

**Declaration Owner**

Skyfold Inc.

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Products

Zenith® & Zenith® Premium Series Movable Walls:

- Zenith®/Zenith® Premium - Dune 4505*
- Zenith®/Zenith® Premium - Carnegie Premium*
- Zenith®/Zenith® Premium - Lentex Wallcovering*

Functional Unit

The functional unit is one square meter of movable wall system product maintained for 75 years

EPD Number and Period of Validity

SCS-EPD-06126

EPD Valid April 30, 2020 through April 29, 2025

Product Category Rule

ISO 21930:2017. Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.

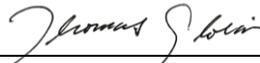
Program Operator

SCS Global Services

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Declaration Owner:	Skyfold, Inc
Address:	325 avenue Lee, Montréal, Québec, Canada H9X 3S3
Declaration Number:	SCS-EPD-06126
Declaration Validity Period:	April 30, 2020 through April 29, 2025
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Gerard Mansell, PhD.
LCA Software:	OpenLCA 1.7
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	<input type="checkbox"/> internal <input checked="" type="checkbox"/> external
LCA Reviewer:	 _____ Tom Gloria, Ph.D., Industrial Ecology Consultants
Product Category Rule:	ISO 21930:2017. Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.
PCR Review conducted by:	
Independent verification of the declaration and data, according to ISO 14025 and the PCR	<input type="checkbox"/> internal <input checked="" type="checkbox"/> external
EPD Verifier:	 _____ Tom Gloria, Ph.D., Industrial Ecology Consultants
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<p>Disclaimers: This EPD conforms to ISO 14025, 14040, 14044, and ISO 21930.</p> <p>Scope of Results Reported: The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.</p> <p>Accuracy of Results: Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.</p> <p>Comparability: 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.</p> <p><i>In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.</i></p>	

1. About Skyfold

At Skyfold Inc., we think vertical: we are the acoustic leader in vertically folding retractable walls. Our walls are more than just space dividers: they are innovative, custom, electric and premium multipurpose space solutions that allow architects, interior designers, contractors and end-users to redefine how a space is used. The easy-to-use, self-retracting system and vertical motion of the operable wall give users the flexibility to quickly divide or expand spaces. When deployed, Skyfold becomes a two-sided, rigid wall and acoustic barrier with acoustic ratings of up to STC 60 (RW 59) and NRC/SAC of up to 0.65. The STC (sound transmission class) rating signifies how little sound is transmitted from one room to the next through the partition system; NRC (Noise Reduction Coefficient), on the other hand, signifies how much noise is dissipated and absorbed into the wall. When not in use, the Skyfold wall disappears into the ceiling for the user to maximize their floor space.

Our solutions are not just soundproofing partition walls used to reconfigure spaces; they are created to be multipurpose design pieces that live within a space. With a wide selection of finish options that can be mix-and-matched, your Skyfold wall can be customized to complement, and even enhance, your space's design. Our standard white markerboard surface finish further transforms a partition wall into a projection screen and a writing surface that colleagues or students can use to brainstorm and that teachers can use for lecture notes.

With over 7000 walls installed worldwide, Skyfold is the premium choice for architects, contractors and interior designers.

2. Product

The Zenith® Series surpasses industry expectations. Zenith® has the vertical innovation and acoustical elements found in the Classic Series, but with a straight down deployment. The fully automated operable wall combines functionality with aesthetic appeal to help create a unique space. Zenith® movable walls are ideal for areas with limited space, like offices and classrooms. The Zenith® features Skyfold's widest range of STC (RW) ratings to suit all acoustic needs. The products assessed include the following:

- Zenith®/Zenith® Premium - Dune 4505 - Polyester fabric coating
- Zenith®/Zenith® Premium - Carnegie Premium – Polypropylene carpet coating
- Zenith®/Zenith® Premium – Lentex Wallcovering – Vinyl fabric coating

Skyfold's movable wall system products are manufactured at the company's production facility in Montréal, Québec, Canada. All electrical components within Skyfold Zenith® movable wall systems are RoHS EU compliant. The products are constructed from a variety of materials including steel, aluminum, plastics, textiles and coatings sourced from various suppliers. Impact results are presented as a production-weighted average across the three products within the Zenith® Series product line

2.2 Application

Skyfold Zenith® movable wall systems are intended for interior applications including commercial office environments, education, healthcare, hospitality, convention facilities, and multi-purpose spaces providing the primary function of partitioning interior spaces.

2.3 Technical Data

Technical specifications of the products included in the LCA scope, as well as product performance testing results are available on the manufacturer's website (<https://www.skyfold.com/en-US/products>).

2.4 Base Materials

The primary materials include steel, aluminum, plastics, textiles and coatings sourced from various suppliers. Packaging materials consist of plastic, steel and wood pallets.

Table 1. Material content for the Skyfold Zenith® products in kg per square meter and percent of total mass.

Material	Zenith® - Dune 4505		Zenith® - Carnegie Premium		Zenith® - Len-tex Wallcovering	
	kg/m ²	Percent	kg/m ²	Percent	kg/m ²	Percent
Steel	42.8	72%	42.8	72%	42.8	70%
Aluminum	4.96	8.4%	4.96	8.4%	4.96	8.1%
Cast iron	3.23	5.5%	3.23	5.5%	3.23	5.3%
Vinyl	3.30	5.6%	2.88	4.9%	5.21	8.5%
Fiberglass	1.98	3.3%	1.98	3.3%	1.98	3.2%
Paper	1.70	2.9%	1.70	2.9%	1.70	2.8%
Other	0.510	0.86%	0.510	0.86%	0.510	0.84%
Rubber	0.306	0.52%	0.306	0.52%	0.306	0.50%
Plastic	0.220	0.37%	0.640	1.1%	0.220	0.36%
Nylon	4.28x10 ⁻²	0.07%	4.28x10 ⁻²	0.07%	4.28x10 ⁻²	0.07%
Non-ferro Metals	7.52x10 ⁻³	0.01%	7.52x10 ⁻³	0.01%	7.52x10 ⁻³	0.01%
Total Product	59.0	100%	59.0	100%	60.9	100%

Table 2. Material content for the Skyfold Zenith® Premium products in kg per square meter and percent of total mass.

