

**Declaration Owner**

Woodco Soc. Coop.

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

Product

SPC Vinyl Flooring: FLOW

EPD represents delivery of product to customers in Italy.

Functional Unit

The functional unit is one square meter of flooring over a 75-year period

EPD Number and Period of Validity

SCS-EPD-10319

EPD Valid January 15, 2025, through January 14, 2030

Product Category Rule

Product Category Rule.PCR2019:14. Construction Products. International EPD® System. Version 1.3.2. December 2023

Complementary Product Category Rules (c-PCR) To PCR 2019:14. Resilient, Textile And Laminate Floor Coverings (EN 16810:2017). International EPD® System. Version 2019-12-20. December 2019

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

Program Operator

SCS Global Services

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Declaration Owner:	Woodco Soc. Coop.
Address:	Via Antonio Detassis n° 17, Trento 38121 Italy
Declaration Number:	SCS-EPD-10319
Declaration Validity Period:	January 15, 2025 through January 14, 2030
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Gerard Mansell, Ph.D., SCS Global Services
LCA Software and LCI database:	OpenLCA v1.11 software and the Ecoinvent v3.9.1 database
Product RSL:	15 years
Markets of Applicability:	Italy; Global
EPD Type:	Product-Specific
EPD Scope:	Cradle-to-Grave
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒ external
LCA Reviewer:	 Thomas Gloria, Ph.D., Industrial Ecology Consultants
Product Category Rule:	Product Category Rule.PCR2019:14. Construction Products. International EPD® System. Version 1.3.2. December 2023.
Part A PCR Review conducted by:	The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile.
Complementary Product Category Rule:	Complementary Product Category Rules (c-PCR) To PCR 2019:14. Resilient, Textile And Laminate Floor Coverings (EN 16810:2017). International EPD® System. Version 2019-12-20. December 2019
Part B PCR Review conducted by:	The Technical Committee of the International EPD® System.
Independent verification of the declaration and data, according to ISO 14025 and the PCR	☐ internal ☒ external
EPD Verifier:	 Thomas Gloria, Ph.D., Industrial Ecology Consultants
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Disclaimers: This EPD conforms to ISO 14025, 14040, 14044, and EN 15804. 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. Accuracy of Results: Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy. Comparability: EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025. 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. Woodco

Woodco s.c., founded in 1983, is an Italian company specializing in the production and distribution of high-quality wood flooring, vinyl floorings, laminates, and outdoor flooring. Since its inception, Woodco has combined artisanal tradition with technological innovation to offer cutting-edge solutions in the construction and interior design sectors. With its extensive experience and commitment to environmental sustainability, the company employs responsible production processes and certified materials. In over four decades of activity, Woodco has built a solid reputation for the quality and reliability of its products, becoming a benchmark for private clients, architects, and designers alike.

2. Product

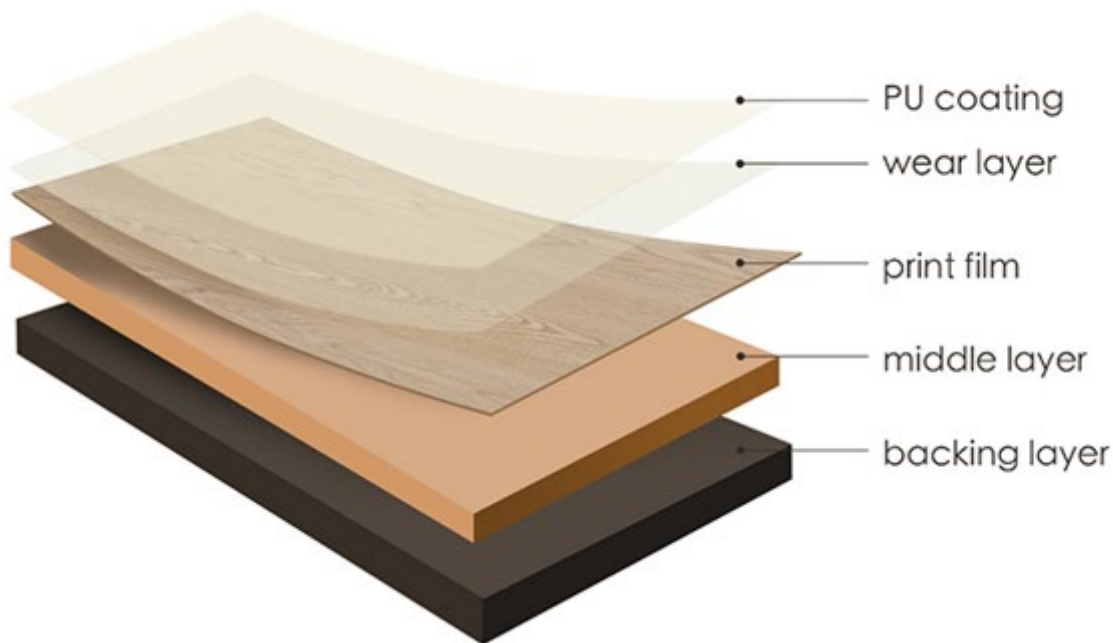
2.1 PRODUCT DESCRIPTION

Heterogeneous, modular poly (vinyl chloride) floor covering (SPC Floor). The flooring consists of a rigid SPC panel, printed decorative film, wear layer and protective finish. All on an integrated IXPE underlay. Advantages of the product include: It has personalized design; Waterproof, no bulging in water; Fire prevention (Bfl-S1); Formaldehyde emission belongs to E1 level; no phthalates, no heavy metals; low VOC Emission.

