

# Environmental Product Declaration



THE INTERNATIONAL EPD® SYSTEM



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

**[Precast-concrete sandwich lightened-panels]**

from

**[Moretti S.p.A.]**



Programme:

The International EPD® System, [www.environdec.com](http://www.environdec.com)

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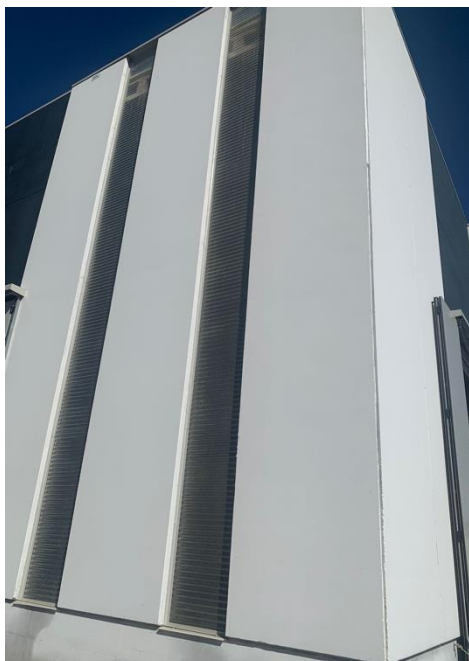
2024-03-31

Valid until:

2029-03-31

*EPD of multiple products, based on the "worst-best" case results of the included products.*

*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](http://www.environdec.com)*



## General information

### Programme information

<b>Programme:</b>	The International EPD® System
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### 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, version 1.3.3 - UN CPC 3755*

PCR review was conducted by: *PCR Committee: IVL Swedish Environmental Research Institute, Secretariat of the International EPD® System*  
Moderator: *Martin Erlandsson, IVL Swedish Environmental Research Institute*

#### Life Cycle Assessment (LCA)

LCA accountability: *Dott. Agr. Francesco Filocamo – PROGEST Consulting*

#### 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: *Marcel Gómez Ferrer (Marcel Gómez Consultoria Ambiental)*

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: Moretti S.p.A. – via Ghandi, 9 – 25030 – Erbusco (BS)

Contact: Ing. Mattia Pedrali – [mattia.pedrali@morettispa.it](mailto:mattia.pedrali@morettispa.it)

Description of the organization: The Moretti S.p.A. operates in the industrial prefabricated concrete sector and is the leading company in industrial prefabrication. In fact, he has created buildings ranging from large shopping centres to sports and leisure facilities, from production plants to office buildings, from residential complexes to villas, from hotels to wineries, from schools to religious buildings.

The company Moretti S.p.A. currently has 2 production centers: the historic headquarters in Erbusco and a recent opening in Balocco.

The headquarters in Erbusco (BS) has an extension of approximately 110,000 square meters of production surface, with an annual capacity of approximately 36,000 cubic meters of prefabricated concrete.

The headquarters in Balocco (VC) has a production area of approximately 160,000 square meters with a production capacity of approximately 19,000 cubic meters of precast concrete per year.

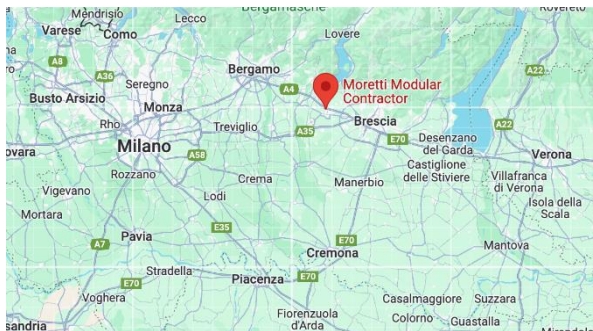
Product-related or management system-related certifications: Moretti S.p.A. is e certified company in according at the standards:

- ISO 9001
- ISO 45001
- ISO 14067 – Carbon Footprint SA
- BREEM (Building Research Establishment Environmental Assessment Method for buildings)

Name and location of production sites:

- Moretti S.p.A. – via Ghandi, 9 – 25030 – Erbusco (BS)
- Moretti S.p.A. – S.P. 57 – 13040 – Balocco (VC)

The manufacturing activities are carried-out in both facilities located at Erbusco (BS) and Balocco (VC) with the same processes and technologies; differences are considered in the study for the different distances from suppliers.



