Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

QCGlass Rainscreen Façade Systems

from

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Licensee:	EPD North America
Type of EPD:	EPD of multiple products, based on the average results of the product group EPD published by trader
Product Types Covered	4 mm, 5 mm, 6 mm, 8 mm, 10 mm, and 12 mm glass thicknesses
EPD registration number:	EPD-IES-0029316:001
Version date:	2026-05-01
Validity date:	2031-04-30
	An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com

GENERAL INFORMATION

Programme Information	
Programme:	The International EPD System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	support@environdec.com

Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): International EPD System PCR 2019:14 "Construction products", v2.0.1, 2025-06-05, UN CPC Code 371 Glass and glass products
PCR review was conducted by: The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com. The review panel may be contacted via support@environdec.com. Review chair: Rob Rouwette (chair), Noa Meron (co-chair).

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☐ **Individual EPD verification without a pre-verified LCA/EPD tool** Third-party verifier: Stephen Forson, ViridisPride Approved by: International EPD System Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

INFORMATION ABOUT EPD OWNER

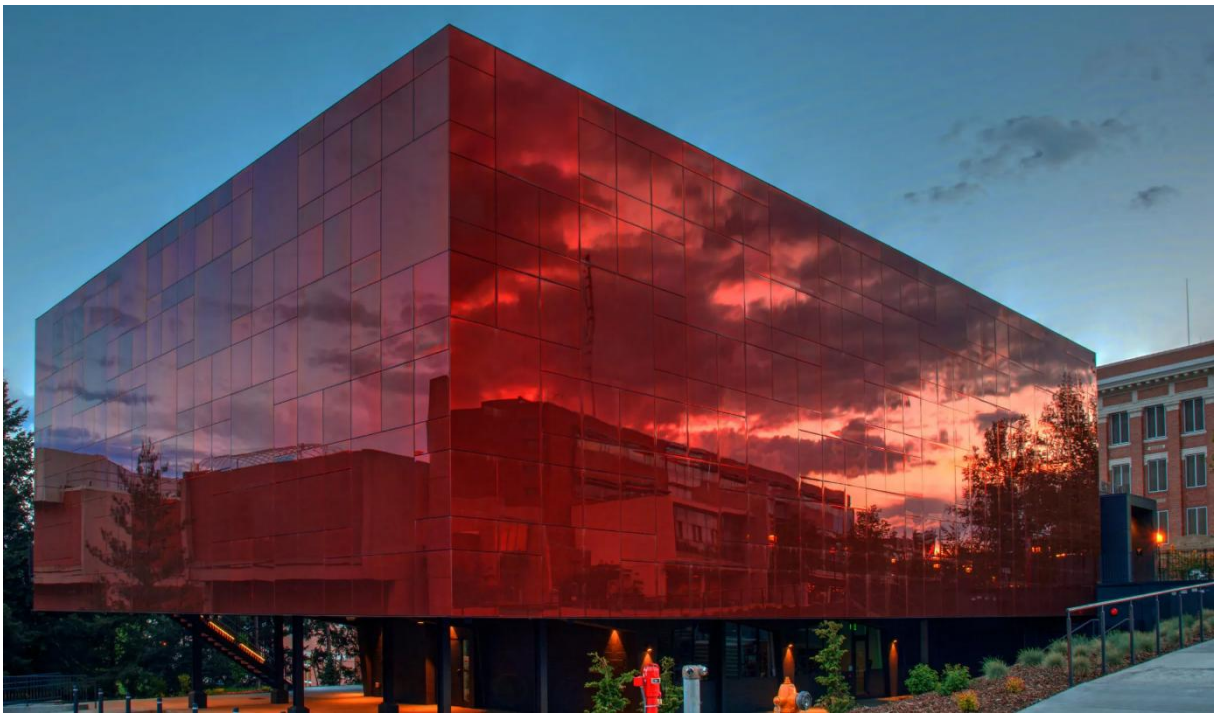
Owner of the EPD: QCfaçades

Address: 2007 S 1300 E, Salt Lake City, UT 84105, United States

Contact: Jason Summers (jsummers@qcfacades.com)

Address and contact information of the LCA practitioner commissioned by the EPD owner: Dr Gareth Davies, garethdavies@tunley-environmental.com, 9 High Ash Crescent, Leeds, United Kingdom, LS17 8RP, UK

Description of the organisation: QCfaçades specializes in high-performance rainscreen façades, offering a diverse range of sustainable, resilient cladding solutions featuring glass panels, aluminium honeycomb panels, aluminium plate panels, and custom-engineered specialty screens. Their systems feature large, ultra-flat panels and support both solar integration and digital design capabilities. QCfaçades creates façade solutions that combine cutting-edge engineering with refined aesthetics, collaborating closely with architects, engineers, and installers on systems ideally suited for complex and iconic building envelopes. They promote environmental responsibility by incorporating high recycled content and fully recyclable materials across their product lines.



