ENVIRONMENTAL PRODUCT DECLARATION

PROCESSED GLASS PRODUCTS

GUARDIAN GLASS

Guardian Glass coated glass allows for exploration of aesthetic and functional possibilities while meeting complex performance requirements. (Waiea Tower, Honolulu, Hawai'i

This EPD was not written to support comparative assertions. Even for similar products, differences in declared unit, use and end-of-life stage assumptions and data quality may produce incomparable results. It is not recommended to compare EPDs with another organization, as there may be differences in methodology, assumptions, allocation methods, data quality such as variability in data sets and results of variability in assessment software tools used.

Guardian Glass is committed to the efficient use of natural resources while operating in a way that protects the safety, health and well-being of its employees, customers, the environment and society.

As a manufacturing leader of high performance, energy-efficient glass products for commercial, residential, interior, transportation and specialty applications, Guardian Glass makes products that help improve people's lives. By allowing abundant natural light into homes, offices and vehicles, glass products can help contribute to occupants' well-being and low-emissivity glass reduces energy consumption for heating and cooling.

By publishing this EPD, Guardian Glass intends to support architects and designers who strive to enhance the sustainability profiles of the buildings they design through the products they specify. The goal is to provide them with the information needed to achieve credits in global green building rating systems.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

GUARDIAN GLASS

PROCESSED GLASS PRODUCTS

According to ISO 14025, ISO 21930:2007 & EN 15804

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Guardian Glass
DECLARATION NUMBER	4788140764.102.1
DECLARED PRODUCT	Processed Glass Products
REFERENCE PCR	UL Part B: Processed Glass (North America) 2016
DATE OF ISSUE	September 5, 2018
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	▪ Product definition and information about building physics ▪ Information about basic material and the material's origin ▪ Description of the product's manufacture ▪ Indication of product processing ▪ Information about the in-use conditions ▪ Life cycle assessment results ▪ Testing results and verifications

The PCR review was conducted by:	PCR Review Panel Thomas Gloria; Chair ncss@nsf.org
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	Grant R. Martin Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria Thomas P. Gloria, Industrial Ecology Consultants

This EPD conforms with ISO 21930:2007 & EN 15804

ENVIRONMENTAL PRODUCT DECLARATION

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PROCESSED GLASS PRODUCTS

According to ISO 14025

Product System

Company Description

Guardian Glass strives to be the go-to solutions provider for the global glass industry, whether it's to solve a practical problem or challenge architectural conventions. With the infrastructure, know-how and capability to work with the entire supply chain, Guardian Glass embraces a future where glass is an even greater part of what the world builds. Guardian Glass helps designers and specifiers of glass realize their vision, overcome obstacles and be partners in the development of world-class structures.

Headquartered in Auburn Hills, Michigan, Guardian Glass is one of the world's largest glass manufacturers with leading positions in float and fabricated glass products for commercial, residential, interior, technical and transportation applications. Guardian Glass strives to constantly innovate to create value and to create value for customers and society.

Guardian Glass believes that environmentally responsible building is the right thing to do and the company is proud to be a member of the U.S. Green Building Council – a coalition of building industry leaders that promotes and creates environmentally responsible structures.

Guardian Glass is part of Guardian Industries, a standalone, wholly-owned subsidiary of Koch Industries, Inc. Koch companies conduct their worldwide operations in compliance with all relevant environmental laws and regulations, while protecting the health and safety of their customers, employees and neighbors. In 2017, Koch was awarded the U.S. Environmental Protection Agency's ENERGY STAR Partner of the Year Award.

Guardian, and its companies, take pride in creating a work environment that recognizes and celebrates individuality, teamwork and success. The foundation of Guardian's culture rests upon the Guiding Principles within Market Based Management®. The company's entrepreneurial spirit encourages employees to think bigger and creates opportunities to learn from and collaborate with very skilled and knowledgeable mentors. For example, the dedicated scientists and engineers at the Guardian Glass Science & Technology Center are constantly working to create new glass products and solutions using the most advanced technologies.

Product Description

Guardian Glass brings the process and results of glassmaking to new levels, applying deep knowledge of chemistry, physics and advanced technologies to create glass with optimal light transmission, clarity and integrity for custom treatments and fabrication. As part of the Guardian Glass manufacturing process, sputter-coatings can be deposited on the glass to support application based energy performance and occupant comfort. These coatings also facilitate aesthetics involving light transmission, color and reflectivity.

