Environmental Product Declaration

In Accordance with ISO 14025
AND ISO 21930:2017

Solar Gard® Low-E All Season Film

Smart EPD® Program
Refer to the EPD Library at www.smartepd.com
for the latest EPD listing information.

General Information

Solar Gard Saint-Gobain

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sustainability@saint-gobain.com **solargard.com**

Product Name:	Solar Gard Low-E All Season films
Declared Unit:	1 m2
Declaration Number:	SmartEPD-2025-059-0378-01
Date of Issue:	March 28, 2025
Expiration:	March 28, 2030
Last updated:	March 28, 2025
EPD Scope:	Cradle to gate with other options A1 - A3, A4, A5, C1 - C4
Market(s) of Applicability:	North America

General Organization Information

Introduction to the Saint-Gobain Group

Saint-Gobains purpose is Making the World a Better Home. With this purpose, the Saint-Gobain Group takes on the ambition to improve everyones lives by making the planet a fairer, more harmonious and sustainable living space. Through its business model generally and its solutions in particular, Saint-Gobain has a tangible impact on the life of each individual, their environment and their way of working, caring for themselves and getting around. The Groups purpose is the link between the infinitely small unit of each persons living space and the infinitely large one of our shared home: the planet.

By committing to protect health and promote well-being, the Saint-Gobain Group affirms its desire to take action to maximize its positive impact and to avoid or to minimize any potential negative footprint related to its activity. With regard to its employees, this involves promoting a healthy working environment and taking action to protect their health. With regard to customers and end users, this involves, in particular, ensuring the safe use of its solutions. With regard to local residents and communities around the Groups sites, this involves complying with applicable regulations and striving to go beyond them, collaborating with local public health agencies, or participating in the social development of communities.

HUMAN RESOURCES

160,000

EMPLOYEES

SALES

€47.9 bn

History of the Saint-Gobain Group

Saint-Gobain was founded in 1665 by Louis XIV, under the name of the Royal Manufacture of Mirrors, in order to put an end to the technological and commercial supremacy of the Republic of Venice in the manufacturing of mirrors. Throughout the 19th century, the Compagnie de Saint-Gobain became a limited company and diversified its activities into sectors such as chemicals, glass products and the automotive industry. It quickly expanded into international markets, establishing itself in the United States in 1829, Germany in 1858, Italy in 1888 and Spain in 1905.

In 1970, the Group invested heavily in research and development, withdrew from its chemical activities and merged with Pont-à-Mousson, created in 1856 and specialized in cast iron pipes. In 1982 Saint-Gobain was nationalized. But only for a short period: in 1986 Saint-Gobain was again privatized and this was a huge popular success as 1,500,000 shareholders subscribed to the operation.

In 1990, through the acquisition of NORTON , the Group doubled its presence in the United States, opening up new markets and enabling it to develop its know-how. In 2007, Saint-Gobain started to focus its strategy on sustainable housing, while continuing to serve many industrial markets and, thanks to its numerous locations, continued to expand in emerging countries.

In 2023, the Saint-Gobain Group has a commercial and/or manufacturing presence in approximately 76 countries.

PRODUCTION
800
INDUSTRIAL SITES AROUND THE WORLD

INNOVATION
+400
PATENTS FILED EACH YEAR

R&D
3,600
RESEARCHERS

START-UP
50
AGREEMENTS SIGNED IN 2021

Saint-Gobain Products and Solutions

Saint-Gobain provides construction and renovation solutions for both residential and commercial buildings. These solutions meet the needs of professional and private customers both in terms of building interiors and the distribution of spaces and building envelope.

For its customers in mobility markets, Saint-Gobain produces glazing that provides daily safety and comfort for motorists, but also for the aeronautical and rail sectors, the maritime sector and industrial vehicles. The Group also offers solutions to improve the performance of electric vehicles (energy efficiency, well-being, safety and connectivity), distributes replacement automotive glazing on the independent market, designs and supplies bearings and tolerance rings.

Saint-Gobain also offers high-performance technological solutions such as airborne and ground radomes. For all its industrial customers, and notably for the construction industry, Saint-Gobain draws on its technological competencies (materials science, formulation, design of glass applications, ceramics, abrasive solutions, performance polymers and fiberglass) and its expertise in multiple cutting-edge applications that use the particular properties of its materials (resistance to high temperatures, abrasion, chemical stability, surface properties, etc.). Many solutions are co-developed with customers, notably in high-performance plastics and refractories for metallurgy or the glass industry. Due to the extensive portfolio of products and solutions in a wide range of segments there are many brands under the Saint-Gobain umbrella.

Solar Gard

Solar Gard builds on nearly 50 years of experience in the development and production of window films.

Solar Gard is a world leader in patented technologies for solar control and protective window film for both residential and commercial buildings, vehicles and public transport.

In 2011 Solar Gard became a part of Saint-Gobain as the Thin Films division. This allowed to cross-leverage sputtering technology that is used both for producing window films and low-E coatings on glass. In addition the integration created important synergies within the renovation and upgrade offering as well as in the mobility segment.

