

**Declaration Owner****Kingspan Light + Air**

28662 North Ballard Drive

Lake Forest, IL 60045

800.759.6985 | www.kingspanlightandair.us**Product:**

- UniQuad® (76mm)
- UniQuad® (108mm)

Declared Unit

One (1) square meter of fenestration assembly

EPD Number and Period of Validity

SCS-EPD-10424

EPD Valid May 16, 2025 through May 15, 2030

Product Category Rule

NSF International. Product Category Rule for Environmental Product Declarations. PCR for Fenestration Assemblies. 1102-23. Version 2. Valid through December 31, 2028.

Program Operator

SCS Global Services

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Declaration owner:	Kingspan Light + Air
Address:	28662 North Ballard Drive Lake Forest, IL 60045
Declaration Number:	SCS-EPD-10424
Date of Issue:	May 16, 2025
Declaration Validity Period:	EPD Valid May 16, 2025 through May 15, 2030
Program Operator:	SCS Global Services, 2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
General Program Instructions:	SCS Type III Environmental Declaration Program: Program Operator Manual. V12.0
Product(s):	UniQuad® (76mm), UniQuad® (108mm)
Declared Unit:	One (1) square meter of fenestration assembly
Product's Intended Application and Use:	Diffuse sunlight and serve as a thermal barrier in commercial spaces
CSI/UNSPSC Codes	08 45 00 for Translucent Wall and Roof Assemblies/30161505 for Panels or Paneling
Markets of Applicability:	North America
EPD Type:	Product average
EPD Scope:	Cradle-to-gate
Year(s) of Reported Manufacturer Primary Data:	2024
LCA Software & Version Number:	OpenLCA v2.4.0, 2025
LCI Database(s) & Version Number:	Ecoinvent v3.11 Allocation cut-off by Classification
LCIA Methodology & Version Number:	TRACI 2.1, CML-A, and IPCC 2013
Cut off criteria and assumptions	1% of impact by life cycle stage, not to exceeding 5%
Allocation rules	Mass based, recycled content approach
Reference PCR:	NSF International. Product Category Rule for Environmental Product Declarations. PCR for Fenestration Assemblies. 1102-23. Version 2. Valid through December 31, 2028
PCR review:	Dr. Thomas P. Gloria, Ph.D., Chair, Jack Geibig, Bill Stough
LCA Practitioner:	Lucas Wathen, SCS Global Services
Independent critical review of the LCA and data, according to ISO 14044 and the PCR:	☐ internal ☒ external
LCA Reviewer:	 Lindita Bushi, PhD., Athena Sustainable Materials Institute
Independent verification of the declaration and data, according to ISO 14025 and the PCR:	☐ internal ☒ external
EPD Verifier:	 Lindita Bushi, PhD., Athena Sustainable Materials Institute
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Disclaimers: An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication. Conformity: This EPD conforms to ISO 14025:2006, and ISO 21930:2017. Ownership: The EPD owner has the sole ownership, liability, and responsibility of the EPD. Accuracy of Results: Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy. Comparability: This EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers or programs, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the construction works level per ISO 21930:2017 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis.” The owner of the declaration shall be liable for the underlying information and evidence; SCS shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence supplied or made available to SCS	

1. KINGSPAN LIGHT + AIR

Kingspan Light + Air North America is the award-winning innovator and manufacturer of high-performance daylighting and ventilation solutions for building envelopes. Our translucent walls, skylights, tubular daylighting devices, canopies, and smoke vents are engineered to perform across a wide array of climates, conditions and geographies, as well as to optimize the role that natural light and air play in building design and occupant health and wellbeing.

Kingspan Light + Air North America is part of the Kingspan Group which was formed in the mid-1960s in Kingscourt, Ireland and has become one of the leading building product manufacturers in the world. Kingspan's integrated approach has made its systems - designed to help reduce the impact buildings have on the environment throughout their lifecycle - preferred by architects, contractors, developers and owners.

2. PRODUCT

2.1 PRODUCT DESCRIPTION

UniQuad® translucent polycarbonate wall systems feature a unitized panel design that provides light control and high thermal performance along with the versatility to meet the functional and creative needs of any building design.

UniQuad® diffuses direct sunlight throughout interior spaces, reducing uncomfortable hot-spots and glare compared to traditional transparent glazing. Systems can also be customized for a wide range of performance and aesthetic needs, including sound control, custom colors and graphics, hurricane and blast protection, and more. UniQuad® systems are available in a 76mm and 108mm thickness.

