Environmental Product Declaration

Declaration Owner

American Biltrite
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Product

- *ABPure Rubber Flooring*
- *ABDefender Rubber Flooring*
- *ABMarathon Rubber Flooring*

(UNSPSC Class Code 30161705)

EPD represents delivery of product to customers globally.

Functional Unit
The functional unit is one square meter of flooring covering installed and maintained for use over a 75-year period

EPD Number and Period of Validity
SCS-EPD-10309
EPD Valid December 20, 2024 through December 19, 2029

Product Category Rule
PCR for Building-Related Products and Services - Part A: LCA Calculation Rules and Report Requirements, UL 10010, UL v.4.0, March 2022.

PCR Guidance for Building-Related Products and Services - Flooring EPD Requirements, v.2.0,[1] validity extended to December 31, 2024.

Program Operator
SCS Global Services
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Declaration Owner:	American Biltrite
Address:	200 Bank St., Sherbrooke, Quebec, J1H 1J4
Declaration Number:	SCS-EPD-10309
Declaration Validity Period:	Valid December 20, 2024 through December 19, 2029
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 2.1 software and the Ecoinvent v3.10 database
Product RSL:	30 years
Markets of Applicability:	Global
EPD Type:	Product-Specific
EPD Scope:	Cradle-to-Grave
LCIA Method and Version:	CML-IA and TRACI 2.1
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒ external
LCA Reviewer:	Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Part A Product Category Rule:	PCR for Building-Related Products and Services - Part A: LCA Calculation Rules and Report Requirements, UL 10010, UL v.4.0, March 2022
Part A PCR Review conducted by:	Lindita Bushi, PhD (Chair); Hugues Imbeault-Tétreault, ing., M.Sc.A.; Jack Geibig
Part B Product Category Rule:	PCR Guidance for Building-Related Products and Services - Flooring EPD Requirements, v.2.0,[1] validity extended to December 31, 2024
Part B PCR Review conducted by:	Jack Geibig (chair), Ecoform; Thomas Gloria, Industrial Ecology Consultants; Thaddeus Owen
Independent verification of the declaration and data, according to ISO 14025 and the PCR	☐ internal ☒ external
EPD Verifier:	Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Declaration Contents:	

Disclaimers: *This EPD conforms to ISO 14025, 14040, 14044, and 21930.*

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: *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.*

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.

1. American Biltrite

Founded in 1908, American Biltrite offers a select range of flooring solutions for the educational, healthcare and institutional sectors. With high aesthetics, great durability, low maintenance and excellent environmental qualities, our collections offer the best alternatives for every project. Products include resilient rubber sheet and tile, solid vinyl tile, and low-VOC luxury vinyl tiles.

2. Product

2.1 PRODUCT DESCRIPTION

Product Line	Representative Thickness	Product Description
ABPure	3.0mm	ABPURE® Nfuse® is a rubber flooring collection specifically engineered to meet the demands of healthcare and education facilities. It offers the ergonomic properties known for rubber floorings, but ABPURE comes with a 10-year color fastness warranty, offering superior color stability on all its colors, with pure whites to blues that will never yellow or change. Available in sheet and tile formats, it offers a variety of sizes, emboss, colors, and designs to suit any interior design vision. Nfuse technology penetrates and seals the pores, creating a no-wax, easy-maintenance surface. This occupancy-ready flooring does not require stripping and sealing after installation. ABPURE Nfuse provides exceptional resistance to stains and chemicals and won't tarnish after repeated disinfection. Declare Red List Free and FloorScore certified, it highlights a commitment to sustainability and indoor air quality. Additionally, ABPURE can be produced with renewable natural gas from organic waste, reducing its cradle-to-gate carbon footprint.
ABDefender	3.0mm	. ABDEFENDER® is a rubber flooring and stair tread system with superior fire-retardant and low smoke development properties. Engineered to meet the stringent safety standards of emergency exits, egress areas, and stairways of high buildings, it meets ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials - Class "A" and CAN/ULC-S102.2 Test of Surface Burning Characteristics of Building Materials and Assemblies. These standards confirm its extreme fire resistance and slower smoke and fire spread hazard, ensuring enhanced protection for occupants and buildings in emergencies. ABDEFENDER® rubber flooring tiles and stair treads serve as the first line of defense for emergency exit stairways in high buildings. In addition to its exceptional fire-retardant capabilities, ABDEFENDER® offers excellent traction, durability, and resistance to wear, ensuring long-lasting performance in high-traffic areas. The flooring and stair tread system comes standard with round profiles and a variety of sizes.
ABMarathon	3.0mm	ABMARATHON® is a long lasting rubber flooring and stair treads, crafted by American Biltrite for over 20 years, offer a durable and versatile solution for high-traffic environments. ABMARATHON flooring ensures long-lasting performance, comfort, traction, enhancing safety on both flat surfaces and stairs. Available in various colors, patterns, and textures, Marathon flooring and stair treads seamlessly integrate with diverse interior design schemes. Marathon products are ideal for spaces requiring both functionality and aesthetics. ABMARATHON rubber flooring is Declare Red List Free and FloorScore certified contributing to sustainable building practices with low VOC emissions. With Marathon, you get a reliable, high-performance flooring solution that meets the rigorous demands of high traffic modern commercial spaces. ABMARATHON can be produced with renewable natural gas from organic waste, reducing its cradle-to-gate carbon footprint.

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 rubber flooring products provide the primary function of flooring for interior applications. The products are used in various 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 life cycle phases included in the product system boundary are shown below.

Cut-off and allocation procedures are described below and conform to the PCR and ISO standards. The assessment follows the attributional LCA approach.

Table 1. *Life cycle phases included in the rubber flooring product system boundary.*

Product			Construction Process		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	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

X = Module Included | MND = Module Not Declared

2.5 TECHNICAL DATA

Technical specifications for the flooring product are summarized in Table 2 through Table 4.

Table 2. *Product specifications for the **ABPure** rubber flooring products.*

Characteristic			Description			
Sustainable certifications			Declare.			
VOC emissions test method			FloorScore®			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			3.00 (0.12)	mm (in)	2.00 (0.08)	3.00 (0.12)
Wear layer thickness (where applicable)			n/a	mm (in)	n/a	n/a
Product weight			4,930 (16.2)	g/m^2 (oz/ft^2)	3,280 (10.7)	4,930 (16.2)
Product Form	Tiles	Width	450.0 (17.7)	mm (in)	450.0 (17.7)	906.0 (35.7)
		Length	450.0 (17.7)	mm (in)	450.0 (17.7)	906.0 (35.7)
Product Form	Rolls	Width	1.52 (4.99)	m (ft)	1.20 (3.94)	1.52 (4.99)
		Length	15.2 (49.9)	m (ft)	4.50 (14.8)	17.0 (55.8)

Table 3. *Product specifications for the **ABDefender** rubber flooring products.*