Solar Gard Products and Solutions

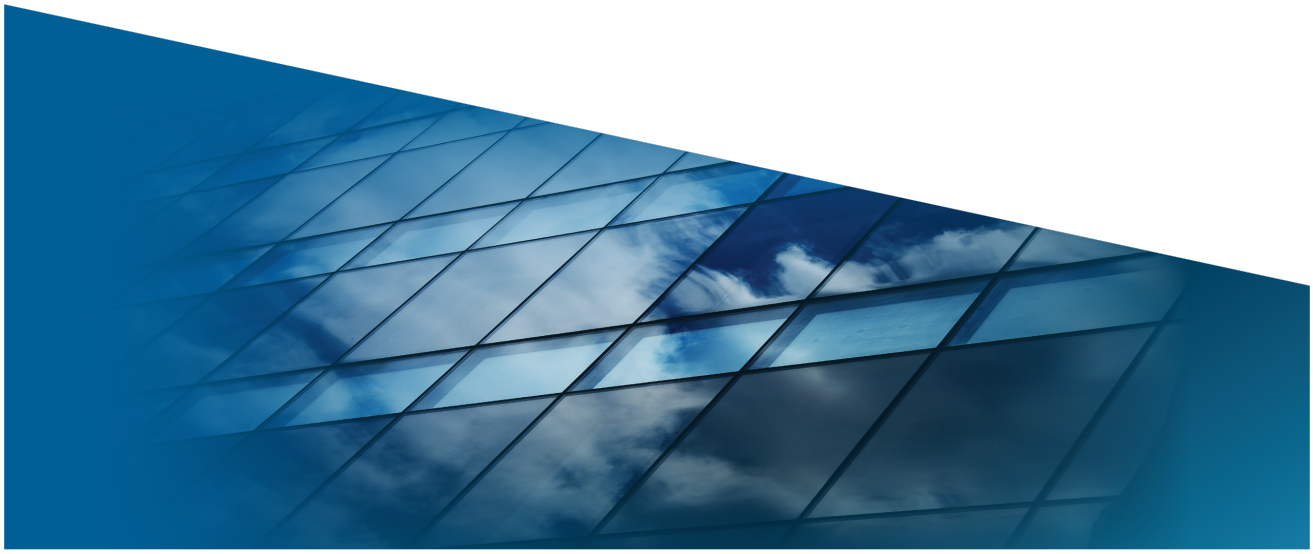
The Solar Gard range of architectural solar films provide solutions for upgrading and enhancing the performance of existing glass and facades of homes and commercial buildings thus improving both winter and summer thermal comfort, increasing visual comfort and reducing the need for cooling.

The Solar Gard range of architectural safety films provide solutions for enhancing safety and security of existing glass and glass facades across all segments and reduces the risks of passengers, residents, employees being hurt by shards of broken glass in the case of an explosion or any glass breakage and increases the level of protection in case of intrusion.

Solar Gard Anti-graffiti films are applied as sacrificial surface protection of surfaces against scratches, graffiti, etching etc. be it glass or metal surfaces, in buildings but also in trains, trams.

In concrete terms Solar Gard Solutions help to:

- Reduce energy consumption in summer and winter.
- Improve the comfort of the indoor climate and make if much more pleasant.
- Introduce sustainable solutions in the context of LEED.
- Increase occupants wellbeing and productivity.
- Protect people from broken glass in the event of an accident, explosion or aggression.
- Secure a building against burglary/intrusion.
- Protect occupants against dangerous UVA and UVB radiation with an equivalent SPF of > 285.



Sustainability

CO_2 EMISSIONS

-23%

REDUCTION FROM 2017 TO 2021*

WITHDRAWLS AVOIDED

9.952 Mt

OF NON-EXTRACTED VIRGIN RAW MATERIALS

RESPONSIBLE PURCHASING

100%

OF PURCHASES COVERED BY THE SUPPLIERS' CHARTER**

Sustainability is a long standing commitment for Saint-Gobain.

"Making the world a better home," is the most precious of headings for Saint- Gobain to follow.
Saint-Gobain is a multi-local organization, driven by the global aim of working each day to make the world a more beautiful and more sustainable place to live. It is reflected in the design and manufacture of solutions which are key ingredients in the well-being of each and the future of all, while taking care of the planet at the same time.

In addition to the multiple actions that have been implemented over the past years across Saint-Gobain sites world-wide, Saint-Gobain has set in 2021 an ambitious target of **Carbon neutrality by 2050**

In this roadmap, **2030 is an intermediate but crucial stage**. The Group is committed to reducing by then its direct and indirect CO2 emissions by 66% compared to 2017. In doing so, Saint-Gobain will make no concession toward the excellence of our products or our competitiveness.

Each year through to 2030, around 100 million is being reserved annually for industrial investments and research & development to reach these targets.

The Group have also adopted the target of reducing our Scope 3 (up and downstream from our operations) emissions by 16% by 2030 measured against the 2017 baseline.

The Group also continues to reduce the water usage across all its sites and more in particular the Group is putting actions in place to reduce the water discharge by 80% vs the 2016 baseline.

