

Environmental Product Declaration

In accordance with ISO 14025 for:

Teknopor EPS from Teknopanel Sakarya

EPD registration number: S-P-04118 Publication date: 05.11.2021 Valid until: 04.11.2026





Programme

EPD Turkey, a fully aligned regional programme.

www.epdturkey.org

The International EPD® System

www.environdec.com

EPD Turkey:

SÜRATAM – Turkish Centre for Sustainable Production

Research & Design

Nef 09 B Blok No:7/15

34415 Kagıthane/Istanbul

Turkey

The International EPD® System

EPD International AB

Box 210 60

SE-100 31 Stockholm

Sweden

Programme Operator

Geographical Scope

Global

UN CPC Code

369

(Other plastic products)

Programme Information

Programme

EPD International AB
Box 210 60

SE-100 31 Stockholm
Sweden

www.environdec.com
info@environdec.com

Product Category Rules (PCR)

Construction Products, 2019:14, Version 1.11

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

EPD process certification ()

EPD verification (**X**)

Third party verifier

Professor Vladimír Kocí

Approved by

The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier

Yes ()

No (**X**)

EPD OWNER

teknopanel

Teknopanel Çatı ve Cephe Panelleri Üretim San. ve Tic. A.Ş.

Sakarya 2. OSB, 1. Cad. No:1, 54300, Hendek,
Sakarya - TURKEY

info@teknopanel.com

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs for construction products are primarily intended for use in B2B communication, but their use in B2C communication under certain conditions is not precluded. For EPDs intended for B2C communication, refer to ISO 14025.

About Company

As Teknopanel, we have been working to render world-class service with our ideas outside of the box to our customers, since the day of establishment in 2005. We provide service to the industry with our 4 different brands under Teknopanel umbrella including Teknopanel Sandwich Panels, Deltapan, Teknopor EPS Products and Teknosistem Exterior Thermal Insulation Systems.

We began the journey from our plant in Mersin where our headquarter and first production facility was established on an area of 34.000 m². Based on our objective to manufacture at a high standard, our Sakarya factory which covers an area of 35.000 m² was established in 2013. We sustain our growth strategy with our latest investments that we open in 2016 in Manisa, which covers an area 46.000 m² and in 2018 in İstanbul which covers an area of 8.000 m². We increased the area of our production facilities to 123.000 m² in total.

Today, our facilities, where Sandwich Panel, EPS Products and Trapezoidal Sheets are manufactured, are among the most leading edge production facilities in Europe. Thanks to our industry-expert R&D team and new investments realized, we provide fast and effective solutions to the needs of our customers with our 13.5 million m² Sandwich Panel and 1.6 million m³ EPS production capacity. We carry these products, manufactured on our own land, with pride to four corners of the world by exporting them to 5 continents, and we fly the flag of our country wherever we provide our services.

With the success we gain; we are glad and proud to rank among Turkey's Top 500 Industrial Enterprises list of Istanbul Chamber of Industry and be the leading company in the industry. We strive for the better every day and keep going with firm steps to become a world brand, with our 460 employees and approximately 100 Authorized Service Points.



We are among ICI Turkey's Top 500 Industrial Enterprises List.



**TÜRKİYE'NİN
500 BÜYÜK SANAYİ
KURULUŞU**

1.600.000 m³

Our annual production capacity for EPS products is 1.6 million cubic meters.



89

We export to 89 countries in total in Asia, Europe, Africa, North and South America.



4

We have 4 production facilities in Mersin, Sakarya, Manisa and İstanbul in with high production standards.



460

We provide service to the sector in Turkey with approximately 460 employees.



Product Information



teknopanel®
TEKNOPOR

Teknopor EPS “expanded polystyrene rigid foam, is an economic and lightweight thermal insulation material derived from petroleum in the form of foam, generally white thermoplastic consisting of 98% air and 2% plastic with closed porous structure.

Small polystyrene granules are heated with water vapor and expanded by inflating with pentane gas, an organic component. The pentane gas in numerous small closed pores, which form in the granules, is replaced by air during production and within a short time after production.

After dried in special silos and inflated with water vapor again, the granules stick firmly to one another without any gaps and take the shape of the mold they are in, resembling honey combs; thus, EPS thermal insulation blocks are formed. This motionless and dry air, which is trapped in the granules with small closed pores, enables EPS thermal insulation to provide superior thermal insulation for buildings.