ENVIRONMENTAL PRODUCT DECLARATION

GUARDIAN GLASS

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This EPD is valid for the following processed glass products produced in North America from Guardian Glass – including those that are heat-treated, coated and/or textured:

Guardian SunGuard® Architectural Glass

Low-emissivity and solar control coated glass designed for a wide variety of commercial applications, including office buildings, high-rise apartments, schools, hospitals, libraries, government buildings and more.

- SuperNeutral 68
- SuperNeutral 54
- SNX 62/27
- SNX 51/23
- SNR 43
- Neutral 78/65
- Neutral 50
- Neutral 40
- AG 50
- AG 43
- IS 20
- Silver 20
- Heat-Treated Glass

Guardian ClimaGuard® Residential Glass

Low-emissivity glass products designed for residential settings and formulated to meet specific solar- and energy-control requirements of differing climates.

- 80/70
- 72/57
- 70/36
- 62/27
- 55/27
- 53/23
- IS 20
- HiLightR 802
- Heat-Treated Glass

Guardian InGlass™ Advanced Interior Glass

ShowerGuard®	Berman Glass editions™	Patterned Glass
Bath and shower glass that provides permanent protection against corrosion and discoloration.	including esto, etre and aqui *Series of signature glass textures hand-designed by pioneering glass artist Joel Berman.*	including Niagara, Spraylite, Dew, Bubble and Glue Chip *Standard textured glass that lends privacy and dimension with a wide range of options at exceptional value.*

Guardian ClimaGuard® Residential Glass

Low-emissivity glass products designed for residential settings and formulated to meet specific solar- and energy-control requirements of differing climates.

- 80/70
- 72/57
- 70/36
- 62/27
- 55/27
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- IS 20
- HiLightR 802
- Heat-Treated Glass

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According to ISO 14025

Guardian Technical Glass	*Glass solutions ideal for electronic displays, highly efficient lighting, solar and commercial refrigeration that deliver advanced performance.* ▪ Anti-Reflective ▪ ITO ▪ SRP ▪ ThermaGuard Series
Guardian Transportation Glass	*Guardian Chrome First Surface Mirror (FSM) is designed for the automotive exterior mirror market*

Please consult www.GuardianGlass.com for more information on these products.

Application

Guardian Glass products are designed for a variety of interior and exterior commercial, residential, technical and transportation applications as outlined in the product description section above. Guardian Glass typically supplies float glass and coated glass to fabricator customers who further process that glass into the final product by cutting, heat-treating, laminating, insulating or otherwise fabricating the glass into the desired size and makeup for use in the intended application. The glass makeup is typically specified by architects, glazing contractors, window manufacturers and other design professionals. Guardian glass may also be used in a range of transportation and specialty glass applications.

Technical Data

Technical data on Guardian Glass products is available on at www.guardianglass.com

Placing on the Market

The products validated in this EPD conform to the following technical specifications for processed glass products:

- ANSI Z97.1 – Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test
- ASTM C 1036: Standard Specification for Flat Glass
- ASTM C 1376: Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass
- CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

Safety Glazing Certification Council (SGCC) certifications are available upon request.

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PROCESSED GLASS PRODUCTS

According to ISO 14025

Properties of Declared Product as Delivered

Products are either cut to customers' specified dimensions or supplied in common stock sizes for further processing by customers. Common dimensions of processed glass include:

- 72" x 84"
- 72" x 96"
- 96" x 130"
- 102" x 144"
- 102" x 168"
- Other sizes

While thickness of glass also varies based on customer needs, some standard thicknesses for processed glass include:

- 2.3mm
- 2.5mm
- 2.7mm
- 3.0mm
- 3.1mm
- 3.2mm
- 4.0mm
- 5.0mm
- 6.0mm
- 8.0mm
- 10.0mm
- 12.0mm

Declaration Type: Business-to-business

Period of Validity: 5 years

Geographic Scope: This declaration is valid for processed glass products sold in North America from Guardian Glass.

Additional Notes: Further processing of the products listed above are beyond the scope of the PCR and as such, not included in this analysis. Please see a separate EPD from Guardian Glass for flat glass products. Additionally, this analysis represents the performance of a production-weighted average of Guardian flat glass products, based on 2016 production volumes.