Also the sites in San Diego where the Solar Gard products are produced and the site in Belgium from which most products are supplied to Europe are working towards the Groups targets.

Further information can be found at: **https://www.solargard.com/**

Reference Standards

Standard(s):	ISO 14025 and ISO 21930:2017
Core PCR:	Smart EPD Part A Product Category Rules for Building and Construction Products and Services, 1000, v1.01 Date of issue: January 15, 2024 Valid until: July 15, 2025
Sub-category PCR review panel:	Contact Smart EPD for more information.
General Program Instructions:	Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

ACLCA PCR Guidance Version:	1.0
ACLCA PCR Conformance Level:	Transparency
LCA Author/Creator:	Saint-Gobain North American ESG Sustainability Group sustainability@saint-gobain.com
EPD Program Operator:	Smart EPD info@smartepd.com www.smartepd.com 585 Grove St., Ste. 145 PMB 966, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071: Rifat Karim Independent Consultant rifat.chimique@gmail.com Independent external verification of EPD, according to ISO 14025 and reference PCR(s): Rifat Karim Independent Consultant rifat.chimique@gmail.com

Limitations, Liability, and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the products use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared. The EPD owner has sole ownership, liability, and responsibility for the EPD.

COMPARISONS: A manufacturer shall not make claims based on an industry-average EPD which leads the market to believe the industry-average is representative of manufacturer-specific or product- specific results.

DECLARED UNIT: The environmental impact results of products in this document are based on a declared unit and therefore do not provide sufficient information to establish comparisons. The results shall not be used for comparisons without knowledge of how the physical properties of the product impact the precise function at the construction level. The environmental impact results shall be converted to a functional unit basis before any comparison is attempted.

Product Information

Declared Unit:	1 m2
Mass:	0.15 kg
Reference Service Life:	16 Years
Product Specificity:	✗ Product Average ✓ Product Specific

Product Description

Solar Gard **ECOLUX** low-e architectural solar control film enhances the performance of existing glass and facades in homes and commercial buildings. It improves thermal comfort in both winter and summer, increases visual comfort, and reduces the need for cooling and heating.

ECOLUX low-e architectural solar control film is composed of multiple layers of polyethylene terephthalate (PET) with a proprietary stack of metal(s) applied through a process called sputtering. This method ensures superior density and bond strength compared to vapor deposition and other metallization techniques. **ECOLUX** film features a uniquely designed scratch-resistant coating with a **low-emissivity surface**, reducing heat loss in the winter while protecting the film during installation and cleaning for long-term durability.

Product Benefits

- Superior spectral selectivity and low-e technology block heat, retain warmth, and let in light
- Offers year-round energy savings on cooling and heating
- Low emissivity surface prevents heat from escaping through windows in the winter
- Improves indoor comfort through high heat rejection
- Increases occupants wellbeing and productivity
- Introduces sustainable solutions in the context of LEED
- Shields occupants from harmful UVA and UVB rays with an SPF equivalent of 285+
- Mitigates the negative effects of UV radiation on interior finishes

All Solar Gard films undergo rigorous inspection and endurance testing to guarantee long-lasting performance and customer satisfaction. Solar Gard also offers product warranties, covering a lifetime for residential applications.

The reference product for this EPD is Solar Gard **ECOLUX 70** (supplied as roll of 1.47 m / 58 wide and 30.5 m / 100 ft long).

The **Performance Specifications** table in the Further Information section provides an overview of the solar control film product references covered in this EPD.

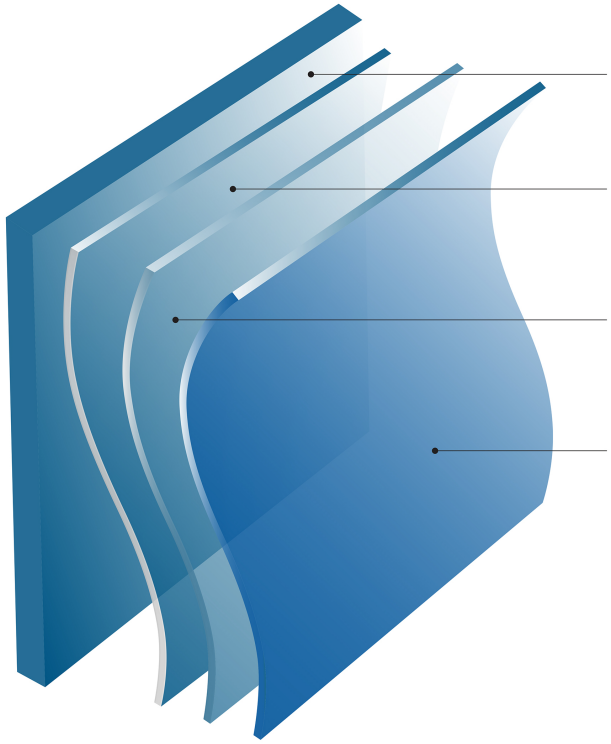
Solar Gard can provide detailed data for any product covered by this EPD, if requested.