- Additional product details include:
- Panels up to 38 feet long, spanning floors of multi-level buildings
- Can incorporate graphics and lighting for an eye-catching look
- Easy to install and maintain
- Can be integrated with other building envelope components
- Frequently used as walls or building facades, or clerestories and smaller scale punched openings
- Removable Skin Technology (RST) allows removal of exterior glazing while maintaining envelope integrity
- Tight-cell polycarbonate glazing design increases durability and enhances light diffusion.



Figure 1. Product image of UniQuad® polycarbonate daylighting system.

2.2 FLOW DIAGRAM

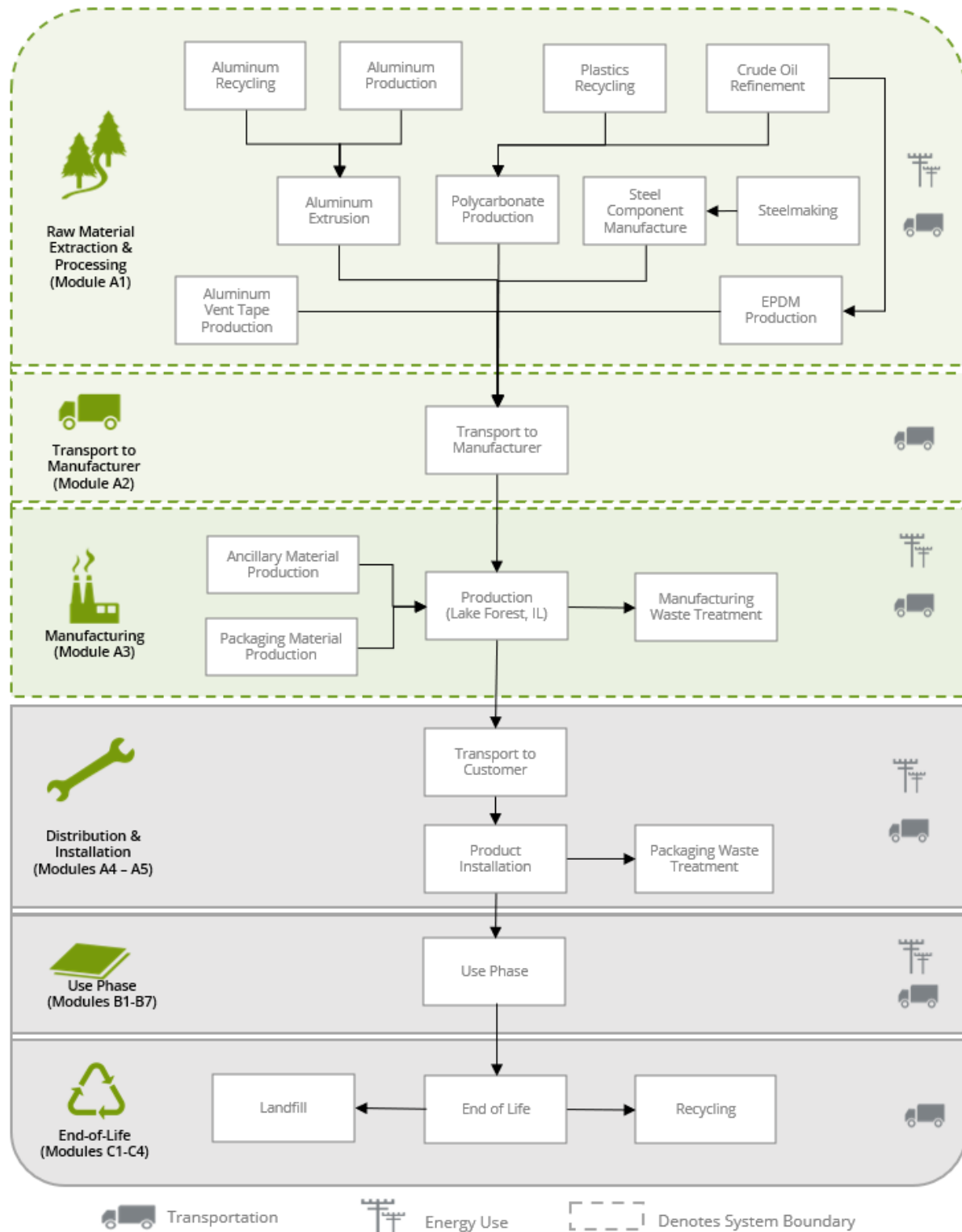


Figure 2. System boundary diagram for the life cycle of the Kingspan Light + Air polycarbonate daylighting systems.