Base and Ancillary Materials

Flat glass is made by floating molten glass on a bed of molten tin. It is manufactured from raw materials such as silica sand, soda ash, dolomite, limestone and cullet. The crystalline raw materials chemically and structurally transform into amorphous glass through a fusion (melting) process, thereby producing a product which is >99.9% glass oxide.

The flat glass product is then processed by either coating or heat treating—or sometimes both, depending on application needs. Guardian processed glass products are similar in composition to clear flat glass but include slight additions of trace elements to achieve required optical properties. Please refer to the Guardian Glass Health Product Declaration for additional information.

Manufacture

Flat glass production involves heating the raw materials to a liquid state and then floating the subsequent ribbon of glass atop a bath of molten tin. Once the ribbon has sufficiently cooled, it is transferred onto rollers and annealed to limit residual stresses. Its edges are trimmed and the ribbon is cut to the desired sizes.

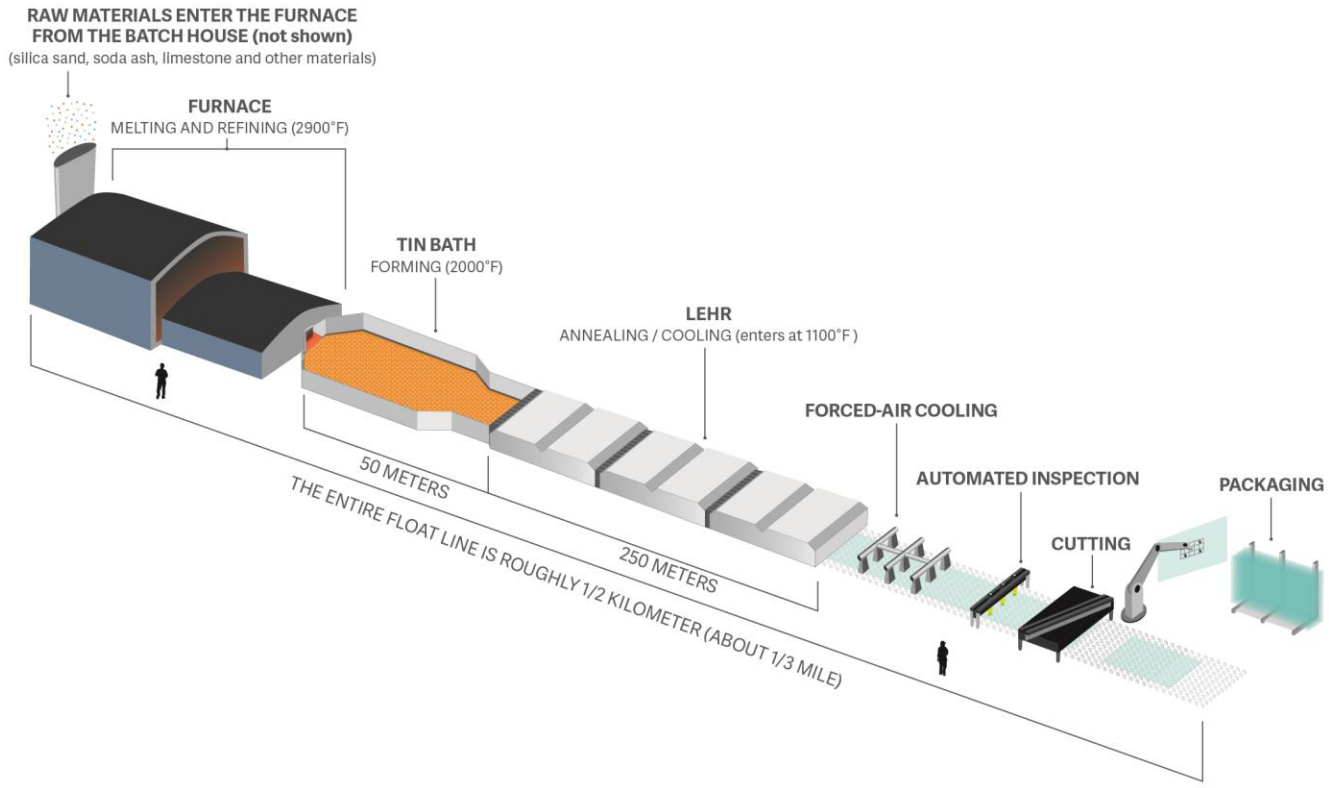

Figure 1: Flat glass production

Following the production of flat glass, the product is then coated and/or heat treated. Coating takes place via magnetron sputter deposition. The exact coating composition and thickness depends on the application. Some coatings require heat activation, in which case the glass is subsequently heat treated. Both coated and uncoated glass can also be tempered (e.g., heat treated) in order to adjust its properties. The finished glass is then packaged and shipped to customers.