Characteristic			Description			
Sustainable certifications			Declare.			
VOC emissions test method			FloorScore®			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			3.00 (0.12)	mm (in)	2.00 (0.08)	3.00 (0.12)
Wear layer thickness (where applicable)			n/a	mm (in)	n/a	n/a
Product weight			5,020 (16.5)	g/m^2 (oz/ft^2)	3,350 (11.0)	5,020 (16.5)
Product Form	Tiles	Width	450.0 (17.7)	mm (in)	450.0 (17.7)	906.0 (35.7)
		Length	450.0 (17.7)	mm (in)	450.0 (17.7)	906.0 (35.7)
Product Form	Rolls	Width	1.52 (4.99)	m (ft)	1.20 (3.94)	1.52 (4.99)
		Length	15.2 (49.9)	m (ft)	4.50 (14.8)	17.0 (55.8)

Table 4. *Product specifications for the **ABMarathon** rubber flooring products.*

Characteristic			Description			
Sustainable certifications			Declare.			
VOC emissions test method			FloorScore®			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			3.00 (0.12)	mm (in)	2.00 (0.08)	3.00 (0.12)
Wear layer thickness (where applicable)			n/a	mm (in)	n/a	n/a
Product weight			5,010 (16.4)	g/m^2 (oz/ft^2)	3,340 (10.9)	5,010 (16.4)
Product Form	Tiles	Width	450.0 (17.7)	mm (in)	450.0 (17.7)	906.0 (35.7)
		Length	450.0 (17.7)	mm (in)	450.0 (17.7)	906.0 (35.7)
Product Form	Rolls	Width	1.52 (4.99)	m (ft)	1.20 (3.94)	1.52 (4.99)
		Length	15.2 (49.9)	m (ft)	4.50 (14.8)	17.0 (55.8)

2.6 MARKET PLACEMENT/APPLICATION RULES

Technical specifications and product performance results for the flooring products can be found on the manufacturer's website https://www.american-biltrite.com/.

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

The products are delivered for installation in the form of tiles and rolls of various dimensions.

2.8 MATERIAL COMPOSITION

The primary materials include rubber, fillers and binders.

Table 5. *Material content for the rubber flooring products in kg per square meter and percent of total mass.*

Component	ABPure		ABDefender		ABMarathon	
	kg/m^2	%	kg/m^2	%	kg/m^2	%
SBR/NBR	0.297	6%	1.38	28%	1.25	25%
EPDM	0.777	16%	0.00	0%	0.00	0%
Filler	2.40	48%	0.415	8.3%	2.75	55%
Glass	0.505	10%	0.00	0%	0.00	0%
Fire retardant	0.379	7.6%	2.76	55%	0.500	10%
Resin	0.189	3.8%	4.15×10^{-2}	0.83%	0.212	4.2%
Pigment	5.08×10^{-2}	1%	0.100	2%	5.02×10^{-2}	1%
Coating	2.90×10^{-2}	0.59%	0.00	0%	0.00	0%
Other	0.332	6.7%	0.300	6%	0.260	5.2%
Total Product	**4.96**	**100%**	**5.00**	**100%**	**5.02**	**100%**

No chemicals regulated by the Resource Conservation and Recovery Act (RCRA) were identified in the product or product components. There are no releases of such substances associated with the production, use or maintenance of the products.

2.9 MANUFACTURING

The rubber flooring is produced at manufacturing facilities in the Quebec, Canada. The manufacturer provided primary data for their annual production, resource use and electricity consumption and waste generation at the facility. Electricity consumption is modeled using Ecoinvent datasets for the regional electricity grid resource mix. No green power sources or CO_2 certificates are included in the present study.

Material-specific scrap rates associated with product manufacture were provided and accounted for within the raw material extraction and processing and upstream transport phases of the assessment. Disposal of manufacturing scrap, via landfilling, is accounted for in the manufacturing stage.

2.10 PACKAGING

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

Table 6. *Material content for the flooring product packaging, in kg per square meter and percent of total mass.*

Component	ABPure		ABDefender		ABMarathon	
	kg/m^2	%	kg/m^2	%	kg/m^2	%
Packaging						
Corrugate	9.12x10^{-2}	23%	0.144	34%	0.160	36%
Plastic	6.14x10^{-3}	1.6%	0.00	0%	5.16x10-3	1.2%
Wood	0.291	75%	0.274	66%	0.274	62%
Total Packaging	**0.389**	**100%**	**0.419**	**100%**	**0.440**	**100%**

2.11 PRODUCT INSTALLATION

Installation of the product is accomplished using hand tools with negligible impacts and waste. For the current assessment, approximately 4% of the product mass is assumed lost as waste during product installation which is assumed landfilled. Impacts associate with the production, transport, waste processing, and disposal of installation wastage are included in this life cycle phase. The impacts associated with packaging disposal are included with the installation phase as per PCR requirements.

2.12 USE CONDITIONS

No special conditions of use are noted.

2.13 PRODUCT REFERENCE SERVICE LIFE AND BUILDING ESTIMATED SERVICE LIFE

The Reference Service Life (RSL) of the flooring product is based on the manufacturer's estimated product lifetime and is summarized in Table 7 below. The building Estimated Service Life (ESL) is 75 years, consistent with the PCR.

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, per PCR guidance. It is assumed that no components of the product are recycled at end-of-life.

2.16 FURTHER INFORMATION

Further information on the product can be found on the manufacturers' website at https://www.american-biltrite.com/.

3. LCA: Calculation Rules

3.1 FUNCTIONAL UNIT

The functional unit used in the study is defined as 1 m^2 of floor covering installed and maintained for use over a 75-year period. The corresponding reference flow for each product system is presented in Table 7. For the present assessment, a reference service lifetime (RSL) corresponding to the manufacturer's estimated 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 7.

Table 7. *Reference flows and RSL for the rubber flooring products.*

Product Name	Reference Flow (kg/m^2)	Reference Service Life – RSL (years)	Replacement Cycle (ESL/RSL-1)
ABPure	4.96	30	1.5
ABDefender	5.00	30	1.5
ABMarathon	5.02	30	1.5

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 8 and illustrated in Figure 1.

Table 8. *The modules and unit processes included in the scope for the flooring products.*

Module	Module Description	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 rubber flooring components.
A2	Transport (to the manufacturer)	Transport of component materials to the manufacturing facility
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 uses 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 products are disposed of via landfilling which requires no waste processing
C4	Disposal	Disposal of flooring product
D	Reuse-recovery-recycling potential	Module Not Declared

