Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Geodren®

High-Performance Polypropylene Nonwoven Geotextile

from

Edilfloor S.p.A.

Product category rules (PCR): *PCR 2019:14 (v1.11)*

Geographical area: The performances are calculated with reference to the Edilfloor plant - Sandrigo (VI) - Italy. The market is international.

Programme:	The International EPD® System, www.environdec.com
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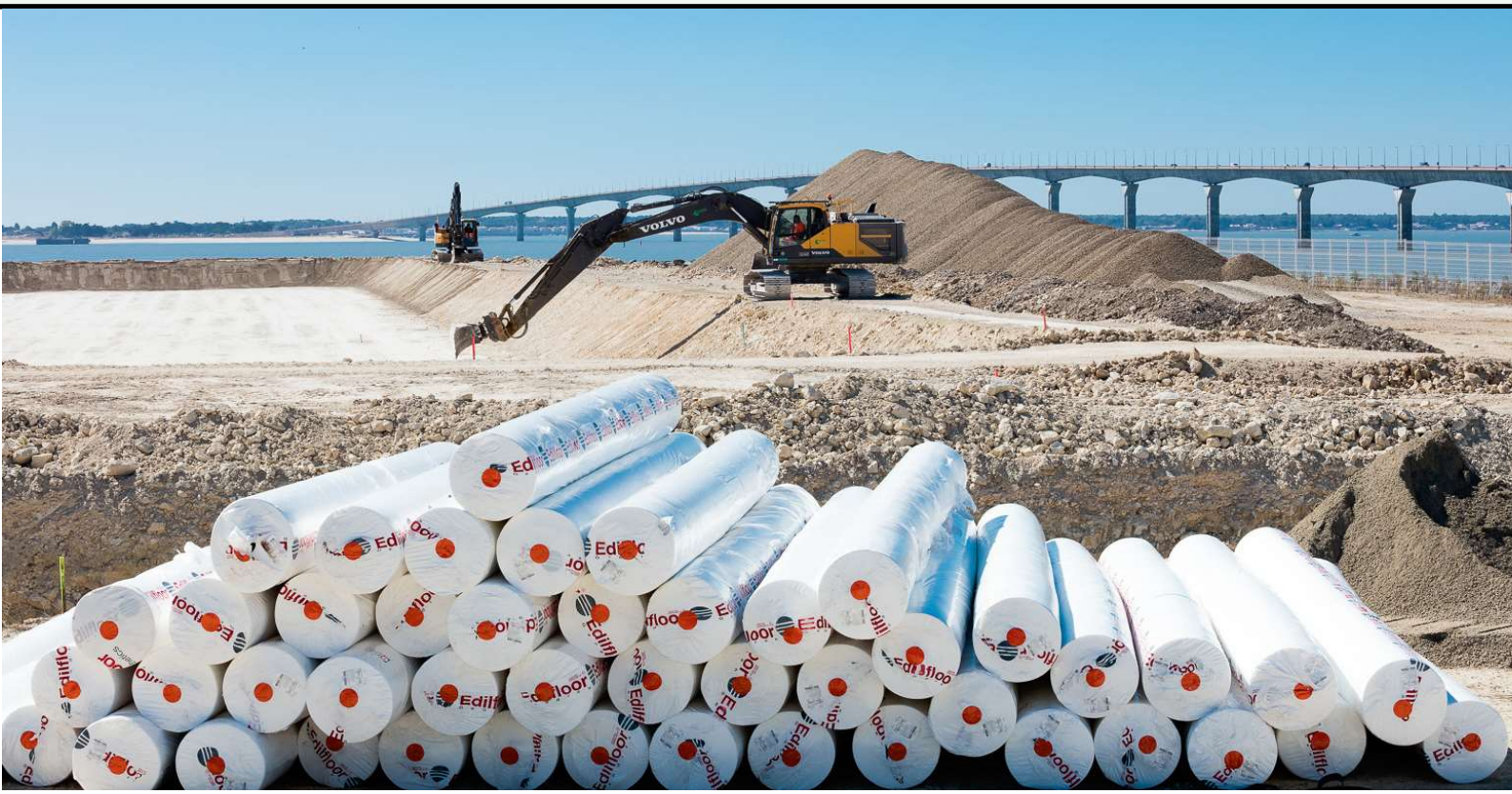


