Bay Resource Group Inc.
SPECIALTY FLOORING PRODUCTS

VERIFIED by SCS GLOBAL SERVICES ENVIRONMENTAL PRODUCT DECLARATION BASED ON LCA

Declaration Owner

Bay Resource Group Inc.
173-11280 Twigg Place,
Richmond, British Columbia, Canada V6V 0A6
www.harbingerfloors.com | info@bayresourcegroup.ca

Products

Luxury Vinyl Flooring:

- Luxury Vinyl Tiles
- Loose Lay
- Polyvinyl Chloride (PVC) Click
- Composite Core with Cork Backing
- Polyvinyl Chloride (PVC) Rigid with Irradiation Cross-linked Polyethylene (IXPE) Backing
- Polyvinyl Chloride (PVC) with Irradiation Cross-linked Polyethylene (IXPE) Backing

Functional Unit

The functional unit is one square meter of floor covering provided and maintained for a period of 60 years.

EPD Number and Period of Validity

SCS-EPD-04951
EPD Valid April 16, 2018 through April 15, 2023

Product Category Rule

Product Category Rule (PCR) for preparing an Environmental Product Declaration (EPD) for Flooring: Carpet, Resilient, Laminate, Ceramic, Wood. NSF International. Version 2. 2014.

Program Operator

SCS Global Services
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SCS global SERVICES

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

PCR review, was conducted by	Jack Geibig, EcoForm. jgeibig@ecoform.com
Approved Date: April 16, 2018 – End Date: April 15, 2023	
Independent verification of the declaration and data, according to ISO 14025:2006 and ISO 21930: 2007.	☐ internal ☑ external
Third party verifier	[signature] Tom Gloria, Ph.D., Industrial Ecology Consultants

ABOUT BAY RESOURCE GROUP INC.

Bay Resource Group has been at the leading edge in the development and distribution of niche flooring products for over 20 years. Bay Resource Group is a family run business based in British Columbia and has distribution agreements covering Eastern Canada and the United States. Bay Resource Group sources and develops a leading edge line of luxury vinyl tiles, which launched under the Harbinger™ brand in 1999.

PRODUCT DESCRIPTION

Luxury vinyl flooring in this EPD are manufactured in an ISO 9001 and ISO 14001 facility in China. The manufacturer warrants for a period of 20 years from the date of purchase, which is used as the reference service life in this EPD. However, according to the manufacturer, the potential product lifetime when properly used and maintained can last as long as 60 years.

PRODUCT APPLICATION

Luxury vinyl flooring in this EPD are used in various commercial and residential applications, including retail, education, and hospitality.

PRODUCT PERFORMANCE

Table 1. *Product performance test results for luxury vinyl flooring products in this EPD.*

Property	Test Method	Result
VOC	State of California DOHS R-174	44 $\mu g/m^3$ .h Less than 10% of allowable level
Critical Radiant Flux	ASTM E648-10	Pass; Class 1
Smoke Density (flaming)	ASTM E662-09	Pass; < 357
Smoke Density (non-flaming)	ASTM E662-09	Pass; 339
Slip Resistance	ASTM D2047	Pass 0.90 (wet); compliance varies with surface texture
Heavy Metal Content	ASTM F963	No detectable heavy metals <1.5mg/kg
Phthalate	CPSC-C1001-09.3	Exceeds CPSA guideline. Phthalate free.
State Load limit	ASTM F970	Residual compression 0.004 inch
Flexibility	ASTM F137	Pass; 6mm Mandrel
Color Fastness (heat)	ASTM F1514	Pass
Color Fastness (light)	ASTM F1515	Pass
Quality Control Management	ISO 9001	Achieved
Heat Stability	ASTM F1514	Pass
Residual Indentation	ASTM F1914-98	0.006 inch (3.5%)
Stain and Chemical Resistance	ASTM F925-2	No change
Dimensional Stability	ASTM F2199	Pass, <0.08%
IIC (Impact Insulation Class)	ASTM E492	IIC 73* Tested on 6” concrete (*Click Composite Core with Cork Backing)
STC (Sound Transmission Coefficient)	ASTM E90-09 ASTM E413-10	STC 68* tested on 6” concrete (*Click Composite Core with Cork Backing)
Radiant Heat Stability	ASTM F1514	Up to 28°C (82°F)

MATERIAL CONTENT

Table 2. *Origin and availability of material content for Vinyl Floor Tile (3mm).*

Component	Materials	Amount (kg/m²)	Percent of Total (%)	Availability			Origin of Raw Materials
				Renewable	Non-renewable	Recycled (% pre-/post-consumer)	
Filler	Calcium Carbonate	3.4	60%	-	Mineral, abundant	9.6%/0%	Global
Polyvinyl chloride	Polyvinyl chloride resin	1.1	20%	-	Fossil, limited	3.3%/0%	Global
Wearlayer	PVC powder, dioctyl terephthalate, other	0.64	11%	-	Fossil, limited	-	Global
Plasticizer	Dioctyl terephthalate	0.36	6.4%	-	Fossil, limited	1.2%/0%	Global
Film	PVC, vinyl chloride copolymer	0.12	2.0%	-	Fossil, limited	-	Global
Stabilizer	Stearic acid, zinc sulfate, calcium chloride, sodium hydroxide	2.2×10^{-2}	0.39%	-	Fossil, limited; Mineral, abundant	0.05%/0%	Global
UV Coating	Epoxy resin, methacrylic acid, photosensitizer, silica, octamethylcyclotetrasiloxane	1.3×10^{-2}	0.23%	-	Fossil, limited	-	Global
Ink	Carbon black	5.5×10^{-3}	0.10%	-	Fossil, limited	0.02%/0%	Global
TOTAL	**-**	**5.6**	**100%**	**-**	**-**	**6.5%/0%**	**-**

Table 3. *Origin and availability of material content for Vinyl Floor Tile (2mm).*

Component	Materials	Amount (kg/m²)	Percent of Total (%)	Availability			Origin of Raw Materials
				Renewable	Non-renewable	Recycled (% pre-/post-consumer)	
Filler	Calcium Carbonate	2.1	58%	-	Mineral, abundant	8.2%/0%	Global
Polyvinyl chloride	Polyvinyl chloride resin	0.75	21%	-	Fossil, limited	2.8%/0%	Global
Wearlayer	PVC powder, dioctyl terephthalate, other	0.40	11%	-	Fossil, limited	-	Global
Plasticizer	Dioctyl terephthalate	0.24	6.6%	-	Fossil, limited	1.0%/0%	Global
Film	PVC, vinyl chloride copolymer	0.12	3.2%	-	Fossil, limited	-	Global
Stabilizer	Stearic acid, zinc sulfate, calcium chloride, sodium hydroxide	1.5×10^{-2}	0.41%	-	Fossil, limited; Mineral, abundant	0.050%/0%	Global
UV Coating	Epoxy resin, methacrylic acid, photosensitizer, silica, octamethylcyclotetrasiloxane	1.3×10^{-2}	0.35%	-	Fossil, limited	-	Global
Ink	Carbon black	3.8×10^{-3}	0.10%	-	Fossil, limited	0.010%/0%	Global
TOTAL	**-**	**3.7**	**100%**	**-**	**-**	**5.4%/0%**	**-**

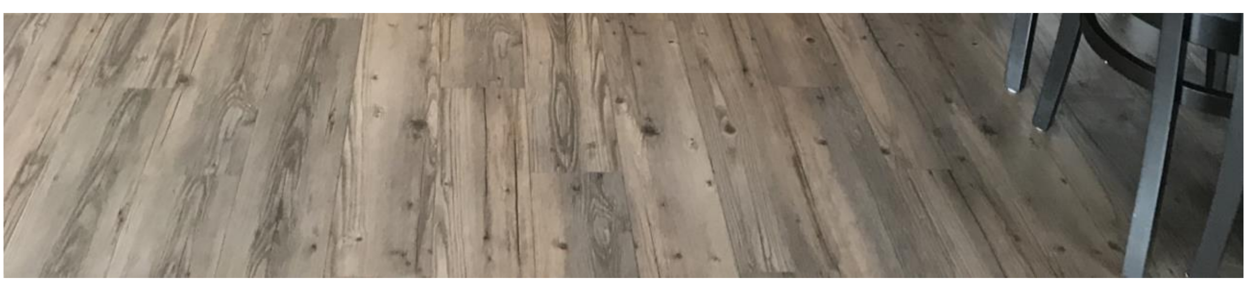


Table 4. *Origin and availability of material content for Loose Lay (5mm).*

Component	Materials	Amount (kg/m²)	Percent of Total (%)	Availability			Origin of Raw Materials
				Renewable	Non-renewable	Recycled (% pre-/post-consumer)	
Filler	Calcium Carbonate	5.5	57%	-	Mineral, abundant	9.8%/0%	Global
Polyvinyl chloride	Polyvinyl chloride resin	1.6	17%	-	Fossil, limited	3.7%/0%	Global
Anti-slip film	PVC, dioctyl terephthalate, stabilizer	1.1	11%	-	Fossil, limited	-	Global
Plasticizer	Dioctyl terephthalate	0.79	8.3%	-	Fossil, limited	1.7%/0%	Global
Wearlayer	PVC powder, dioctyl terephthalate, other	0.40	4.1%	-	Fossil, limited	-	Global
Film	PVC, vinyl chloride copolymer	0.12	1.2%	-	Fossil, limited	-	Global
Fiberglass	Glass fiber reinforced plastic, polyester resin	$4.2x10^{-2}$	0.44%	-	Fossil, limited; Mineral, abundant	-	Global
Stabilizer	Stearic acid, zinc sulfate, calcium chloride, sodium hydroxide	$3.2x10^{-2}$	0.33%	-	Fossil, limited; Mineral, abundant	0.070%/0%	Global
UV Coating	Epoxy resin, methacrylic acid, photosensitizer, silica, octamethylcyclotetrasiloxane	$1.3x10^{-2}$	0.13%	-	Fossil, limited	-	Global
Ink	Carbon black	$7.9x10^{-3}$	0.083%	-	Fossil, limited	0.010%/0%	Global
TOTAL	**-**	**9.6**	**100%**	**-**	**-**	**6.4%/0%**	**-**

