MM 50 and PlanoFix

Masonry Mortars
by BAUMIT Bulgaria EOOD

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1. General Information

EPD owner: **BAUMIT Bulgaria EOOD**
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This declaration is the type III Environmental Product Declaration (EPD) based on EN 15804 and verified according to ISO 14025. It contains information about the impact of declared construction materials on environment and their aspects verified by the independent Advisory Board according to ISO 14025.

Basically, a comparison, or evaluation of EPD data is possible only if all the compared data were created according to EN 15804.

Life Cycle analysis (LCA): Modules A1-A3, C1-C4 in accordance with EN 15804 (Cradle to Gate with options)
Declared durability: 100 years under normal conditions of use
Product standard: BDS EN 998-2
PCR: ITB-EPD General PCR v1.4/2014
Representativeness: BG, RER, GLO

Declared unit: 1 ton masonry mortar dry mix
LCA scope: Product stage (modules A1-A3), End-of-life stage (modules C1-C4)
Year of preparing the characteristic: 2020

2. Product Description

BAUMIT MM 50

BAUMIT MM 50 is factory made dry mix for masonry mortar. It consists of limestone crushed stone, Portland cement, hydrated lime and additives. MM 50 mortar covers the requirements for masonry mortars of group M5–G as per BDS EN 998-2. MM 50 is packed in bags with mass 40 kg.

MM 50 mortar can be used with the usual construction materials for all types of masonry walls, including load-bearing and non-load bearing walls as well as masonry chimneys.

BAUMIT PlanoFix

BAUMIT PlanoFix is factory made dry mix for masonry mortar. PlanoFix consists of limestone crushed stone, Portland cement and additives. PlanoFix mortar covers the requirements for masonry mortars of group M5–T as per BDS EN 998-2. PlanoFix is packed in bags with mass 25 kg.

PlanoFix mortar can be used for masonry walls made with aerated autoclaved concrete blocks (cellular concrete blocks) and ceramic masonry blocks with even (factory-abraded) contact surfaces.

Figure 1: MM 50 masonry mortar

Figure 2: PlanoFix masonry mortar

Table 1 lists the essential characteristics of MM 50 and PlanoFix as per the Product specification sheets.

Table 1: Technical characteristics of MM 50 and PlanoFix

Characteristics	Value		Units	Technical specification
	MM 50	PlanoFix		
Dry density	≈ 1800	≈ 1480	kg/m^3	BDS EN 998-2
Grain size	< 4	0.6	mm	BDS EN 998-2
Compressive strength (28 day)	> 5	> 5	N/mm^2	BDS EN 998-2
Thermal conductivity, λ_r	≈ 0.80	≈ 0.80	W/(m.K)	BDS EN 998-2
Necessary water	≈ 5.5 – 6.0 l	≈ 5.75 l	litres/bag	
Production rate per 1 bag (25 kg)	24	18.45	litres ready masonry mortar from 1 bag	

3. LCA Information

FUNCTIONAL UNIT 1 ton masonry mortar dry mix

SYSTEM BOUNDARIES Cradle to Gate with options: Modules A1-A3, C1-C4

DECLARED DURABILITY 100 years under normal conditions of use

CUT-OFF CRITERIA As per EN 15804, in the case that there is not enough information, the process energy and materials representing less than 1% of the energy and mass used per module can be excluded (if they do not cause significant impacts). The addition of all the inputs and outputs excluded is less than 5% of the whole mass and energy used, as well of the emissions to environment occurred.
Flows related to human activities such as employee transport are excluded.

