

Environmental Product Declaration



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

Grey EPS (expanded polystyrene) thermal insulation sheet from Masterplast Nyrt.



Programme:	The International EPD® System, www.environdec.com
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EPD of multiple products, based on a representative product.

Product list: EPS 70G, EPS 80G, EPS 100G, EPS 150G

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



Programme information

Programme:	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 - <i>Construction Products (PCR 2019:14, version 1.3.4) and c-PCR – Thermal Insulation products (EN 16783:2024) (c-PCR-005, 2024-05-03)</i> UN CPC 369 – <i>Other plastic products</i>
PCR review was conducted by: <i>The Technical Committee of the International EPD System. See www.environdec.com 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.</i> c-PCR review was conducted by: <i>Technical Committee CEN/TC 88 “Thermal insulating materials and products” (other information at CEN website: https://www.en-standard.eu/)</i>
Life Cycle Assessment (LCA)
LCA accountability: <i>Ágnes Elvira Farkas, Renáta Bodnárné Sándor - Bay Zoltán Nonprofit Ltd. for Applied Research</i>
Third-party verification
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>Jan Weinzettel</i> Approved by: The International EPD® System as individual verifier for the third-party verification.
Procedure for follow-up of data during EPD validity involves third party verifier: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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“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: **Masterplast Nyrt.**

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<https://www.masterplastgroup.com/>

Contact: **Zsuzsa Szőlősiné Pavelka**, Head of Secretariat, pavelkazsuzsa@masterplast.hu

Description of the organisation: The Masterplast group, founded in 1997, is the largest Hungarian-owned construction material manufacturing company in the Central European region. With its subsidiaries, it ensures direct market presence in 10 European countries and is present in the majority of European countries through its export partners. It has a decisive position in the market of facade thermal insulation, high-roof insulation and dry construction system components. Its product background is primarily ensured by production and strategic manufacturer collaborations at its ISO and TÜV certified manufacturing bases in Hungary, Serbia and Germany.

Masterplast provides competitive business services to its partners with a built-in customer-oriented sales system, continuous monitoring of the quality of manufactured and distributed products, a stable product supply background and flexible logistics solutions. The company considers the aspects of sustainability, energy efficiency and environmental protection to be extremely important both in its internal processes and in the production and development of its products.

The EPS insulation materials produced by Masterplast stand out not only with their excellent thermal insulation properties, but also play a key role in increasing energy efficiency and achieving the EU's zero neutrality goals. As part of the company's commitment to sustainable architecture, Masterplast products contribute to reducing the carbon emissions of buildings, which is not only essential for environmental protection, but also offers significant benefits to consumers by reducing heating and cooling costs.

Name and location of production site(s): The Masterplast group has production sites in 9 different locations, producing different products. Grey EPS sheet products are produced in the following Masterplast group companies and sites:

Company (member of Masterplast group)	Grey EPS sheet producing site address
Masterplast YU d.o.o	Bodrogvari Ferenc str. 172., Subotica, Serbia 24000
MASTERFOAM Ltd.	Jászapáti úti industrial park 1., Kál, Hungary 3350
T-CELL Plaszтик Ltd.	Szováti útfél 3/B, Hajdúszoboszló, Hungary 4200
	Zrínyi Miklós str. 101., Zalaegerszeg, Hungary 8900

Product information

Product name: **Grey EPS (expanded polystyrene) thermal insulation sheet**

Product identification: EPS 70G, EPS 80G, EPS 100G, EPS 150G

Product description: Grey EPS sheets are produced by expanding PS beads (that already contain all necessary additives like blowing agent, flame retardant and graphite) in a mould. The volume of the mould and the quantity of the added PS beads determine the density of the product. After the expansion, the product is cut to the desired dimensions and packaged to protect it during storage and transportation.

The products' application is wide, they can be used as thermal insulation:

- of building structures in the ground,
- in a floor on the ground or on a ceiling that cools downwards, under a screed or concrete,
- in an upward-cooling ceiling, in the interior, as large-panel covering placed under screed or

- concrete base, with normal load capacity, protected by waterproofing,
- in a straight layered, single-skin, warm roof that cannot be walked on,
- in an extensive green roof,
- in facade thermal insulation systems, installed above the plinth line.

