DECORATIVE GLASS BUILDING BOARDS BROKISGLASS

EPD OF IDENTICAL PRODUCT OF DIFFERENT DIMENSIONS AND COLORS,
BASED ON RESULTS FOR REPRESENTATIVE PRODUCT

BROKIS®
GLASS

ENVIRONMENTAL PRODUCT DECLARATION
IN ACCORDANCE WITH ISO 14025:2006,
EN 15804:2012+A2:2019/AC:2021 AND EN 17074:2019

Programme:	National Environmental Labelling Program, **www.cenia.cz**
Programme operator:	CENIA, Czech Environmental Information Agency
Date of publication:	20.1.2025
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GENERAL INFORMATION

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

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

National Environmental Labelling Program

CENIA
Czech Environmental Information Agency
Vršovická 1442/65, Prague 10, 100 10
Czech Republic

cenia.cz

ACCOUNTABILITIES FOR PCR, LCA AND INDEPENDENT, THIRD-PARTY VERIFICATION

Product Category Rules (PCR)

CEN standard EN 15804 serve as the core Product Category Rules (PCR)

EN 17074:2019 Glass in building – Environmental product declaration – Product category rules for flat glass products

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LIFE CYCLE ASSESSMENT (LCA)

LCA accountability

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Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

✔ EPD verification by individual verifier

Third-party verifier

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Procedure for follow-up of data during EPD validity involves third party verifier: No

COMPANY INFORMATION

Brokisglass is the result of the ecological approach of Sklárna Janštejn and the BROKIS company, whose cooperation thus enabled the creation of a new unique material from glass shards. The material brings a new dimension and aesthetics to glass. Its use is suitable for architecture, construction, interior and product design.

BROKISGLASS decorative boards use glass shards, which are created as a by-product during the production of lamps in the glass factory, thereby contributing to a significant reduction in the amount of residual glass. By transforming this glass into a new material, the raw material is ecologically and effectively upcycled. Through the process of upcycling glass shards, the glass factory implements strategic elements of the circular economy and thereby contributes to the creation of healthy relationships between nature and human society.

In the production of lighting glass, which Sklárna Janštejn specializes in, 1/3 of each blown piece must be removed. This materially full-value raw material (glass shards) is generally perceived as waste. The main impetus for the development of BROKISGLASS was therefore the need for a change in the perception of shards as waste, which until then had been exported to landfills, burdened the environment and changed the environmental character of the landscape.

The beginning of the BROKISGLASS development story dates back to 2010, when the glass factory began to look at shards as a raw material suitable for transformation into a new material. In this period, the process of sorting the shards by color and storing them began. In the very beginnings of the development of the new material, the glass factory cooperated with the Glass High School in Valašské Meziříčí. After the successful material tests that resulted from this cooperation, the glass factory decided to invest in the purchase of a fusing furnace (2014).

After less than three years of developing the material, which was processed using the technology of building shards in a stationary furnace, Sklárna Janštejn teamed up with leading experts in their field and created a conceptual design for a continuous furnace that could process the material more efficiently. This continuous furnace was put into operation in 2017. After six months of testing, it was possible to set up the production process in such a way that it is possible to efficiently process up to 10 tons of waste material per week during two-shift operation.

JANŠTEJN GLASS GROUP

Manufacturing company	Janštejn Glass Group s.r.o.
EPD owner	Janštejn Glass Group s.r.o. Španielova 1315/25, Řepy, 163 00 Prague 6 Czech Republic Registration Nº: 28449703 VAT Nº: CZ28449703
Production site and address	sídliště Janštejn 39, 588 52 Horní Dubenky Czech Republic
Contacts	+420 567 374 175 jitka.cervenkova@brokis.cz brokisglass.cz

PRODUCT INFORMATION

Size	7 mm	8 mm	9 mm	10 mm
0.5 m²	8.6 kg	9.8 kg	11 kg	12.3 kg
1 m²	17.5 kg	20 kg	22.5 kg	25 kg

The standard thickness of the plates ranges from 7 to 10 mm. The technology enables the production of boards in dimensions of 700×700 mm. Other sizes and material thicknesses can be made to order. By choosing the right production process, it is possible to achieve a material width of 25-50 mm.