Table 5. *Origin and availability of material content for PVC Click (5mm).*

Component	Materials	Amount (kg/m²)	Percent of Total (%)	Availability			Origin of Raw Materials
				Renewable	Non-renewable	Recycled (% pre-/post-consumer)	
Filler	Calcium Carbonate	6.5	67%	-	Mineral, abundant	12%/0%	Global
Polyvinyl chloride	Polyvinyl chloride resin	1.8	18%	-	Fossil, limited	4.2%/0%	Global
Wearlayer	PVC powder, dioctyl terephthalate, other	0.64	6.6%	-	Fossil, limited	-	Global
Plasticizer	Dioctyl terephthalate	0.60	6.2%	-	Fossil, limited	1.5%/0%	Global
Film	PVC, vinyl chloride copolymer	0.11	1.1%	-	Fossil, limited	-	Global
Fiberglass	Glass fiber reinforced plastic, polyester resin	$5.0x10^{-2}$	0.52%	-	Fossil, limited; Mineral, abundant	-	Global
Stabilizer	Stearic acid, zinc sulfate, calcium chloride, sodium hydroxide	$3.5x10^{-2}$	0.36%	-	Fossil, limited; Mineral, abundant	0.070%/0%	Global
UV Coating	Epoxy resin, methacrylic acid, photosensitizer, silica, octamethylcyclotetrasiloxane	$1.2x10^{-2}$	0.12%	-	Fossil, limited	-	Global
Ink	Carbon black	$8.9x10^{-3}$	0.091%	-	Fossil, limited	0.020%/0%	Global
TOTAL	**-**	**9.7**	**100%**	**-**	**-**	**9.1%/0%**	**-**

Table 6. *Origin and availability of material content for Click Composite Core with Cork Backing (7.5mm)*

Component	Materials	Amount (kg/m^2)	Percent of Total (%)	Availability			Origin of Raw Materials
				Renewable	Non-renewable	Recycled (% pre-/post-consumer)	
Filler	Calcium Carbonate	3.4	43%	-	Mineral, abundant	6.2%/0%	Global
Polyvinyl chloride	Polyvinyl chloride resin	2.3	29%	-	Fossil, limited	6.2%/0%	Global
Cork Backing	Soft wood, additive	1.0	12%	Biogenic	Fossil, limited	-	
Wearlayer	PVC powder, dioctyl terephthalate, other	0.64	8.0%	-	Fossil, limited	-	Global
LP-90	Styrene, other	0.16	2.0%	-	Fossil, limited	0.53%/0%	Global
Plasticizer	Dioctyl terephthalate	0.14	1.8%	-	Fossil, limited	-	Global
Film	PVC, vinyl chloride copolymer	0.12	1.5%	-	Fossil, limited	-	Global
Stabilizer	Stearic acid, zinc sulfate, calcium chloride, sodium hydroxide	0.11	1.4%	-	Fossil, limited; Mineral, abundant	0.33%/0%	Global
Glue	polyurethane reactive hot melt	$3.5x10^{-2}$	0.44%	-	Fossil, limited	-	Global
Foaming agent	azodicarbonamide	$1.7x10^{-2}$	0.21%	-	Fossil, limited	5.3%/0%	Global
UV Coating	Epoxy resin, methacrylic acid, photosensitizer, silica, octamethylcyclotetrasiloxane	$1.3x10^{-2}$	0.17%	-	Fossil, limited	-	Global
PE Wax	Polyethylene	$7.9x10^{-3}$	0.10%	-	Fossil, limited	0.90%/0%	Global
Ink	Carbon black	$1.7x10^{-3}$	0.021%	-	Fossil, limited	-	Global
TOTAL	**-**	**8.0**	**100%**	**-**	**-**	**4.5%/0%**	**-**

Table 7. *Origin and availability of material content for PVC Rigid with IXPE Backing (5.5mm)*

Component	Materials	Amount (kg/m^2)	Percent of Total (%)	Availability			Origin of Raw Materials
				Renewable	Non-renewable	Recycled (% pre-/post-consumer)	
Filler	Calcium Carbonate	5.6	57%	-	Mineral, abundant	8.7%/0%	Global
Polyvinyl chloride	Polyvinyl chloride resin	1.7	18%	-	Fossil, limited	2.5%/0%	Global
IXPE Backing	Polyethylene blowing agent masterbatch	1.0	10%	-	Fossil, limited	-	
Wearlayer	PVC powder, dioctyl terephthalate, other	0.90	9.1%	-	Fossil, limited	-	Global
Plasticizer	Dioctyl terephthalate	0.20	2.0%	-	Fossil, limited	-	Global
Stabilizer	Stearic acid, zinc sulfate, calcium chloride, sodium hydroxide	0.13	1.4%	-	Fossil, limited; Mineral, abundant	0.27%/0%	Global
Film	PVC, vinyl chloride copolymer	0.11	1.1%	-	Fossil, limited	-	Global
DL-50	Methyl methacrylate-butyl acrylate	$8.9x10^{-2}$	0.91%	-	Fossil, limited	-	Global
Stearic Acid	Stearic acid	$1.6x10^{-2}$	0.16%	-	Fossil, limited	0.20%/0%	Global
PE Wax	Polyethylene	$1.3x10^{-2}$	0.14%	-	Fossil, limited	0.030%/0%	Global
UV Coating	Epoxy resin, methacrylic acid, photosensitizer, silica, octamethylcyclotetrasiloxane	$1.2x10^{-2}$	0.12%	-	Fossil, limited	-	Global
Ink	Carbon black	$3.1x10^{-3}$	0.032%	-	Fossil, limited	-	Global
TOTAL	**-**	**9.8**	**100%**	**-**	**-**	**5.4%/0%**	**-**

Table 8. *Origin and availability of material content for PVC with IXPE Backing (4.5mm).*

Component	Materials	Amount (kg/m²)	Percent of Total (%)	Availability			Origin of Raw Materials
				Renewable	Non-renewable	Recycled (% pre-/post-consumer)	
Filler	Calcium Carbonate	3.4	59%	-	Mineral, abundant	9.5%/0%	Global
Polyvinyl chloride	Polyvinyl chloride resin	1.1	19%	-	Fossil, limited	3.3%/0%	Global
Wearlayer	PVC powder, dioctyl terephthalate, other	0.64	11%	-	Fossil, limited	-	Global
Plasticizer	Dioctyl terephthalate	0.36	6.4%	-	Fossil, limited	1.2%/0%	Global
Film	PVC, vinyl chloride copolymer	0.12	2.0%	-	Fossil, limited	-	Global
IXPE Backing	Polyethylene blowing agent masterbatch	6.5×10^{-2}	1.1%	-	Fossil, limited	-	Global
Stabilizer	Stearic acid, zinc sulfate, calcium chloride, sodium hydroxide	2.2×10^{-2}	0.39%	-	Fossil, limited; Mineral, abundant	0.050%/0%	Global
UV Coating	Epoxy resin, methacrylic acid, photosensitizer, silica, octamethyl cyclotetrasiloxane	1.3×10^{-2}	0.22%	-	Fossil, limited	-	Global
Ink	Carbon black	5.5×10^{-3}	0.10%	-	Fossil, limited	0.020%/0%	Global
TOTAL	**-**	**5.7**	**100%**	**-**	**-**	**6.3%/0%**	**-**

In conformance with the PCR, product materials were reviewed for the presence of any hazardous chemicals. A review of Material Data Safety Sheets (MSDS) provided by the manufacturer reveals the presence of the following regulated chemicals in one or more of the products (this does not indicate that the threshold for reportable quantities is exceeded):

- Calcium carbonate (CAS# 471-34-1)
- Styrene (CAS# 100-42-5)
- Methacrylic Acid (CAS # 79-41-4)
- Silica (CAS# 7631-86-9)
- Fiber Glass Continuous Filament (CAS# 65997-17-3)

PRODUCTION OF MAIN MATERIALS

Calcium Carbonate: An abundant mineral found worldwide and a common substance found in rocks. It can be ground into varying particle sizes.

Cork: An impermeable buoyant material sourced from the phellem layer of bark tissue that is harvested from the cork oak tree (*Quercus suber*).

IXPE: Irradiation cross-linked polyethylene foam based on low density polyethylene as a raw material.

LP-90: A synthetic styrene resin used as an aid for acrylic processing to ensure fusion and homogeneity.

Plasticizer: Plasticizers are used to make vinyl soft and flexible. Diisononyl phthalate (DINP) was used in the life cycle assessment model to represent plasticizers used to manufacture products covered by this EPD, specifically Diisooctyl terephthalate (DOTP).

Polyvinyl Chloride (PVC): Derived from fossil fuel and salt. Petroleum or natural gas is processed to make ethylene, and salt is subjected to electrolysis to separate out the natural element chlorine. Ethylene and chlorine are combined to produce ethylene dichloride, which is further processed into vinyl chloride monomer (VCM) gas. Finally, in polymerization the VCM molecule forms chains, converting the gas into fine, white powder—vinyl resin.

Stabilizers: Stabilizers are used to prevent the decomposition which occurs as PVC is heated to soften during the extrusion or molding process. Stabilizers also provide enhanced resistance to daylight, weathering and heat aging and have an important influence on the physical properties of PVC.

PRODUCT CHARACTERISTICS

Table 9. *Product characteristics for Luxury Vinyl Tile (3mm).*

<table>
<tr><th colspan="3">Characteristic</th><th>Nominal Values</th><th>Unit</th><th>Maximum Value</th><th>Minimum Value</th></tr>
<tr><td colspan="3">Product thickness</td><td>3.0
(0.12)</td><td>mm
(in)</td><td>5.0
(0.20)</td><td>2.0
(0.080)</td></tr>
<tr><td colspan="3">Wear layer thickness</td><td>0.55
(0.022)</td><td>mm
(in)</td><td>0.70
(0.028)</td><td>0.10
(0.0039)</td></tr>
<tr><td colspan="3">Product Weight</td><td>5.64
(18.5)</td><td>kg/m^2
(oz/ft^2)</td><td>9.36
(30.7)</td><td>3.70
(12.1)</td></tr>
<tr><td colspan="3">VOC emissions test method</td><td colspan="4">FloorScore®</td></tr>
<tr><td rowspan="2">Product form</td><td rowspan="2">Tile</td><td>Width</td><td>177.80
(7.0)</td><td>mm
(in)</td><td>254.00
(10)</td><td>101.60
(4.0)</td></tr>
<tr><td>Length</td><td>1,220.20
(48.04)</td><td>mm
(in)</td><td>1,524.00
(60)</td><td>914.40
(36)</td></tr>
</table>

Table 10. *Product characteristics for Luxury Vinyl Tile (2mm).*

Characteristic			Nominal Values	Unit	Maximum Value	Minimum Value
Product thickness			2.0 (0.080)	mm (in)	5.0 (0.20)	2.0 (0.080)
Wear layer thickness			0.55 (0.022)	mm (in)	0.70 (0.028)	0.10 (0.0039)
Product Weight			3.70 (12.1)	kg/m^2 (oz/ft^2)	9.36 (30.7)	3.70 (12.1)
VOC emissions test method			FloorScore®			
Product form	Tile	Width	177.80 (7.0)	mm (in)	254.00 (10)	101.60 (4.0)
		Length	1,220 (48)	mm (in)	1,524.00 (60)	914.40 (36)

