ENVIRONMENTAL PRODUCT DECLARATION

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

SGG PARSOL®

6 mm

Version 1
Date of publication: 2023-06-15
Validity: 5 years
Valid until: 2028-06-14
Scope of the EPD®: India

Registration number
The International EPD® System:
S-P-09223

Manufacturer:
Saint-Gobain India Pvt. Ltd

SAINT-GOBAIN GLASS

General information

Company information

Manufacturer: SAINT-GOBAIN INDIA PRIVATE LIMITED – GLASS BUSINESS, Sigapi Aachi Building, Floor No. 7, 18/3, Rukmini Lakshmipathy Road, 600008 Chennai,India
Production plant: Chennai, India
Management system: Venugopal, R (venugopal.r@saint-gobain.com)

Programme used: The International EPD® System. More information at www.environdec.com
EPD registration/declaration number: S-P-09223
PCR identification : PCR 2019 :14 Construction products (EN 15804 :2012: A2) version 1.2.5 and its c-PCR-009 Flat glass products used in buildings and other construction works (EN17074:2019) Complementary PCR (c-PCR-005): 2019-12-20. Thermal insulation products (EN 16783:2017)
UN CPC CODE: 371
Owner of the declaration: SAINT-GOBAIN India Private Limited
Product name and manufacturer represented: SGG PARSOL® produced by SAINT-GOBAIN India Private Limited – Glass Business
EPD® prepared by: Sreekavya Vadapalli (Saint Gobain Research India, Sreekavya.Vadapalli@saint-gobain.com), Tavishi Misra (Saint Gobain Research India, Tavishi.Misra@saint-gobain.com), Marie-Charlotte Harquet (Saint-Gobain LCA central team, marie-charlotte.harquet@saint-gobain.com)
Geographical scope of the EPD®: India
EPD® registration number: S-P-09223
Declaration issued: 15_06_2023, valid until: 14_06_2028
Demonstration of verification: an independent verification of the declaration was made, according to ISO 14025:2010. This verification was external and conducted by the following third party based on the PCR mentioned above.

Programme information

PROGRAMME:	The International EPD® System – India Regional Hub
ADDRESS:	EPD International AB - Box 210 60 - SE-100 31 Stockholm - Sweden
WEBSITE:	www.environdec.com, www.environdecindia.com
E-MAIL:	info@environdec.com

CEN standard EN 15804:2012 + A2:2019 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 Construction Products, version 1.2.5
PCR review was conducted by: The Technical Committee of the International EPD® System
President: Claudia A. Peña. Contact via info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006:
☐ EPD process certification ☒ EPD verification
Third party verifier: SUNIL KUMAR
SIPL PVT Ltd. - sunil@sipl-sustainability.com
Approved by: The International EPD© System
Procedure for follow-up of data during EPD validity involves third part verifier: ☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Product description

Product description and description of use

This Environmental Product Declaration (EPD®) describes the environmental impacts of 1 m² of body tinted glass PARSOL® to 6 mm with a light transmittance in the range of 14-74%*, for an expected average service life of 30 years.

PARSOL® is a body-tinted soda-lime silicate glass, produced using the float procedure. It is meant to be used in building & industrial applications. PARSOL® has a colored appearance, as well as basic solar control properties.

There are 3 colors commercially available in the PARSOL® range: Parsol H Green, Parsol Bronze, Parsol Dark Grey. The fourth colour of the range - Parsol Saphire Blue is available as a substrate for High performance Magnetron Coatings. PARSOL® products are available in a thickness of 6 mm depending on the colour.

Technical data/physical characteristics:

PARSOL H GREEN

Thickness (mm)	6
Visible parameters	
Light transmittance (LT) %	74
External light reflection (RLE) (%)	7
Energetic parameters	
Energy transmittance (ET) %	49
Energy absorbance (EA) %	45
Solar factor g	0.6

Table 1: Performance Data of PARSOL® H Green - 6 mm

PARSOL SAPHIRE BLUE

Thickness (mm)	6
Visible parameters	
Light transmittance (LT) %	57
External light reflection (RLE) (%)	6
Energetic parameters	
Energy transmittance (ET) %	42
Energy absorbance (EA) %	53
Solar factor g	0.55

Table 1: Performance Data of PARSOL® Sapphire Blue - 6 mm

The performance data are given according to the EN 410-2011 standard.