Material	Zenith® Premium - Dune 4505		Zenith® Premium - Carnegie Premium		Zenith® Premium - Len-tex Wallcovering	
	kg/m ²	Percent	kg/m ²	Percent	kg/m ²	Percent
Steel	42.8	72%	42.8	72%	42.8	70%
Aluminum	4.96	8.4%	4.96	8.4%	4.96	8.1%
Cast iron	3.23	5.5%	3.23	5.5%	3.23	5.3%
Vinyl	3.30	5.6%	2.88	4.9%	5.21	8.5%
Fiberglass	1.98	3.3%	1.98	3.3%	1.98	3.2%
Paper	1.70	2.9%	1.70	2.9%	1.70	2.8%
Other	0.510	0.86%	0.510	0.86%	0.510	0.84%
Rubber	0.306	0.52%	0.306	0.52%	0.306	0.50%
Plastic	0.220	0.37%	0.640	1.1%	0.220	0.36%
Nylon	4.28x10 ⁻²	0.07%	4.28x10 ⁻²	0.07%	4.28x10 ⁻²	0.07%
Non-ferro Metals	7.52x10 ⁻³	0.01%	7.52x10 ⁻³	0.01%	7.52x10 ⁻³	0.01%
Total Product	59.0	100%	59.0	100%	60.9	100%

Table 3. Material content for the Skyfold Zenith® product packaging, per square meter.

Material	Zenith® - Dune 4505		Zenith® - Carnegie Premium		Zenith® - Len-tex Wallcovering	
	kg/m ²	Percent	kg/m ²	Percent	kg/m ²	Percent
Plastic	1.73x10 ⁻²	0.05%	1.73x10 ⁻²	0.05%	1.73x10 ⁻²	0.05%
Wood	37.6	99%	37.6	99%	37.6	99%
Steel	0.366	0.96%	0.366	0.96%	0.366	0.96%
Total Packaging	38.0	100%	38.0	100%	38.0	100%

Table 4. Material content for the Skyfold Zenith® Premium product packaging, per square meter.

Material	Zenith® Premium - Dune 4505		Zenith® Premium - Carnegie Premium		Zenith® Premium - Len-tex Wallcovering	
	kg/m ²	Percent	kg/m ²	Percent	kg/m ²	Percent
Plastic	1.73x10 ⁻²	0.05%	1.73x10 ⁻²	0.05%	1.73x10 ⁻²	0.05%
Wood	38.0	99%	38.0	99%	38.0	99%
Steel	0.366	0.95%	0.366	0.95%	0.366	0.95%
Total Packaging	38.4	100%	38.4	100%	38.4	100%

2.5 Manufacture

Skyfold's movable wall system products are manufactured at the company's production facility in Montreal, Quebec. Resources use at the production facility is allocated to the product based on mass.

2.6 Environment and Health during Manufacture

No environmental or health impacts are expected during the manufacture of the product.

2.7 Product Processing/Installation

Typical installation is accomplished using hand tools. Skyfold deploys its own, specially-trained assembly teams for installation.

2.8 Packaging

The Skyfold products are packaged for shipment using plastic wrap, steel banding and wood pallets.

2.9 Condition of Use

No special conditions of use are noted.

2.10 Environment and Health during use

No environmental or health impacts are expected due to normal use of the movable wall system product.

2.11 Reference Service Life

The Reference Service Life (RSL) of the movable wall product is based on the manufacturer's warranted lifetime and is summarized in Table 5 below. The building Estimated Service Life (ESL) is 75 years, consistent with the PCR.

2.12 Extraordinary Effects

No environmental or health impacts are expected due to extraordinary effects including fire and/or water damage and unforeseeable mechanical destruction.

2.13 Further Information

Further information on the product can be found on the manufacturers' website at:
<https://www.skyfold.com/en-US/products>

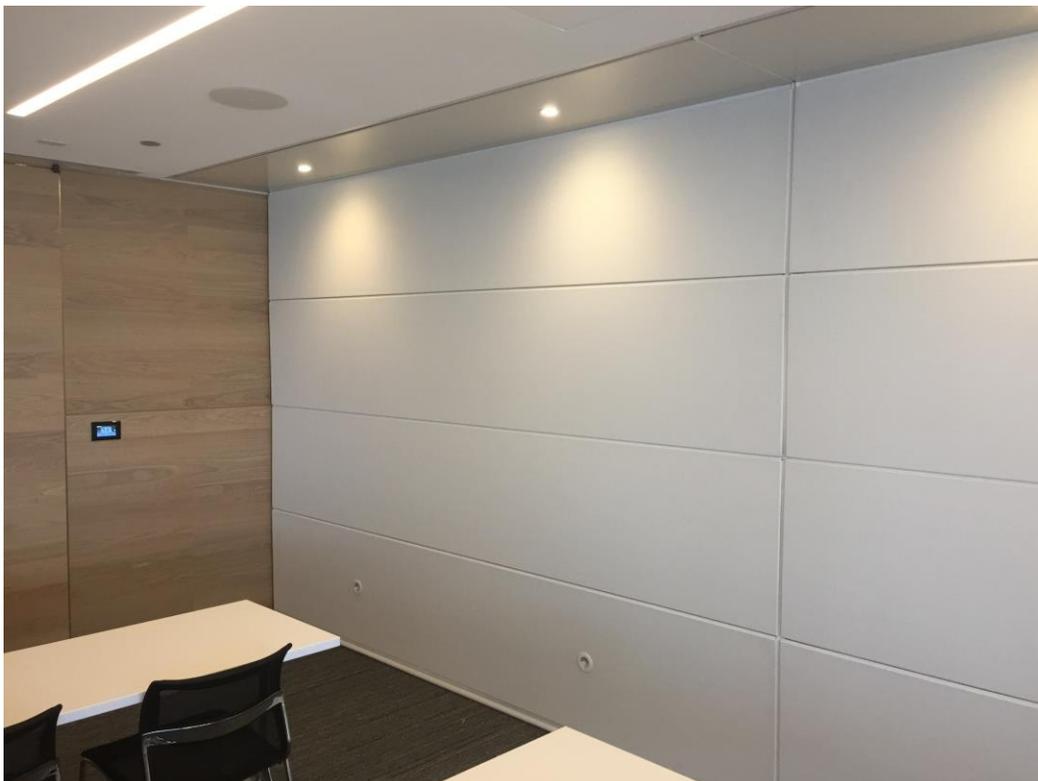
3. LCA: Calculation Rules

3.1 Functional Unit

The functional unit used in the study is defined as 1 m² of movable wall system product maintained for 75 years. The reference flows for each product are summarized in Table 5.

Table 5. Reference flows for the Skyfold Zenith® products, per square meter.