During installation, the sheets are laid next to each other on a horizontal surface, glued or mechanically fixed (e.g. doweled) on an inclined or vertical surface.

Product components and materials:

The raw material of product group is grey expandable polystyrene bead, which contains polystyrene as the polymer base, a flame retardant, a blowing agent and graphite. Masterplast is not adding any other materials to the product during the production.

Product properties:

The key technical properties of the covered product portfolio are shown in the next table:

Property	Thermal conductivity (W/mK)	Flexural strength (kPa)	Compression strength at 10% compression (kPa)	Fire protection class
Standard	EN 12667	EN 12089	EN 826	EN 13501-1
EPS 70G	0,031	115	≥ 70	E
EPS 80G	0,031	125	≥ 80	E
EPS 100G	0,03	150	≥ 100	E
EPS 150G	0,03	200	≥ 150	E

UN CPC code: 369: Other plastic products

Geographical scope: the majority of the raw materials (A1) are produced in Europe, the product is manufactured (A3) in Serbia and Hungary, and built into (A5) houses in Europe, where the end-of-life phase also takes place (C1-C4 and D modules).

Multiple products: EPS 80G was selected as a representative product for the grey EPS thermal insulation sheets produced by Masterplast group. The list of the products covered by this EPD can be found at the Product identification paragraph. The chemical composition is the same for all listed products, the difference in physical properties are originating from the different expansion ratios. The representative product has almost 95% share (based on weight) within the product group, which justifies the choice and calculation approach.

LCA information

Declared unit: 1 m² grey EPS insulation with R value of 1 m²K/W (32 mm thickness, 0,5037 kg weight) at the factory gate, ready for distribution.

Reference service life: If applied correctly the lifetime of EPS insulation is equal to the building's lifetime, usually without requiring any maintenance. Durability studies on applied EPS show no loss of technical properties after 35 years. Additional tests with products under artificial aging show that "no deficiencies are to be expected from EPS fills placed in the ground over a normal life cycle of 100 years." (Long-term Behaviour 2004; Long-term performance 2001)

Time representativeness:

Reference years:

- 2023.01.01 – 2023.12.31 for Subotica, Hajdúszoboszló and Zalaegerszeg plants
- 2023.06.01 – 2024.05.31 for Kál plant (because EPS production at Kál started in 2023).