PRODUCT INFORMATION

Product name: QCGlass Rainscreen Façade

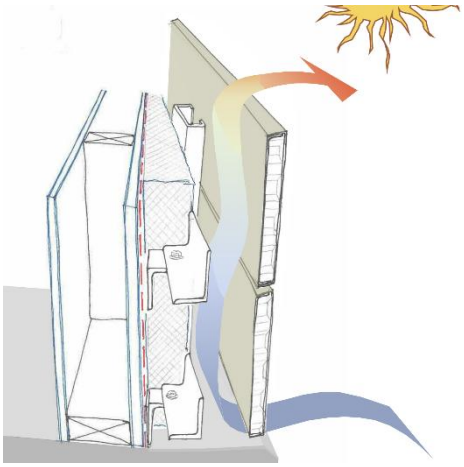
List of Products Covered: 4 mm, 5 mm, 6 mm, 8 mm, 10 mm, and 12 mm glass thicknesses.

Product identification: QCGlass façades are rainscreen panel systems primarily composed of glass with an aluminium-based fixing system.

UN CPC code: UN CPC Code 371 Glass and glass products

Name and location of the final process in direct control of the trader: 2007 S 1300 E, Salt Lake City, UT 84105, United States

Product description: The QCGlass façade system is a rainscreen panel system composed mainly of glass. Rainscreens employ layered façade construction with an outer cladding, a ventilated and drained cavity, thermal insulation, and a water-resistive backing wall. The outer cladding acts as the primary rain barrier. The ventilated cavity equalises pressure and allows drainage and evaporation of infiltrated moisture. The technical lifespan of the QCGlass façade system is the same as the reference service life.



Rainscreen façades separate weather protection from thermal insulation, improving hygrothermal performance, reducing condensation risk, and enhancing durability. QCfaçades rainscreen systems deliver resilient, low-maintenance solutions that enable sophisticated architectural designs and support a wide range of finishes. They are also engineered to accommodate structural movement; resist wind loads; and meet fire, acoustic, and thermal performance requirements. Further specification information can be found at https://qcfacades.com/downloads/.

Glass manufactured by Guardian represents 51% of the product by mass (based on input glass used in the reference year), whilst glass in general represents 71% of the product mass. Aluminium is primary used for the fixing system and does not materially confer to additional technical characteristics beyond affixing to the building. Details representative of the

QCGlass system come from the Guardian website on the subsequent page. The table shows the glass performance including strength, sound insulation, heat transfer, light transmission and reflection, and solar energy transmission and reflection.

Glass processing includes the cutting, grinding, machining, tempering, and lamination of the glass to produce the required finished product under the construction specifications. This glass is transported directly to the installation site concurrently to the fixing system materials.

Item	Unit	02mm	03mm	04mm	05mm	06mm	08mm	10mm	12mm	15mm
Characteristic Bending Strength	MPa	45	45	45	45	45	45	45	45	45
Direct airborne sound insulation (EN 12758)	dB	NPD	28 (-1;-4)	29 (-2;-3)	30 (-1;-2)	31 (-2;-3)	32 (-2;-3)	33 (-2;-3)	34 (-1;-2)	36 (-1;-3)
Thermal transmittance (U-value)	W/(m².K)	5.8	5.8	5.8	5.7	5.7	5.6	5.6	5.5	5.4
Light transmission **τ**V (EN 410)	**τ**V	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.88	0.88
Light reflection ρV (EN 410)	ρ V	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Solar energy transmission **τ**E (EN 410)	**τ**E	0.89	0.88	0.87	0.85	0.84	0.82	0.79	0.78	0.75
Solar energy reflection ρE (EN 410)	ρ E	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07

CONTENT DECLARATION

The mass (weight) per declared unit: 22.46 kg/m^2.

The product is primarily composed of glass; the fixing system comprises aluminium and propylene components. Guardian, Saint-Gobain, and AGC supplied glass. Aluminium foil wrap, propylene strapping, and separation corks were used to protect glass during transportation. International sea freighting required the use of protective A-frame crates as tertiary packaging.

This content declaration is representative of the mass weighted average glass from the manufacturer in the reference year with a reference average fixing system composed primarily of aluminium with a small portion of polypropylene.

