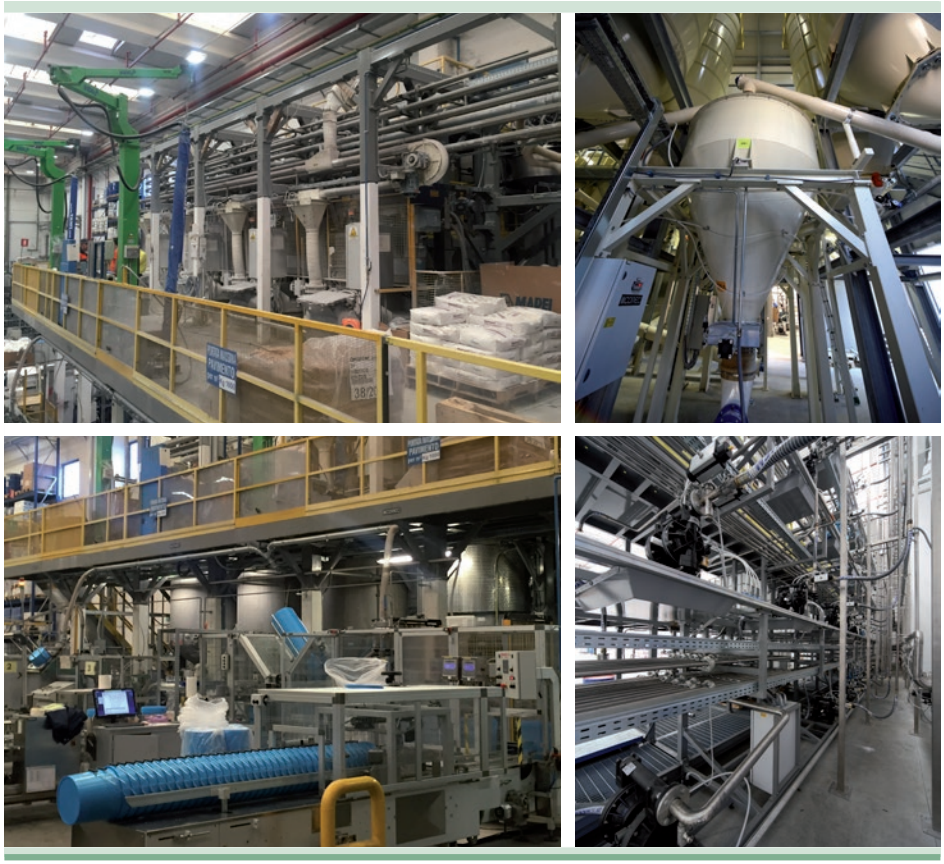
Table 2: System boundaries



A brief description of production process, is the following:

The production process starts from raw materials, that are purchased from external and intercompany suppliers and stored in the plant. Bulk raw materials are stored in specific silos and added automatically in the production mixer, according to the formula of the product. Other raw materials, supplied in bags, big bags or tanks, are stored in the warehouse and added automatically or manually in the mixer. The production is a discontinuous process, in which all the components are mechanically mixed in batches. The semi-finished product is then packaged in buckets, put on wooden pallets, covered by stretched hoods and stored in the finished products warehouse. The quality of final products is controlled before the sale.

Figure 1: Production process detail



6. CUT-OFF RULES & ALLOCATION

Criteria for the exclusion of inputs and outputs (cut-off rules) in the LCA, information modules and any additional information are intended to support an efficient calculation procedure. They are not applied in order to hide data.
The following procedure is followed for the exclusion of inputs and outputs:

- All inputs and outputs to a unit process, for which data are available, are included in the calculation.

Input flows are covered for the whole formula.

Table 3: Cut-off criteria

Process excluded from study	Cut-off criteria	Quantified contribution from process
A1: raw materials	Less than 0.1% (by mass) included in the formulas	Sensitivity study demonstrates a relative contribution lower than 0.3%

For the allocation procedure and principles, consider the following table (Table 4):

Table 4: Allocation procedure and principles

Module	Allocation Principle
A1	All data refer to 1 kg of powder • A1: electricity is allocated to the whole plant
A3	All data refer to 1 kg of packaged product: • A3-wastes: all data are allocated to the whole plant

7. ENVIRONMENTAL PERFORMANCE & INTERPRETATION

GWP_{100}

Global Warming Potential refers to the emission/presence of GHGs (greenhouse gases) in the atmosphere (mainly CO_2, N_2O, CH_4) which contribute to the increase in the temperature of the planet.

