

# Environmental Product Declaration



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

## **DANOPREN®EXTRUDED POLYSTYRENE (XPS) INSULATION BOARD**

from

**DANOSA Group**

*EPD of multiple products, based on average results*



Programme:

Programme operator:

EPD registration number:

Publication date:

Valid until:

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

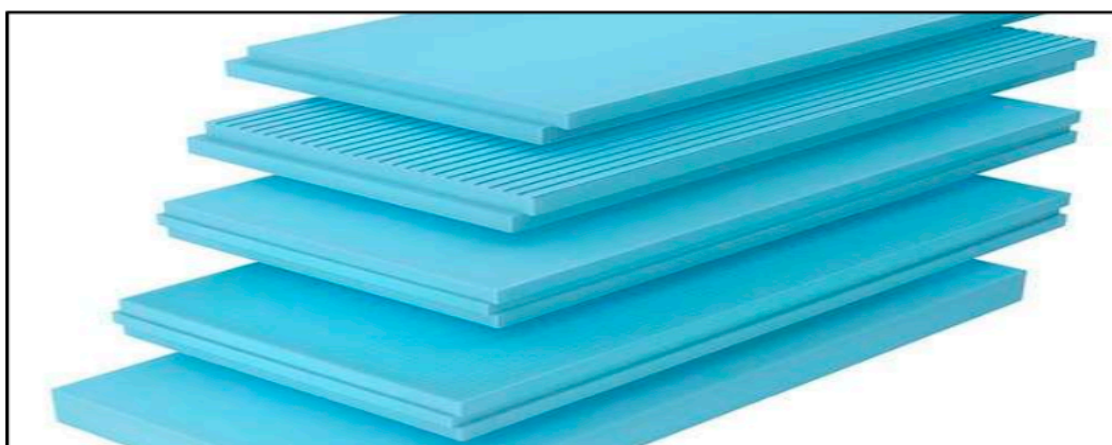
EPD International AB

EPD-IES-0021369

2025-03-21

2030-03-21

*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to continued registration and publication at [www.environdec.com](http://www.environdec.com)*



## General information

### Programme information

<b>Programme:</b>	The International EPD® System
<b>Address:</b>	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
<b>Website:</b>	<a href="http://www.environdec.com">www.environdec.com</a>
<b>E-mail:</b>	<a href="mailto:info@environdec.com">info@environdec.com</a>

<b>Accountabilities for PCR, LCA and independent, third-party verification</b>
<b>Product Category Rules (PCR)</b>
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction Products, Construction products (EN 15804+A2) version 1.3.4  COMPLEMENTARY PRODUCT CATEGORY RULES (C-PCR): THERMAL INSULATION PRODUCTS (EN 16783:2024), C-PCR-005, VERSION: 2024-05-03
The review of the PCR was carried out by: The International EPD® System Technical Committee. See <a href="http://www.environdec.com">www.environdec.com</a> for a list of members. The review group can be contacted through the Secretariat at <a href="http://www.environdec.com/contact">www.environdec.com/contact</a> .
<b>Life Cycle Assessment (LCA)</b>
LCA accountability: <i>Marcel Gómez Consultoría Ambiental</i>
<b>Third-party verification</b>
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:  <input checked="" type="checkbox"/> EPD verification by individual verifier  Third-party verifier: <i>Elisabet Amat, <a href="mailto:eamat@greenize.es">eamat@greenize.es</a></i>  Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier:  <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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 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

EPD owner: DANOSA Group

Contact: Ana Baraibar, tecnico.es@danosa.com

DANOSA considers that personal and business honesty is a core value of its internal relations with its suppliers, its customers and the environment. DANOSA is committed to complying with the laws, rules and regulations that concern both the quality and the environment and other internal commitments made by the company itself.

DANOSA manufactures its products always respecting the declared specifications and minimizing the environmental impacts associated with their activities. Where possible, this includes reducing the amount of waste sent to sewage.

DANOSA especially considers suppliers and subcontractors in order to achieve its objectives of Quality and Environment, encouraging them to develop the best environmental practices creating a relationship of mutual collaboration.

Location of the production center: DANOSA ESPAÑA, Polígono Industrial Sector 9, 19290 FONTANAR (Guadalajara) SPAIN and Rua do Norte, Lugar da Quinta do Aduquete. 3100-342 POMBAL, Portugal.

This document will be used for B2B communication and may be considered Europe in scope.

## Product information

Product name: DANOPREN®EXTRUDED POLYSTYRENE (XPS) INSULATION BOARD

Product identification: Rigid boards of extruded polystyrene (XPS), in accordance with UNE EN 13164 standard, with different treatments for perimeter joints (shiplap, tongue & groove, butt edge). The product is manufactured in a wide range of sizes and thickness, being used mainly for thermal insulation in building. DANOPREN® is manufactured at Danosa's manufacturing plants in Fontanar (Spain) and Pombal (Portugal).