Further information can be found at: **https://www.solargard.com/product/ecolux/**

Product Specifications

Product Classification Codes:	EC3 - Openings -> Glazing

Product Composition Diagram



Material Composition

Material/Component Category	Origin	% Mass
Polyethylene Terephthalate (PET) Film	None	69
Acrylic Adhesive	None	7
Coating	None	0.15
Release Liner (PET)	None	23

Packaging Material	Origin	kg Mass
Cardboard Box	None	0.0015
Cardboard Core	None	0.0012
LDPE Sleeves	None	0.00003
End Plug - Cardboard or HDPE	None	0.00009
End Plates - MDF	None	0.0008
Pallet - Wood	None	0.01
Shrink Wrap - LLDPE	None	0.0004

Biogenic Carbon Content	kg C per m2
Biogenic carbon content in product	None
Biogenic carbon content in accompanying packaging	0.00756

Hazardous Materials
No regulated hazardous or dangerous substances are included in this product.

EPD Data Specificity

Primary Data Year: 2019

Manufacturing Specificity:

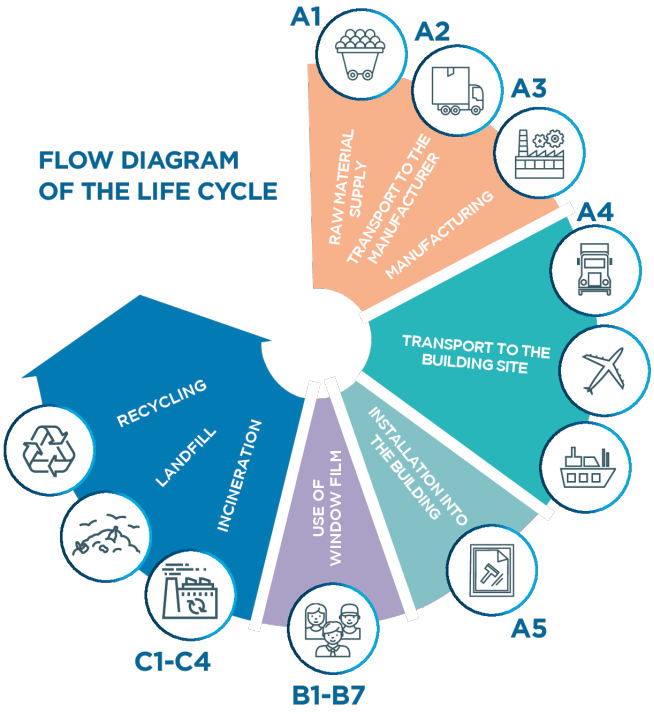
- ✗ Industry Average
- ✗ Manufacturer Average
- ✓ Facility Specific

Averaging:

Averaging was not conducted for this EPD. The EPD uses a reference product to represent a broader category of products within a range. The reference product for this EPD is Solar Gard **ECOLUX 70** (supplied as roll of 1.47 m / 58 wide and 30.5 m / 100 ft long). The variability between any of the products covered in this EPD and the reference product **ECOLUX 70** remains within 10% for GWP, as required by the governing PCR. The results are for 1m2 of installed window film.

System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓
Use	B1	Use	ND
	B2	Maintenance	ND
	B3	Repair	ND
	B4	Replacement	ND
	B5	Refurbishment	ND
	B6	Operational Energy Use	ND
	B7	Operational Water Use	ND
End of Life	C1	Deconstruction	✓
	C2	Transport	✓
	C3	Waste Processing	✓
	C4	Disposal	✓
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	ND



Product stage, A1-A3

Description of the stage: the product stage of windows film products is subdivided into 3 modules A1, A2 and A3 respectively "Raw material supply", "transport to manufacturer" and "manufacturing".

A1, raw material 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, plane and/or train transportations of each raw material.

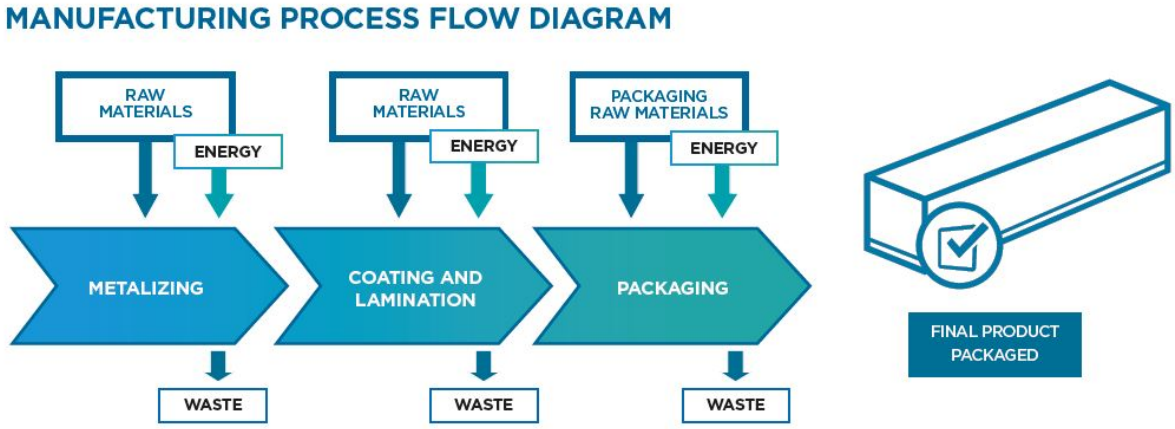
A3, manufacturing.