Declaration of the main product components and/or materials

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

Description of the main components and/or materials for 1 m² of glass PARSOL® to 6 mm with a light transmittance in the range of 14-74%.

PARAMETER	VALUE
Quantity of glass for 1 m² of product	15 kg
Thickness	6 mm
Packaging for the transportation and distribution	wood pallets, aluminium foil, corrugated board, expanded polystyrene (thermocol and polystyrene) and polyethylene
Product used for the Installation	Tinted Glass

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).

Packaging and product used: None

Description of the main product components and/or materials:

All the raw materials contributing to more than 5% to any environmental impact are listed in the following table

Product components	Weight (%)	Post-consumer material weight (%)	Biogenic material weight- and kg C/kg(%)
Silica sand	50 – 60 %		
Sodium carbonate	10 – 20 %		
Dolomite	10 – 15 %		
Lime Stone	0 – 5 %		
Cullet	10 – 15 %	5 – 10 %	
Others	<1%		
Sum	**100**	**5 – 10 %**	
Packaging materials	**Weight (%)**	**Weight (%)**	**Weight biogenic carbon kg C/kg**
Aluminium foil	50– 60%	NA	NA
Polyethylene	20– 40%	NA	NA
Others	<1%		

LCA calculation information

FUNCTIONAL UNIT	1 m² of body tinted glass PARSOL® for 6 mm with a light transmittance of the range 14-74% for an expected average service life of 30 years.
SYSTEM BOUNDARIES	Cradle to grave and module D Mandatory Stages = A1-A3 ; B1-B7 ; C1-C4 and D
REFERENCE SERVICE LIFE (RSL)	According to PCR EN 17074:2019, the reference service life is 30 years
CUT-OFF RULES	All significant parameters shall be included. According to EN 15804, mass flows under 1% of the total mass input; and/or energy flows representing less than 1% of the total primary energy usage of the associated unit process may be omitted. However, the total amount of energy and mass omitted must not exceed 5% per module. The energy used for the installation of 1m² of glass and the transport glass racks are included in the cut-off-rules.
ALLOCATIONS	Allocations are done on mass basis (kg)
GEOGRAPHICAL COVERAGE AND TIME PERIOD	The information was established over the year Aug 2021 – Aug 2022. The information collected comes from the production plant in Chennai site producing PARSOL® 6 mm.
BACKGROUND DATA SOURCE	GaBi data were used to evaluate the environmental impacts. The data are representative of the years 2015-2019.
SOFTWARE	Gabi 9.2 - GaBi envision

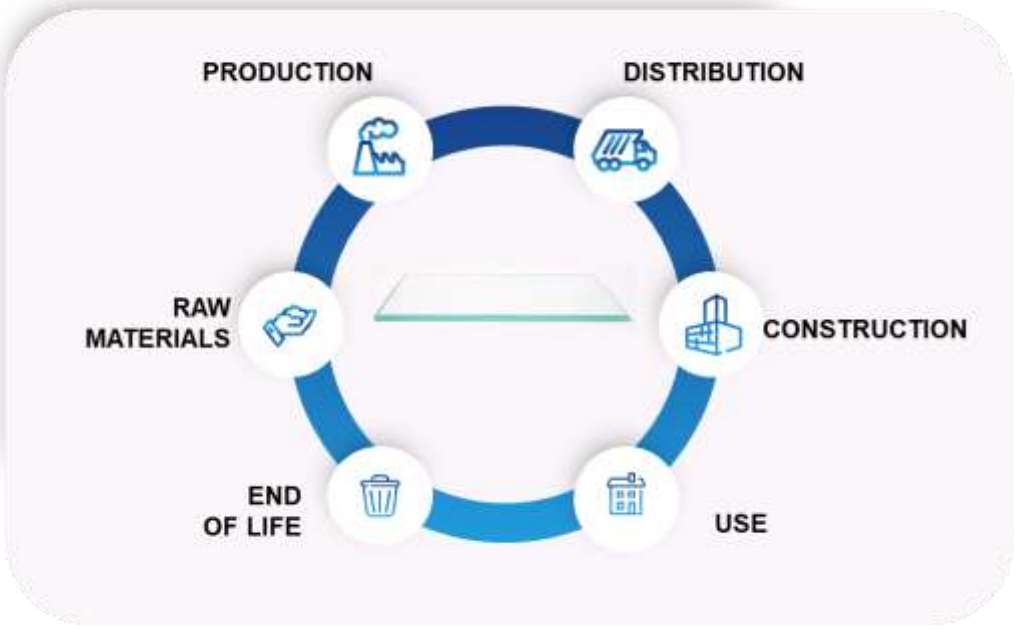
According to EN 15804+A2, EPD of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPD might not be comparable if they are from different programmes