Product description:

DANOPREN is a type of insulation board made from extruded polystyrene foam (XPS). XPS boards are commonly used in building and construction projects as a thermal insulation material for roofs, walls, and foundations. DANOPREN boards are lightweight, durable, and moisture-resistant, and provide excellent thermal insulation properties. They are available in a range of thicknesses, with higher thicknesses providing better insulation values. Easy to install and can be cut to fit the shape and size of the surface they are being installed on. They are also resistant to mold, mildew, and insects, making them a low-maintenance and long-lasting option for insulation in construction projects.

Product specification:

Extruded polystyrene (XPS) rigid boards are produced in various sizes and thicknesses, primarily serving as thermal insulation in construction. DANOPREN® is manufactured at Danosa's facilities in Fontanar, Spain, and Pombal, Portugal.

The EPD is representative of the below mentioned products

### Products produced in Spanish Production plant

- Inverted roof- Danopren<sup>®</sup> TR (Thickness from 30 -100 cm)
- Pitched roof- Danopren<sup>®</sup> TL. (Thickness from 30 -100 cm) & Danopren<sup>®</sup> CH. (Thickness from 30 -100 cm)
- Cavity wall -Danopren<sup>®</sup> PR. (Thickness from 30 -100 cm)
- Exterior façade- Danopren<sup>®</sup> FS. (Thickness from 30 -100 cm)

### Product produced in Portugal production plant.

- Inverted roof- Danopren<sup>®</sup> TR (Thickness from 40 -80 cm)
- Pitched roof- Danopren<sup>®</sup> TL. (Thickness from 40 -80 cm)
- Cavity wall -Danopren<sup>®</sup> PR. (Thickness from 40 -80 cm)
- Exterior facade- Danopren<sup>®</sup> FS. (Thickness from 25 -80 cm)

#### Technical specification:

PARAMETER	VALUE
Composition	<b>Spanish production plant</b> Virgin polystyrene-20% Recycled polyesterene internally-15% Recycled polyesterene externally –50% Additives-8% Gases-7%  <b>Portugal production plant</b> Virgin polystyrene-12% Recycled polyesterene internally-12% Recycled polyesterene externally –68% Additives-1% Gases- 7%
Thickness	25-100 mm
Wide	1.80
Longitude	15
Density	32 Kg/m <sup>3</sup>
Product Thermal Resistance, R	1.00 K.m <sup>2</sup> . <sup>W</sup> -1 (UNE EN 12667)
Thermal Conductivity	0.034 W/(m·K) (UNE EN 12667)
Reaction to fire	Euroclass E (UNE EN 13501-1)
Compressive Strength	≥300 Kpa (UNE EN 826)

Acoustic properties	No recognised acoustic properties
Water vapour transmission	$\mu=200$ (UNE EN 12086)
Products used for installation	None
Product shelf life	50 years

Product certificate: SPAIN: ISO 9001, 14001 and 50001, Portugal: ISO 9001

CPC Code: 369 – other plastic products

## LCA Information

Declared unit: Raw materials extraction, transport, manufacturing, transport to the customer, installation, use and end of life of one m<sup>2</sup> of extruded polystyrene (XPS) insulation board DANOPREN<sup>®</sup>, with a thermal resistance of 1.00 K.m<sup>2</sup>.W<sup>-1</sup>. Panel thickness: 3,4 cm, weight of the panel is 1,09 kg

For information purposes: It is estimated that the lifespan of the product will be the same as that of the building in which it is installed, since it is a product that is incorporated into the building's installations, i.e., 50 years.

Temporal representativeness: The primary data were obtained from the production center and refer to the year 2023.

Databases and software used: Ecoinvent v3.9.1 (allocation, cut-off by classification) and SimaPro 9.5.0.2. The calculation methodologies are in accordance with UNE-EN 15804:2012+A2:2019.

Description of system boundaries: Cradle-to-grave with module D

As it is a passive product within a construction, the use stage (including modules B1 to B7) is considered negligible and is not declared.

The principles of modularity and "polluter payer principles" have been followed.

Modularity and polluter payer principles have been followed. The following processes have been excluded:

- Manufacture of equipment used in production of buildings or any other capital goods (affects all upstream, core and downstream processes).
- The transportation of personnel to the plant;
- Transportation of personnel within the plant;
- Research and development activities;
- Long-term emissions.

This report includes at least 95% of all mass and energy inputs and outputs of the central system, as identified in the life cycle inventory. Those inputs and outputs for which data are not available, representing less than 5% of mass, such as the packaging waste of auxiliary materials, have not been considered.

Wherever possible, allocation has been avoided. The overall energy consumption and waste generation data for the factory have been allocated using physical criteria, based on tons produced.

The scenarios included for the installation stage (A5) and End-of-life (C1-C4) are currently in use and are representative of one of the most likely alternatives.

#### A1. Raw material extraction

This module takes into account the extraction and processing of raw materials, as well as the required energy consumption for these processes before product manufacturing.