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.

Plants

Solar Gard
4540 Viewridge Ave, San Diego, CA 92123, USA

Product Flow Diagram



Software and Database

LCA Software:	GaBi v. 8.0		
LCI Foreground Database(s):	Ecoinvent v. 3.6	North America	Mass
LCI Background Database(s):	GaBi Professional Database v.		

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. After evaluating the inventory, according to the defined ranking in the LCA report, the assessment reflects good inventory data quality.

Life Cycle Module Descriptions

Raw Materials (A1)
This module includes the extraction and processing of all raw materials and energy which occur upstream from the manufacturing process.

Transport to the Manufacture (A2)
The raw materials are transported to the manufacturing site. The modelling includes road, boat, plane and/or train transportation of each raw material.

Manufacturing (A3)
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.

Solar Gard architectural solar control films are manufactured in San Diego, CA. The films are produced from one or more layers of high quality, optically clear PET film ranging from 0.5 to 2 mil in thickness. The first step is to coat a layer of film with an ultra-thin transparent layer of ceramic element, metal, or a variety of metals such as gold, silver, aluminum, titanium, copper or stainless steel through a process of metal deposition in a vacuum chamber called sputtering.* The result of this sputter-coating process is a very dense, highly bonded thin film that provides the desired performance result while achieving maximum durability. Next, the coated film* is laminated to other layers of optically clear or dyed PET. An acrylic pressure-sensitive adhesive and a protective release liner are applied to the film, along with a proprietary acrylic scratch-resistant coating (hard coat) specifically designed for its installation position.
* Only for the solar control window films. The clear films do not have a sputtered layer in their construction.

Packaging (A3)
The packaging is made up of four components: core, sleeve, box, and pad plugs (or end caps). The core, a tube made of high impact polystyrene (HIPS), is what the finished film is wrapped around. The sleeve covers and protects the roll of film, and is made from low-density polyethylene (LDPE). A cardboard box is used to protect the film during transport, handling and storage. The boxes are also labelled with product name, type, dimensions and a unique batch number. Pad plugs (end caps) are made from high-density polyethylene (HDPE); there are two end caps in each box. The function of the end caps is to keep the film suspended in the center of the box, away from the cardboard outer box, and ensure its stability during transit and storage.

Transport to the Building Site (A4)
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 section. Data is calculated from the arithmetic mean covering all sales destinations in North America.

Installation Into the Building (A5)
This module includes the parameters for installing the product at the building site. All installation materials and their waste processing are included.

The installation of the product consists of a thorough cleaning of the glass surface, removal and disposal of the protective release liner, and application of the film to the glass. A mixture of mild soap and water (also referred to as slip solution) and specialized tools are used for glass surface cleaning and the installation of the film.

End of Life (C1-C4)
This module includes deconstruction and demolition (C1), transportation to waste processing facilities (C2), waste processing for reuse, recovery, and/or recycling (C3), and waste disposal (C4).

The window film waste is 46% landfilled, 15% recycled and 40% incinerated with energy recovery*. Transportation is assumed to be 50 km to landfill and incineration and 100 km to recycling disposal. *Percentages shown here are rounded, so may not total to 100%.

LCA Discussion

Allocation Procedure

The data for the site has been allocated on the basis of a surface distribution considering that the manufacturing impacts per m2 of product are the same regardless of the product manufactured. The polluter pays as well the modularity principles have been followed.

Cut-off Procedure

Not applied, all the information is considered.

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.

Renewable Electricity

Energy Attribute Certificates (EACs) such as Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) are included in the baseline reported results:	✕ No

Scenarios

Transport to the building/construction site (A4)

A4 Module

PARAMETER	VALUE (per declared unit)
Vehicle Type	Truck
Transport Distance	2923 km
Packaging Mass	0.05 kg
Weight of products transported	0.12 kg
Capacity utilization volume factor	=1
Assumptions for scenario development	The distribution distance for is calculated on weighted averaged from San Diego plant in US and destination to North America regions.

Installation in to the building/construction site (A5)