Programme information

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

Product category rules (PCR): *PCR 2019:14 Construction products and construction services (v1.11)*
EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction works

PCR review was conducted by:
The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

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

☐ EPD process certification ☒ EPD verification

Third party verifier: SGS Italia S.p.A. via Caldera, 21, 20153 – Milano T +39 02 73 931 - www.it.sgs.com

Accreditation certification n 006H
Accredited by: *ACCREDIA*

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 from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804:2012+A2:2019.

Company information

EPD owner: Edilfloor S.p.A – via Leonardo da Vinci, 15 – 36066 Sandrigo (VI) – Italy.

Reference person: Ugo Stefani u.stefani@edilfloor.com, Mirco Cuman m.cuman@edilfloor.com
Technical support: Spin Life S.r.l – Spinoff dell'Università di Padova, via Cerato 14, Padova

Description of the organization: Edilfloor S.p.A (hereinafter referred to as Edilfloor) produces and distributes nonwoven geotextiles for civil engineering works and other kinds of nonwoven technical textiles for furniture and industrial uses, DIY and agricultural applications. The production site, located in Sandrigo - Italy, includes a series of departments for the various manufacturing phases: carding, folding, needling, calendaring, cutting, marking and packing.

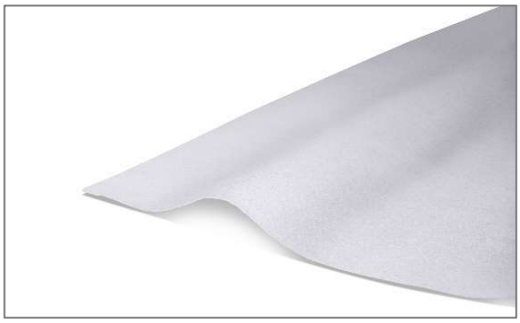
Edilfloor was born in 1979, with the aim of development and growth of the company, based on continuous improvement and product and process quality. In 1985, the first production line was installed and Edilfloor became a nonwoven geotextiles manufacturer. In 1994 the company obtained the certification of its Quality Management System (current UNI EN ISO 9001:2015 certificate number: CERT-00244-94-AQ-VEN-SINCERT) and since 2002 all geosynthetics families have the CE marking. Nowadays, there are four production lines, various packaging equipment and logistic centres.

Name and location of the production sites: Edilfloor S.p.A – via Leonardo da Vinci, 15 – 36066 Sandrigo (VI) – Italy; via Leonardo da Vinci, 12 – 36066 Sandrigo (VI) – Italy.

Product information

Product Name**:** Geodren®

Products description: Geodren® is the high-performance nonwoven geotextile range made of high-tenacity UV stabilized polypropylene fibers for civil engineering works. Geodren® is a product designed for geotechnical applications to perform functions of filtration, separation, protection and drainage. It is the ideal nonwoven geotextile when excellent performance is required at low weights to reduce the environmental impact and optimize the final cost of the work.



Applications: The Geodren® product range is installed and used as filtration and separation, protection or drainage layer in a wide variety of civil works. For example, in the fields of application:

- Roads, railways, and heavy traffic areas;

-Tunnels and underground works;

- Basins and landfill construction;

- Roofing.

The family of nonwoven geotextiles Geodren® includes: Geodren N1-N5, Geodren GRK 2 – GRK 5, Geodren HPQ 3.3 - HPQ 3.4, Geodren A2 – A8, Geodren A30 P – A120 P, Geodren O-1200, Geodren T500 - T900, Geodren PPST 70 – 2000, Geodren PPST 100 P - 2000 P.