Product	Reference flow (kg/m ²)	Reference Service Life (RSL)	Replacement Cycle (ESL/RSL-1)
Zenith® - Dune 4505	59.0	10	6.5
Zenith® - Carnegie Premium	59.0	10	6.5
Zenith® - Len-tex Wallcovering	60.9	10	6.5
Zenith® Premium - Dune 4505	59.0	10	6.5
Zenith® Premium - Carnegie Premium	59.0	10	6.5
Zenith® Premium - Len-tex Wallcovering	60.9	10	6.5



3.2 System Boundary

The scope of the EPD is cradle-to-grave, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal. The life cycle phases included in the EPD scope are described in Table 6 and illustrated in Figure 1.

Table 6. *The modules and unit processes included in the scope for the Skyfold Classic™ products.*

Module	Module description from the PCR	Unit Processes Included in Scope
A1	Extraction and processing of raw materials; any reuse of products or materials from previous product systems; processing of secondary materials; generation of electricity from primary energy resources; energy, or other, recovery processes from secondary fuels	Extraction and processing of raw materials for the movable wall system components.
A2	Transport (to the manufacturer)	Transport of component materials to the manufacturing facilities
A3	Manufacturing, including ancillary material production	Manufacturing of products and packaging (incl. upstream unit processes*)
A4	Transport (to the building site)	Transport of product (including packaging) to the building site
A5	Construction-installation process	Impacts from the installation of product are assumed negligible. Only impacts from packaging disposal are included in this phase
B1	Product use	Use of the wall system in a commercial building setting. Impacts from electricity consumption associated with the use of the products are included in this phase.
B2	Product maintenance	Maintenance of products over the 75-year ESL, including periodic cleaning. Impacts from product maintenance are assumed negligible.
B3	Product repair	The products are not expected to require repair over its lifetime
B4	Product replacement	The materials and energy required for replacement of the product over the 75-year ESL of the assessment are included in this phase..
B5	Product refurbishment	The products are not expected to require refurbishment over their lifetime
B6	Operational energy use by technical building systems	There is no operational energy use associated with the use of the product
B7	Operational water use by technical building systems	There is no operational water use associated with the use of the product
C1	Deconstruction, demolition	Demolition of the product is accomplished using hand tools with no associated emissions and negligible impacts
C2	Transport (to waste processing)	Transport of the product to waste treatment at end-of-life
C3	Waste processing for reuse, recovery and/or recycling	The products are disposed of by landfilling or incineration which require no waste processing
C4	Disposal	Disposal of the product in a municipal landfill or incineration
D	Reuse-recovery-recycling potential	Module Not Declared

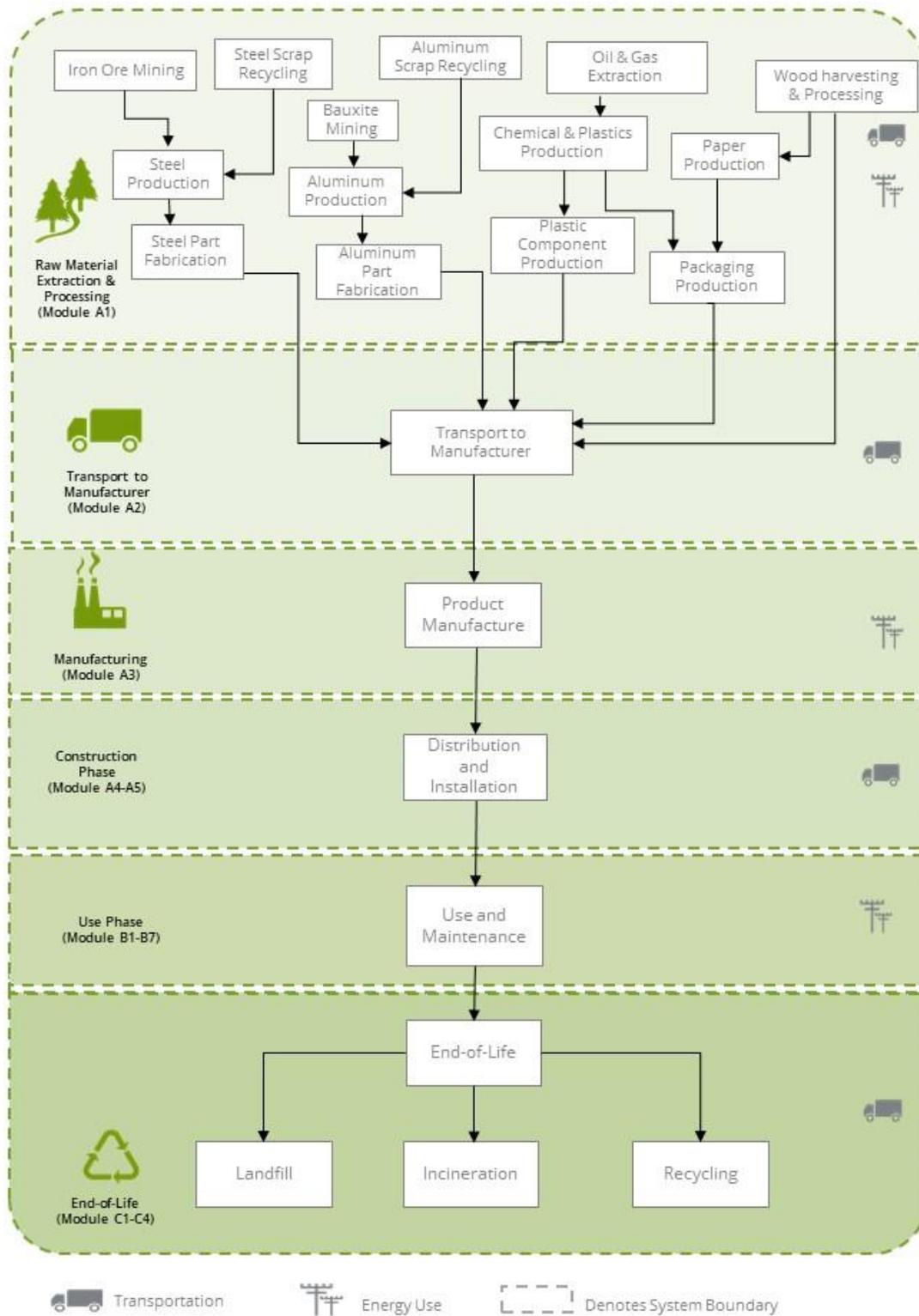


Figure 1. Flow diagram representing the major unit operations in the life cycle of the Skyfold Zenith® products.

