

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

SGG MASTERGLASS®

SGG DECORGLASS®

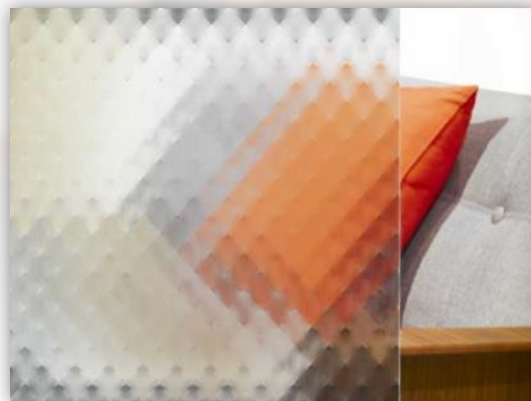
SGG ALBARINO®

From 3 mm to 10 mm

Patterned glass

Date of issue : 15-09-2016

Version : V.01



EPD®

VERIFICATION

SP-00928


SAINT-GOBAIN

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General information

Manufacturer:

SAINT-GOBAIN GLASS FRANCE¹
18 avenue d'Alsace
92400 Courbevoie
FRANCE

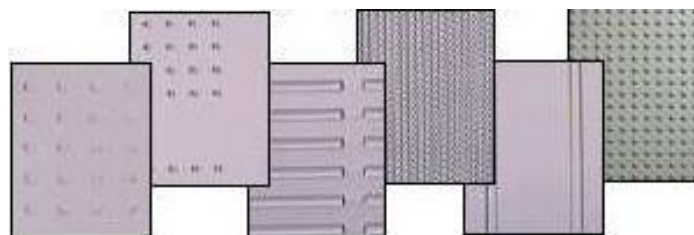
European standard EN 15804 served as core EPD			
Product / product family name and manufacturer represented	SGG MASTERGLASS / SGG DECORGLASS / SGG ALBARINO produced by SAINT-GOBAIN GLASS INDUSTRY		
Declaration issued:	15-09-2016		
valid until:	15-09-2021		
Program used	INTERNATIONAL	EPD	SYSTEM
EPD registration number/declaration number:	www.environdec.com		
PCR identification	S-P 00928		
PCR review was conducted by	EN 15804 as the core PCR and PCR for construction products and construction services issue by the International EPD System (PCR 2012:01 Construction products and construction services, version 2.01 / 2016-03-09)		
CPC Classification:	The technical committee of the international EPD system Chair: Massimo Marino		
Independent verification of the declaration and data, according to ISO 14025	Contact via info@environdec.com		
Third party verifier	37113 "Float glass and surface ground or polished glass, in sheets."		
Accredited or approved by	An independent verification of the declaration and data was made, according to ISO 14025:2010. This verification was based on the PCR mentioned above. EPD process certification (internal)		
	Bureau Veritas Certification Sverige AB for the EPD process certification		
	INTERNATIONAL EPD SYSTEM		
	Swedac Ackreditering		

¹ The manufacturing companies concerned are SAINT-GOBAIN GLASS FRANCE, SAINT-GOBAIN GLASS DEUTSCHLAND, SAINT-GOBAIN GLASS UK, SAINT-GOBAIN GLASS ITALY, SAINT-GOBAIN CRISTALLERIA, SAINT-GOBAIN GLASS POLSKA, and all glassolutions sites within the EU.

Product description

Product description and description of use

SGG DECORGLASS (classical patterns), SGG MASTERGLASS (contemporary patterns), SGG ALBARINO (pattern glass for solar applications and greenhouses) are basic soda-lime silicate glass produced using specific furnace, with a texture printed on their surface. To do this, the glass is passed between two rollers, which emboss the pattern into the sheet, providing a durable finish.



Examples of glass patterns

SGG DECORGLASS, SGG MASTERGLASS and SGG ALBARINO comply with the requirements of standard EN 572-5.

Performance data

Depending on the pattern, the visible and energetic values might vary.

The light transmission of SGG MASTERGLASS is 80 – 90%, dependent on the pattern (thickness 6 mm).