An average product has been chosen for the impact assessment. Its mass per unit area is equal to 201 g/m^2.

All environmental performance indicators have been calculated taking the above-mentioned product as a reference.

The impact range of the whole family is declared with reference to the average product.

UN CPC code: 36950

Geographical area: Italy

The performances were calculated with reference to the Edilfloor plants in Sandrigo (VI). The reference market is international.

Table 1: Technical data of the product family being analyzed - Geodren® range

Product	Mass per unit area (g/m^2)	
	Min	Max
Geodren N1 - N5	90	340
Geodren GRK 2 – GRK 5	110	300
Geodren HPQ 3.3 - HPQ 3.4	160	270
Geodren A2 - A8	90	385
Geodren A30 P - A120 P	300	1200
Geodren O-1200	1200	2000
Geodren T500 - T900	500	900
Geodren PPST	70	2000
Geodren PPST ___ P	100	2000

Table 2: Technical Data: the technical data are listed in the table below. The values for unit weight, tensile strength and hydraulic characteristics depend on the product type within the Geodren® range.

Characteristic	Standard		Value	Unit
Mass per unit area	EN ISO 9864		70 - 2000	g/m^2
Tensile strength	EN ISO 10319	MD	3,2 - 77	kN/m
		CMD	3,5 - 155	kN/m
Tensile elongation	EN ISO 10319	MD	40 - 100	%
		CMD	50 - 100	%
CBR	EN ISO 12236		0,7 - 20	kN
Vindex	EN ISO 11058		5 - 130	mm/s
Opening Size	EN ISO 12956		20 - 120	µm
Durability	Predicted to be durable for 100 years in natural soil with 4<pH<9 and soil temperature <25°C on the basis of results of test method EN ISO 13438 procedure A according EN 13249:2016 and ff.			
Functions:	Separation, Filtration, Protection, Drainage.			

LCA information

Declared unit: 1 kg of nonwoven geotextile, with its packaging (the packaging is not included in the declared kg)

Time representativeness: The primary data cover a period of 12 months, reference year 2020.

Used database and software: Ecoinvent 3.8 database; SimaPro software version 9.1.1.1.

System boundaries and process units excluded: The system boundaries include the mandatory modules A1, A2, A3, C1, C2, C3, C4 and D required by Standard EN 15804 (CEN, 2019), as reported in the following table according to a "from cradle to gate with module C1-C4 and module D" type application. It is emphasized that the construction, maintenance and decommissioning of infrastructures, understood as buildings, and the occupation of industrial land were not considered, since it is believed that their contribution to the environmental impact of the declared unit is negligible. The consumption of oils for machine maintenance and water treatment is included. It is also emphasized that the deployment, installation, and maintenance phases are not included in the study.

The table below shows a detail of the modeling of the various modules.

Module	Scenario
A1	This phase includes extraction and processing of raw materials, generation of electricity and heat. processing up to the end-of-waste state or disposal of final residues.
A2	This phase includes transportation up to the factory gate and internal transport.
A3	This phase includes manufacturing of the geotextiles, their co-products and their packaging.
C1	This phase includes the removal of the geotextiles from the construction having assumed a civil scenario. An excavation hydraulic digger is considered.
C2	This phase includes the transportation of the discarded geotextiles. Average distance from the demolition site to the waste treatment is assumed to be 100km for landfill disposal. The transport was modeled with trucks > 32 t, EURO 4.
C3	This phase includes disassembly for recycling of the geotextiles. In this case it is equal to zero.
C4	This phase includes disposal in the final stage of the life of the product. It is assumed that 100% of the material is disposed in landfills.
D	This module contains the potential impacts and benefits related to the recycling of the product. In this case it is equal to zero.

The criterion chosen for the initial inclusion of the input and output elements is based on the definition of a 1% cut-off level, in terms of mass, energy and environmental relevance. This means that a process has been neglected if it is responsible for less than 1% of the total mass, primary energy, and total impact. It can be assumed that the neglected processes would have contributed less than 5% to the impact categories considered.