AP

Acidification Potential refers to the emission of specific acidifying substances (i.e. NOx, SOx) in the air. These substances decrease the pH of the rainfall with predictable damages to the ecosystem.

EP

Eutrophication Potential refers to the nutrient enrichment of flowing water, which determines unbalance in aquatic ecosystems and causes the death of the aquatic fauna.

ODP

Ozone Depletion Potential refers to the degradation of the stratospheric layer of the ozone involved in blocking the UV component of sunrays. Depletion is due to particularly reactive components that originate from chlorofluorocarbon (CFC) or chlorofluoromethanes (CFM).

POCP

The Photochemical Ozone Creation Potential is the ozone formation in low atmosphere. This is quite common in the cities where a great amount of pollutants (like VOC and NOx) are emitted every day (industrial emissions and vehicles). It is mainly diffused during the summertime.

ADP_e (elements)

Abiotic Depletion Potential elements refers to the depletion of the mineral resources.

ADP_f (fossil fuel)

Abiotic Depletion Potential fossil fuel refers to the depletion of the fossil fuel resources.

The following tables show environmental impacts for the products considered according to **CML2001** (Jan. 2016) methodology and **TRACI 2.1** methodology.

MAPEI Ultralite Mortar Pro (white and gray)

*Table 5: **MAPEI Ultralite Mortar Pro** (white): Environmental categories, impacts for 1 kg of product and for 1 m^2 of product calculated according to CML2001 methodology*

System boundary		Upstream + core	
Environmental category	Unit	A1 – A3 [for 1 kg of product]	A1 – A3 [for 1 m^2 of product]
GWP_{100}	(kg CO_2 eq.)	9.40E-01	3.41E+00
ODP	(kg R-11 eq.)	5.24E-08	1.90E-07
AP	(kg SO_2 eq.)	3.93E-03	1.43E-02
EP	(kg $(PO_4)^{3-}$ eq.)	1.08E-03	3.93E-03
POCP	(kg ethylene eq.)	3.98E-04	1.44E-03
ADPe (element)	(kg Sb eq.)	4.72E-06	1.71E-05
ADPf (fossil)	(MJ)	9.16E+00	3.32E+01

GWP_{100}: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

*Table 6: **MAPEI Ultralite Mortar Pro** (white): Environmental categories, impacts for 1 kg of product and for 1 m² of product calculated according to TRACI 2.1 methodologys*

System boundary		Upstream + core	
Environmental category	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m² of product]**
GWP	(kg CO_2 eq.)	9.35E-01	3.39E+00
ODP	(kg CFC-11 eq.)	6.64E-08	2.41E-07
AP	(kg SO_2 eq.)	4.00E-03	1.45E-02
EP	(kg N eq.)	1.73E-03	6.27E-03
SFP	(kg O_3 eq.)	6.09E-02	2.21E-01

GWP: Global Warming Potential; **ODP**: Ozone Depletion Potential; **AP**: Acidification Potential; **EP**: Eutrophication Potential; **SFP**: Smog Formation Potential.

*Table 7: **MAPEI Ultralite Mortar Pro** (white): Environmental categories, impacts for 1 kg of product and for 1 m² of product calculated according to TRACI 2.1 methodology*

System boundary		Upstream + core	
Environmental indicator	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m² of product]**
RPEE	MJ	9.64E+00	3.49E+01
RPEM	MJ		
TPE	MJ	9.64E+00	3.49E+01
NRPE	MJ	9.89E+00	3.58E+01
NRPM	MJ		
TRPE	MJ	9.89E+00	3.58E+01
SM	kg		
RSF	MJ		
NRSF	MJ		
W	m^3	6.12E-03	2.22E-02

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water [total freshwater consumption]

*Table 8: **MAPEI Ultralite Mortar Pro** (white): Waste production & other output flows*

