SAINT-GOBAIN GLASS

ENVIRONMENTAL PRODUCT DECLARATION

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

PLANICLEAR®

2 mm – 12 mm

Version 3
Version date: 2016-09-15
Date of revision: 2026-05-22
Validity: 5 years
Validity date: 2031-05-21

EPD of multiple products, based on a representative product

EPD INTERNATIONAL EPD SYSTEM

The International EPD® System
Programme operator: EPD international AB
Registration number: **EPD-IES-0032142:001**

ECO PLATFORM EPD VERIFIED

An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com

EPD Owner: Saint-Gobain Glass France

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General information

Programme information

PROGRAMME:	The International EPD® System
ADDRESS:	EPD International AB - Box 210 60 - SE-100 31 Stockholm - Sweden
WEBSITE:	www.environdec.com
E-MAIL:	support@environdec.com

PCR information

Product category rules (PCR):
CEN standard **15804:2012+A2:2019/AC:2021** serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 Construction Products, version 2.0.1

Complementary PCR: c-PCR-009 Flat glass products used in buildings and other construction works (EN17074:2019).

PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com for a list of members.
Chairs of the PCR review: Rob Rouwette (chair), Noa Meron (co-chair).

Verification

External and independent ('third-party') verification of the declaration and data, according to ISO 14025:2006, via EPD verification through:
☒ Individual EPD verification without a pre-verified LCA/EPD tool
☐ Individual EPD verification with a pre-verified LCA/EPD tool
☐ EPD process certification* without a pre-verified LCA/EPD tool
☐ EPD process certification* with a pre-verified LCA/EPD tool
☐ Fully pre-verified EPD tool

Independent third-party verification of the declaration and data, according to ISO 14025:2006:
☒ EPD verification by individual verifier
Third party verifier: Pierre-Alexis DUVERNOIS, ELYS CONSEIL – pa.duvernois@elys-conseil.com
Approved by: The International EPD© System
Procedure for follow-up of data during EPD validity involves third part verifier: ☒ Yes ☐ No

Ownership and limitation on use of EPD

The EPD owner has the sole ownership, liability and responsibility for the EPD.

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

Information about EPD owner

Address and contact information of the EPD owner: Saint-Gobain Glass France, 12 place de l'Iris, 92400 Courbevoie
Description of the organization of the EPD owner: Saint-Gobain Glass is a worldwide manufacturer and supplier of flat glass and glass solutions for a wide range of applications in residential and commercial buildings.
Management system-related certification: Glass products are manufactured in production plants with an integrated management system certified according to ISO 9001:2015, ISO 14001:2015 and OHSAS 18001:2009 standards.
LCA Practitioner: EPD® prepared by Laura Hoffmann (Saint-Gobain LCA central team)
Communication: The intended use of this EPD is for B2B communication.

Product information

Product name: PLANICLEAR®
Visual representation of the product: See opposite
UN CPC CODE: 3711 - Unworked glass, flat glass and pressed or moulded glass for construction; glass mirrors.
Manufacturing site(s):
Saint-Gobain Glass France, 251 Boulevard Drion, 59580 Aniche, France
Eurofloat, 312 rue des Balmes, 38150 Salaise-sur-Sanne, France
Saint-Gobain Cristaleria S.L, Avenida de Lugo, 112, 33401 Avilés, Spain
Saint-Gobain Glass Italia, Via Ponte a Piglieri, 2, 56121 Pisa, Italy
Saint-Gobain Glass Flachglas GmbH, Solarstraße 1, 04860 Torgau, Germany
Saint-Gobain Glass Germany, Poststraße 103, 51143 Köln, Germany
Saint-Gobain Buidling Glass Deutschland, Nikolausstraße 1, 52222 Stolberg, Germany
Saint-Gobain Glass LTD, Weeland Rd, Goole DN14 0FD, United Kingdom
Saint-Gobain Glass Romania, Varianta Nord numărul 61, Călărași 910053, Romania
Saint-Gobain Innovative Materials Polska, Szklanych Domów 1, 42-530 Dąbrowa Górnicza, Poland

Product description

This Environmental Product Declaration (EPD®) describes the environmental impacts of 1 m² of clear glass PLANICLEAR® 4mm with a light transmittance of maximum 90.5%*, for an expected average service life of 30 years, without installation accessories.
*Check table 1, below, with all the performance data according to the corresponding thickness

This EPD is an average of 10 manufacturing sites in Europe. All the sites producing PLANICLEAR® are considered. The average calculated is a weighted arithmetic mean.
Packaging and impact for product installation are not taken into account. Demonstration was given that packaging materials (including metallic trestle) as well as energy used for installation of glass product are included in the cut-of-rules.

To calculate the impact of the range of commercial thicknesses between 2 mm and 12 mm, refer to the table "Conversion factor to specific thickness" in the additional information section.

PLANICLEAR® is a basic soda-lime silicate glass produced using the float procedure it can be incorporated into a building, furniture or industrial application.

The product is 100% glass CAS number 65997-17-3, EINECS number 266-046-0.

This glass is in conformity with the European Standard EN 572-2.

For more information visit: www.calumen.com and www.saint-gobain-glass.com

Technical data/physical characteristics:

PARAMETER	VALUE
Visible parameters	
Light transmittance (LT) %	90.5%
External Light Reflexion (RLE) (%)	8.2%
Energetic parameters	
Energy Transmittance (ET) %	87%
Solar factor g	0.88

Content declaration

Description of the main components and/or materials for the following declared unit: 1 m² of declared product:

PARAMETER	VALUE
Quantity of glass for 1 m² of declared product	10 kg
Thickness	4 mm
Packaging for the transportation and distribution	Glass is transported on metal trestles that have a high turnover rate. In some cases, the glass may contain packaging materials. However, demonstration was given that trestles and packaging materials are included in the cut-of-rules according to EN 15804+A2
Product used for the Installation	NA

This EPD uses the 4 mm thickness as a reference. The content declaration below is representative of this thickness.

Product components	Mass (%)	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product or declared unit
Sand	55-60 %	NA	NA	
Cullet	15-20%	1-5%	NA	
Sodium carbonate	15-20%	NA	NA	
Limestone	5-10%	NA	NA	
Other	10-15%	NA	NA	
Sum	100%	1-5%		

Hazardous substances

At the date of issue of this declaration, there is no “Substance of Very High Concern” (SVHC) in concentration above 0.1% by weight, and neither do their packaging, following the European REACH regulation (Registration, Evaluation, Authorization and Restriction of Chemicals).