The method chosen to evaluate the potential environmental impacts of the product subject of this study is the method provided by the standard EN 15804 (CEN, 2019).

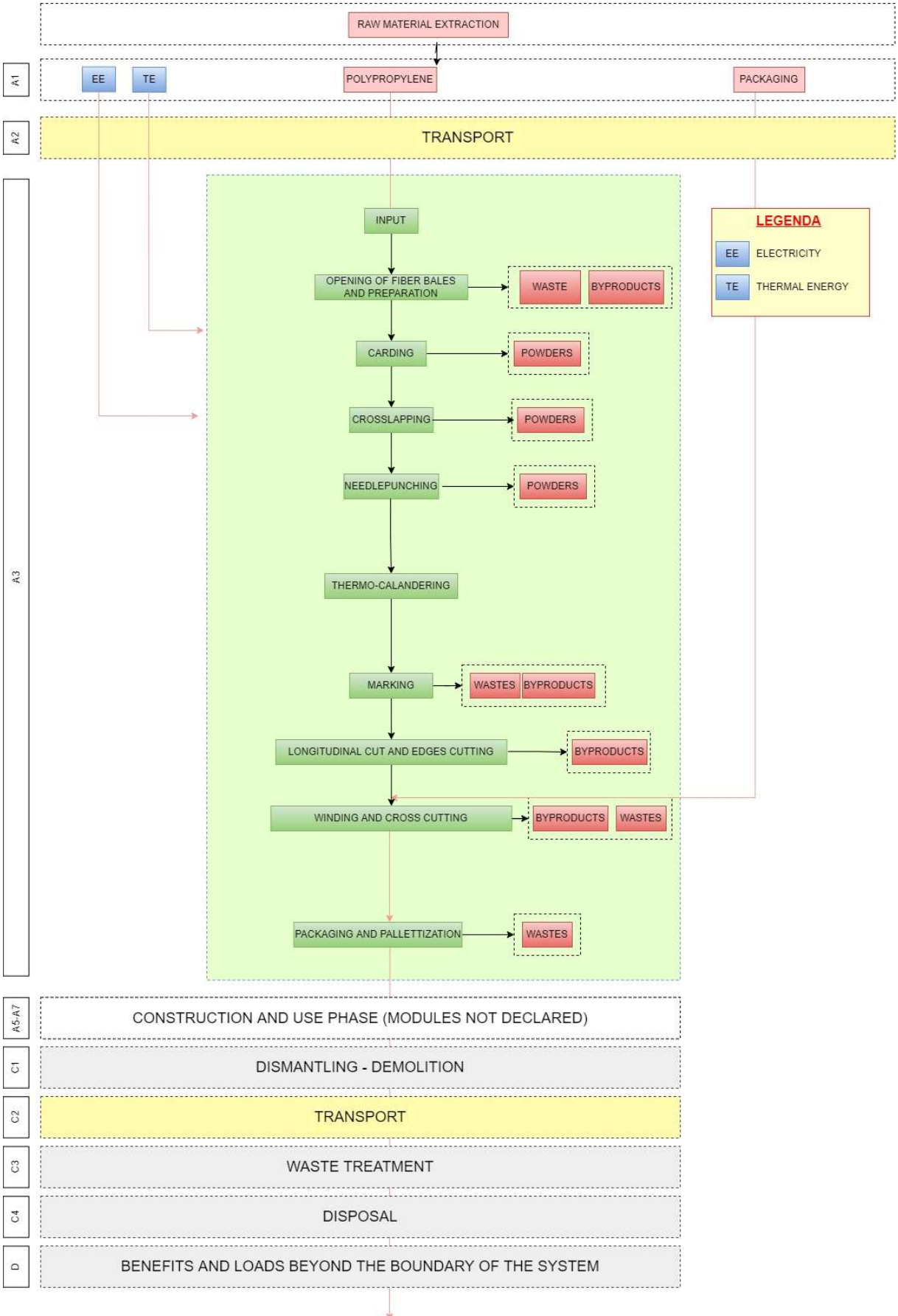
Electricity modeling (Module A1): The modeling of electricity consumption in module A1 was carried out using the residual Italian national mix, using the AIB 2020 report as a data source. The breakdown of the energy sources used is shown below.