Table 11. *Product characteristics for Loose Lay (5mm).*

Characteristic			Nominal Values	Unit	Maximum Value	Minimum Value
Product thickness			5.00 (0.20)	mm (in)	5.0 (0.20)	2.0 (0.080)
Wear layer thickness			0.55 (0.022)	mm (in)	0.70 (0.028)	0.10 (0.0039)
Product Weight			9.60 (31.5)	kg/m^2 (oz/ft^2)	9.25 (30.3)	6.48 (21.2)
VOC emissions test method			FloorScore®			
Product form	Tile	Width	177.80 (7.0)	mm (in)	254.00 (10)	152.40 (6.0)
		Length	1,220 (48)	mm (in)	1,524 (60)	914.40 (36)

Table 12. *Product characteristics for PVC Click (5mm).*

Characteristic			Nominal Values	Unit	Maximum Value	Minimum Value
Product thickness			5.00 (0.20)	mm (in)	5.0 (0.20)	3.20 (0.13)
Wear layer thickness			0.55 (0.022)	mm (in)	0.70 (0.028)	0.10 (0.0039)
Product Weight			9.72 (31.9)	kg/m^2 (oz/ft^2)	9.73 (31.9)	6.23 (20.4)
VOC emissions test method			FloorScore®			
Product form	Tile	Width	177.80 (7.0)	mm (in)	254.00 (10)	152.40 (6.0)
		Length	1,220 (48)	mm (in)	1,524 (60)	914.40 (36)

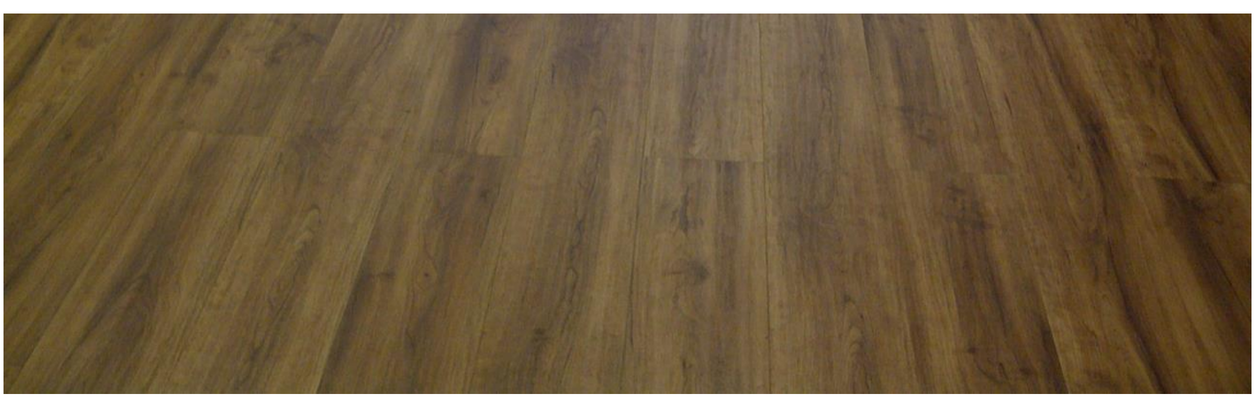


Table 13. *Product characteristics for Click Composite Core with Cork Backing (7.5mm).*

Characteristic			Nominal Values	Unit	Maximum Value	Minimum Value
Product thickness			7.50 (0.30)	mm (in)	8.00 (0.31)	5.00 (0.20)
Wear layer thickness			0.55 (0.022)	mm (in)	0.70 (0.028)	0.10 (0.0039)
Product Weight			7.96 (26.1)	kg/m^2 (oz/ft^2)	7.82 (25.6)	4.89 (16.0)
VOC emissions test method			FloorScore®			
Product form	Tile	Width	177.80 (7.0)	mm (in)	254.00 (10)	152.40 (6.0)
		Length	1,220 (48)	mm (in)	1,524 (60)	914.40 (36)

Table 14. *Product characteristics for PVC Rigid with IXPE Backing (5.5mm).*

Characteristic			Nominal Values	Unit	Maximum Value	Minimum Value
Product thickness			5.50 (0.22)	mm (in)	6.50 (0.26)	3.50 (0.14)
Wear layer thickness			0.55 (0.022)	mm (in)	0.70 (0.023)	0.15 (0.0059)
Product Weight			9.83 (32.2)	kg/m^2 (oz/ft^2)	10.93 (35.8)	7.04 (23.1)
VOC emissions test method			FloorScore®			
Product form	Tile	Width	177.80 (7.0)	mm (in)	254.00 (10)	152.40 (6.0)
		Length	1,220 (48)	mm (in)	1,524 (60)	914.40 (36)

Table 15. *Product characteristics for PVC with IXPE Backing (4.5mm).*

Characteristic			Nominal Values	Unit	Maximum Value	Minimum Value
Product thickness			4.5 (0.18)	mm (in)	6.50 (0.26)	3.00 (0.12)
Wear layer thickness			0.55 (0.022)	mm (in)	0.70 (0.023)	0.15 (0.0059)
Product Weight			5.70 (18.7)	kg/m^2 (oz/ft^2)	8.19 (26.8)	3.78 (12.4)
VOC emissions test method			FloorScore®			
Product form	Tile	Width	177.80 (7.0)	mm (in)	254.00 (10)	152.40 (6.0)
		Length	1,220 (48)	mm (in)	1,524 (60)	914.40 (36)

LIFE CYCLE ASSESSMENT

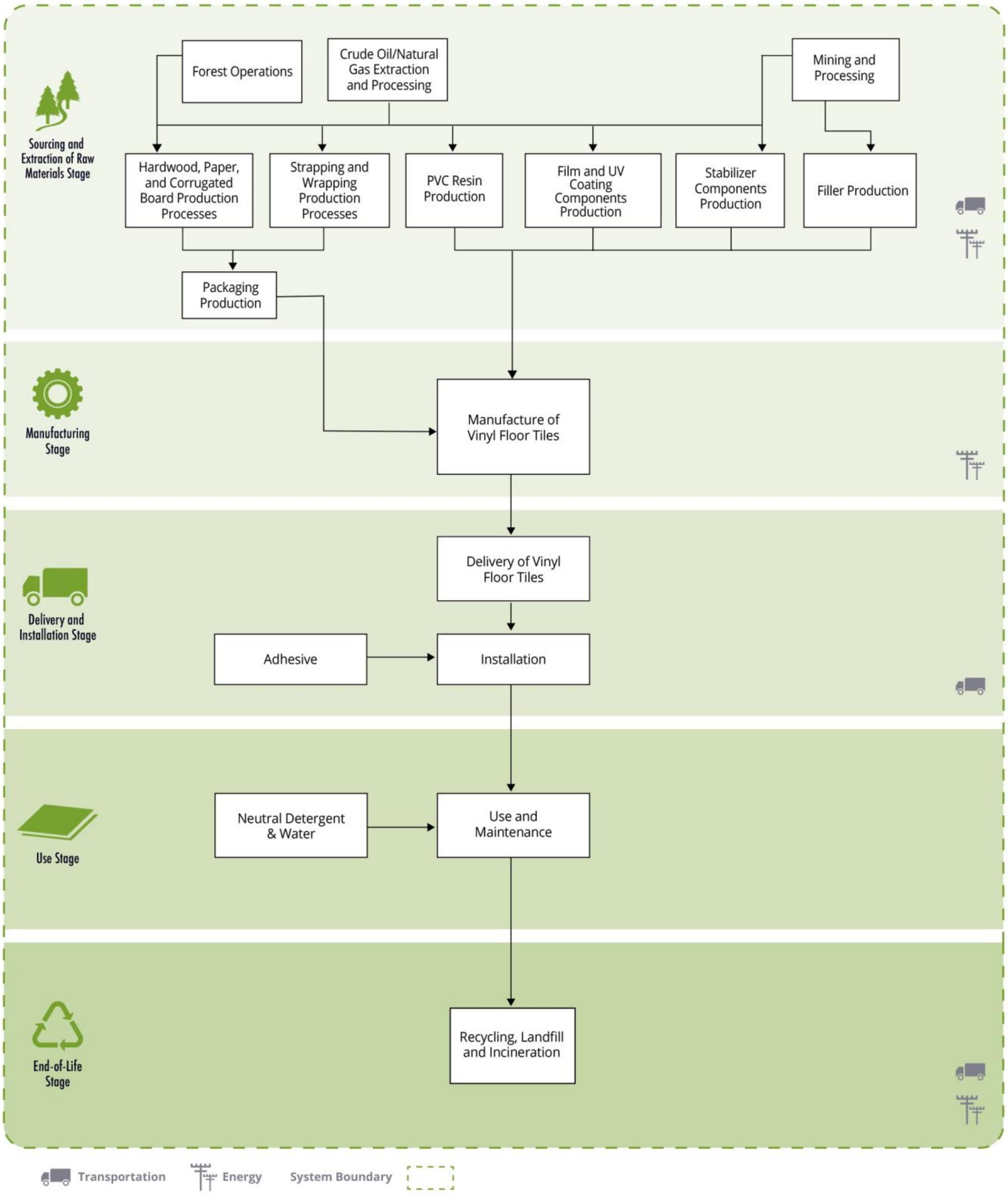
A cradle to grave life cycle assessment (LCA) was completed for this product group in accordance with ISO 14040, ISO 14044, ISO 21930, and Product Category Rule for Environmental Product Declarations for Flooring: Carpet, Resilient, Laminate, Ceramic, Wood (Version 2).

The functional unit is, according to the PCR, the total impact for the expected life of the building (60 years). But the service life is dependent on the product lifetime, which is 20 years in this case. The PCR consequently requires separate reporting of LCA results A) for 1 m^2 of floor covering - extraction/processing, manufacturing, delivery and installation and end of life, B) the average 1- year use stage, and C) for the 60 year life of the building as combined using A) and B), calculated from the reference service life (RSL) of the product.