#### A2. Transport

This module includes the transport of raw materials from the manufacturer to DANOSA's manufacturing plant. The real distance and type of truck for every raw material has been introduced.

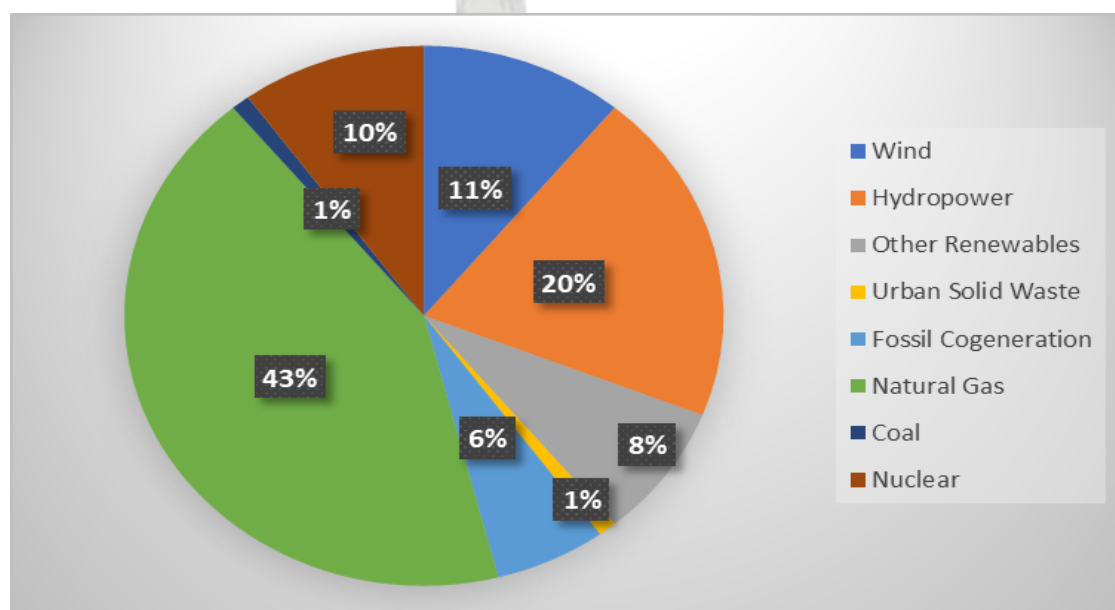
### A3. Manufacturing

In this module is included the energy consumption, additives and packaging used during the manufacturing process. At the same time, emissions in the facility which have not originated during the fuels combustion are assessed (no emissions from fuels occur), as well as the transport and management of waste produced in the factory.

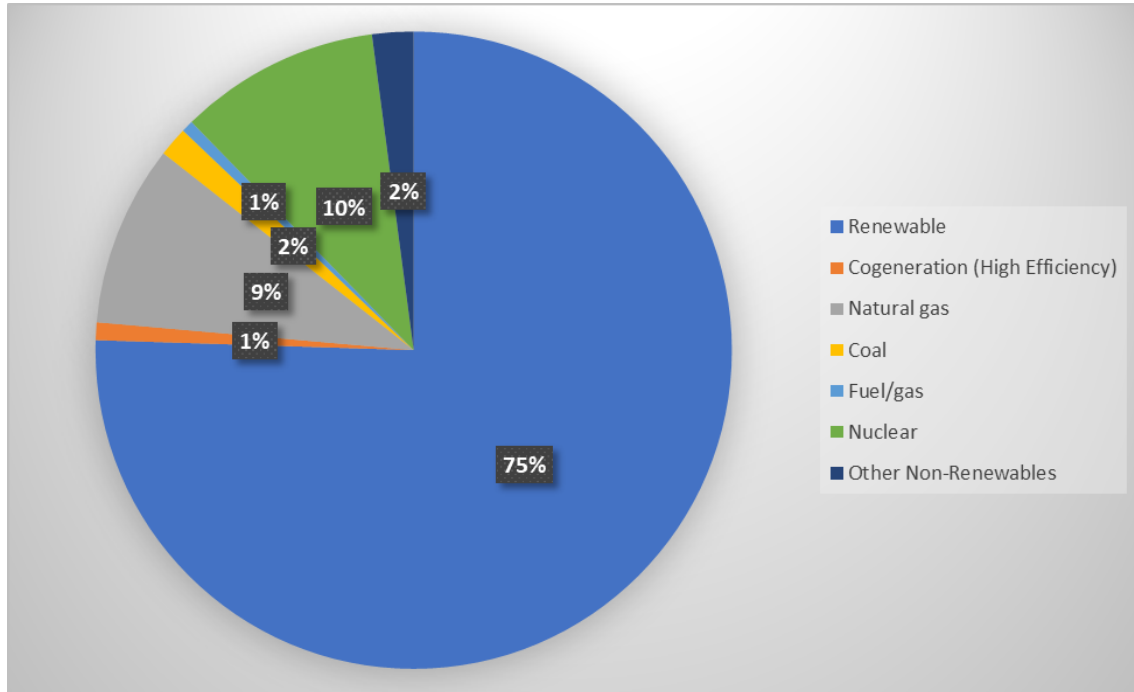
Extruded polystyrene (XPS) is produced through a continuous extrusion processing with electricity as the energy source. In this process, first raw polystyrene is melted in an extruder machine, together with additives (flame retardant, pigments, etc.), and subsequently other additives as expansion or foaming agents. The fall of the pressure in the entry of the extruder makes the gel expands, producing a foam or homogenous cellular structure base in polystyrene. This results in a continuous panel, with homogeneous closed-cellular structure. Then in the manufacturing plant the panel is divided in measured dimensions, with the necessary lengths depending of the type of product and intended use. The sides of the panels are profiled to half wood or dovetail. Then, the foaming skin from the extrusion process can be maintained, resulting in a smooth surface, or can be mechanically brushed, resulting in a rough surface and suitable to adhere the panel with common products as, for example, cement glues, ETICS mortars, gypsum plaster, etc.