3.3 Estimates and Assumptions

- Skyfold's manufacturing facility is located in Montreal, Quebec, Canada. An Ecoinvent inventory dataset for the energy mix for the Quebec, Canada subregion is used to estimate resource use and emissions from electricity use at the manufacturing facility.
- Electricity and resource use at the production facility were allocated to the movable wall system products based on product mass utilizing annualized production data for June 2018 – May 2019 provided by the manufacturer.
- Primary data for upstream component fabrication were not available. Representative LCI datasets from the ecoinvent database were used to model processing for aluminum and steel material components.

It should also be noted that LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The PCR allows for the results for several inventory flows related to construction products to be reported as "other parameters". These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted taking into account this limitation.

3.4 Cut-off criteria

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 Background Data

Primary data were provided by Skyfold for the Montreal manufacturing facility. The sources of secondary LCI data are the Ecoinvent database.



Table 7. Data sources for the Skyfold Zenith® product system.

Component	Material Dataset	Data Source	Publication Date
Product			
Steel			
Steel (Galvannealed)	steel production, electric, low-alloyed steel, low-alloyed Cutoff/CA-QC	EI v3.6	2019
Steel	steel production, electric, low-alloyed steel, low-alloyed Cutoff/CA-QC	EI v3.6	2019
Steel (Galvanized)	steel production, electric, low-alloyed steel, low-alloyed Cutoff/CA-QC	EI v3.6	2019
Steel (Zinc Plated)	steel production, electric, low-alloyed steel, low-alloyed Cutoff/CA-QC	EI v3.6	2019
Steel (Stainless)	steel production, electric, low-alloyed steel, low-alloyed Cutoff/CA-QC	EI v3.6	2019
Aluminum			
Primary aluminum	Aluminum, primary ingot - LCI CA-QC	EI v3.6	2019
Pre-consumer recycled Al	aluminium scrap, new, Recycled Content cut-off aluminium scrap, new Cutoff - GLO	EI v3.6	2019
Post-consumer recycled Al	market for aluminium scrap, post-consumer, prepared for melting aluminium scrap, post-consumer, prepared for melting Cutoff - GLO	EI v3.6	2019
Cast iron	market for cast iron cast iron Cutoff/GLO	EI v3.6	2019
Vinyl			
PVC	market for polyvinylchloride, bulk polymerised polyvinylchloride, bulk polymerised Cutoff/GLO	EI v3.6	2019
Vinyl	market for polyvinylchloride, bulk polymerised polyvinylchloride, bulk polymerised Cutoff/GLO	EI v3.6	2019
Len-tex Wallcoverings	LenTex vinyl wallcovering /kg	EI v3.6	2019
Fibreglass	market for glass fibre glass fibre Cutoff/GLO	EI v3.6	2019
Paper	market for kraft paper, unbleached kraft paper, unbleached Cutoff/GLO	EI v3.6	2019
Adhesive	market for polyurethane, flexible foam polyurethane, flexible foam Cutoff/RoW	EI v3.6	2019
Rubber	market for synthetic rubber synthetic rubber Cutoff/GLO	EI v3.6	2019
Plastic			
Foam	market for polyurethane, flexible foam polyurethane, flexible foam Cutoff/RoW	EI v3.6	2019
Plastic	market for polyethylene terephthalate, granulate, amorphous polyethylene terephthalate, granulate, amorphous Cutoff/GLO	EI v3.6	2019
Carnegie Premium Selection	polypropylene fabric (from CRI data) System/GLO	CRI ¹ ; EI v3.6	2016; 2019
Dune 4505	PET fabric System/GLO	CRI ¹ ; EI v3.6	2016; 2019
Nylon	market for nylon 6 nylon 6 Cutoff/GLO	EI v3.6	2019
Non-ferro Metals			
Copper	market for copper copper Cutoff/GLO	EI v3.6	2019
Brass	market for brass brass Cutoff/RoW	EI v3.6	2019
Total			
Packaging			
Packaging plastic	market for packaging film, low density polyethylene packaging film, low density polyethylene Cutoff/GLO	EI v3.6	2019
Wood pallet	EUR-flat pallet production EUR-flat pallet Cutoff, U /kg - LCI/GLO	EI v3.6	2019
Steel	worldsteel Data - Hot Dip Galvanized Steel (Steel Banding) System/GLO	EI v3.6	2019
Resources			
Grid electricity	market for electricity, medium voltage electricity, medium voltage Cutoff/CA-QC	EI v3.6	2019
Heat – natural gas	market group for heat, district or industrial, natural gas heat, district or industrial, natural gas Cutoff/GLO	EI v3.6	2019
Transport			
Truck	market for transport, freight, lorry 16-32 metric ton, EURO4 transport, freight, lorry 16-32 metric ton, EURO4 Cutoff/RoW	EI v3.6	2019
Rail	market for transport, freight train transport, freight train Cutoff/US	EI v3.6	2019
Ship	transport, freight, sea, transoceanic ship transport, freight, sea, transoceanic ship Cutoff/GLO	EI v3.6	2019

¹ Carpet and Rug Institute.

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 8. Data quality assessment for the Skyfold Zenith® product system.

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 5 years old (typically 2016). All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annualized production for 2018-19.
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 for the Quebec, Canada electricity mix. Surrogate data used in the assessment are representative of global or European operations. Data representative of European operations 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 fabrication 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 or 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 represent 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 v3.6 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 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 Skyfold's facility in Montréal, Québec represent an annual 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 datasets Ecoinvent v3.6 LCI data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the product and packaging is low. Actual supplier data for upstream operations was 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 method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

3.7 Period under review

The period of review is June 2018 - May 2019.

3.8 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.

3.9 Comparability

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.

4. LCA: Scenarios and Additional Technical Information

Delivery and Installation stage (A4 - A5)

Distribution of the products to the point of installation is included in the assessment. Transportation parameters for modeling product distribution are summarized in Table 9. Production-weighted average distances by transport mode were used to represent global product distribution.

Table 9. Product distribution parameters, per 1 m² (A4).

Transport Parameter	Unit	Zenith®			Zenith® Premium		
		Dune 4505	Carnegie Premium	Len-tex Wallcovering	Dune 4505	Carnegie Premium	Len-tex Wallcovering
Diesel truck – Fuel utilization	L/100 km	18.7	18.7	18.7	18.7	18.7	18.7
Diesel truck – Capacity utilization	%	76%	76%	76%	76%	76%	76%
Diesel truck – Distance	km	2,443	709	1,875	2,443	709	1,875
Freight train – Fuel utilization	g/tkm	18.7	18.7	18.7	18.7	18.7	18.7
Freight train – Capacity utilization	%	76%	76%	76%	76%	76%	76%
Freight train – Distance	km	33	0	0	33	0	0
Ocean freighter – Fuel utilization	g/tkm	2.5	2.5	2.5	2.5	2.5	2.5
Ocean freighter – Capacity utilization	%	65%	65%	65%	65%	65%	65%
Ocean freighter – Distance	km	682	376	1,104	682	376	1,104
Gross mass of products transported (including packaging)	kg	97.0	97.0	98.9	97.4	97.4	99.3

The impacts associated with the product installation are assumed negligible. The impacts associated with packaging disposal are included with the installation phase as per PCR requirements.