Smaller and other formats or shapes are created by cutting individual boards using water jet cutting technology. It is possible to drill holes of different diameters, or to cut out any shapes at any place on the board.

The weight of the boards depends on the basic size of 700 x 700 mm and thickness of 7-10 mm. Due to manual production, the weight of the boards may vary, and the weight of the boards in the basic dimension ranges from 8.5 kg to 12.25 kg. The weight of the boards per square meter is 17-25 kg. The parameters of boards with a thickness of 8 mm and a weight of 20 kg/m2 are used for the assessment.

It is also possible to achieve greater thicknesses during the custom production of boards. In this case, the weight of the boards is also higher than with the basic size, and its weight increases in direct proportion to the thickness.

PRODUCT INFORMATION

INSTALLATION METHODS

- Assembled systems with mechanical attachment to supporting grids (with invisible and visible fixing of plates)
- Installation on insulated and ventilated systems
- Installation in frames
- Glued to a flat surface
- Mounting in both vertical and horizontal positions

USE FOR INTERIORS

- Illuminated interior cladding of living rooms (kitchens, bathrooms, halls, etc.) can be used as a standard for cladding the interiors of social and technical spaces, offices and apartments.
- It is also possible to use the boards for internal cladding of industrial buildings (laboratories, chemically aggressive areas, food and veterinary establishments or hospital halls).
- Boards can also be used for social spaces that require indirect lighting, such as hotels, receptions and passages.

USE FOR EXTERIORS

- Cladding for covering buildings with large-scale cladding
- Glazed outdoor spaces (atriums, pergolas, etc.)
- Garden and cemetery architecture (garden tables, translucent dividing walls, tombstones)

CONTENT DECLARATION

The composition corresponds to the average representation of materials in all products.

Product components	Weight (kg)	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/DU
Pre-consumer cullet	20.00	0%	0
Total	**20.00**	**0%**	**0**
Packaging materials	**Weight (kg)**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/DU**
-	-	-	-

Note: There are no dangerous substances from the candidate list of SVHC for authorisation in this product

UN CPC: 3711 Unworked glass, flat glass and pressed or moulded glass for construction; glass mirrors

BIOGENIC CARBON CONTENT

BIOGENIC CARBON CONTENT per 1 pc of external blinds system	
Biogenic carbon content in product	0
Biogenic carbon content in accompanying packaging	0

LCA INFORMATION

DECLARED UNIT
1 m^2 of decorative glass building boards BROKISGLASS (average weight 20 kg per 1 m^2)

REFERENCE SERVICE LIFE
Not exactly declared; the value 30 years of service life is mentioned in EN 17074:2020

TIME REPRESENTATIVENESS
2022

DATABASE(S) AND LCA SOFTWARE USED
Ecoinvent 3.9 (using the Cut-off processes/allocation model),
Simapro v. 9.5
EN 15804 reference package based on EF 3.1

CUT-OFF RULES
Neglected flow in all modules is less than 1% of the energy use and total mass.

ALLOCATION METHOD
The economic allocation of the basic inputs, which is the glass shards produced by Sklárna Janštejn was used for the calculation of the production of BROKISGLASS.
The allocation of inputs is based on the market price of glass shards. The shards produced by Sklárna Janštejn are identical raw materials to the waste glass shards on the market. The allocation was made on the basis of the ratio of the market price of waste shards and products of Sklárna Janštejn. Based on the mentioned procedure 0.02% of Sklárna Janštejn inputs were allocated to BROKISGLASS inputs.

DESCRIPTION OF SYSTEM BOUNDARIES
The type of EPD is Cradle to Gate with options, modules C1-C4 and module D
(EPD Type b - Modules A1-A3, C1-C4, and D)

INFRASTRUCTURE/CAPITAL GOODS
Infrastructure is part of the generic processes used for upstream and downstream.
For the Core phase, infrastructure was not considered.