2.3 APPLICATION

Kingspan Light + Air polycarbonate daylighting systems are intended for exterior commercial applications.

2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-gate, including raw material extraction and processing; raw material transportation; and product manufacture including packaging.

Manufacturing resource use was allocated to the products based on mass. Impacts from transportation were allocated based on the mass of material and distance transported.

Processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No known flows were deliberately excluded from this EPD.

2.5 MATERIAL COMPOSITION

Kingspan Light + Air polycarbonate daylighting systems primary consist of aluminum and polycarbonate. Further details on material composition of the products can be found in the tables below.

Table 1. Material component summary for the **UniQuad® (76mm)** Polycarbonate Daylighting System per 1m².

Raw Materials	Mass Final Product (kg)	% Mass Final Product
Aluminum	5.95	54.1%
Polycarbonate	4.66	42.4%
Stainless Steel	5.06x10 ⁻²	0.46%
EPDM	0.326	2.97%
Aluminum Vent Tape	3.65x10 ⁻³	0.03%
Total:	11.0	100%

Table 2. Material component summary for the **UniQuad® (108mm)** Polycarbonate Daylighting System per 1m².

Raw Materials	Mass Final Product (kg)	% Mass Final Product
Aluminum	8.29	63.6%
Polycarbonate	4.66	35.8%
Stainless Steel	4.91x10 ⁻²	0.38%
EPDM	2.72x10 ⁻²	0.21%
Aluminum Vent Tape	3.04x10 ⁻⁴	0.00%
Total:	13.0	100%

2.6 TRANSPORTATION

Raw materials required to produce the polycarbonate daylighting systems are primarily delivered to Kingspan Light + Air's facility in Lake Forest, IL via truck and ship transport.

2.7 MANUFACTURE

Kingspan Light + Air polycarbonate daylighting systems are manufactured at their facility in Lake Forest, IL. Here, pre-extruded polycarbonate panels and pre-extruded aluminum frame are cut, sized, and assembled to build the systems based on client order. Edges of the aluminum frame are welded.

2.8 PACKAGING

Kingspan Light + Air's polycarbonate daylighting systems are packaged using wood pallets and corrugate packaging.

3. Methodological Framework

3.1 DECLARED UNIT

The declared unit in the study is defined by the PCR as one (1) square meter of fenestration assembly. The reference flows for each product are summarized in Table 3.

Table 3. *Declared unit.*

Name	Unit	UniQuad® (76mm)	UniQuad® (108mm)
Declared Unit	n/a	One (1) square meter of fenestration assembly	
Reference Flow	kg/m ²	10.9	13.0

3.2 SYSTEM BOUNDARY

The scope of the EPD is cradle-to-gate, including raw material extraction and processing, transportation, and product manufacture, including packaging. The life cycle phases included in the product system boundary are shown in the table below.

Table 4. *Life cycle phases included in the product system boundary.*

Product			Construction		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B1	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X = Module Included | MND = Module Not Declared

3.3 ALLOCATION

Manufacturing resource use was allocated to the products based on mass. Impacts from transportation were allocated based on the mass of material and distance transported.

The product system includes some recycled materials, which were allocated using the recycled content allocation method (also known as the 100-0 cut-off method). Using the recycled content allocation approach, system inputs with recycled content do not receive any burden from the previous life cycle other than reprocessing of the waste material. At end-of-life, materials which are recycled leave the system boundaries with no additional burden.

3.4 CUT-OFF RULES

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results. No known flows are deliberately excluded from this EPD.

3.5 DATA SOURCES

Primary data were provided by Kingspan Light + Air for the Lake Forest, Illinois facility. The primary source of secondary LCI data was the ecoinvent v3.11 database, with additional data obtained through EPDs published by upstream suppliers.

Table 5. Data sources for the Kingspan Light + Air polycarbonate daylighting systems.