The following vinyl flooring product included in the EPD scope is summarized in Table 1.

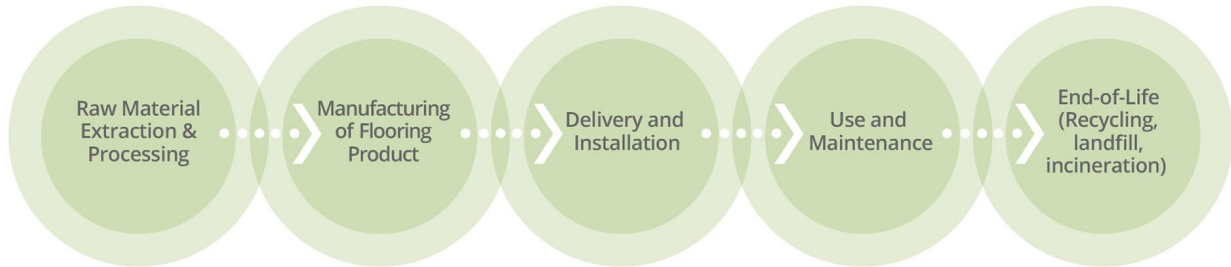
Table 1. FLOW flooring products included in the LCA scope.

Product Name	Product Thickness (mm)	Product weight (kg/m ²)	Manufacturing Facility Location	Consumer Markets	Overall Thickness (mm)	Length (mm)	Width (mm)
FLOW SPC Vinyl Flooring	5.5	9.0	China	Italy	3.0-12.0	200-2000	100-2000



2.2 PRODUCT FLOW DIAGRAM

A flow diagram illustrating the production processes and life cycle phases included in the scope of the EPD is provided below.



2.3 APPLICATION

The products provide the primary function of flooring for interior applications. The flooring products are used in various residential and commercial applications including retail, healthcare, education, and hospitality.

2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

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 LCA is conducted using an attributional approach. The environmental loads and benefits resulting from recyclable materials leaving a product system (Module D) are negligible. Cut-off and allocation procedures are described below and conform to the PCR and ISO standards.

The life cycle phases included in the product system boundary are shown below.



Table 2. 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
Modules Declared	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Geography	GLO	GLO	CN	GLO	GLO	OTG	OTG	OTG	OTG	OTG	OTG	OTG	OTG	OTG	OTG	OTG	GLO
Share of specific data	>90%			>90%		-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-			-		-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	-			-		-	-	-	-	-	-	-	-	-	-	-	-

X = Included in system boundary

MND = Module not declared

GLO = Global; CN = China

2.5 TECHNICAL DATA

Technical specifications for the vinyl flooring products are summarized in Table 3.

Table 3. Product characteristics for the FLOW SPC Vinyl Flooring (5.5mm) product.

Characteristic			Description			
Sustainable certifications			SCS RECYCLED CONTENT CERTIFIED; ISO 9001; ISO 14001			
VOC emissions test method			A+ (FRENCH VOC REGULATION) IACG, FLOORSORE			
Characteristic			Average Value	Unit	Min Value	Max Value
Product thickness			5.50 (0.22)	mm (in)	4.0 (0.157)	6.50 (0.26)
Wear layer thickness (where applicable)			0.5 (0.0197)	mm (in)	0.4 (0.0157)	0.55 (0.0217)
Product weight			8.18 (0.0268)	g/m ² (oz/ft ²)	8.18 (0.0268)	12.67 (0.0415)
Product Form	Planks	Width	228 (8.98)	mm (in)	127 (5.0)	228 (8.98)
		Length	1.5 (0.0049)	m (ft)	0.625 (0.002)	1.83 (0.006)
	Tiles	Width	600 (23.6)	mm (in)	460 (18.1)	600 (23.6)
		Length	1.2 (0.0039)	m (ft)	0.920 (0.003)	1.2 (0.0039)

2.6 MARKET PLACEMENT/APPLICATION RULES

Technical specifications of the flooring products are summarized above. Detailed product performance results can be found on the manufacturer's website <https://www.pavimentoflow.it/>

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

The luxury vinyl flooring products are delivered for installation in the form of planks of various dimensions.

2.8 MATERIAL COMPOSITION

The primary materials include polyvinyl chloride (PVC), plasticizers, fillers and various stabilizers and coatings.

Table 4. Material content for the flooring products in kg per square meter and percent of total mass. All values in the table have been rounded; masses to three significant figures, percentages to two significant figures.

Component	Renewable	Recycled Content (%)	Mass (kg/m ²)	% Mass
PVC	No	0%	2.16	24%
Re-grind	No	100%	2.98	33%
CaCO ₃	No	0%	2.47	27%
Plasticizer	No	0%	0.401	4.5%
Stabilizer	No	0%	0.185	2.1%
IXPE; PE	No	0%	0.123	1.4%
Other	No	0%	0.685	7.6%
Total Product			9.00	100%

Based on a review of the product components provided by the manufacturer, no regulated chemicals, i.e., substances of Very High Concern (SVHC) or substances on the REACH Candidate List, were identified in the product or product components.