## Product information

Product name: Precast-concrete sandwich lightened-panels, with different thickness

Product identification: The elements are covered by the UE marking, as established by *CPR 305/2011 (Construction Products Regulation - EU)* and by the specific harmonized product standard EN 13225. The prefabricated panels are designed in compliance with the EN 14992:2007+A1:2012 Precast concrete products - Wall elements standard.

Product description: 1 square meter of a panel.

Included products: According to the General Programme Instruction (GPI) v. 4.0 and the *PCR 2019:14 "Construction products" v.1.3.3*, the 1 square meter product included in the study are represented by:

“Lightened panels which have inside a lightening element in polystyrene;  
the different thickness of element is cm 10, 15, 25.

The products included in the study are represented by vertical infill construction elements represented by solid prefabricated panels, with different thickness.

The infill panels constitute the walls of a building and therefore are the elements that delimit its external dimensions or divide it internally. These are sized in compliance with the technical regulations, mandatory and in force in the construction sector, sized to resist the design stresses and transmit the resulting loads to the vertical structures (pillars) or to the horizontal structures (beams).

From a building point of view, the infill panels are made of vibrated reinforced concrete and are available in the vertical version ("resting" on the foundation curb and "bracing" the elevated structure) or horizontally developed ("hanging" from the pillars), depending on the different architectural needs required.

The prefabricated panels are available in different thicknesses with variable fire resistance characteristics in accordance with the UNI EN 1992-1-2:2005 standard and with different thermal performances calculated according to the UNI EN ISO 10211:2008.



UN CPC code: **3755** – Prefabricated structural components for building or civil engineering, of cement, concrete or artificial stone.

Geographical scope: Italia

## LCA information

Declared unit: 1 square meter of a **“Lightened-panel” with thickness in cm 25.**

The weight of the product per declared unit is **Kg 413/m<sup>2</sup>**.

The declared unit is related to *the worst-case* and the weight of the product varies in function of the panel's thickness from Kg 248 – 413 per square meter (*see content tables below*).

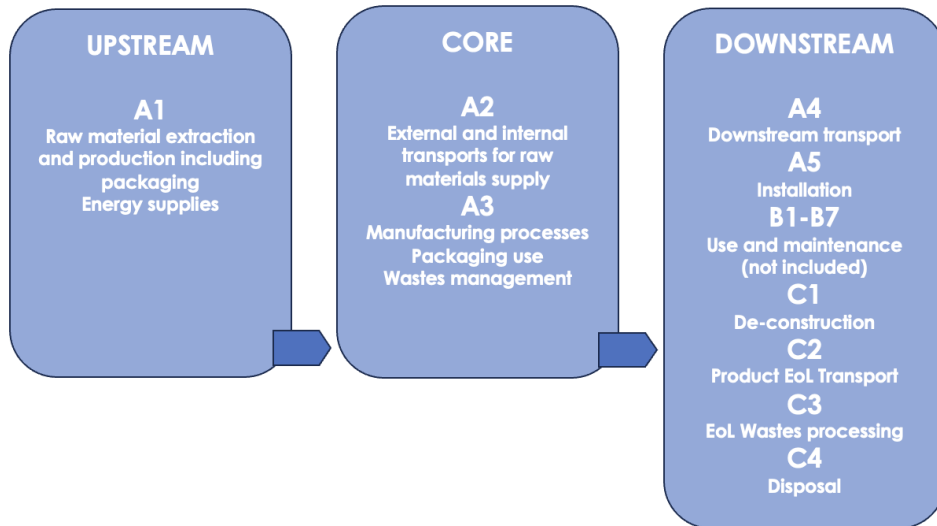
Reference service life: The duration of the products depends mainly on the duration of the building or construction site in which it is applied. Since the use phase is not covered in the EPD, there is no specific information on the reference RSL. It has been generically adopted a “reference life” of 50 years.

Time representativeness: 2022

Database(s) and LCA software used: The Ecoinvent database v.3.9.1 ([www.ecoinvent.org](http://www.ecoinvent.org)) provides the life cycle inventory data for the raw and process materials obtained from the background system. LCA software used is SimaPro 9.5.0.2.

Description of system boundaries: Cradle to gate with options, modules C1–C4, module D and with optional modules (A1–A3 + C + D and additional modules A4-A5).