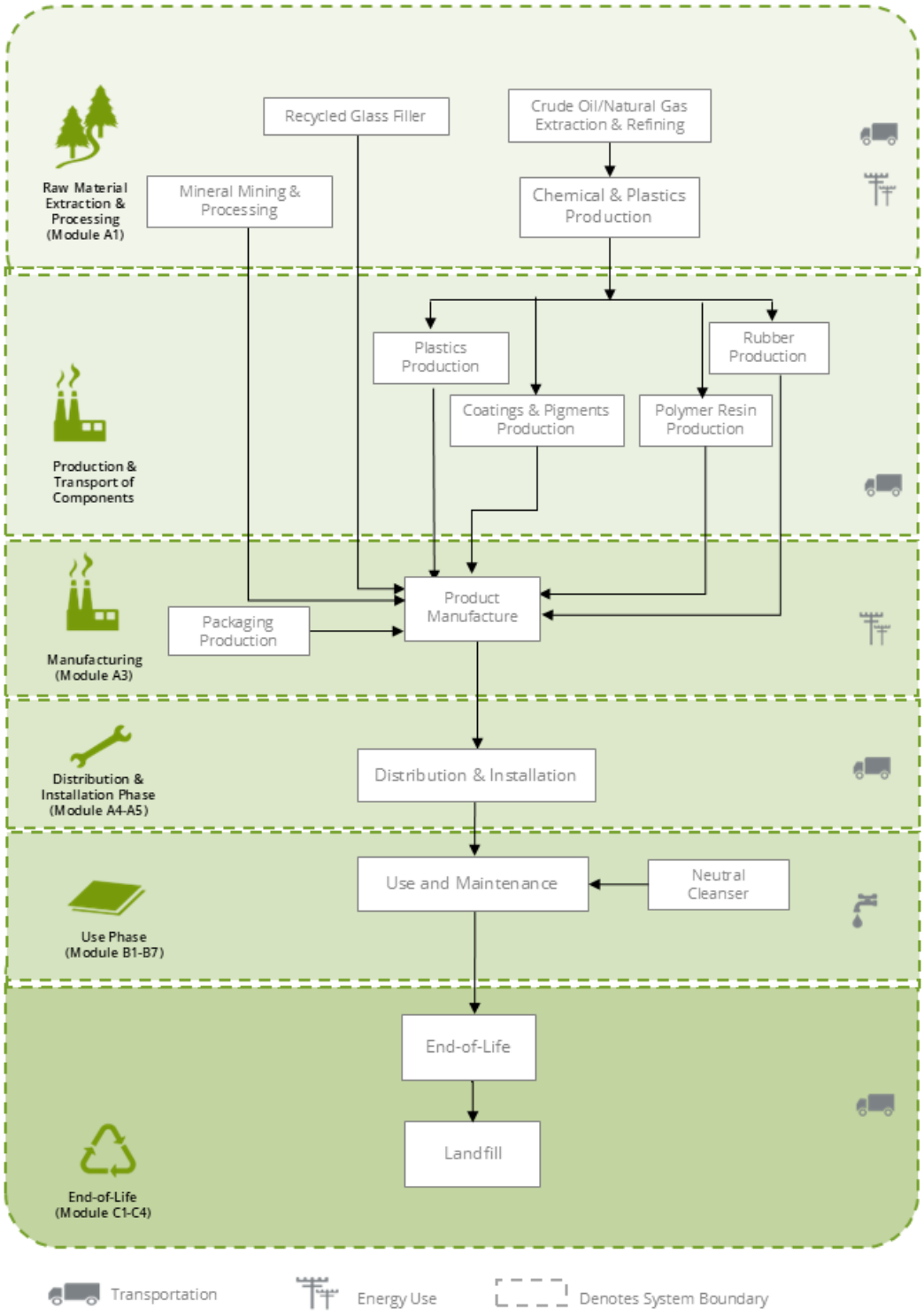

Figure 1. *Flow Diagram for the life cycle of the rubber flooring product system.*

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

- Electricity use at the manufacturing facility was allocated to the American Biltrite flooring products based on the product mass as a fraction of the total production.
- The American Biltrite production facilities are located in the Quebec, Canada. An Ecoinvent inventory dataset for the regional electric grid was to model resource use and emissions from electricity use at the manufacturing facility.
- Downstream transport was modeled based on information provided by the manufacturer representing transport for global product distribution.
- 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.
- 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 packaging is modeled based on the PCR guidance regarding recycling rates of packaging materials.
- For final disposal of the packaging material and flooring products at end-of-life, all materials are assumed to be transported 100 miles (161 km) by diesel truck to either a landfill or material reclamation facility (for recycling). Datasets representing disposal in a landfill and waste incineration are from Ecoinvent.
- 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 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 considering this limitation.

3.6 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.

3.7 DATA SOURCES

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

Table 9. *Data sources for the rubber flooring product system.*

Component	Dataset	Data Source	Publication Date
PRODUCT			
Rubber			
EPDM, SBR, NBR	synthetic rubber production | synthetic rubber | Cutoff, S/RoW	EI v3.10	2023
Filler			
Calcium Carbonate	limestone production, crushed, washed | limestone, crushed, washed | Cutoff, S/RoW	EI v3.10	2023
Clay	market for clay | clay | Cutoff, S/RoW	EI v3.10	2023
Glass (recycled)	market for glass cullet, sorted | glass cullet, sorted | Cutoff, S/RoW	EI v3.10	2023
Silica	silica sand production | silica sand | Cutoff, S/RoW	EI v3.10	2023
Fire retardant			
	aluminium hydroxide production | aluminium hydroxide | Cutoff, S/RoW	EI v3.10	2023
Polymer resins			
Resins	C3 hydrocarbon production, mixture, petroleum refinery operation | C3 hydrocarbon mixture | Cutoff, S/RoW	EI v3.10	2023
	acrylic acid production | acrylic acid | Cutoff, S/RoW	EI v3.10	2023
Pigment			
TiO_2	market for titanium dioxide | titanium dioxide | Cutoff, S/RoW	EI v3.10	2023
Other			
Additives	chemical production, organic | chemical, organic | Cutoff, S/GLO	EI v3.10	2023
	chemical production, inorganic | chemical, inorganic | Cutoff, S/GLO	EI v3.10	2023
	hydrogen peroxide production, product in 50% solution state | hydrogen peroxide, without water, in 50% solution state | Cutoff, S/RoW	EI v3.10	2023
	stearic acid production | stearic acid | Cutoff, S/GLO	EI v3.10	2023
	market for sulfur | sulfur | Cutoff, S/GLO	EI v3.10	2023
	zinc oxide production | zinc oxide | Cutoff, S/RoW	EI v3.10	2023
PACKAGING			
Cardboard	containerboard production, linerboard, kraftliner | containerboard, linerboard | Cutoff, S/RoW	EI v3.10	2023
Plastic	market for polyurethane, flexible foam | polyurethane, flexible foam | Cutoff, S/RoW	EI v3.10	2023
Wood	market for EUR-flat pallet | EUR-flat pallet | Cutoff, S/GLO	EI v3.10	2023
TRANSPORT			
Road transport	market for transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, S/RoW	EI v3.10	2023
Ship transport	transport, freight, sea, container ship | transport, freight, sea, container ship | Cutoff, S/GLO	EI v3.10	2023
MAINTENACE			
Neutral cleaner	ethoxylated alcohol (AE7) production, petrochemical | ethoxylated alcohol (AE7) | Cutoff, S/RoW; fatty acid production, from palm oil | fatty acid | Cutoff, S/RoW; tap water production, conventional treatment | tap water | Cutoff, S/RoW	EI v3.10	2023
Electricity	market for electricity, low voltage | electricity, low voltage | Cutoff, S/US	EI v3.10	2023
Water	tap water production, conventional treatment | tap water | Cutoff, S/RoW	EI v3.10	2023
WASTE DESPOSAL			
Landfill	treatment of municipal solid waste, sanitary landfill | municipal solid waste | Cutoff, S/RoW	EI v3.10	2023
RESOURCES			
Grid electricity	market for electricity, medium voltage | electricity, medium voltage | Cutoff, S/CA-QC	EI v3.10	2023
Heat – natural gas	market group for heat, district or industrial, natural gas | heat, district or industrial, natural gas | Cutoff, S/GLO	EI v3.10	2023
Heat - propane	heat production, propane, at industrial furnace >100kW | heat, district or industrial, other than natural gas | Cutoff, S/RoW	EI v3.10	2023