Finally, XPS panels which are not in agreement with the specifications, together with the materials rejected from cutting and mechanical treatments are recycled, being reincorporated to the manufacturing process (20-12% of the virgin polystyrene used in the product). There is no manufacturing losses. There are some direct emission , but quantity are negligible.

Electricity mix Portugal



## Electricity mix Spain



In reference to the electricity mix of electricity production, the consumption mix in Spain in 2023 has been used, data collected by “CEPSA GAS Y ELECTRICIDAD SAU and for Portugal 2023 electricity mix from Portugal is used. The GWP GHG for the electricity for Spain and Portugal are 0,117 and 0,305 kg CO<sub>2</sub> eq./kWh respectively. For the Spanish production plant 12,7% electricity is coming from the solar panel installed in the production plant and 87,3% from the CEPSA GAS Y ELECTRICIDAD SAU

### A4. Distribution

Module A4 Transportation of the product includes the transport of the finished product from DANOSA’s manufacturing plant to customer site, this is a theoretical scenario. Down below described the main parameters of the module.

PARAMETER	VALUE (expressed in declared unit)
Type of fuel and consumption of the vehicle or type of means of transportation used	National distribution: lorry 7.5-16 metric ton, EURO5 with a diesel consumption of 0,29 liters per km and Transoceanic ship.
Distance	250 Km
Usage capacity (including return transport without load)	% assumed in Ecoinvent



Bulk density of the transported product	32 Kg/m <sup>3</sup> (packaging not included)
Volume use capacity factor	1 (default)

#### A5. Installation

Module A5 Installation includes all materials and energy consumption needed for installation process. Furthermore, it takes into account the transportation and further treatment of the waste arise from this phase.

In this case, no matter and energy consumption are required in the most common installation scenario (flat roof). Nevertheless, it must be noted that for the installation on other wall types is necessary the use of ancillary materials. A installation loss of 5% is considered in this study.

PARAMETER	VALUE (expressed in declared unit)
Secondary materials for installation	None
Consumption of other resources	None
Quantitative description of the type of energy (regional mix) and its consumption during the installation process.	None
Waste of materials on site, prior to the processing of waste generated during the installation of the product:	Packaging waste: 3,67E-02 Kg (landfilled)  Product losses: 5%
Direct emissions to air, soil, or water	Considered negligible

#### Use stage B1-B7

As it is a passive product within a construction, the use stage (including modules B1 to B7) is considered negligible with no impacts.

#### B1-USE

It includes aspects and environmental impacts during the product use, with the exception of water and energy consumption. In this case, the impact of the product is zero since any material is consumed, as well as neither emission to the environment occurs during its use phase.

#### B2-MAINTENANCE

The product does not require any type of maintenance during the 50 years of reference service life of the building.

#### B3-REPAIR

The product does not require any type of repair during the 50 years of reference service life of the building.

#### B4-REPLACEMENT

The product does not require any type of replacement during the 50 years of reference service life of the building.

#### B5-REFURBISHMENT

The product does not require any type of refurbishment during the 50 years of reference service life of the building.

#### B6-OPERATIONAL ENERGY USE

The product does not consume any type of energy during the 50 years of reference service life of the building.

#### B7-OPERATIONAL WATER USE

The product does not consume water during the 50 years of reference service life of the building.

#### Demolition (C1)

For the demolition the impacts are negligible.

#### Transport (C2)

It is considered that the product is 100% landfill. The transport distance selected to landfill site is 50 km.

#### Waste treatment for reuse, recovery or recycling (C3)

There is no reuse, recycling or energy recovery.