Table 10. Installation parameters for the Skyfold movable wall system products, per 1 m².

Parameter	Zenith®			Zenith® Premium		
	Dune 4505	Carnegie Premium	Len-tex Wallcovering	Dune 4505	Carnegie Premium	Len-tex Wallcovering
Ancillary materials (kg)	-	-	-	-	-	-
Net freshwater consumption (m ³)	-	-	-	-	-	-
Electricity consumption (kWh)	-	-	-	-	-	-
Product loss per functional unit (kg)	negligible	negligible	negligible	negligible	negligible	negligible
Waste materials generated by product installation (kg)	negligible	negligible	negligible	negligible	negligible	negligible
Output materials resulting from on-site waste processing (kg)	na	na	na	na	na	na
Mass of packaging waste (kg)	Plastic	1.73x10 ⁻²				
	Wood	37.6	37.6	37.6	37.6	38.0
	Steel	0.366	0.366	0.366	0.366	0.366
Biogenic carbon contained in packaging (kg CO ₂)	66.2	66.2	66.2	66.9	66.9	66.9
Direct emissions to ambient air, soil and water (kg)	-	-	-	-	-	-

Use stage (B1)

Impacts from the use of the product are modeled based on energy consumption data provided by the manufacturer representing typical operating conditions. The parameters used to model the product use phase are summarized in Table 11.

Table 11. Operational energy use for the movable wall system product.

Parameter	Zenith®			Zenith® Premium		
	Dune 4505	Carnegie Premium	Len-tex Wallcovering	Dune 4505	Carnegie Premium	Len-tex Wallcovering
Electricity (kWh/yr)	61.98	61.98	61.98	93.54	93.54	93.54
Further assumptions	Typical operation (weekly)					

Maintenance stage (B2)

Impacts from routine cleaning and maintenance of the products are assumed negligible.

Repair/Refurbishment stage (B3; B5)

Product repair and refurbishment are not relevant during the lifetime of the product.

Replacement stage (B4)

The materials and energy required for replacement of the product over the 75-year RSL of the assessment are included in this stage.

Building operation stage (B6 – B7)

There is no operational energy or water use associated with the use of the product.

Disposal stage (C1 - C4)

The disposal stage includes removal of the products (C1); transport of the products to waste treatment facilities (C2); waste processing (C3); and associated emissions as the product degrades in a landfill or is burned in an incinerator (C4). For the movable wall system products, no emissions are generated during demolition (C1) while no waste processing (C3) is required for incineration or landfill disposal.

Transportation of waste materials at end-of-life (C2) assumes a 20 mile (~32 km) average distance to disposal, consistent with assumptions used in the US EPA WARM model. The recycling rates used for the product and packaging are based on regional statistics regarding municipal solid waste generation and disposal in the United States for 2015, from the US Environmental Protection Agency. The relevant disposal statistics used for the packaging are summarized in Table 12 and Table 13. For material not recycled, 80% are assumed landfilled and 20% incinerated.

Table 12. Recycling rates for product and packaging materials at end-of-life.

	Product Recycling Rate (%)	Packaging Recycling Rate (%)
Recycling Rates		
Non-ferro	67.6%	n/a
Plastic	6.6%	14.6%
Paper & Pulp	79.0%	n/a
Rubber	20.5%	n/a
Steel	27.8%	5.4%
Textile	13.7%	n/a
Wood	-	26.1%
Disposal of Non-recyclables		
Landfill	80.0%	80.0%
Incineration	20.0%	20.0%

Table 13. End-of-life disposal scenario parameters for the flooring products.

Parameter		Zenith®			Zenith® Premium		
		Dune 4505	Carnegie Premium	Dune 4505	Carnegie Premium	Dune 4505	Carnegie Premium
Assumptions for scenario development		USEPA	USEPA	USEPA	USEPA	USEPA	USEPA
Collection process	Collected separately	-	-	-	-	-	-
	Collected with mixed construction waste	785	785	799	788	788	802
Recovery		-	-	-	-	-	-
Disposal	Recycling	260	260	262	261	261	263
	Landfill	420	420	429	421	421	431
	Incineration	105	105	107	105	105	108
Removals of biogenic carbon (excluding packaging) (kg CO ₂ eq)		92.8	92.7	92.6	100	100	100

5. 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.

Table 14. Life cycle phases included in the product system boundary.

Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B2	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	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

X = Included in system boundary

MND = Module not declared

The following environmental impact category indicator are reported using characterization factors based on the U.S. EPA's Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts – TRACI:

Impact Category	Unit
Global Warming Potential (GWP 100)	kg CO ₂ eq
Ozone Depletion Potential (ODP)	kg CFC 11 eq
Acidification Potential (AP)	kg SO ₂ eq
Eutrophication Potential (EP)	kg N eq
Smog Formation Potential (POCP)	kg O ₃ eq
Fossil Fuel Depletion Potential (FFD)	MJ Surplus, LHV

These six 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 optional environmental impact category indicators are also reported based on the CML-IA characterization factors:

Impact Category	Unit
Global Warming Potential (GWP 100)	kg CO ₂ eq
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq
Acidification Potential of soil and water (AP)	kg SO ₂ eq
Eutrophication Potential (EP)	kg (PO ₄) ³⁻ eq
Photochemical Oxidant Creation Potential (POCP)	kg C ₂ H ₄ eq
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ, LHV



Table 15. CML Life Cycle Impact Assessment (LCIA) results for the Skyfold Zenith®/Zenith® Premium products per 1 m². Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Zenith® - Dune 4505; Zenith® - Carnegie Premium; Zenith® - Len-tex Wallcovering.