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 10. *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 2023.
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 Quebec. 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 disposal processes are based on US 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 the most recent data where available. Different portions of the product life cycle are equally considered; however, it must be noted that final disposition of the product is based on assumptions of current average practices in the United States.
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 facilities 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 v3.10 LCI data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the flooring products 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.

3.9 PERIOD UNDER REVIEW

The period of review is the calendar year 2023.

3.10 ALLOCATION

Manufacturing resource use was allocated to the products using a mass-based allocation approach. Impacts from transportation were allocated 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 installation is included in the assessment. Transportation parameters for modeling product distribution are summarized in Table 11. Production-weighted average distances by transport mode were used to represent product distribution globally.

Table 11. *Distribution parameters for the flooring products.*

Parameter	Unit	Value	
Ground transport			
Fuel type	-	Diesel	
Liters of fuel	L/100km	18.7	
Vehicle type	-	Diesel truck	
Capacity utilization	%	76	
Ocean transport			
Fuel type	-	Fuel oil	
Liters of fuel	L/tkm	2.23	
Vehicle type	-	Ocean freighter	
Capacity utilization	%	70	
Product Name	**Gross mass transported[1] (kg)**	**Transport distance (km)**	
		Road	Ship
ABPure	5.35	1,353	1,027
ABDefender	5.42	1,353	1,027
ABMarathon	5.46	1,353	1,027

[1] Including packaging.

Installation of the product and periodic cleaning are included in the life cycle use phase. The manufacturer provided installation and maintenance guidelines detailing the recommended installation methods and maintenance routine. For the current assessment, approximately 4% of the product mass is assumed lost as waste during product installation which is assumed landfilled. Impacts associate with the production, transport, waste processing, and disposal of installation wastage are included in this life cycle phase. The VOC emissions associated with the installation, use and maintenance of the products are negligible.

The impacts associated with packaging disposal are included with the installation phase as per PCR requirements. The recycling rates used for the product packaging are based on the PCR guidance. The relevant disposal statistics used for the packaging are summarized in Table 12. For material not recycled, 80% are assumed landfilled and 20% incinerated.

Modeling parameters for product installation are summarized in Table 13.

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

Material	Recycling rate (%)
Recycling Rates	
Plastics	15%
Paper & Pulp	75%
Wood	0%
Disposal of Non-recyclables	
Landfill	80%
Incineration	20%

Table 13. *Installation parameters for the rubber flooring products, per 1 m^2.*

Parameter		ABPure	ABDefender	ABMarathon
Ancillary materials		negligible	negligible	negligible
Net freshwater consumption (m^3)		0.00	0.00	0.00
Electricity consumption (kWh)		0.00	0.00	0.00
Product loss per functional unit (kg)		0.198	0.200	0.201
Waste materials generated by product installation (kg)		0.587	0.619	0.366
Output materials resulting from on-site waste processing (kg)		n/a	n/a	n/a
Mass of packaging waste (kg)	Plastic	$6.14x10^{-3}$	0.00	$5.16x10^{-3}$
	Corrugate	$9.12x10^{-2}$	0.144	0.160
	Wood	0.291	0.274	0.274
Biogenic carbon contained in packaging (kg CO_2)		0.701	0.768	0.797
Direct emissions (kg)		0.00	0.00	0.00

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. The present assessment is based on a recommended weekly cleaning schedule including sweeping and damp mopping with a neutral cleaner. Monthly machine cleaning of the flooring products is also included.

Table 14. *Maintenance parameters for the flooring products, per 1 m^2.*

Parameter	Unit	Value
Maintenance process	-	Damp mopping
Maintenance cycle	Cycles / RSL	1,560
Maintenance cycle	Cycles / ESL	3,900
Net freshwater consumption	$m^3/m^2/yr$	0.0058
Cleaning agent	$kg/m^2/yr$	0.119
Further assumptions	-	Moderate traffic; weekly maintenance
Maintenance process	-	Machine cleaning
Maintenance cycle	Cycles / RSL	360
Maintenance cycle	Cycles / ESL	900
Electricity	$kWh/m^2/yr$	0.022
Further assumptions	-	Moderate traffic; monthly 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 15. Impacts associated with the production, transport, waste processing, and disposal of all materials required for the replacement of the product over the 75-year assessment period are included in this life cycle phase.

Table 15. *Product replacement parameters for the flooring products, per 1 m^2.*

Parameter	Unit	ABPure	ABDefender	ABMarathon
Reference service life	Years	30	30	30
Replacement cycle	-	1.5	1.5	1.5
Energy input	kWh	0.00	0.00	0.00
Freshwater consumption	m^3	0.00	0.00	0.00
Ancillary materials	kg	Negligible	Negligible	Negligible
Replacement parts, including packaging	kg	8.02	8.13	8.19
Direct emissions	kg	0.00	0.00	0.00

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 flooring 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 flooring 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 100 mile (~161 km) average distance to disposal, consistent with the PCR. No recycling of the product materials is assumed at end-of-life. End-of-life modeling parameters are summarized in Table 16.

Table 16. *End-of-life disposal scenario parameters for the flooring products.*

Product	Scenario assumptions	Collection process		Recovery	Disposal			Removals of biogenic carbon[1]
		Collected separately	Collected with mixed waste		Recycling	Landfill	Incineration	
ABPure	Landfill	0	4.96	n/a	0	4.96	0	n/a
ABDefender	Landfill	0	5.00	n/a	0	5.00	0	n/a
ABMarathon	Landfill	0	5.02	n/a	0	5.02	0	n/a

[1] excluding packaging

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 following environmental impact category indicators 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 2.1 and CML-IA.

CMLI-A Impact Category	Unit	TRACI 2.1 Impact Category	Unit
Global Warming Potential (GWP)	kg CO_2 eq	Global Warming Potential (GWP)	kg CO_2 eq
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq	Ozone Depletion Potential (ODP)	kg CFC 11 eq
Acidification Potential of soil and water (AP)	kg SO_2 eq	Acidification Potential (AP)	kg SO_2 eq
Eutrophication Potential (EP)	kg PO_4^{3-} eq	Eutrophication Potential (EP)	kg N eq
Photochemical Oxidant Creation Potential (POCP)	kg C_2H_4 eq	Smog Formation Potential (SFP)	kg O_3 eq
Abiotic depletion potential (ADPE) for non-fossil resources	kg Sb eq	Fossil Fuel Depletion Potential (FFD)	MJ Surplus, LHV
Abiotic depletion potential (ADPF) for fossil resources	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, specified by the PCR, are also reported.