A5 Module

PARAMETER	VALUE (per declared unit)
Installation Scrap Rate Assumed	5 %
Ancillary Materials	Soap: 0.005 kg
Net Fresh Water Consumption Specified by Water Source and Fate	0.001 m3
Product Lost per Declared/Functional Unit	0.006 kg
Waste Materials at the Construction Site Before Waste Processing	0.05 kg
Mass of Packaging Waste Specified by Type	Release Film: 0.035 kg/m2 to landfill (46%), recycling (15%) and incineration with energy recovery (40%); Film: 0.006 kg/m2 (5%) to landfill (46%), recycling (15%) and incineration with energy recovery (40%) Cardboard box: 1.48 g/m2 to landfill (69%) and recycling (31%) Cardboard core: 1.2 g/m2 to landfill (69%) and recycling (31%) LDPE sleeves: 0.03 g/m2 to landfill (46%), recycling (15%) and incineration with energy recovery (40%) Cardboard or HDPE end plug: 0.09 g/m2 to landfill MDF end plates: 0.82 g/m2 to landfill (69%) and recycling (31%) Pallet: 10.2 g/m2 to landfill (69%) and recycling (31%) Shrink wrap: 0.4 g/m2 to landfill (46%), recycling (15%) and incineration with energy recovery (40%)*
Biogenic Carbon Contained in Packaging	7.56E-03 kg
Assumptions for scenario development	The installation of the product consists of a thorough cleaning of the glass surface, removal and disposal of the protective release liner, and application of the film to the glass. A mixture of mild soap and water (also referred to as slip solution) and specialized tools are used for glass surface cleaning and the installation of the film.The scenario of end of life of the product loss and release liner is based on Organization for Economic Co-operation and Development (OECD) statistics. *Percentages shown here are rounded, so may not total to 100%.

End of Life (C1 - C4)

C1 - C4 Modules

Collection Process

PARAMETER	VALUE (per declared unit)
Collected Separately	0.017 kg
Collected with Mixed Construction Waste	0.10 kg

Recovery

PARAMETER	VALUE (per declared unit)
Recycling	0.02 kg
Landfill	0.05 kg
Incineration with Energy Recovery	0.05 kg

Disposal

PARAMETER	VALUE (per declared unit)
Product or Material for Final Disposal	0.12 kg

PARAMETER	VALUE (per declared unit)
Assumptions for scenario development	The window film wastes are 46% landfilled, 15% recycled and 40%* incinerated with energy recovery. Transportation is assumed to be 50 km to landfill and incineration and 100 km to recycling disposal. *Percentages shown here are rounded, so may not total to 100%.

Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1
per 1 m2 of product .
LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Method	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
GWP-total	IPCC AR5 GWP 100	kg CO2 eq	5.63	0.013	0.331	0.0004	0.0012	0.0068	0.131
GWP-fossil	IPCC AR5 GWP 100	kg CO2 eq	5.63	0.013	0.306	0.0004	0.0012	0.0052	0.131
GWP-biogenic	IPCC AR5 GWP 100	kg CO2 eq	-0.0092	ND	0.017	0.00000258	5.36e-7	0.0016	0.00000749
GWP-luluc	IPCC AR5 GWP 100	kg CO2 eq	0.0019	ND	0.0073	5.65e-7	4.44e-7	0.00000578	7.37e-7
ODP	TRACI 2.1	kg CFC 11 eq	9.33e-7	2.99e-13	4.98e-8	2.22e-11	2.28e-10	5.82e-10	3.32e-10
AP	TRACI 2.1	kg SO2 eq	0.0588	0.0000898	0.00314	0.00000188	0.00000706	0.0000276	0.0000323
EP	TRACI 2.1	kg N eq	0.0038	0.0000914	0.00000604	4.7e-8	4.35e-7	0.00000161	0.00000419
POCP	TRACI 2.1	kg O3 eq	0.00366	0.0000897	0.000192	5.33e-8	4.79e-7	0.00000164	0.00000249

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Resource Use Indicators

per 1 m2 of product .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
PERE	MJ	5.09	ND	0.366	0.0006	0.0002	0.0037	0.0006
PERM	MJ	0.108	ND	0.0049	ND	ND	ND	ND
PERT	MJ	5.2	ND	0.371	0.0006	0.0002	0.0037	0.0006
PENRE	MJ	87.5	0.166	4.64	0.0059	0.0178	0.598	0.035
PENRM	MJ	3.35	ND	0.14	ND	ND	-0.507	ND
PENRT	MJ	90.9	0.166	4.79	0.0059	0.0178	0.0914	0.035
ADP-fossil	MJ	90.9	0.166	4.78	0.0059	0.0178	0.0914	0.035
SM	kg	ND	ND	ND	ND	ND	ND	ND
RSF	MJ	ND	ND	ND	ND	ND	ND	ND

NRSF	MJ	ND	ND	ND	ND	ND	ND	ND
FW	m3	0.0361	0.0002	0.0035	0.001	0.00000213	0.0000381	0.0000197
RE	MJ	ND	ND	ND	ND	ND	ND	ND

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 m2 of product .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
HWD	kg	0.0242	ND	0.0012	3.23e-9	4.44e-8	1.4e-7	1.43e-7
NHWD	kg	81.5	ND	4.09	0.0002	0.0013	0.0068	0.0802
RWD	kg	ND	ND	ND	ND	ND	ND	ND
HLRW	kg	0.000324	ND	0.0000194	2.1e-8	1.15e-7	3.05e-7	1.32e-7
ILLRW	kg	ND	ND	ND	ND	ND	ND	ND
CRU	kg	ND	ND	ND	ND	ND	ND	ND
MFR	kg	0.0308	ND	0.0049	ND	ND	0.022	ND
MER	kg	ND	ND	ND	ND	ND	ND	ND
MNER	kg	ND	ND	ND	ND	ND	ND	ND
EEE	MJ	ND	ND	ND	ND	ND	ND	ND
EET	MJ	ND	ND	ND	ND	ND	ND	ND