LCA information

TYPE OF EPD	Cradle to grave and module D
FUNCTIONAL UNIT/DECLARED UNIT	1 m² of clear glass PLANICLEAR® ® 4mm with a light transmittance of maximum 90.5%, for an expected average service life of 30 years, without installation accessories.
CONVERSION FACTOR TO MASS	Density = 10 kg/m²
SYSTEM BOUNDARIES	Cradle to grave and module D
REFERENCE SERVICE LIFE (RSL)	According to cPCR EN 17074:2019, the reference service life is 30 years.
CUT-OFF RULES	In the case that there is not enough information, the process energy and materials representing less than 1% of the whole energy and mass used can be excluded (if they do not cause significant impacts). The addition of all the inputs and outputs excluded cannot be bigger than the 5% of the whole mass and energy used, as well of the emissions to environment occurred. Therefore, according to EN 15804+A2, the energy used for the installation of 1m² of glass and the transport glass racks are included in the cut-off-rules. Flows related to human activities such as employee transport are excluded. The construction of plants, production of machines and transportation systems are excluded since the related flows are supposed to be negligible compared to the production of the building product when compared at these systems lifetime level. However, we note that some generic datasets used in the LCA model may include capital goods and infrastructure within their system boundaries.
ALLOCATIONS	The polluter pays and the modularity principles as well have been followed. **Allocation of materials for recycling:** - **Post-consumer:** When a flow enters the manufacturing process (A1-A3), it is treated with waste allocation (as defined in EN15804+A2). All the steps after its “End of Waste” status are quantified. The incoming flow contributes to module D and Secondary Materials indicator. Post-consumer materials end-of-waste state is considered to be reached after sorting at jobsite. All further transformation activities are included in the EPD. - **Pre-consumer:** When a flow enters the manufacturing process (A1-A3), it is considered as an incoming coproduct that bears a fraction of the impact of the original manufacturing process where it was generated (which might be 0, e.g. in case of an

<table>
<tr><td></td><td>economic allocation with a negligible (<1%) economic value). The incoming flow does not contribute to module D nor Secondary Materials indicator.
It has been demonstrated in LCA report that pre-consumer cullet from downstream and upstream processing (pre-consumer) have a contribution to overall income less than 1% (following an economic allocation). Thus, according to § 6.4.3.2 of the EN 15804+A2 standard, no impact is considered.
Calumite (blast furnace slag) is integrated into the system as a co-product and bear a share of the steel manufacturing process based on economical allocation depending on the geography. All information are provided in the LCA report.
Except from those materials which benefits from a particular status, no other co-products are taken into account therefore, there is no further allocation to describe.</td></tr>
<tr><td>DATA QUALITY ASSESSMENT</td><td>Data quality assessment has been performed using guidance from EN15941:2023 and EN 15804+A2:2019.
Primary and secondary data had been judged by its precision (measured, calculated, or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methodology applied), and representativeness (geographical, technological, and temporal).
For more information, please refer to the following section: Data Quality Declaration.

Overall data quality of background data is given below:
<table>
<tr><th>GR</th><th>TeR</th><th>TR</th><th>Precision</th></tr>
<tr><td>2.1
Good</td><td>2.0
Good</td><td>1
Very good</td><td>1.9
Good</td></tr>
</table></td></tr>
<tr><td>GEOGRAPHICAL COVERAGE AND TIME PERIOD</td><td>Scope: Europe
Data are collected from 10 production site located in: France, Germany, Italy, Spain, Great Britain, Romania and Poland
Data collected for the year: 2023 and 2024</td></tr>
<tr><td>BACKGROUND DATA SOURCE</td><td>Databases from Sphera CUP2024.2 and ecoinvent v.3.10
GWP100, EN 15804+A2. Version: EF 3.1, February, 2023</td></tr>
<tr><td>SOFTWARE</td><td>Sphera LCA for Expert (GaBi) 10</td></tr>
</table>

Data quality declaration

Data quality information displayed according to guidance from *§7.3.3 and* example 4 in appendix C of EN 15941: 2023	
Data collection	01/01/2023 to 31/12/2024
Sites used	Refer to manufacturing sites mentioned in 'Product information' section.
Geography	Produced in: Europe (France, Germany, Italy, Spain, Great Britain, Romania and Poland) Sold in: Europe Use and disposal in: Europe
Technology	Float process
Averaging	Production weighted average covering 100 % of production by the company
LCI/LCA database	Sphera CUP2024.2 and ecoinvent v.3.10
EPD used	For natural and synthetic sodium carbonate (Confidential)
Data Quality Scheme	EN 15804 :2012+A2:2019, Annex E, Table E.2
Use of fair data with more than 30% of a core impact	None
Use of Poor relevant data	None
Use of very poor relevant data	None

The share of primary data below is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories

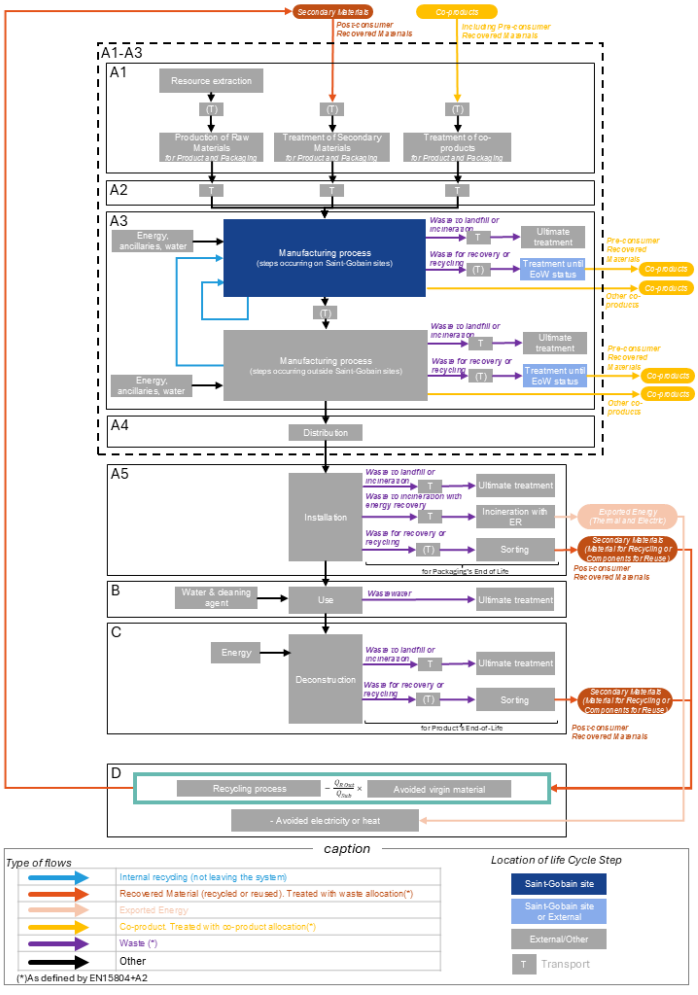
SHARE OF SPECIFIC DATA IN EPDs	PROCESS	SOURCE TYPE	SOURCE	REFERENCE YEAR	DATA CATEGORY	SHARE OF PRIMARY DATA OF GWP-GHG RESULTS FOR A1-A3
	Plant data / Manufacturing process					
	Thermal energy	Database	Sphera 2024.2	<5 years old	Primary data	52.2%
	Electricity	Database	Sphera 2024.2 /ecoinvent 3.10	<5 years old	Primary data	4.38%
	Direct emissions	Collected data	EPD Owner	2023/2024	Primary data	16.82%
	RMs from EPDs					
5%	**Dolomite**	Verified LCI	INIES	2022	Primary data	0.09%
0%	**Synthetic sodium carbonate dense (IT)**	Verified LCA	Internal	2022	Primary data	1.39%
0%	**Synthetic sodium carbonate dense (FR)**	Verified LCA	Internal	2021	Primary data	1.52%
0%	**Synthetic sodium carbonate dense (DE)**	Verified LCA	Internal	2019	Primary data	0.11%
0%	**Synthetic sodium carbonate dense (DE)**	Verified LCA	Internal	2020	Primary data	3.07%
0%	**Synthetic sodium carbonate dense (ES)**	Verified LCA	Internal	2023	Primary data	1.36%
25%	**Silica sand, dry (FR)**	Verified LCI	INIES	2022	Primary data	0.19%
0%	**Natural sodium carbonate (Na2CO3)**	EPD	International EPD System	2022	Primary data	0.84%
0%	**Natural sodium carbonate (Na2CO3)**	EPD	International EPD System	2022	Primary data	1.02%
0%	**Synthetic sodium carbonate dense**	EPD	Instytut Techniki Budowlanej (ITB)	2022	Primary data	2.62%
0%	**Synthetic sodium carbonate dense**	EPD	Instytut Techniki Budowlanej (ITB)	2022	Primary data	2.10%
	Transport of RM					
	Transport of RM Product	Database	Sphera 2024.2 /ecoinvent 3.10	<5 years old	Secondary data	4.15%
	Transport of RM Packaging	Database	Sphera 2024.2 /ecoinvent 3.10	<5 years old	Secondary data	0.00%
	Transport for inter-plant glass transfer	Database	Sphera 2024.2 /ecoinvent 3.10	<5 years old	Secondary data	0.55%
	Background datasets in A1-A3					
	Other processes	Database	Sphera 2024.2/ecoinvent 3.10	<5 years old	Secondary data	7.58%
					Total share of primary data	**73.33%**