PRODUCTION STAGE (A1-A3)

According to the definition of EN 17074:2020, BROKISGLASS products are produced from shards from the production phase (pre-consumer cullet), which is waste glass created during the production of products that contain glass as one of their components and which leaves the specific facility where it was produced but it will not reach the consumer market. These shards meet the shard specifications of flat glass manufacturers and can be directly returned to the furnace without further processing.

The shards are then spread into a metal form, according to colour and thickness, and melted in a continual furnace. This process produces a BROKISGLASS board with a maximum size of 700 mm x 700 mm. The weight of the board depends on the required thickness of the board. The BROKISGLASS board is then used to make individual products.

The A1 module contains primarily an allocated part of raw materials for the production of primary glass, the production of glass fabric, electricity, the extraction and distribution of natural gas and the production of diesel.

Phase A2 includes the allocated transportation of the above-mentioned materials and components to production in phase A3. Internal transport between Sklárna Janštejn and BROKISGLASS (same production site) is specific based on fuel consumption.

No disposable packaging are used for BROKISGLASS boards.

Production generates waste from production (waste water, waste glass, inert waste) and waste packaging (plastics, paper and cardboard, mixed).

GWP-GHG from the production of electricity: 0.656 kg CO_2eq/kWh
(Czech residual mix, contains: 53.6% of fossil fuels, 41% of nuclear, 5.4% of renewable sources).

TRANSPORT TO CONSTRUCTION STAGE (A4) – NOT DECLARED

Production is made to order and the volume of traffic varies significantly from year to year and is not so informative.

CONSTRUCTION-INSTALLATION (A5) – NOT DECLARED

Installation can be done in different ways, using different technologies and materials.

USE STAGE (B1-B7). NOT DECLARED

Phases B1-B7 are not declared. The products do not require operational inputs or regular repairs and maintenance. It can be considered the washing in the phase of using.

END-OF-LIFE STAGE (C1-C4)

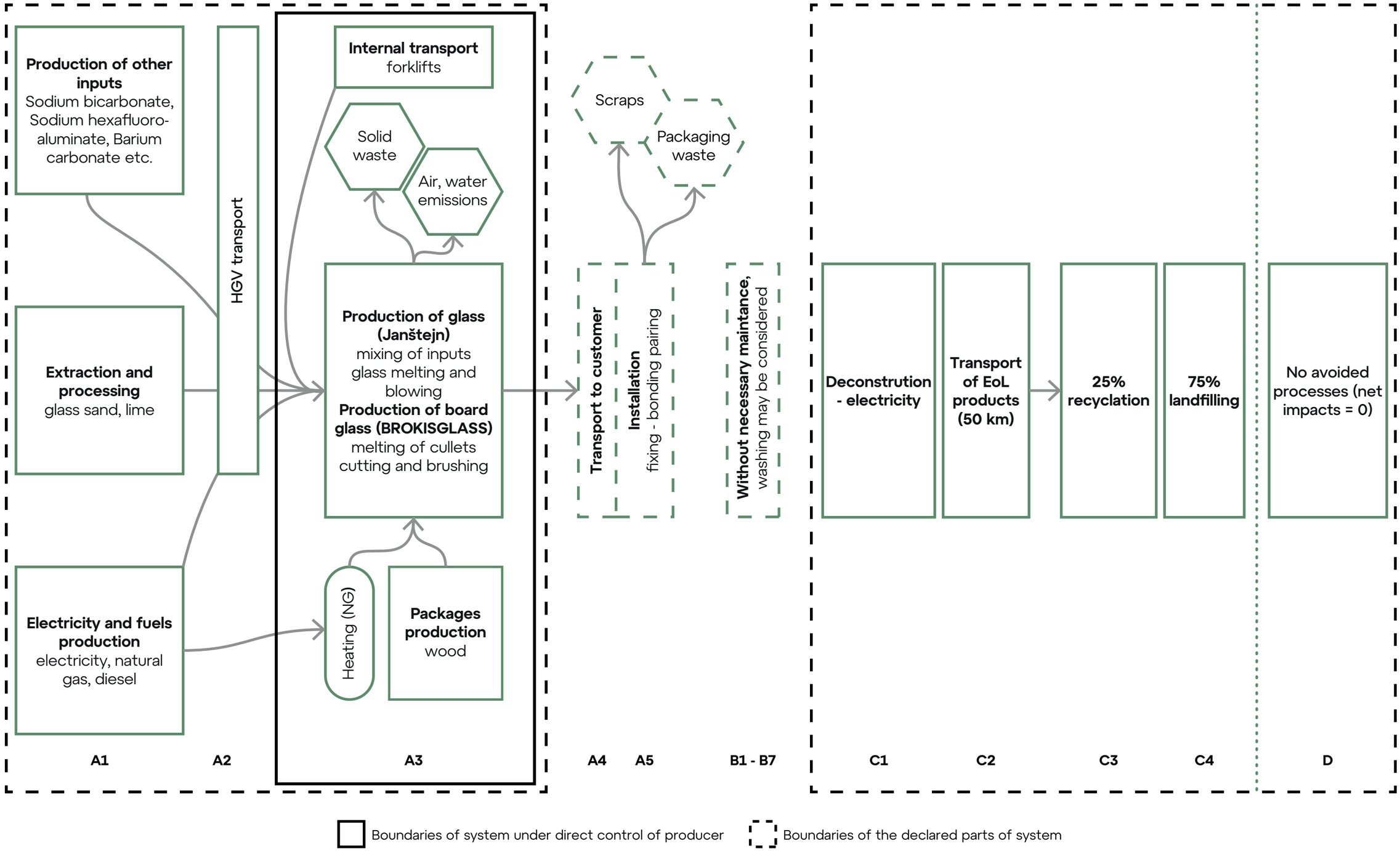
In the EOL stage the deconstruction of the boards is considered using a demolition hammer with an input of 700 W and a work time of 30 s/m^2.
Based on EN 17074:2020, recycling of 25% of product is assumed but not calculated in phase C3 and landfilling of 75% in phase C4. Transport for recycling and landfill is calculated at a 50 km distance.