Source	Residual Mix 2020
Renewables Unspecified	0,00%
Solar	5,02%
Wind	1,75%
Hydro&Marine	1,72%
Geothermal	0,00%
Biomass	1,73%
Nuclear	11,42%
Fossil Unspecified	2,11%
Lignite	0,54%
Hard Coal	17,40%
Gas	54,44%
Oil	3,87%
TOTAL	100,00%

Summary table in reference to the declared unit

Characteristic	Unit of measurement	Value
Reference year	-	2020
Mass Unit	g/m^2	201
Components		
Polypropylene	kg/kg_product	1,00E0
Packaging		
Cardboard core	kg/kg_product	1,60E-02
Plastic core	kg/kg_product	1,80E-02
Roll film	kg/kg_product	8,55E-03
Wood packaging	kg/kg_product	4,52E-03
Plastic straps	kg/kg_product	5,50E-04
Wood pallet	kg/kg_product	3,52E-03
External plastic film	kg/kg_product	1,14E-04
Consumptions and other data		
Diesel	L/kg_product	8,05E-04
Electricity	kWh/kg_product	3,01E-01
Natural gas	Sm3/kg_product	1,35E-02
Waste	kg/kg_product	2,02E-02
Emissions	kg/kg_product	2,17E-04
By-products	kg/kg_product	5,76E-02
Upstream transport	km truck/kgPP	1,73E+03
	km ferry/kgPP	5,15E0

System diagram:



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

	Product Stage			Construction Stage		Use stage							End of life stage				Benefits beyond system boundaries
	Raw Materials Supply	Transport	Manufacturing	Transport to site	On site processes	Use	Maintence	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/Demolition	Transport	Waste processing	Disposal	Reuse/Recovery/Recycling
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU 27	EU 27	IT										EU 27	EU 27	EU 27	EU 27	EU 27
Specific data used	>90%																
Variation - products	< 10%																
Variation - sites	Not relevant																

Content statement

Product components

The nonwoven geotextiles are 100% composed by virgin polypropylene, not renewable.

Packaging materials

The finished product packaging consists of a film of polyethylene, pipes in cardboard or plastic and pallets or wood packaging.

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Polypropylene	1,00E0	0,00%	0,00%
TOTAL	1,00E0	0,00%	0,00%
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Cardboard core	1,60E-02	1,5%	
Plastic core	1,80E-02	1,7%	
Roll PE film	8,55E-03	0,8%	
Wood packaging	4,52E-03	0,4%	
Plastic straps	5,50E-04	0,1%	
Wood pallet	3,52E-03	0,3%	
External PE film	1,14E-04	0,0%	
TOTAL	5,12E-02	4,9%	

Dangerous substances from the candidate list of SVHC for Authorisation

The product does not contain substances included in the "Candidate list of substances of very high concern (SVHC) for authorization" in a percentage greater than 0.1%.

Environmental performance

Potential environmental impact

The values below relating to the average Geodren® product are shown below.

The variation of the GWP-GHG indicator among the different products of the Geodren® family is lower than ±10% compared to the impact of the average product.