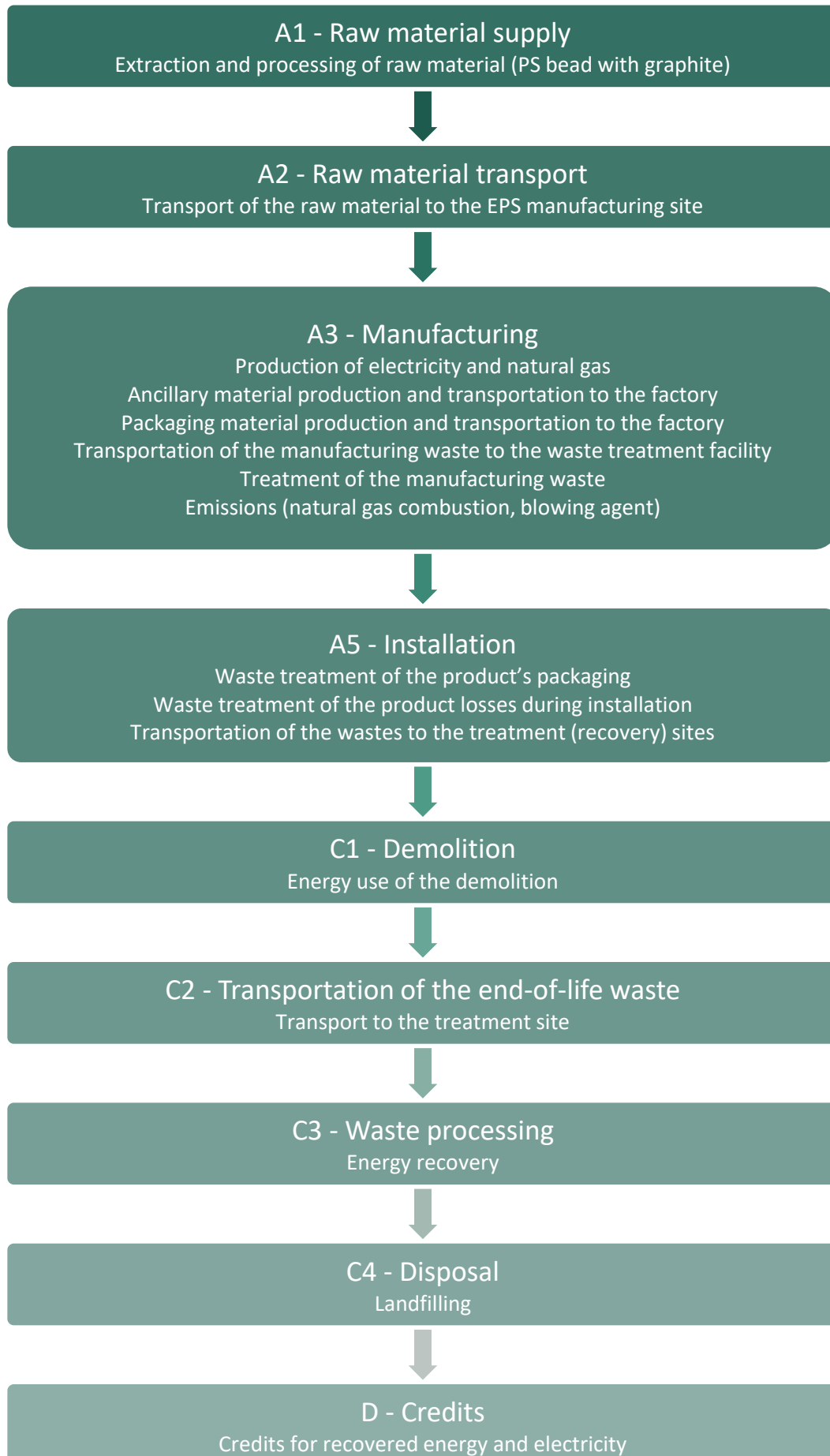
Database(s) and LCA software used: The LCA model for production was made using the LCA for Experts software (LfE, formerly known as GaBi Professional) system for life cycle engineering, developed by Sphera (version 10, 2024).

Applied databases are:

- Managed LCA content (Sphera) database (version 10, 2024),
- Ecoinvent database (version 3.10, 2024).

Description of system boundaries:

Cradle to gate (Modules A1 to A3) with modules A5, C1-C4 and module D. Infrastructure/capital goods are excluded from upstream, core and downstream processes. The “Polluter pays” principle has been applied.



Process diagram of the EPS manufacturing process (A3):



Scenario information:

Installation (A5)

Due to the various application possibilities of the covered products, a wide range of ancillary materials can be used in varying quantities. Selecting only one scenario to observe is not reasonable and the choice was made to exclude the ancillary materials from this module.

The installation's energy need also varies significantly depending on the exact application method, so estimates could not be made for it. However, previous studies¹ indicate that this energy need is negligible (less than 0,1%) compared to the total energy need, so this omission does not come with any significant effects on the impacts.

Masterplast is operating a waste recovery system² in their main market (Hungary), so the consumers have the possibility to send their installation scrap back to Masterplast where it is used as an input in the EPS production process. (Due to the recent start of the program, this waste is not yet included in the input flows.) In other countries, similar collection schemes are also available as this type of scrap can be used in any EPS production.

The packaging of the products can be recycled, so the transport to a recovery site is assumed.

Demolition (C1)

Limited information is available on the energy demand of demolitions and no information was available for the removal of the EPS product specifically. The most common building structure in the market served by Masterplast is concrete, so the general energy of the demolition of a concrete structure was assumed, which is 0,07 MJ/kg according to the JRC report¹.