Product content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product or declared unit
Glass	16.43	0%	0%	0
Aluminium	7.49	0%	0%	0
Polypropylene	0.05	0%	0%	0
Total	**23.97**			

Packaging materials	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/product or declared unit
Aluminium Foil Wrap	0.11	0.45%	0.00E+00
Propylene Straps	0.002	0.01%	0.00E+00
Separation Cork	0.01	0.05%	4.47E-03
A Frame Crate	5.05	21.07%	2.22E+00
Total	**5.17**		**2.23E+00**

1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg ofCO_2.

The product does not contain a concentration higher than 0,1% (by unit weight) of either carcinogenic substances or substances of very high concern (SVHC) on the REACH Candidate List published by the European Chemicals Agency.

LCA INFORMATION

Declared unit: One square metre (1 m^2) of QCGlass rainscreen façade, plus packaging

Conversion factor to mass: 22.46 kg/m^2

Reference service life: 25 years

Time representativeness: The reference year 2024 was used for data collection from manufacturing site(s).

Cut off and allocation procedures: Cut-off rules were applied in accordance with PCR 2019:14, targeting completeness of at least 99% per unit process and 95% per life-cycle stage (mass and energy). Glass material manufacturing applies a mass-based allocation methodology for the input materials. Manufacturing methodologies for the glass processing uses production volume allocation. No other allocation methodologies were employed.

Geographical scope: A global geographical scope is utilised. The glass portion represents 71% of the mass of the product and is manufactured at one facility in Marconistraat 6, 8801 PM Franeker, Netherlands. Minor fixing system components have allocated manufacturers in China, Belgium, and the USA.

Database(s) and LCA software used: Ecoinvent v3.11 using EF 3.1 factors as well as SimaPro version 10.3.0.1.

Description of system boundaries: Type b) Cradle to gate with options, modules A4-5, modules C1–C4, module D and with optional modules (A1–A3 + C + D and additional modules). The QCGlass rainscreen façade is a passive product. Once installed, it is lightly maintained and has minimal impact during its use phase (B1-B7). Consequently, the use stage has not been considered.

Product stage: Raw material supply, Transport and Manufacturing (A1-A3)
The product stage includes the extraction, processing, and manufacture of all raw materials used in the QCGlass rainscreen façade system. The system is primarily composed of glass, with additional aluminium and polypropylene components used in the fixing system, alongside packaging materials. Module A1 covers the production of these materials, A2

includes upstream transportation from suppliers using sea freight and heavy goods vehicles, and A3 accounts for manufacturing electricity consumption and waste processing at the Steinfort Glas facility in Franeker, Netherlands.

Construction stage: Transport to customer and Construction installation (A4-A5)

The construction stage considers the transportation of finished products from manufacturing facilities to project sites using a combination of sea freight and heavy goods vehicles. Transportation distances were modelled using seven representative projects to estimate average freight distances. No installation processes were included in the assessment, however the end-of-life treatment of packaging materials generated during installation was allocated to module A5. The aluminium packaging is allocated to recycling, the cork and polypropylene packaging is allocated to landfill, the timber is allocated to incineration with energy recovery.

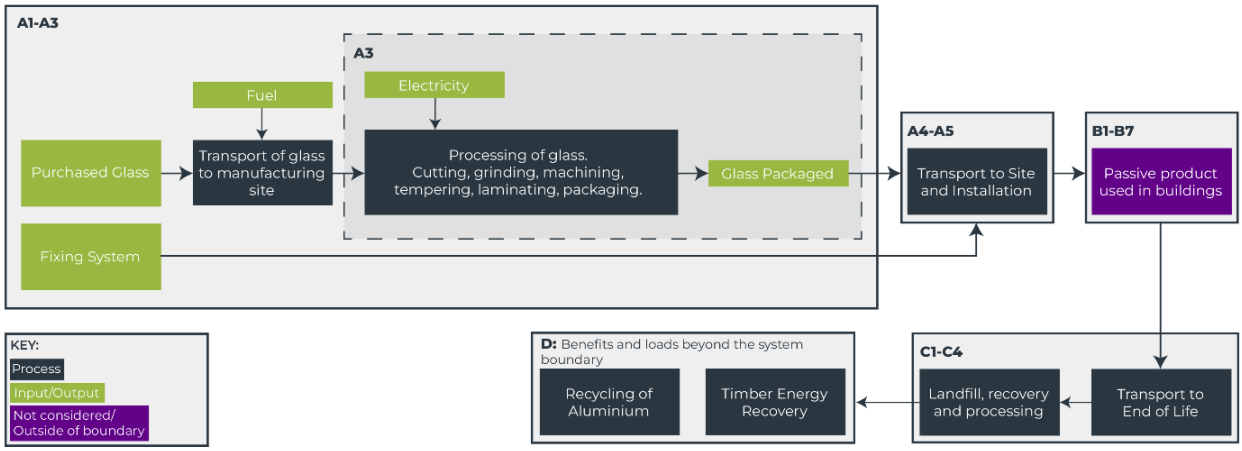
End of life stage: De-construction demolition, Transport, Waste processing and Disposal (C1-C4)