LCA scope

System boundaries (X=included. MND=module not declared)

	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	India																
Specific data used	<90%																
Variation products	Not Relevant																
Variation sites	NA																

Life cycle stages



A1-A3, Product stage

Description of the stage:

For flat glass A1 to A3 represents the production of glass in the float from cradle to gate.

Description of the stage: the product stage of flat glass is subdivided into 3 modules A1, A2 and A3 respectively “Raw material supply”, “transport to manufacturer” and “manufacturing”.

Description of the scenarios and other additional technical information:

A1, Raw materials supply

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

A2, Transport to the manufacturer

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

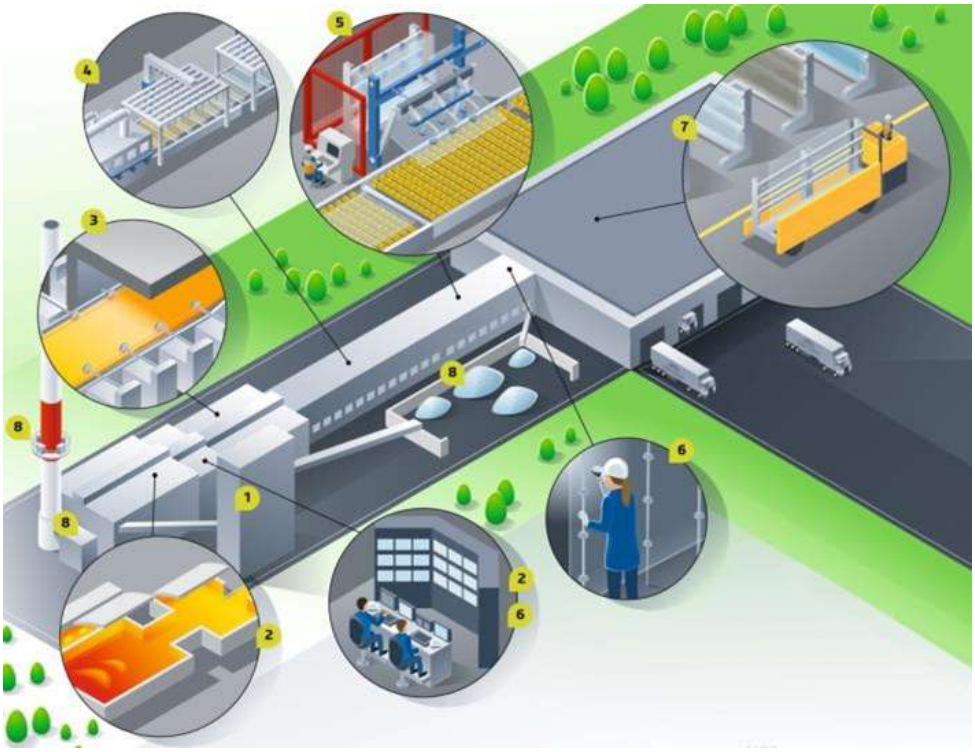
A3, Manufacturing

This module includes the manufacture of products and the manufacture of packaging. The production of packaging material is taken into account at this stage. The processing of any waste arising from this stage is also included.

The product stage includes the extraction and processing of raw materials and energies, transport to the manufacturer, manufacturing and processing of flat glass.

Manufacturing process flow diagram

System diagram:



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 FURNACE: Raw materials are melted at 1,550°C in a furnace.
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.
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. 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.
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.