Resources	Unit	Waste and Outflows	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	**HLRW:** High-level radioactive waste, conditioned, to final repository	kg
$NRPR_M$: Non-renewable primary resources with energy content used as material	MJ, LHV	**ILLRW:** Intermediate- and low-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 net freshwater resources	m^3	-	-

Modules B1, B3, B5, B6, and B7 are not associated with any impact and are therefore declared as zero. In addition, module C1 is likewise not associated with any impact as the floor is manually deconstructed. Additionally, as rubber flooring products do not typically contain bio-based materials, biogenic carbon emissions and removals are not declared. Module D is not declared. In the interest of space and table readability, these modules are not included in the results presented below.

Table 17. *Life Cycle Impact Assessment (LCIA) results for the **ABPure** flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Impact Category	A1	A2	A3	A4	A5	B2	B4	C2	C4
CML									
GWP (kg CO_2 eq)	7.30	0.659	1.19	1.45	0.801	4.63	22.5	1.11	2.51
	17%	1.6%	2.8%	3.4%	1.9%	11%	53%	2.6%	5.9%
AP (kg SO_2 eq)	$2.77x10^{-2}$	$2.07x10^{-3}$	$1.84x10^{-3}$	$5.70x10^{-3}$	$2.06x10^{-3}$	$1.71x10^{-2}$	$6.63x10^{-2}$	$4.21x10^{-3}$	$6.03x10^{-4}$
	22%	1.6%	1.4%	4.5%	1.6%	13%	52%	3.3%	0.47%
EP (kg $(PO_4)^{3-}$ eq)	$1.19x10^{-2}$	$5.70x10^{-4}$	$5.02x10^{-3}$	$1.35x10^{-3}$	$5.81x10^{-3}$	$1.20x10^{-2}$	$9.16x10^{-2}$	$9.67x10^{-4}$	$3.54x10^{-2}$
	7.2%	0.35%	3.1%	0.82%	3.5%	7.3%	56%	0.59%	22%
POCP (kg C_2H_4 eq)	$2.77x10^{-3}$	$1.01x10^{-4}$	$2.15x10^{-4}$	$2.51x10^{-4}$	$2.08x10^{-4}$	$9.71x10^{-4}$	$6.40x10^{-3}$	$1.88x10^{-4}$	$5.36x10^{-4}$
	24%	0.87%	1.8%	2.2%	1.8%	8.3%	55%	1.6%	4.6%
ODP (kg CFC-11 eq)	$1.97x10^{-7}$	$7.87x10^{-9}$	$1.59x10^{-8}$	$1.73x10^{-8}$	$1.13x10^{-8}$	$6.04x10^{-8}$	$3.96x10^{-7}$	$1.35x10^{-8}$	$1.33x10^{-9}$
	27%	1.1%	2.2%	2.4%	1.6%	8.4%	55%	1.9%	0.19%
ADPF (MJ eq)	147	9.17	12.2	20.1	9.43	79.7	321	14.3	1.48
	24%	1.5%	2%	3.3%	1.5%	13%	52%	2.3%	0.24%
ADPE (kg Sb eq)	$4.21x10^{-5}$	$9.41x10^{-7}$	$9.50x10^{-7}$	$2.01x10^{-6}$	$1.89x10^{-6}$	$1.07x10^{-5}$	$7.25x10^{-5}$	$3.41x10^{-7}$	$6.94x10^{-8}$
	32%	0.72%	0.72%	1.5%	1.4%	8.1%	55%	0.26%	0.053%
TRACI									
GWP (kg CO_2 eq)	7.21	0.654	1.12	1.44	0.746	4.58	21.5	1.10	2.03
	18%	1.6%	2.8%	3.6%	1.8%	11%	53%	2.7%	5%
AP (kg SO_2 eq)	$2.94x10^{-2}$	$2.49x10^{-3}$	$2.09x10^{-3}$	$6.67x10^{-3}$	$2.36x10^{-3}$	$1.82x10^{-2}$	$7.38x10^{-2}$	$5.37x10^{-3}$	$7.78x10^{-4}$
	21%	1.8%	1.5%	4.7%	1.7%	13%	52%	3.8%	0.55%
EP (kg N eq)	$2.43x10^{-2}$	$6.79x10^{-4}$	$1.30x10^{-2}$	$1.51x10^{-3}$	$1.53x10^{-2}$	$2.62x10^{-2}$	0.228	$5.49x10^{-4}$	$9.69x10^{-2}$
	6%	0.17%	3.2%	0.37%	3.8%	6.4%	56%	0.13%	24%
SFP (kg O_3 eq)	0.377	$6.34x10^{-2}$	$3.86x10^{-2}$	0.160	$4.65x10^{-2}$	0.215	1.29	0.162	$1.17x10^{-2}$
	16%	2.7%	1.6%	6.8%	2%	9.1%	55%	6.9%	0.49%
ODP (kg CFC-11 eq)	$2.58x10^{-7}$	$1.07x10^{-8}$	$2.07x10^{-8}$	$2.35x10^{-8}$	$1.49x10^{-8}$	$8.84x10^{-8}$	$5.22x10^{-7}$	$1.82x10^{-8}$	$1.88x10^{-9}$
	27%	1.1%	2.2%	2.5%	1.6%	9.2%	54%	1.9%	0.2%
FFD (MJ surplus)	19.5	1.30	1.81	2.85	1.30	9.09	43.7	2.15	0.198
	24%	1.6%	2.2%	3.5%	1.6%	11%	53%	2.6%	0.24%