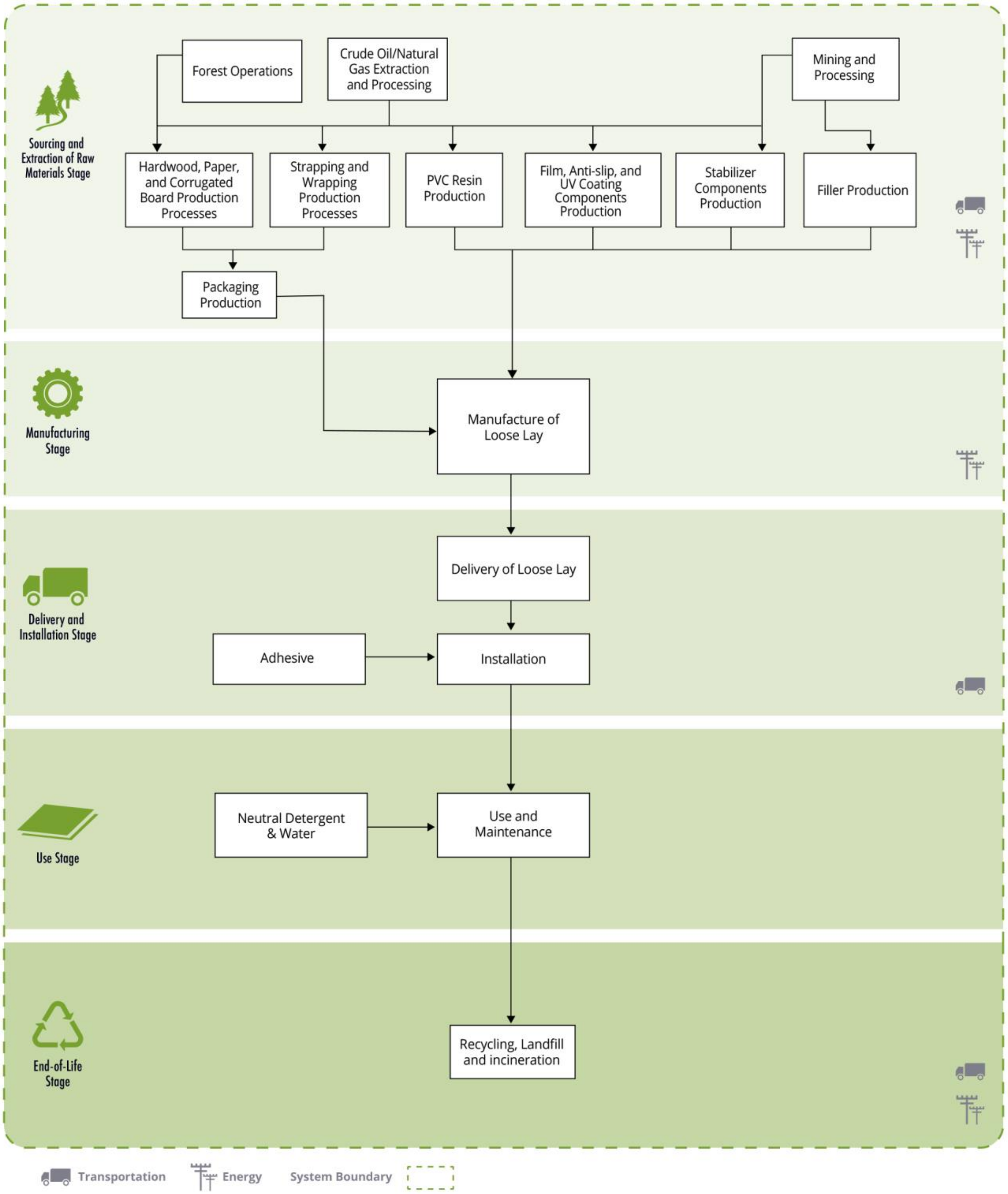
PRODUCT LIFE CYCLE FLOW DIAGRAM

The diagrams below are a representation of the most significant contributions to the life cycle of each luxury vinyl flooring. This includes resource extraction and processing, product manufacture, use and maintenance, and end-of-life.

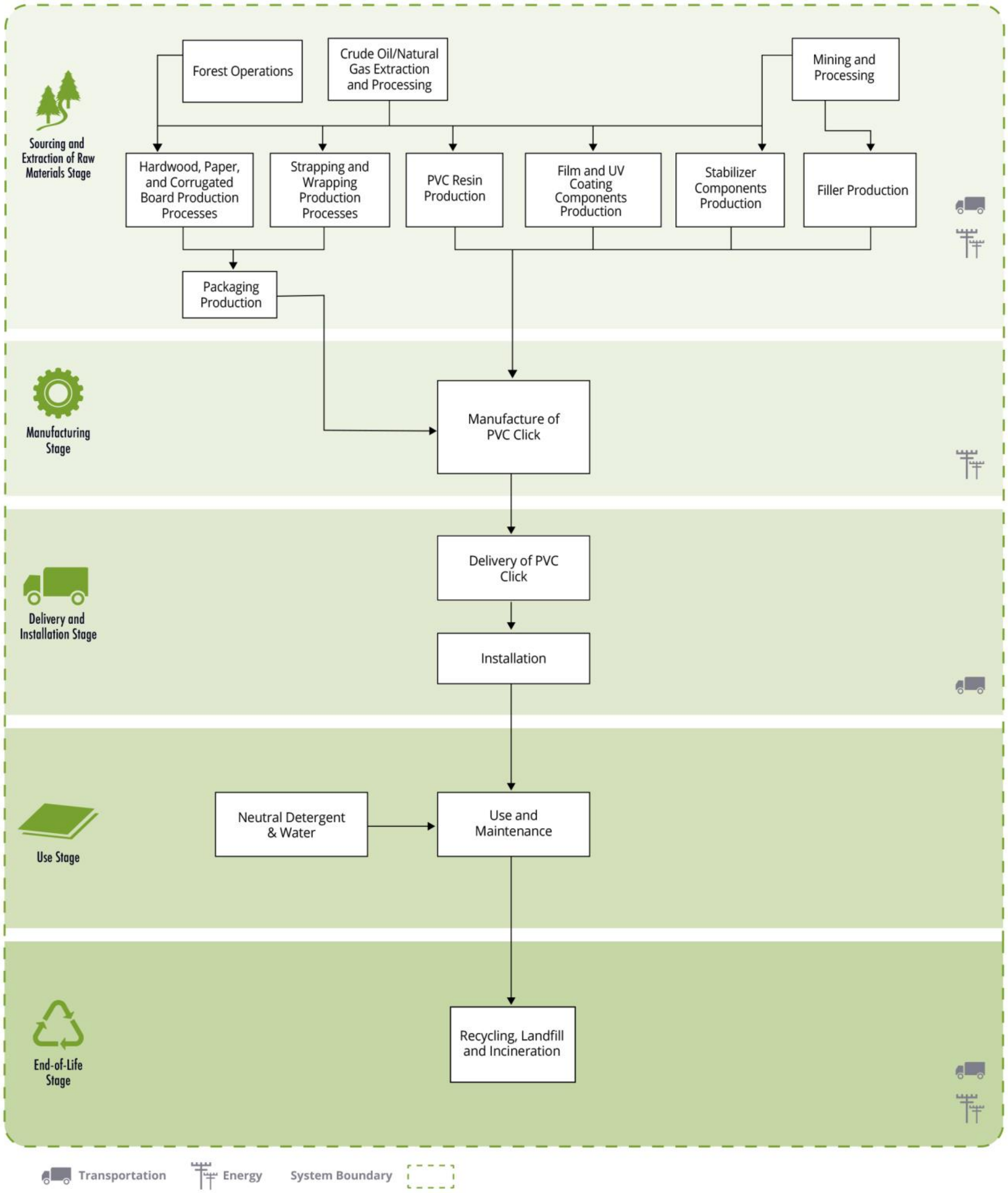
Process Life Cycle Flow Diagram for Luxury Vinyl Tiles



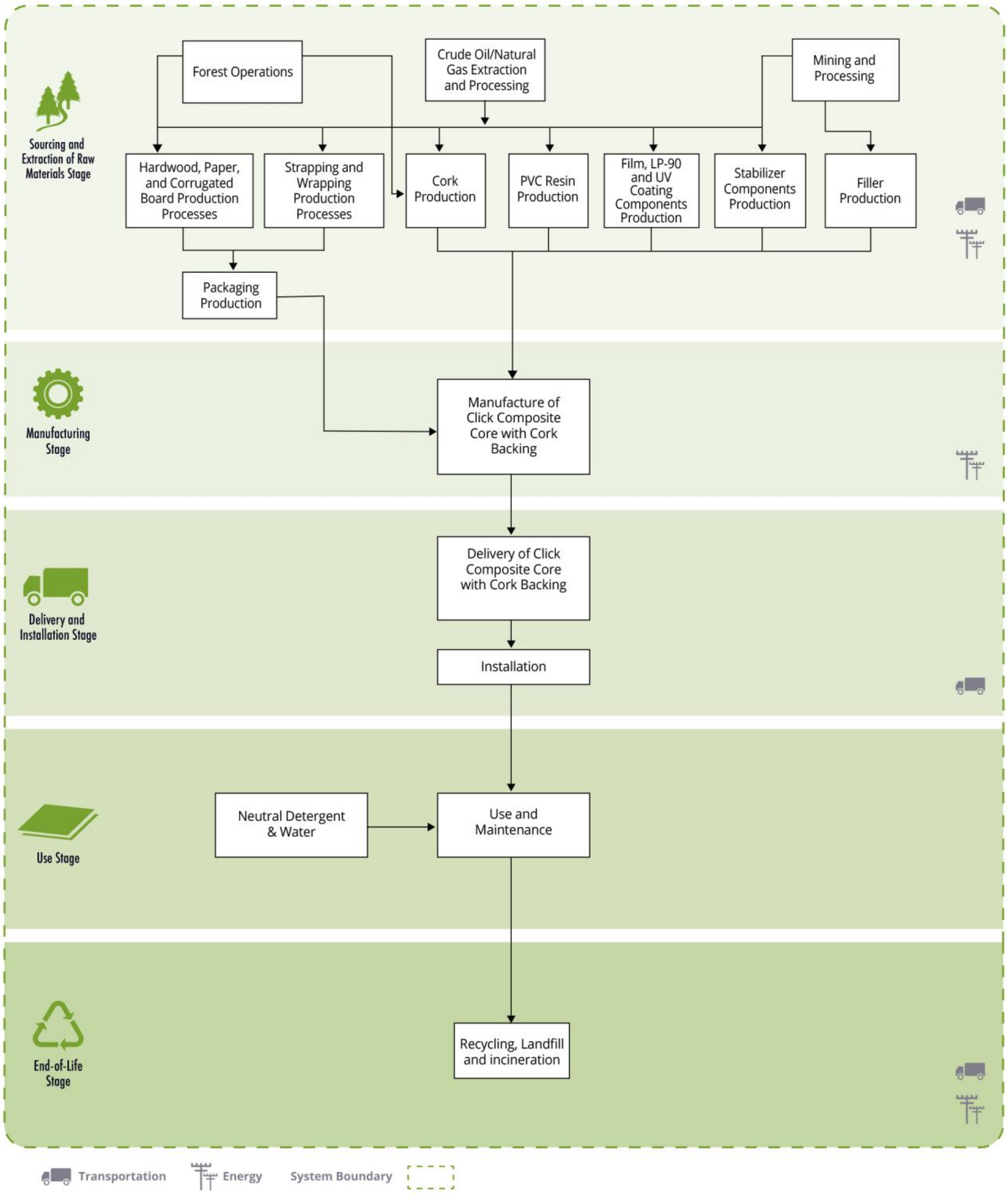
Process Life Cycle Flow Diagram for Loose Lay