Module	GWP	ODP	AP	EP	POCP	ADPE	ADPF
	kg CO ₂ eq	kg CFC-11 eq	kg SO ₂ eq	kg (PO ₄) ³⁻ eq	kg C ₂ H ₄ eq	kg Sb eq	MJ eq
Total	2,890	2.91x10 ⁻⁴	24.8	11.0	1.21	5.24x10 ⁻⁴	32,300
	100%	100%	100%	100%	100%	100%	100%
A1	231	2.17x10 ⁻⁵	2.62	1.24	0.127	6.89x10 ⁻⁵	2,620
	8.0%	7.5%	11%	11%	11%	13%	8.1%
A2	27.0	4.74x10 ⁻⁶	0.106	2.52x10 ⁻²	3.68x10 ⁻³	2.77x10 ⁻⁸	398
	0.93%	1.6%	0.43%	0.23%	0.30%	0.01%	1.2%
A3	41.2	3.75x10 ⁻⁶	0.107	4.40x10 ⁻²	1.30x10 ⁻²	9.81x10 ⁻⁸	532
	1.4%	1.3%	0.43%	0.40%	1.1%	0.02%	1.6%
A4	34.7	5.97x10 ⁻⁶	0.324	4.93x10 ⁻²	9.34x10 ⁻³	3.01x10 ⁻⁸	496
	1.2%	2.1%	1.3%	0.45%	0.77%	0.01%	1.5%
A5	3.74	3.37x10 ⁻⁷	9.55x10 ⁻³	6.32x10 ⁻²	6.48x10 ⁻⁴	1.03x10 ⁻⁹	27.6
	0.13%	0.12%	0.04%	0.57%	0.05%	0.00%	0.09%
B1	321	1.33x10 ⁻⁵	0.932	0.264	4.83x10 ⁻²	6.47x10 ⁻⁶	1,390
	11%	4.6%	3.8%	2.4%	4.0%	1.2%	4.3%
B2	0	0	0	0	0	0	0
B3	0	0	0	0	0	0	0
B4	2,230	2.40x10 ⁻⁴	20.7	9.32	1.00	4.49x10 ⁻⁴	26,700
	77%	83%	83%	85%	83%	86%	83%
B5	0	0	0	0	0	0	0
B6	0	0	0	0	0	0	0
B7	0	0	0	0	0	0	0
C1	0	0	0	0	0	0	0
C2	2.43	4.23x10 ⁻⁷	1.13x10 ⁻²	2.45x10 ⁻³	3.75x10 ⁻⁴	6.63x10 ⁻¹⁰	33.2
	0.08%	0.15%	0.05%	0.02%	0.03%	0.00%	0.10%
C3	0	0	0	0	0	0	0
C4	2.84	5.44x10 ⁻⁸	1.61x10 ⁻³	1.23x10 ⁻²	3.45x10 ⁻⁴	6.58x10 ⁻¹⁰	3.51
	0.10%	0.02%	0.01%	0.11%	0.03%	0.00%	0.01%
D	MND	MND	MND	MND	MND	MND	MND

Table 16. TRACI Life Cycle Impact Assessment (LCIA) results for the Skyfold Zenith®/Zenith® Premium products per 1 m². Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Zenith® - Dune 4505; Zenith® - Carnegie Premium; Zenith® - Len-tex Wallcovering.

Module	GWP	ODP	AP	EP	SFP	FFD
	kg CO ₂ eq	kg CFC-11 eq	kg SO ₂ eq	kg N eq	kg O ₃ eq	MJ eq
Total	2,860	3.67x10 ⁻⁴	25.4	23.6	268	3,530
	100%	100%	100%	100%	100%	100%
A1	228	2.67x10 ⁻⁵	2.63	2.72	19.0	252
	8.0%	7.3%	10%	12%	7.1%	7.1%
A2	26.9	6.30x10 ⁻⁶	0.124	3.15x10 ⁻²	2.95	53.5
	0.94%	1.7%	0.49%	0.13%	1.1%	1.5%
A3	40.5	4.57x10 ⁻⁶	0.117	8.59x10 ⁻²	4.17	68.5
	1.4%	1.2%	0.46%	0.36%	1.6%	1.9%
A4	34.7	7.94x10 ⁻⁶	0.355	4.36x10 ⁻²	7.20	67.2
	1.2%	2.2%	1.4%	0.18%	2.7%	1.9%
A5	3.58	4.48x10 ⁻⁷	1.22x10 ⁻²	0.172	0.328	3.85
	0.12%	0.12%	0.05%	0.73%	0.12%	0.11%
B1	321	1.72x10 ⁻⁵	0.961	0.426	12.4	161
	11%	4.7%	3.8%	1.8%	4.6%	4.5%
B2	0	0	0	0	0	0
B3	0	0	0	0	0	0
B4	2,200	3.03x10 ⁻⁴	21.2	20.1	221	2,920
	77%	83%	83%	85%	83%	83%
B5	0	0	0	0	0	0
B6	0	0	0	0	0	0
B7	0	0	0	0	0	0
C1	0	0	0	0	0	0
C2	2.42	5.63x10 ⁻⁷	1.40x10 ⁻²	1.84x10 ⁻³	0.396	4.70
	0.08%	0.15%	0.06%	0.01%	0.15%	0.13%
C3	0	0	0	0	0	0
C4	2.70	6.48x10 ⁻⁸	2.92x10 ⁻³	3.26x10 ⁻²	4.14x10 ⁻²	0.418
	0.09%	0.02%	0.01%	0.14%	0.02%	0.01%
D	MND	MND	MND	MND	MND	MND

Table 17. Resource use for the Skyfold Zenith®/Zenith® Premium products per 1 m². Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Zenith® - Dune 4505; Zenith® - Carnegie Premium; Zenith® - Len-tex Wallcovering.

Module	PERE	PERM	PENRE	PENRM	SM	RSF	NRSF	FW
	MJ	MJ	MJ	MJ	kg	MJ	MJ	m ³
Total	63,700	0.00	INA	INA	297	0.00	0.00	150
	100%	0.00			100%	0.00	0.00	100%
A1	660	0.00	INA	INA	39.6	Neg.	Neg.	12.9
	1.0%	0.00			13%	0.00	0.00	8.6%
A2	4.42	0.00	INA	INA	0.00	Neg.	Neg.	0.289
	0.01%	0.00			0.00%	0.00	0.00	0.19%
A3	1,220	0.00	INA	INA	0.00	Neg.	Neg.	1.90
	1.9%	0.00			0.00%	0.00	0.00	1.3%
A4	5.04	0.00	INA	INA	0.00	Neg.	Neg.	0.324
	0.01%	0.00			0.00%	0.00	0.00	0.22%
A5	0.194	0.00	INA	INA	0.00	Neg.	Neg.	1.70x10 ⁻²
	0.00%	0.00%			0.00%	0.00%	0.00%	0.01%
B1	49,600	0.00	INA	INA	0.00	Neg.	Neg.	33.6
	78%	0.00			0.00%	0.00	0.00	22%
B2	0	0	0	0	0	0	0	0
B3	0	0	0	0	0	0	0	0
B4	12,300	0.00	INA	INA	257	Neg.	Neg.	101
	19%	0.00%			87%	0.00%	0.00%	67%
B5	0	0	0	0	0	0	0	0
B6	0	0	0	0	0	0	0	0
B7	0	0	0	0	0	0	0	0
C1	0	0	0	0	0	0	0	0
C2	0.122	0.00	INA	INA	0.00	Neg.	Neg.	1.09x10 ⁻²
	0.00%	0.00%			0.00%	0.00%	0.00%	0.01%
C3	0	0	0	0	0	0	0	0
C4	0.203	0.00	INA	INA	0.00	Neg.	Neg.	6.14x10 ⁻²
	0.00%	0.00%			0.00%	0.00%	0.00%	0.04%
D	MND	MND	MND	MND	MND	MND	MND	MND