The flat glass is transported on dedicated racks, used many times. This racks are not included in the life cycle of the product.

A4-A5, Construction process stage

Description of the 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 on the basis of a scenario with the parameters described in the following table

PARAMETER	VALUE
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Vehicle type camion - “GLO: Truck-trailer ts”: EURO 4, 34-40 t gross weight / 27 t payload capacity, 85% average utilization by mass; Reference year of data set: 2015. Data Thinkstep Professional Database
Distance	750 km
Capacity utilisation (including empty returns)	GaBi default values: 85% of mass capacity 30% empty trips
Bulk density of transported products*	2500 kg/m3
Volume capacity utilisation factor	Coefficient < 1

A5, Installation in the building:

The accompanying table quantifies the parameters for installing the product at the building site. All installation materials and their waste processing are included.

PARAMETER	VALUE/DESCRIPTION
Wastage of materials on the building site before waste processing, generated by the product’s installation (specified by type)	According to PCR EN 17074, no waste is considered
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
Ancillary materials for installation (specified by materials)	According to PCR NF EN 17074, nonancillary materials considered
Other resource use	None
Quantitative description of energy type (regional mix) and consumption during the installation process	According to EN 15804+A1 , the energy needed during the installation is less than 0,1% of the total life cycle energy. It’s include in the cut-off-rules.
Direct emissions to ambient air, soil and water	None

B1-B7, Use stage (excluding potential savings)

Description of the stage: 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:

PARAMETER	VALUE
Maintenance process	Water and cleaning agent
Maintenance cycle	Annual average
Ancillary materials for maintenance (e.g. cleaning agent, specify materials)	cleaning agent: 0,001 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

Description of the scenarios and additional technical information:
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 PCR EN 17074, only the maintenance by cleaning glass with water and cleaning agent is included in this study.

C1-C4, End of Life Stage

Description of the stage: this stage includes the next modules:

- C1, Deconstruction, demolition : The de-construction and/or dismantling of the product take part of the demolition of the entire building. In our case, a small amount of energy is considered 0.05 MJ/m².
- C2, Transport to waste processing
- C3, Waste processing for reuse, recovery and/or recycling
- C4, Disposal

End of life scenario used in this study is:
100% of glass is landfilled and the distance to the landfill site considered is 50 km.

Description of the scenarios and additional technical information:

PARAMETER	VALUE/DESCRIPTION
Thickness (mm)	6 mm
Collection process specified by type	15 kg collected per 1 m2 0 kg collected with no separation between construction product
Recovery system specified by type	0 kg reuse 0 kg recycled 0 kg for energy recovery
Disposal specified by type	15 kg disposed of in landfill per 1 m2
Assumptions for scenario development (e.g. transportation)	50 km to landfill site and 0 km for recycling site

D, Reuse/recovery/recycling potential

An end of life recycling 0% (100% of glass wastes are landfilled) has been assumed using local demolition waste data and adjusted considering the recyclability of the product.

LCA results

Product Environmental Footprint (PEF) method has been used as the impact model. Specific data has been supplied by the plant, and generic data come from GABI and Ecoinvent databases.

All emissions to air, water, and soil, and all materials and energy used have been included.

Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant (Production data according to Aug 2021-Aug 2022)

All result tables refer to a functional unit of 1 m² of body tinted glass PARSOL® for 6 mm with a light transmittance in the range of 14-74% for an expected average service life of 30 years.