Recycling in the C3 module is not calculated due to no avoided products in module D (see below).

BENEFITS AND LOADS (D) - FUTURE REUSE, RECYCLING OR ENERGY RECOVERY POTENTIALS

Beyond the life cycle, benefits in the form of recyclate generation are not considered. In accordance with ch. 6.4.3.3 EN 15804+A2, net impacts are calculated for module D, for which all input flows of secondary raw materials are subtracted in module D. In the case of BROKISGLASS, the input material is 100% recycled and for this reason no benefits and costs are taken into account in module D, but it can be assumed that some part may be recycled.

SYSTEM DIAGRAM



RESULTS INFORMATION

	Product stage			Construction stage		Use stage	End of life stage				Benefits and loads beyond the system boundary
	Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use Maintenance Repair Replacement Refurbishment Operational energy use Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1 - B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	**X**	**X**	**X**	**ND**	**ND**	**ND**	**X**	**X**	**X**	**X**	**X**
Geography	**GLO**	**EU**	**CZE**	**EU**	**EU**	**EU**	**EU**	**EU**	**EU**	**EU**	**EU**
Specific data	**91.13%***			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variation - products	**-12.5% to +25%****			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variation - sites	**0%****			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	X – module declared ND – module not declared"										

* Based on GWP-GHG of Stage A3 divided by GWP-GHG for stages A1-A3. Data for A3 is specific to BROKISGLASS facilities.
** Results are calculated for specific product types.
Notice: It is not recommended to use the results of modules A1-A3 without considering the results of module C.