2.9 MANUFACTURING

The vinyl flooring is produced at their manufacturing facility in China. The luxury vinyl flooring is made primarily from polyvinyl chloride (PVC), calcium carbonate (mineral reinforcement), plasticizers and additives (i.e., pigments and stabilizers). These flooring products are structured into a number of layers, with a polyurethane (PU) protective layer, a clear embossed PVC wear layer, a high definition photographic layer, stability and backing layers and a mineral filler. Post-industrial recycled material is included in the products.

The production of luxury vinyl tile flooring involves the following general manufacturing processes. The raw materials are first mixed and heated. The mixture is then calendared into a sheet to create the backing or the transparent wear layers. The sheets are cut and laminated with a print film. The semi-finished product is coated with a lacquer and annealed. Finally, the product is cut into planks and packaged. Quality checks are made at each step of the production process.

2.10 PACKAGING

The products are packaged for shipment using cardboard cartons and plastic wrap.

Table 5. Material content for the flooring product packaging in kg per square meter. All values in the table have been rounded; masses to three significant figures, percentages to two significant figures.

Component	Renewable	Recycled Content (%)	Mass (kg/m ²)	% Mass
Corrugated	Yes	0%	1.40	90%
Plastic	No	0%	0.150	9.7%
Total Packaging			1.55	100%

2.11 PRODUCT INSTALLATION

Installation of the product is accomplished using hand tools with negligible impacts. Approximately 4% installation waste is assumed. The impacts associated with packaging disposal, as well as the production, transport and disposal of installation waste are included with the installation phase as per PCR requirements.

2.12 USE CONDITIONS

No special conditions of use are noted.

2.13 REFERENCE SERVICE LIFE

The Reference Service Life (RSL) of the flooring products is 15 years.

2.14 RE-USE PHASE

The flooring products are not reused at end-of-life.

2.15 DISPOSAL

At end-of-life, the products are disposed of in a landfill.

2.16 FURTHER INFORMATION

Further information on the product can be found on the manufacturer's website <https://www.woodco.it/>

3. LCA: Calculation Rules

3.1 FUNCTIONAL UNIT

The functional unit used in the study is defined as 1 m² of floor covering installed for use over a 75-year period. The corresponding reference flow for the product system is presented in Table 6. For the present assessment, a reference service lifetime (RSL) corresponding to the manufacturer's warranted lifetime is assumed. The total number of required product lifecycles during the 75-year period over which the product system is modeled is also summarized for the product in Table 6.

Table 6. Reference flows and RSL for the FLOW flooring products.

Product Name	Product Thickness (mm)	Reference flow (kg/m ²)	Reference Service Life – RSL (years)	Replacement Cycle (ESL/RSL-1)
Flow SPC Vinyl Flooring	5.5	9.00	15	4.0

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 following processes are excluded from the system boundary, consistent with the PCR:

- Construction activities, capital equipment, and infrastructure
- Maintenance and operation of capital equipment
- Personnel travel and resource use

The life cycle phases included in the EPD scope are described in Table 7 and illustrated in Figure 1.

Table 7. *The modules and unit processes included in the scope for the flooring product system.*

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 flooring components.
A2	Transport (to the manufacturer)	Transport of component materials to the manufacturing facilities.
A3	Manufacturing, including ancillary material production	Manufacturing of flooring products and packaging (including 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. Impacts from the production, transport and disposal of waste material associated with installation are included in this phase in addition to impacts from packaging disposal
B1	Product use	Use of the flooring in a commercial building setting. There are no associated emissions or impacts from the use of the product.
B2	Product maintenance	Maintenance of products over the 75-year ESL, including periodic cleaning.
B3	Product repair	The flooring is 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 flooring is not expected to require refurbishment over its 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 flooring product to waste treatment at end-of-life.
C3	Waste processing for reuse, recovery and/or recycling	The product is disposed of by incineration and/or landfilling which require no waste processing.
C4	Disposal	Disposal of flooring product in municipal landfill or incineration.
D	Reuse-recovery-recycling potential	There are no significant impacts associated with Module D as only minimal amounts of recycled materials are used in the products.