Table 18. *Resource use and waste flows for the **ABPure** flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Resources									
RPR_E (MJ)	20.5	0.123	26.6	0.265	1.91	4.49	74.3	$6.23x10^{-2}$	$4.61x10^{-2}$
	16%	0.096%	21%	0.21%	1.5%	3.5%	58%	0.049%	0.036%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	0%	0%	0%	0%	0%	0%	0%
$NRPR_E$ (MJ)	142	9.30	13.1	20.4	9.73	82.0	332	14.4	1.54
	23%	1.5%	2.1%	3.3%	1.6%	13%	53%	2.3%	0.25%
$NRPR_M$ (MJ)	10.7	0.00	0.00	0.00	0.00	0.00	16.1	0.00	0.00
	40%	0%	0%	0%	0%	0%	60%	0%	0%
SM (kg)	$5.05x10^{-3}$	0.00	0.00	0.00	0.00	0.00	$7.58x10^{-3}$	0.00	0.00
	40%	0%	0%	0%	0%	0%	60%	0%	0%
RSF/NRSF (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RE (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW (m^3)	0.446	$7.46x10^{-3}$	$6.98x10^{-2}$	$1.61x10^{-2}$	$2.25x10^{-2}$	0.775	0.854	$5.37x10^{-3}$	$2.71x10^{-3}$
	20%	0.34%	3.2%	0.73%	1%	35%	39%	0.24%	0.12%
Wastes									
HWD (kg)	$1.72x10^{-3}$	$6.47x10^{-5}$	$7.97x10^{-5}$	$1.40x10^{-4}$	$9.34x10^{-5}$	$9.78x10^{-4}$	$3.31x10^{-3}$	$1.01x10^{-4}$	$9.77x10^{-6}$
	26%	1%	1.2%	2.2%	1.4%	15%	51%	1.5%	0.15%
NHWD (kg)	0.608	0.441	0.598	0.935	0.661	0.169	12.4	$6.82x10^{-2}$	4.97
	2.9%	2.1%	2.9%	4.5%	3.2%	0.81%	60%	0.33%	24%
HLRW (kg)	$2.33x10^{-5}$	$5.60x10^{-7}$	$1.48x10^{-5}$	$1.21x10^{-6}$	$1.66x10^{-6}$	$1.10x10^{-5}$	$6.32x10^{-5}$	$3.24x10^{-7}$	$2.54x10^{-7}$
	20%	0.48%	13%	1%	1.4%	9.4%	54%	0.28%	0.22%
ILLRW (kg)	$6.27x10^{-5}$	$1.32x10^{-6}$	$7.10x10^{-6}$	$2.85x10^{-6}$	$3.11x10^{-6}$	$2.52x10^{-5}$	$1.18x10^{-4}$	$7.63x10^{-7}$	$6.40x10^{-7}$
	28%	0.6%	3.2%	1.3%	1.4%	11%	53%	0.34%	0.29%
CRU (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR (kg)	0.00	0.00	0.00	0.00	$3.89x10^{-2}$	0.00	$5.83x10^{-2}$	0.00	0.00
	0%	0%	0%	0%	40%	0%	60%	0%	0%
MER (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 19. *Life Cycle Impact Assessment (LCIA) results for the **ABDefender** flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Impact Category	A1	A2	A3	A4	A5	B2	B4	C2	C4
CML									
GWP (kg CO_2 eq)	8.37	1.37	1.63	1.47	0.962	4.63	26.6	1.12	2.81
	17%	2.8%	3.3%	3%	2%	9.5%	54%	2.3%	5.7%
AP (kg SO_2 eq)	$3.35x10^{-2}$	$4.30x10^{-3}$	$2.10x10^{-3}$	$5.78x10^{-3}$	$2.43x10^{-3}$	$1.71x10^{-2}$	$7.95x10^{-2}$	$4.24x10^{-3}$	$6.45x10^{-4}$
	22%	2.9%	1.4%	3.9%	1.6%	11%	53%	2.8%	0.43%
EP (kg $(PO_4)^{3-}$ eq)	$1.34x10^{-2}$	$1.19x10^{-3}$	$5.23x10^{-3}$	$1.37x10^{-3}$	$6.04x10^{-3}$	$1.20x10^{-2}$	0.102	$9.75x10^{-4}$	$3.98x10^{-2}$
	7.3%	0.65%	2.9%	0.76%	3.3%	6.6%	56%	0.54%	22%
POCP (kg C_2H_4 eq)	$2.41x10^{-3}$	$2.11x10^{-4}$	$2.47x10^{-4}$	$2.54x10^{-4}$	$2.15x10^{-4}$	$9.71x10^{-4}$	$6.19x10^{-3}$	$1.89x10^{-4}$	$6.01x10^{-4}$
	21%	1.9%	2.2%	2.3%	1.9%	8.6%	55%	1.7%	5.3%
ODP (kg CFC-11 eq)	$6.39x10^{-7}$	$1.64x10^{-8}$	$2.37x10^{-8}$	$1.75x10^{-8}$	$2.97x10^{-8}$	$6.04x10^{-8}$	$1.11x10^{-6}$	$1.37x10^{-8}$	$1.37x10^{-9}$
	33%	0.86%	1.2%	0.92%	1.6%	3.2%	58%	0.71%	0.071%
ADPF (MJ eq)	166	19.1	18.8	20.4	11.0	79.7	377	14.4	1.53
	23%	2.7%	2.7%	2.9%	1.5%	11%	53%	2%	0.22%
ADPE (kg Sb eq)	$4.91x10^{-5}$	$1.96x10^{-6}$	$9.22x10^{-7}$	$2.04x10^{-6}$	$2.21x10^{-6}$	$1.07x10^{-5}$	$8.50x10^{-5}$	$3.44x10^{-7}$	$7.21x10^{-8}$
	32%	1.3%	0.61%	1.3%	1.5%	7%	56%	0.23%	0.047%
TRACI									
GWP (kg CO_2 eq)	8.25	1.36	1.56	1.46	0.892	4.58	25.4	1.11	2.27
	18%	2.9%	3.3%	3.1%	1.9%	9.8%	54%	2.4%	4.8%
AP (kg SO_2 eq)	$3.52x10^{-2}$	$5.18x10^{-3}$	$2.40x10^{-3}$	$6.76x10^{-3}$	$2.76x10^{-3}$	$1.82x10^{-2}$	$8.78x10^{-2}$	$5.42x10^{-3}$	$8.34x10^{-4}$
	21%	3.1%	1.5%	4.1%	1.7%	11%	53%	3.3%	0.51%
EP (kg N eq)	$2.75x10^{-2}$	$1.41x10^{-3}$	$1.34x10^{-2}$	$1.53x10^{-3}$	$1.58x10^{-2}$	$2.62x10^{-2}$	0.253	$5.53x10^{-4}$	0.109
	6.1%	0.31%	3%	0.34%	3.5%	5.8%	56%	0.12%	24%
SFP (kg O_3 eq)	0.458	0.132	$4.81x10^{-2}$	0.163	$5.41x10^{-2}$	0.215	1.55	0.164	$1.21x10^{-2}$
	16%	4.7%	1.7%	5.8%	1.9%	7.7%	55%	5.9%	0.43%
ODP (kg CFC-11 eq)	$7.91x10^{-7}$	$2.23x10^{-8}$	$3.13x10^{-8}$	$2.38x10^{-8}$	$3.73x10^{-8}$	$8.84x10^{-8}$	$1.39x10^{-6}$	$1.83x10^{-8}$	$1.93x10^{-9}$
	33%	0.93%	1.3%	0.99%	1.6%	3.7%	58%	0.76%	0.081%
FFD (MJ surplus)	22.2	2.70	2.91	2.89	1.53	9.09	51.9	2.17	0.203
	23%	2.8%	3%	3%	1.6%	9.5%	54%	2.3%	0.21%