Description of system boundaries

System boundaries (X=included, MND=module not declared, NA= Not applicable)

	PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
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	EUR	EUR	EUR	EUR	EUR	-	EUR	-	-	-	-	-	EUR	EUR	EUR	EUR	EUR
Share of primary data	73.5% on GWP-GHG			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	-50% to 200% on GWP-GHG			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	-20.8% to 43.9% on GWP-GHG			-	-	-	-	-	-	-	-	-	-	-	-	-	-

System boundaries when the end-of-waste state is reached



Life cycle stages

A1-A3. Product stage

For the product covered by this EPD, stages A1–A3 represent the production of flat glass using the float process, from cradle to gate.
This includes the extraction and processing of raw materials and energy (module A1), transportation to the manufacturer (module A2), and the manufacturing and processing of flat glass (module A3).

Transport distances for raw material supply are calculated based on the transport distances of the raw materials to the various flat glass production sites, weighted by production volumes in tonnes (road and maritime transport).

Cullet is also added to the batch, originating from:

- Manufacturing or processing plants: pre-consumer cullet
- Renovation or demolition sites: end-of-life or post-consumer cullet

***Note**: Internal cullet (furnace process cullet) is never considered as a secondary material.*

A1. Raw materials supply

This module includes the extraction and processing of all raw materials and energy which occur upstream from the manufacturing process.

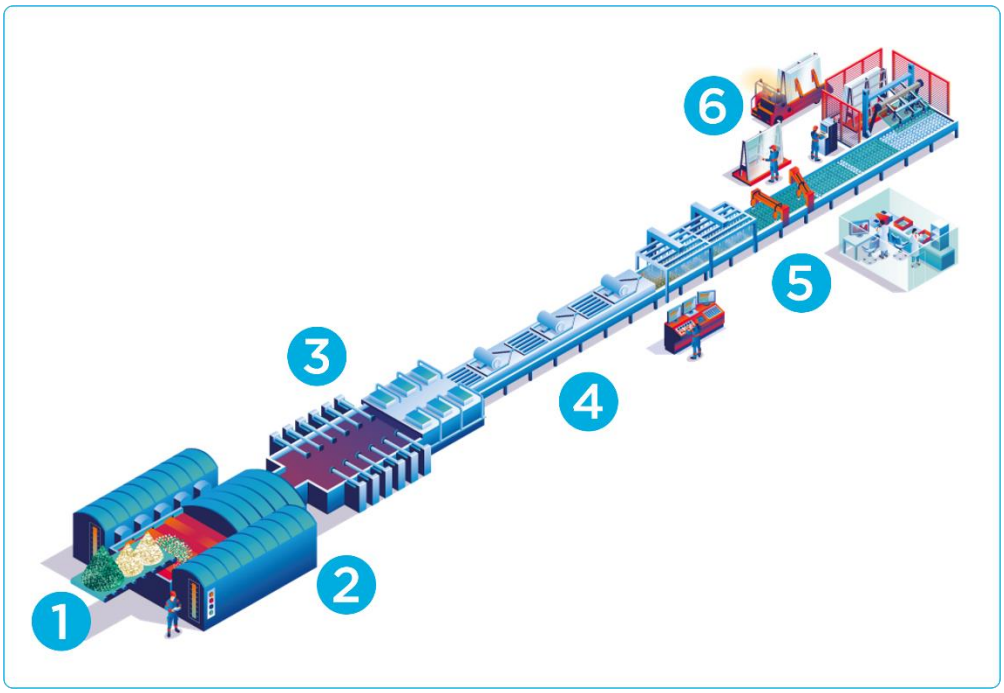
A2. Transport to the manufacturer

This module includes the transportation of raw materials to the manufacturing site. The modelling includes road, boat and/or train transportations of each raw material.

A3. Manufacturing

This module includes the manufacture of products. When it is relevant, the manufacture of packaging as well as production of packaging material is taken into account at this stage.
The processing of any waste arising from this stage is also included.

Float glass process



1. **BATCH MIXER:** Mix of raw materials (silica, soda ash, lime, feldspar and dolomite) to which is added recycled glass (cullet) and other compounds depending on the desired color and properties.
2. **FUSION:** Raw materials are melted at 1,550°C in a furnace. Thermal energy from flames can be recovered in regenerator, those from smokes can be useful to produce electricity or heat the factory.
3. **FLOAT**: The molten glass is fed into a bath of molten tin. The glass floats on this flat surface and is drawn off in a ribbon. Serrated wheels, or top rolls, pull and push the glass sideways depending on the desired thickness (from 2 to 19 millimeters).
4. **ANNEALING LEHR:** The glass is lifted onto conveyor rollers and passes through a controlled cooling tunnel measuring more than 100 meters in length. Approximately 600°C at the start of this step, the glass exits the lehr at room temperature.
5. **CUTTING AND STACKING:** The glass is automatically cut lengthwise and crosswise to produce panel glass from 1 to 20 square meters. The sheets of glass are raised by vacuum frames that then place them on glass stillages.
6. **QUALITY:** Automatic inspections and regular samples are taken to check the quality of the glass at each step in the glassmaking process.
7. **STORAGE AND TRANSPORTATION:** The stillages are placed on storage racks in the warehouse. Note that flat glass is transported on dedicated racks, used many times. According to EN15804+A2, these racks are not included in the life cycle of the product.
8. **ENVIRONMENT**: Use of recycled cullet, installation of pollution abatement systems and closed-circuit management of water: every measure is taken to limit the consumption of energy, extraction of natural resources, production of waste and emissions into the atmosphere.

Glass is transported on metal trestles that have a high turnover rate. In some cases, the glass may contain packaging materials. However, demonstration was given that trestles and packaging materials are included in the cut-of-rules according to EN 15804+A2.

A4-A5. Construction process stage

The construction process is divided into 2 modules: A4, transport to the building site and A5, installation in the building.

A4. Transport to the building site

This module includes transport from the production gate to the building site.
Transport is calculated based on a scenario with the parameters described in the following table.