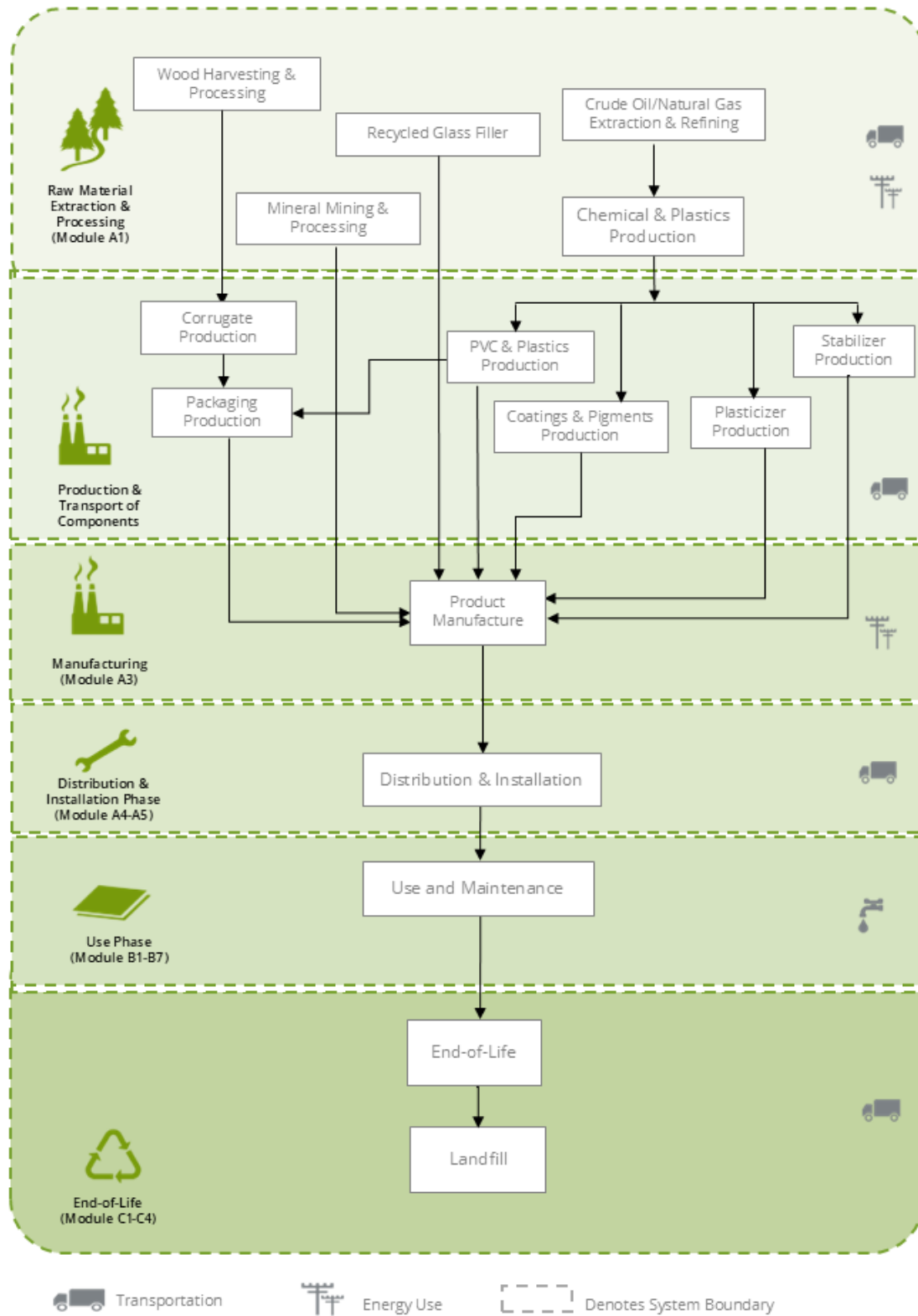


Figure 1. Flow Diagram for the life cycle of the vinyl flooring products.

3.3 PRODUCT SPECIFIC CALCULATION FOR USE PHASE

The recommended cleaning regime is highly dependent on the use of the premises where the floor covering is installed. In high traffic areas more frequent cleaning will be needed compared to areas where there is low traffic. For the purposes of this EPD, average maintenance (moderate traffic levels) is presented based on typical installations.

3.4 UNITS

All data and results are presented using SI units.

3.5 ESTIMATES AND ASSUMPTIONS

- The manufacturing facility is located in China. Regional Ecoinvent inventory datasets for the appropriate energy grid mix were used to model resource use and emissions from electricity use at the manufacturing facility.
- Modeling of recycled materials follows the recycled content method (also known as 100-0 method or cut-off method) whereby only the burdens of reprocessing the waste material are allocated to the system from the use of the recycled material.
- The Reference Service Life (RSL) of the products was modeled based on information provided by the manufacturer assuming their products are installed and maintained as recommended and used for the specific application noted.
- Downstream transport was modeled based on information provided by the manufacturer representing transport to consumer markets in Italy.
- The maintenance phase of the product life cycle was modeled based on information provided by the manufacturer including recommended installation and cleaning methods, as well as cleaning frequency.
- For the product end-of-life, disposal of product and product packaging is modeled based on the PCR guidance regarding recycling rates of product and packaging materials. It is assumed that no components of the product are recycled at end-of-life.
- For final disposal of the packaging material and luxury vinyl flooring at end-of-life, all materials are assumed to be transported 161 km by diesel truck to either a landfill, incineration facility, or material reclamation facility (for recycling). Datasets representing disposal in a landfill and waste incineration are from Ecoinvent.

The PCR requires the results for several inventory flows related to construction products to be reported including energy and resource use and waste and outflows. These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted taking into account this limitation.

3.6 CUT-OFF RULES

According to the PCR, processes contributing greater than 5% 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.

3.7 DATA SOURCES

Primary data were provided by the manufacturer for their facility. The sources of secondary LCI data are the Ecoinvent database.