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Carbon Emissions and Removals

per 1 m2 of product .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
BCRP	kg CO2	ND	ND	ND	ND	ND	ND	ND
BCEP	kg CO2	ND	ND	ND	ND	ND	ND	ND
BCRK	kg CO2	-0.00756	ND	ND	ND	ND	ND	ND
BCEK	kg CO2	ND	ND	0.00756	ND	ND	ND	ND
BCEW	kg CO2	ND	ND	ND	ND	ND	ND	ND
CCE	kg CO2	ND	ND	ND	ND	ND	ND	ND
CCR	kg CO2	ND	ND	ND	ND	ND	ND	ND
CWNR	kg CO2	ND	ND	ND	ND	ND	ND	ND

Note:

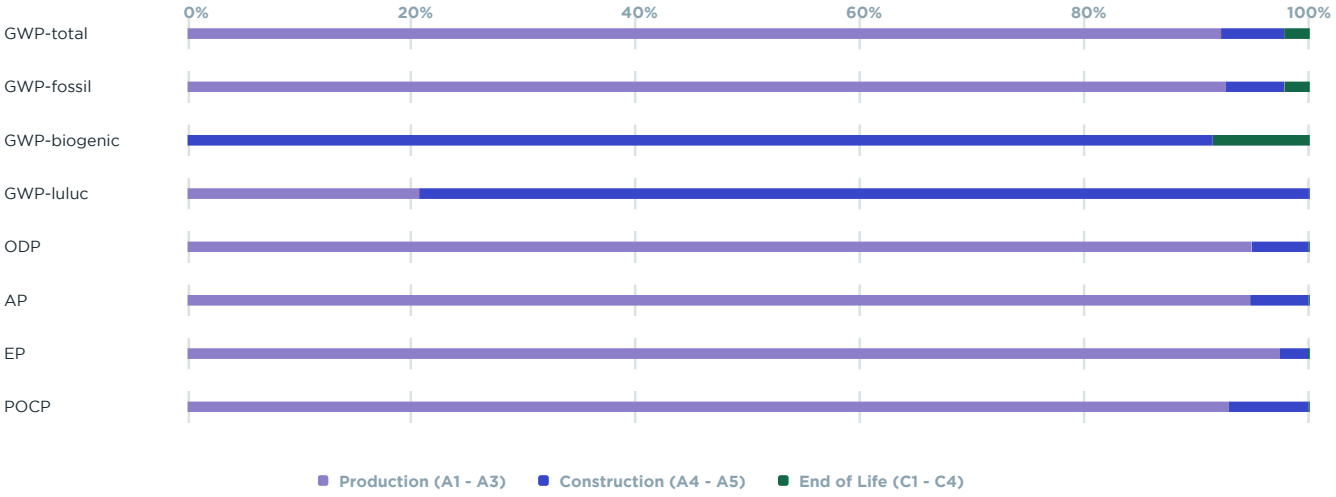
Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Interpretation

For GWP, 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 emissions are generated upstream from the production of electricity and is also released on site by the combustion diesel and natural gas. Other sections of the life cycle also contribute to the GWP. However, the production modules contribute to over 80% of the contribution. Emissions from waste disposal in A5 (disposal after installation) and C (transport and disposal at the end of life) generate the second highest percentage of greenhouse gas emissions.

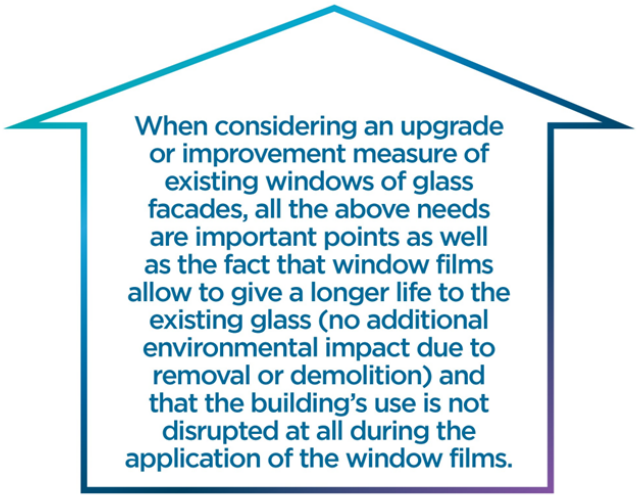


Further Information

General Functional of the Building and the Well-being of the Occupants

It is important to remember that environmental considerations must always be balanced with other crucial aspects of a building's operation and use. These include:

- **Occupant Thermal Comfort:** Significant improvements in thermal comfort are valuable, even if they don't lead to substantial reductions in energy consumption.
- **Occupant Visual Comfort:** Reducing glare through window films enhances visual comfort, which is essential for occupant well-being and productivity, regardless of direct energy savings.
- **Protection from Harmful UV Radiation:** Window films blocking over 99% of UVA rays offer significant health benefits, protecting occupants from skin aging and potential health risks.
- **Safety and Security Enhancement:** Safety films, while having minimal impact on energy consumption, provide crucial protection against glass breakage and deter intrusions, thereby reducing risks to people and property.
- **Surface Preservation:** Protective films, though not affecting energy balance, contribute significantly to maintenance budgets by minimizing repair and replacement costs.
- **Energy Consumption Reduction:** Even if the overall impact on environmental measures is not significant, window films can still lead to substantial reductions in a building's energy usage, resulting in lower operating costs and a more efficient building.