## Stages descriptions



### UPSTREAM process

#### Stage:

*A1 – Raw material supply:* This stage considers the extraction and processing of all raw materials.

### CORE process

#### Stages:

*A2 - Transport:* This stage accounts for the transport activities of raw materials to both the facilities located in Erbusco (BS) and Balocco (VC). This stage includes road transport by lorry.

*A3 - Manufacturing:* This stage includes the manufacturing process conducted in the facilities before the transport to the different locations. The operations included in this stage are reported forward in the next paragraph.

### DOWNSTREAM process

#### Stages:

*A4 – Transport to the construction site:* This stage stands for transporting materials from the production site to the construction site. Different destination scenarios have been modelled in this stage to obtain an average impact considering the average distribution of sales during the last year. The products are shipped to construction sites located in Italy, with an average distance of Km 25 x 1 square meter of element.

*A5 – Construction/Installation:* This stage includes the activities related to the installation of the panels. It is assumed that energy is required for installation and this is modelled as working-time requested by the operation machine for displacement of the elements and by other equipment (i.e. electric-power generators), using as a reference the background process available in Ecoinvent 3.9 for conducting this specific activity. The air emissions deriving from the engines are considered. When the precast concrete panels are installed at work-sites it has assumed that none other materials are necessary for installation but only the placement is operated. The panels do not have packaging.

*B1-B7 – Use stage is not accounted.*

*C1 – Deconstruction/Demolition:* The impacts associated with the demolition phase require energy and this is modelled as working-time requested by the operation machine, using as a reference the background process available in Ecoinvent 3.9 for conducting this specific activity. The air emissions deriving from the engines are considered.

**C2 - Transport:** The transport of the dismantled materials is considered in this stage. A distance of 50 km is assumed to the disposal facility.

**C3 – Waste processing:** In the case of selective demolition of buildings, the product can be recovered and sent to companies specialized in recovery. A recovery percentage of 80% is estimated and the remaining materials sent to landfill.

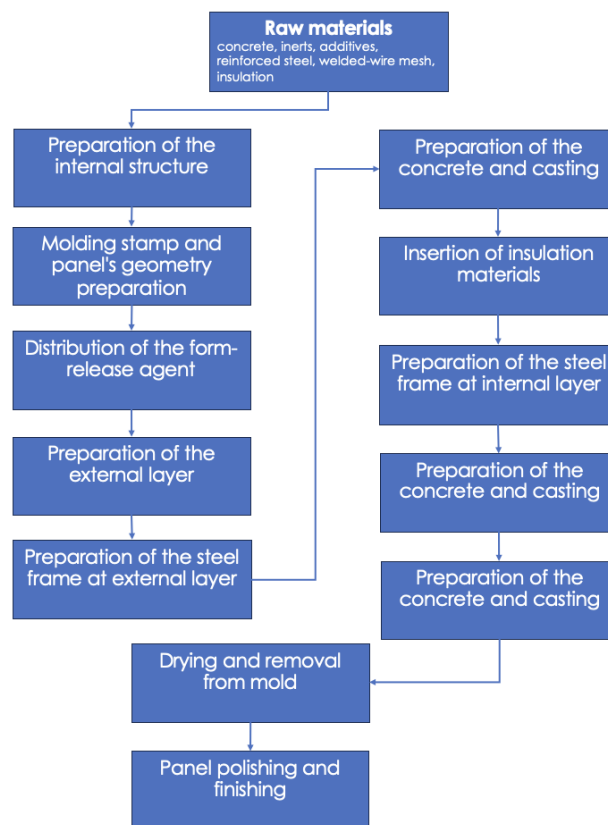
**C4 - Disposal:** The waste disposal scenario taken into account the disposal of the wastes deriving from the end-of-life of the structural elements which have not been sent for recovery.

The main assumptions during the end-of-life stage consider the scenario for de-construction wastes suggested by the industrial wastes management-book, yearly issued by ISPRA (Italian Higher Institute for Protection and Environmental Research) that considers, for this part of wastes, a disposed rate of about 97% in the inert-materials landfill and about 3% in the hazardous-wastes landfill.

Benefits and loads beyond the system boundaries:

**D – Benefits or recovery:** Benefits of recycled steel used in product are considered in module D. It is assumed the amount of recovered steel (22,1%, as illustrated in the ISPRA publication for wastes originated in manufacturing sector) is recycled and used as scrap steel in the production of the reinforced steel used by the company.