Manufacturing of processed glass products in North America takes place at Guardian Glass facilities located in Carleton, MI; Corsicana, TX; DeWitt, IA; Geneva, NY; Kingsburg, CA; Richburg, SC; and El Marques, Queretaro, Mexico. The primary raw material for glass is silica sand, and most Guardian Glass float plants are within 200 miles of their sand supply, which reduces energy spent and emissions in transit to the manufacturing plant.

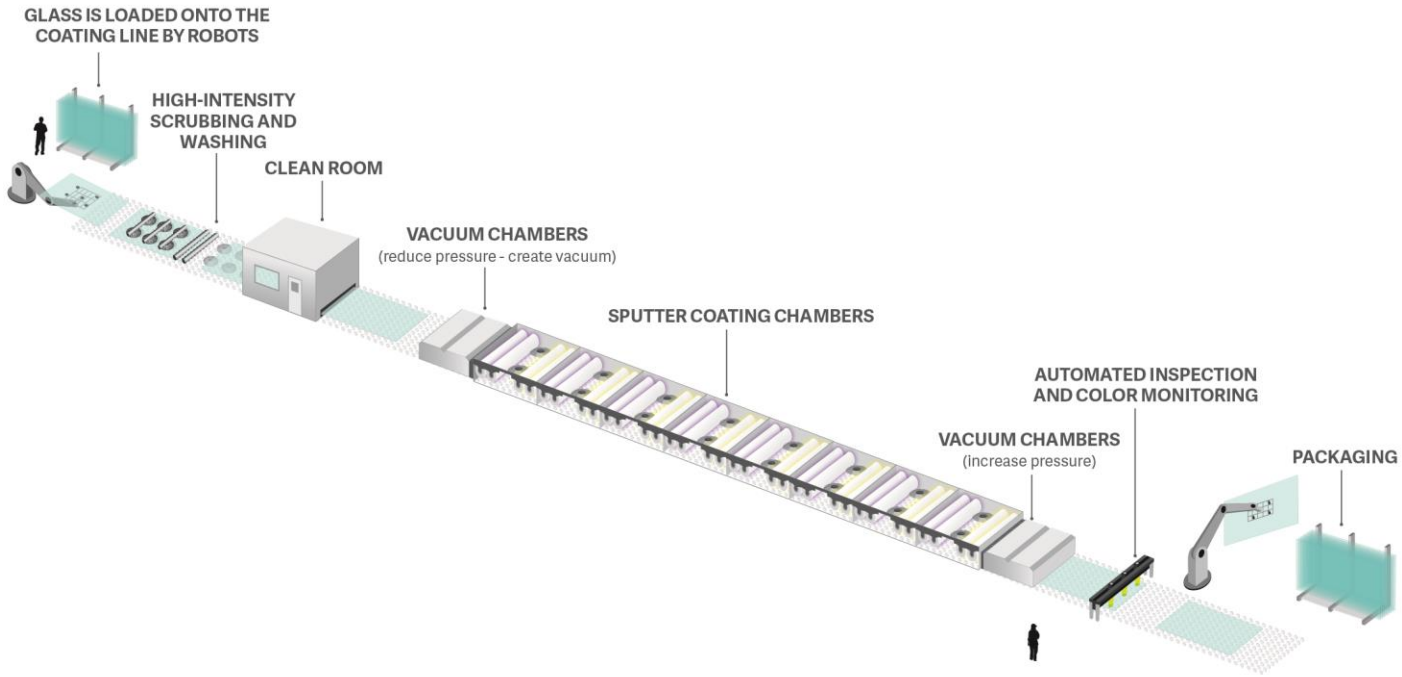

Figure 2: Glass coating

Environment and Health during Manufacturing

Guardian Glass implements measures to reduce waste and reuse/recycle materials internally within its manufacturing processes. Consistent with industry practice, batch ingredients include “cullet”, broken glass from prior in-plant ribbon-trimming operations and other potential sources. A limited amount of cullet from outside the plant may be implemented if it complies with Guardian’s rigorous quality criteria. The use of cullet helps to moderate consumption of batch materials and furnace fuel, both affecting carbon dioxide (CO_2) emissions.