#### Final disposal (C4)

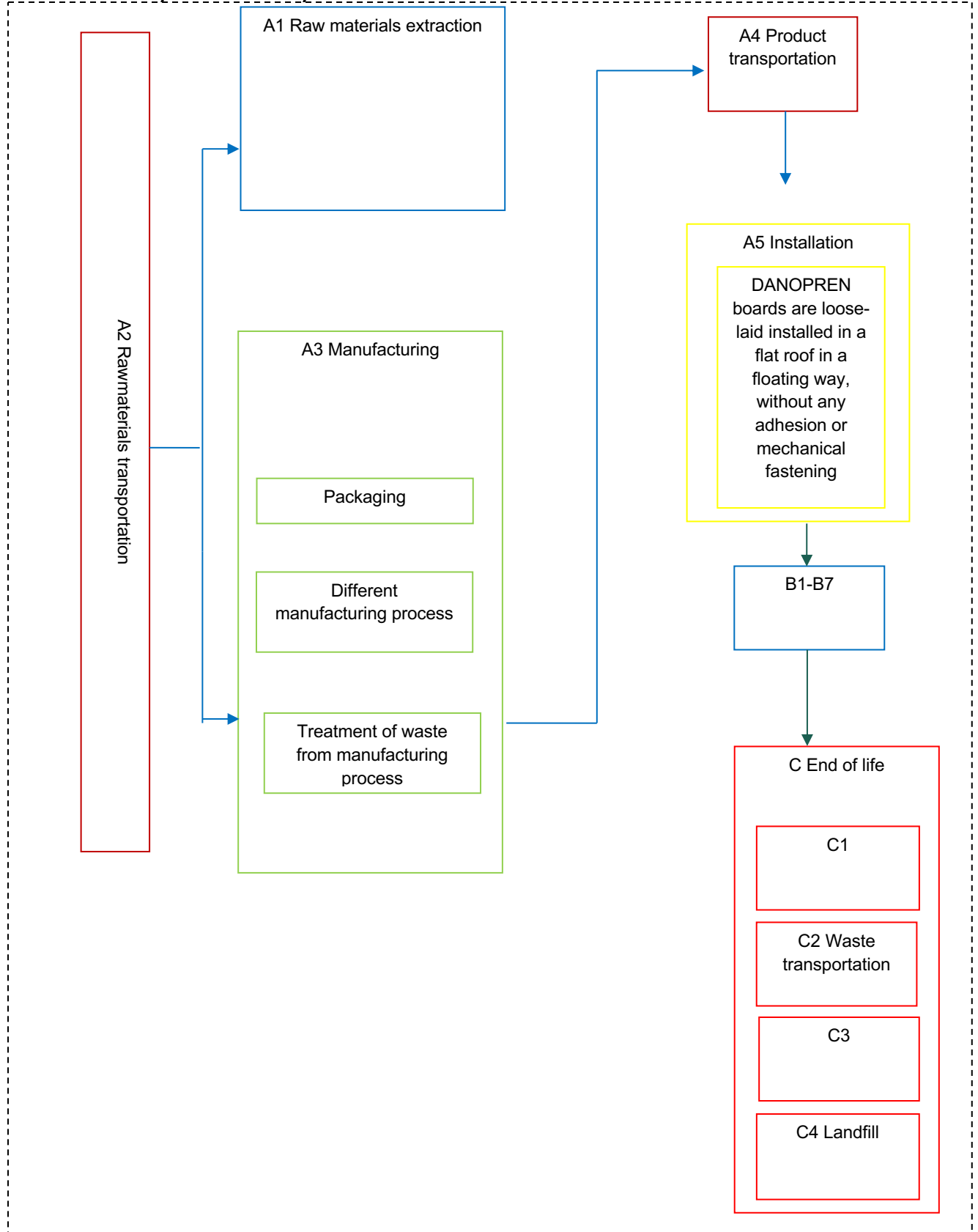
The most unfavorable scenario is considered. Therefore, 100% of the demolition waste is disposed of in a landfill.

PARAMETER	VALUE (expressed in declared unit)
Waste collection process specified by type	100 % to landfill, collected and mixed with the rest of construction waste
Recovery system specified by type	0% recycling
Specified discharge by type	100% landfill
Assumptions for scenario development	Waste from the demolition of construction profiles is transported 50 km by 16-32 Tn truck with a fuel consumption of 25 l per 100 km. To the final treatment or disposal site.

#### Recycling charges and benefits (module D)

There are no loads and benefits accounted, because there is no recycling or reuse or energy recovery.

**Limits of the system under study**



## Additional information

- The life cycle analysis study has been carried out by DANOSA with the technical support of Marcel Gómez Consultoría Ambiental.
- More information about the product: <https://www.danosa.com/>
- The quality of the input data has been evaluated according to its technological, temporal and geographical coverage. The representativeness of the selected processes is considered to be good, resulting in a value of 4,4 out of 5.