System boundary		Upstream + core	
Output flow	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m² of product]**
NHW	kg	1.35E-02	4.90E-02
HW	kg	4.65E-05	1.69E-04
RW	kg	0.00E+00	0.00E+00
Components for re-use	kg	-	-
Materials for recycling	kg	-	-
Materials for energy recovery	kg	-	-
Exported energy	MJ	-	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

*Table 9: **MAPEI Ultralite Mortar Pro** (gray): Environmental categories, impacts for 1 kg of product and for 1 m² of product calculated according to CML2001 methodology*

System boundary		Upstream + core	
Environmental category	Unit	A1 – A3 [for 1 kg of product]	A1 – A3 [for 1 m² of product]
GWP_{100}	(kg CO_2 eq.)	8.40E-01	3.04E+00
ODP	(kg R-11 eq.)	5.12E-08	1.85E-07
AP	(kg SO_2 eq.)	3.84E-03	1.39E-02
EP	(kg $(PO_4)^{3-}$ eq.)	1.01E-03	3.67E-03
POCP	(kg ethylene eq.)	3.96E-04	1.44E-03
ADPe (element)	(kg Sb eq.)	5.08E-06	1.84E-05
ADPf (fossil)	(MJ)	9.03E+00	3.27E+01

GWP_{100}: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

*Table 10: **MAPEI Ultralite Mortar Pro** (gray): Environmental categories, impacts for 1 kg of product and for 1 m² of product calculated according to TRACI 2.1 methodology*

System boundary		Upstream + core	
Environmental category	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m² of product]**
GWP	(kg CO_2 eq.)	8.35E-01	3.03E+00
ODP	(kg CFC-11 eq.)	6.47E-08	2.34E-07
AP	(kg SO_2 eq.)	3.87E-03	1.40E-02
EP	(kg N eq.)	1.61E-03	5.83E-03
SFP	(kg O_3 eq.)	5.68E-02	2.06E-01

GWP: Global Warming Potential; **ODP**: Ozone Depletion Potential; **AP**: Acidification Potential; **EP**: Eutrophication Potential; **SFP**: Smog Formation Potential.

*Table 11: **MAPEI Ultralite Mortar Pro** (gray): Other environmental indicators, impacts for 1 kg of product and for 1 m² of product*

System boundary		Upstream + core	
Environmental indicator	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m² of product]**
RPEE	MJ	9.64E+00	3.49E+01
RPEM	MJ		
TPE	MJ	9.64E+00	3.49E+01
NRPE	MJ	9.70E+00	3.52E+01
NRPM	MJ		
TRPE	MJ	9.70E+00	3.52E+01
SM	kg		
RSF	MJ		
NRSF	MJ		
W	m^3	6.01E-03	2.18E-02

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water [total freshwater consumption]

*Table 12: **MAPEI Ultralite Mortar Pro** (gray): Waste production & other output flows*

System boundary		Upstream + core	
Output flow	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m^2 of product]**
NHW	kg	1.22E-02	4.40E-02
HW	kg	1.77E-05	6.43E-05
RW	kg	0.00E+00	0.00E+00
Components for re-use	kg	-	-
Materials for recycling	kg	-	-
Materials for energy recovery	kg	-	-
Exported energy	MJ	-	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

MAPEI Ultralite Mortar

*Table 13: **MAPEI Ultralite Mortar**: Environmental categories, impacts for 1 kg of product and for 1 m^2 of product calculated according to CML2001 methodology*

System boundary		Upstream + core	
Environmental category	Unit	A1 – A3 [for 1 kg of product]	A1 – A3 [for 1 m^2 of product]
 **GWP_{100}**	(kg CO_2 eq.)	1.07E+00	3.89E+00
 **ODP**	(kg R-11 eq.)	6.09E-08	2.21E-07
 **AP**	(kg SO_2 eq.)	4.46E-03	1.62E-02
 **EP**	(kg $(PO_4)^{3-}$ eq.)	1.21E-03	4.38E-03
 **POCP**	(kg ethylene eq.)	4.59E-04	1.66E-03
 **ADPe (element)**	(kg Sb eq.)	2.91E-06	1.06E-05
 **ADPf (fossil)**	(MJ)	1.12E+01	4.05E+01