Table 8. *Data sources for the flooring products.*

Component	Dataset	Data Source	Publication Date
PRODUCT			
PVC			
Polyvinyl Chloride	polyvinylchloride production, bulk polymerisation polyvinylchloride, bulk polymerised Cutoff, S/RoW	EI v3.9	2022
Filler			
Calcium Carbonate	limestone production, crushed, washed limestone, crushed, washed Cutoff, S/RoW	EI v3.9	2022
Plasticizer			
PVC Plasticizer	diethyl terephthalate production diethyl terephthalate Cutoff, S/GLO	EI v3.9	2022
Stabilizer			
Stabilizer	Ca-Zn stabilizer;	EI v3.9	2022
	chemical production, organic chemical, organic Cutoff, S/GLO	EI v3.9	2022
	chemical production, inorganic chemical, inorganic Cutoff, S/GLO	EI v3.9	2022
	limestone production, crushed, washed limestone, crushed, washed Cutoff, S/RoW	EI v3.9	2022
	zinc oxide production zinc oxide Cutoff, S/RoW	EI v3.9	2022
Pigment			
Titanium dioxide	market for titanium dioxide titanium dioxide Cutoff, S/RoW	EI v3.9	2022
Carbon Black	carbon black production carbon black Cutoff, S/GLO	EI v3.9	2022
Other			
Organic chemicals	chemical production, organic chemical, organic Cutoff, S/GLO	EI v3.9	2022
Adhesive	polyurethane adhesive production polyurethane adhesive Cutoff, S/GLO	EI v3.9	2022
IXPE; PE	polyethylene production, low density, granulate steam, in chemical industry Cutoff, S/RoW	EI v3.9	2022
PACKAGING			
Cardboard	corrugated board box production corrugated board box Cutoff, S/RoW	EI v3.9	2022
Plastic	packaging film production, low density polyethylene packaging film, low density polyethylene Cutoff, S/RoW;	EI v3.9	2022
	polypropylene production, granulate polypropylene, granulate Cutoff, S/RoW	EI v3.9	2022
TRANSPORT			
Road transport	transport, freight, lorry 16-32 metric ton, EURO4 transport, freight, lorry 16-32 metric ton, EURO4 Cutoff, S/RoW	EI v3.9	2022
Ship transport	transport, freight, sea, container ship transport, freight, sea, container ship Cutoff, S/GLO	EI v3.9	2022
RESOURCES			
Grid electricity ¹	market group for electricity, medium voltage electricity, medium voltage Cutoff, S/CN	EI v3.9	2022

¹ The Chinese electricity resource mix consists of approximately 66% coal, 32% wind and hydropower, and 2% natural gas as represented in the ecoinvent v3.9 database. The GWP-GHG (AR6) impact of the Chinese grid electricity is ~0.9443 kg CO₂e/kWh.

3.8 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 9. *Data quality assessment for the flooring 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. 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 annual production for 2022.
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 Asia. 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. Data representing product disposal are based on regional statistics.
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 flooring 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 v3.9 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 the manufacturing facility represents 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 data, Ecoinvent v3.9 LCI 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 were not available 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.

3.9 PERIOD UNDER REVIEW

The period of review is calendar year 2022.

3.10 ALLOCATION

Resource use at the manufacturing facility (e.g., water and energy) was allocated to the products based on the product area as a fraction of the total facility production volume (i.e., area-based allocation). Area-based allocation was deemed most appropriate for the flooring products as total facility production was available as total square meters of product. Electricity use at the manufacturing facility was modeled using ecoinvent inventory datasets for the country-specific electrical grid.

Impacts from transportation, including product distribution to point of sale, were attributed to the products based on the mass of material and distance transported.

3.11 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 flooring products to the point of sale in Italy is included, based on data from the manufacturer. Transportation parameters for modeling product distribution are summarized in Table 10.

Table 10. *Product distribution parameters, per 1 m².*

Parameter	Unit	Value
Ground transport		
Fuel type	-	Diesel
Liters of fuel	L/100km	18.7
Vehicle type	-	Diesel truck
Capacity utilization	%	76
Mass transported	kg	10.6
Transport distance	km	825
Ocean transport		
Fuel type	-	Fuel oil
Liters of fuel	L/tkm	2.23
Vehicle type	-	Ocean freighter
Capacity utilization	%	70
Mass transported	kg	10.6
Transport distance	km	9,900

Installation of the product is accomplished using hand tools with no associated emissions and negligible impacts. Approximately 4% installation waste is assumed landfilled. The impacts associated with packaging disposal, as well as the production, transport and disposal of installation waste are included with the installation phase as per PCR requirements. Modeling parameters for product installation are summarized in Table 11

Table 11. *Installation parameters for the flooring products, per 1 m².*

Parameter		Value
Ancillary materials (kg)		negligible
Net freshwater consumption (m ³)		-
Electricity consumption (kWh)		-
Product loss per functional unit (kg)		0.212
Waste materials generated by product installation (kg)		1.55
Output materials resulting from on-site waste processing (kg)		n/a
Mass of packaging waste (kg)	Corrugated	1.40
	Plastic	0.15
Biogenic carbon contained in packaging (kg CO ₂)		2.57
Direct emissions (kg)		-

Use stage (B1)

No impacts are associated with the use of the product over the Reference Service Lifetime.