Component	Dataset	Geography	Data Source	Publication Date
Product				
Aluminum Mix	Aluminum Extruders Council (AEC), mill finished aluminum extrusions.	North America	Industry wide EPD	2022
	Aluminum Extruders Council (AEC), anodized aluminum extrusions.	North America	Industry wide EPD	2022
	market for acrylic varnish, with water, in 53% solution state acrylic varnish, with water, in 53% solution state Cutoff, U	RoW	EI v3.11	2024
	market for polyester resin, unsaturated polyester resin, unsaturated Cutoff, U	RoW	EI v3.11	2024
	market for polyvinylfluoride polyvinylfluoride Cutoff, U	GLO	EI v3.11	2024
	market for solvent for paint solvent for paint Cutoff, U	GLO	EI v3.11	2024
	heat production, natural gas, at industrial furnace >100kW heat, district or industrial, natural gas Cutoff, U	RoW	EI v3.11	2024
Polycarbonate Panels	market for extrusion, plastic pipes extrusion, plastic pipes Cutoff, U	GLO	EI v3.11	2024
	market for polycarbonate polycarbonate Cutoff, U	RoW	EI v3.11	2024
Steel Hardware	market for steel, low-alloyed, hot rolled steel, low-alloyed, hot rolled Cutoff, U	GLO	EI v3.11	2024
	market for metal working, average for steel product manufacturing metal working, average for steel product manufacturing Cutoff, U	GLO	EI v3.11	2024
EPDM	market for synthetic rubber synthetic rubber Cutoff, U	GLO	EI v3.11	2024
Aluminum Vent Tape	market for sealing tape, aluminium/PE, 50 mm wide sealing tape, aluminium/PE, 50 mm wide Cutoff, U	GLO	EI v3.11	2024
Packaging				
Cardboard	market for corrugated board box corrugated board box Cutoff, U	US	EI v3.11	2024
Wood	market for EUR-flat pallet EUR-flat pallet Cutoff, U	RoW	EI v3.11	2024
Transport				
Air	transport, freight, aircraft, dedicated freight, long haul transport, freight, aircraft, long haul Cutoff, U	GLO	EI v3.11	2024
Truck	market for transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 Cutoff, U	RoW	EI v3.11	2024
Ship	transport, freight, sea, container ship, heavy fuel oil transport, freight, sea, container ship, heavy fuel oil Cutoff, U	GLO	EI v3.11	2024
Manufacture Inputs				
Electricity	market for electricity, medium voltage electricity, medium voltage Cutoff, U	RFCW	EI v3.11 EPA eGRID	2024
Natural Gas	heat production, natural gas, at industrial furnace >100kW heat, district or industrial, natural gas Cutoff, U	RoW	EI v3.11	2024
Propane	market for propane propane Cutoff, U	GLO	EI v3.11	2024
Waste Outputs				
Waste to Landfill	market for inert waste, for final disposal inert waste, for final disposal Cutoff, U	RoW	EI v3.11	2024
Waste to Recycling	Waste/unspecified	n/a	EI v3.11	2024
Direct Emissions	Carbon Dioxide/Emissions to air/unspecified	n/a	EI v3.11	2024
	Argon/Emissions to air/unspecified	n/a	EI v3.11	2024

3.6. DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 6. Data Quality Assessment.

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The manufacturer provided primary data on product manufacturing for the Lake Forest, IL facility on annual production for the year 2024. Representative datasets (secondary data) for upstream and background processes are generally less than 10 years old.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Electricity use for product manufacture is modeled using representative data modelled for the specific electricity grids represented in this study. Surrogate data used in the assessment are representative of global operations and are considered sufficiently similar to actual processes.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative component datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of the products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data used in the assessment represents typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent v3.11 data where available. Different portions of the product life cycle are equally considered.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of the data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at the Lake Forest, IL facility represent a 12-month average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. For secondary LCI data, Ecoinvent v3.11 data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the products and packaging is low. Actual supplier data for upstream operations was largely not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years) but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment methodology includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

3.7 PERIOD UNDER REVIEW

The period of review is based on a 12-month window from January 1, 2024, through December 31, 2024.

3.8 COMPARABILITY AND BENCHMARKING

The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

3.9 ESTIMATES AND ASSUMPTIONS

The assessment relied on a number of assumptions related to material composition, processing, and end-of-life. The major assumptions used in the assessment are described below.