GWP_{100}: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

*Table 14: **MAPEI Ultralite Mortar**: Environmental categories, impacts for 1 kg of product and for 1 m² of product calculated according to TRACI 2.1 methodology*

System boundary		Upstream + core	
Environmental category	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m² of product]**
GWP	(kg CO_2 eq.)	1.07E+00	3.87E+00
ODP	(kg CFC-11 eq.)	7.68E-08	2.78E-07
AP	(kg SO_2 eq.)	4.51E-03	1.63E-02
EP	(kg N eq.)	1.93E-03	7.00E-03
SFP	(kg O_3 eq.)	6.74E-02	2.44E-01

GWP: Global Warming Potential; **ODP**: Ozone Depletion Potential; **AP**: Acidification Potential; **EP**: Eutrophication Potential; **SFP**: Smog Formation Potential.

*Table 15: **MAPEI Ultralite Mortar**: Other environmental indicators, impacts for 1 kg of product and for 1 m² of product*

System boundary		Upstream + core	
Environmental indicator	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m² of product]**
RPEE	MJ	9.67E+00	3.51E+01
RPEM	MJ		
TPE	MJ	9.67E+00	3.51E+01
NRPE	MJ	1.20E+01	4.33E+01
NRPM	MJ		
TRPE	MJ	1.20E+01	4.33E+01
SM	kg		
RSF	MJ		
NRSF	MJ		
W	m^3	7.01E-03	2.54E-02

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water [total freshwater consumption]

*Table 16: **MAPEI Ultralite Mortar**: Waste production & other output flows*

System boundary		Upstream + core	
Output flow	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m^2 of product]**
NHW	kg	1.06E-02	3.86E-02
HW	kg	1.40E-05	5.06E-05
RW	kg	0.00E+00	0.00E+00
Components for re-use	kg	-	-
Materials for recycling	kg	-	-
Materials for energy recovery	kg	-	-
Exported energy	MJ	-	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

MAPEI Ultralite S1 Quick (white and gray)

*Table 17: **MAPEI Ultralite S1 Quick** (white): Environmental categories, impacts for 1 kg of product and for 1 m² of product calculated according to CML2001 methodology*

System boundary		Upstream + core	
Environmental category	Unit	A1 – A3 [for 1 kg of product]	A1 – A3 [for 1 m² of product]
GWP_{100}	(kg CO_2 eq.)	8.36E-01	3.03E+00
ODP	(kg R-11 eq.)	1.10E-07	3.99E-07
AP	(kg SO_2 eq.)	3.32E-03	1.20E-02
EP	(kg $(PO_4)^{3-}$eq.)	9.82E-04	3.56E-03
POCP	(kg ethylene eq.)	5.14E-04	1.86E-03
ADPe (element)	(kg Sb eq.)	5.13E-06	1.86E-05
ADPf (fossil)	(MJ)	1.21E+01	4.38E+01

GWP_{100}: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

*Table 18: **MAPEI Ultralite S1 Quick** (white): Environmental categories, impacts for 1 kg of product and for 1 m^2 of product calculated according to TRACI 2.1 methodology*

System boundary		Upstream + core	
Environmental category	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m^2 of product]**
GWP	(kg CO_2 eq.)	8.31E-01	3.01E+00
ODP	(kg CFC-11 eq.)	1.21E-07	4.38E-07
AP	(kg SO_2 eq.)	3.27E-03	1.19E-02
EP	(kg N eq.)	1.29E-03	4.67E-03
SFP	(kg O_3 eq.)	4.40E-02	1.59E-01

GWP: Global Warming Potential; **ODP**: Ozone Depletion Potential; **AP**: Acidification Potential; **EP**: Eutrophication Potential; **SFP**: Smog Formation Potential.