Neg. = Negligible

INA = Indicator Not Assessed

Table 18. Waste and outflows for the Skyfold Zenith®/Zenith® Premium products per 1 m². Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Zenith® - Dune 4505; Zenith® - Carnegie Premium; Zenith® - Len-tex Wallcovering.

Module	HWD	NHWD	RWD-HL	RWD-LL	CRU	MR	MER	EE
	kg	kg	kg	kg	kg	kg	kg	MJ
Total	0.247	1,240	6.46x10 ⁻²	0.125	0.00	204	Neg.	Neg.
	100%	100%	100%	100%	0.00	100%	Neg.	Neg.
A1	2.02x10 ⁻²	71.0	1.47x10 ⁻³	6.13x10 ⁻³	0.00	0.00	Neg.	Neg.
	8.2%	5.7%	2.3%	4.9%	0.00	0.00%	Neg.	Neg.
A2	1.07x10 ⁻³	19.1	2.17x10 ⁻⁵	2.63x10 ⁻³	0.00	0.00	Neg.	Neg.
	0.43%	1.5%	0.03%	2.1%	0.00	0.00%	Neg.	Neg.
A3	9.37x10 ⁻³	9.10	3.39x10 ⁻⁴	1.17x10 ⁻³	0.00	0.00	Neg.	Neg.
	3.8%	0.73%	0.52%	0.94%	0.00	0.00%	Neg.	Neg.
A4	1.14x10 ⁻³	18.8	2.40x10 ⁻⁵	3.32x10 ⁻³	0.00	0.00	Neg.	Neg.
	0.46%	1.5%	0.04%	2.7%	0.00	0.00%	Neg.	Neg.
A5	6.86x10 ⁻⁵	23.0	9.52x10 ⁻⁷	1.87x10 ⁻⁴	0.00	9.32	Neg.	Neg.
	0.03%	1.9%	0.00%	0.15%	0.00	4.6%	Neg.	Neg.
B1	7.32x10 ⁻³	141	5.07x10 ⁻²	2.24x10 ⁻²	0.00	0.00	Neg.	Neg.
	3.0%	11%	78%	18%	0.00	0.00%	Neg.	Neg.
B2	0	0	0	0	0	0	0	0
B3	0	0	0	0	0	0	0	0
B4	0.208	955	1.21x10 ⁻²	8.90x10 ⁻²	0.00	177	Neg.	Neg.
	84%	77%	19%	71%	0.00	87%	Neg.	Neg.
B5	0	0	0	0	0	0	0	0
B6	0	0	0	0	0	0	0	0
B7	0	0	0	0	0	0	0	0
C1	0	0	0	0	0	0	0	0
C2	9.03x10 ⁻⁵	0.157	5.60x10 ⁻⁷	2.36x10 ⁻⁴	0.00	0.00	Neg.	Neg.
	0.04%	0.01%	0.00%	0.19%	0.00%	0.00%	Neg.	Neg.
C3	0	0	0	0	0	0	0	0
C4	6.73x10 ⁻⁶	5.76	8.09x10 ⁻⁷	1.75x10 ⁻⁵	0.00	17.9	Neg.	Neg.
	0.00%	0.46%	0.00%	0.01%	0.00%	8.8%	Neg.	Neg.
D	MND	MND	MND	MND	MND	MND	MND	MND

Neg. = Negligible

INA = Indicator Not Assessed

6. LCA: Interpretation

The interpretation phase conforms to ISO 14044 with further guidance from the ILCD General Guide for Life Cycle Assessment. The interpretation included the use of evaluation and sensitivity checks to steer the iterative process during the assessment, and a final evaluation including completeness, sensitivity, and consistency checks, at the end of the study.

Cradle-to-grave impact results are summarized by life cycle phase for the functional unit of one square meter of product maintained for 75 years. Results are also presented as a percentage of the total for each impact category indicator. The product replacement phase (B4) accounts for approximately 77% to 86% of the total impact over the 75-yr ESL of the assessment, depending on the product and impact indicator. In general, the remaining life cycle phase contributions are dominated by the raw material extraction and processing phase (A1) followed by the product use phase (B1), product manufacturing (A3), the construction phases (A4-A5) and upstream material transport (A2).