	In accordance with EN 15804 the construction of plants, production of machines and transportation systems are excluded. Environmental burden of the administrative building is partly considered. Some additives in very small amounts (less than 0.5 %) are excluded due to lack of enough data and negligible potential environmental impacts. The total sum of omitted processes does not exceed 5% of the whole mass of inputs and outputs.
ASSUMPTIONS AND LIMITATIONS	Generic data from ecoinvent v.3.6 database is used to model the masonry mortars components that are delivered by external suppliers and the manufacturer does not have influence on their production processes. Packaging materials and packaging waste are considered in the assessment of all components of MM 50 and PlanoFix.
GEOGRAPHICAL COVERAGE AND TIME PERIOD	All data related to the masonry mortars is collected from BAUMIT Bulgaria EOOD and represents the manufacturing process in 2018. Assessment of transport of all components covers all used transport types, external and internal transport activities.
DATA QUALITY	The information on the production process of the mortars is collected from BAUMIT Bulgaria EOOD. Information on the transport and composition of components is provided by BAUMIT Bulgaria EOOD. Information on the production process of additives is accounted as presented in ecoinvent v.3.6 database.
ALLOCATION	The factory of BAUMIT Bulgaria EOOD in Elin Pelin produces various construction products for external and internal finishing layers of buildings. The manufacturing processes for both masonry mortars are equivalent with slight variance in terms of working regime of drying and mixing stations. Even though, allocation is done regarding energy and fuel use, and generated waste. Environmental impacts, resource use and waste generation are calculated based on yearly data about the inputs/outputs and the yearly production of masonry mortars for 2018.

4. Manufacturing process

The received fraction of crushed stone is 20/60 mm and it is dried in an oven, if necessary. This fraction is then crushed in a coarse crusher and subsequently sieved into seven fractions. The smaller fractions are fed into pipelines and then carried to silos.

The other ingredients - cement CEM I 52.5 N, hydrated lime and additives (polymeric, cellulose), are delivered as dry substances. Cement and hydrated lime are delivered in mobile (transportable silos) and are discharged into the factory silos (in the factory tower) through pneumatic compressed air pipe system. The additives are delivered in paper bags or big bags and are also discharged into smaller silos in the factory tower.

After the predefined quantity of each material is set, the materials are dosed and released on gravity pipelines that take them to a mixing facility. The ready mix is then transported to a machine for bag-filling. For MM50 the packed product mass is 40 kg and for PlanoFix – 25 kg. The sealed bags are transported to

the palletizing station through conveying belt. The bags are arranged on the pallets and covered by elastic polyethylene film. The pallets are transported by forklifts to an outside storage space.

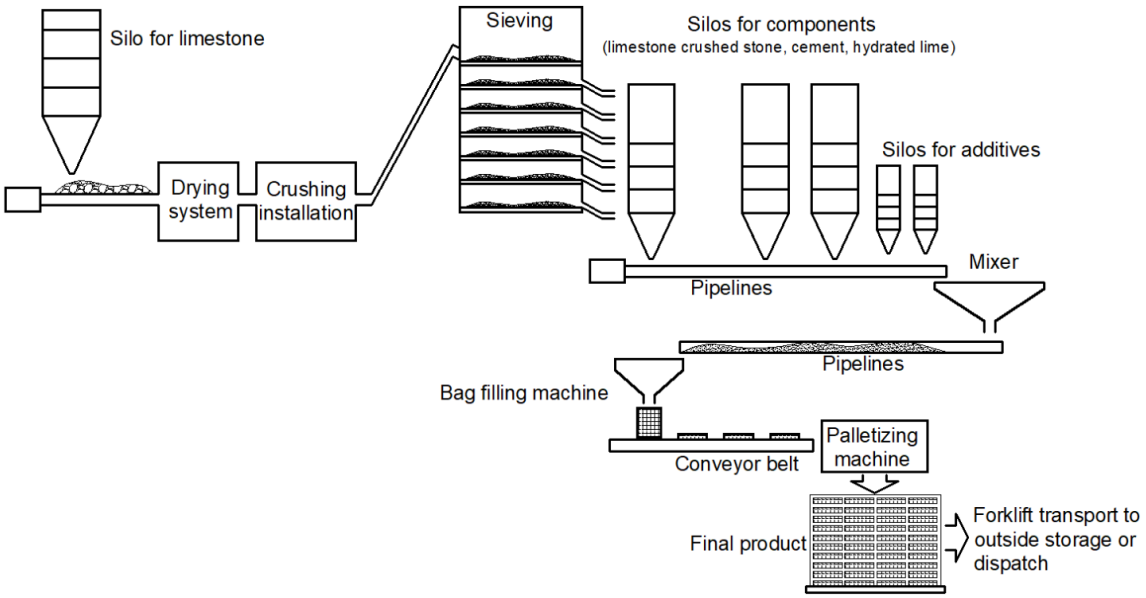

Figure 3: Production process of MM 50 and PlanoFix masonry mortars

5. System boundaries

Module A1: Raw materials supply and transport
Module A1 includes the production processes of the limestone crushed stone, Portland cement, hydrated lime and additives. Since the manufacturer does not produce these materials, they are considered using referent data for the ecoinvent 3.6 database. Production of packaging materials is also considered using referent data from the ecoinvent database.