PARAMETER	VALUE / DESCRIPTION
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Freight truck - "GLO: Truck-trailer, EURO 6 A-C, 34-40 t gross weight / 27 t payload capacity" Reference year of data set: 2023 Data source : Sphera Profesionnal Database
Distance	654 km
Capacity utilisation (including empty returns)	100 % of the capacity in volume 30 % of empty returns in mass
Bulk density of transported products	2500 kg/m^3
Volume capacity utilisation factor	1 (by default)

A5. Installation in the building

This module includes: the installation of the product, the surplus of raw materials and packaging (cradle to gate) to compensate for the loss of product during the installation, the transport and management of packaging and product waste.

PARAMETER	VALUE / DESCRIPTION
Ancillary materials for installation (specified by materials)	According to cPCR EN 17074:2019, nonancillary materials considered
Water use	None
Other resource use	According to EN 15804+A2, the energy needed during the installation is less than 0.1% of the total life cycle energy. It's included in the cut-off-rules.
Quantitative description of energy type (regional mix) and consumption during the installation process	None
Waste of materials on the building site before waste processing, generated by the product's installation (specified by type)	According to cPCR EN 17074:2019, no waste is considered as well as no packaging waste.
Output materials (specified by type) as results of waste processing at the building site e.g., of collection for recycling, for energy recovering, disposal (specified by route)	None
Direct emissions to ambient air, soil and water	None

B1-B7. Use stage (excluding potential savings)

The use stage is divided into the following modules:

- B1: Use
- B2: Maintenance
- B3: Repair
- B4: Replacement
- B5: Refurbishment
- B6: Operational energy use
- B7: Operational water use

B2. Maintenance:
The product has a reference service life of 30 years. This assumes that the product will last in situ with no requirements for repair, replacement or refurbishment throughout this period. Therefore, it has no impact at this stage, except for maintenance.

According to cPCR EN 17074:2019, only the maintenance by cleaning glass with water and cleaning agent is included in this study.

PARAMETER	VALUE
Maintenance process	Water and cleaning agent
Maintenance cycle	Annual average
Ancillary materials for maintenance (e.g. cleaning agent, specify materials)	Cleaning agent: 0.01 kg/m² of glass/year
Wastage material during maintenance (specify materials)	0 kg
Net fresh water consumption during maintenance	0.2 kg/m² of glass/year
Energy input during maintenance	None required during product lifetime

C1-C4. End of Life Stage

This stage includes the next modules:

- **C1: Deconstruction, demolition:** The deconstruction and/or dismantling of the product takes part of the demolition of the entire building. In our case, the energy considered for demolition is 0.00396 MJ/kg.
- **C2: Transport to waste processing**
- **C3: Waste processing for reuse, recovery and/or recycling**
- **C4: Waste disposal**

Description of the scenarios and additional technical information for the end-of-life:

End of life scenario used in this study is: 70% of glass product going to landfill, 24% of glass product going to recycling facilities to end-up as recycled aggregates for backfilling operations. and 6% of glass going to recycling facilities to end-up as glass-to-glass recycling operations.

According to PCR 2.0.1 for construction production, the distance transportation to landfill, backfilling and recycling is 80km.

PARAMETER	VALUE/DESCRIPTION
Thickness (mm)	**4 mm**
Collection process specified by type	The entire product is collected separately.
Recovery system specified by type	0.6 kg of product are recycled in glass-to-glass recycling operation 2.4 kg of product are recycled in backfilling operation
Disposal specified by type	7 kg of product are landfilled
Assumptions for scenario development (e.g. transportation)	The waste will be transported by truck. A distance of 80 km is considered from deconstruction/demolition site to landfill and recycling facilities.

D. Reuse/recovery/recycling potential

In module D is declared the environmental benefits and loads from reusable products, recyclable materials, or energy recovery. Module D considers:

- Inputs of secondary materials: recycled raw materials for product and packaging (when relevant). Post-consumer materials only.
- Outputs of secondary materials: product and/or packaging (when relevant) sent to recycling.
- Exported energy (electric or thermal): product and/or packaging (when relevant) sent to incineration with energy recovery.

Environmental performance

As specified in EN 15804:2012+A2:2019/AC:2021 and the Product-Category Rules, the environmental impacts are declared and reported using the baseline characterization factors based on EF 3.1. Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant.

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.
The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Disclaimer 1: 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 following indicators:

- Resource use, mineral and metals [kg Sb eq.]
- Resource use, energy carriers [MJ]
- Water deprivation potential [m³ world equiv.]
- Land use [Pt]
- Human toxicity (cancer) [CTUh]
- Human toxicity(noncancer) [CTUh]
- Ecotoxicity (freshwater [CTUe]

Disclaimer 2: The impact category Ionizing radiation, human health [kBq U235 eq.] 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 material is also not measured by this indicator.

Disclaimer 3: The assumptions for the modules are in accordance with the project report (LCA study).

The following non-mandatory additional environmental indicators are not declared:

- Ecotoxicity freshwater [CTUe]
- Particulate Matter emissions [Disease incidence]
- Cancer human health effects [CTUh]
- Ionizing radiation - human health [kBq U235 eq.]
- Non-cancer human health effects [CTUh]
- Land Use [Pt]

Results tables refer to a functional unit/declared unit of 1 m² of clear glass PLANICLEAR® 4 mm with a light transmittance of maximum 90.5% and an expected average service life of 30 years.

To obtain results with different thicknesses see additional information section.

Environmental Impacts

Environmental indicators	PRODUCT STAGE		CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	A1 / A2 / A3		A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Climate Change - total [kg CO_2 eq.]	9.10E+00		5.16E-01	0	0	1.10E-01	0	0	0	0	0	4.00E-03	6.31E-02	8.43E-03	1.06E-01	-3.29E-01
Climate Change (fossil) [kg CO_2 eq.]	9.09E+00		5.06E-01	0	0	1.02E-01	0	0	0	0	0	4.00E-03	6.19E-02	8.29E-03	1.05E-01	-3.22E-01
Climate Change (biogenic) [kg CO_2 eq.]	5.57E-03		1.40E-03	0	0	5.65E-04	0	0	0	0	0	3.23E-07	1.71E-04	2.81E-05	3.02E-04	-7.24E-03
Climate Change (land use change) [kg CO_2 eq.]	7.79E-03		8.37E-03	0	0	7.64E-03	0	0	0	0	0	3.48E-07	1.02E-03	1.12E-04	6.29E-04	-7.63E-05
Ozone depletion [kg CFC-11 eq.]	3.14E-04		5.02E-14	0	0	2.45E-09	0	0	0	0	0	6.13E-11	6.14E-15	1.50E-14	2.83E-13	-5.50E-11
Acidification terrestrial and freshwater [Mole of H+ eq.]	3.64E-02		6.02E-04	0	0	6.91E-04	0	0	0	0	0	3.61E-05	7.36E-05	4.15E-05	7.44E-04	-1.69E-03
Eutrophication freshwater [kg P eq.]	1.02E-03		2.13E-06	0	0	1.37E-05	0	0	0	0	0	1.41E-08	2.60E-07	3.23E-08	2.38E-07	-3.58E-07
Eutrophication marine [kg N eq.]	1.54E-02		2.06E-04	0	0	3.25E-04	0	0	0	0	0	1.68E-05	2.52E-05	1.91E-05	1.92E-04	-2.75E-04
Eutrophication terrestrial [Mole of N eq.]	1.76E-01		2.49E-03	0	0	1.48E-03	0	0	0	0	0	1.83E-04	3.05E-04	2.11E-04	2.11E-03	-4.07E-03
Photochemical ozone formation - human health [kg NMVOC eq.]	4.21E-02		5.68E-04	0	0	4.43E-04	0	0	0	0	0	5.47E-05	6.94E-05	5.29E-05	5.86E-04	-6.90E-04
Resource use, mineral and metals [kg Sb eq.][1]	1.34E-05		4.24E-08	0	0	1.16E-06	0	0	0	0	0	1.43E-09	5.18E-09	8.70E-09	6.79E-09	-2.82E-08
Resource use, energy carriers [MJ][1]	1.12E+02		6.51E+00	0	0	1.82E+00	0	0	0	0	0	5.19E-02	7.95E-01	1.55E-01	1.38E+00	-3.97E+00
Water deprivation potential [m³ world equiv.][1]	5.77E-01		7.42E-03	0	0	3.89E-01	0	0	0	0	0	1.61E-04	9.07E-04	1.59E-03	1.20E-02	-2.29E-02