Teknopor is the brand of Teknopropanel’s white and pink EPS thermal insulation boards. Graphite Teknopor is the brand of EPS thermal insulation boards produced with the grey graphite raw material. Graphite Teknopor increases thermal insulation performance by reducing the material’s thermal conductivity value with its graphite addition. Dry and motionless air within numerous granules constituting EPS does not create thermal bridges, and ensures excellent thermal insulation by preventing heat loss.

EPS is more economical compared to other thermal insulation materials with the same insulation performance. Moreover, it comes to the forefront as an economical option with low energy consumption in its production and its superior technical features. EPS is produced with the required density according to the usage area and your requests. As its features can be customized, it does not lead to material wastage and unnecessary incremental costs. The insulation performance of Graphite Teknopor EPS is higher than Teknopor by up to 20%. The performance of EPS thermal insulation boards remains stable during the product’s economic life thanks to its effective mechanical strength as well as the air trapped by the closed pores it contains. Its thickness does not increase, its thermal conductivity does not change; its mechanical features do not change; and no deformation occurs in other features.

Lightness, easy processibility, and usability in the production of other materials and composite products are among the other features of EPS as a finished product.

In addition to all these features, EPS is an environment-friendly material by being 100% recyclable, and containing components that do not harm the atmosphere and ozone layer.

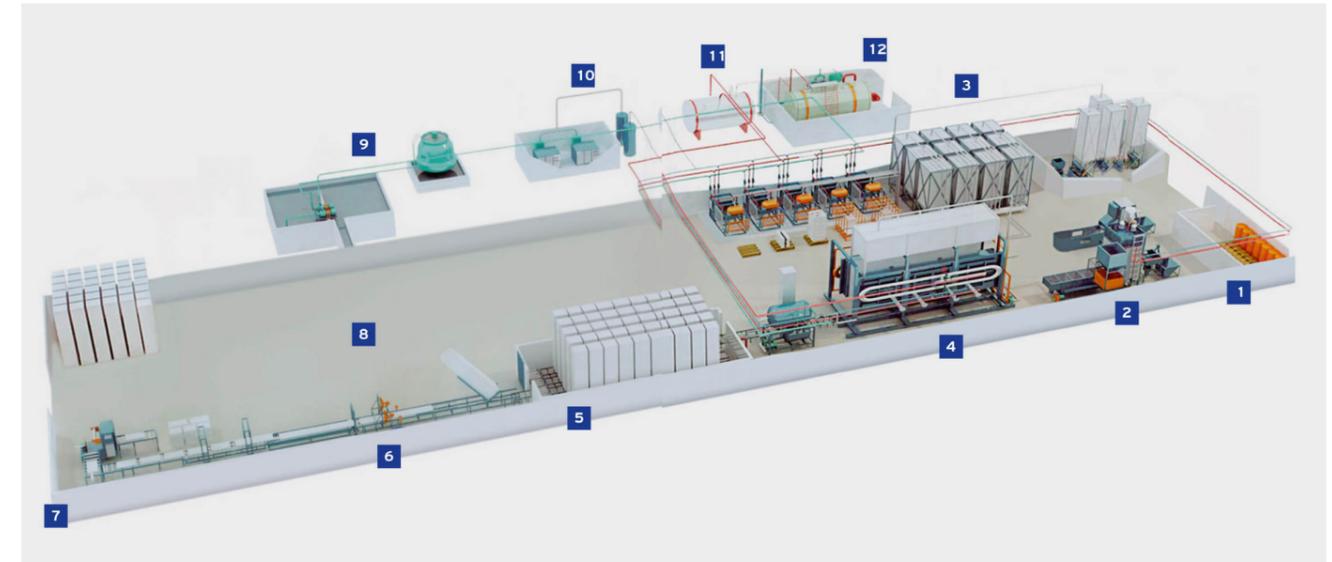
Testing and classification units of the European Union have determined that human health and environment-friendly EPS does not contain any toxic or cancerogenic substances in normal usage.

We fabricate all products under the roof of Teknopropanel in our indoor area of 46.000 m2 in total in Mersin, Sakarya, Manisa and Istanbul. We are the most important producer of the sector with our 460 employees and an annual total production of 1.6 million m3 of EPS on 6 production lines at our facilities of advanced technology. We use clean technology by turning towards clean and renewable energy resources in our EPS production facilities within the scope of our environmental protection policy. No solid waste is generated at the end of EPS production by using minimized water and energy consumption within a closed circuit. As the waste generated during cutting process is recyclable, it is integrated into production again immediately or afterwards. Emissions into underground resources and atmosphere are kept at minimum level and controllable point.