End of life processes were modelled using the default scenarios provided in PCR 2019:14 based on the mass balance of materials within the system. These modules include transport of materials to waste processing facilities, sorting and treatment processes, and final disposal pathways. Glass materials are assumed to be landfilled, aluminium components sent for recycling.

Resource recovery stage: Reuse - recovery - recycling potential (D)

Module D reports the benefits and loads associated with material and energy recovery beyond the system boundary. Recovered aluminium is assumed to substitute the production of equivalent virgin aluminium using a substitution approach. Energy generated from the incineration of timber packaging is assumed to offset conventional electricity generation. Recycling loads such as collection, sorting, and secondary processing are accounted for separately and reported alongside the credited benefits.

Process flow diagram:



More information:

Secondary material input is provided directly by upstream EPDs used in glass materials provided previously. The LCA calculations are based on 1-year averaged data and have been updated within the last 5 years. These data were checked to ensure that sufficient materials and water are included within the inputs to account for all products, wastes and emissions.

Data quality was assessed using the Product Environmental Footprint (PEF) Data Quality Rating methodology. The dataset achieved a geographical representativeness score of 2.62, technological representativeness score of 1.70, and temporal representativeness score of 2.38, resulting in an overall Data Quality Rating of 2.23. According to the PEF rating scale, this indicates that the overall data quality is classified as good.

Electricity factors from Ecoinvent v3.11 were employed. A full table of the electricity factors and the input fuel grid mix values given by the cumulative energy demand method are provided below. The shares of electricity technologies on this market are valid for the year 2021. They have been calculated by the data provider and don't correspond with the production volumes entered in the undefined datasets of the different electricity supplying technologies. The shares have been calculated based on statistics from 2021. Grid losses are based on data from 2021.

Item	GWP-GHG (kg CO_2e/kWh)	Fossil	Nuclear	Biomass	Renewable
1 kWh Electricity, high voltage {NL}	0.44	67%	13%	8%	12%
1 kWh Electricity, high voltage {US}	0.48	64%	26%	2%	8%

Material and process environmental impact factors come from Ecoinvent v3.11. Calculations were carried out in SimaPro 10.3.0.1 and Excel. EF3.1 package was utilised in this LCA. Manufacture and maintenance of capital equipment, buildings, and other infrastructure are not included in the LCA model.

Material and energy substitution is utilised for the modelling of module D benefits outside of the system boundary. A recovery rate of 80 is applied for aluminium in the fixing system. An energy conversion of 22% to electricity is applied for the timber crate packaging.

Modules declared, geographical scope, share of primary data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Distribution/ installation stage		Use stage							End-of-life stage				Beyond product lifecycle
Module	Raw material supply **A1**	Transport **A2**	Manufacturing **A3**	Transport **A4**	Construction installation **A5**	Use **B1**	Maintenance **B2**	Repair **B3**	Replacement **B4**	Refurbishment **B5**	Operational energy use **B6**	Operational water use **B7**	De-construction demolition **C1**	Transport **C2**	Waste processing **C3**	Disposal **C4**	Reuse-Recovery-Recycling-potential **D**
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	GLO	GLO	USA	ND	ND	ND	ND	ND	ND	ND	USA	USA	USA	USA	USA
Share of primary data		35%				-	-	-	-	-	-	-	-	-	-	-	-
Variation – products		-6%/+12%				-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites		0%				-	-	-	-	-	-	-	-	-	-	-	-

Process	Source Type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Input Glass	Database	Ecoinvent v3.11	2024 Calendar Year	Primary	0%
Fixing System	Database	Ecoinvent v3.11	2024 Calendar Year	Secondary	0%
Product Packaging	Database	Ecoinvent v3.11	2024 Calendar Year	Secondary	0%
Upstream Freight	Database	Ecoinvent v3.11	2024 Calendar Year	Primary and Secondary	1%
Glass Processing	Database	Ecoinvent v3.11	2024 Calendar Year	Primary	34%
EoL Processing	Database	Ecoinvent v3.11	2024 Calendar Year	Secondary	0%
Total share of primary data, of GWP-GHG results for A1-A3					**35%**