Guardian Glass benefits from recycling in several ways: recycled glass reduces CO_2 process emissions and consumption of virgin raw materials; extends the life of plant equipment (such as furnaces); and saves energy. Recycled glass is always part of the recipe for glass, and the more that is used, the greater the decrease in energy used in the furnace. This makes using recycled glass profitable in the long run – lowering costs and benefiting the environment while ensuring greater product sustainability without negatively impacting quality.

Product Processing / Installation

Guardian Glass products should be processed and installed according to best industry standards and according to all applicable building codes in the given jurisdiction.

Packaging

Guardian Glass products are primarily packaged on reusable steel racks. Racks used for distribution of glass are reused many times both in the manufacturing plants and shipped to the customer and subsequently returned to Guardian Glass float plants. The greatest risks associated with the handling and storage of float glass are lacerations from cut/broken glass and injury from falling glass. Serious injuries and fatalities may result from improper handling and transportation of float glass. It is imperative that all persons involved with these activities receive proper training, wear adequate personal protective equipment and adhere to all best handling guidelines and safety procedures.

Conditions of Use

Flat glass products are used in applications ranging from equipment components to transportation vehicles and architectural products. Guardian Glass typically supplies float glass and coated glass to fabricator customers who further process that glass into the final product by cutting, heat-treating, laminating, insulating or otherwise fabricating the glass into the desired size and makeup for use in the intended application.

Environment and Health during Use

The life cycle assessment is conducted for a cradle-to-gate system boundary, per NSF GANA Product Category Rule (PCR) for Flat Glass – UNCPC 3711. Life cycle stages and environmental impacts downstream of Guardian's North America float glass facilities are not included in this declaration. Additionally, transportation to waste or scrap facilities is excluded from the system, as are capital goods, infrastructure, and personnel-related activities.

Reference Service Life

As this analysis does not include the use stage of the glass, no reference service life is declared for Guardian's processed glass products.

Distribution, Use, and End-of-Life

Upon leaving Guardian Glass facilities, flat glass can be further processed through a nationwide network of independent fabricators.

Racks used for distribution of glass are reused many times both in the manufacturing plants and shipped to the customer and returned to Guardian Glass plants.

Glass should be installed according to industry standards and according to all applicable building codes in the given jurisdiction. Glass should be washed frequently to remove surface dirt and to protect the glass from staining. Glass staining occurs when the sodium within the glass reacts with moisture in the air. Sodium, when combined with small amounts of water, can create sodium hydroxide, which is corrosive to glass.

Once installed, Guardian Glass products do not consume energy or require maintenance beyond general cleaning to fulfill their estimated service life. At end-of-life, glass is typically landfilled and in some instances recycled.

Extraordinary Effects

Inorganic glass is non-hazardous and is considered an article per OSHA 29 CFR 1910.1200. The end use is dependent upon the fabricated shape and design. This article will not pose an exposure hazard under normal conditions. Sanding, grinding, edge-deleting or similar activities can create nuisance dust particles. Glass is not classified as flammable or combustible per OSHA 29 CFR 1910.1200 Appendix B.

Re-Use Phase

Reuse or recycle glass where feasible. Per the GANA informational bulletin “Recyclability of Architectural Glass Products”, recycled crushed architectural is used as a raw material in fiberglass and glass container manufacturing. Crushed glass can also be utilized in abrasives, highway paint, terrazzo counters, flooring, and more.

Disposal

Glass is not considered a hazardous material. Accordingly, it may be disposed via typical, non-hazardous waste streams. Glass is a sustainable material that can be easily recycled. Guardian Glass encourages recycling of glass products where feasible.

Further Information

Further information about Guardian Glass products is available at www.guardianglass.com.

LCA: Calculation Rules

Declared Unit

The declared unit is 1 m^2 of processed glass.