Transport to waste processing (C2)

The transport distance was assumed to be 100 km and the transportation method to be a truck.

Waste processing (C3)

According to the THE EPS-INDUSTRY'S JOURNEY TOWARDS CIRCULARITY report³, out of all the EPS construction waste, 66% is going to incineration with energy recovery and 10% is going to recycling. However, this construction waste includes the wastes generated during installation and it is reasonable to assume that only this type of pure waste can be recycled currently, and the EOL product extracted during demolition has 0% recycling rate.

The ratio of energy recovery and landfilling is assumed to stay constant, which means that 73,3% of the waste would be incinerated with energy recovery and the rest is landfilled.

Disposal (C4)

The rest of the EPS construction waste (26,6%) is assumed to end up on a landfill based on the same report³ and same assumptions as in module C3.

Benefits (D)

¹JRC Report - Model for Life Cycle Assessment (LCA) of buildings (2018)

² <https://www.masterplast.hu/hungarocell-zold-program/>

³ <https://eumeps.eu/images/website/the-eps-industry-s-journey-towards-circularity-progress-report-final.pdf>

Benefits are calculated based on the heat and electricity generation during the energy recovery of the EOL EPS waste. The used process describes the benefits from the incineration with average substituted heat and electricity.

Allocation:

Since the covered product portfolio is produced in the same plants and same machinery as the white EPS products of Masterplast, physical allocation was used for the materials and energies that were shared between the two product groups.

There is also a co-product called Sole, which is used as packaging of other products. Economic allocation was applied between the EPS products (white and grey) and the Sole co-product. The Sole co-product holds no value, which means that it receives 0% of the impact.

Cut-off criteria:

Cut-off rules were not needed to be applied. In some cases, proxy data were used to achieve 100% completeness, as this is better than data gaps.

Data quality:

At the selection of the most suitable process, it is important to apply the local – country specific – process. Therefore, the country specific processes were chosen, for example in case of the electricity, thermal energy, but other cases – when there was no typical country specific process available – average European processes were selected. In some cases, only processes from other European countries were available.

Generic data used in the LCA study are not older than 5 years and site-specific data are not older than 2 years.

Documentation of the used energy

Module	Process					
	Name	Provider	Reference year	Validity	Factor (kg CO ₂ eq / kWh)	Share within consumption (%)
A3	HU: electricity, medium voltage, residual mix	ecoinvent	2022		0,4129	41,3
	RS: electricity, medium voltage, residual mix	ecoinvent	2022		1,1152	52,6
	HU: Electricity from photovoltaic	Sphera	2020	2026	0,0308	6,2
C	RER: Electricity grid mix	Sphera	2020	2026	0,3016	-

Electricity grid factors used in the Study (kg CO₂ eq./ kWh) - Source: GaBi professional 10. Characterisation factor: EN15804+A2 (based on EF3.1), Climate Change - total

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	ND	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	RER	GLO	HU, RS	-	RER	-	-	-	-	-	-	-	RER	RER	RER	RER	RER
Specific data used	17,75%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-11,7%, +46,2%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	4,01%					-	-	-	-	-	-	-	-	-	-	-	-

When a module is accounted for, the box in the last row is then marked with an “X”.

When a module is not accounted for, the box in the last row is then marked with “ND”, not declared.

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Polystyrene with flame retardant and graphite	0,5037	0	0 resp. 0
TOTAL	0,5037	0	0 resp. 0
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
LDPE film	7,15E-03	1,420%	0
Stretch film	1,91E-03	0,380%	0
Self-adhesive label	2,20E-04	0,044%	0,3560
TOTAL	9,28E-03	1,843%	0,0084

Environment/ hazardous properties: No substance listed under the REACH Regulation is present in either of these products, either above the limits for registration with the European Chemicals Agency or in excess of 0,1 weight-% of the products.

Results of the environmental performance indicators

The environmental impacts of the declared unit for the following impact categories were reported in the EPD according to EN 15804:2012+A2:2019/AC:2021.