ENVIRONMENTAL PERFORMANCE

LCA results of the product(s) - main environmental performance results

Mandatory impact category indicators according to EN 15804

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	1.47E+02	3.82E+00	8.31E+00	0.00E+00	3.88E-01	3.39E-02	9.95E-03	-5.27E+01
GWP-fossil	kg CO_2 eq.	1.53E+02	3.82E+00	1.48E-01	0.00E+00	3.88E-01	3.38E-02	9.94E-03	-5.19E+01
GWP-biogenic	kg CO_2 eq.	-7.75E+00	8.06E-04	8.17E+00	0.00E+00	1.23E-04	5.76E-05	1.24E-05	0.00E+00
GWP-luluc	kg CO_2 eq.	1.36E+00	1.93E-03	6.38E-05	0.00E+00	1.74E-04	1.05E-05	2.61E-06	-8.64E-01
ODP	kg CFC 11 eq.	2.60E-06	5.20E-08	1.90E-09	0.00E+00	4.92E-09	4.01E-10	1.45E-10	-6.35E-07
AP	mol H^+ eq.	8.99E-01	7.73E-02	6.16E-04	0.00E+00	1.32E-03	3.32E-04	1.19E-04	-3.62E-01
EP-freshwater	kg P eq.	5.78E-02	2.35E-04	1.55E-05	0.00E+00	4.25E-05	7.93E-06	5.68E-07	-2.29E-02
EP-marine	kg N eq.	1.58E-01	1.96E-02	2.16E-04	0.00E+00	4.20E-04	1.44E-04	5.33E-05	-5.06E-02
EP-terrestrial	mol N eq.	1.68E+00	2.17E-01	2.35E-03	0.00E+00	4.56E-03	1.56E-03	5.83E-04	-5.02E-01
POCP	kg NMVOC eq.	5.50E-01	6.08E-02	8.37E-04	0.00E+00	1.79E-03	4.42E-04	1.64E-04	-1.91E-01
ADP-minerals&metals*	kg Sb eq.	2.87E-04	6.88E-06	4.91E-07	0.00E+00	1.27E-06	1.02E-07	3.77E-08	-6.68E-05
ADP-fossil*	MJ	2.05E+03	4.89E+01	2.03E+00	0.00E+00	5.36E+00	4.73E-01	1.27E-01	-6.76E+02
WDP*	m^3	3.32E+01	1.55E-01	9.07E-03	0.00E+00	2.49E-02	2.08E-03	3.12E-04	-1.12E+01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption								

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

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 results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

The biogenic carbon from the packaging materials leaves the system through manual biogenic balancing within module A5.

Additional mandatory and voluntary impact category indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	1.54E+02	3.82E+00	1.48E-01	0.00E+00	3.88E-01	3.39E-02	9.94E-03	-5.27E+01
PM	Disease incidence	9.42E-06	1.77E-07	1.07E-08	0.00E+00	3.00E-08	7.34E-10	2.32E-10	-3.87E-06
IRP[2]	kBq U235 eq.	1.84E+01	2.81E-02	1.59E-03	0.00E+00	4.32E-03	3.00E-03	6.48E-05	-6.96E+00
ETP-fw[3]	CTUe	3.58E+02	5.57E+00	3.58E-01	0.00E+00	9.88E-01	4.34E-02	1.11E-02	-9.52E+01
HTP-c[3]	CTUh	3.15E-01	0.00E+00	9.31E-05	0.00E+00	0.00E+00	1.86E-04	7.11E-05	-1.86E-01
HTP-nc[3]	CTUh	1.05E-06	1.88E-08	1.20E-09	0.00E+00	3.32E-09	1.33E-10	3.65E-11	-4.80E-07
SQP[3]	dimensionless	1.62E+03	1.31E+01	1.11E+00	0.00E+00	3.15E+00	4.12E-02	9.96E-03	-5.82E+01
Acronyms	GWP-GHG = Global warming potential greenhouse gases, this declares all biogenic emissions at zero; PM = particulate matter emissions; IRP = ionizing radiation, human health; ETP-fw = eco-toxicity to freshwater; HTP-c = human toxicity cancer effects; HTP-nc = human toxicity, non-cancer effects; SQP = Land use related impacts/ soild quality.								