Essential Characteristic (Teknopor Type 16 Graphite)	Performance	Harmonized Technical Specification
Thickness	T2	TS EN 823
Thermal Conductivity	Mak. 0.031 W/mK	TS EN 12667
Reaction to Fire Class	E	TS EN 13501-1
Bending Strength	BS125	TS EN 12089
Compressive Stress at 10% Deformation	CS(10)60	TS EN 826
Tensile Strength Perpendicular To Faces	TR100	TS EN 1607
Long-term Water Absorption Determination by Immersion Method	WL(T) 3.5	TS EN 12087



Teknopropanel gives attention environmental burdens and resource depletion. While production of Teknopor EPS, we use recycled content by 12% and all the production wastes are recycled.



- | | |
|------------------------------|---------------------------|
| 1. Raw Material Warehouse | 7. EPS Packaging Machine |
| 2. Batch Pre-Expander | 8. EPS Storage Area |
| 3. EPS Silos | 9. Water Cooling System |
| 4. EPS Block Molding Machine | 10. Compressed-Air System |
| 5. Drying Room for EPS Block | 11. Accumulation Tank |
| 6. EPS Cutting Machine | 12. Steam Boiler |

Applications of EPS

EPS products are especially used for thermal insulation in buildings, and are also useful for sound insulation. In addition, they offer solutions for different purposes in special engineering constructions and sectors other than construction. Usage areas of EPS get diversified and improved day by day.

For Thermal Insulation In Buildings

- Thermal insulation of walls in buildings
- Thermal insulation of inclined and terrace roofs in buildings
- Thermal insulation of flooring in buildings
- Thermal insulation of ceilings in buildings
- Thermal insulation of protrusions in buildings
- Impact sound insulation in floating floor applications in buildings
- Formation of multi-layered elements for air sound insulation in buildings (after going through special processes)
- Thermal insulation of cold storages
- Thermal insulation of pipes
- Thermal insulation of poultry houses

For Other Purposes In Buildings

- Expansion joints
- Manufacturing lightweight building blocks (lightweight brick, briquette etc.)
- Manufacturing filler blocks
- Thermal insulation of window shade frames
- Manufacturing lightweight concrete and insulation plaster from EPS granules
- As filling material in door production
- Manufacturing prefabricated lightweight concrete elements
- Insulation of tanks and storages
- Manufacturing composite (multi-layered finished) boards

In Special Engineering Constructions

- Manufacturing floating piers (pontoon)
- Construction of highways in cold regions
- For increasing ground strength by filling in loose grounds
- Expansion joints of bridges

In Other Fields

- Packaging industry
- Manufacturing lifejackets and life buoys for ships
- Manufacturing windsurfing boards
- Manufacturing small boats
- In decoration works

LCA Information

Functional Unit

1 R (m²K/W) Teknopor Type 16 kg/m³ Graphite Insulation EPS Materials

Time Representativeness

2021

Database(s) and LCA Software Used

Ecoinvent 3.6, TLCID (Turkish Lifecycle Inventory Database) and SimaPro 9.1

System Boundaries

Cradle to Grave (A1-A5, C1-C4 and D)