Processing diagram:



Production description for sandwich panels: The production of the sandwich-panels mainly consists of two steps:

- The preparation of the internal structure of the product consisting of reinforcements made with steel bars with improved adhesion, pylons and electro-welded meshes, adequately shaped according to the

design schemes and containing the insulating lightening material (when provided) necessary to optimize the performance characteristics of the product.

- The specific production of the panel which starts with the preparation of the formwork done in accordance with the executive technical datasheet. After having installed the sides and created the definitive geometry of the product, it proceeds to distribute the release-oil on the internal surface of the formwork; at the end, the external layer of the product (crust) is cast in concrete.

The cast is vibrated on site for a homogeneous distribution of it and at the same time, allows to eliminate of any parts of air trapped in it. In the case of the creation of the "Thermal Break" type of panel, before inserting the reinforcements, the laying of suitable insulation with thermal insulation function is required, in line with the required transmittance requirements.

The subsequent insertion of the previously assembled reinforcements inside the production mold takes place by means of an overhead crane and at the same time it proceeds with the assembly of dedicated lifting and/or connection accessories with the other products.

At this point in the production process, is cast the concrete which will form the internal crust of the product, joined with the structural ribs. At the end of the final casting, it proceeds with a first polishing phase, useful for removing the concrete exceeding the section of the product.

The final finishing process involves mechanical trowelling, useful for containing the natural imperfections of the straightened concrete.

Cut-off rules: 1% cut-off is applied. The following were excluded from the study: Manufacture of equipment used in production, buildings or any other capital goods; The transportation of personnel to the plant; Transportation of personnel within the plant; Research and development activities; Long-term emissions.

Quality data: The foreground data was collected internally, considering the latest available average production amounts and measures during the last year. Data regarding waste processes and scenarios were taken from waste scenarios for Europe contained in Ecoinvent 3.9. Specific data are used for raw materials, electricity, fuel data, emissions, waste data, average distances and means of transport in modules A2 and A4.

Electricity mix: The electricity used in the production process (phase A1-A3). The electric energy was modelled considering the mix of the supply company for the period considered. The GWP-GHG of the electricity mix is equal to kgCO<sub>2</sub>e 0.571/kWh.

Allocation rules: In A1-A3 modules the mass-allocation was used, based on the quantity and type of products in the reference year.

An additional quantity of 2,5% has been accounted for the steel used in the manufacturing process in according at the "*modularity principle*", balancing a wastage of 2,5% considered for the steel in use, due its dimensional adaptation at the element under production.

The generated wastes that go to recycling are considered out of the system in according at the "*polluter-pay-principle*".

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				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	Raw material supply	Transport of raw materials	Manufacturing	Transport to customer	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport to waste processing	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
<b>MODULES</b>	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
<b>Declared Modules</b>	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
<b>Geography</b>	IT	IT	IT	IT	IT								IT	IT	IT	IT	IT
<b>Share of specific data</b>	>90%																
<b>Variation – products</b>	---																
<b>Variation – sites</b>	not relevant																

### Content information – worst case of “Lightened-Panels” family (cm 25)

Manufacturing site			
Erbusco (BS)		Balocco (VC)	
weight / D.U. Kg/m <sup>2</sup> 413			
Product components	Weight - Kg	Post-consumer material Weight %	Biogenic material, weight Kg C/Kg
Cement	58	2,5%	0; 0
Inerts	319	0	0; 0
Reinforced steel	11	87%	0; 0
Insulation element (polystyrene)	2,5		
Water	21	0	0; 0
Additives	0,8	0	0; 0

The products are sold without packaging.

The product does not contain substances which exceed the limits for registration with the European Chemicals Agency regarding the “Candidate List of Substances of Very High Concern for Authorisation”.