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	Total	D
GWP-total	kg CO2 eq	2,73E+00	3,04E-01	1,10E-01	2,65E-01	1,65E-02	0,00E+00	2,20E-01	3,65E+00	0,00E+00
GWP-fossil	kg CO2 eq	2,81E+00	3,04E-01	1,32E-01	2,65E-01	1,65E-02	0,00E+00	1,24E-01	3,65E+00	0,00E+00
GWP-biogenic	kg CO2 eq	-7,35E-02	1,63E-04	-2,23E-02	1,02E-04	8,89E-06	0,00E+00	9,55E-02	0,00E+00	0,00E+00
GWP-luluc	kg CO2 eq	1,48E-03	1,06E-04	4,11E-04	2,77E-05	5,83E-06	0,00E+00	2,08E-06	2,03E-03	0,00E+00
ODP	kg CFC11 eq	1,04E-07	6,95E-08	2,53E-08	5,56E-08	3,78E-09	0,00E+00	3,11E-09	2,61E-07	0,00E+00
AP	mol H+ eq	1,04E-02	1,56E-03	7,04E-04	2,71E-03	8,41E-05	0,00E+00	7,40E-05	1,56E-02	0,00E+00
EP-freshwater	kg P eq	6,44E-04	2,23E-05	5,68E-05	1,48E-05	1,22E-06	0,00E+00	9,24E-07	7,40E-04	0,00E+00
EP-freshwater	kg PO_4^{3-} eq.	1,98E-03	6,85E-05	1,74E-04	4,55E-05	3,75E-06	0,00E+00	2,84E-06	2,27E-03	0,00E+00
EP-marine	kg N eq	1,84E-03	5,38E-04	1,41E-04	1,19E-03	2,89E-05	0,00E+00	4,05E-04	4,14E-03	0,00E+00
EP-terrestrial	mol N eq	1,91E-02	5,89E-03	1,35E-03	1,30E-02	3,16E-04	0,00E+00	3,01E-04	4,00E-02	0,00E+00
POCP	kg NMVOC eq	8,03E-03	1,68E-03	4,48E-04	3,58E-03	9,01E-05	0,00E+00	1,13E-04	1,39E-02	0,00E+00
ADP – mineral&metals*	kg Sb eq	2,49E-05	8,22E-06	2,48E-06	4,59E-07	4,51E-07	0,00E+00	7,44E-08	3,66E-05	0,00E+00
ADP – fossil*	MJ	8,75E+01	4,61E+00	2,81E+00	3,63E+00	2,51E-01	0,00E+00	2,27E-01	9,90E+01	0,00E+00
WDP*	m^3 world eq. depriv.	1,28E-02	1,04E-01	6,37E-03	7,00E-04	0,00E+00	1,04E-03	1,28E-02	2,56E+00	0,00E+00
GWP-GHG	kg CO2 eq	2,71E+00	3,02E-01	1,31E-01	2,64E-01	1,65E-02	0,00E+00	1,06E-01	3,53E+00	0,00E+00

GWP-total: Global Warming Potential total; **GWP-fossil**: Global Warming Potential fossil; **GWP-biogenic**: Global Warming Potential biogenic; **GWP-luluc**: Global Warming Potential land use and land use change; **ODP**: Depletion potential of the stratospheric ozone layer; **AP**: Acidification potential, Accumulated Exceedence; **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 Exceedence; **POCP**: Formation potential of tropospheric ozone; **ADP-minerals&metals**: Abiotic depletion potential for non fossil resources*; **ADP-fossil**: Abiotic depletion for fossil sources potential*; **WDP**: Water (user) deprivation potential, deprivation-weighted water consumption*. **The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

Potential incidence of disease due to PM emissions (PM), Potential Human exposure efficiency relative to U235 (IRP), Potential Comparative Toxic Unit for ecosystems (ETP-fw), Potential Comparative Toxic Unit for humans (HTP-c), Potential Comparative Toxic Unit for humans (HTP-nc) and Potential soil quality index (SQP) are not declared (ND) in this document.