Table 1: Declared unit and conversion to kg

Name	Unit	Coated	Heat-treated
Declared unit	m^2	1	1
Mass per piece	kg / m^2	10	10
Conversion factor to 1 kg	m^2 / kg	0.1	0.1
Thickness	mm	4 mm	4 mm

System Boundary

The analysis is conducted for a cradle-to-gate system boundary (Figure 3). Life cycle stages downstream of Guardian Glass facilities—that is, distribution, use, and end-of-life—are not included. Additionally, capital goods, infrastructure, and personnel-related activities are excluded from the system, as is typical for LCA studies.

Figure 3: LCA system boundary

- **A1: Raw material supply:** Upstream extraction and processing of raw materials, including processing of secondary materials used as input.
- **A2: Inbound transportation:** Transportation of raw materials up to the factory gate and internal transportation.
- **A3: Manufacturing:** Manufacturing of products and co-products. This stage also includes production of packaging materials and treatment of manufacturing waste.

Estimates and Assumptions

Due to limitations in data availability, assumptions were made in allocating important manufacturing inputs and outputs including process materials, natural gas, and facility emissions. The allocation approaches taken may therefore overestimate the environmental burden for uncoated glass production.

Additionally, the “average “ glass pane used in modeling is a calculated average pane thickness and area and does not represent a specific product manufactured by Guardian Glass.

Cut-off Criteria

No cut-off criteria were applied within this study. The system boundary was defined based on relevance to the goal of the study. For the processes within the system boundary, all available energy and material flow data were included in the model. In cases where no matching life cycle inventories were available to represent a flow (e.g., the upstream production of a specific material), proxy data were applied based on conservative assumptions regarding environmental impacts.

Background Data

Regional and national averages for fuel inputs, electricity grid mixes, materials, transportation, and disposal methods were obtained from the GaBi 2017 database. Documentation for all GaBi datasets can be found at www.gabi-software.com/international/databases/gabi-databases/.

Data Quality

A variety of tests and checks were performed throughout the project to ensure the high quality of the completed LCA. Checks included an extensive review of the LCA model, as well as the background data used.

Data included first-hand company manufacturing data in combination with consistent background LCI information from the GaBi 2017 databases.

Period under Review

The data are representative of production at Guardian Glass for the 2016 calendar year.

Allocation

Where manufacturing inputs, such as electricity use, were not sub-metered, they were allocated by mass, area, or by expert judgement.

Comparability

A comparison or evaluation of EPD data is only possible if all data sets to be compared are 1) created according to EN 15804 and 2) are considered in a whole building context or utilize identical defined use stage scenarios. Given this PCR is cradle to gate in scope, comparisons of EPD data from one product to another are not allowed. Refer to section 5.3 of EN 15804 for further information.

Comparison of the environmental performance of processed glass using EPD information shall be based on the product's use and impacts at the building level; therefore, EPDs may not be used for comparability purposes when not considering the building energy phase as instructed under this PCR.

LCA: Results

EPD results represent a cradle-to-gate analysis of processed glass products. Declared modules are indicated with an "X" in Table 2, and modules that are not declared are indicated with "MND". Life impact assessment (Table 3) and inventory results (Table 4 and Table 5) are presented below for coated and heat-treated glass. The lower heating value (LHV) is used for all energy results.

It shall be noted that impact categories represent potential impacts, i.e., they are approximations of environmental impacts that may occur if the emissions (a) follow the underlying impact pathway and (b) meet the necessary conditions in the receiving environment while doing so. In addition, the inventory only captures that fraction of the total environmental load that corresponds to the functional unit (relative approach). Life cycle impact assessment results are therefore relative expressions only and do not predict actual impacts, the exceeding of thresholds, safety margins, or risks.