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				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	EU	EU	ES/PT	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU
Specific data used	<40%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-29% / +200%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	5%					-	-	-	-	-	-	-	-	-	-	-	-

EU: Europe, ES: SPAIN, PT: Portugal

Conversion factors and variability for all impact categories can be seen in additional environmental information section.

## Content information

*The results are for the Weighted average(production) of Danopren® TR produced in Spain and Portugal production plant. This content are for 1 m<sup>2</sup> of product for 3.4 cm thickness.*

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Virgin Polystyrene	1,85E-01	-	-
Recycled Polystyrene internally	1,51E-01	-	-
Recycled Polystyrene externally Spain	3,43E-01	100%	-
Recycled Polystyrene externally Portugal	2,74E-01	100%	-
Additives	5,89E-02	-	-
Gases	7,62E-02	-	-
TOTAL	1,09E+00	-	-
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Blue plastic film	4,91E-03	0,5%	-
Plastic film	1,52E-03	0,1%	-
TOTAL	3,73E-02	0,6%	-

*The product does not contain the substances included in the "Candidate List of SVHC" document issued by the European Chemicals Agency (<http://echa.europa.eu/candidate-list-table>).*

## Results of the environmental performance indicators

LCIA results are relative expressions and do not predict impacts on category endpoints, threshold exceedances, safety margins or risks. The following life cycle impact assessment methods have been used in SimaPro to calculate these results:

- Basic environmental impact indicators: EF Method (adapted) V3.1 / Global (2010) / with toxicity categories and CML-IA (baseline) v3.09.
- Indicators describing resource use:
  - Energy: cumulative energy demand v1.11.
  - Materials: inventory data used..
  - Indicators describing waste production: EDIP 2003.

Disclaimer: The use of the results of modules A1-A3 without considering the results of module C is discouraged.

## Mandatory impact category indicators according to EN 15804

Results per functional unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq.	6,85E-01	2,82E-02	4,01E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,65E-03	0,00E+00	5,02E-02	0,00E+00
GWP-biogenic	kg CO <sub>2</sub> eq.	4,20E-02	8,26E-06	5,05E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,65E-06	0,00E+00	6,05E-01	0,00E+00
GWP-luluc	kg CO <sub>2</sub> eq.	3,32E-03	1,33E-05	1,67E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,66E-06	0,00E+00	3,19E-06	0,00E+00
GWP-total	kg CO <sub>2</sub> eq.	7,30E-01	2,83E-02	9,08E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,65E-03	0,00E+00	6,56E-01	0,00E+00
ODP	kg CFC 11 eq.	2,31E-08	6,18E-10	1,22E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,24E-10	0,00E+00	3,70E-10	0,00E+00
AP	mol H <sup>+</sup> eq.	2,49E-03	9,51E-05	1,41E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,90E-05	0,00E+00	1,31E-04	0,00E+00
EP-freshwater	kg P eq.	2,35E-05	2,28E-07	1,62E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,57E-08	0,00E+00	5,36E-06	0,00E+00
EP-marine	kg N eq.	6,03E-04	3,25E-05	1,42E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,51E-06	0,00E+00	1,37E-03	0,00E+00
EP-terrestrial	mol N eq.	5,94E-03	3,48E-04	3,54E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,96E-05	0,00E+00	4,19E-04	0,00E+00
POCP	kg NMVOC eq.	2,56E-03	1,48E-04	1,68E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,96E-05	0,00E+00	3,79E-04	0,00E+00
ADP-minerals&metals*	kg Sb eq.	1,47E-06	7,62E-08	8,35E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,52E-08	0,00E+00	6,22E-08	0,00E+00
ADP-fossil*	MJ	1,36E+01	4,13E-01	7,31E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,26E-02	0,00E+00	2,86E-01	0,00E+00
WDP*	m <sup>3</sup>	3,15E-01	1,97E-03	1,60E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,95E-04	0,00E+00	1,47E-03	0,00E+00
Acronyms	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 = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; 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 = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption															

\* 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.

Disclaimer 2 - This impact category is primarily concerned with the eventual impacts of low doses of ionizing radiation on human health due to the nuclear fuel cycle. It does not consider effects due to potential nuclear accidents or occupational exposure from the disposal of radioactive waste at subway facilities. The ionizing radiation potential of soil, due to radon or some building materials is not measured or measured by this parameter.

## Additional mandatory and voluntary impact category indicators

Results per functional unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG <sup>1</sup>	kg CO <sub>2</sub> eq.	7,34E-01	2,83E-02	9,60E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,65E-03	0,00E+00	7,18E-01	0,00E+00
Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017																

## Resource use indicators

Results per functional unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	2,99E+00	6,05E-03	1,53E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,21E-03	0,00E+00	4,08E-02	0,00E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,99E+00	6,05E-03	1,53E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,21E-03	0,00E+00	4,08E-02	0,00E+00
PENRE	MJ	1,46E+01	4,39E-01	7,82E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,78E-02	0,00E+00	3,03E-01	0,00E+00
PENRM	MJ	3,87E+01	0,00E+00	1,94E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	5,33E+01	4,39E-01	2,72E+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	8,78E-02	0,00E+00	3,03E-01	0,00E+00
SM	kg	6,16E-01	0,00E+00	3,08E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m <sup>3</sup>	5,32E-03	6,49E-05	3,03E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,30E-05	0,00E+00	4,11E-04	0,00E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy 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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water															

<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.