Vision through the glazing can be modulated from almost transparent to semi-opaque. The Visual Control Factor (VCF) is a set of criteria established and registered by Saint-Gobain Glass to assess this parameter. It is based on the identification of the same object placed behind glass panes of SGG DECORGLASS at an equal distance and under similar lighting. (cf. table below).

sgg DECORGLASS products	VCF
Translucent glass	
SGG ALBARINO S	4
SGG ANTIQUE	9
SGG ARENA	4
SGG BALDOSA GRABADA	ND
SGG CLARGLAS NEW	4
SGG DIAMANTE	3
SGG ENTRELAZADO	4
SGG ESTRIADO	8
SGG FLOR ND	ND
SGG GIVRE ND	ND
SGG GOTICO	9
SGG HOJAS	8
SGG JAPONES	1
SGG KATHEDRAL MIN	7
SGG KRALIKA	2
SGG KYOTO	2
SGG LISTRAL M	5
SGG LISTRAL N	5
SGG MARTELE	6
SGG MONUMENTAL R	3
SGG MORESCO	2
SGG PIXARENA	4
SGG VISON	4

SGG WATERDROP	1
Glass with optimized quality to be tempered	
SGG MARIS	6
SGG SR LISTRAL L	4
SGG THELA	7

For SGG ALBARINO, measurements taken for the 3.2 mm and 4 mm thicknesses are taken in accordance with ISO 9050 and ISO 9845 standard test conditions:

- Light transmittance: 91.5%
- Energy transmittance: 91.3%.

Declaration of the main product components and/or materials

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

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).

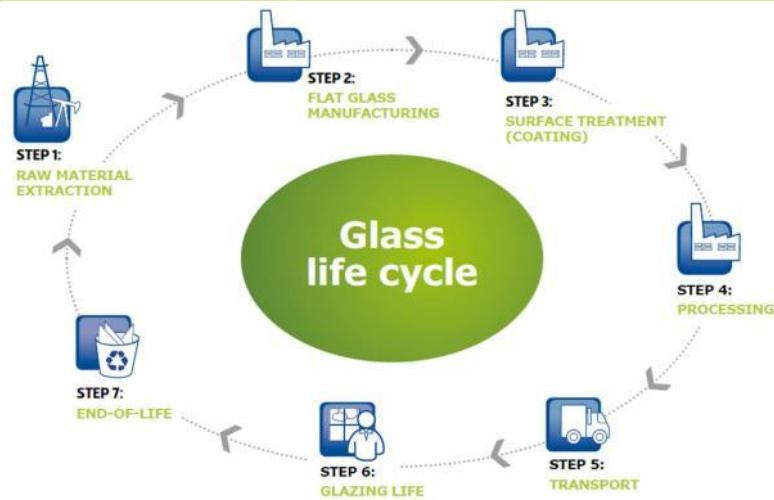
LCA calculation information

FUNCTIONAL UNIT / DECLARED UNIT	1m ² of sgg MASTERGLASS / DECORGLASS / ALBARINO to be incorporated into a building, furniture or industrial application. The impacts of installation are not taken into account.
SYSTEM BOUNDARIES	Cradle to gate: Mandatory Stages = A1-A3
REFERENCE SERVICE LIFE (RSL)	n/a. Boundaries are cradle to gate
CUT-OFF RULES	<p>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.</p> <p>Substances of Very High Concern (SVHC), as defined in the REACH Regulation (article 57), in a concentration above 0.1% by weight, in glass final products, shall be included in the Life Cycle Inventory and the cut-off rules shall not apply.</p>
ALLOCATIONS	Allocations are done on mass basis (kg)
GEOGRAPHICAL COVERAGE AND TIME PERIOD	<p>The informations were established over the year 2014. The information collected comes from the European sites producing sgg MASTERGLASS/DECORGLASS/ALBARINO (SAINT-GOBAIN GLASS INDUSTRY)</p>
BACKGROUND DATA SOURCE	GaBi data were used to evaluate the environmental impacts.
SOFTWARE	<p>Gabi 6 - GaBi envision SGG_EPD tool for Building glass 1m2_2016-08-09.gmbx</p>

According to EN 15804, 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.