ENVIRONMENTAL IMPACTS

EN 15804 reference package based on EF 3.1 was used as LCIA method.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

CORE ENVIRONMENTAL IMPACTS
per 1 m² of BROKISGLASS boards, 8 mm thickness

Impact category	Unit	A1-A3	C1	C2	C3	C4	D
Climate change	kg CO_2 eq	2.34E+00	4.59E-03	1.89E-01	0.00E+00	8.51E-02	0.00E+00
Climate change - Fossil	**kg CO_2 eq**	**2.34E+00**	**4.59E-03**	**1.88E-01**	**0.00E+00**	**8.49E-02**	**0.00E+00**
Climate change - Biogenic*	kg CO_2 eq	2.59E-03	2.97E-06	1.70E-04	0.00E+00	2.61E-04	0.00E+00
Climate change - Land use and LU change	kg CO_2 eq	5.01E-04	1.02E-06	9.14E-05	0.00E+00	1.67E-05	0.00E+00
GWP-GHG**	kg CO_2 eq	2.34E+00	4.59E-03	1.88E-01	0.00E+00	8.49E-02	0.00E+00
Ozone depletion	kg CFC-11 eq	5.89E-08	2.44E-11	4.10E-09	0.00E+00	2.94E-09	0.00E+00
Acidification	mol H+ eq	6.47E-03	1.55E-05	6.14E-04	0.00E+00	5.48E-04	0.00E+00
Eutrophication, freshwater**	kg P eq	5.31E-04	2.39E-06	1.32E-05	0.00E+00	3.96E-06	0.00E+00
Eutrophication, marine	kg N eq	2.28E-03	4.63E-06	2.11E-04	0.00E+00	2.39E-04	0.00E+00
Eutrophication, terrestrial	mol N eq	2.35E-02	4.71E-05	2.23E-03	0.00E+00	2.56E-03	0.00E+00
Photochemical ozone formation	kg NMVOC eq	7.89E-03	0.00E+00	9.17E-04	0.00E+00	1.02E-03	0.00E+00
Resource use, fossils**	MJ	3.55E+01	0.00E+00	2.67E+00	0.00E+00	2.16E+00	0.00E+00
Resource use, minerals and metals**	kg Sb eq	4.39E-05	0.00E+00	6.04E-07	0.00E+00	8.94E-08	0.00E+00
Water use**	m^3 depriv.	2.20E-01	0.00E+00	1.09E-02	0.00E+00	7.78E-03	0.00E+00

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

* The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.
** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

ADDITIONAL ENVIRONMENTAL IMPACTS
per 1 m² of BROKISGLASS boards, 8 mm thickness

Impact category	Unit	A1-A3	C1	C2	C3	C4	D
Particulate matter	disease inc.	4.87E-08	5.75E-11	1.50E-08	0.00E+00	1.38E-08	0.00E+00
Ionising radiation	kBq U-235 eq	4.20E-01	0.00E+00	3.57E-03	0.00E+00	2.05E-03	0.00E+00
Human toxicity, non-cancer**	CTUh	2.32E-08	0.00E+00	1.88E-09	0.00E+00	3.79E-10	0.00E+00
Human toxicity, cancer**	CTUh	6.47E-10	0.00E+00	8.55E-11	0.00E+00	2.88E-11	0.00E+00
Ecotoxicity, freshwater	CTUe	6.31E+00	1.27E-02	1.32E+00	0.00E+00	9.11E-01	0.00E+00
Land use**	Pt	5.89E+00	0.00E+00	1.59E+00	0.00E+00	4.45E+00	0.00E+00

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.
** Disclaimer: This impact category deals mainly with the eventual impact of low dose ionising radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