Resource use indicators

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	5.34E+02	4.92E-01	9.57E+01	0.00E+00	7.47E-02	1.98E-02	1.45E-03	-2.22E+02
PERM	MJ	9.57E+01	0.00E+00	-9.57E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	6.30E+02	4.92E-01	2.79E-02	0.00E+00	7.47E-02	1.98E-02	1.45E-03	-2.22E+02
PENRE	MJ	1.59E+03	5.20E+01	4.40E+00	0.00E+00	5.70E+00	5.02E-01	1.35E-01	-7.20E+02

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

[2] This impact category deals mainly with the eventual impact of low dose ionizing 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 ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

[3] 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.

PENRM	MJ	2.24E+00	0.00E+00	-2.24E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.59E+03	5.20E+01	2.16E+00	0.00E+00	5.70E+00	5.02E-01	1.35E-01	-7.20E+02
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.15E+00	4.76E-03	2.72E-04	0.00E+00	7.41E-04	7.10E-05	1.14E-05	-1.19E+00
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water								

Waste indicators

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	4.11E+00	0.00E+00	1.27E-02	0.00E+00	0.00E+00	0.00E+00	1.65E+01	0.00E+00
Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output flow indicators

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	1.09E-01	0.00E+00	0.00E+00	7.49E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	5.05E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Exported energy, electricity	MJ	0.00E+00	0.00E+00	2.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Variation LCA Calculations and LCIA Results

Herein the methodology for the variation between different product types is calculated. The variance is based on the highest thickness and lowest thickness glass input material. The lowest thickness glass used is 4 mm, the highest thickness glass is 12 mm. This equates to a calculated input mass of 10 kg for the lowest thickness of glass and 30 kg of glass for the highest thickness This is due to an assumed density of 2,500 kg/m^3 and the declared unit of 1 m^2. A table is provided in Table 1 which also shows the average product thickness. This thickness is considered for the A1 module in the mass of glass required to produce the product. It is also considered for the upstream transportation (A2) of the glass materials and the downstream transportation weight of the product (A4). It is not considered for the manufacturing stage as this is completed on a mass-weighted average with no visuality of thickness. This may have an impact on certain processes *e.g.* cutting which is likely to require additional electrical input for thicker glass. No estimation for this are made. Due to changes in product mass end of life values for C2 and C4 are also modified.

The variance for the GWP-GHG across A1-3 is subsequently calculated by the GWP-GHG A1-A3 value for the highest thickness minus that of the lowest thickness. This is divided by the average between the GWP-GHG A1-A3 for the highest and lowest thickness. This provides the percentage variation between the two values

Table 1. Product variation reporting considered thickness and mass, and calculated GWP-GHG.

Product Variation	Thickness (mm)	Mass (kg/m²)	Adjusted for losses mass (kg/m²)	Calculated A1-A3 GWP-GHG (kg CO_2e/m²)
Lowest thickness – Group 1	4	10	12.5	1.45E+02
Mass weighted average thickness	6.57	16.4	20.5	1.54E+02
Highest thickness - Group 2	12	30	37.5	1.74E+02

The calculated variance across all indicators is reported in Table 2. Group 1 the lower thickness glass shows between 1 and 51% variance across environmental indicators. Whilst

Group 2 the higher thickness glass has between 1 and 60% variance across environmental indicators.

Table 2. Variance between highest thickness glass product and lowest thickness glass product.

Core environmental impact indicators (MANDATORY)	Acronym	Unit	A1-A3 Average	A1-A3 Group 1 (4 mm) variance	A1-A3 Group 2 (12 mm) variance
Global warming potential - total (GWP-total)	GWP-total	kg CO2 eq.	1.47E+02	4%	8%
Global warming potential - fossil fuels (GWP-fossil)	GWP-fossil	kg CO2 eq.	1.53E+02	6%	12%
Global warming potential - biogenic (GWP-biogenic)	GWP-biogenic	kg CO2 eq.	-7.75E+00	51%	60%
Global warming potential - land use and land use change (GWP-luluc)	GWP-luluc	kg CO2 eq.	1.36E+00	1%	1%
Depletion potential of the stratospheric ozone layer (ODP)	ODP	kg CFC-11 eq.	2.60E-06	9%	16%
Acidification potential, accumulated exceedance (AP)	AP	mol H+ eq.	8.99E-01	11%	19%
Eutrophication potential - freshwater (EP-freshwater)	EP-freshwater	kg P eq.	5.78E-02	3%	6%
Eutrophication potential - marine (EP-marine)	EP-marine	kg N eq.	1.58E-01	12%	21%
Eutrophication potential - terrestrial (EP-terrestrial)	EP-terrestrial	mol N eq.	1.68E+00	13%	23%
Photochemical ozone creation potential (POCP)	POCP	kg NMVOC eq.	5.50E-01	11%	20%
Abiotic depletion potential - non-fossil resources (ADPE)	ADPE	kg Sb eq.	2.87E-04	20%	33%
Abiotic depletion potential - fossil resources (ADPF)	ADPF	MJ, net calorific value	2.05E+03	6%	11%