Maintenance stage (B2)

According to the manufacturer, typical maintenance involves regular sweeping and damp mopping, as well as periodic machine cleaning of the vinyl flooring. The present assessment is based on a recommended weekly cleaning schedule including sweeping and mopping with a neutral cleaner and monthly machine cleaning. The parameters used to model the product maintenance are summarized in Table 12.

Table 12. *Maintenance parameters for the flooring products, per 1 m².*

Parameter	Unit	Value
Maintenance cycle	Cycles / RSL	780
Maintenance cycle	Cycles / ESL	3,900
Maintenance process	-	Damp mopping
Net freshwater consumption	m ³ /m ² /yr	0.0058
Cleaning agent	kg/m ² /yr	0.0119
Maintenance process	-	Machine cleaning
Electricity	kWh/m ² /yr	0.022
Further assumptions	-	Moderate traffic; weekly maintenance

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 estimated service Lifetime of the assessment are included in this stage. Modeling parameters for the product replacement stage are summarized in Table 13.

Table 13. Product replacement parameters for the flooring products, per 1 m².

Parameter	Units	Value
Reference service life	Years	15
Replacement cycle	-	4.0
Energy input	kWh	0
Freshwater consumption	m ³	0
Ancillary materials	kg	Negligible
Replacement parts	kg	42.2
Direct emissions	kg	0

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 demolition of the products (C1); transport of the flooring products to waste treatment facilities (C2); waste processing (C3); and associated emissions as the product degrades in a landfill (C4). For the flooring products, no emissions are generated during demolition (C1) while no waste processing (C3) is required for landfill disposal.

Transportation of waste materials at end-of-life (C2) assumes a 161 km average distance to disposal, as specified by the PCR. A 10% recycling rate is assumed for the product packaging materials, consistent with the PCR. No recycling of the product materials is assumed at end-of-life. The end-of-life disposal scenario modeling parameters are summarized in Table 14.

Table 14. End-of-life disposal scenario parameters for the flooring products.

Product	Assumptions for scenario development	Collected with mixed construction waste (kg)	Recovery	Disposal – Landfill (kg)	Removals of biogenic carbon (kg CO ₂ eq)
Flow SPC Vinyl Flooring (5.5mm)	100% landfill	9.00	n/a	9.00	n/a



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. All LCA results are stated to three significant figures in agreement with the PCR for this flooring product and therefore the sum of the total values may not exactly equal 100%.

The impact indicators specified by the PCR include:

- Potential for Global Warming,
- Acidification Potential,
- Eutrophication Potential,
- Ozone Depletion Potential,
- Photochemical Ozone (smog) Creation Potential.
- Ecotoxicity,
- Human Toxicity, and
- Land Use/Land Occupation

Impact category indicators for acidification, eutrophication, ozone depletion potential and photochemical ozone creation are estimated using the characterization factors¹, as prescribed by the PCR, including from CML-IA and ReCiPe methodologies as well as those defined by EN 15804 reference package based on EF 3.0. Impact indicators for Ecotoxicity and Human Toxicity are estimated using the USEtox 2.02 characterization method, while Land Occupation impacts are estimated using the ReCiPe 2016 version 1.1 methodology. The impact category indicators included in the assessment are summarized below.

Note that the use of the results of modules A1-A3 without considering the results of module C is discouraged.

¹ <https://www.environdec.com/resources/indicators>

Table 15. Key Life Cycle Impact Assessment results for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.