## Results of the environmental performance indicators for m<sup>2</sup> 1 of “Lightened-Panel” tick cm 25 – worst-case

### Mandatory impact category indicators according to EN 15804

#### Results per functional or declared unit = m<sup>2</sup> 1 – tick cm 25 Lightened-panel worst-case

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	Kg CO <sub>2</sub> eq	1,17E+02	2,25E+00	1,51E+01	1,67E+01	3,89E+00	1,53E+00	1,14E+00	-2,81E+00
GWP-biogenic	Kg CO <sub>2</sub> eq	1,57E+00	1,64E-02	2,40E-02	2,90E-02	2,83E-02	2,95E-03	2,26E-02	-7,51E-02
GWP-luluc	Kg CO <sub>2</sub> eq	2,37E-02	1,09E-03	1,60E-03	1,87E-03	1,89E-03	2,15E-04	6,59E-03	-1,94E-03
GWP-total	Kg CO <sub>2</sub> eq	1,18E+02	2,26E+00	1,52E+01	1,67E+01	3,92E+00	1,53E+00	1,17E+00	-2,89E+00
ODP	Kg CFC 11eq	6,19E-06	4,89E-08	2,40E-07	2,64E-07	8,46E-08	2,44E-08	2,78E-08	-5,12E-08
AP	mol H <sup>+</sup> eq	1,64E-01	7,32E-03	1,29E-01	1,08E-01	1,27E-02	1,41E-02	6,64E-03	-1,25E-02
EP-freshwater	kg P eq	2,05E-02	1,57E-04	4,19E-04	5,10E-04	2,72E-04	4,88E-05	2,93E-04	-1,37E-03
EP-marine	Kg N eq	3,95E-02	2,52E-03	5,92E-02	4,85E-02	4,36E-03	6,53E-03	2,22E-03	-2,87E-03
EP-terrestrial	mol N eq	4,05E-01	2,66E-02	6,43E-01	5,26E-01	4,60E-02	7,10E-02	2,36E-02	-2,91E-02
POCP	Kg NMVOC eq	2,30E-01	1,09E-02	1,90E-01	1,63E-01	1,89E-02	2,11E-02	9,04E-03	-1,37E-02
ADP-fossil*	MJ	6,81E+02	3,18E+01	1,97E+02	2,18E+02	5,51E+01	2,01E+01	2,07E+01	-3,09E+01
ADP-minerals&metals*	Kg Sb eq	2,41E-04	7,21E-06	5,48E-06	5,80E-06	1,25E-05	5,79E-07	1,61E-06	-1,87E-05
WDP*	m <sup>3</sup>	2,74E+01	1,30E-01	4,07E-01	4,69E-01	2,25E-01	5,04E-02	7,26E-01	-2,44E-01

Akronyms	<p><b>GWP-fossil</b> = Global Warming Potential fossil fuels; <b>GWP-biogenic</b> = Global Warming Potential biogenic; <b>GWP-luluc</b> = Global Warming Potential land use and land use change; <b>ODP</b> = Depletion potential of the stratospheric ozone layer; <b>AP</b> = Acidification potential, Accumulated Exceedance; <b>EP-freshwater</b> = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; <b>EP-marine</b> = Eutrophication potential, fraction of nutrients reaching marine end compartment; <b>EP-terrestrial</b> = Eutrophication potential, Accumulated Exceedance; <b>POCP</b> = Formation potential of tropospheric ozone; <b>ADP-minerals&amp;metals</b> = Abiotic depletion potential for non-fossil resources; <b>ADP-fossil</b> = Abiotic depletion for fossil resources potential; <b>WDP</b> = Water (user) deprivation potential, deprivation-weighted water consumption</p>
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\* 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 functional or declared unit = m<sup>2</sup> 1 – tick cm 25 Lightened-panel worst-case

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG <sup>1</sup>	Kg CO <sub>2eq</sub>	<b>5,98E+01</b>	2,63E+00	1,72E+01	1,90E+01	4,55E+00	1,74E+00	1,41E+00	-2,82E+00
PM	Desease incidence	<b>2,49E-06</b>	1,79E-07	2,60E-06	2,76E-06	3,09E-07	2,72E-06	1,41E-07	-2,41E-07
IRP	Kg U <sub>235</sub> eq	<b>2,82E+00</b>	4,26E-02	8,68E-02	1,03E-01	7,38E-02	9,88E-03	2,16E-02	-1,31E-01
ETP-fw	CTUeq	<b>1,31E+02</b>	1,16E+01	7,13E+01	7,84E+01	2,01E+01	7,27E+00	7,02E+00	-1,21E+01
HTP-c	CTUh	<b>1,00E-07</b>	1,02E-09	5,52E-09	8,17E-09	1,77E-09	4,73E-10	3,27E-09	-2,18E-08
HTP-nc	CTUh	<b>1,68E-06</b>	2,24E-08	3,50E-08	3,95E-08	3,88E-08	3,40E-09	6,72E-09	-5,98E-08
SQP	Pt	<b>5,43E+02</b>	1,90E+01	1,31E+01	1,47E+01	3,28E+01	1,77E+00	4,21E+01	-9,53E+00