- The Lake Forest, IL facility is located in the RFCW eGRID subregion. An Ecoinvent dataset was modified to reflect the electricity generation mix for this region.
- Kingspan Light + Air's polycarbonate daylighting systems contain three kinds of extruded aluminum: mill finished, anodized, and painted. Aluminum input to the product system was modeled using impacts from industry average EPDs for extruded aluminum products published by the Aluminum Extruders Council (AEC), of which Kingspan Light + Air's supplier is a member. However, due to inaccuracies in the EPD results for painted aluminum specifically, impacts from painted aluminum were modeled using a combination of the EPD results for mill finished, plus additional raw material flows sourced from the ecoinvent database. Additional primary data on energy consumption during the painting process was provided by Kingspan's upstream supplier.
- Using the aforementioned AEC EPDs, GWP results for aluminum input to the product system were only available using the IPCC 2013 LCIA methodology, not the TRACI 2.1 methodology as required by the PCR. As aluminum input is a significant source of impact for this product system, this LCA quantifies GWP using the IPCC 2013 to make best use of available data on the aluminum inputs.
- Primary data was not available regarding corrugate packaging consumption at Kingspan Light + Air's Lake Forest, IL facility. An assumption of 0.5lbs/ft² of product was used to model all products. This assumption was based on Kingspan Light + Air's previous LCA on the UniQuad® product.
- Specific data were not available on EPDM in the product recipe. Secondary datasets for synthetic rubber were used from the Ecoinvent database to represent this raw material in the LCA model.
- Per the PCR, transport of the manufacturing waste to waste treatment is assumed to be 32 km based on the US EPA WARM model.

4. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The following environmental impact category indicators are reported using characterization factors based on TRACI 2.1, CML-IA, LCIA, and IPCC 2013 methodologies according to the table below. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Table 7. *Mandatory environmental impact assessment categories.*

Impact Category	LCIA Methodology	Unit
GWP: Global Warming Potential	IPCC 2013	kg CO ₂ eq.
ODP: Depletion potential of the stratospheric ozone layer	TRACI 2.1	kg CFC 11 eq.
AP: Acidification Potential of soil and water	TRACI 2.1	kg SO ₂ eq.
EP: Eutrophication Potential	TRACI 2.1	kg N eq.
SFP: Smog Formation Potential	TRACI 2.1	kg O ₃ eq.
ADP_F: Abiotic Depletion Potential, fossil fuels	CML-IA Baseline	MJ, LHV

These impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes. The following inventory parameters, both (1) resource use, and (2) waste and output, are also reported as specified by the PCR.

Table 8. *Additional transparency categories.*

Resource Use Indicators	Unit	Waste and Output Indicators	Unit
RPR_E: Renewable primary resources used as energy carrier (fuel)	MJ, LHV	HWD: Hazardous waste disposed	kg
RPR_M: Renewable primary resources with energy content used as material	MJ, LHV	NHWD: Non-hazardous waste disposed	kg
NRPR_E: Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	ILLWD: Intermediate to low level radioactive waste, conditioned, to final repository	kg
NRPR_M: Non-renewable primary resources with energy content used as material	MJ, LHV	HLWD: High level radioactive waste, conditioned, to final repository	kg
SM: Secondary materials	kg	CRU: Components for re-use	kg
RSF: Renewable secondary fuels	MJ, LHV	MR: Materials for recycling	kg
NRSF: Non-renewable secondary fuels	MJ, LHV	MER: Materials for energy recovery	kg
RE: Recovered energy	MJ, LHV	EE: Recovered energy exported from the product system	MJ, LHV
FW: Use of new freshwater resources	m ³		

Per the PCR, results for the framing and glazing components of the fenestration assembly are presented separately. The “Glazing” column represents the impact of the polycarbonate panels, while the A1 -A3 life cycle modules represent the framing components. Glazing beads and stops, sealants, gaskets, and other parts that retain or support the glazing are considered as part of the framing assembly and not the glazing assembly. Note that transportation of polycarbonate panels to Kingspan's manufacturing facility is included in A2. All LCA results are stated to three significant figures in agreement with the PCR for this product and therefore the sum of the total values may not exactly equal 100%.

Table 9. LCIA indicator results for the Kingspan Light + Air **UniQuad® 76mm & 108mm** per 1m².

LCIA Indicator	Unit	Glazing	Framing Life Cycle Modules			
			A1	A2	A3	A1-A3 Total
UniQuad® (76mm)						
GWP	kg CO ₂ eq	32.3	67.7	2.85	13.4	83.9
ODP	kg CFC-11 eq	9.17x10 ⁻⁷	5.22x10 ⁻⁸	4.11x10 ⁻⁸	2.55x10 ⁻⁷	3.48x10 ⁻⁷
AP	kg SO ₂ eq	0.123	0.246	1.94x10 ⁻²	3.23x10 ⁻²	0.297
ODP	kg N eq	0.161	1.74x10 ⁻²	4.17x10 ⁻³	3.70x10 ⁻²	5.85x10 ⁻²
EP	kg O ₃ eq	1.84	2.37	0.419	0.505	3.30
ADP _F	MJ, LHV	552	716	38.2	176	930
UniQuad® (108mm)						
GWP	kg CO ₂ eq	32.3	92.7	3.17	15.4	111
ODP	kg CFC-11 eq	9.17x10 ⁻⁷	2.76x10 ⁻⁸	4.57x10 ⁻⁸	2.81x10 ⁻⁷	3.54x10 ⁻⁷
AP	kg SO ₂ eq	0.123	0.336	2.06x10 ⁻²	3.60x10 ⁻²	0.393
ODP	kg N eq	0.161	1.57x10 ⁻²	4.68x10 ⁻³	4.11x10 ⁻²	6.15x10 ⁻²
EP	kg O ₃ eq	1.84	3.23	0.449	0.567	4.25
ADP _F	MJ, LHV	552	961	42.6	203	1,210