Use of resources

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	Total	D
PERE	MJ	1,62E+00	4,43E-02	9,58E-02	2,22E-02	2,43E-03	0,00E+00	7,11E-03	1,79E+00	0,00E+00
PERM	MJ	1,96E+00	2,04E-02	3,86E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,37E+00	0,00E+00
PERT	MJ	3,58E+00	6,48E-02	4,82E-01	2,90E-02	3,55E-03	0,00E+00	8,85E-03	4,17E+00	0,00E+00
PENRE	MJ	4,58E+01	4,61E+00	2,81E+00	3,63E+00	2,51E-01	0,00E+00	2,27E-01	5,73E+01	0,00E+00
PENRM	MJ	4,17E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,17E+01	0,00E+00
PENRT	MJ	8,74E+01	4,61E+00	2,81E+00	3,63E+00	2,51E-01	0,00E+00	2,27E-01	9,90E+01	0,00E+00
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	4,78E-02	4,84E-04	2,46E-03	2,24E-04	2,65E-05	0,00E+00	2,80E-04	5,12E-02	0,00E+00

PERE: Use of renewable primary energy excluding resources used as raw materials; **PERM**: Use of renewable primary energy resources used as raw materials; **PERT**: Total use of renewable primary energy; **PENRE**: Use of non-renewable primary energy excluding resources used as raw materials; **PENRM**: Use of non-renewable primary energy resources used as raw materials; **PENRT**: Total use of non-renewable primary energy; **SM**: Secondary material; **RSF**: Renewable secondary fuels; **NRSF**: Non-renewable secondary fuels; **FW**: Net use of fresh water.

Production of waste and outflows

Waste production

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	Total	D
HWD	kg	1,59E-05	1,21E-05	2,47E-06	1,00E-05	6,58E-07	0,00E+00	2,73E-07	4,14E-05	0,00E+00
NHWD	kg	1,19E-01	2,19E-01	1,81E-02	6,73E-03	1,20E-02	0,00E+00	1,00E+00	1,38E+00	0,00E+00
RWD	kg	8,88E-05	3,14E-05	5,27E-06	2,47E-05	1,71E-06	0,00E+00	1,48E-06	1,53E-04	0,00E+00

HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

Outgoing flows

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	Total	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	0,00E+00
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CRU: Components for reuse; **MFR:** Material for recycling; **MER:** Materials for energy recovery; **EE:** Exported energy.

Information on biogenic carbon content

The average Geodren® product contains 0 kgC per kg of geotextile, while the content in its packaging is equal to 1,08E-02kgC per kg of geotextile.

Type and source of data

In choosing the data to be used for the LCA study, primary data collected at Edilfloor through a campaign of measurements were privileged. The primary data cover a period of 12 months, from January 2020 to December 2020 and concern:

- the transport of incoming materials for the production of the analyzed products (distance traveled, type of fuel, Euro class of vehicles, flow rate);
- raw materials used (quantity and type);
- the production process nonwoven geotextiles at Edilfloor (mass balance and energy consumption);
- waste produced at Edilfloor (quantity and destination);

In the event that primary data or models for calculating such data were not available, secondary data obtained by consulting internationally recognized databases were used, preferring where possible the use of the most up-to-date ones. The secondary data in particular concern:

- The combustion processes of vehicles: emissions, maintenance, use of the road network, fuel consumption (data sets Ecoinvent version 3.8);
- Operating machines: emissions (Ecoinvent 3.8 data sets);
- Electricity: distribution network, losses (Ecoinvent 3.8 data sets);
- The productions of the materials used (Ecoinvent 3.8 data sets).

Data proxies are less than 10% as required by the program rules.

References

- General Programme Instructions of the International EPD® System. Version 3.01
- PCR construction Products and construction services 2019:14 version 1.11 valid until 2024-12-20
- European Residual Mixes. Results of the calculation of Residual Mixes for the calendar year 2020. AIB, 2021
- LCA Report “Studio di Life Cycle Assessment dei prodotti Geodren®, geotessili nontessuti in polipropilene di varie dimensioni di Edilfloor S.p.A.”, rev 3 del 27/04/2022

Standard

- ISO 14040:2006/Amd 1:2020 Environmental management - Life cycle assessment - Principles and framework – Amendment 1
- ISO 14044:2006/Amd 2:2020 Environmental management — Life cycle assessment — Requirements and guidelines — Amendment 2
- ISO 14025:20010 Environmental labels and declarations — Type III environmental declarations — Principles and procedures
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction works

EPD®

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