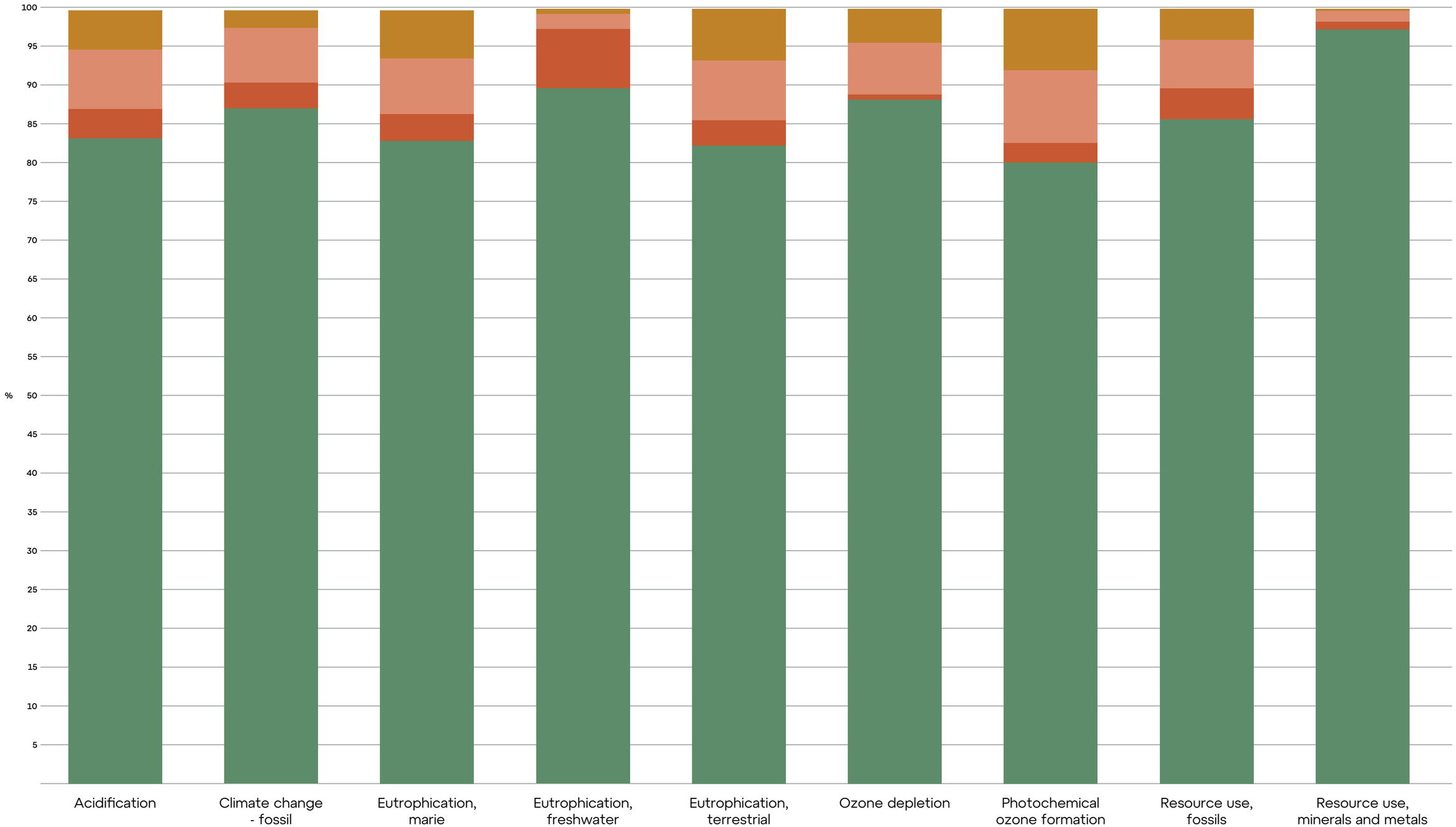
USE OF RESOURCES
per 1 m² of BROKISGLASS boards, 8 mm thickness

Impact category	Unit	A1-A3	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value	8.40E-01	2.96E-03	4.14E-02	0.00E+00	3.22E-02	0.00E+00
Use of renewable primary energy resources used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value	8.40E-01	2.96E-03	4.14E-02	0.00E+00	3.22E-02	0.00E+00
Use of non- renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value	3.55E+01	8.63E-02	2.67E+00	0.00E+00	1.62E+00	0.00E+00
Use of non- renewable primary energy resources used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non- renewable primary energy resources (primary energyand primary energy resources used as raw materials)	MJ, net calorific value	3.55E+01	8.63E-02	2.67E+00	0.00E+00	1.62E+00	0.00E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non renewable secondary fuels	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	2.64E-01	8.16E-02	1.29E-03	0.00E+00	1.42E-03	0.00E+00