Allocation

No allocation performed

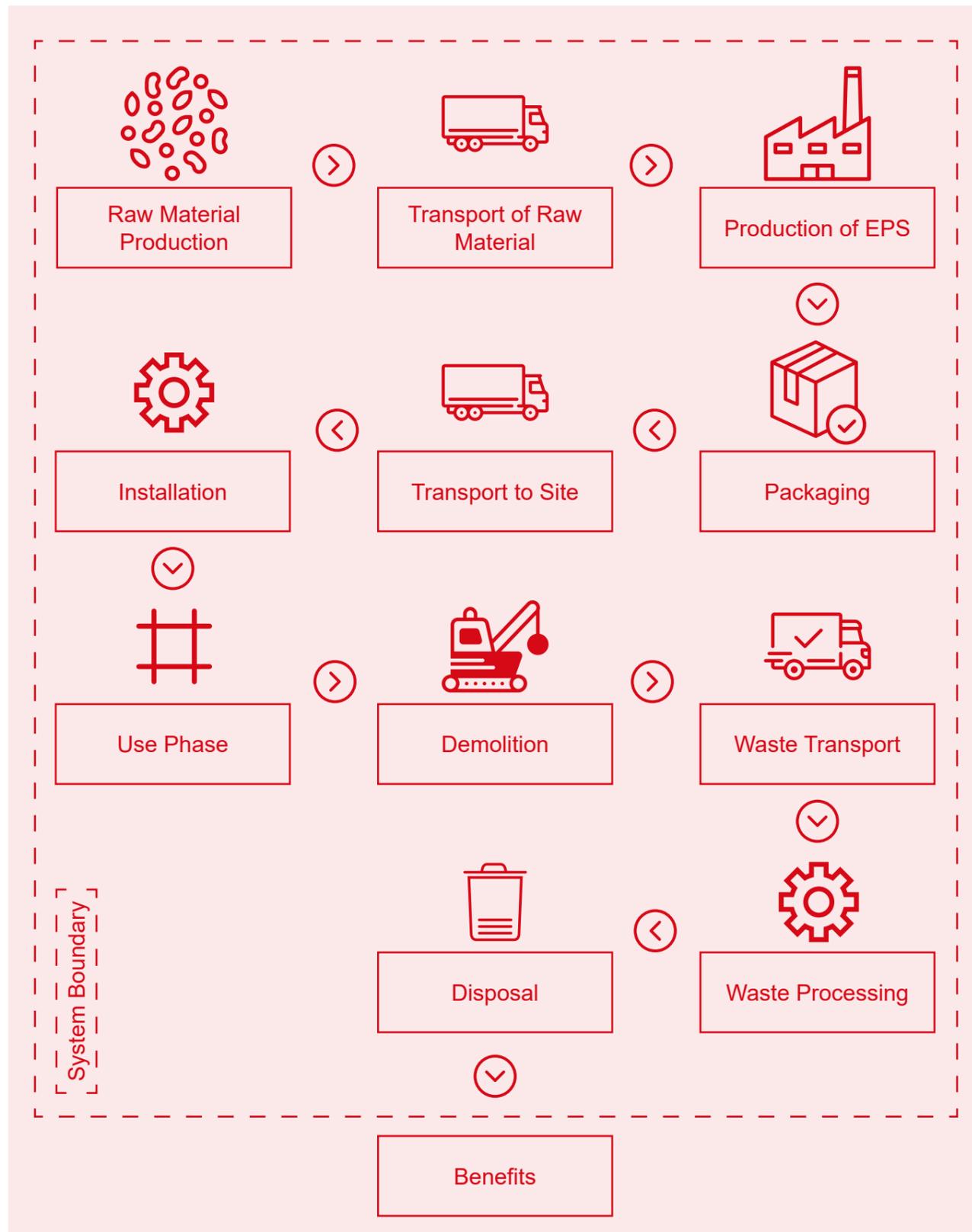
Cut-Off Rules

No cut-off rule was applied within the LCA study underlying this EPD.

Raw Material Supply	Upstream		Core		Downstream											Other Environmental Information
	Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction, demolition	Transport	Waste Processing	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

*ND: Not declared.

System Boundary



System Description

A1. Raw Material Production

This step covers production of EPS raw material which include propane and carbon black.

A2. Transport to Factory

This step is relevant delivery of raw materials to production facility. Distance is 508 km from İzmir to Sakarya.

A3. Manufacturing

EPS raw material is processed and inflated, at last step, final product cutted in intended dimensions. Recycled material is added to virgin material while production. Recycled material ratio of end product is 12%.

A4. Transport to Site

Manufactured product are transported to sites of customers. Average distance is calculated 350 km by figures of 2020.

A5. Installation

Dowels and screws are used for the installation of EPS product.

C1. Demolition

It is assumed that there is no energy use and any other consumption for demolition.

C2. Waste Transport

100 km of average distance is assumed for the waste transport.

C3. Waste Processing

It is assumed that there is no energy use and any other consumption for waste processing.

C4. Disposal

All construction products are disposed into a landfill. 76% of packaging materials are recycled, remaining 23% are disposed into a landfill..

D. Benefits & Loads

There is no potential benefit as the products go completely to the landfill at the end of life. Recycle content of end product (12%), production wastes are used for different quality of products (13%) as recycled content, and 76% of packaging which recycled were included as benefits.