[1] 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

Resources Use

Resources Use indicators	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Use of renewable primary energy (PERE) [MJ] [2]	1.04E+01	5.50E-01	0	0	5.85E-01	0	0	0	0	0	3.22E-04	6.72E-02	1.65E-02	2.41E-01	-2.24E-02
Primary energy resources used as raw materials (PERM) [MJ] [2]	7.45E-03	0.00E+00	0	0	0.00E+00	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (PERT) [MJ][2]	1.04E+01	5.50E-01	0	0	5.85E-01	0	0	0	0	0	3.22E-04	6.72E-02	1.65E-02	2.41E-01	-2.24E-02
Use of non-renewable primary energy (PENRE) [MJ][2]	1.12E+02	6.51E+00	0	0	1.46E+00	0	0	0	0	0	5.19E-02	7.95E-01	1.55E-01	1.38E+00	-4.04E+00
Non-renewable primary energy resources used as raw materials (PENRM) [MJ] [2]	2.99E-03	0.00E+00	0	0	3.66E-01	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (PENRT) [MJ] [2]	1.12E+02	6.51E+00	0	0	1.82E+00	0	0	0	0	0	5.19E-02	7.95E-01	1.55E-01	1.38E+00	-4.04E+00
Use of secondary material (SM) [kg]	1.05E-01	0.00E+00	0	0	0.00E+00	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels (RSF) [MJ]	4.85E-06	0.00E+00	0	0	0.00E+00	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels (NRSF) [MJ]	0.00E+00	0.00E+00	0	0	0.00E+00	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water (FW) [m^3]	5.89E-02	6.17E-04	0	0	9.05E-03	0	0	0	0	0	3.75E-06	7.55E-05	4.62E-05	3.66E-04	-5.29E-04

[2] From EPD International Construction Product PCR 1.3.2 (Annex 3). The option B was retained to calculate the primary energy use indicators.

Waste category and output flows

	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
Waste Category & Output Flows	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (HWD) [kg]	5.69E-02	2.10E-10	0	0	6.17E-03	0	0	0	0	0	4.50E-05	2.57E-11	2.24E-11	3.44E-10	3.57E-05
Non-hazardous waste disposed (NHWD) [kg]	1.65E+00	1.01E-03	0	0	2.18E-01	0	0	0	0	0	3.40E-04	1.24E-04	4.27E-05	7.01E+00	-9.46E-02
Radioactive waste disposed (RWD) [kg]	1.29E-03	8.40E-06	0	0	2.29E-06	0	0	0	0	0	5.76E-09	1.03E-06	1.95E-06	1.45E-05	5.35E-05
Components for re-use (CRU) [kg]	0.00E+00	0.00E+00	0	0	0.00E+00	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for Recycling (MFR) [kg]	0.00E+00	0.00E+00	0	0	0.00E+00	0	0	0	0	0	0.00E+00	0.00E+00	3.00E+00	0.00E+00	0.00E+00
Material for Energy Recovery (MER) [kg]	0.00E+00	0.00E+00	0	0	0.00E+00	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy (EEE) [MJ]	2.67E-04	0.00E+00	0	0	0.00E+00	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy (EET) [MJ]	5.41E-03	0.00E+00	0	0	0.00E+00	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional environmental impact indicators

	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
Environmental indicators	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
GWP-GHG [kg CO_2 eq.][3]	9.10E+00	5.16E-01	0	0	1.10E-01	0	0	0	0	0	4.00E-03	6.31E-02	8.43E-03	1.06E-01	-3.26E-01

[3] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Alternative End-of-life scenario

Environmental indicators		100% landfill					100% recycling				
		END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE	END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
		C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Climate Change (total) [kg CO_2 eq.	4.00E-03	6.31E-02	0	1.51E-01	6.90E-02	4.00E-03	6.31E-02	2.81E-02	0	-6.53E+00
	Climate Change (fossil) [kg CO_2 eq.]	4.00E-03	6.19E-02	0	1.50E-01	6.75E-02	4.00E-03	6.19E-02	2.76E-02	0	-6.39E+00
	Climate Change (biogenic) [kg CO_2 eq.]	3.23E-07	1.71E-04	0	4.31E-04	1.52E-03	3.23E-07	1.71E-04	9.38E-05	0	-1.44E-01
	Climate Change (land use change) [kg CO_2 eq.]	3.48E-07	1.02E-03	0	8.98E-04	1.05E-05	3.48E-07	1.02E-03	3.74E-04	0	-9.97E-04
	Ozone depletion [kg CFC-11 eq.]	6.13E-11	6.14E-15	0	4.04E-13	1.79E-11	6.13E-11	6.14E-15	4.99E-14	0	-1.69E-09
	Acidification terrestrial and freshwater [Mole of H+ eq.]	3.61E-05	7.36E-05	0	1.06E-03	3.54E-04	3.61E-05	7.36E-05	1.38E-04	0	-3.35E-02
	Eutrophication freshwater [kg P eq.]	1.41E-08	2.60E-07	0	3.40E-07	1.07E-07	1.41E-08	2.60E-07	1.08E-07	0	-1.01E-05
	Eutrophication marine [kg N eq.]	1.68E-05	2.52E-05	0	2.74E-04	5.67E-05	1.68E-05	2.52E-05	6.37E-05	0	-5.37E-03
	Eutrophication terrestrial [Mole of N eq.]	1.83E-04	3.05E-04	0	3.01E-03	8.45E-04	1.83E-04	3.05E-04	7.04E-04	0	-8.00E-02
	Photochemical ozone formation - human health [kg NMVOC eq.]	5.47E-05	6.94E-05	0	8.37E-04	1.42E-04	5.47E-05	6.94E-05	1.76E-04	0	-1.35E-02
	Resource use, mineral and metals [kg Sb eq.][4]	1.43E-09	5.18E-09	0	9.70E-09	6.66E-09	1.43E-09	5.18E-09	2.90E-08	0	-6.30E-07
	Resource use, energy carriers [MJ][4]	5.19E-02	7.95E-01	0	1.97E+00	8.35E-01	5.19E-02	7.95E-01	5.17E-01	0	-7.91E+01
	Water deprivation potential [m^3 world equiv.][4]	1.61E-04	9.07E-04	0	1.71E-02	5.04E-03	1.61E-04	9.07E-04	5.29E-03	0	-4.77E-01