Table 20. *Resource use and waste flows for the **ABDefender** flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Resources									
RPR_E (MJ)	6.87	0.256	27.7	0.269	1.41	4.49	54.9	$6.29x10^{-2}$	$4.99x10^{-2}$
	7.2%	0.27%	29%	0.28%	1.5%	4.7%	57%	0.066%	0.052%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	0%	0%	0%	0%	0%	0%	0%
$NRPR_E$ (MJ)	159	19.3	19.7	20.6	11.3	82.0	389	14.5	1.59
	22%	2.7%	2.7%	2.9%	1.6%	11%	54%	2%	0.22%
$NRPR_M$ (MJ)	13.8	0.00	0.00	0.00	0.00	0.00	20.7	0.00	0.00
	40%	0%	0%	0%	0%	0%	60%	0%	0%
SM (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	0%	0%	0%	0%	0%	0%	0%
RSF/NRSF (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RE (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW (m^3)	0.493	$1.55x10^{-2}$	$9.39x10^{-2}$	$1.63x10^{-2}$	$2.57x10^{-2}$	0.775	0.978	$5.41x10^{-3}$	$2.91x10^{-3}$
	20%	0.64%	3.9%	0.68%	1.1%	32%	41%	0.22%	0.12%
Wastes									
HWD (kg)	$1.47x10^{-3}$	$1.34x10^{-4}$	$9.77x10^{-5}$	$1.42x10^{-4}$	$8.77x10^{-5}$	$9.78x10^{-4}$	$3.06x10^{-3}$	$1.02x10^{-4}$	$1.00x10^{-5}$
	24%	2.2%	1.6%	2.3%	1.4%	16%	50%	1.7%	0.16%
NHWD (kg)	2.19	0.917	0.616	0.947	0.774	0.169	15.8	$6.88x10^{-2}$	5.02
	8.3%	3.5%	2.3%	3.6%	2.9%	0.64%	60%	0.26%	19%
HLRW (kg)	$2.86x10^{-5}$	$1.16x10^{-6}$	$1.50x10^{-5}$	$1.22x10^{-6}$	$1.91x10^{-6}$	$1.10x10^{-5}$	$7.29x10^{-5}$	$3.27x10^{-7}$	$2.76x10^{-7}$
	22%	0.88%	11%	0.92%	1.4%	8.3%	55%	0.25%	0.21%
ILLRW (kg)	$1.17x10^{-4}$	$2.74x10^{-6}$	$7.29x10^{-6}$	$2.89x10^{-6}$	$5.36x10^{-6}$	$2.52x10^{-5}$	$2.05x10^{-4}$	$7.69x10^{-7}$	$6.96x10^{-7}$
	32%	0.75%	2%	0.79%	1.5%	6.9%	56%	0.21%	0.19%
CRU (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR (kg)	0.00	0.00	0.00	0.00	$4.19x10^{-2}$	0.00	$6.28x10^{-2}$	0.00	0.00
	0%	0%	0%	0%	40%	0%	60%	0%	0%
MER (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 21. *Life Cycle Impact Assessment (LCIA) results for the **ABMarathon** flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Impact Category	A1	A2	A3	A4	A5	B2	B4	C2	C4
CML									
GWP (kg CO_2 eq)	6.58	2.04	1.69	1.48	0.946	4.63	25.0	1.12	2.82
	14%	4.4%	3.7%	3.2%	2%	10%	54%	2.4%	6.1%
AP (kg SO_2 eq)	$2.57x10^{-2}$	$6.42x10^{-3}$	$2.32x10^{-3}$	$5.82x10^{-3}$	$2.24x10^{-3}$	$1.71x10^{-2}$	$7.12x10^{-2}$	$4.26x10^{-3}$	$6.47x10^{-4}$
	19%	4.7%	1.7%	4.3%	1.7%	13%	52%	3.1%	0.48%
EP (kg $(PO_4)^{3-}$ eq)	$1.01x10^{-2}$	$1.77x10^{-3}$	$5.39x10^{-3}$	$1.38x10^{-3}$	$6.18x10^{-3}$	$1.20x10^{-2}$	$9.85x10^{-2}$	$9.79x10^{-4}$	$3.99x10^{-2}$
	5.7%	1%	3.1%	0.78%	3.5%	6.8%	56%	0.56%	23%
POCP (kg C_2H_4 eq)	$1.86x10^{-3}$	$3.14x10^{-4}$	$2.66x10^{-4}$	$2.56x10^{-4}$	$2.04x10^{-4}$	$9.71x10^{-4}$	$5.55x10^{-3}$	$1.90x10^{-4}$	$6.03x10^{-4}$
	18%	3.1%	2.6%	2.5%	2%	9.5%	54%	1.9%	5.9%
ODP (kg CFC-11 eq)	$2.21x10^{-7}$	$2.44x10^{-8}$	$2.56x10^{-8}$	$1.77x10^{-8}$	$1.35x10^{-8}$	$6.04x10^{-8}$	$4.76x10^{-7}$	$1.37x10^{-8}$	$1.37x10^{-9}$
	26%	2.9%	3%	2.1%	1.6%	7.1%	56%	1.6%	0.16%
ADPF (MJ eq)	143	28.4	19.6	20.5	10.5	79.7	357	14.5	1.53
	21%	4.2%	2.9%	3%	1.6%	12%	53%	2.1%	0.23%
ADPE (kg Sb eq)	$4.31x10^{-5}$	$2.92x10^{-6}$	$1.09x10^{-6}$	$2.06x10^{-6}$	$2.02x10^{-6}$	$1.07x10^{-5}$	$7.73x10^{-5}$	$3.46x10^{-7}$	$7.24x10^{-8}$
	31%	2.1%	0.78%	1.5%	1.4%	7.7%	55%	0.25%	0.052%
TRACI									
GWP (kg CO_2 eq)	6.49	2.03	1.62	1.47	0.873	4.58	23.8	1.11	2.28
	15%	4.6%	3.7%	3.3%	2%	10%	54%	2.5%	5.2%
AP (kg SO_2 eq)	$2.70x10^{-2}$	$7.72x10^{-3}$	$2.64x10^{-3}$	$6.81x10^{-3}$	$2.57x10^{-3}$	$1.82x10^{-2}$	$7.95x10^{-2}$	$5.44x10^{-3}$	$8.37x10^{-4}$
	18%	5.1%	1.8%	4.5%	1.7%	12%	53%	3.6%	0.56%
EP (kg N eq)	$2.05x10^{-2}$	$2.11x10^{-3}$	$1.37x10^{-2}$	$1.54x10^{-3}$	$1.63x10^{-2}$	$2.62x10^{-2}$	0.246	$5.55x10^{-4}$	0.109
	4.7%	0.48%	3.2%	0.35%	3.7%	6%	56%	0.13%	25%
SFP (kg O_3 eq)	0.330	0.197	$5.17x10^{-2}$	0.164	$5.26x10^{-2}$	0.215	1.46	0.164	$1.21x10^{-2}$
	12%	7.4%	2%	6.2%	2%	8.1%	55%	6.2%	0.46%
ODP (kg CFC-11 eq)	$2.87x10^{-7}$	$3.32x10^{-8}$	$3.35x10^{-8}$	$2.40x10^{-8}$	$1.77x10^{-8}$	$8.84x10^{-8}$	$6.24x10^{-7}$	$1.84x10^{-8}$	$1.94x10^{-9}$
	25%	2.9%	3%	2.1%	1.6%	7.8%	55%	1.6%	0.17%
FFD (MJ surplus)	19.1	4.03	3.01	2.91	1.47	9.09	49.4	2.18	0.204
	21%	4.4%	3.3%	3.2%	1.6%	9.9%	54%	2.4%	0.22%