Table 10. Resource use indicator results for the Kingspan Light + Air **UniQuad® 76mm & 108mm** per 1m².

LCIA Indicator	Unit	Glazing	Framing Life Cycle Modules			
			A1	A2	A3	A1-A3 Total
UniQuad® (76mm)						
RPR _E	MJ, LHV	23.8	318	0.507	51.5	369
RPR _M	MJ, LHV	0.00	2.07x10 ⁻⁷	0.00	44.5	44.5
NRPR _E	MJ, LHV	572	747	38.7	208	994
NRPR _M	MJ, LHV	0.00	4.15	0.00	0.00	4.15
SM	kg	0.00	5.95	0.00	0.00	5.95
RSF	MJ, LHV	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, LHV	0.00	0.00	0.00	0.00	0.00
RE	MJ, LHV	0.00	0.00	0.00	0.00	0.00
FW	m ³	2.84x10 ⁻²	2.15x10 ⁻²	1.53x10 ⁻³	4.95x10 ⁻²	7.26x10 ⁻²
UniQuad® (108mm)						
RPR _E	MJ, LHV	23.8	440	0.572	52.7	494
RPR _M	MJ, LHV	0.00	2.89x10 ⁻⁷	0.00	45.1	45.1
NRPR _E	MJ, LHV	572	1,000	43.1	241	1,290
NRPR _M	MJ, LHV	0.00	5.77	0.00	0.00	5.77
SM	kg	0.00	8.28	0.00	0.00	8.28
RSF	MJ, LHV	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, LHV	0.00	0.00	0.00	0.00	0.00
RE	MJ, LHV	0.00	0.00	0.00	0.00	0.00
FW	m ³	2.84x10 ⁻²	2.85x10 ⁻²	1.71x10 ⁻³	4.98x10 ⁻²	8.00x10 ⁻²

Table 11. Waste & Output indicator results for the Kingspan Light + Air **UniQuad® 76mm & 108mm** per 1m².

LCIA Indicator	Unit	Glazing	Framing Life Cycle Modules			
			A1	A2	A3	A1-A3 Total
UniQuad® (76mm)						
HWD	kg	0.00	1.43x10 ⁻²	0.00	0.00	1.43x10 ⁻²
NHWD	kg	0.00	17.9	0.00	2.21	20.1
HLRW	kg	0.00	2.48x10 ⁻⁵	0.00	0.00	2.48x10 ⁻⁵
ILLRW	kg	0.00	6.76x10 ⁻⁴	0.00	0.00	6.76x10 ⁻⁴
CRU	kg	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	2.42	0.00	2.30	4.72
MER	kg	0.00	0.00	0.00	0.00	0.00
EE	MJ, LHV	0.00	0.00	0.00	0.00	0.00
UniQuad® (108mm)						
HWD	kg	0.00	1.99x10 ⁻²	0.00	0.00	1.99x10 ⁻²
NHWD	kg	0.00	24.9	0.00	2.62	27.5
HLRW	kg	0.00	3.45x10 ⁻⁵	0.00	0.00	3.45x10 ⁻⁵
ILLRW	kg	0.00	9.41x10 ⁻⁴	0.00	0.00	9.41x10 ⁻⁴
CRU	kg	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	3.37	0.00	2.72	6.09
MER	kg	0.00	0.00	0.00	0.00	0.00
EE	MJ, LHV	0.00	0.00	0.00	0.00	0.00

Significant data limitations currently exist within the LCI data used to generate waste metrics for Life Cycle Assessments and Environmental Product Declarations. The waste metrics were calculated in a way conformant with the requirements of ISO 21930:2017, but these values represent rough estimates and are for informational purposes only. As such, no decisions regarding actual cradle-gate waste performance between products should be derived from these reported values.