Module A2: Transport of raw materials to the production site
The transport to the factory of the Portland cement, hydrated lime, limestone crushed stone, additives and packaging materials is considered using real data from the manufacturer.

Module A3: Manufacturing
This module considers the actual production process. This includes the process of crushing, drying, sieving, dosing, packaging and palletizing. Energy and fuel consumption are considered in full based on 1-year consumption data provided by the manufacturer.

Module C1: Deconstruction/Demolition of the building
Module C1 describes the processing of masonry mortar during the deconstruction/demolition of masonry walls as part of the deconstruction/demolition process of the entire building. Data is assembled based on developed scenario.

The following scenario is developed, based on existing practices in Bulgaria in regards with the construction and demolition waste (C&DW) management and the requirements of the national legislation (WMA, 2012 and Ordinance on C&DW management, 2012 and 2017). The national legislation imposes a

material recovery degree for some C&DW, such as waste from concrete (at least 85%) and bricks (at least 70%). Actually, due to the economic reasons, when such C&DW is generated, the whole amount is transported to a treatment plant for recovery operations.

The deconstruction/demolition of the masonry walls is considered as a part of the entire demolition process of the whole building. The masonry mortar represents a small percent of the mass of a masonry wall. Therefore, the contribution of the masonry mortars to the demolition of the entire building can be neglected and the impact of this module is assumed as zero.

Module C2: Transport to waste recovery facility

Module C2 refers to the transport of the C&D waste containing masonry mortar to a facility for waste recovery or disposal. Data is assembled based on developed scenario. The transport of waste containing masonry mortars is transported to a recovery facility (recycling plant). The following assumptions are made to calculate the impacts of this module:

- 100% of the masonry mortar is transported to a recovery facility as part of waste 17 01 01 or 17 01 02.

Table 2: Information on assumed transport for module C2

Parameter	Data
Transport of waste by	Lorry of the size class 7.5-16 tons, Euro IV emissions class.
Distance of transportation	25 km

Module C3: Waste processing

Module C3 accounts for the environmental impacts during the processing of C&D waste containing masonry mortar at the waste recovery facility. Data is assembled based on developed scenario. The masonry mortar-containing waste for recovery operations is classified as 'non-hazardous waste' of code 17 01 01 or 17 01 02.The first group of waste is recycled for all-in fraction 0/63 mm acc. to BDS EN 13242:2002+A1:2007. The recycling process includes crushing and screening. No preliminary treatment, additional sieving to fractions or post-treatment (washing, air cyclone) are applied. In Bulgaria, the recycling is usually performed in a treatment plant, but the main recycling equipment is mobile. Taking into consideration that the masonry mortar would be a small part of waste code 17 01 01, subject to that recycling and masonry mortar is a friable material, its contribution to the recycling-related impacts is to be neglected. The second group of waste (17 01 02) is usually recovered in backfilling. Only a rough crushing is applied to achieve a suitable grading.

Module C4: Disposal

Module C4 should consider the effects from masonry mortar containing C&DW that is disposed.

In the developed scenario no disposal operations are considered.

Module D: Benefits and loads beyond the system boundary

Module D regards the effects and impact of the secondary material derived from recycling of masonry mortar containing C&D waste. There is a high uncertainty regarding the development of scenarios for Module D, which makes it difficult to model and calculate. The recycled crushed stone fraction 0/63 mm of concrete C&DW code 17 01 01, containing masonry mortar contributes to the saving of natural materials and to the decrease of landfilling. However, the low content of masonry mortar in the total

fraction allows to neglect these positive impacts. When the treated C&DW of code 17 01 02 containing masonry mortar is used as backfilling material, it contributes to the savings of natural raw materials.

6. LCA Results

Declared unit

The declaration refers to 1 ton of masonry mortar dry mix.