Table 22. *Resource use and waste flows for the **ABMarathon** flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Resources									
RPR_E (MJ)	12.0	0.381	28.2	0.271	1.65	4.49	64.0	$6.31x10^{-2}$	$5.01x10^{-2}$
	11%	0.34%	25%	0.24%	1.5%	4%	58%	0.057%	0.045%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	0%	0%	0%	0%	0%	0%	0%
$NRPR_E$ (MJ)	136	28.8	20.6	20.8	10.8	82.0	368	14.5	1.60
	20%	4.2%	3%	3%	1.6%	12%	54%	2.1%	0.23%
$NRPR_M$ (MJ)	12.5	0.00	0.00	0.00	0.00	0.00	18.7	0.00	0.00
	40%	0%	0%	0%	0%	0%	60%	0%	0%
SM (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	0%	0%	0%	0%	0%	0%	0%
RSF/NRSF (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RE (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW (m^3)	0.425	$2.31x10^{-2}$	$9.83x10^{-2}$	$1.64x10^{-2}$	$2.35x10^{-2}$	0.775	0.892	$5.43x10^{-3}$	$2.92x10^{-3}$
	19%	1%	4.3%	0.73%	1%	34%	39%	0.24%	0.13%
Wastes									
HWD (kg)	$1.66x10^{-3}$	$2.00x10^{-4}$	$1.15x10^{-4}$	$1.43x10^{-4}$	$9.92x10^{-5}$	$9.78x10^{-4}$	$3.49x10^{-3}$	$1.02x10^{-4}$	$1.00x10^{-5}$
	24%	2.9%	1.7%	2.1%	1.5%	14%	51%	1.5%	0.15%
NHWD (kg)	0.678	1.37	0.626	0.955	0.753	0.169	14.2	$6.90x10^{-2}$	5.04
	2.8%	5.7%	2.6%	4%	3.2%	0.71%	60%	0.29%	21%
HLRW (kg)	$2.30x10^{-5}$	$1.74x10^{-6}$	$1.54x10^{-5}$	$1.23x10^{-6}$	$1.72x10^{-6}$	$1.10x10^{-5}$	$6.54x10^{-5}$	$3.28x10^{-7}$	$2.77x10^{-7}$
	19%	1.4%	13%	1%	1.4%	9.1%	55%	0.27%	0.23%
ILLRW (kg)	$6.44x10^{-5}$	$4.09x10^{-6}$	$7.82x10^{-6}$	$2.91x10^{-6}$	$3.34x10^{-6}$	$2.52x10^{-5}$	$1.26x10^{-4}$	$7.72x10^{-7}$	$6.99x10^{-7}$
	27%	1.7%	3.3%	1.2%	1.4%	11%	54%	0.33%	0.3%
CRU (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR (kg)	0.00	0.00	0.00	0.00	$4.40x10^{-2}$	0.00	$6.60x10^{-2}$	0.00	0.00
	0%	0%	0%	0%	40%	0%	60%	0%	0%
MER (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

6. LCA: Interpretation

The contributions to total impact indicator results are dominated by the product replacement phase (B4) of the assessment. Of the remaining life cycle phases, with the exception of the Eutrophication Potential, the raw material extraction and processing phase is generally the largest contributor to the overall impacts, followed by product maintenance (*B2*) and product distribution (A4). The Eutrophication Potential is dominated primarily by the product disposal stage followed by the product maintenance stage and the raw material extraction and processing stage. Other life cycle phase contributions are minimal.

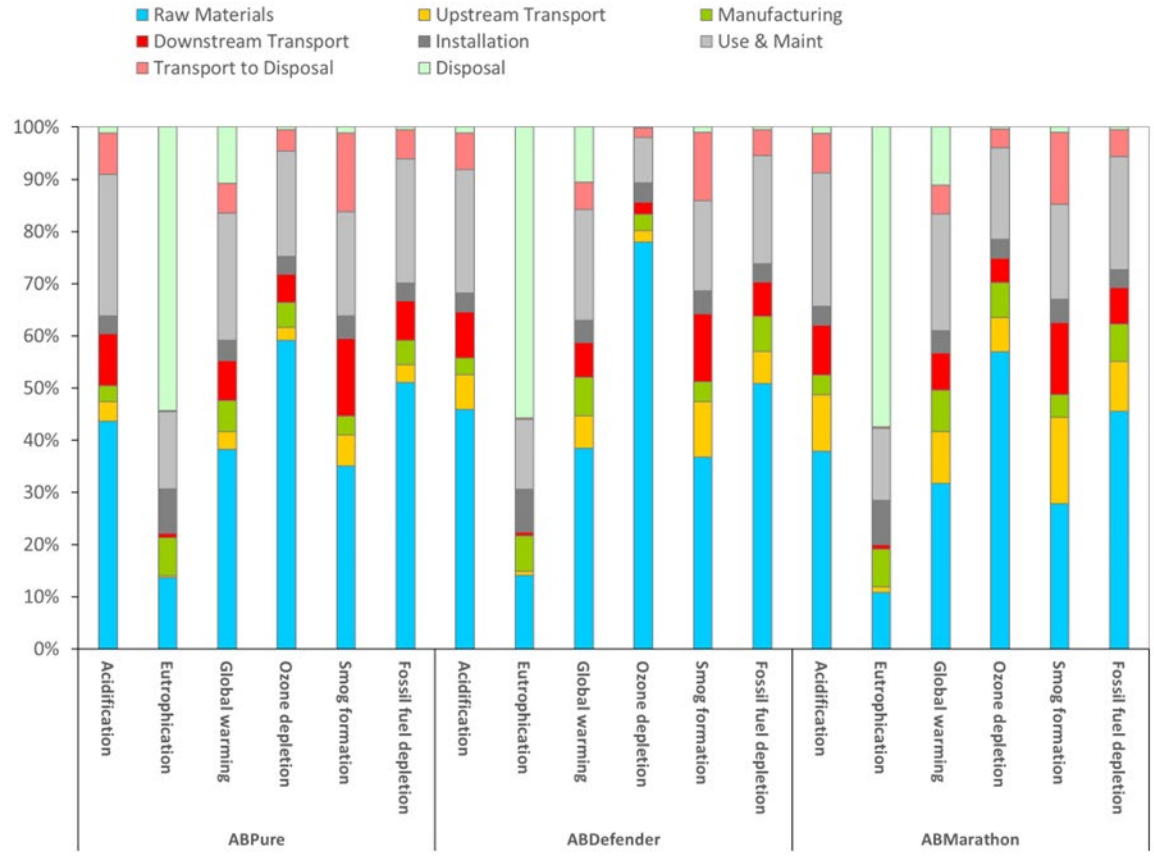

Figure 2. *Contribution analysis for the rubber flooring product – TRACI v2.1. (excluding product replacements)*

7. References

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