*Table 19: **MAPEI Ultralite S1 Quick** (white): Other environmental indicators, impacts for 1 kg of product and for 1 m^2 of product*

System boundary		Upstream + core	
Environmental indicator	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m^2 of product]**
RPEE	MJ	9.64E+00	3.49E+01
RPEM	MJ		
TPE	MJ	9.64E+00	3.49E+01
NRPE	MJ	1.26E+01	4.57E+01
NRPM	MJ		
TRPE	MJ	1.26E+01	4.57E+01
SM	kg		
RSF	MJ		
NRSF	MJ		
W	m^3	6.17E-03	2.24E-02

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water [total freshwater consumption]

*Table 20: **MAPEI Ultralite S1 Quick** (white): Waste production & other output flows*

System boundary		Upstream + core	
Output flow	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m^2 of product]**
NHW	kg	1.46E-02	5.30E-02
HW	kg	8.97E-05	3.25E-04
RW	kg	0.00E+00	0.00E+00
Components for re-use	kg	-	-
Materials for recycling	kg	-	-
Materials for energy recovery	kg	-	-
Exported energy	MJ	-	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

*Table 21: **MAPEI Ultralite S1 Quick** (gray): Environmental categories, impacts for 1 kg of product and for 1 m^2 of product calculated according to CML2001 methodology*

System boundary		Upstream + core	
Environmental category	Unit	A1 – A3 [for 1 kg of product]	A1 – A3 [for 1 m^2 of product]
GWP_{100}	(kg CO_2 eq.)	8.02E-01	2.91E+00
ODP	(kg R-11 eq.)	8.19E-08	2.97E-07
AP	(kg SO_2 eq.)	5.71E-03	2.07E-02
EP	(kg $(PO_4)^{3-}$eq.)	1.55E-03	5.63E-03
POCP	(kg ethylene eq.)	5.13E-04	1.86E-03
ADPe (element)	(kg Sb eq.)	8.12E-06	2.94E-05
ADPf (fossil)	(MJ)	1.14E+01	4.13E+01

GWP_{100}: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

*Table 22: **MAPEI Ultralite S1 Quick** (gray): Environmental categories, impacts for 1 kg of product and for 1 m² of product calculated according to TRACI 2.1 methodology*

System boundary		Upstream + core	
Environmental category	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m² of product]**
GWP	(kg CO_2 eq.)	7.94E-01	2.88E+00
ODP	(kg CFC-11 eq.)	1.01E-07	3.65E-07
AP	(kg SO_2 eq.)	5.54E-03	2.01E-02
EP	(kg N eq.)	2.56E-03	9.29E-03
SFP	(kg O_3 eq.)	6.43E-02	2.33E-01

GWP: Global Warming Potential; **ODP**: Ozone Depletion Potential; **AP**: Acidification Potential; **EP**: Eutrophication Potential; **SFP**: Smog Formation Potential.

*Table 23: **MAPEI Ultralite S1 Quick** (gray): Other environmental indicators, impacts for 1 kg of product and for 1 m² of product*

System boundary		Upstream + core	
Environmental indicator	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m² of product]**
RPEE	MJ	9.67E+00	3.51E+01
RPEM	MJ		
TPE	MJ	9.67E+00	3.51E+01
NRPE	MJ	1.20E+01	4.36E+01
NRPM	MJ		
TRPE	MJ	1.20E+01	4.36E+01
SM	kg		
RSF	MJ		
NRSF	MJ		
W	m^3	8.12E-03	2.94E-02

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water [total freshwater consumption]

*Table 24: **MAPEI Ultralite S1 Quick** (gray): Waste production & other output flows*

System boundary		Upstream + core	
Output flow	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m^2 of product]**
NHW	kg	1.46E-02	5.30E-02
HW	kg	8.97E-05	3.25E-04
RW	kg	0.00E+00	0.00E+00
Components for re-use	kg	-	-
Materials for recycling	kg	-	-
Materials for energy recovery	kg	-	-
Exported energy	MJ	-	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

MAPEI Ultralite S2 (white and gray)

For **MAPEI Ultralite S2**, the impacts between the two version (white and gray) differ for no more than 10%. In this case, it is possible to represent the impacts of both versions together.