Life cycle stages

Diagram of the Life Cycle



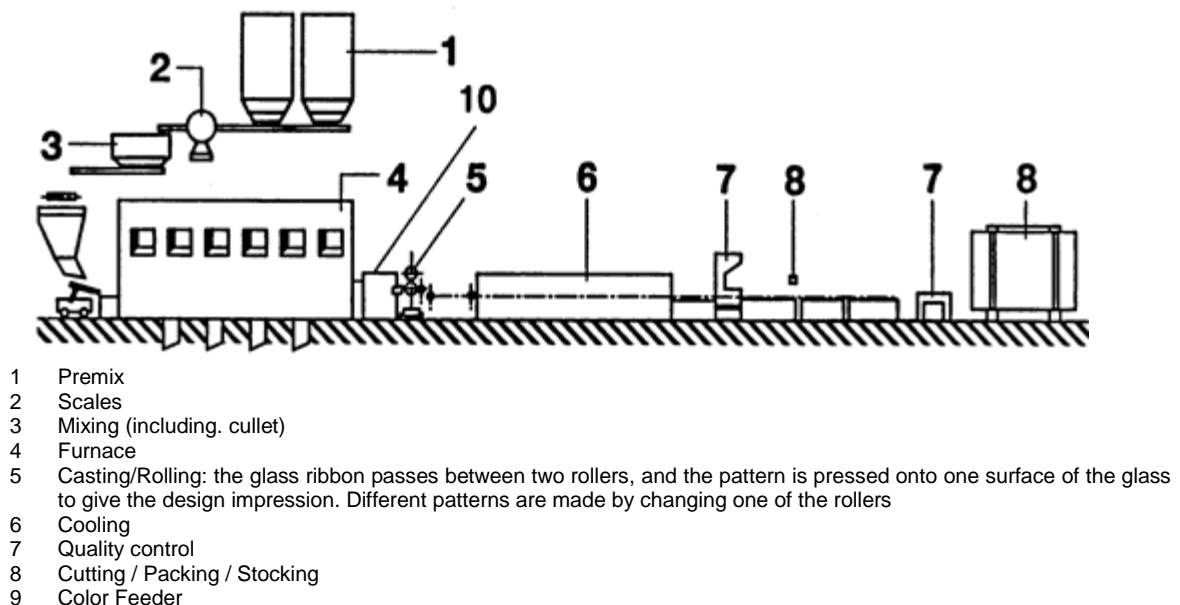
Not relevant stages: as this is a cradle to gate with options declaration stages A4, A5 and B1-B7 are not relevant.

Product stage, A1-A3

Description of the stage: For rolled glass A1 to A3 represents the production of glass in the float from cradle to gate.

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











LCA results

The table below present the environmental impacts associated with the production of 1 square meter of SGG MASTERGLASS/DECORGLASS/ALBARINO. This is a Cradle-to-Gate EPD. The environmental impacts of all the other stages in the life cycle of SGG MASTERGLASS/DECORGLASS/ALBARINO are not declared (MND).




ENVIRONMENTAL IMPACTS 3 mm

Parameters	Product stage	Construction process 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	
 Global Warming Potential (GWP) - <i>kg CO₂ equiv/FU</i>	11.4	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.														
 Ozone Depletion (ODP) <i>kg CFC 11 equiv/FU</i>	1.15E-10	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons). Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
 Acidification potential (AP) <i>kg SO₂ equiv/FU</i>	0.0519	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.														
 Eutrophication potential (EP) <i>kg (PO₄)³⁻ equiv/FU</i>	0.00719	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
 Photochemical ozone creation (POPC) <i>kg Ethene equiv/FU</i>	0.00342	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
 Abiotic depletion potential for non-fossil resources (ADP-elements) - <i>kg Sb equiv/FU</i>	5.53E-5	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Abiotic depletion potential for fossil resources (ADP-fossil fuels) - <i>MJ/FU</i>	128	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														





RESOURCE USE 3 mm

Parameters	Product stage	Construction process 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	
 Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	5.46	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) MJ/FU	5.46	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	131	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	131	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of secondary material kg/FU	0.87	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable secondary fuels- MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable secondary fuels - MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of net fresh water - m³/FU	0.0283	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND








WASTE CATEGORIES 3 mm

Parameters	Product stage	Construction process 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	
 Hazardous waste disposed <i>kg/FU</i>	3.36E-7	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Non-hazardous(excluding inert) waste disposed <i>kg/FU</i>	0.192	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Radioactive waste disposed <i>kg/FU</i>	0.00106	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND









OUTPUT FLOWS 3 mm

Parameters	Product stage	Construction process 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	
 Components for re-use <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for recycling <i>kg/FU</i>	0.172	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for energy recovery <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Exported energy. detailed by energy carrier <i>MJ/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND




ENVIRONMENTAL IMPACTS 4 mm

Parameters	Product stage	Construction process 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	
 Global Warming Potential (GWP) - <i>kg CO₂ equiv/FU</i>	15.2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.															
 Ozone Depletion (ODP) <i>kg CFC 11 equiv/FU</i>	1.53E-10	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons). Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.															
 Acidification potential (AP) <i>kg SO₂ equiv/FU</i>	0.0692	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.															
 Eutrophication potential (EP) <i>kg (PO₄)³⁻ equiv/FU</i>	0.00959	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.															
 Photochemical ozone creation (POPC) <i>kg Ethene equiv/FU</i>	0.00456	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.															
 Abiotic depletion potential for non-fossil resources (ADP-elements) - <i>kg Sb equiv/FU</i>	7.37E-5	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Abiotic depletion potential for fossil resources (ADP-fossil fuels) - <i>MJ/FU</i>	171	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Consumption of non-renewable resources, thereby lowering their availability for future generations.															





RESOURCE USE 4 mm

Parameters	Product stage	Construction process 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	
 Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	7.29	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) MJ/FU	7.29	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	174	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	174	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of secondary material kg/FU	1.16	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable secondary fuels- MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable secondary fuels - MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of net fresh water - m³/FU	0.0377	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND








WASTE CATEGORIES 4 mm

Parameters	Product stage	Construction process 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	
 Hazardous waste disposed <i>kg/FU</i>	4.49E-7	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Non-hazardous(excluding inert) waste disposed <i>kg/FU</i>	0.255	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Radioactive waste disposed <i>kg/FU</i>	0.00141	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND









OUTPUT FLOWS 4 mm

Parameters	Product stage	Construction process 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	
 Components for re-use <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for recycling <i>kg/FU</i>	0.229	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for energy recovery <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Exported energy. detailed by energy carrier <i>MJ/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND




ENVIRONMENTAL IMPACTS 6 mm

Parameters	Product stage	Construction process 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	
 Global Warming Potential (GWP) - <i>kg CO₂ equiv/FU</i>	22.8	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.														
 Ozone Depletion (ODP) <i>kg CFC 11 equiv/FU</i>	2.29E-10	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons). Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
 Acidification potential (AP) <i>kg SO₂ equiv/FU</i>	0.104	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.														
 Eutrophication potential (EP) <i>kg (PO₄)³⁻ equiv/FU</i>	0.0144	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
 Photochemical ozone creation (POPC) <i>kg Ethene equiv/FU</i>	0.00683	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
 Abiotic depletion potential for non-fossil resources (ADP-elements) - <i>kg Sb equiv/FU</i>	0.00011	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Abiotic depletion potential for fossil resources (ADP-fossil fuels) - <i>MJ/FU</i>	256	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														





RESOURCE USE 6 mm

Parameters	Product stage	Construction process 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	
 Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	10.9	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) MJ/FU	10.9	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	261	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	261	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of secondary material kg/FU	1.74	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable secondary fuels- MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable secondary fuels - MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of net fresh water - m³/FU	0.0565	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND








WASTE CATEGORIES 6 mm

Parameters	Product stage	Construction process 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	
 Hazardous waste disposed <i>kg/FU</i>	6.73E-7	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Non-hazardous(excluding inert) waste disposed <i>kg/FU</i>	0.383	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Radioactive waste disposed <i>kg/FU</i>	0.00212	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND









OUTPUT FLOWS 6 mm

Parameters	Product stage	Construction process 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	
 Components for re-use <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for recycling <i>kg/FU</i>	0.344	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for energy recovery <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Exported energy. detailed by energy carrier <i>MJ/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND




ENVIRONMENTAL IMPACTS 8 mm

Parameters	Product stage	Construction process 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	
 Global Warming Potential (GWP) - <i>kg CO₂ equiv/FU</i>	30.4	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.														
 Ozone Depletion (ODP) <i>kg CFC 11 equiv/FU</i>	3.06E-10	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons). Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
 Acidification potential (AP) <i>kg SO₂ equiv/FU</i>	0.138	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.														
 Eutrophication potential (EP) <i>kg (PO₄)³⁻ equiv/FU</i>	0.0192	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
 Photochemical ozone creation (POPC) <i>kg Ethene equiv/FU</i>	0.00911	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
 Abiotic depletion potential for non-fossil resources (ADP-elements) - <i>kg Sb equiv/FU</i>	0.00014	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Abiotic depletion potential for fossil resources (ADP-fossil fuels) - <i>MJ/FU</i>	341	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														





RESOURCE USE 8 mm

Parameters	Product stage	Construction process 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	
 Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	14.6	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) MJ/FU	14.6	n/a	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	348	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	348	n/a	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of secondary material kg/FU	2.32	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable secondary fuels- MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable secondary fuels - MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of net fresh water - m³/FU	0.0754	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND








WASTE CATEGORIES 8 mm

Parameters	Product stage	Construction process 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	
 Hazardous waste disposed <i>kg/FU</i>	8.97E-7	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Non-hazardous(excluding inert) waste disposed <i>kg/FU</i>	0.511	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Radioactive waste disposed <i>kg/FU</i>	0.00282	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND









OUTPUT FLOWS 8 mm

Parameters	Product stage	Construction process 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	
 Components for re-use <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for recycling <i>kg/FU</i>	0.459	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for energy recovery <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Exported energy. detailed by energy carrier <i>MJ/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND




ENVIRONMENTAL IMPACTS 10 mm

Parameters	Product stage	Construction process 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	
 Global Warming Potential (GWP) - <i>kg CO₂ equiv/FU</i>	38	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.														
 Ozone Depletion (ODP) <i>kg CFC 11 equiv/FU</i>	3.82E-10	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons). Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
 Acidification potential (AP) <i>kg SO₂ equiv/FU</i>	0.173	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.														
 Eutrophication potential (EP) <i>kg (PO₄)³⁻ equiv/FU</i>	0.024	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
 Photochemical ozone creation (POPC) <i>kg Ethene equiv/FU</i>	0.0114	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
 Abiotic depletion potential for non-fossil resources (ADP-elements) - <i>kg Sb equiv/FU</i>	0.00018	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Abiotic depletion potential for fossil resources (ADP-fossil fuels) - <i>MJ/FU</i>	426	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														





RESOURCE USE 10 mm

Parameters	Product stage	Construction process 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	
 Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	18.2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) MJ/FU	18.2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	435	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable primary energy used as raw materials MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	435	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of secondary material kg/FU	2.9	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of renewable secondary fuels- MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of non-renewable secondary fuels - MJ/FU	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Use of net fresh water - m³/FU	0.0942	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

WASTE CATEGORIES 10 mm

Parameters	Product stage	Construction process 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	
 Hazardous waste disposed <i>kg/FU</i>	1.12E-6	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Non-hazardous(excluding inert) waste disposed <i>kg/FU</i>	0.638	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Radioactive waste disposed <i>kg/FU</i>	0.00353	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

OUTPUT FLOWS 10 mm






Parameters	Product stage	Construction process 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	
 Components for re-use <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for recycling <i>kg/FU</i>	0.574	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Materials for energy recovery <i>kg/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
 Exported energy. detailed by energy carrier <i>MJ/FU</i>	0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

LCA results interpretation

In the production of SGG MASTERGLASS / DECORGLASS / ALBARINO, we find two main sources of 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, the soda ash.