WASTE PRODUCTION and OUTPUT FLOWS per 1 m² of BROKISGLASS boards, 8 mm thickness

Impact category	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste	kg	1.26E-03	1.67E-06	6.61E-05	0.00E+00	2.22E-05	0.00E+00
Non-hazardous waste disposed	kg	2.90E-01	1.53E-04	1.30E-01	0.00E+00	1.12E+01	0.00E+00
Radioactive waste disposed/stored	kg	9.99E-05	1.53E-04	8.67E-07	0.00E+00	3.50E-07	0.00E+00
Components for re-use	kg	0	0	0	0	0	0
Materials for recycling	kg	0	0	0	5.00E+00	0	0
Materials for energy recovery	kg	0	0	0	0	0	0
Exported energy - electricity	MJ per energy carrier	0	0	0	0	0	0
Exported energy - heat	MJ per energy carrier	0	0	0	0	0	0

THE SHARE OF LIFE CYCLE STAGES IN THE TOTAL RESULT



Method: EN 15804+A2 (adapted) V1.00/EF 3.1 normalization and weighting set/Characterization
Analyzing 1 p 'BG20';

OTHER ENVIRONMENTAL PERFORMANCE INDICATORS
None included

ADDITIONAL ENVIRONMENTAL INFORMATION
Results according to EN 17074:2019

Impact category	Unit	A1-A3	C1	C2	C3	C4	D
Acidification (fate not incl.)	kg SO_2 eq	5.87E-03	2.81E-04	5.45E-04	0.00E+00	3.75E-04	0.00E+00
Eutrophication	kg PO_4--- eq	2.45E-03	2.30E-04	1.30E-01	0.00E+00	7.22E-05	0.00E+00
Global warming (GWP100a)	kg CO_2 eq	2.32E+00	9.13E-02	1.87E-01	0.00E+00	6.27E-02	0.00E+00
Photochemical oxidation	kg NMVOC	7.90E-03	2.47E-04	9.17E-04	0.00E+00	7.63E-04	0.00E+00
Abiotic depletion, elements	kg Sb eq	4.39E-05	4.77E-07	6.05E-07	0.00E+00	6.71E-08	0.00E+00
Abiotic depletion, fossil fuels	MJ	2.79E+01	1.04E+00	2.61E+00	0.00E+00	1.59E+00	0.00E+00
Water scarcity	m^3 eq	2.20E-01	1.77E-02	1.08E-02	0.00E+00	5.14E-03	0.00E+00
Ozone layer depletion (ODP) (optional)	kg CFC-11 eq	5.01E-08	4.19E-10	3.36E-09	0.00E+00	1.77E-09	0.00E+00

Additional Social and Economic Information
None included

Information Related to Sector EPD
Not applicable

ADDITIONAL ENVIRONMENTAL INFORMATION

VARIABILITY OF PRODUCTS

All products are manufactured in the same way and only differ in size and color. The color is only affected by the color of the input cullets. The thickness of the final product is processed during the pouring of the glass into the mold, and the length and width of the boards are then processed by water jet cutting. The results of individual board types are only influenced by their weight due to weight allocation of inputs and outputs used in LCA. The variability of the results is thus -12.5% to +25% for the thickness of plates 7-10 mm, (87.5% of the result of an 8 mm plate for a plate of 7 mm and 125% for a plate of 10 mm).

The following table shows the conversion factors for different types of boards. Based on the factor for 1 kg of board, it is possible to calculate the results for any type of product with a known weight. The results for 1 m^2 of 8 mm board given in this EPD must be multiplied by the given factor to calculate the results of another type. The factor represents the weight ratio of 1 m^2 of 8 mm board and the specified type of product.

Thickness (mm)	N/A	7	8	9	10
Weight (kg)	1	17.5	20	22.5	25
Conversion factor	0.05	0.875	1	1.125	1.25

REFERENCES

ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

ISO 14044:2006-10, Environmental Management — Life Cycle Assessment — Requirements and Instructions (ISO 14044:2006); EN ISO 14044:2006

EN EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the construction products product category

EN 17074:2019 Glass in building. Environmental product declaration. Product category rules for flat glass products

ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

/Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

/SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

BROKIS®

GLASS