Environmental Impacts

Environmental indicators	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				REUSE, RECOVERY RECYCLING
	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 [kg CO2 eq.]	2.05E+01	7.32E-01	0	0	9.50E-02	0	0	0	0	0	0	3.66E-02	0	2.10E-01	0.00E+00
Climate Change (fossil) [kg CO2 eq.]	2.06E+01	7.27E-01	0	0	8.08E-02	0	0	0	0	0	0	3.64E-02	0	2.28E-01	0.00E+00
Climate Change (biogenic) [kg CO2 eq.]	-1.52E-01	-0.00126	0	0	-5.86E-02	0	0	0	0	0	0	-6.28E-05	0	-0.018	0.00E+00
Climate Change (land use change) [kg CO2 eq.]	4.70E-02	5.96E-03	0	0	7.28E-02	0	0	0	0	0	0	2.98E-04	0	6.55E-04	0.00E+00
Ozone depletion [kg CFC-11 eq.]	4.06E-07	8.84E-17	0	0	4.39E-09	0	0	0	0	0	0	4.42E-18	0	8.43E-16	0.00E+00
Acidification terrestrial and freshwater [Mole of H+ eq.]	1.59E-01	3.12E-03	0	0	4.99E-04	0	0	0	0	0	0	1.56E-04	0	1.63E-03	0.00E+00
Eutrophication freshwater [kg P eq.]	8.04E-04	2.24E-06	0	0	3.23E-05	0	0	0	0	0	0	1.12E-07	0	3.91E-07	0.00E+00
Eutrophication marine [kg N eq.]	2.26E-02	1.47E-03	0	0	5.33E-04	0	0	0	0	0	0	7.33E-05	0	4.20E-04	0.00E+00
Eutrophication terrestrial [Mole of N eq.]	2.99E-01	1.63E-02	0	0	1.38E-03	0	0	0	0	0	0	8.14E-04	0	4.62E-03	0.00E+00
Photochemical ozone formation - human health [kg NMVOC eq.]	6.22E-02	3.94E-03	0	0	3.22E-04	0	0	0	0	0	0	1.97E-04	0	1.27E-03	0.00E+00
Resource use, mineral and metals [kg Sb eq.][1]	1.56E-05	5.27E-08	0	0	2.55E-06	0	0	0	0	0	0	2.64E-09	0	2.04E-08	0.00E+00
Resource use, energy carriers [MJ][1]	2.19E+02	9.79E+00	0	0	1.38E+00	0	0	0	0	0	0	4.90E-01	0	2.98E+00	0.00E+00
Water deprivation potential [m³ world equiv.][1]	1.83E+00	6.57E-03	0	0	3.27E-01	0	0	0	0	0	0	3.29E-04	0	2.38E-02	0.00E+00

[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				D REUSE, RECOVERY, RECYCLING
	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]	3.08E+01	5.50E-01	0	0	7.69E-01	0	0	0	0	0	0	2.75E-02	0	3.91E-01	0.00E+00
Primary energy resources used as raw materials (PERM) [MJ]	1.44E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT) [MJ]	3.22E+01	5.50E-01	0	0	7.69E-01	0	0	0	0	0	0	2.75E-02	0	3.91E-01	0.00E+00
Use of non-renewable primary energy (PENRE) [MJ]	2.19E+02	9.80E+00	0	0	1.38E+00	0	0	0	0	0	0	4.90E-01	0	2.99E+00	0.00E+00
Non-renewable primary energy resources used as raw materials (PENRM) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total use of non-renewable primary energy resources (PENRT) [MJ]	2.19E+02	9.80E+00	0	0	1.48E+00	0	0	0	0	0	0	4.90E-01	0	2.99E+00	0.00E+00
Input of secondary material (SM) [kg]	1.32E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00E+00
Use of renewable secondary fuels (RSF) [MJ]	4.63E-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00E+00
Use of non-renewable secondary fuels (NRSF) [MJ]	5.44E-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00E+00
Use of net fresh water (FW) [m3]	5.76E-02	6.37E-04	0	0	7.61E-03	0	0	0	0	0	0	3.19E-05	0	7.53E-04	0.00E+00

Waste Category & Output flows

	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				D REUSE, RECOVERY, RECYCLING
Waste Category & Output Flows	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational	B7 Operational water	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (HWD) [kg]	6.73E-07	4.56E-07	0	0	7.69E-11	0	0	0	0	0	0	2.28E-08	0	4.55E-08	0
Non-hazardous waste disposed (NHWD) [kg]	1.01E+00	1.50E-03	0	0	6.47E-03	0	0	0	0	0	0	7.50E-05	0	1.50E+01	0
Radioactive waste disposed (RWD) [kg]	1.24E-03	1.21E-05	0	0	2.84E-06	0	0	0	0	0	0	6.07E-07	0	3.39E-05	0
Components for re-use (CRU) [kg]	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Materials for Recycling (MFR) [kg]	1.56E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Material for Energy Recovery (MER) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported electrical energy (EEE) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported thermal energy (EET) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Additional voluntary indicators from EN 15804 (according to ISO 21930:2017)