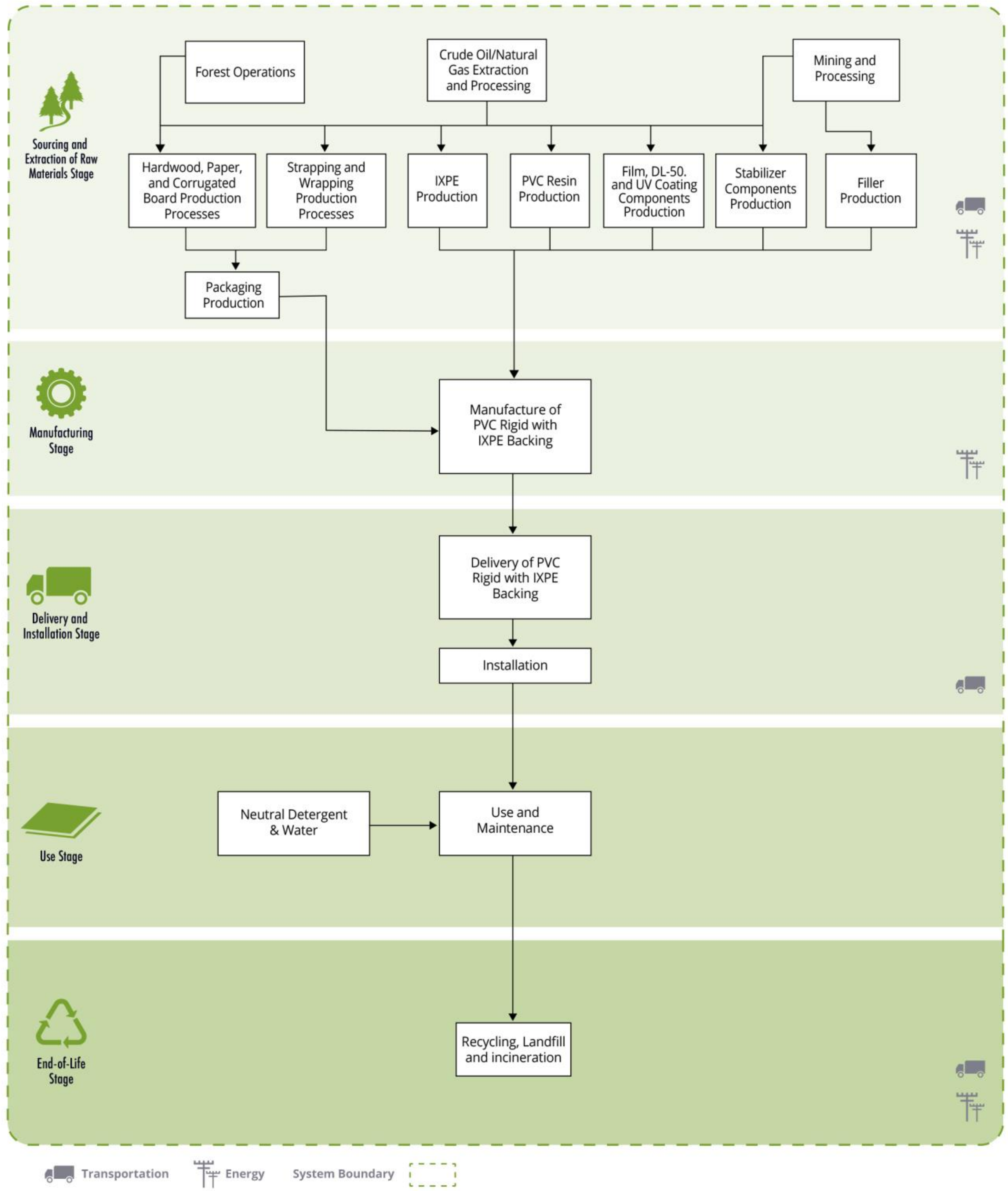
Process Life Cycle Flow Diagram for PVC Click



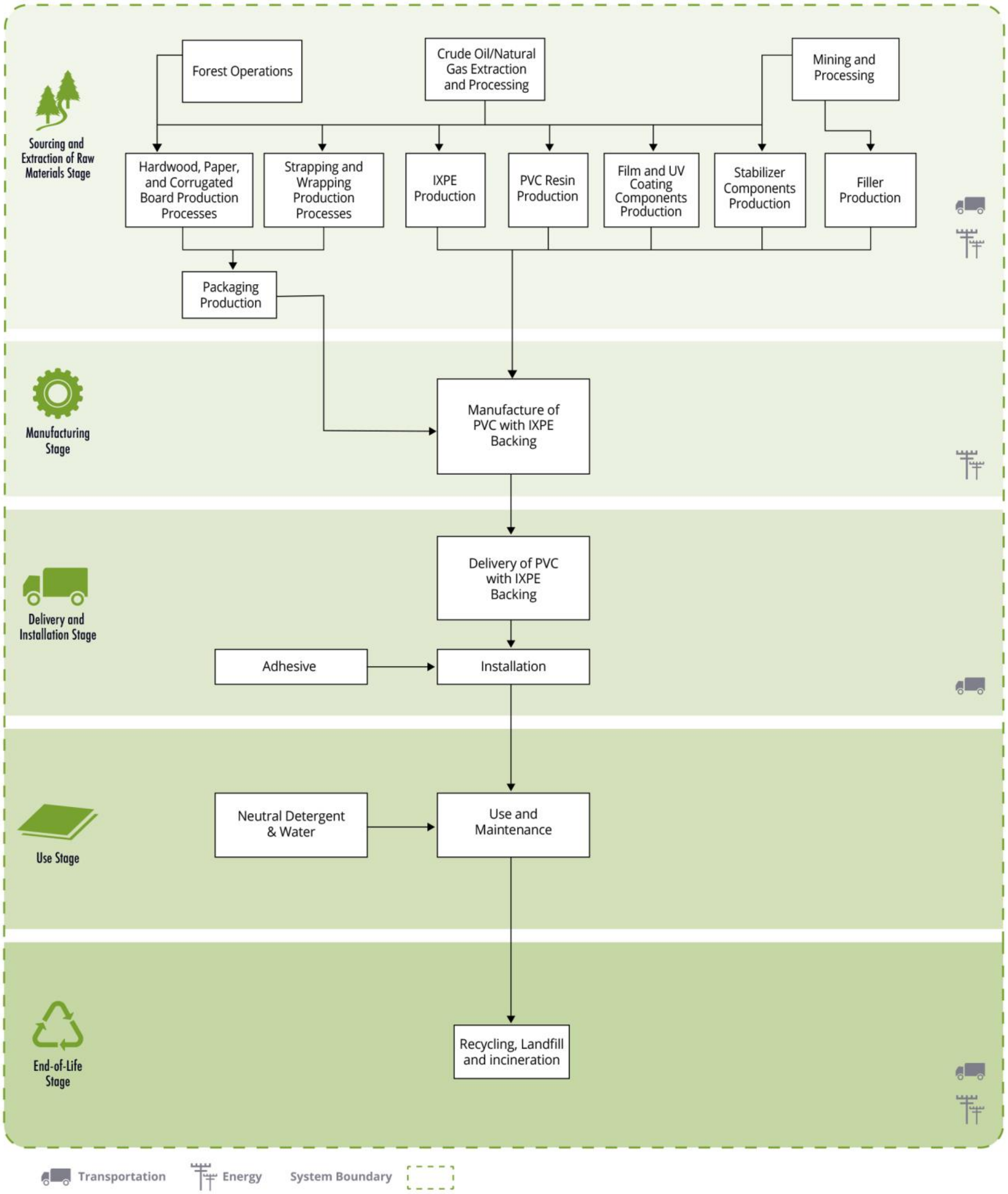
Process Life Cycle Flow Diagram for Composite Core with Cork Backing



Process Life Cycle Flow Diagram for PVC Rigid with IXPE Backing



Process Life Cycle Flow Diagram for PVC with IXPE Backing



LIFE CYCLE ASSESSMENT STAGES AND REPORTED INFORMATION

Sourcing/Extraction Stage (raw material acquisition)

This stage includes extraction and processing of raw materials used for packaging and the manufacturing of luxury vinyl flooring, including delivery of these material components to the production site.

Manufacturing Stage

This stage includes all the relevant manufacturing processes and flows, including the impacts from energy use, emissions, and wastes at the facility. Production of capital goods, infrastructure, manufacturing equipment, and personnel-related activities are excluded.

Delivery and Installation Stage

Delivery

This stage includes the delivery of the flooring product to the point of installation. Modeling used in the life cycle assessment assumed an estimated distribution distance to point of sale of 1,217 kilometers (756 miles) via diesel truck and 9,262 kilometers (5,755 miles) by ship, representing transport from the manufacturing facility in China to various locations across the United States.

Installation

The manufacturer provides recommended installation guidance on the web: http://www.harbingerfloors.com/resources

Waste

Waste generated during product installation can be disposed of in a landfill, incinerated, or recycled.