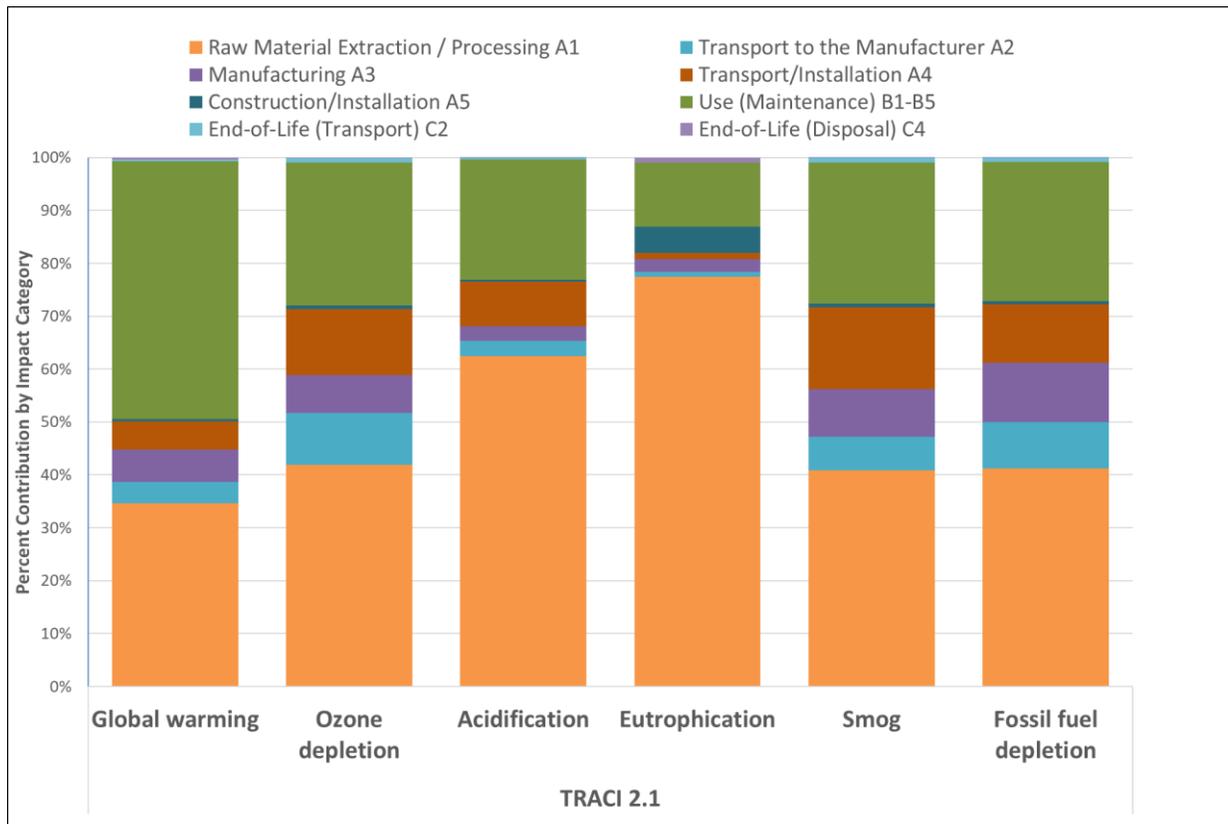


Figure 2. Contribution analysis for the Skyfold products – TRACI 2.1 (excluding product replacements).

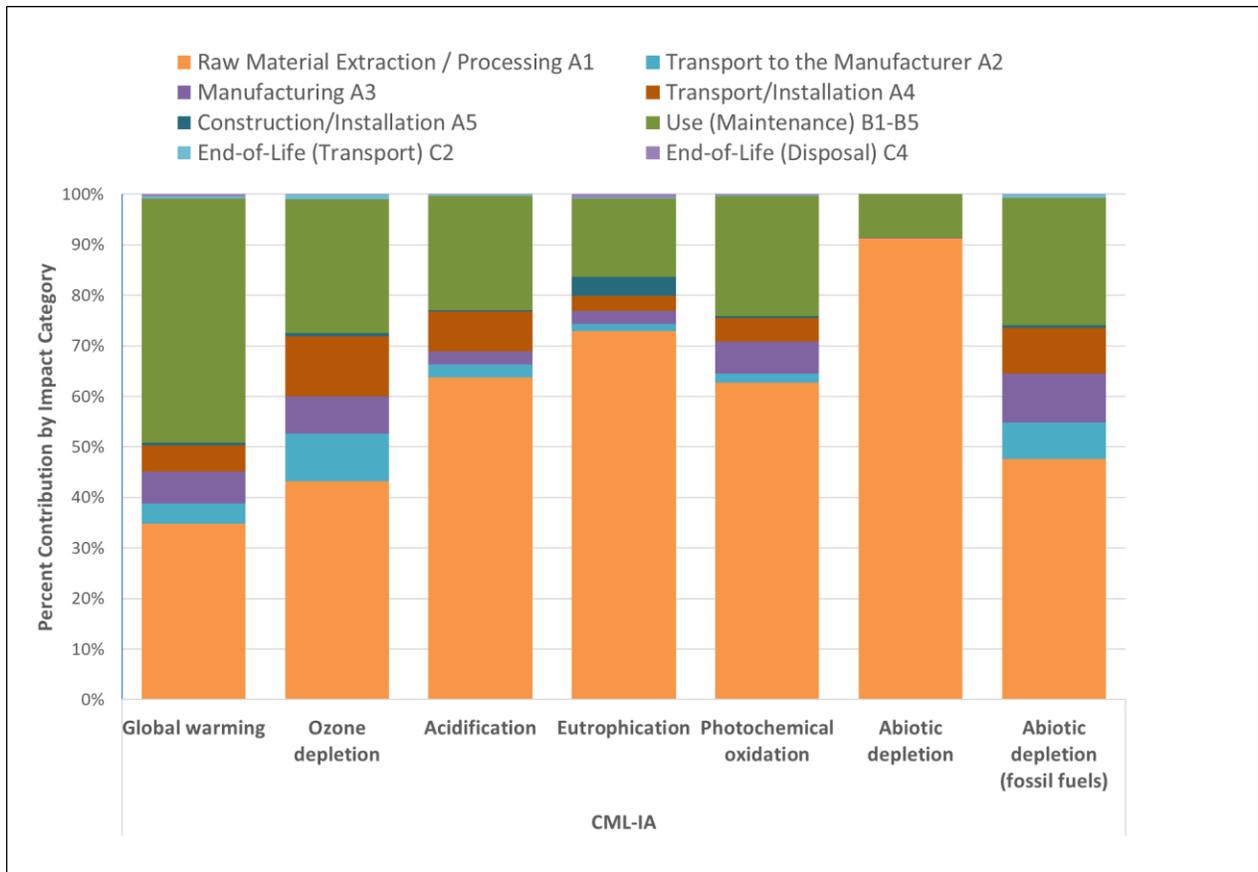
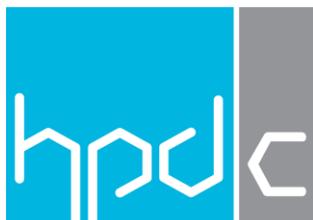


Figure 3. Contribution analysis for the Skyfold products – CML-IA (excluding product replacements).

7. Additional Environmental Information

Skyfold's manufacturing plant in Montreal is certified to the quality management system ISO 9001, which ensures consistent quality of Skyfold's products.

Skyfold is pleased to be an official member of the U.S. Green Building Council. The Green Council is committed to promoting better designed buildings that not only are more environmentally and socially responsible, but help improve the quality of life for the people that occupy them and the communities in which they are built. The Skyfold vertical retractable walls are constructed mainly from recycled materials which offer tremendous advantages and opportunities to earn points required for LEED certification.



A Health Product Declaration (HPD) gives a transparent account of the materials and substances contained within a construction product, as well as of the associated effects on human health. Skyfold offers a comprehensive HPD for its Zenith® & Zenith® Premium Series. Substances are listed by weight in the entire product instead of by material. All substances over 1000 ppm or 100 ppm of the product are reported.

8. References

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