	PRODUCT STAGE	CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				REUSE, RECOVERY RECYCLING
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
Respiratory inorganics [Disease incidences]	1.77E-06	1.46E-08	0	0	5.95E-09	0	0	0	0	0	0	7.29E-10	0	2.02E-08	0.00E+00
Ionising radiation - human health [kBq U235 eq.]	3.31E-01	1.75E-03	0	0	5.53E-03	0	0	0	0	0	0	8.77E-05	0	3.49E-03	0.00E+00
Ecotoxicity freshwater [CTUe]	9.91E+02	6.92E+00	0	0	4.22E+00	0	0	0	0	0	0	3.46E-01	0	1.71E+00	0.00E+00
Cancer human health effects [CTUh]	6.44E-09	1.45E-10	0	0	1.83E-10	0	0	0	0	0	0	7.25E-12	0	2.53E-10	0.00E+00
Non-cancer human health effects [CTUh]	3.11E-07	7.96E-09	0	0	1.69E-09	0	0	0	0	0	0	3.98E-10	0	2.79E-08	0.00E+00
Land Use [Pt]	7.81E+01	3.44E+00	0	0	4.01E+00	0	0	0	0	0	0	1.72E-01	0	6.22E-01	0.00E+00

Information on biogenic carbon content

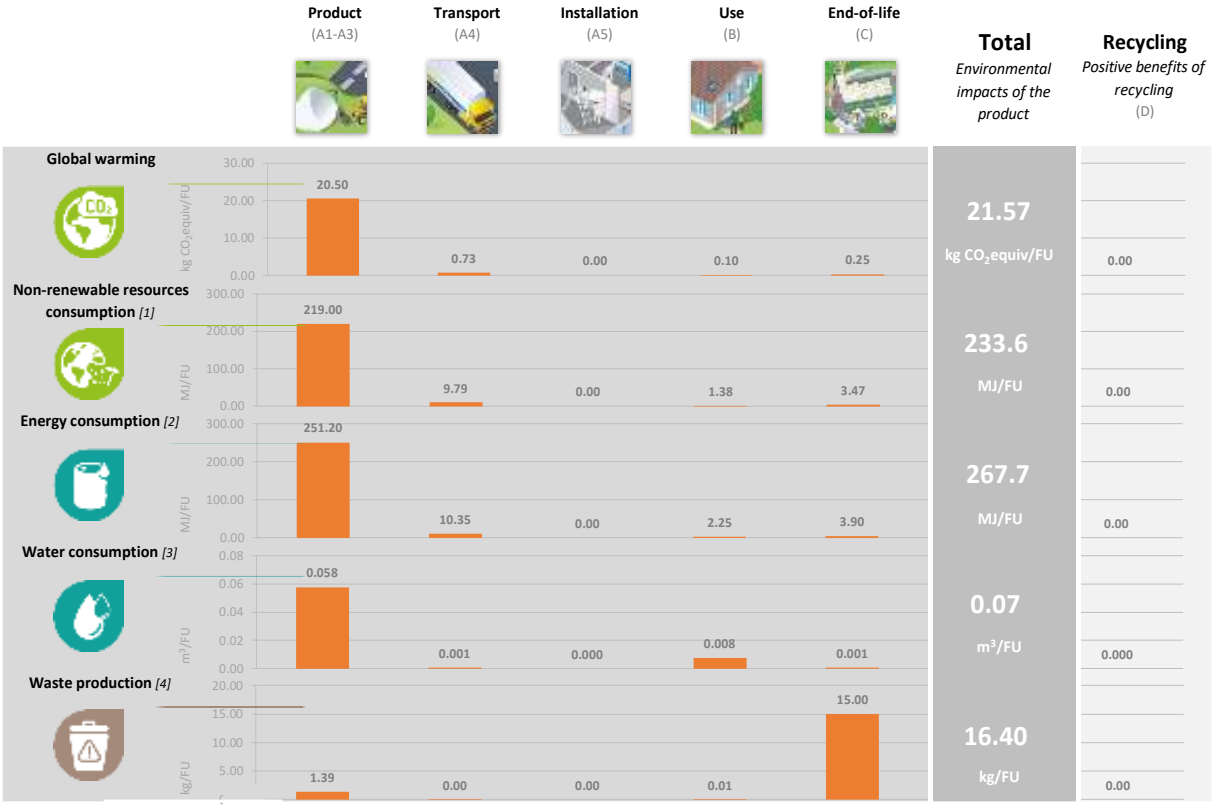
Biogenic Carbon Content		PRODUCT STAGE A1 / A2 / A3
	Biogenic carbon content in product [kg]	0
	Biogenic carbon content in packaging [kg]	**3.91E-02**