*The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.*

Akronyms	<p><b>PM</b> = Particulate matter emissions; <b>IRP</b> = Ionizing radiation, human health; <b>ETP-fw</b> = Eco-toxicity - freshwater; <b>HTP-c</b> = Human toxicity, cancer effect; <b>HTP-nc</b> = Human toxicity, non-cancer effects; <b>SQP</b> = Land use related impacts/Soil quality.</p> <hr/> <p><sup>1</sup> - 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 CO<sub>2</sub> is set to zero.</p>
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### Resource use indicators

#### Results per functional or declared unit = m<sup>2</sup> 1 – tick cm 25 Lightened-panel worst-case

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,54E+01	3,59E-01	7,93E-01	9,54E-01	6,21E-01	9,19E-02	-3,92E-01	-2,12E+00
PERM	MJ	8,08E+00	1,36E-01	2,36E-01	2,86E-01	2,36E-01	2,77E-02	2,75E+00	-6,83E-01
PERT	MJ	3,35E+01	4,95E-01	1,03E+00	1,24E+00	8,57E-01	1,20E-01	2,36E+00	-2,80E+00
PENRE	MJ	6,32E+02	3,18E+01	6,20E+01	1,20E+02	5,51E+01	2,01E+01	2,07E+01	-3,09E+01
PENRM	MJ	4,87E+01	0,00E+00	1,35E+02	9,80E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	6,81E+02	3,18E+01	1,97E+02	2,18E+02	5,51E+01	2,01E+01	2,07E+01	-3,09E+01
SM	Kg	1,11E+01	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
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
FW	m <sup>3</sup>	7,74E-01	4,54E-03	1,49E-02	1,71E-02	7,85E-03	1,76E-03	1,79E-02	-1,45E-02
Akronyms	<p> <b>PERE</b> = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; <b>PERM</b> = Use of renewable primary energy resources used as raw materials; <b>PERT</b> = Total use of renewable primary energy resources; <b>PENRE</b> = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; <b>PENRM</b> = Use of non-renewable primary energy resources used as raw materials; <b>PENRT</b> = Total use of non-renewable primary energy re-sources; <b>SM</b> = Use of secondary material; <b>RSF</b> = Use of renewable secondary fuels; <b>NRSF</b> = Use of non-renewable secondary fuels; <b>FW</b> = Use of net fresh water                 </p>								

### Waste indicators

#### Results per functional or declared unit = m<sup>2</sup> 1 – tick cm 25 Lightened-panel worst-case

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	Kg	2,39E-03	2,03E-04	1,33E-03	1,46E-03	3,51E-04	1,35E-04	2,83E+00	-2,05E-04
Non-hazardous waste disposed (NHWD)	Kg	9,87E+00	1,56E+00	2,56E-01	3,11E-01	2,69E+00	3,16E+02	9,70E+01	-1,21E+00
Radioactive waste disposed (RWD)	Kg	6,26E-04	1,03E-05	1,99E-05	2,38E-05	1,79E-05	2,29E-06	5,18E-06	-3,29E-05

## Output flow indicators

### Results per functional or declared unit = m<sup>2</sup> 1 – tick cm 25 Lightened-panel worst-case

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use (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
Materials for recycling (MFR)	Kg	8,85E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,53E+02	0,00E+00	-1,96E+00
Materials for energy recovery (MER)	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
Exported electrical energy (EEE)	MJ	1,38E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (EET)	MJ	1,10E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

## Comparison of environmental impact-indicators between the “Lightened-panels” under study

The percentage variation in the modules A1-A3 results for each of the products in relation at the "worst-case" of the studied products. The environmental impact results of the products are calculated per 1 square meter (m<sup>2</sup>) of each panel. The differences in impact-indicators are therefore due to the different raw materials consumption of each product, with a range of Kg 248-413 per square meter.