9 reasons to consider Solar Gard window films

As a summary, Solar Gard window films offer a range of solutions to improve the performance of existing buildings and more in particular the performance of the glass and glazing in existing and to help the operators/users of a building to meet the functional requirements in situation where such is not the case.

It is important to evaluate the use of window films in their totality:

- Reduction of energy consumption
- Reduction of carbon footprint
- Improvement of the safety in case of glass breakage
- Improvement of security against intrusion
- Improvement of summer and winter comfort
- Improvement of the privacy
- Reduction of risk for fading
- Improvement the aesthetics of the building/faade
- Improvement of the visual comfort

LEED CREDITS

Global sustainable assessment -and rating methods for buildings

Building owners can earn a higher rating with the use of Solar Gard film.

SS EA EQ MR ID

LEED POINTS

- Energy Performance Credits (EPC)
- Light Pollution Reduction (LPR)
- Glare Reduction Credit (GRC)
- Thermal Comfort (TC)
- Innovation Credts (IC)

and more

Learn more about Solar Gard & LEED Credits
solargard.com/resources/energy-efficiency-and-sustainability/leed-credits/

Performance Specifications

Product Family	Product name	VLT (%)	VLR e/i (%)	U-Factor	SHGC	TSER (%)	Tdw-ISO (%)
ECOLUX	ECOLUX*	67	13/4	0.60	0.47	53	40

Notes:
* Certified by the National Fenestration Rating Council (NFRC)

Performance results are calculated using NFRC methodology and LBNL Window software, and are subject to variations within industry standards and only intended for estimating purposes. This data is provided for informational purposes only and are subject to normal manufacturing variances.

Product Characteristics

Test Standard	Test Description	Performance Level
National Fenestration Rating Councils (NFRC) standard guidelines	Solar performance characteristics	Provided in Performance Specifications Table above
ASTM E84	Surface burning characteristics	Class A (or Type I)
California Department of Public Health Standard	Volatile organic compounds emissions (VOC)	Reference specific test reports

Acronym

ACRONYM	EXPLANATION
GWP-total [kg CO2 eq.]	Global Warming Potential (GWP 100), IPCC 2013 (AR5) [kg CO2 eq.]
GWP-fossil [kg CO2 eq.]	Global Warming Potential (fossil) [kg CO2 eq.]
GWP-biogenic [kg CO2 eq.]	Global Warming Potential (biogenic) [kg CO2 eq.]
GWP-Luluc [kg CO2 eq.]	Global Warming Potential (land use change) [kg CO2 eq.]
ODP [kg CFC 11 eq.]	Ozone Depletion Potential [kg CFC 11 eq.]
AP [kg SO2 eq.]	Acidification Potential [kg SO2 eq.]
EP [kg N eq.]	Eutrophication Potential [kg N eq.]
POCP [kg O3 eq.]	Smog Formation Potential [kg O3 eq.]
PCR	Product Category Rule(s)
HDPE	High Density Polyethylene
LDPE	Low Density Polyethylene
NFRC	National Fenestration Rating Council
LEED	Leadership in Energy and Environmental Design
IWFA	The International Window Film Association
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals

ACRONYM	EXPLANATION
ANSI/CPSC/CAN CGSB/EN 12600	Impact test (Human impact)
EN 356	European norm for Intrusion resistance test
ISO, GSA, ASTM	Explosion (bomb blast) tests
VLT (%)	Visible Light Transmittance
VLRe/VLRi (%)	Visible light Reflectance Exterior/Interior
U-Factor (Btu hr/ft2 F)	Winter U-factor
SHGC	Solar heat gain coefficient (G-value)
TSER (%)	Total solar energy rejected
Tdw-ISO (%)	Fading factor (300-700 nm)

References

- https://www.solargard.com/
- https://www.saint-gobain.com/en
- ISO 21930:2017 Sustainability in building construction Environmental declaration of building products
- ISO 14025:2006 Environmental labels and declarations Type III environmental declarations Principles and procedures
- ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework
- ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines
- Global Plastics Outlook - plastics waste by region

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About Solar Gard®

Solar Gard protects what matters most to you: your family, your home, your business, your car. Headquartered in San Diego, California, Solar Gard makes state-of-the-art window films and protective coatings for the architecture and automotive markets. Solar Gard is a division of Saint-Gobain Performance Plastics, a subsidiary of Saint-Gobain, the world leader in habitat and construction markets. Our proven carbon-negative solutions positively impact lives and reduce global greenhouse gas emissions. Solar Gard products are sold in more than 90 countries under the Solar Gard®, Quantum®, and Solar Gard® Armorcoat® brands.