ENVIRONMENTAL PERFORMANCE

Thickness (cm)	Conversion Factor
1	0.32
2	0.65
3	0.97
4	1.29
5	1.61
6	1.94
7	2.26
8	2.58
9	2.90
10	3.23
12	3.87
14	4.52
16	5.16
17	5.48
18	5.81
19	6.13
20	6.45

Please use conversion factors to calculate specific environmental impact or a given thickness.



POTENTIAL ENVIRONMENTAL IMPACT

Impact category	Unit	A1-A2-A3	A4	A5	C1	C2	C3	C4	D
GWP - Fossil	kg CO ₂ eq	2.67	0.56	13.2 x10 ⁻³	0	8.29 x10 ⁻³	0	58.2 x10 ⁻³	-0.61
GWP - Biogenic	kg CO ₂ eq	23.4 x10 ⁻³	0.12 x10 ⁻³	21.6 x10 ⁻⁶	0	1.73 x10 ⁻⁶	0	35.9 x10 ⁻⁶	-5.10 x10 ⁻³
GWP - Luluc	kg CO ₂ eq	0.94 x10 ⁻³	0.16 x10 ⁻³	4.10 x10 ⁻⁶	0	2.43 x10 ⁻⁶	0	2.76 x10 ⁻⁶	-0.13 x10 ⁻³
GWP - Total	kg CO ₂ eq	2.70	0.56	13.2 x10 ⁻³	0	8.29 x10 ⁻³	0	58.2 x10 ⁻³	-0.61
ODP	kg CFC11 eq	0.11 x10 ⁻⁶	0.13 x10 ⁻⁶	0.47 x10 ⁻⁹	0	1.89 x10 ⁻⁹	0	1.79 x10 ⁻⁹	-15.7 x10 ⁻⁹
AP	mol H ⁺ eq	11.1 x10 ⁻³	2.29 x10 ⁻³	62.2 x10 ⁻⁶	0	34.1 x10 ⁻⁶	0	50.1 x10 ⁻⁶	-2.48 x10 ⁻³
EP - Freshwater	kg P eq	0.35 x10 ⁻³	44 x10 ⁻⁶	7.83 x10 ⁻⁶	0	0.66 x10 ⁻⁶	0	1.05 x10 ⁻⁶	-66.8 x10 ⁻⁶
*EP - Freshwater	kg PO ₄ eq	1.06 x10 ⁻³	0.14 x10 ⁻³	24 x10 ⁻⁶	0	2 x10 ⁻⁶	0	3.22 x10 ⁻⁶	-0.2 x10 ⁻³
EP - Marine	kg N eq	1.77 x10 ⁻³	0.67 x10 ⁻³	13 x10 ⁻⁶	0	9.91 x10 ⁻⁶	0	1.06 x10 ⁻³	-0.39 x10 ⁻³
EP - Terrestrial	mol N eq	18.9 x10 ⁻³	7.32 x10 ⁻³	0.13 x10 ⁻³	0	0.11 x10 ⁻³	0	0.17 x10 ⁻³	-4.19 x10 ⁻³
POCP	kg NMVOC eq	22.9 x10 ⁻³	2.23 x10 ⁻³	58.3 x10 ⁻⁶	0	33.2 x10 ⁻⁶	0	62.1 x10 ⁻⁶	-5.34 x10 ⁻³
ADPE	kg Sb eq	0.68 x10 ⁻⁶	1.64 x10 ⁻⁶	0.1 x10 ⁻⁶	0	24.5 x10 ⁻⁹	0	7.09 x10 ⁻⁹	-0.11 x10 ⁻⁶
ADPF	MJ	55.1	8.46	0.25	0	0.13	0	0.14	-12.3
WDP	m ³ depriv.	1.57	57.5 x10 ⁻³	3.30 x10 ⁻³	0	0.86 x10 ⁻³	0	5.81 x10 ⁻³	-0.36
PM	disease inc.	0.12 x10 ⁻⁶	39.1 x10 ⁻⁹	0.92 x10 ⁻⁹	0	0.58 x10 ⁻⁹	0	0.88 x10 ⁻⁹	-25.4 x10 ⁻⁹
IR	kBq U-235 eq	55.2 x10 ⁻³	39.9 x10 ⁻³	0.4 x10 ⁻³	0	0.59 x10 ⁻³	0	0.68 x10 ⁻³	-11.3 x10 ⁻³
ETP - FW	CTUe	23.7	6.05	0.32	0	90 x10 ⁻³	0	0.27	-5.06
HTTP - C	CTUh	0.57 x10 ⁻⁹	0.18 x10 ⁻⁹	70.3 x10 ⁻¹²	0	2.62 x10 ⁻¹²	0	3.69 x10 ⁻¹²	-0.13 x10 ⁻⁹
HTTP - NC	CTUh	10.8 x10 ⁻⁹	6.92 x10 ⁻⁹	0.88 x10 ⁻⁹	0	0.1 x10 ⁻⁹	0	0.12 x10 ⁻⁹	-2.25 x10 ⁻⁹
SQP	Pt	2.77	5.67	30.2 x10 ⁻³	0	84.4 x10 ⁻³	0	0.3	-0.53