Table 2: System boundary modules

Product stage			Construction process stage		Use stage							End-of-life stage				Benefits & loads
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly / install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction	Transport	Waste processing	Disposal	Reuse, recovery, recycling potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Table 3: Life cycle impact assessment results per declared unit

Parameter	Parameter	Unit	Coated	Heat-treated
TRACI 2.1				
GWP	Global warming potential – 100 years	kg CO_2 eq.	1.66E+01	1.85E+01
ODP	Stratospheric ozone layer depletion potential	kg CFC-11 eq.	1.84E-09	2.78E-09
AP	Acidification potential	kg SO_2 eq.	6.74E-02	6.84E-02
EP	Eutrophication potential	kg N eq.	3.43E-03	3.56E-03
POCP	Photochemical ozone creation potential	kg O_3 eq.	1.41E+00	1.46E+00
ADP elements	Abiotic resource depletion potential, minerals	kg Fe eq.	2.96E-01	1.95E-01
ADP fossil	Abiotic resource depletion potential, fossil fuels	MJ	2.99E+01	3.20E+01
CML v4.1				
GWP	Global warming potential – 100 years	kg CO_2 eq.	1.66E+01	1.85E+01
ODP	Stratospheric ozone layer depletion potential	kg CFC-11 eq.	1.73E-09	2.62E-09
AP	Acidification potential	kg SO_2 eq.	6.05E-02	6.10E-02
EP	Eutrophication potential	kg PO_4^{3-} eq.	8.11E-03	8.38E-03
POCP	Photochemical ozone creation potential	kg ethene eq.	3.28E-03	3.37E-03
ADP elements	Abiotic resource depletion potential, minerals	kg Sb eq.	1.77E-04	7.90E-05
ADP fossil	Abiotic resource depletion potential, fossil fuels	MJ	2.30E+02	2.56E+02

Table 4: Resource use per declared unit

Parameter	Parameter	Unit	Coated	Heat-treated
PERE	Renewable primary energy as energy carrier	MJ	9.70E+00	1.52E+01
PERM	Renewable primary energy resources as material	MJ	1.20E+00	1.24E+00
PERT	Total use of renewable primary resources	MJ	1.09E+01	1.64E+01
PENRE	Non-renewable primary energy as energy carrier	MJ	2.45E+02	2.79E+02
PENRM	Non-renewable primary energy resources as material	MJ	8.49E-02	8.18E-02
PENRT	Total use of non-renewable primary resources	MJ	2.45E+02	2.79E+02
SM	Use of secondary material	kg	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00
NRSF	Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	4.28E+01	6.06E+01

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Table 5: Output flows and waste categories per declared unit

Parameter	Parameter	Unit	Coated	Heat-treated
HWD	Hazardous waste disposed	kg	4.25E-07	4.34E-07
NHWD	Non-hazardous waste disposed	kg	1.53E+00	1.58E+00
RWD	Radioactive waste disposed	kg	5.98E-03	9.09E-03
CRU	Components for re-use	kg	0.00E+00	0.00E+00
MFR	Materials for recycling	kg	5.83E-01	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00
EE	Exported energy	MJ	0.00E+00	0.00E+00

LCA: Interpretation

Relative contributions of uncoated glass manufacturing versus glass processing are broken down in Figure 4 and Figure 5. In most cases, the impacts of uncoated glass significantly outweigh those of glass processing. However, in coating, glass processing significantly contributes to ozone depletion potential due to nuclear power in the electricity grid. Similarly, in heat treatment, all impact categories are primarily driven by electricity consumption and direct emissions in the heat treatment process.

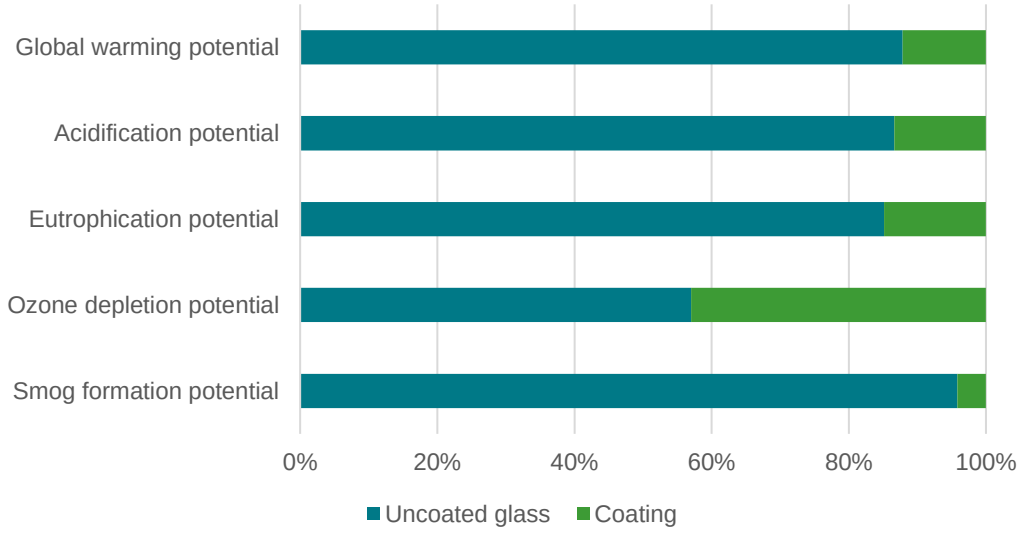

Figure 4: Relative contributions of uncoated glass production and the application of coating (TRACI 2.1)