Mandatory impact category indicators according to EN 15804:2012+A2:2019/AC:2021 (based on EF 3.1)

Results per declared unit (1 m ² of grey EPS with R=1 m ² K/W thermal resistance)								
Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	1,61E+00	1,50E-04	2,90E-03	5,08E-03	1,23E+00	3,91E-03	-4,60E-01
GWP-biogenic	kg CO ₂ eq.	7,73E-03	0,00E+00	2,61E-05	0,00E+00	2,89E-05	0,00E+00	0,00E+00
GWP-luluc	kg CO ₂ eq.	9,34E-04	2,54E-06	4,40E-07	8,60E-05	2,26E-06	1,44E-05	-4,21E-05
GWP-total	kg CO ₂ eq.	1,62E+00	1,52E-04	2,92E-03	5,16E-03	1,23E+00	3,92E-03	-4,60E-01
ODP	kg CFC 11 eq.	7,30E-10	1,52E-17	6,57E-14	5,15E-16	6,06E-14	1,29E-14	-4,18E-12
AP	mol H ⁺ eq.	3,39E-03	9,30E-07	5,60E-06	3,15E-05	1,08E-04	2,34E-05	-4,88E-04
EP-freshwater	kg P eq.	1,28E-04	6,44E-10	1,20E-08	2,18E-08	1,30E-08	2,25E-06	-7,79E-07
EP-marine	kg N eq.	8,64E-04	4,56E-07	1,40E-06	1,55E-05	2,43E-05	5,04E-06	-1,48E-04
EP-terrestrial	mol N eq.	9,13E-03	5,06E-06	1,46E-05	1,72E-04	5,16E-04	5,54E-05	-1,59E-03
POCP	kg NMVOC eq.	2,66E-02	8,74E-07	3,70E-06	2,96E-05	7,17E-05	1,61E-05	-4,19E-04
ADP-minerals&metals*	kg Sb eq.	3,02E-07	1,29E-11	5,42E-10	4,35E-10	6,29E-10	2,60E-10	-4,05E-08
ADP-fossil*	MJ	4,65E+01	1,97E-03	6,08E-02	6,68E-02	1,32E-01	6,61E-02	-8,22E+00
WDP*	m ³	1,60E-01	2,25E-06	8,01E-04	7,62E-05	9,99E-02	5,06E-04	-5,11E-02
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							

Disclaimers:

- Infrastructure/capital goods are excluded in upstream, core and downstream processes.
- The results of modules A1-A3 should not be used without considering the results of module C.
- The environmental impacts of the declared unit for the following results of the indicators and the corresponding disclaimers were reported in the EPD according to EN 15804:2012+A2:2019/AC:2021, JRC characterization factors (based on EF3.1).
- The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

Additional mandatory and voluntary impact category indicators

Results per declared unit (1 m ² of grey EPS with R=1 m ² K/W thermal resistance)								
Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	1,61E+00	1,52E-04	2,90E-03	5,16E-03	1,23E+00	3,93E-03	-4,60E-01

Results per declared unit (1 m ² of grey EPS with R=1 m ² K/W thermal resistance)								
Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
Particulate matter	Disease incidences	2,29E-08	5,97E-12	4,68E-11	2,02E-10	6,26E-10	2,43E-10	-4,00E-09
Ionising radiation, human health	kBq U235 eq.	5,51E-02	3,56E-07	1,60E-03	1,21E-05	1,22E-03	1,28E-04	-1,02E-01
Ecotoxicity, freshwater	CTUe	2,22E+01	1,45E-03	1,76E-02	4,91E-02	5,42E-02	1,43E-01	-1,18E+00
Human toxicity, cancer	CTUh	6,05E-10	2,92E-14	9,89E-13	9,88E-13	6,87E-12	2,12E-12	-9,48E-11
Human toxicity, non-cancer	CTUh	1,96E-08	1,30E-12	1,52E-11	4,39E-11	4,89E-11	4,45E-11	-2,21E-09

Disclaimer: The ionising radiation, human health impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Resource use indicators