Soda ash is in the origin of more than 25% of the GWP, more than 60% of the abiotic depletion for non fossil fuels (ADP elements) and more than 20% of the energy consumption.

		Environmental impacts (A1-A3) SGG MASTERGLASS / DECORGLASS / ALBARINO 6mm	Unit
	Global warming	22.8	Kg CO ₂ equiv/FU
	Non-Renewable resources consumption ^[1]	256	MJ/FU
	Energy consumption ^[2]	271.9	MJ/FU
	Water consumption ^[3]	0.0565	M ³ /FU
	Waste production ^[4]	0.3851	Kg/FU

^[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 fresh net water.

^[4]: This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

Health characteristics

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

Additional Environmental Information

Saint-Gobain's environmental policy

Saint-Gobain's environmental vision is to ensure the sustainable development of its Activities, while preserving the environment from the impacts of its processes and services throughout their life cycle. The Group thus seeks to ensure the preservation of resources, meet the expectations of its relevant stakeholders, and offer its customers the highest added value with the lowest environmental impact.

The Group has set two long-term objectives: zero environmental accidents and a minimum impact of its activities on the environment. Short and medium-term goals are set to address these two ambitions. They concern five environmental areas identified by the Group: raw materials and waste; energy; atmospheric emissions and climate; water; biodiversity; and environmental accidents and nuisance.

Saint-Gobain's long term objectives:



Non recovered waste (2010-2025) : -50%
Long-term: zero non-recovered waste



Energy consumption: -15% (2010-2025)
CO₂ emissions: -20% (2010-2025)
Emissions of NO_x, SO₂ and dust: -20% for each emissions category (2010-2025)



Water discharge: -80% (2010-2025)
Long-term: zero industrial water discharge in liquid form



2025: promote the preservation of natural areas at Company sites as much as possible



2025: all environmental events are recorded, registered and investigated

More information on our website: www.saint-gobain.com and our Registration Document.

Our products' contribution to Sustainable Buildings

Saint-Gobain encourages sustainable construction and develops innovative solutions for new and renovated buildings that are energy efficient, comfortable, healthy and esthetically superior, while at the same time protecting natural resources.

The following information might be of help for green building certification programs:

RECYCLED CONTENT

(Required for LEED v4 Building product disclosure and optimization - sourcing of raw materials)

Recycled content: proportion, by mass, of recycled material in a product or packaging. Only pre-consumer and post-consumer materials shall be considered as recycled content.

- Post-consumer material: material generated by households or commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose.

In practice, in the case of flat glass, all material coming from glass recycling collection schemes falls under this category, i.e. glass waste from end-of-life vehicles, construction and demolition waste, etc.

- Pre-consumer material: material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

In the case of flat glass, this waste originates from the processing or re-processing of glass that takes place before the final product reaches the consumer market. Pre-consumer waste flat glass is made of cut-offs, losses during laminating, bending and other processing, including the manufacture of insulating glass units or automotive windscreens.

Cullet generated in the furnace plant and which is reintroduced into the furnace cannot be considered as pre-consumer recycled content, since there was never an intent to discard it and therefore it would never have entered the solid waste stream.

Pre-consumer cullet	~7%
Post-consumer cullet	< 1%

In the future, Saint-Gobain Glass intends to continue the increase of recycled material in its products, especially when recycling building post-consumer cullet glass dismantling and recycling networks will be available in every country.

RESPONSIBLE SOURCING

(Required for BREEAM International new construction 2013 – MAT 03 Responsible sourcing)

All Saint-Gobain Glass Industry sites with a glassmaking furnace, are ISO 14001 certified.

The Saint-Gobain Glass Industry site from the UK (Eggborough) has a BES 6001 certification, with a Very Good score.

All internal Saint-Gobain Glass quarries are certified ISO 14001 like, for example, SAINT-GOBAIN SAMIN (sand) in France. Many Saint-Gobain Glass raw material suppliers are certified ISO 14001. Our policy consists in encouraging the sourcing of raw materials extracted or made in sites certified ISO 14001 (or the equivalent).

For any other question / document / certification, please contact our local sales teams.