## Waste indicators

Results per functional unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	4,23E-05	2,57E-06	2,44E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,13E-07	0,00E+00	1,99E-06	0,00E+00
Non-hazardous waste disposed	kg	1,70E-01	3,62E-02	9,81E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,24E-03	0,00E+00	1,09E+00	0,00E+00
Radioactive waste disposed	kg	3,74E-05	1,26E-07	1,92E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,52E-08	0,00E+00	5,50E-07	0,00E+00

## Output flow indicators

Results per functional unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	1,51E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

## Biogenic carbon content information

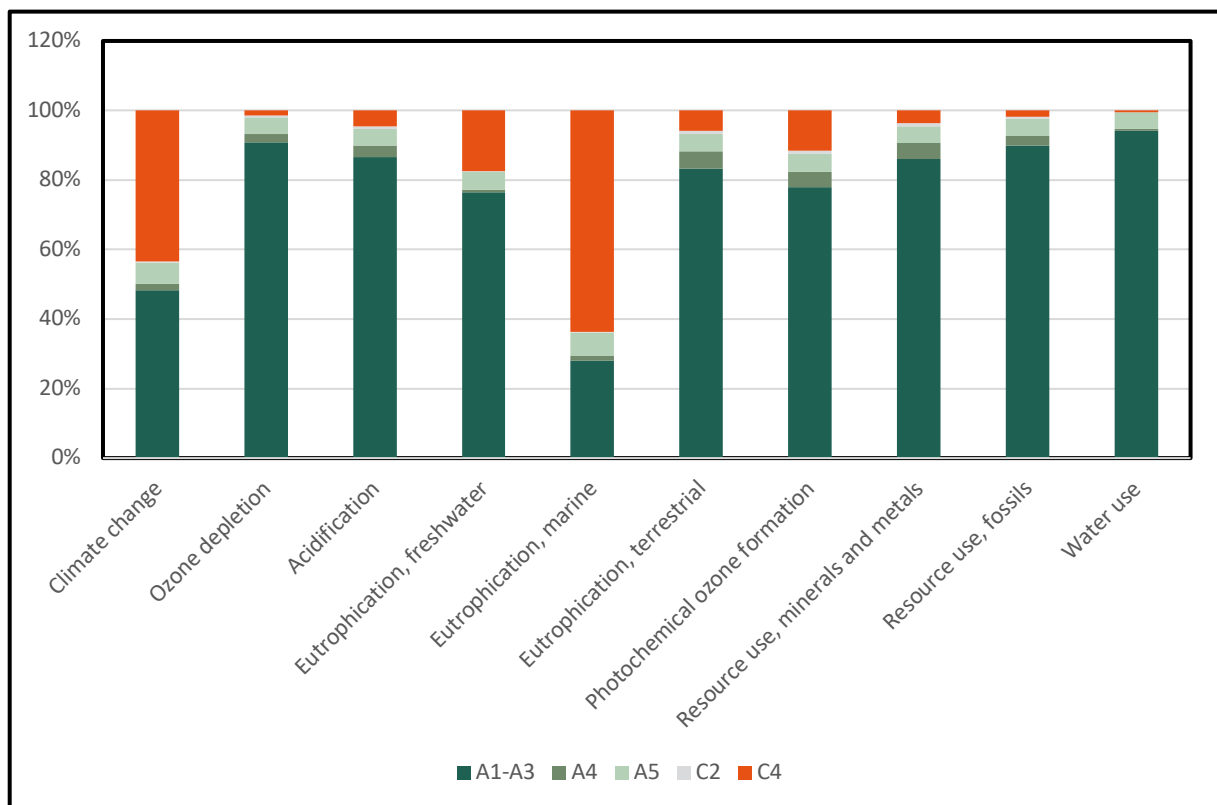
Results by functional unit		
Biogenic carbon content		Unit
Biogenic carbon content in the product		kg C
Biogenic carbon content in the enclosed packaging.		kg C

## LCA interpretation

This section analyzes the potential impacts of the life cycle stages of the 1 m<sup>2</sup> of XPS panel (Weighted average) compared to the total impacts and identifies critical points during the life cycle of the products.

The life cycle impacts of the 1 m<sup>2</sup> of XPS panel are influenced by the A1-A3 stage of the product across all impact categories. A1-A3 exhibits the highest impact contribution across all impact categories, except for eutrophication, marine, which represents 28%.