Acronyms: GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.

Legend: A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.

Disclaimer 1: This 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.

Disclaimer 2: 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.

*EP-Freshwater: This indicator has been calculated as "kg P eq" as required in the characterization model. (EUTREND model, Struijs et al, 2009b, as implemented in ReCiPe; <http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>)

USE OF RESOURCE

Impact Category	Unit	A1-A2-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	0.86	83.4 x10 ⁻³	9.85 x10 ⁻³	0	1.24 x10 ⁻³	0	2.52 x10 ⁻³	-0.19
PERM	MJ	0	0	0	0	0	0	0	0
PERT	MJ	0.86	83.4 x10 ⁻³	9.85 x10 ⁻³	0	1.24 x10 ⁻³	0	2.52 x10 ⁻³	-0.19
PENRE	MJ	55.1	8.46	0.25	0	0.13	0	0.14	-12.3
PENRM	MJ	0	0	0	0	0	0	0	0
PENRT	MJ	55.1	8.46	0.25	0	0.13	0	0.14	-12.3
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m ³	6.12 x10 ⁻³	1.43 x10 ⁻³	48.8 x10 ⁻⁶	0	21.3 x10 ⁻⁶	0	0.14 x10 ⁻³	-1.18 x10 ⁻³

Acronyms : 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.

OUTPUT FLOWS

Impact Category	Unit	A1-A2-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	0	0	0	0	0	0	0	0
NHWD	kg	4.00 x10 ⁻³	0	9.30 x10 ⁻³	0	0	0	0.43	0
RWD	kg	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	4.00 x10 ⁻³	0	7.07 x10 ⁻³	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0	0	0	0

HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal.

References

Ecoinvent

Ecoinvent Centre, www.ecoinvent.org

ELCD Database

European Platform on Life Cycle Assessment, <https://eplca.jrc.ec.europa.eu/ELCD3/>

EN ISO 9001

Quality Management Systems - Requirements

EN ISO 14001

Environmental Management Systems - Requirements

Firat, F. K., & Akbaş, M. F. (2015)

The Development of Recycling in the Construction Industry and Its Effect on the Economy, International Conference on Eurasian Economies 2015

GPI

General Programme Instructions of the International EPD® System. Version 3.0.

ISO 45001

Occupational Health & Safety Management System - Requirements

ISO 14020:2000

Environmental Labels and Declarations — General principles

EN 15804:2012+A2:2019

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 declarations — Principles and procedures

ISO 14040/44/ DIN EN ISO 14040:2006-10

Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

SimaPro

SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

The International EPD® System

The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

Contact Information



Programme

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www.epdturkey.org

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www.environdec.com

Programme Operator

EPD Turkey
SÜRATAM – Turkish Centre for Sustainable Production Research & Design
Nef 09 B Blok No:7/15,
34415 Kagithane / Istanbul, Turkey
www.epdturkey.org
info@epdturkey.org

EPD International AB
Box 210 60
SE-100 31 Stockholm, Sweden
www.environdec.com
info@environdec.com

Owner of the Declaration



Sakarya 2. OSB, 1. Cad. No:1,
54300, Hendek, Sakarya, Turkey
+90 850 777 0850

www.teknopanel.com
info@teknopanel.com

LCA Practitioner & EPD Designer



United Kingdom Office
4 Clear Water Place
Oxford OX2 7NL, UK
0 800 722 0185
Turkey Office
Lalegül Sok. No:7/18
34415 4. Levent-Istanbul, Turkey
+90 212 281 13 33

www.metsims.com
info@metsims.com

3rd Party Verifier



Professor Vladimír Kocí
LCA Studio
Šárcecká 5,16000
Prague 6 - Czech Republic

www.lcastudio.cz



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