Water (user) deprivation potential (WDP)	WDP	m3 world eq. deprived	3.32E+01	13%	23%
Additional mandatory environmental impact indicators (MANDATORY)	**Acronym**	**Unit**	**A1-A3**	**A1-A3**	**A1-A3**
Global warming potential (GWP-GHG)	GWP-GHG	kg CO2 eq.	1.54E+02	6%	12%

Additional End-of-Life Scenarios

We present the environmental impacts of the product lifecycle if 100% of the 1 m^2 of QC QCGlass Rainscreen Façade Systems product was sent to landfill (Table 3).

Table 3. End of life stages (C1-C4, & D) covering the environmental impacts for 100% landfill scenario of QC Glass Rainscreen Façade System.

Acronym	**Unit**	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	0.00E+00	3.88E-01	0.00E+00	7.76E-03	-3.66E+00
GWP-fossil	kg CO2 eq.	0.00E+00	3.88E-01	0.00E+00	7.75E-03	-3.64E+00
GWP-biogenic	kg CO2 eq.	0.00E+00	1.23E-04	0.00E+00	2.46E-06	0.00E+00
GWP-luluc	kg CO2 eq.	0.00E+00	1.74E-04	0.00E+00	3.47E-06	-1.63E-02
ODP	kg CFC-11 eq.	0.00E+00	4.92E-09	0.00E+00	9.85E-11	-1.90E-08
AP	mol H+ eq.	0.00E+00	1.32E-03	0.00E+00	2.65E-05	-1.36E-02
EP-freshwater	kg P eq.	0.00E+00	4.25E-05	0.00E+00	8.50E-07	-2.64E-03
EP-marine	kg N eq.	0.00E+00	4.20E-04	0.00E+00	8.39E-06	-2.47E-03
EP-terrestrial	mol N eq.	0.00E+00	4.56E-03	0.00E+00	9.12E-05	-2.12E-02
POCP	kg NMVOC eq.	0.00E+00	1.79E-03	0.00E+00	3.59E-05	-8.46E-03
ADPE	kg Sb eq.	0.00E+00	1.27E-06	0.00E+00	2.54E-08	-2.49E-06
ADPF	MJ, net calorific value	0.00E+00	5.36E+00	0.00E+00	1.07E-01	-6.08E+01
WDP	m3 world eq. deprived	0.00E+00	2.49E-02	0.00E+00	4.99E-04	-6.36E-01
Acronym	**Unit**	C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq.	0.00E+00	3.88E-01	0.00E+00	7.76E-03	-3.66E+00
Acronym	**Unit**	C1	C2	C3	C4	D
PM	Disease incidence	0.00E+00	3.00E-08	0.00E+00	6.00E-10	-1.12E-07
IRP	kBq U235 eq.	0.00E+00	4.32E-03	0.00E+00	8.64E-05	-1.10E+00
ETP-fw	CTUe	0.00E+00	9.88E-01	0.00E+00	1.98E-02	-6.64E+00
HTP-c	CTUh	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.02E-03
HTP-nc	CTUh	0.00E+00	3.32E-09	0.00E+00	6.63E-11	-2.15E-08
SQP	dimensionless	0.00E+00	3.15E+00	0.00E+00	6.30E-02	-6.30E+00
Acronym	**Unit**	C1	C2	C3	C4	D
PERE	MJ, net calorific value	0.00E+00	7.47E-02	0.00E+00	1.49E-03	-9.41E+00
PERM	MJ, net calorific	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