*Table 25: **MAPEI Ultralite S2** (gray & white): Environmental categories, impacts for 1 kg of product and for 1 m^2 of product calculated according to CML2001 methodology*

System boundary		Upstream + core	
Environmental category	Unit	A1 – A3 [for 1 kg of product]	A1 – A3 [for 1 m^2 of product]
 **GWP_{100}**	(kg CO_2 eq.)	9.39E-01	3.40E+00
 **ODP**	(kg R-11 eq.)	6.60E-08	2.39E-07
 **AP**	(kg SO_2 eq.)	4.34E-03	1.57E-02
 **EP**	(kg $(PO_4)^{3-}$eq.)	1.24E-03	4.49E-03
 **POCP**	(kg ethylene eq.)	5.42E-04	1.97E-03
 **ADPe (element)**	(kg Sb eq.)	2.82E-06	1.02E-05
 **ADPf (fossil)**	(MJ)	1.25E+01	4.54E+01

GWP_{100}: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

*Table 26: **MAPEI Ultralite S2** (gray & white): Environmental categories, impacts for 1 kg of product and for 1 m^2 of product calculated according to TRACI 2.1 methodology*

System boundary		Upstream + core	
Environmental category	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m^2 of product]**
GWP	(kg CO_2 eq.)	9.32E-01	3.38E+00
ODP	(kg CFC-11 eq.)	8.41E-08	3.05E-07
AP	(kg SO_2 eq.)	4.33E-03	1.57E-02
EP	(kg N eq.)	2.02E-03	7.34E-03
SFP	(kg O_3 eq.)	6.16E-02	2.23E-01

GWP: Global Warming Potential; **ODP**: Ozone Depletion Potential; **AP**: Acidification Potential; **EP**: Eutrophication Potential; **SFP**: Smog Formation Potential.

*Table 27: **MAPEI Ultralite S2** (gray & white): Other environmental indicators, impacts for 1 kg of product and for 1 m^2 of product*

System boundary		Upstream + core	
Environmental indicator	**Unit**	**A1 – A3 [for 1 kg of product]**	**A1 – A3 [for 1 m^2 of product]**
RPEE	MJ	9.67E+00	3.51E+01
RPEM	MJ		
TPE	MJ	9.67E+00	3.51E+01
NRPE	MJ	1.33E+01	4.83E+01
NRPM	MJ		
TRPE	MJ	1.33E+01	4.83E+01
SM	kg		
RSF	MJ		
NRSF	MJ		
W	m^3	9.83E-03	3.56E-02

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water [total freshwater consumption]

*Table 28: **MAPEI Ultralite S2** (gray & white): Waste production & other output flows*

System boundary		Upstream + core	
Output flow	Unit	A1 – A3 [for 1 kg of product]	A1 – A3 [for 1 m^2 of product]
NHW	kg	1.32E-02	4.79E-02
HW	kg	7.53E-05	2.73E-04
RW	kg	0.00E+00	0.00E+00
Components for re-use	kg	-	-
Materials for recycling	kg	-	-
Materials for energy recovery	kg	-	-
Exported energy	MJ	-	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

The CML 2001 (Jan. 2016) and the TRACI 2.1 life cycle impact assessment methodologies are different due to their distinct modeling approaches as well as to the regions they represent.

The production of raw materials and the energy for manufacturing give the highest contribution in all impact categories considered and for both CML 2001 and TRACI 2.1.

Raw materials extraction and processing show the most relevant environmental load considering the system boundary: binders (both organic and inorganic) and fillers represent the most relevant contribution for all the environmental categories and indicators (up to 95% - see the detail in the plots below).

The electricity consumption during the production phase has a relative contribution up to 5% (in term of GWP_{100}) based on the electricity grid mix; more details about the electrical mix used in this EPD are reported in next table:

	Data source	Amount	Unit
Electricity grid mix (US) – 2013	GaBi database	0.614	kg CO_2-eqv/kWh

The contribution of the module **A3** is relevant also because the packaging components (plastic bag and wooden pallet) have quite high emission factors.

It is not possible to merge the environmental loads referred to the white and gray product versions because the values for the environmental categories considered differs for more than 10% and, according to the Environdec GPI (general program instructions) v 3.0, they have to be stated separately. The only exception is represented by **MAPEI Ultralite S2**, where just one table has been used to represent both the gray and white versions.

The details about the relative contribution of the different modules considered in the system boundary are shown in Table 29 and Table 30. A focus on the module A1, which represents the highest impact for all the environmental categories, is shown in Table 31.