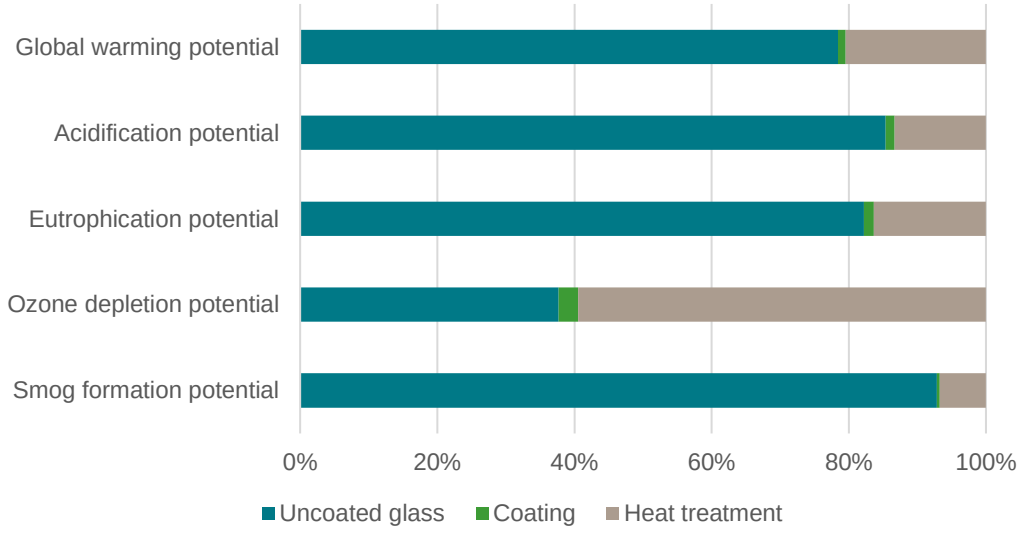

Figure 5: Relative contributions of uncoated glass production and the application of coating and heat treatment (TRACI 2.1)

Additional Environmental Information

Guardian Glass is committed to being a good corporate citizen to its employees, customers, communities and the environment. Guardian Industries Sustainability Vision guides the company's actions to assist in meeting this commitment:

> *Guardian creates long-term value for society by using resources more efficiently; protecting the environment and the safety and health of our workers and others; consistently applying good science; and employing Market Based Management®. Together these contribute to our overall quality of life.*

In alignment with the company's Sustainability Vision, Guardian Glass actively seeks to minimize waste and improve the environmental, health and safety aspects of its products and processes. Guardian Glass offers competitive products that meet the needs of its customers and improve people's lives using as few resources as necessary.

Guardian's commitment to integrity includes, among other things, an expectation that its suppliers conduct their activities in compliance with all applicable laws. Guardian Glass is committed to sourcing in a socially responsible manner and avoids knowingly using goods, services or raw materials such as tin, tungsten, tantalum or gold (Conflict Minerals) sourced in a way that supports or funds inhumane treatment.

The Guardian Glass Sustainability Calculator can help design professionals evaluate and document the environmental performance of Guardian glass products during the project design phase. The Sustainability Calculator is part of the company's Glass Analytics suite of engineering and analytic tools for glass. These online tools offer a comprehensive suite of engineering and analytical reports that demonstrate the advantages of high performance glass in buildings.

In summary, Guardian Glass has initiated responsible policies and practices to ensure sustainability is embedded into the company's culture and business decisions. Through responsible practices in the areas of environmental management and health and safety, the company's goal is to reduce environmental impacts for communities and create an exceptional workplace for its employees.

References

ASTM C 1036: Standard Specification for Flat Glass

ASTM C 1376: Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass

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