	value					
PERT	MJ, net calorific value	0.00E+00	7.47E-02	0.00E+00	1.49E-03	-9.41E+00
PENRE	MJ, net calorific value	0.00E+00	5.70E+00	0.00E+00	1.14E-01	-6.46E+01
PENRM	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, net calorific value	0.00E+00	5.70E+00	0.00E+00	1.14E-01	-6.46E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	0.00E+00	7.41E-04	0.00E+00	1.48E-05	-3.51E-02
Acronym	**Unit**	C1	C2	C3	C4	D
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	0.00E+00	0.00E+00	0.00E+00	2.40E+01	0.00E+00
RWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acronym	**Unit**	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rules
c-PCR	Complementary Product Category Rules
CEN	European Committee for Standardization
CLC	Co-location centre
CPC	Central product classification
GHS	Globally harmonized system of classification and labelling of chemicals
GRI	Global Reporting Initiative
Environmental Impact Indicators (EN 15804)	
GHG	Greenhouse gas
GWP	Global Warming Potential (kg CO_2 eq.)
GWP-fossil	Global Warming Potential from fossil sources (kg CO_2 eq.)
GWP-biogenic	Global Warming Potential from biogenic sources (kg CO_2 eq.)
GWP-luluc	Global Warming Potential from land use and land use change (kg CO_2 eq.)
GWP-total	Total Global Warming Potential (kg CO_2 eq.)
GWP-GHG	Global Warming Potential for greenhouse gases (kg CO_2 eq.)
ODP	Ozone Depletion Potential (kg CFC-11 eq.)
AP	Acidification Potential (mol H^+ eq.)
EP	Eutrophication Potential
EP-freshwater	Freshwater eutrophication potential (kg P eq.)
EP-marine	Marine eutrophication potential (kg N eq.)
EP-terrestrial	Terrestrial eutrophication potential (mol N eq.)
POCP	Photochemical Ozone Creation Potential (kg NMVOC eq.)
ADP	Abiotic Depletion Potential
ADP-minerals&metals	Abiotic depletion potential for non-fossil resources (kg Sb eq.)
ADP-fossil	Abiotic depletion potential for fossil resources (MJ)
WDP	Water Deprivation Potential (m^3)
Resource Use Indicators	
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ)
PERM	Use of renewable primary energy resources used as raw materials (MJ)
PERT	Total use of renewable primary energy resources (MJ)
PENRE	Use of non-renewable primary energy excluding non- renewable primary energy resources used as raw materials (MJ)
PENRM	Use of non-renewable primary energy resources used as raw materials (MJ)
PENRT	Total use of non-renewable primary energy resources (MJ)

SM	Use of secondary material (kg)
RSF	Use of renewable secondary fuels (MJ)
NRSF	Use of non-renewable secondary fuels (MJ)
FW	Use of net fresh water (m^3)
Waste Indicators	
HW	Hazardous Waste (disposed) (kg)
NHW	Non-Hazardous Waste (disposed) (kg)
RW	Radioactive Waste (disposed) (kg)
Output Flow Indicators	
CFR	Components for Reuse (kg)
MR	Material for Recycling (kg)
MER	Materials for Energy Recovery (kg)
EEE	Exported Energy, Electricity (MJ)
EET	Exported Energy, Thermal (MJ)
Lifecycle Stages / Modules	
A1	Raw material supply
A2	Transport
A3	Manufacturing
A4	Transport to site
A5	Construction/Installation
B1	Use
B2	Maintenance
B3	Repair
B4	Replacement
B5	Refurbishment
B6	Operational energy use
B7	Operational water use
C1	Deconstruction/Demolition
C2	Transport to waste processing
C3	Waste processing
C4	Disposal
D	Reuse-Recovery-Recycling potential
Other Relevant Terms	
SVHC	Substances of Very High Concern
EC No.	European Community Number
CAS No.	Chemical Abstracts Service Number
MJ	Megajoule
kg	Kilogram
m^3	Cubic Meter
NMVOC	Non-Methane Volatile Organic Compounds
Sb eq.	Antimony Equivalents
P eq.	Phosphorus Equivalents
N eq.	Nitrogen Equivalents
CFC-11 eq.	Chlorofluorocarbon-11 Equivalents
CO_2 eq.	Carbon Dioxide Equivalents

kg C	Kilograms of Carbon
kg CO_2 eq.	Kilograms of Carbon Dioxide Equivalent
ND	Not Declared

REFERENCES

a) General Program Instructions, Version 5.0, 2025-02-27 - The International EPD System - EPD International AB.

b) PCR 2019:14 - Construction products, version 2.0.1, 2025-06-05 - The International EPD® System – EPD International AB

c) DS/EN 15804:2012 + A2:2019 – Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

d) Ecoinvent database – www.ecoinvent.ch

e) ISO 14025:2009-11 - Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

f) SimaPro version 10.3.0.1

g) EN 572-9:2005 Glass in building - Basic soda lime silicate glass products - Part 9: Evaluation of conformity/Product standard.

VERSION HISTORY

Original Version of the EPD, 2026-05-01