### LIGHTENED panels" family (cm 15-25)

IMPACT CATEGORIES	M.U.	A1+A3	A1+A3	panel cm 15 "best-case"		panel cm 20	
		panel cm 25 "worst-case"	average lightened paneles	A1+A3	differences by worst-case (%)	A1+A3	differences by worst-case (%)
Global warming potential - fossil fuels (GWP-fossil)	Kg CO <sub>2</sub> e	1,17E+02	9,31E+01	6,98E+01	-40,1%	9,31E+01	-20,1%
Global warming potential - biogenic (GWP-biogenic)	Kg CO <sub>2</sub> e	1,57E+00	1,26E+00	9,40E-01	-40,1%	1,26E+00	-20,0%
Global warming potential - land use and land use change (GWP-luluc)	Kg CO <sub>2</sub> e	2,37E-02	1,89E-02	1,42E-02	-40,1%	1,89E-02	-20,0%
Global warming potential - total (GWP-total)	Kg CO <sub>2</sub> e	1,18E+02	9,44E+01	7,07E+01	-40,1%	9,43E+01	-20,1%
Depletion potential of the stratospheric ozone layer (ODP)	Kg CFC-11 eq	6,19E-06	4,95E-06	3,71E-06	-40,1%	4,94E-06	-20,2%
Acidification potential, accumulated exceedance (AP)	moli H <sup>+</sup> eq	1,64E-01	1,31E-01	9,81E-02	-40,1%	1,31E-01	-20,0%
Eutrophication potential - freshwater (EP-freshwater)	Kg P eq	2,05E-02	1,63E-02	1,23E-02	-40,1%	1,63E-02	-20,1%
Eutrophication potential - marine (EP-marine)	Kg N eq	3,95E-02	3,16E-02	2,37E-02	-40,1%	3,16E-02	-20,0%
Eutrophication potential - terrestrial (EP-terrestrial)	moli N eq	4,05E-01	3,24E-01	2,43E-01	-40,1%	3,24E-01	-20,0%
Photochemical ozone creation potential (POCP)	Kg NMVOC eq	2,30E-01	1,84E-01	1,38E-01	-40,1%	1,84E-01	-20,0%
Abiotic depletion potential - fossil resources (ADPF)*	MJ	6,81E+02	5,44E+02	4,07E+02	-40,2%	5,45E+02	-20,0%
Abiotic depletion potential - non-fossil resources (ADPE)*	Kg Sb eq	2,41E-04	1,93E-04	1,45E-04	-40,1%	1,93E-04	-19,9%
Water (user) deprivation potential (WDP)*	m <sup>3</sup> depriv.	2,74E+01	2,19E+01	1,64E+01	-40,1%	2,19E+01	-20,1%

## Additional environmental information

### Recycled materials content

The construction elements manufactured by Moretti S.p.A. and reported here contain part of recycled by-product material available in cement and reinforced steel components. The total average percentage of **recycled materials, calculated in the declared unit (m<sup>2</sup> 1) is 0,45% per square meter of LIGHTENED-panel.**

The assessment method approached to define the percentage of recycled materials content (arriving from cement and reinforced steel) is the method of mass balance.

The following calculation has been made taking into consideration the weight of panel based on its thickness of cm 15.

Content of Recycled materials per F.U. of "Lightened-panels" worst-case (cm 25)			
Kg 413 / m <sup>2</sup>			
Product components	Average content per F.U.	Average of Post-consumer recycled material in the component	Average content of recycled material per F.U. (Kg/m <sup>2</sup> )
Cement	14,5%	2,50%	1,5
Reinforced steel	2,7%	87%	9,7
Total Kg			11,2
Total %			0,45%