Table 29: Environmental Impact as percentage (representative for all products considered) according to CML2001 (Jan. 2016) methodology

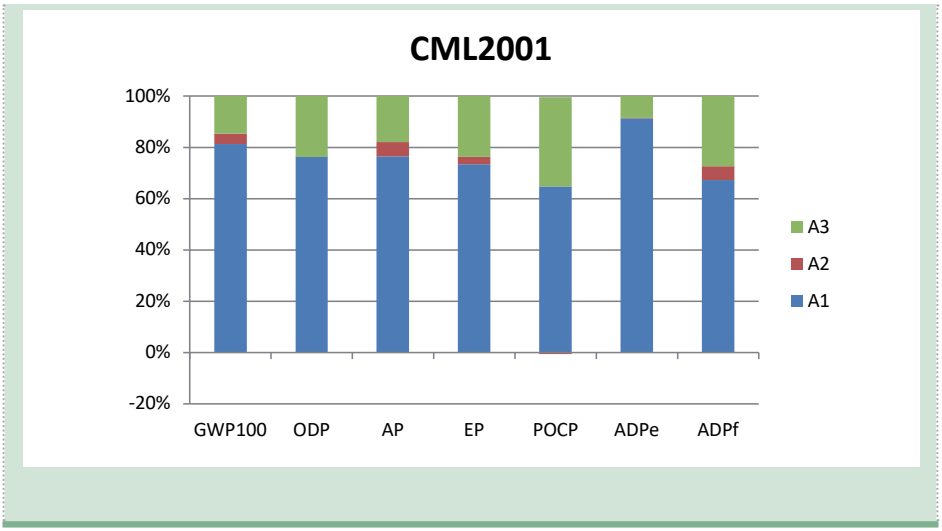
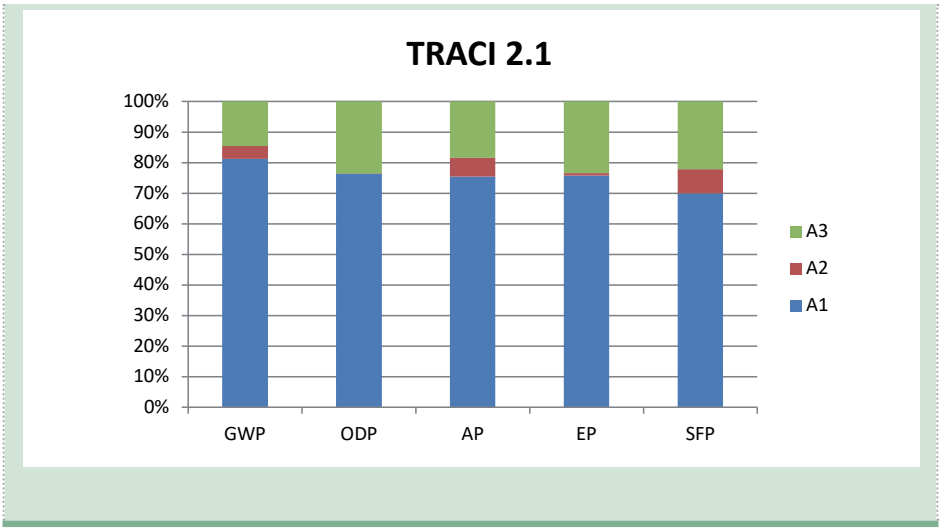
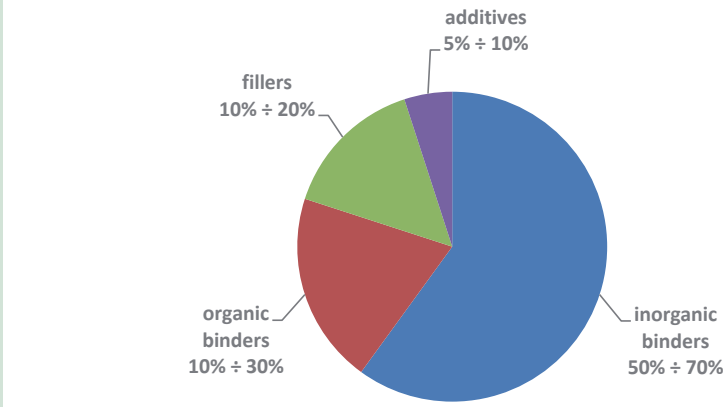


Table 30: Environmental Impact as percentage (representative for all products considered) according to TRACI 2.1 methodology



A detail on the GWP_{100} is shown in the piechart below (Table 31).