A4 stage representing less than 5% in all the impact categories. Conversely, A5 represent around in 5% in all impact categories. C2 phase is negligible. In C4 highest impact coming from the eutrophication, marine 64% due to the sanitary landfill and lowest in water use around 0,4%.



### Other environmental performance indicators

None

## Additional environmental information

These are the following conversion table.

Conversion factors for all products produced in Spain (Danopren® TR, Danopren® TL, Danopren® CH, Danopren® PR, Danopren® FS)

THICKNESS (CM)	FACTOR
3	0,88
4	1,18
5	1,47
6	1,76
8	2,35
10	2,94
3,4	1

Conversion factors for products produced in Portugal for Danopren® TR and Danopren® TL

THICKNESS (CM)	FACTOR
4	1,18
5	1,47
6	1,76
8	2,35
3,4	1

Conversion factors for products produced in Portugal for Danopren® TR

THICKNESS (CM)	FACTOR
4	1,18
5	1,47
6	1,76
8	2,35
3,4	1

**Conversion factors for products produced in Portugal for Danopren® FS**

THICKNESS (CM)	FACTOR
2,5	0,74
4	1,18
5	1,47
6	1,76
8	2,35
3,4	1

## Variability of results

The variability of results is done for the total (A-C)  
**impact category indicators**

Indicator	Unit	MAX (Danopren TR 10 cm)	MIN (Danopren FS 2,5 cm thickness)	Weighted average Danopren® TR (3,4 cm)
GWP-fossil	kg CO <sub>2</sub> eq.	190%	-26%	8,09E-01
GWP-biogenic	kg CO <sub>2</sub> eq.	198%	-35%	6,98E-01
GWP-luluc	kg CO <sub>2</sub> eq.	180%	-21%	3,51E-03
GWP-total	kg CO <sub>2</sub> eq.	194%	-30%	1,51E+00
ODP	kg CFC 11 eq.	234%	-44%	2,54E-08
AP	mol H <sup>+</sup> eq.	183%	-23%	2,88E-03
EP-freshwater	kg P eq.	204%	-32%	3,08E-05
EP-marine	kg N eq.	199%	-34%	2,16E-03
EP-terrestrial	mol N eq.	213%	-35%	7,14E-03
POCP	kg NMVOC eq.	206%	-33%	3,28E-03
ADP-minerals&metals*	kg Sb eq.	248%	-50%	1,71E-06
ADP-fossil*	MJ	208%	-33%	1,51E+01
WDP*	m <sup>3</sup>	189%	-24%	3,34E-01

## impact category indicators

Indicator	Unit	MAX (Danopren® TR 10 cm)	MIN (Danopren® FS 2,5 cm thickness)	Weighted average Danopren® TR (3,4 cm)
GWP-GHG <sup>2</sup>	kg CO <sub>2</sub> eq.	194%	-30%	1,58E+00

## Resource use indicators

Indicator	Unit	MAX (Danopren® TR 10 cm)	MIN (Danopren® FS 2,5 cm thickness)	Weighted average Danopren® TR (3,4 cm)
PERE	MJ	222%	-39%	3,19E+00
PERM	MJ	0%	0%	0,00E+00
PERT	MJ	222%	-5%	3,19E+00
PENRE	MJ	207%	-32%	1,62E+01
PENRM	MJ	-8%	-22%	4,07E+01
PENRT	MJ	54%	-25%	5,69E+01
SM	kg	160%	4%	6,47E-01
RSF	MJ	0%	0%	0,00E+00
NRSF	MJ	0%	0%	0,00E+00
FW	m <sup>3</sup>	170%	-17%	6,12E-03

<sup>2</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.

## Waste indicators

Indicator	Unit	MAX (Danopren® TR 10 cm)	MIN (Danopren® FS 2,5 cm thickness)	Weighted average Danopren® TR (3,4 cm)
Hazardous waste disposed	kg	199%	-29%	4,98E-05
Non-hazardous waste disposed	kg	-95%	-35%	1,40E+00
Radioactive waste disposed	kg	254%	-52%	4,00E-05
Components for re-use	kg	218%	-36%	1,51E-01

## References

- General Programme Instructions of the International EPD® System. Version 4.0.
- General Programme Instructions of the International EPD® System. Version 5.0.
- Product Category Rules (PCR): PCR 2019:14 Construction Products, Construction products (EN 15804+A2) version 1.3.4
- COMPLEMENTARY PRODUCT CATEGORY RULES (C-PCR): THERMAL INSULATION PRODUCTS (EN 16783:2024), C-PCR-005, VERSION: 2024-05-03
- ISO 14040:2006. Environmental management -- Life cycle assessment -- Principles and framework
- ISO 14044:2006. Environmental management -- Life cycle assessment -- Requirements and guidelines
- ISO 14025:2006. Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
- EN 15804:2012 + A2:2019/AC:2021– Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- Life cycle analysis of one m2 of danopren® extruded polystyrene thermal insulating board DANOSA report. Marcel Gómez. (2025)