Packaging

Table 16. *Origin and availability of material content for packaging of luxury vinyl flooring products in this EPD.*

Component	Materials	Amount (kg/m^2)	Percent of Total (%)	Availability			Origin of Raw Materials
				Renewable	Non-renewable	Recycled (% pre-/post-consumer)	
Color box	Corrugated board	0.22	41%	Biogenic	Fossil, limited	-	Global
Pallet	Hardwood	0.15	28%	Biogenic	-	-	Global
Cover board	Hardwood	8.1×10^{-2}	15%	Biogenic	-	-	Global
Instructions	Paper	3.5×10^{-2}	6.4%	Biogenic	Fossil, limited	-	Global
Air bag	Brown paper bags	3.1×10^{-2}	5.7%	Biogenic	-	-	Global
Corner protection strip	Corrugated board	1.4×10^{-2}	2.5%	Biogenic	Fossil, limited	-	Global
Wrapping	Low-density polyethylene	3.0×10^{-3}	0.55%	-	Fossil, limited	-	Global
Strapping	Polypropylene	2.9×10^{-3}	0.54%	-	Fossil, limited	-	Global
Label	Paper, adhesive	4.0×10^{-4}	0.074%	Biogenic	Fossil, limited	-	Global
TOTAL	**-**	**0.54**	**100%**	**-**	**-**	**-**	**-**

Use Stage

Cleaning and maintenance

Table 17. *Cleaning and maintenance for luxury vinyl flooring products in this EPD.*

Cleaning Process	Cleaning Frequency	Method
Routine Maintenance	Twice Weekly (104 times /year)	4mL/L Millennium Neutral Blue Floor Cleaner w/water and damp mop
Extra Dirty Floors	Monthly (12 times /year)	16 mL/L Millennium Neutral Blue Floor Cleaner w/water and damp mop
Heavily Soiled Floors	Semi-annually (2 times/year)	32 mL/L Vardet 383 Non Butyl degreasing Floor Cleaner w/water and scrub brush

End-of-Life Stage

Recycling, reuse, or repurpose

Data for the estimation of recycling rates for the product and packaging are based on data prepared by the US Environmental Protection Agency's Municipal Solid Waste Report. These data provide 2014 statistics on US disposal, including recycling rates.

Table 18. *Recycling rates based on 2014 US EPA Municipal Solid Waste statistics.*

Material	Durable Goods	Packaging
Paper and paperboard	N/A	75.4%
Plastics	7.5%	14.8%

Disposal

For disposal of product materials not recycled, it is assumed that 20% are incinerated and 80% go to a landfill, based on the US EPA data. Transportation of waste materials at end of life assumes a 32 kilometers (20 miles) average distance to disposal, consistent with assumptions used in the US EPA WARM model.

LIFE CYCLE INVENTORY

In accordance with ISO 21930:2007, the following aggregated inventory flows are included in the LCA, in addition to the LCIA and inventory flow requirements specified by the PCR:

- Use of renewable material resources
- Use of non-renewable material resources
- Consumption of freshwater
- Hazardous Waste
- Non-hazardous Waste

All results are calculated using the SimaPro 8.3 model using primary and secondary inventory data. Classification for Use of Renewable Material Resources is based on review of elementary flows and resources considered renewable on a human time scale. Elementary flows related to use of wood, minerals, and land occupation were not included. Water consumption is reported separately.

Table 19. *Aggregated inventory flows, shown in kg per 1 m² of Vinyl Floor Tile (3mm) maintained for 60 years.*

Parameter	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Non-renewable material resources	kg	5.6	0.0	0.90	3.6	0.0	10
Renewable material resources	kg	1.3	3.9×10^{-2}	4.6×10^{-2}	8.1×10^{-2}	1.3×10^{-2}	1.5
Freshwater	m^3	3.9	0.27	0.19	1.3	7.4×10^{-2}	5.7
Hazardous waste	kg	5.4×10^{-4}	9.0×10^{-5}	6.7×10^{-4}	2.0×10^{-4}	1.5×10^{-4}	1.7×10^{-3}
Non-hazardous waste	kg	1.2	6.7×10^{-2}	2.6	0.63	14	18

Table 20. *Aggregated inventory flows, shown in kg per 1 m² of Vinyl Floor Tile (2mm) maintained for 60 years.*

Parameter	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Non-renewable material resources	kg	3.7	0.0	0.90	3.6	0.0	8.2
Renewable material resources	kg	1.3	2.5×10^{-2}	3.9×10^{-2}	8.1×10^{-2}	8.9×10^{-3}	1.4
Freshwater	m^3	2.8	0.17	0.16	1.3	4.9×10^{-2}	4.4
Hazardous waste	kg	4.0×10^{-4}	5.8×10^{-5}	4.7×10^{-4}	2.0×10^{-4}	1.0×10^{-4}	1.2×10^{-3}
Non-hazardous waste	kg	0.91	4.4×10^{-2}	1.8	0.63	8.9	12

Table 21. *Aggregated inventory flows, shown in kg per 1 m² of Loose Lay (5mm) maintained for 60 years.*

Parameter	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Non-renewable material resources	kg	9.6	0.0	0.90	3.6	0.0	14
Renewable material resources	kg	1.4	6.6×10^{-2}	6.0×10^{-2}	8.1×10^{-2}	2.1×10^{-2}	1.6
Freshwater	m^3	5.3	0.46	0.24	1.3	0.11	7.4
Hazardous waste	kg	1.1×10^{-3}	1.5×10^{-4}	1.1×10^{-3}	2.0×10^{-4}	2.6×10^{-4}	2.8×10^{-3}
Non-hazardous waste	kg	2.0	0.11	4.4	0.63	23	30

Table 22. *Aggregated inventory flows, shown in kg per 1 m² of PVC Click (5mm) maintained for 60 years.*

Parameter	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Non-renewable material resources	kg	9.7	0.0	0.0	3.6	0.0	13
Renewable material resources	kg	1.3	6.7×10^{-2}	3.5×10^{-2}	8.1×10^{-2}	2.2×10^{-2}	1.5
Freshwater	m^3	5.8	0.46	0.13	1.3	0.12	7.8
Hazardous waste	kg	8.2×10^{-4}	1.5×10^{-4}	9.8×10^{-4}	2.0×10^{-4}	2.6×10^{-4}	2.4×10^{-3}
Non-hazardous waste	kg	1.8	0.12	4.3	0.63	23	30

Table 23. *Aggregated inventory flows, shown in kg per 1 m² of Click Composite Core with Cork Backing (7.5mm) maintained for 60 years.*

Parameter	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Non-renewable material resources	kg	7.1	0.0	0.0	3.6	0.0	11
Renewable material resources	kg	11	$5.5x10^{-2}$	$2.9x10^{-2}$	$8.1x10^{-2}$	$2.4x10^{-2}$	11
Freshwater	m^3	6.6	0.38	0.10	1.3	0.14	8.5
Hazardous waste	kg	$7.9x10^{-4}$	$1.3x10^{-4}$	$8.1x10^{-4}$	$2.0x10^{-4}$	$2.4x10^{-4}$	$2.2x10^{-3}$
Non-hazardous waste	kg	2.7	$9.4x10^{-2}$	3.5	0.63	19	26

Table 24. *Aggregated inventory flows, shown in kg per 1 m² of PVC Rigid with IXPE Backing (5.5mm) maintained for 60 years.*

Parameter	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Non-renewable material resources	kg	9.8	0.0	0.0	3.6	0.0	13
Renewable material resources	kg	1.3	$6.7x10^{-2}$	$3.6x10^{-2}$	$8.1x10^{-2}$	$2.2x10^{-2}$	1.5
Freshwater	m^3	6.4	0.47	0.13	1.3	0.12	8.4
Hazardous waste	kg	$6.0x10^{-4}$	$1.6x10^{-4}$	$1.0x10^{-3}$	$2.0x10^{-4}$	$2.6x10^{-4}$	$2.2x10^{-3}$
Non-hazardous waste	kg	2.0	0.12	4.3	0.63	24	31

Table 25. *Aggregated inventory flows, shown in kg per 1 m² of PVC with IXPE Backing (4.5mm) maintained for 60 years.*

Parameter	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Non-renewable material resources	kg	5.7	0.0	0.90	3.6	0.0	10
Renewable material resources	kg	1.3	$3.9x10^{-2}$	$4.6x10^{-2}$	$8.1x10^{-2}$	$1.3x10^{-2}$	1.5
Freshwater	m^3	4.0	0.27	0.19	1.3	$7.4x10^{-2}$	5.8
Hazardous waste	kg	$5.5x10^{-4}$	$9.1x10^{-5}$	$6.7x10^{-4}$	$2.0x10^{-4}$	$1.6x10^{-4}$	$1.7x10^{-3}$
Non-hazardous waste	kg	1.3	$6.7x10^{-2}$	2.7	0.63	14	18

LIFE CYCLE IMPACT ASSESSMENT

The impact assessment for the EPD is conducted in accordance with requirements of the PCR. Impact category indicators are estimated using the CML-IA (Tables 26 through 40) and TRACI 2.1 (Tables 41 through 43) characterization methods. Aggregated inventory flows for energy use are also calculated. The LCIA and inventory flow results are calculated using SimaPro 8.3 software and declared in this EPD in the following ways:

- **Table A:** The potential impacts for 1 m² of floor covering for each of the following life cycle stages: sourcing/extraction, manufacturing, delivery and installation, and end of life. The impacts are not normalized to the 60-year reference service life of the building.
- **Table B:** The impacts for the use stage for 1 m² of floor covering for an average one year use.
- **Table C:** The total impacts of all life cycle stages based on the estimated replacement schedule for 1 m² of floor covering over a 60-year reference service life of a building.

Table 26. *Table A: Cradle to install and end of life LCIA results for 1 m² of Vinyl Floor Tile (3mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	4.3×10^{-6} 37%	2.8×10^{-7} 2.4%	6.2×10^{-6} 53%	8.4×10^{-7} 7.2%	1.2×10^{-5} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	180 74%	18 7.5%	38 16%	6.8 2.8%	240 100%
Global Warming Potential	kg CO_2 eq	7.7 50%	1.9 12%	2.2 14%	3.5 23.0%	15 100%
Ozone Depletion Potential	kg CFC-11 eq	2.7×10^{-7} 35%	3.3×10^{-8} 4.2%	3.5×10^{-7} 44%	1.3×10^{-7} 17%	7.9×10^{-7} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	1.4×10^{-3} 43%	3.9×10^{-4} 12%	8.7×10^{-4} 27%	5.9×10^{-4} 18%	3.2×10^{-3} 100%
Acidification Potential	kg SO_2 eq	2.6×10^{-2} 45%	9.2×10^{-3} 16%	2.0×10^{-2} 34%	2.7×10^{-3} 4.8%	5.7×10^{-2} 100%
Eutrophication Potential	kg PO_4^{3-} eq	6.0×10^{-3} 26%	1.3×10^{-3} 5.8%	3.0×10^{-3} 13%	1.2×10^{-2} 55%	2.3×10^{-2} 100%
Primary Energy, Non-Renewable	MJ	210 76%	18 6.7%	39 14%	7.2 2.7%	270 100%
Primary Energy, Renewable	MJ	12 84%	1.2 8.0%	0.87 5.9%	0.29 2.0%	15 100%