Table 31: Detail on GWP_{100} for the module A1



8. DATA QUALITY

Table 32: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
A1; A3		
Binders (US, specific from supplier)	ecoinvent v 3.3	2010 - 2015
Fillers (GLO)	ecoinvent v 3.3	2010 - 2016
Electricity grid mix (US)	GaBi Database	2013
Additives & others (Packaging components)	ecoinvent v 3.3	2007 - 2016
A2		
Truck transport (GLO)	GaBi Database	2016
Oceanic ship (27500 DWT - GLO)	GaBi Database	2016
Light Train Gross Ton Weight 500 Tons - GLO)	GaBi Database	2016
Electricity mix (US)	GaBi Database	2013
Diesel for transport (US)	GaBi Database	2013
Heavy Fuel Oil (US)	GaBi Database	2013

All data included in table above refer to a period between 2007 and 2016; all datasets come from global or US databases and they are all less than 10 years old (according to EN 15804 § 6.3.7 "*Data quality requirements*").
Primary data concern the year 2016 and represent the whole annual production

9. REQUISITE EVIDENCE VOC EMISSIONS

Volatile Organic Compounds (VOC) Emissions have been evaluated on **MAPEI Ultralite S2**, according to ISO 16000 parts 3, 6, 9 and 11 and CN/TS 16516. The adhesive has been analized in emission chambers, in order to detect its VOC emissions after 3 and 28 days storage in the ventilated chambers.

MAPEI Ultralite S2 meets the requirements for the emission class Emicode EC1R^{PLUS} label, as "very low VOC emission", released by GEV (Gemeinschaft Emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte e.V.).

The next table describes the limits for the Emicode EC1R^{PLUS} class:

	3 days µg/m³	28 days µg/m³
TVOC (C6-C16)	≤ 750 µg/m³	≤ 60 µg/m3
TSVOC (C16-C22)		≤ 40 µg/m³
C1A-C1B substances	Total ≤ 10 µg/m³	Single substances ≤ 1 µg/m³
Formaldehyde/ acetaldehyde	≤ 50 µg/m³	
Sum of formaldehyde/acetaldehyde	≤ 50 ppb	
Sum of non-assessable VOCs		≤ 40
R value		≤ 1

10. VERIFICATION AND REGISTRATION

EPD of construction products may not be comparable if they do not comply with EN 15804.
Environmental product declarations within the same product category from different programs may not be comparable.

CEN standard EN15804 contenente le PCR	
PCR:	PCR 2012:01 Construction products and Construction services, Version 2.2, 2017-05-30
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via **info@environdec.com**
Independent verification of the declaration and data, according to ISO 14025	☒ EPD Process Certification (Internal) ☐ EPD Verification (external)
Third party verifier:	Certiquality S.r.l. Number of accreditation: 003H rev14
Accredited or approved by:	Accredia

11. REFERENCES

- GENERAL PROGRAMME INSTRUCTIONS OF THE INTERNATIONAL EPD® SYSTEM. VERSION 3.0
- PCR 2012:01; “PRODUCT GROUP CLASSIFICATION: MULTIPLE UN CPC CODES CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES”; VERSION 2.2
- ISO 14044: ENVIRONMENTAL MANAGEMENT - LIFE CYCLE ASSESSMENT - REQUIREMENTS AND GUIDELINES
- ISO 14040: ENVIRONMENTAL MANAGEMENT - LIFE CYCLE ASSESSMENT - PRINCIPLES AND FRAMEWORKS
- ISO 14025: ENVIRONMENTAL LABELS AND DECLARATIONS - TYPE III ENVIRONMENTAL DECLARATIONS - PRINCIPLES AND PROCEDURES

12. CONTACT INFORMATION

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