Impact Category	Climate change (kg CO ₂ eq)	Climate change - Biogenic (kg CO ₂ eq)	Climate change - Fossil (kg CO ₂ eq)	Climate change - Land use and LU change (kg CO ₂ eq)	GWP-GHG (IPCC AR6)	Acidification (mol H ⁺ eq)	Eutrophication, freshwater (kg P eq)	Eutrophication, marine (kg N eq)	Eutrophication, terrestrial (mol N eq)	Ozone depletion (kg CFC11 eq)	Photochemical ozone formation (kg NMVOC eq)	Particulate matter (disease inc.)
Key Indicators												
A1	10.5	3.97x10 ⁻²	10.4	1.33x10 ⁻²	10.0	4.82x10 ⁻²	3.01x10 ⁻³	9.23x10 ⁻³	9.52x10 ⁻²	6.55x10 ⁻⁶	3.62x10 ⁻²	4.16x10 ⁻⁷
	7.7%	0.13%	9.9%	7.9%	8.1%	7.6%	13%	3.9%	5.6%	19%	6.1%	6.9%
A2	0.708	2.75x10 ⁻⁴	0.708	3.73x10 ⁻⁴	0.689	4.34x10 ⁻³	5.38x10 ⁻⁵	1.41x10 ⁻³	1.53x10 ⁻²	1.09x10 ⁻⁸	4.93x10 ⁻³	4.44x10 ⁻⁸
	0.52%	0.00088%	0.67%	0.22%	0.55%	0.69%	0.24%	0.6%	0.89%	0.031%	0.83%	0.73%
A3	2.06	-0.727	2.77	1.62x10 ⁻²	2.92	1.41x10 ⁻²	8.46x10 ⁻⁴	5.06x10 ⁻³	3.55x10 ⁻²	4.71x10 ⁻⁸	1.13x10 ⁻²	2.35x10 ⁻⁷
	1.5%	-2.3%	2.6%	9.6%	2.4%	2.2%	3.7%	2.1%	2.1%	0.14%	1.9%	3.9%
A4	2.78	5.69x10 ⁻⁴	2.78	1.68x10 ⁻³	2.71	3.89x10 ⁻²	1.70x10 ⁻⁴	1.06x10 ⁻²	0.116	4.23x10 ⁻⁸	3.34x10 ⁻²	1.41x10 ⁻⁷
	2%	0.0018%	2.6%	1%	2.2%	6.1%	0.75%	4.5%	6.8%	0.12%	5.6%	2.3%
A5	1.96	0.778	1.19	1.32x10 ⁻³	1.56	6.33x10 ⁻³	1.77x10 ⁻⁴	2.84x10 ⁻³	2.02x10 ⁻²	2.72x10 ⁻⁷	7.34x10 ⁻³	8.01x10 ⁻⁸
	1.4%	2.5%	1.1%	0.79%	1.3%	1%	0.78%	1.2%	1.2%	0.78%	1.2%	1.3%
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	2.55	1.51x10 ⁻²	2.54	1.60x10 ⁻³	2.44	1.21x10 ⁻²	5.82x10 ⁻⁴	2.10x10 ⁻³	2.25x10 ⁻²	1.39x10 ⁻⁸	1.27x10 ⁻²	1.14x10 ⁻⁷
	1.9%	0.048%	2.4%	0.95%	2%	1.9%	2.6%	0.89%	1.3%	0.04%	2.1%	1.9%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	107	24.9	82.0	0.133	97.3	0.497	1.76x10 ⁻²	0.188	1.35	2.78x10 ⁻⁵	0.465	4.75x10 ⁻⁶
	79%	80%	78%	79%	78%	78%	78%	79%	79%	80%	78%	78%
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	2.05	4.29x10 ⁻⁴	2.05	2.54x10 ⁻⁴	2.00	1.10x10 ⁻²	3.75x10 ⁻⁵	4.77x10 ⁻³	5.16x10 ⁻²	3.14x10 ⁻⁸	2.02x10 ⁻²	2.52x10 ⁻⁷
	1.5%	0.0014%	2%	0.15%	1.6%	1.7%	0.17%	2%	3%	0.09%	3.4%	4.2%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	6.74	6.14	0.607	1.68x10 ⁻⁴	4.45	1.36x10 ⁻³	1.12x10 ⁻⁴	1.31x10 ⁻²	4.06x10 ⁻³	3.02x10 ⁻⁹	2.81x10 ⁻³	1.86x10 ⁻⁸
	4.9%	20%	0.58%	0.1%	3.6%	0.22%	0.5%	5.5%	0.24%	0.0087%	0.47%	0.31%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 16. Life Cycle Impact Assessment results for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.

Impact Category	Freshwater ecotoxicity (PAF.m ³ .day)	Human toxicity, cancer (cases)	Human toxicity, non-cancer (cases)	Land use (species.yr)	Resource use, fossils (MJ) ¹⁾	Resource use, minerals and metals (kg Sb eq) ¹⁾	Water use (m ³ depriv.) ¹⁾
Other Indicators							
A1	168,000	7.03x10 ⁻⁷	2.04x10 ⁻⁶	1.40x10 ⁻⁹	218	1.17x10 ⁻⁴	0.320
	4.8%	9.7%	5.8%	2.5%	12%	16%	1.2%
A2	2,900	4.68x10 ⁻⁸	9.01x10 ⁻⁸	2.18x10 ⁻¹⁰	9.70	2.11x10 ⁻⁶	4.83x10 ⁻²
	0.083%	0.65%	0.26%	0.38%	0.54%	0.29%	0.17%
A3	40,100	1.66x10 ⁻⁷	8.53x10 ⁻⁷	8.28x10 ⁻⁹	39.3	7.37x10 ⁻⁶	0.831
	1.1%	2.3%	2.4%	15%	2.2%	1%	3%
A4	8,910	1.73x10 ⁻⁷	2.74x10 ⁻⁷	5.96x10 ⁻¹⁰	36.5	6.37x10 ⁻⁶	0.154
	0.25%	2.4%	0.78%	1.1%	2%	0.88%	0.56%
A5	32,400	6.49x10 ⁻⁸	3.48x10 ⁻⁷	4.52x10 ⁻¹⁰	17.0	5.60x10 ⁻⁶	7.63x10 ⁻²
	0.92%	0.89%	0.99%	0.8%	0.94%	0.78%	0.28%
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	34,100	1.60x10 ⁻⁷	3.66x10 ⁻⁷	3.29x10 ⁻¹⁰	62.7	1.88x10 ⁻⁵	19.7
	0.97%	2.2%	1%	0.58%	3.5%	2.6%	71%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	2.78x10 ⁶	5.68x10 ⁻⁶	2.79x10 ⁻⁵	4.51x10 ⁻⁸	1,400	5.63x10 ⁻⁴	6.37
	79%	78%	79%	80%	77%	78%	23%
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1,870	3.84x10 ⁻⁸	8.27x10 ⁻⁸	9.42x10 ⁻¹¹	26.0	1.29x10 ⁻⁶	5.23x10 ⁻²
	0.053%	0.53%	0.23%	0.17%	1.4%	0.18%	0.19%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	440,000	2.27x10 ⁻⁷	3.28x10 ⁻⁶	2.39x10 ⁻¹⁰	2.90	4.82x10 ⁻⁷	0.111
	13%	3.1%	9.3%	0.42%	0.16%	0.067%	0.4%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00

¹⁾ The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 17. Resource use for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.