6. LCA: Interpretation

A contribution analysis for the UniQuad® 76mm polycarbonate daylighting system demonstrates that the raw material extraction and processing stage (A1) is the dominant contributor to all LCIA indicators assessed, contributing between 77% and 88% of impact. The second most impactful life cycle stage was manufacturing (A3), which contributes between 8% and 20% of impact, followed by transport of raw materials, which contributes between 2% and 8% of impact across all indicators. This relationship holds true for the 108mm UniQuad® product, with A1 contributing 74%-89%, A3 contributing 7%-22%, and A2 contributing 2%-7%. Figure 3 and Figure 4 illustrate the results of this contribution analysis for the UniQuad® 76mm and 108mm polycarbonate daylighting systems, respectively. Note that percent figures lower than 5% are omitted for the sake of readability.

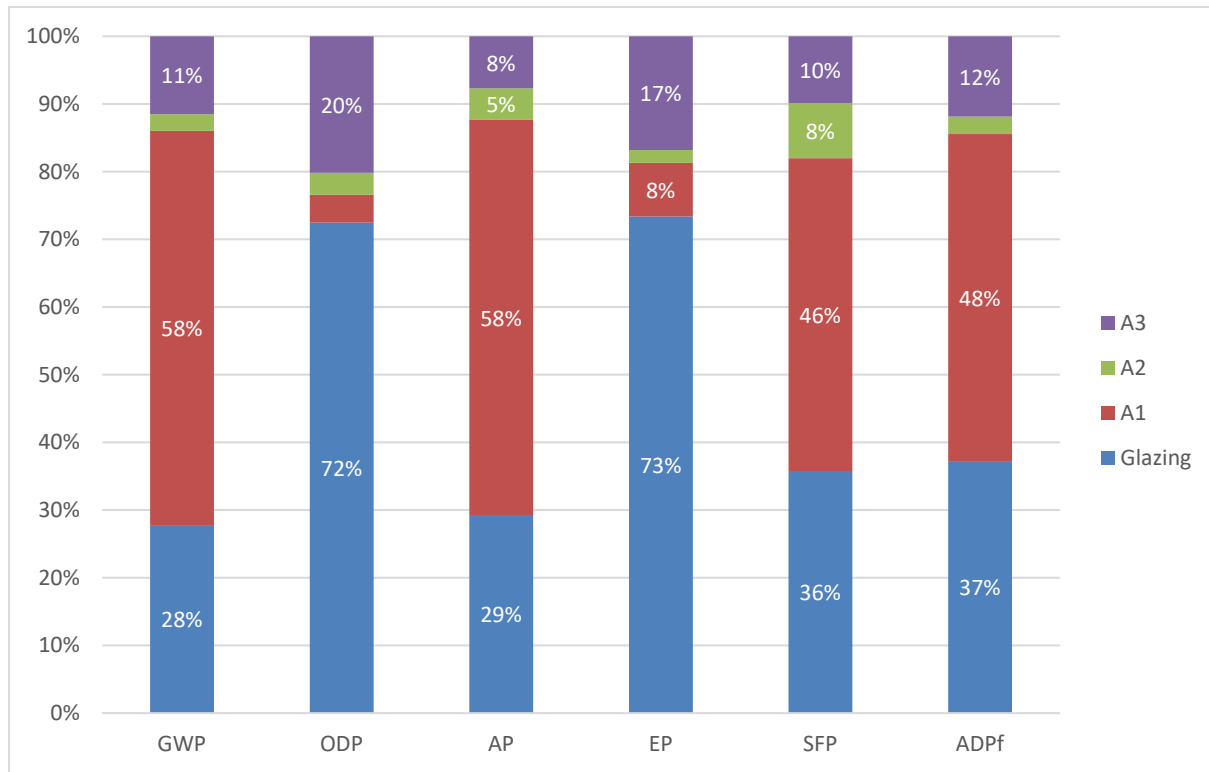


Figure 3. Contribution analysis of the Kingspan Light + Air **UniQuad® 76mm** polycarbonate daylighting system.