Table 3: Description of the system boundary

Environmental assessment information (☒ – Included in LCA, MNA – Module not assessed, IND – Indicator not determined)															
Product stage			Construction process		Use stage							End of life				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 to construction site	Construction – assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling potential
☒	☒	☒	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	☒	☒	☒	☒	IND

The following tables provide the LCA results on the evaluated environmental categories. A list of the used abbreviations is given below:

GWP-total	Global warming potential total (sum of GWP-fossil, GWP-biogenic and GWP-luluc)
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	Ozone depletion potential
AP	Acidification potential
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	Photochemical ozone creation potential
ADP-minerals & metals	Abiotic depletion potential for non-fossil resources
ADP-fossil fuels	Abiotic depletion potential of fossil resources
RPER	Renewable primary energy resources
NRPER	Non-renewable primary energy resources
ETP-fw	Eco-toxilcity freshwater (Potential Comparative Toxic Unit for ecosystems)
HTP-c	Human toxicity, cancer effects (Potential Comparative Toxic Unit for humans)
HTP-nc	Human toxicity, non-cancer effects (Potential Comparative Toxic Unit for humans)
IRP	Ionizing radiation, human health (Potential Human exposure efficiency relative to U-235)
SQP	Land use related impacts/ Soil quality (Potential soil quality index)
PM	Particulate Matter emissions (Potential incidence of disease due to PM emissions)

Table 4: LCA results for MM 50 – environmental impacts, resource use, waste, output flows and biogenic carbon

Environmental impacts for 1 ton MM 50									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO_2–eq.	9.46E+01	6.49E+00	2.34E+01	0.00E+00	4.30E+00	1.69E+01	0.00E+00	IND
GWP-fossil	kg CO_2–eq.	9.39E+01	6.49E+00	2.34E+01	0.00E+00	4.30E+00	1.69E+01	0.00E+00	IND
GWP-biogenic	kg CO_2–eq.	6.64E-01	0.00E+00	1.77E-02	0.00E+00	0.00E+00	1.18E-02	0.00E+00	IND
GWP-luluc	kg CO_2–eq.	2.61E-03	5.05E-05	1.79E-05	0.00E+00	3.41E-05	5.01E-05	0.00E+00	IND
ODP	kg CFC 11–eq.	4.39E-06	1.52E-06	1.11E-06	0.00E+00	9.41E-07	3.35E-06	0.00E+00	IND
AP	mol H^+–eq.	2.26E-01	1.52E-02	1.66E-01	0.00E+00	2.06E-02	3.66E-02	0.00E+00	IND
EP-freshwater	kg PO_4–eq.	9.79E-03	4.70E-04	5.26E-02	0.00E+00	3.70E-04	2.55E-03	0.00E+00	IND
EP-marine	kg N–eq.	5.73E-02	2.16E-03	2.44E-02	0.00E+00	6.82E-03	5.30E-03	0.00E+00	IND
EP-terrestrial	mol N–eq.	6.68E-01	2.30E-02	1.46E-01	0.00E+00	7.43E-02	5.41E-02	0.00E+00	IND
POCP	kg NMVOC–eq.	1.69E-01	1.24E-02	4.33E-02	0.00E+00	2.11E-02	2.49E-02	0.00E+00	IND
ADP-minerals & metals	kg Sb–eq.	3.70E-04	1.30E-04	6.39E-05	0.00E+00	1.10E-04	2.97E-05	0.00E+00	IND
ADP-fossil	MJ	5.01E+02	9.92E+01	3.67E+02	0.00E+00	6.44E+01	2.32E+02	0.00E+00	IND
WDP	m^3	1.46E+03	8.10E+01	5.14E+03	0.00E+00	2.06E+01	6.65E+02	0.00E+00	IND

Additional environmental impacts for 1 ton MM 50									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
ETP-fw	CTUe	7.05E+00	4.03E+00	1.20E+00	0.00E+00	2.07E+00	1.34E+00	0.00E+00	IND
HTP-c	CTUh	1.35E-08	1.87E-09	7.20E-09	0.00E+00	1.32E-09	1.06E-08	0.00E+00	IND
HTP-nc	CTUh	1.02E-06	1.23E-07	1.38E-06	0.00E+00	9.05E-08	2.26E-07	0.00E+00	IND
IRP	kBq U-235-eq.	3.81E+00	5.13E-01	1.14E+01	0.00E+00	2.97E-01	2.03E+00	0.00E+00	IND
SQP	-	5.63E+02	1.60E+02	2.36E+01	0.00E+00	6.24E+01	2.99E+01	0.00E+00	IND
PM	Disease incidence	1.76E-06	5.31E-07	2.65E-07	0.00E+00	3.03E-07	7.40E-07	0.00E+00	IND