[4] 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

Environmental indicators		100% backfill				
		END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
		C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Climate Change (total) [kg CO_2 eq.	4.00E-03	6.31E-02	2.81E-02	0	5.96E-02
	Climate Change (fossil) [kg CO_2 eq.]	4.00E-03	6.19E-02	2.76E-02	0	5.82E-02
	Climate Change (biogenic) [kg CO_2 eq.]	3.23E-07	1.71E-04	9.38E-05	0	1.47E-03
	Climate Change (land use change) [kg CO_2 eq.]	3.48E-07	1.02E-03	3.74E-04	0	-9.94E-05
	Ozone depletion [kg CFC-11 eq.]	6.13E-11	6.14E-15	4.99E-14	0	1.41E-10
	Acidification terrestrial and freshwater [Mole of H+ eq.]	3.61E-05	7.36E-05	1.38E-04	0	3.06E-04
	Eutrophication freshwater [kg P eq.]	1.41E-08	2.60E-07	1.08E-07	0	7.20E-07
	Eutrophication marine [kg N eq.]	1.68E-05	2.52E-05	6.37E-05	0	3.14E-05
	Eutrophication terrestrial [Mole of N eq.]	1.83E-04	3.05E-04	7.04E-04	0	5.67E-04
	Photochemical ozone formation - human health [kg NMVOC eq.]	5.47E-05	6.94E-05	1.76E-04	0	7.88E-05
	Resource use, mineral and metals [kg Sb eq.][5]	1.43E-09	5.18E-09	2.90E-08	0	2.04E-08
	Resource use, energy carriers [MJ][5]	5.19E-02	7.95E-01	5.17E-01	0	7.69E-01
	Water deprivation potential [m³ world equiv.][5]	1.61E-04	9.07E-04	5.29E-03	0	9.09E-03

[5] 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

Resources Use indicators	100% landfill					100% recycling				
	END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE	END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Use of renewable primary energy (PERE) [MJ]	3.22E-04	6.72E-02	0	3.44E-01	2.08E-03	3.22E-04	6.72E-02	5.52E-02	0	-1.97E-01
Primary energy resources used as raw materials (PERM) [MJ][6]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Total use of renewable primary energy resources (PERT) [MJ]	3.22E-04	6.72E-02	0	3.44E-01	2.08E-03	3.22E-04	6.72E-02	5.52E-02	0	-1.97E-01
Use of non-renewable primary energy (PENRE) [MJ]	5.19E-02	7.95E-01	0	1.97E+00	8.49E-01	5.19E-02	7.95E-01	5.17E-01	0	-8.03E+01
Non-renewable primary energy resources used as raw materials (PENRM) [MJ][6]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Total use of non-renewable primary energy resources (PENRT) [MJ]	5.19E-02	7.95E-01	0	1.97E+00	8.49E-01	5.19E-02	7.95E-01	5.17E-01	0	-8.03E+01
Input of secondary material (SM) [kg]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Use of renewable secondary fuels (RSF) [MJ]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Use of non-renewable secondary fuels (NRSF) [MJ]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Use of net fresh water (FW) [m^3]	3.75E-06	7.55E-05	0	5.23E-04	1.15E-04	3.75E-06	7.55E-05	1.54E-04	0	-1.09E-02

[6] For this study, both the product and its packaging are reported in the indicators "Use of renewable primary energy resources used as raw materials" ("PERM") and "Use of non-renewable primary energy resources used as raw materials" ("PENRM"). PERM and PENRM are reported as negative values when materials are recycled or recovered, but not when landfilled.

Resources Use indicators		100% backfill				
		END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
		C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Use of renewable primary energy (PERE) [MJ]	3.22E-04	6.72E-02	5.52E-02	0	-5.04E-02
	Primary energy resources used as raw materials (PERM) [MJ][7]	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
	Total use of renewable primary energy resources (PERT) [MJ]	3.22E-04	6.72E-02	5.52E-02	0	-5.04E-02
	Use of non-renewable primary energy (PENRE) [MJ]	5.19E-02	7.95E-01	5.17E-01	0	7.82E-01
	Non-renewable primary energy resources used as raw materials (PENRM) [MJ][7]	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
	Total use of non-renewable primary energy resources (PENRT) [MJ]	5.19E-02	7.95E-01	5.17E-01	0	7.82E-01
	Input of secondary material (SM) [kg]	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
	Use of renewable secondary fuels (RSF) [MJ]	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
	Use of non-renewable secondary fuels (NRSF) [MJ]	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
	Use of net fresh water (FW) [m^3]	3.75E-06	7.55E-05	1.54E-04	0	1.74E-04

[7] For this study, both the product and its packaging are reported in the indicators "Use of renewable primary energy resources used as raw materials" ("PERM") and "Use of non-renewable primary energy resources used as raw materials" ("PENRM"). PERM and PENRM are reported as negative values when materials are recycled or recovered, but not when landfilled.

Waste Category & Output Flows	100% landfill					100% recycling				
	END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE	END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (HWD) [kg]	4.50E-05	2.57E-11	0	4.91E-10	2.78E-09	4.50E-05	2.57E-11	7.48E-11	0	-2.63E-07
Non-hazardous waste disposed (NHWD) [kg]	3.40E-04	1.24E-04	0	1.00E+01	2.50E-03	3.40E-04	1.24E-04	1.42E-04	0	-2.36E-01
Radioactive waste disposed (RWD) [kg]	5.76E-09	1.03E-06	0	2.07E-05	-1.21E-05	5.76E-09	1.03E-06	6.51E-06	0	1.14E-03
Components for re-use (CRU) [kg]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Materials for Recycling (MFR) [kg]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+01	0	0.00E+00
Material for Energy Recovery (MER) [kg]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Exported electrical energy (EEE) [MJ]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Exported thermal energy (EET) [MJ]	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00

Waste Category & Output Flows	100% backfill				
	END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (HWD) [kg]	4.50E-05	2.57E-11	7.48E-11	0	1.49E-04
Non-hazardous waste disposed (NHWD) [kg]	3.40E-04	1.24E-04	1.42E-04	0	-3.42E-01
Radioactive waste disposed (RWD) [kg]	5.76E-09	1.03E-06	6.51E-06	0	-2.73E-05
Components for re-use (CRU) [kg]	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Materials for Recycling (MFR) [kg]	0.00E+00	0.00E+00	1.00E+01	0	0.00E+00
Material for Energy Recovery (MER) [kg]	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Exported electrical energy (EEE) [MJ]	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00
Exported thermal energy (EET) [MJ]	0.00E+00	0.00E+00	0.00E+00	0	0.00E+00

	100% landfill				
	END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
Environmental indicators	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
GWP-GHG [kg CO_2 eq.][3]	4.00E-03	6.31E-02	0	1.51E-01	6.83E-02

	100% recycling				
	END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
Environmental indicators	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
GWP-GHG [kg CO_2 eq.][3]	4.00E-03	6.31E-02	2.81E-02	0	-6.46E+00

Environmental indicators	100% backfilling				
	END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE LIFE CYCLE
	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
GWP-GHG [kg CO_2 eq.][3]	4.00E-03	6.31E-02	2.81E-02	0	5.88E-02

Information on biogenic carbon content

	PRODUCT STAGE
Biogenic Carbon Content	**A1 / A2 / A3**
Biogenic carbon content in product [kg]	0
Biogenic carbon content in packaging [kg]	0

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

There is no biogenic carbon in glass products. Every thickness considered in this EPD has the same value for biogenic carbon 0 kg C. Moreover, there is no packaging considered for glass products.