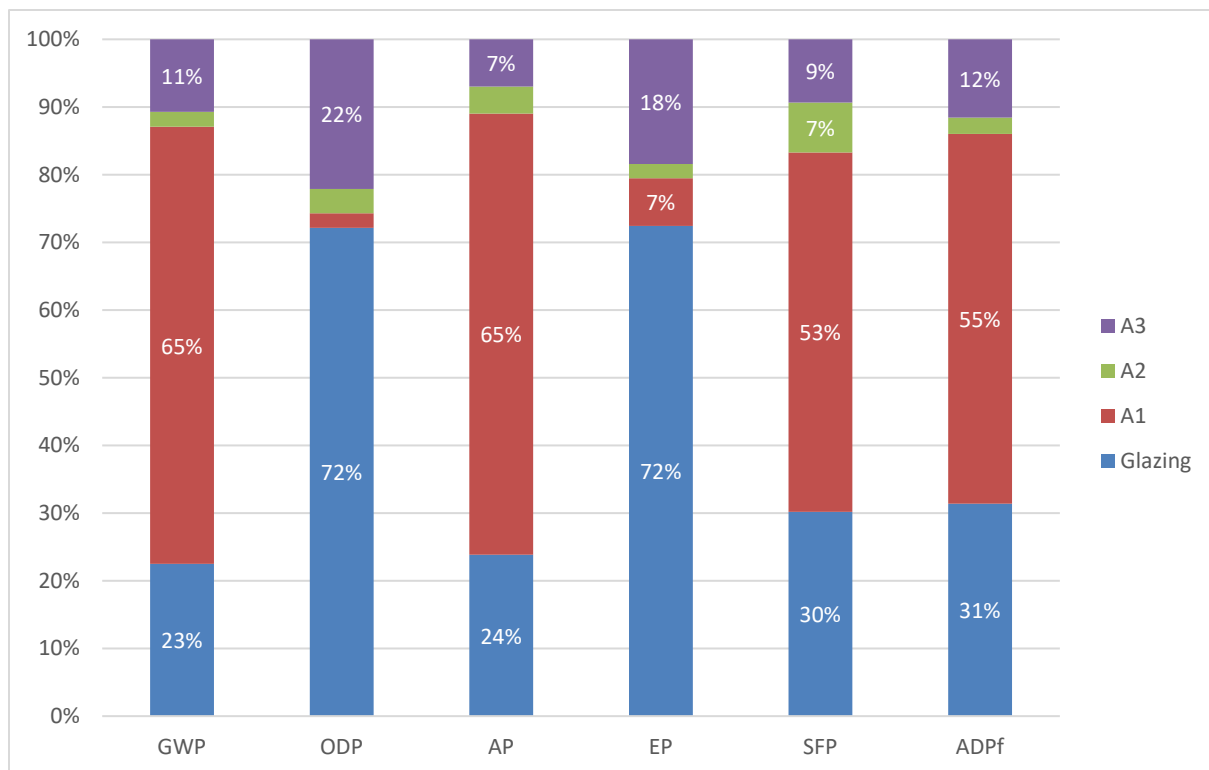


Figure 4. Contribution analysis of the Kingspan Light + Air **UniQuad® 108mm** polycarbonate daylighting system.

7. Additional Environmental Information

7.1 WARRANTY PERIOD

The warranty period for Kingspan Light + Air's polycarbonate daylighting system is 10 years

7.2 ENVIRONMENTAL ACTIVITIES AND CERTIFICATIONS

Kingspan Light + Air is a Kingspan group company. Kingspan understands its impact on the environment, both in terms of the role its products can play in optimizing energy efficiency, and the responsibility the company has with a global footprint of over 200 manufacturing facilities and over 22,000 employees. Kingspan seeks to operate as sustainability as possible throughout its supply chain.

Planet Passionate is Kingspan's global sustainability program that aims to impact three global issues: climate change, circulatory, and protection of our natural world. Through Planet Passionate, Kingspan will contribute to the world's renewable energy mix, reduce carbon emissions, divert waste from landfill, conserve water, provide upcycling solutions for plastic waste, and help clean the world's oceans and protect biodiversity.

The strategy is made up of ambitious targets that address the impact of Kingspan's business operations and manufacturing of the four key areas of energy, carbon, circularity, and water, with commitments by 2030 to include:

- Energy: Powering 60% of all Kingspan operations directly from renewable energy with a minimum of 20% of this energy generated on manufacturing sites. (This will include installing solar PV on all wholly owned facilities).
- Carbon: Achieving a 65% GHG emissions reduction and a 50% reduction in product CO₂ intensity from primary supply partners.
- Circularity: 1.5 million tons of recycled/renewable raw materials used annually.
- Water: Harvesting 100 million liters of rainwater annually.
- Waste: Target of zero company waste sent to landfill.

7.3 FURTHER INFORMATION

Further information on the product can be found on the manufacturer's website at www.kingspanlightandair.us

8. References

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