Resource use for 1 ton MM 50									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
RPER excluding RPER used as raw materials	MJ	3.28E+01	1.30E+00	2.81E+01	0.00E+00	7.14E-01	8.21E+00	0.00E+00	IND
RPER used as raw materials	MJ	2.51E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	IND
PERT	MJ	5.79E+01	1.30E+00	2.81E+01	0.00E+00	7.14E-01	8.21E+00	0.00E+00	IND
NRPER excluding NRPER used as raw materials	MJ	5.51E+02	1.01E+02	5.67E+02	0.00E+00	6.53E+01	2.53E+02	0.00E+00	IND
NRPER used as raw materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	IND
PENRT	MJ	5.51E+02	1.01E+02	5.67E+02	0.00E+00	6.53E+01	2.53E+02	0.00E+00	IND
Use of secondary material	kg	2.74E+00	3.59E-02	3.95E-02	0.00E+00	2.51E-02	1.34E-01	0.00E+00	IND
Use of renewable secondary fuels	MJ	1.55E+00	4.56E-02	1.15E+00	0.00E+00	1.40E-02	6.33E-01	0.00E+00	IND
Use of non-renewable secondary fuels	MJ	8.44E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	IND
Net use of fresh water	m^3	2.58E-01	7.17E-03	1.62E-01	0.00E+00	3.14E-03	4.01E-02	0.00E+00	IND

Output flows and waste categories for 1 ton MM 50									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.43E+00	9.85E-02	3.01E-01	0.00E+00	8.36E-02	3.69E-01	0.00E+00	IND
Non-hazardous waste disposed	kg	4.65E+01	9.98E+00	0.00E+00	0.00E+00	4.66E+00	1.21E+01	0.00E+00	IND
Radioactive waste disposed	kg	2.36E-03	6.90E-04	2.84E-03	0.00E+00	4.20E-04	1.72E-03	0.00E+00	IND
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	IND
Materials for recycling	kg	2.25E+00	3.08E-02	1.84E+01	0.00E+00	2.10E-02	1.21E-01	0.00E+00	IND
Materials for energy recovery	kg	2.06E-02	5.00E-04	1.13E-02	0.00E+00	1.80E-04	6.26E-03	0.00E+00	IND
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	IND

Biogenic carbon content	**Unit**	
Biogenic carbon content in product	kg C	1.17E-01
Biogenic carbon content in accompanying packaging	kg C	2.60E+01

Table 5: LCA results for PlanoFix – environmental impacts, resource use, waste, output flows and biogenic carbon

Environmental impacts for 1 ton PlanoFix									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO_2–eq.	1.54E+02	7.83E+00	2.66E+01	0.00E+00	4.30E+00	1.69E+01	0.00E+00	IND
GWP-fossil	kg CO_2–eq.	1.52E+02	7.83E+00	2.65E+01	0.00E+00	4.30E+00	1.69E+01	0.00E+00	IND
GWP-biogenic	kg CO_2–eq.	2.04E+00	0.00E+00	2.00E-02	0.00E+00	0.00E+00	1.18E-02	0.00E+00	IND
GWP-luluc	kg CO_2–eq.	3.26E-03	6.20E-05	2.03E-05	0.00E+00	3.41E-05	5.01E-05	0.00E+00	IND
ODP	kg CFC 11–eq.	5.46E-06	1.82E-06	1.26E-06	0.00E+00	9.41E-07	3.35E-06	0.00E+00	IND
AP	mol H^+–eq.	3.68E-01	1.83E-02	1.88E-01	0.00E+00	2.06E-02	3.66E-02	0.00E+00	IND
EP-freshwater	kg PO_4–eq.	1.72E-02	5.70E-04	5.97E-02	0.00E+00	3.70E-04	2.55E-03	0.00E+00	IND
EP-marine	kg N–eq.	9.63E-02	2.58E-03	2.77E-02	0.00E+00	6.82E-03	5.30E-03	0.00E+00	IND
EP-terrestrial	mol N–eq.	1.11E+00	2.75E-02	1.66E-01	0.00E+00	7.43E-02	5.41E-02	0.00E+00	IND
POCP	kg NMVOC–eq.	2.75E-01	1.46E-02	4.91E-02	0.00E+00	2.11E-02	2.49E-02	0.00E+00	IND
ADP-minerals & metals	kg Sb–eq.	6.50E-04	1.70E-04	7.24E-05	0.00E+00	1.10E-04	2.97E-05	0.00E+00	IND
ADP-fossil	MJ	7.22E+02	1.19E+02	4.16E+02	0.00E+00	6.44E+01	2.32E+02	0.00E+00	IND
WDP	m^3	2.73E+03	1.02E+02	5.83E+03	0.00E+00	2.06E+01	6.65E+02	0.00E+00	IND