Declaration of variation

Variation between sites

This EPD covers a similar product manufactured at different sites. The variation in the GWP-GHG indicator between sites ranges from -20.8% to 43.9%. This variation is declared on module A1-A3.

Variations between products

According to PCR 2.0.1, since this EPD is multi-product, the variation of impact between products shall be declared. This variation is declared on module A-C for GWP-GHG as well as all the mandatory environmental indicators.

The following table provides this variation of impact between:

- Reference (4mm) and minimum (2mm)
- Reference (4 mm) and the maximum (12 mm)
- Minimum (2mm) and the maximum (12 mm)

Deviation	% Between 4 mm and 2mm	% Between 4 mm and 12 mm	% Between 2 mm and 12 mm
GWP-GHG	-49%	198%	488%
Climate Change	-49%	198%	489%
Climate Change (fossil)	-49%	198%	489%
Climate Change (biogenic)	-46%	186%	434%
Climate Change (land use change)	-35%	140%	270%
Ozone depletion	-50%	200%	500%
Acidification terrestrial and freshwater	-49%	196%	482%
Eutrophication freshwater	-49%	197%	487%
Eutrophication marine	-49%	196%	480%
Eutrophication terrestrial	-50%	198%	492%
Photochemical ozone formation - human health	-49%	198%	490%
Resource use, mineral and metals	-46%	184%	426%
Resource use, energy carriers	-49%	197%	485%
Water deprivation potential	-30%	121%	217%

Additional environmental information:

Conversion factor to specific thicknesses

All the results presented in this EPD refer to the reference thickness of 4 mm with a specific light transmittance of 90.5% during a reference service life of 30 years (without installation accessories).

However, this EPD includes all range of PLANICLEAR® products with different thicknesses between 2 mm and 12 mm. To obtain the impact on each indicator for every specific thickness, the results expressed in this EPD must be multiplied by the corresponding conversion factor displayed below.

The conversion factor given for each thickness are **valid for all indicators from EN15804+A2 on A1-A3, A4 and C1-C4 stages.**

Note: For B2 module, the results don't vary according to the thickness. Results can be directly taken as displayed in the results tables from page 17 to 20.

Product thickness (mm)	Light transmittance (%)	Conversion factor
2 mm	91.1 %	0.5
3 mm	90.8 %	0.75
4 mm	90.5 %	1
5 mm	90.3 %	1.25
6 mm	90 %	1.5
8 mm	89.4 %	2
10 mm	88.8 %	2.5
12 mm	88.3 %	3

Electricity information

- **France**

Both factories based in France uses the following electricity description:

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of residual mix in country where the plant is located
Geographical & technical representativeness	Share of energy sources: 0.90%: Biomass 0.22%: Hard coal 0.49%: Heavy fuel oil 8.11%: Natural gas 86.53%: Nuclear 2.23%: Photovoltaic 1.52%: Wind 7.62%: transmission losses
Reference year	2023
Dataset version	Sphera CUP 2024.2 / ecoinvent 3.10 (medium voltage)
Source of electricity mix	Sphera/ecoinvent/AIB report 2024/IEA
GHG-GWP CO_2 eq. / kWh	0.054 kg of CO_2 eq/kWh

- **Italy**

The factory based in Italy uses electricity with Guarantee of Origin certificate (GO's).

Hence, the electricity mix considered for the manufacturing of the studied product is modelled according to the electricity mix described in the Guarantee of Origin certificate. The amount of electricity purchased with GO's covers 19.08% of the electricity consumption for Italian manufacturing site.

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of the guarantee of origin purchased by Saint-Gobain
Share of electricity covered by Guarantee of origin	19,08% of the energy consumption is covered by the GO
Energy sources for electricity	Share of energy sources: 1.67%: Geothermal 55.78%: Hydro 10.49%: Photovoltaic 32.07%: Wind 2.2%: transmission losses
Dataset version	Sphera CUP 2024.2 / ecoinvent 3.10 (medium voltage)
Source of electricity mix	Guarantee of Origin certificate: 2024032122923 (2023) 2024032122887 (2023) 2024111200035 (2023) 202503260036809 (2024) 202502270013833 (2024) 202502270003773 (2024) 202502270002188 (2024)

GHG-GWP CO_2 eq. / kWh (Guarantee of Origin)	0.0108 kg of CO_2 eq/kWh

An EPD is valid for 5 years. Therefore, the GO will be prolonged continuously to be valid for the whole validity of the EPD. If not prolonged, the EPD will be updated.

The rest of the electricity is modelled according to the following electricity description:

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of residual mix in country where the plant is located
Geographical & technical representativeness	Share of energy sources: 0.63%: Biomass 22.72%: Hard coal 7.33%: Heavy fuel oil 0.05%: Lignite 58.22%: Natural gas 4.40%: Nuclear 6.21%: Photovoltaic 0.43%: Wind 6.26%: transmission losses
Reference year	2023
Dataset version	Sphera CUP 2024.2 / ecoinvent 3.10 (medium voltage)
Source of electricity mix	Sphera/ecoinvent/AIB report 2024/IEA
GHG-GWP CO_2 eq. / kWh	0.689 kg of CO_2 eq/kWh

- **Poland**

The factory based in Poland uses electricity with Guarantee of Origin certificate (GO's).

Hence, the electricity mix considered for the manufacturing of the studied product is modelled according to the electricity mix described in the Guarantee of Origin certificate. The amount of electricity purchased with GO's covers 10.5% of the electricity consumption for Polish manufacturing site.

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of the guarantee of origin purchased by Saint-Gobain
Share of electricity covered by Guarantee of origin	10.5% of the energy consumption is covered by the GO
Energy sources for electricity	Share of energy sources: 100%: Wind 2.2%: transmission losses
Dataset version	Sphera CUP 2024.2 / ecoinvent 3.10 (medium voltage)
Source of electricity mix	Guarantee of Origin certificate: RGP_STXSERV_2023-10-11_2295 (Q1Q2 2023) RGP_STXSERV_2024-03-07_6185 (Q3Q4 2023) RGP_STXSERV_2024-08-21_9169 (Q1Q2 2024) RGP_STXSERV_2025-03-31_2149 (Q3Q4 2024)

GHG-GWP CO_2 eq. / kWh (Guarantee of Origin)	0.0129 kg of CO_2 eq/kWh

An EPD is valid for 5 years. Therefore, the GO will be prolonged continuously to be valid for the whole validity of the EPD. If not prolonged, the EPD will be updated.

The rest of the electricity is modelled according to the following electricity description:

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of residual mix in country where the plant is located
Geographical & technical representativeness	Share of energy sources: 2%: Biomass 70.35%: Hard coal 1.13%: Heavy fuel oil 0.5%: Hydro 13.51%: Natural gas 0.43%: Nuclear 6.51%: Photovoltaic 5.58%: Wind 6.99%: transmission losses
Reference year	2023
Dataset version	Sphera CUP 2024.2 / ecoinvent 3.10 (medium voltage)
Source of electricity mix	Sphera/ecoinvent/AIB report 2024/IEA
GHG-GWP CO_2 eq. / kWh	0.879 kg of CO_2 eq/kWh

- **Romania**

The factory based in Romania uses the following electricity description:

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of residual mix in country where the plant is located
Geographical & technical representativeness	Share of energy sources: 0.32%: Biomass 12.65%: Hard coal 0.08%: Heavy fuel oil 34.57%: Hydro 14.86%: Natural gas 20.21%: Nuclear 3.17%: Photovoltaic 14.17%: Wind 13.4%: transmission losses
Reference year	2023
Dataset version	Sphera CUP 2024.2 / ecoinvent 3.10 (medium voltage)
Source of electricity mix	Sphera/ecoinvent/AIB report 2024/IEA
GHG-GWP CO_2 eq. / kWh	0.345 kg of CO_2 eq/kWh

- **Germany**

Factories based in Germany use electricity with Guarantee of Origin certificate (GO's).