Table 27. *Table C: Cradle to grave impacts over 60 year building service life for 1 m² of Vinyl Floor Tile (3mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	1.3×10^{-5} 25%	8.3×10^{-7} 1.6%	1.9×10^{-5} 36%	1.7×10^{-5} 33%	2.5×10^{-6} 4.8%	5.2×10^{-5} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	530 68%	54 6.9%	110 15%	59 7.6%	21 2.6%	780 100%
Global Warming Potential	kg CO_2 eq	23 46%	5.6 11%	6.7 13%	4.0 8.1%	11 21%	50 100%
Ozone Depletion Potential	kg CFC-11 eq	8.2×10^{-7} 27%	1.0×10^{-7} 3.2%	1.0×10^{-6} 34%	7.4×10^{-7} 24%	3.9×10^{-7} 13%	3.1×10^{-6} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	4.1×10^{-3} 37%	1.2×10^{-3} 10%	2.6×10^{-3} 23%	1.4×10^{-3} 13%	1.8×10^{-3} 16%	1.1×10^{-2} 100%
Acidification Potential	kg SO_2 eq	7.7×10^{-2} 40%	2.8×10^{-2} 14%	5.9×10^{-2} 30%	2.2×10^{-2} 11%	8.2×10^{-3} 4.2%	0.19 100%
Eutrophication Potential	kg PO_4^{3-} eq	1.8×10^{-2} 24%	4.0×10^{-3} 5.3%	9.1×10^{-3} 12%	7.5×10^{-3} 10%	3.7×10^{-2} 49%	7.6×10^{-2} 100%
Primary Energy, Non-Renewable	MJ	620 71%	55 6.2%	120 13%	64 7.3%	22 2.5%	880 100%
Primary Energy, Renewable	MJ	37 70%	3.5 6.6%	2.6 4.9%	8.9 17%	0.88 1.7%	53 100%

Table 28. *Table A: Cradle to install and end of life LCIA results for 1 m² of Vinyl Floor Tile (2mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	3.3×10^{-6} 36%	1.8×10^{-7} 2.0%	5.0×10^{-6} 56%	5.6×10^{-7} 6.2%	9.0×10^{-6} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	130 74%	12 6.9%	28 17%	4.5 2.7%	170 100%
Global Warming Potential	kg CO_2 eq	5.5 52%	1.2 12%	1.6 15%	2.3 22%	11 100%
Ozone Depletion Potential	kg CFC-11 eq	2.0×10^{-7} 36%	2.2×10^{-8} 4.0%	2.4×10^{-7} 44%	8.8×10^{-8} 16%	5.5×10^{-7} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	9.9×10^{-4} 43%	2.5×10^{-4} 11%	6.6×10^{-4} 29%	3.8×10^{-4} 17%	2.3×10^{-3} 100%
Acidification Potential	kg SO_2 eq	1.8×10^{-2} 46%	6.0×10^{-3} 15%	1.4×10^{-2} 34%	1.8×10^{-3} 4.5%	4.0×10^{-2} 100%
Eutrophication Potential	kg PO_4^{3-} eq	4.4×10^{-3} 28%	8.7×10^{-4} 5.6%	2.2×10^{-3} 14%	8.2×10^{-3} 52%	1.6×10^{-2} 100%
Primary Energy, Non-Renewable	MJ	140 76%	12 6.2%	30 16%	4.8 2.5%	190 100%
Primary Energy, Renewable	MJ	11 87%	0.76 5.9%	0.72 5.6%	0.20 1.5%	13 100%

Table 29. *Table C: Cradle to grave impacts over 60 year building service life for 1 m² of Vinyl Floor Tile (2mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	9.8×10^{-6} 22%	5.4×10^{-7} 1.2%	1.5×10^{-5} 34%	1.7×10^{-5} 39%	1.7×10^{-6} 3.8%	4.4×10^{-5} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	370 66%	35 6.2%	85 15%	59 10%	14 2.4%	570 100%
Global Warming Potential	kg CO_2 eq	16 46%	3.7 10%	4.9 14%	4.0 11%	6.9 19%	36 100%
Ozone Depletion Potential	kg CFC-11 eq	6.0×10^{-7} 25%	6.6×10^{-8} 2.7%	7.3×10^{-7} 31%	7.4×10^{-7} 31%	2.6×10^{-7} 11%	2.4×10^{-6} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	3.0×10^{-3} 36%	7.6×10^{-4} 9.2%	2.0×10^{-3} 24%	1.4×10^{-3} 17%	1.1×10^{-3} 14%	8.3×10^{-3} 100%
Acidification Potential	kg SO_2 eq	5.5×10^{-2} 39%	1.8×10^{-2} 13%	4.1×10^{-2} 29%	2.2×10^{-2} 15%	5.4×10^{-3} 3.8%	0.14 100%
Eutrophication Potential	kg PO_4^{3-} eq	1.3×10^{-2} 24%	2.6×10^{-3} 4.8%	6.7×10^{-3} 12%	7.5×10^{-3} 14%	2.4×10^{-2} 45%	5.5×10^{-2} 100%
Primary Energy, Non-Renewable	MJ	430 68%	36 5.6%	89 14%	64 10%	14 2.3%	640 100%
Primary Energy, Renewable	MJ	34 71%	2.3 4.8%	2.2 4.5%	8.9 19%	0.59 1.2%	48 100%

Table 30. *Table A: Cradle to install and end of life LCIA results for 1 m² of Loose Lay (5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	1.2×10^{-5} 54%	4.7×10^{-7} 2.1%	8.7×10^{-6} 38%	1.3×10^{-6} 5.6%	2.3×10^{-5} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	320 77%	31 7.3%	57 14%	11 2.7%	420 100%
Global Warming Potential	kg CO_2 eq	13 51%	3.2 12%	3.5 13%	6.0 23%	26 100%
Ozone Depletion Potential	kg CFC-11 eq	6.1×10^{-7} 43%	5.7×10^{-8} 4.0%	5.7×10^{-7} 39%	2.0×10^{-7} 14%	1.4×10^{-6} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	3.0×10^{-3} 50%	6.6×10^{-4} 11%	1.3×10^{-3} 22%	1.0×10^{-3} 17%	6.0×10^{-3} 100%
Acidification Potential	kg SO_2 eq	4.7×10^{-2} 48%	1.6×10^{-2} 16%	3.1×10^{-2} 32%	4.5×10^{-3} 4.5%	9.9×10^{-2} 100%
Eutrophication Potential	kg PO_4^{3-} eq	1.1×10^{-2} 28%	2.3×10^{-3} 5.8%	4.7×10^{-3} 12%	2.1×10^{-2} 54%	3.9×10^{-2} 100%
Primary Energy, Non-Renewable	MJ	360 78%	31 6.7%	58 13%	12 2.6%	460 100%
Primary Energy, Renewable	MJ	15 80%	2.0 11%	1.2 6.4%	0.45 2.5%	18 100%

Table 31. *Table C: Cradle to grave impacts over 60 year building service life for 1 m² of Loose Lay (5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	3.7×10^{-5} 43%	1.4×10^{-6} 1.6%	2.6×10^{-5} 30%	1.7×10^{-5} 20%	3.8×10^{-6} 4.5%	8.6×10^{-5} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	960 73%	92 6.9%	170 13%	59 4.5%	34 2.6%	1,300 100%
Global Warming Potential	kg CO_2 eq	39 48%	10 12%	10 13%	4.0 5.0%	18 22%	81 100%
Ozone Depletion Potential	kg CFC-11 eq	1.8×10^{-6} 36%	1.7×10^{-7} 3.4%	1.7×10^{-6} 34%	7.4×10^{-7} 15%	6.1×10^{-7} 12%	5.1×10^{-6} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	9.1×10^{-3} 47%	2.0×10^{-3} 10%	3.9×10^{-3} 20%	1.4×10^{-3} 7.4%	3.1×10^{-3} 16%	1.9×10^{-2} 100%
Acidification Potential	kg SO_2 eq	0.14 45%	4.7×10^{-2} 15%	9.4×10^{-2} 30%	2.2×10^{-2} 6.8%	1.3×10^{-2} 4.2%	0.32 100%
Eutrophication Potential	kg PO_4^{3-} eq	3.3×10^{-2} 27%	6.8×10^{-3} 5.5%	1.4×10^{-2} 11%	7.5×10^{-3} 6.0%	6.3×10^{-2} 51%	0.12 100%
Primary Energy, Non-Renewable	MJ	1,100 75%	93 6.4%	180 12%	64 4.4%	36 2.5%	1,500 100%
Primary Energy, Renewable	MJ	44 69%	6.0 9.3%	3.5 5.5%	8.9 14%	1.4 2.1%	64 100%

Table 32. *Table A: Cradle to install and end of life LCIA results for 1 m^2 of PVC Click (5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	$6.9x10^{-6}$ 46%	$4.8x10^{-7}$ 3.2%	$6.1x10^{-6}$ 41%	$1.4x10^{-6}$ 9.3%	$1.5x10^{-5}$ 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	270 75%	31 8.7%	46 13%	12 3.3%	350 100%
Global Warming Potential	kg CO_2 eq	11 48%	3.2 14%	3.0 13%	6.1 26%	24 100%
Ozone Depletion Potential	kg CFC-11 eq	$4.1x10^{-7}$ 34%	$5.8x10^{-8}$ 4.7%	$5.3x10^{-7}$ 43%	$2.2x10^{-7}$ 18%	$1.2x10^{-6}$ 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	$2.0x10^{-3}$ 43%	$6.7x10^{-4}$ 14%	$1.0x10^{-3}$ 22%	$1.0x10^{-3}$ 21%	$4.8x10^{-3}$ 100%
Acidification Potential	kg SO_2 eq	$3.9x10^{-2}$ 44%	$1.6x10^{-2}$ 18%	$2.9x10^{-2}$ 33%	$4.6x10^{-3}$ 5.2%	$8.9x10^{-2}$ 100%
Eutrophication Potential	kg PO_4^{3-} eq	$8.9x10^{-3}$ 24%	$2.3x10^{-3}$ 6.3%	$4.0x10^{-3}$ 11%	$2.1x10^{-2}$ 58%	$3.7x10^{-2}$ 100%
Primary Energy, Non-Renewable	MJ	310 77%	31 7.9%	47 12%	12 3.1%	400 100%
Primary Energy, Renewable	MJ	14 81%	2.0 12%	0.74 4.3%	0.48 2.8%	17 100%