Additional environmental impacts for 1 ton PlanoFix									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
ETP-fw	CTUe	7.77E+00	4.64E+00	1.36E+00	0.00E+00	2.07E+00	1.34E+00	0.00E+00	IND
HTP-c	CTUh	2.24E-08	2.31E-09	8.17E-09	0.00E+00	1.32E-09	1.06E-08	0.00E+00	IND
HTP-nc	CTUh	1.75E-06	1.49E-07	1.57E-06	0.00E+00	9.05E-08	2.26E-07	0.00E+00	IND
IRP	kBq U-235-eq.	6.28E+00	6.18E-01	1.30E+01	0.00E+00	2.97E-01	2.03E+00	0.00E+00	IND
SQP	-	6.60E+02	1.75E+02	2.67E+01	0.00E+00	6.24E+01	2.99E+01	0.00E+00	IND
PM	Disease incidence	2.42E-06	6.12E-07	3.00E-07	0.00E+00	3.03E-07	7.40E-07	0.00E+00	IND

Resource use for 1 ton PlanoFix									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
RPER excluding RPER used as raw materials	MJ	3.86E+01	1.59E+00	3.19E+01	0.00E+00	7.14E-01	8.21E+00	0.00E+00	IND
RPER used as raw materials	MJ	3.24E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	IND
PERT	MJ	7.09E+01	1.59E+00	3.19E+01	0.00E+00	7.14E-01	8.21E+00	0.00E+00	IND
NRPER excluding NRPER used as raw materials	MJ	8.11E+02	1.22E+02	6.43E+02	0.00E+00	6.53E+01	2.53E+02	0.00E+00	IND
NRPER used as raw materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	IND
PENRT	MJ	8.11E+02	1.22E+02	6.43E+02	0.00E+00	6.53E+01	2.53E+02	0.00E+00	IND
Use of secondary material	kg	3.41E+00	4.45E-02	4.47E-02	0.00E+00	2.51E-02	1.34E-01	0.00E+00	IND
Use of renewable secondary fuels	MJ	2.82E+00	5.63E-02	1.30E+00	0.00E+00	1.40E-02	6.33E-01	0.00E+00	IND
Use of non-renewable secondary fuels	MJ	2.36E-01	-1.94E-01	-5.06E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	IND
Net use of fresh water	m^3	4.12E-01	8.65E-03	1.84E-01	0.00E+00	3.14E-03	4.01E-02	0.00E+00	IND

Output flows and waste categories for 1 ton PlanoFix									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.50E+00	1.19E-01	3.41E-01	0.00E+00	8.36E-02	3.69E-01	0.00E+00	IND
Non-hazardous waste disposed	kg	8.23E+01	1.12E+01	0.00E+00	0.00E+00	4.66E+00	1.21E+01	0.00E+00	IND
Radioactive waste disposed	kg	3.35E-03	8.30E-04	3.22E-03	0.00E+00	4.20E-04	1.72E-03	0.00E+00	IND
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	IND
Materials for recycling	kg	2.81E+00	1.85E+01	1.84E+01	0.00E+00	2.10E-02	1.21E-01	0.00E+00	IND
Materials for energy recovery	kg	3.37E-02	6.20E-04	1.28E-02	0.00E+00	1.80E-04	6.26E-03	0.00E+00	IND
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	IND

Biogenic carbon content	**Unit**	
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in accompanying packaging	kg C	3.04E+01

7. Interpretation

For most environmental indicators more than half of the emissions come from module A1 (raw materials acquisition and pre-products processing). Cement is the component with the highest impact on most indicators because the manufacturing process requires a lot of energy. The cement content in PlanoFix is higher, which leads to higher environmental impacts. The GWP-total, POCP, EP-marine, EP-terrestrial and ADPE impacts for PlanoFix are by 50% higher, AP and FW are by 40% higher, ODP, EP-freshwater and ADPF are by 20-30% higher compared to MM 50. Use of non-renewable energy resources for PlanoFix is by 30% higher, and the use renewable energy resources is by 20% higher. Hydrated lime in MM 50 is also a significant contributor to most of the environmental impacts.