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2.

There is no biogenic carbon in glass product. Every thickness considered in this EPD have the same value to biogenic carbon 0 kg C.

LCA interpretation

The following figure refers to a functional unit 1 m² of body tinted glass PARSOL® for 6 mm with a light transmittance in the range of 14-74% for an expected average service life of 30 years..



[1] This indicator corresponds to the abiotic depletion potential of fossil resources.
[2] This indicator corresponds to the total use of primary energy.
[3] This indicator corresponds to the use of net fresh water.
[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

Global Warming Potential (Climate Change) (GWP)

When analyzing the above figure for GWP, it can clearly be seen that the majority of contribution to this environmental impact is from the production modules (A1 – A3). This is primarily because the sources of greenhouse gas emissions are predominant in this part of the life cycle. CO2 is generated upstream from the production of electricity and is also released on site by the combustion of natural gas. Production of one of raw material will generate the second highest percentage of greenhouse gas emissions. We can see that other sections of the life cycle also contribute to the GWP; however, the production modules contribute to over 90% of the contribution.

Non-renewable resources consumptions

We can see that the consumption of non – renewable resources is once more found to have the highest value in the production modules. This is because a large quantity of natural gas is consumed within the factory. The contribution to this impact from the other modules is very small and primarily due to the non – renewable resources consumed during transportation.

Energy Consumptions

As we can see, modules A1 – A3 have the highest contribution to total energy consumption. Energy in the form of electricity and natural gas is consumed in a vast quantity during the manufacture of glass so we would expect the production modules to contribute the most to this impact category.

Water Consumption
As we don't use water in any of the other modules (A4 – A5, C1 – C4), we can see that there is no contribution to water consumption. For the production phase, water is used within the manufacturing facility and therefore we see the highest contribution here. However, we recycle a lot of the water on site so the contribution is still relatively low. We also use water during the use phase to cleaning the product.

Waste Production
Waste production does not follow the same trend as the above environmental impacts. The largest contributor is the end of life module. This is because 100% of the product is sent to landfill. However, there is still an impact associated with the production module since we do generate waste on site.

In the production of SGG PARSOL®, we find two main sources of impacts in A1-A3 detailed impacts

One is the energy consumed in the furnace and the other one is the impacts generated in the production of one of the main raw materials, soda ash.

Soda ash is in the origin of more than 25% of the GWP. Cobalt contributed significantly to all other environmental indicators.

Data quality

Inventory data quality is judged by geographical, temporal, and technological representativeness. To cover these requirements and to ensure reliable results, first-hand industry data crossed with LCA background datasets were used. The data was collected from internal records and reporting documents from 2015-2019. After evaluating the inventory, according to the defined ranking in the LCA report, the assessment reflects fair inventory data quality.

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 16783:2017 Thermal insulation products - Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations
5. EN 15804:2019+A2 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
6. European Chemical Agency, Candidate List of substances of very high concern for Authorization. http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp
7. The general program instructions (GPI) for the international EPD® (version 3.01: 2021)
8. ISO 21930: 2017 Sustainability in building construction – Environmental declaration of building products
9. PCR 2019:14 Construction products (EN 15804:2012: A2) version 1.2.5 and c-PCR-009 Flat glass products (EN 17074)
10. General Program Instruction of the International EPD® System, version 4.0
11. LCA report, Information for the Environmental Product Declaration of insulation products.