Impact Category	Use of renewable primary energy (MJ)	Use of renewable primary energy resources used as raw materials (MJ)	Total Renewable primary energy (MJ)	Use of nonrenewable primary energy (MJ)	Use of nonrenewable primary energy resources used as raw materials (MJ)	Total Nonrenewable primary energy (MJ)	Use of secondary materials (MJ)	Use of Renewable secondary fuels (MJ)	Use of Nonrenewable secondary fuels (MJ)	Use of net fresh water (m ³)
Resources										
A1	8.41	0.00	8.41	ND	ND	218	2.98	0.00	0.00	0.711
	5.4%	0%	5.4%			0%	20%	0%	0%	14%
A2	0.120	0.00	0.120	ND	ND	9.70	0.00	0.00	0.00	7.18x10 ⁻³
	0.077%	0%	0.077%			0%	0%	0%	0%	0.14%
A3	20.5	0.00	20.5	ND	ND	39.3	0.00	0.00	0.00	0.128
	13%	0%	13%			0%	0%	0%	0%	2.5%
A4	0.391	0.00	0.391	ND	ND	36.5	0.00	0.00	0.00	2.32x10 ⁻²
	0.25%	0%	0.25%			0%	0%	0%	0%	0.45%
A5	1.21	0.00	1.21	ND	ND	17.0	0.00	0.00	0.00	3.72x10 ⁻²
	0.77%	0%	0.77%			0%	0%	0%	0%	0.72%
B1	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B2	1.72	0.00	1.72	ND	ND	62.7	0.00	0.00	0.00	0.589
	1.1%	0%	1.1%			0%	0%	0%	0%	11%
B3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B4	123	0.00	123	ND	ND	1,400	11.9	0.00	0.00	3.69
	79%	0%	79%			0%	80%	0%	0%	71%
B5	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C2	0.103	0.00	0.103	ND	ND	26.0	0.00	0.00	0.00	9.27x10 ⁻³
	0.066%	0%	0.066%			0%	0%	0%	0%	0.18%
C3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C4	0.121	0.00	0.121	ND	ND	2.90	0.00	0.00	0.00	5.84x10 ⁻³
	0.077%	0%	0.077%			0%	0%	0%	0%	0.11%
D	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00

Table 18. Waste and outflows for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.

Impact Category	Hazardous waste (kg)	Nonhazardous waste (kg)	Radioactive waste (kg)	Components for re-use (kg)	Materials for recycling (kg)	Materials for energy recovery (kg)	Exported energy (MJ)
Wastes & Outflows							
A1	3.02x10 ⁻⁴	1.07	1.87x10 ⁻⁴	0.00	0.00	0.00	0.00
	6.5%	1.6%	0%	0%	0%	0%	0%
A2	6.17x10 ⁻⁵	0.442	1.90x10 ⁻⁶	0.00	0.00	0.00	0.00
	1.3%	0.68%	0%	0%	0%	0%	0%
A3	8.43x10 ⁻⁵	0.516	3.59x10 ⁻⁵	0.00	0.00	0.00	0.00
	1.8%	0.79%	0%	0%	0%	0%	0%
A4	2.16x10 ⁻⁴	1.17	6.17x10 ⁻⁶	0.00	0.00	0.00	0.00
	4.7%	1.8%	0%	0%	0%	0%	0%
A5	5.95x10 ⁻⁵	0.699	9.77x10 ⁻⁶	0.00	1.22	0.00	0.00
	1.3%	1.1%	0%	0%	20%	0%	0%
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	4.00x10 ⁻⁵	0.171	2.27x10 ⁻⁵	0.00	0.00	0.00	0.00
	0.87%	0.26%	0%	0%	0%	0%	0%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	3.67x10 ⁻³	52.2	9.80x10 ⁻⁴	0.00	4.88	0.00	0.00
	79%	80%	0%	0%	80%	0%	0%
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.77x10 ⁻⁴	0.132	1.90x10 ⁻⁶	0.00	0.00	0.00	0.00
	3.8%	0.2%	0%	0%	0%	0%	0%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.73x10 ⁻⁵	9.03	2.29x10 ⁻⁶	0.00	0.00	0.00	0.00
	0.37%	14%	0%	0%	0%	0%	0%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00

6. LCA: Interpretation

Contributions to total impact indicator results are dominated by the product replacement phase (B4) of the assessment. Of the remaining life cycle phases, with few exceptions, the raw material extraction and processing (A1) phase is the largest contributor to indicator impact results followed by product maintenance (B2), product distribution (A4), product manufacture (A3), and disposal (C4). Other life cycle phase contributions are minimal.

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