Transport of raw materials to the factory site (module A2) is of small importance for most indicators. It is relevant mostly to the ozone depletion (ODP) and abiotic depletion potential for elements (ADPE). The share of transport in the total values of these indicators is around 20-25%. The contribution from transport on the abiotic depletion potential for fossils is around 10%. For the rest of the indicators the contribution is less than 5%.

The manufacturing process (module A3) mostly associated with electricity consumption is also a significant contributor to the A1-A3 results. The contributions vary from one indicator to another, the highest impact from electricity is observed at AP, EP-freshwater and ADPF. Electricity production is also highly relevant to the GWP indicators, ODP, EP-marine and EP-terrestrial and ADPF.

The results from the end-of-life stage (modules C1-C4) are quite small compared to the product stage and are relevant to indicators (GWO, ADPF, PENRT) that account for fuel and energy use because of the machinery used for waste treatment and processing.

8. EPD verification

The process of verification of an EPD is in accordance with ISO 14025, clause 8.1.3 and ISO 21930, clause 9. After verification this EPD is valid for a 5 years period. EPD does not have to be recalculated after 5 years if the underlying data has not changed significantly.

CEN standard EN 15804 serves as the core PCR along with ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3) ☒ external ☐ internal
Verification of EPD: PhD Eng. Halina Prejzner, PhD Eng. Justyna Tomaszewska LCI audit and input data verification: PhD Eng. Roumiana Zaharieva, PhD Eng. Yana Kancheva, PhD Eng. Justyna Tomaszewska LCA auditor: PhD Eng. Roumiana Zaharieva, PhD Eng. Yana Kancheva Verification of procedures and declaration: PhD Eng. Justyna Tomaszewska

Literature

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[2] BDD EN 15804:2012+A2:2019, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

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[5] BDS EN 15942:2011, Sustainability of construction works – Environmental product declarations. Communication format business-to-business

[6] BDS EN 998-2:2016 Specification for mortar for masonry - Part 2: Masonry mortar

[7] Product specification sheet for MM 50, December 2015

[8] Data safety sheet for MM 50 v.2 – 01.06.2015

[9] Product specification sheet for PlanoFix, April 2018

[10] Data safety sheet PlanoFix v.3 – 01.06.2015

[11] International Energy Agency, www.iea.org (last visited March 21, 2019)

[12] EN 16449 – Wood and wood-based products – Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

[13] REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

[14] Bulgarian Law on Environmental protection, State Gazette No 91 dated 91 dated 25.09.2002, last amend. SG No 98 dated 27.11.2018 (Закон за опазване на околната среда)

[15] Bulgarian Waste Management Act, State Gazette No 53 dated 13.07.2012, last amend. SG No 81 dated 15.10.2019 (Закон за управление на отпадъците)

[16] Bulgarian Ordinance No.6 for construction and use of landfills and other facilities for waste recovery and disposal, State Gazette No 80 dated 13 Sept 2013г., last amend. SG No 13 dated 7.02.2017 (Наредба № 6 от 27 август 2013 г. за условията и изискванията за изграждане и експлоатация на депа и на други съоръжения и инсталации за оползотворяване и обезвреждане на отпадъци).

[17] Bulgarian Ordinance No 1 on the procedure and forms for providing information about the activities on waste and procedures for keeping the public registers, State Gazette No 51 dated 20 June 2014, last amend. SG No 51 dated 51 19 June 2018 (Наредба № 1 от 04 юни 2014 г. за реда и образците, по които се предоставя информация за дейностите по отпадъците, както и реда за водене на публични регистри)

Signature Not Verified

Dokument podpisany przez Agnieszka Winkler-Skalna; ITB
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dr inż. Agnieszka Winkler-Skalna

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