Hence, the electricity mix considered for the manufacturing of the studied product is modelled according to the electricity mix described in the Guarantee of Origin certificate. The amount of electricity purchased with GO's covers 100% of the electricity consumption for the German manufacturing sites.

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of the guarantee of origin purchased by Saint-Gobain
Share of electricity covered by Guarantee of origin	100% of the energy consumption is covered by the GO
Energy sources for electricity	Share of energy sources: 100%: Hydro 2.2%: transmission losses
Dataset version	Sphera CUP 2024.2 / ecoinvent 3.10 (medium voltage)
Source of electricity mix	Guarantee of Origin certificate: 636804 (2023) 636805 (2024)
GHG-GWP CO_2 eq. / kWh (Guarantee of Origin)	0.00618 kg of CO_2 eq/kWh

An EPD is valid for 5 years. Therefore, the GO will be prolonged continuously to be valid for the whole validity of the EPD. If not prolonged, the EPD will be updated.

- **United Kingdom**

The factory based in United Kingdom uses electricity with Guarantee of Origin certificate (GO's).

Hence, the electricity mix considered for the manufacturing of the studied product is modelled according to the electricity mix described in the Guarantee of Origin certificate. The amount of electricity purchased with GO's covers 100% of the electricity consumption for English manufacturing site.

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of the guarantee of origin purchased by Saint-Gobain
Share of electricity covered by Guarantee of origin	100% of the energy consumption is covered by the GO
Energy sources for electricity	Share of energy sources: 0.59%: Biomass 4.95%: Hydro 50.61%: Photovoltaic 1.08%: Solar thermal 0.65%: Waste 42.12%: Wind 2.2%: transmission losses
Dataset version	Sphera CUP 2024.2 / ecoinvent 3.10 (medium voltage)

Source of electricity mix	Guarantee of Origin certificate: Saint-Gobain Glass (United Kingdom) SmartestEnergy Limited _2022 Mar2023.pdf Saint-Gobain Glass (United Kingdom) SmartestEnergy Limited _2023 Mar2024.pdf Saint-Gobain Glass (United Kingdom) SmartestEnergy Limited _2024 Mar 2025.pdf
GHG-GWP CO_2 eq. / kWh (Guarantee of Origin)	0.029 kg of CO_2 eq/kWh

An EPD is valid for 5 years. Therefore, the GO will be prolonged continuously to be valid for the whole validity of the EPD. If not prolonged, the EPD will be updated.

- **Spain**

The factory based in Spain uses electricity with Guarantee of Origin certificate (GO's).

Hence, the electricity mix considered for the manufacturing of the studied product is modelled according to the electricity mix described in the Guarantee of Origin certificate. The amount of electricity purchased with GO's covers 100% of the electricity consumption for Spanish manufacturing site.

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of the guarantee of origin purchased by Saint-Gobain
Share of electricity covered by Guarantee of origin	100% of the energy consumption is covered by the GO
Energy sources for electricity	Share of energy sources: 31.93%: Hydro 3.61%: Photovoltaic 64.45%: Wind 2.2%: transmission losses
Dataset version	Sphera CUP 2024.2 / ecoinvent 3.10 (medium voltage)
Source of electricity mix	Guarantee of Origin certificate: ES0026000000599738TY0F (2024) ES0026000000599738TY0F (2023)
GHG-GWP CO_2 eq. / kWh (Guarantee of Origin)	0.0114 kg of CO_2 eq/kWh

An EPD is valid for 5 years. Therefore, the GO will be prolonged continuously to be valid for the whole validity of the EPD. If not prolonged, the EPD will be updated.

Health transparency

Concerning the indoor air quality, PLANICLEAR® glass is an inert material that doesn't release any inorganic & organic compounds, in particular no VOC (volatile organic compounds).

Visit www.saint-gobain-glass.com to learn more about our commitment to sustainability.

Version history

Original Version of the EPD, 2016-09-15

Revision 1, 2021-12-17
Switching from EN 15804+A1 to EN 15804+A2 including all new requirement, environmental impact indicator, with a more recent data collection and based on a full life cycle stages compare to the previous cradle to gate.

Revision 2, 2026-05-22
Updated and recent data collection. Alignment with PCR 2.0.1 and EN15941 requirements regarding data quality. Update of our calculation model and use of our supplier EPDs.

Abbreviations

AIB	Association of issuing bodies
DU	Declared unit
EPD	Environmental Product Declaration
EF	Environmental footprint
eq.	equivalents
FU	Functional unit
g	gram
IOBC	Instantaneous Oxidation of Biogenic Carbon
GO	Guaranty of Origin
GHG	Greenhouse gas
GJ	Giga Joules (as Net Calorific Value)
GWP	Global warming potential
GWP-GHG	Global warming potential – Greenhouse gas
kg	kilogram
kWh	kilowatt-hour
L	liter
LCA	Life Cycle Assessment
LCI	Life Cycle Inventory Analysis
LCIA	Life Cycle Impact Assessment
MJ	Mega Joules (as Net Calorific Value)
$m^2 \cdot K/W$	kilowatt per square meter
PCR	Product Category Rules
RSL	Reference Service Life (in years)
ton	metric ton
W/(m.K)	Watts per meter-Kelvin

References

1. ISO 14040:2006 Environmental Management - Life Cycle Assessment - Principles and framework.
2. ISO 14044:2006 Environmental Management - Life Cycle Assessment - Requirements and guidelines.
3. ISO 14025:2006 Environmental labels and Declarations - Type III Environmental Declarations - Principles and procedures.
4. EN 15804:2012+A2:2019/AC:2021 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
5. EN 15941 Sustainability of construction works - Data quality for environmental assessment of products and construction work - Selection and use of data
6. EPD International. General Program Instructions (GPI) for the International EPD® System (version 5.0.1) http://www.environdec.com/.
7. European Chemical Agency, Candidate List of substances of very high concern for Authorization. https://echa.europa.eu/candidate-list-table.
8. Product Environmental Footprint Category Rules (PEFCRs) for products in buildings (2019).
9. The International EPD System PCR 2019:14 Construction products and Construction services. Version 2.0.1
10. EN-17074 Glass in building - Environmental product declaration - Product category rules for flat glass products complementary Product Category Rules (PCR) to EN15804 for Flat glass products
11. CRISTOBAL GARCIA, J., CARO, D., FOSTER, G., PRISTERA, G., GALLO, F. and TONINI, D., Techno-economic and environmental assessment of construction and demolition waste management in the European Union, Publications Office of the European Union, Luxembourg, 2024, https://publications.jrc.ec.europa.eu/repository/handle/JRC135470
12. LCA report, PLANICLEAR® 2mm to 12mm, version 3, February 2025