Results per declared unit (1 m ² of grey EPS with R=1 m ² K/W thermal resistance)								
Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
PERE	MJ	1,21E+00	1,93E-04	5,11E-02	6,57E-03	4,45E-02	1,16E-02	-3,25E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,21E+00	1,93E-04	5,11E-02	6,57E-03	4,45E-02	1,16E-02	-3,25E+00
PENRE	MJ	5,28E+01	2,29E-03	7,08E-02	7,77E-02	1,54E-01	7,70E-02	-9,57E+00
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	5,28E+01	2,29E-03	7,08E-02	7,77E-02	1,54E-01	7,70E-02	-9,57E+00
SM	kg	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
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Results per declared unit (1 m ² of grey EPS with R=1 m ² K/W thermal resistance)								
Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
FW	m ³	7,99E-03	2,17E-07	3,91E-05	7,38E-06	2,72E-03	1,76E-05	-2,50E-03
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							

Waste indicators

Results per declared unit (1 m ² of grey EPS with R=1 m ² K/W thermal resistance)								
Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	5,82E-04	6,37E-14	8,79E-11	2,16E-12	7,95E-11	1,63E-11	-5,65E-09
Non-hazardous waste disposed	kg	1,49E-02	3,06E-07	5,01E-05	1,04E-05	4,45E-03	1,33E-01	-4,32E-03
Radioactive waste disposed	kg	2,73E-04	2,55E-09	9,72E-06	8,63E-08	7,59E-06	9,33E-07	-6,18E-04

Output flow indicators

Results per declared unit (1 m ² of grey EPS with R=1 m ² K/W thermal resistance)								
Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
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
Material for recycling	kg	2,90E-03	1,43E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	9,76E-07	0,00E+00	0,00E+00	0,00E+00	3,66E-01	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,22E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,95E+00	0,00E+00	0,00E+00

Variation of the results:

The presented results can be converted to each product specifically by multiplying them with following conversion factors:

Product	Conversion factor (-)
EPS 70G	0,883
EPS 80G	1 (reference product)
EPS 100G	1,114
EPS 150G	1,462

The same conversion factors can be applied for all calculated impact categories.

The variations for the complete product portfolio, for all impact categories are -11,7% and +46,2%.

This high variation occurs because the results are proportional to the unit weight of each product, and the unit weights are different because of the different expansion ratio of each product. (In this case the unit weight is defined as the weight of 1 m² product with an R value of 1 m²K/W.)

Identification of significant issues

The contributions of the modules were assessed based on their contributions to the complete life cycle (all declared modules except D).

At most of the declared parameters the A1 module is the most significant life cycle phase. This includes the production of expandable PS beads and has a very significant contribution to the impact assessment results because it has the largest share in 8 of the 13 mandatory impact categories and it is significant in many categories: GWP-fossil (45,48%), GWP-biogenic (107,52%), GWP-luluc (38,40%), GWP-total (45,63%), AP (62,17%), EP-marine (65,40%), EP-terrestrial (65,27%), ADP-minerals&metals (72,54%), ADP-fossil (87,87%), WDP (42,89%).

The A2 module, the transportation of the expandable PS beads by truck and ship is significant in some categories: GWP-luluc (47,88%), EP-marine (15,10%), EP-terrestrial (15,35%).

The A3 module is significant in multiple impact categories: ODP (90,00%), AP (24,70%), EP-freshwater (95,76%), EP-marine (14,37%), POCP (89,08%), ADP-minerals&metals (22,92%), ADP-fossil (10,33%), WDP (18,49%).

The A5, C1, C2, and C4 modules are not significant in any impact categories.

The C3 module, waste processing, is in this case the incineration of the EPS end-of-life waste. This is significant in the GWP-fossil (43,15%), GWP-total (43,03%), and WDP (38,23%) categories.

Completeness, consistency and sensitivity checks

The LCA study is complete; there are no relevant life cycle phases or processes excluded.

Consistency of the used data is good: high quality specific data have been collected for the A3 module, while the best available generic data have been selected for A1 and for all other life cycle processes.

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