## LCA interpretation

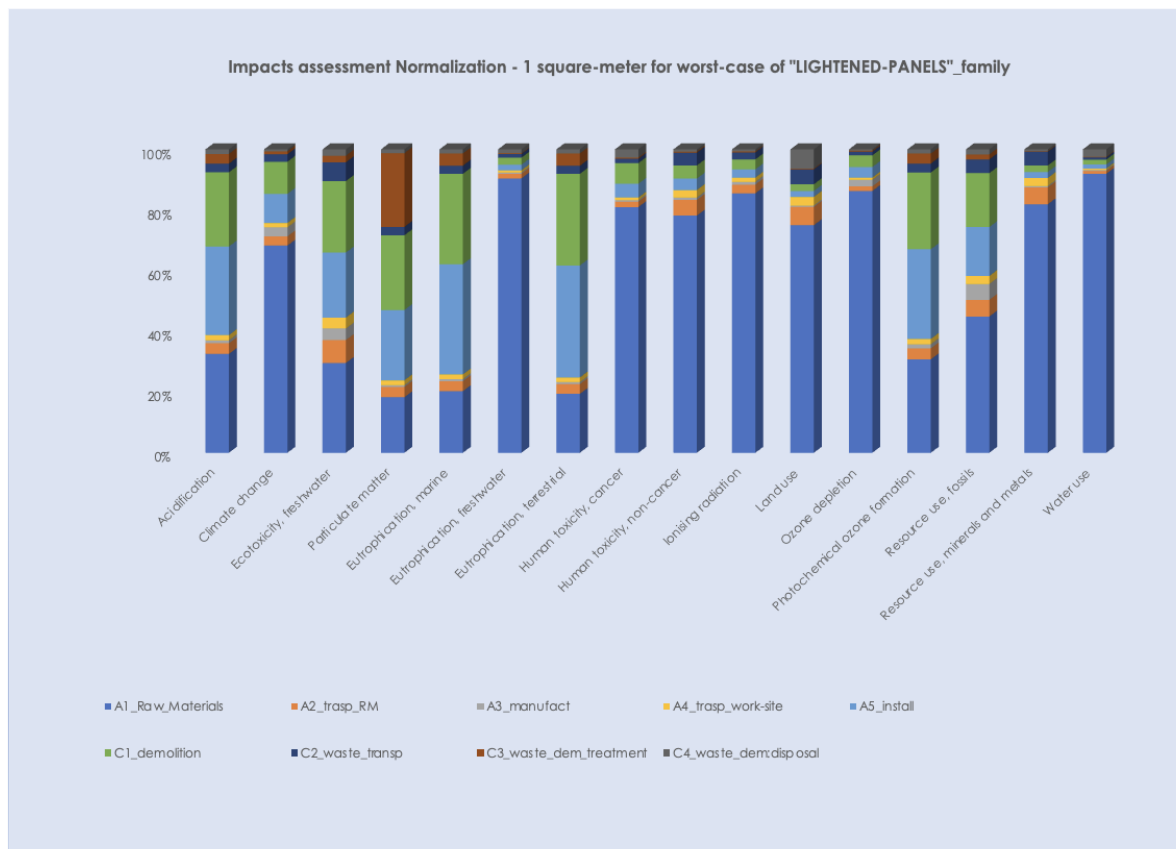
Individual Life Cycle Assessments have been carried out for the structural elements manufactured by MORETTI company to identify their environmental impact following the framework described in ISO 14025 (2006), ISO 21930 (2007), and EN 15804:2012+A2:2019. Additional PCR (PCR 2019:14 Construction products, version 1.3.3) was considered during this study. The LCAs were performed assuming a declared unit of m<sup>2</sup> 1 with an RSL of 50 years.

The impact on the various environmental impact categories in the life cycle per declared unit of structural elements manufactured by MORETTI company is primarily driven by the production stage (A1-A3). The production stage accounts for more than 60% of the overall impact in most categories, especially in the Global Warming potential resulting from land use and land use changes, freshwater eutrophication, ozone depletion potential.

In terms of fossil resources uses, the transport of the raw materials, the elements to work-site and the deconstruction processes contribute each-one with about 20%.

From the End-of-Life stage, module C1 is the most significant contributor (i.e particulate matter, eutrophication marine water and terrestrial, due that the materials are mainly recovered and have a low impact in disposal activities).

Module D, accounting for benefits or loads beyond the system boundaries, shows a benefit from recycling steel components according to the modelled waste treatment scenario within the time boundaries, with average values of about 22%.



## Information related to the EPD sector

This EPD is not sectorial.

## Differences from previous version

This document is the first version of EPD.

## References

- General Programme Instructions of the International EPD<sup>®</sup> System. Version 4.0
- PCR 2019:14 Construction products, version 1.3.3
- EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental
- ISO 14040-44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment-Principles
- ISO 14021:1999, “Environmental labels and declarations – Self-declared environmental claims (Type II environmental labeling)”
- ISPRA, Rapporto rifiuti speciali Edizione 2023