Table 33. *Table C: Cradle to grave impacts over 60 year building service life for 1 m^2 of PVC Click (5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	$2.1x10^{-5}$ 33%	$1.4x10^{-6}$ 2.3%	$1.8x10^{-5}$ 29%	$1.7x10^{-5}$ 28%	$4.1x10^{-6}$ 6.7%	$6.2x10^{-5}$ 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	800 71%	93 8.3%	140 12%	59 5.3%	35 3.1%	1,100 100%
Global Warming Potential	kg CO_2 eq	34 46%	10 13%	9.0 12%	4.0 5.4%	18 24%	75 100%
Ozone Depletion Potential	kg CFC-11 eq	$1.2x10^{-6}$ 28%	$1.7x10^{-7}$ 3.9%	$1.6x10^{-6}$ 36%	$7.4x10^{-7}$ 17%	$6.5x10^{-7}$ 15%	$4.4x10^{-6}$ 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	$6.1x10^{-3}$ 39%	$2.0x10^{-3}$ 13%	$3.1x10^{-3}$ 20%	$1.4x10^{-3}$ 9.1%	$3.1x10^{-3}$ 20%	$1.6x10^{-2}$ 100%
Acidification Potential	kg SO_2 eq	0.12 40%	$4.8x10^{-2}$ 17%	$8.8x10^{-2}$ 31%	$2.2x10^{-2}$ 7.5%	$1.4x10^{-2}$ 4.8%	0.29 100%
Eutrophication Potential	kg PO_4^{3-} eq	$2.7x10^{-2}$ 23%	$6.9x10^{-3}$ 5.9%	$1.2x10^{-2}$ 10%	$7.5x10^{-3}$ 6.4%	$6.4x10^{-2}$ 55%	0.12 100%
Primary Energy, Non-Renewable	MJ	920 73%	94 7.5%	140 11%	64 5.1%	37 2.9%	1,300 100%
Primary Energy, Renewable	MJ	42 69%	6.0 9.9%	2.2 3.6%	8.9 15%	1.5 2.4%	61 100%

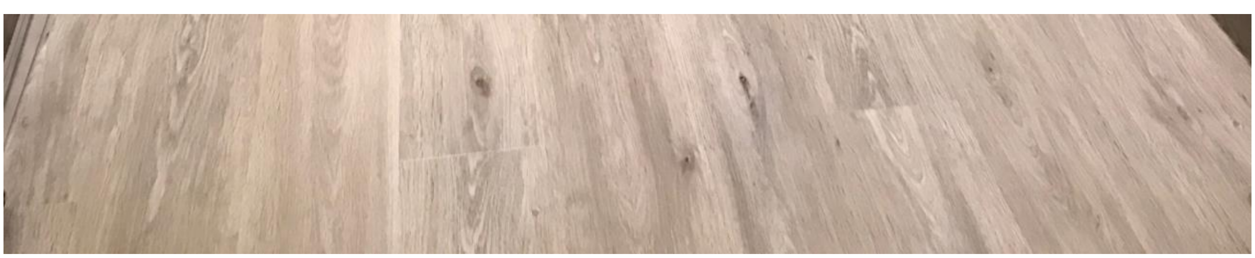


Table 34. *Table A: Cradle to install and end of life LCIA results for 1 m^2 of Click Composite Core with Cork Backing (7.5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	9.2×10^{-6} 57%	3.9×10^{-7} 2.4%	5.0×10^{-6} 31%	1.5×10^{-6} 9.6%	1.6×10^{-5} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	270 79%	25 7.4%	38 11%	11 3.1%	350 100%
Global Warming Potential	kg CO_2 eq	13 57%	2.7 11%	2.5 11%	4.9 21%	23 100%
Ozone Depletion Potential	kg CFC-11 eq	4.2×10^{-7} 37%	4.7×10^{-8} 4.2%	4.3×10^{-7} 38%	2.3×10^{-7} 21%	1.1×10^{-6} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	2.8×10^{-3} 56%	5.5×10^{-4} 11%	8.5×10^{-4} 17%	7.8×10^{-4} 16%	5.0×10^{-3} 100%
Acidification Potential	kg SO_2 eq	4.7×10^{-2} 53%	1.3×10^{-2} 15%	2.4×10^{-2} 27%	4.3×10^{-3} 4.8%	8.9×10^{-2} 100%
Eutrophication Potential	kg PO_4^{3-} eq	1.1×10^{-2} 32%	1.9×10^{-3} 5.6%	3.3×10^{-3} 10%	1.8×10^{-2} 53%	3.4×10^{-2} 100%
Primary Energy, Non-Renewable	MJ	320 81%	26 6.6%	39 10%	11 2.9%	390 100%
Primary Energy, Renewable	MJ	140 98%	1.6 1.2%	0.61 0.43%	0.53 0.4%	140 100%

Table 35. *Table C: Cradle to grave impacts over 60 year building service life for 1 m^2 of Click Composite Core with Cork Backing (7.5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	2.7×10^{-5} 42%	1.2×10^{-6} 1.8%	1.5×10^{-5} 23%	1.7×10^{-5} 26%	4.6×10^{-6} 7.1%	6.6×10^{-5} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	810 74%	76 7.0%	110 10%	59 5.4%	32 2.9%	1,100 100%
Global Warming Potential	kg CO_2 eq	40 54%	8.0 11%	7.4 10%	4.0 5.5%	15 20%	74 100%
Ozone Depletion Potential	kg CFC-11 eq	1.3×10^{-6} 30%	1.4×10^{-7} 3.4%	1.3×10^{-6} 31%	7.4×10^{-7} 18%	7.0×10^{-7} 17%	4.1×10^{-6} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	8.3×10^{-3} 51%	1.6×10^{-3} 10%	2.5×10^{-3} 16%	1.4×10^{-3} 8.8%	2.3×10^{-3} 14%	1.6×10^{-2} 100%
Acidification Potential	kg SO_2 eq	0.14 49%	3.9×10^{-2} 14%	7.2×10^{-2} 25%	2.2×10^{-2} 7.6%	1.3×10^{-2} 4.5%	0.29 100%
Eutrophication Potential	kg PO_4^{3-} eq	3.2×10^{-2} 29%	5.7×10^{-3} 5.2%	9.8×10^{-3} 9.0%	7.5×10^{-3} 6.9%	5.4×10^{-2} 49%	0.11 100%
Primary Energy, Non-Renewable	MJ	950 76%	77 6.2%	120 9.4%	64 5.2%	34 2.7%	1,200 100%
Primary Energy, Renewable	MJ	410 96%	4.9 1.1%	1.8 0.42%	8.9 2.1%	1.6 0.37%	430 100%

Table 36. *Table A: Cradle to install and end of life LCIA results for 1 m² of PVC Rigid with IXPE Backing (5.5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	$6.9x10^{-6}$ 46%	$4.8x10^{-7}$ 3.2%	$6.2x10^{-6}$ 41%	$1.4x10^{-6}$ 9.1%	$1.5x10^{-5}$ 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	320 78%	31 7.7%	47 12%	12 2.9%	410 100%
Global Warming Potential	kg CO_2 eq	13 51%	3.3 13%	3.0 12%	6.2 24%	26 100%
Ozone Depletion Potential	kg CFC-11 eq	$3.3x10^{-7}$ 29%	$5.8x10^{-8}$ 5.1%	$5.3x10^{-7}$ 47%	$2.2x10^{-7}$ 19%	$1.1x10^{-6}$ 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	$2.4x10^{-3}$ 47%	$6.8x10^{-4}$ 13%	$1.0x10^{-3}$ 20%	$1.0x10^{-3}$ 20%	$5.2x10^{-3}$ 100%
Acidification Potential	kg SO_2 eq	$4.4x10^{-2}$ 47%	$1.6x10^{-2}$ 17%	$3.0x10^{-2}$ 31%	$4.6x10^{-3}$ 4.9%	$9.5x10^{-2}$ 100%
Eutrophication Potential	kg PO_4^{3-} eq	$8.6x10^{-3}$ 23%	$2.3x10^{-3}$ 6.3%	$4.0x10^{-3}$ 11%	$2.2x10^{-2}$ 59%	$3.7x10^{-2}$ 100%
Primary Energy, Non-Renewable	MJ	360 80%	32 7.0%	48 11%	12 2.7%	460 100%
Primary Energy, Renewable	MJ	14 81%	2.0 12%	0.75 4.3%	0.48 2.8%	17 100%

Table 37. *Table C: Cradle to grave impacts over 60 year building service life for 1 m² of PVC Rigid with IXPE Backing (5.5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	$2.1x10^{-5}$ 33%	$1.5x10^{-6}$ 2.3%	$1.8x10^{-5}$ 30%	$1.7x10^{-5}$ 28%	$4.1x10^{-6}$ 6.6%	$6.2x10^{-5}$ 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	960 74%	94 7.3%	140 11%	59 4.6%	35 2.7%	1,300 100%
Global Warming Potential	kg CO_2 eq	40 49%	10 12%	9.1 11%	4.0 5.0%	19 23%	81 100%
Ozone Depletion Potential	kg CFC-11 eq	$9.9x10^{-7}$ 24%	$1.8x10^{-7}$ 4.2%	$1.6x10^{-6}$ 39%	$7.4x10^{-7}$ 18%	$6.5x10^{-7}$ 17%	$4.2x10^{-6}$ 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	$7.2x10^{-3}$ 43%	$2.0x10^{-3}$ 12%	$3.1x10^{-3}$ 19%	$1.4x10^{-3}$ 8.5%	$3.1x10^{-3}$ 18%	$1.7x10^{-2}$ 100%
Acidification Potential	kg SO_2 eq	0.13 43%	$4.8x10^{-2}$ 16%	$8.9x10^{-2}$ 29%	$2.2x10^{-2}$ 7.1%	$1.4x10^{-2}$ 4.6%	0.31 100%
Eutrophication Potential	kg PO_4^{3-} eq	$2.6x10^{-2}$ 22%	$7.0x10^{-3}$ 5.9%	$1.2x10^{-2}$ 10%	$7.5x10^{-3}$ 6%	$6.6x10^{-2}$ 56%	0.12 100%
Primary Energy, Non-Renewable	MJ	1,100 76%	95 6.6%	140 10%	64 4.5%	37 2.6%	1,00 100%
Primary Energy, Renewable	MJ	42 69%	6.1 10%	2.2 3.7%	8.9 15%	1.4 2.4%	61 100%

Table 38. *Table A: Cradle to install and end of life LCIA results for 1 m^2 of PVC with IXPE Backing (4.5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	4.4×10^{-6} 37%	2.8×10^{-7} 2.4%	6.3×10^{-6} 53%	8.4×10^{-7} 7.2%	1.2×10^{-5} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	180 74%	18 7.4%	38 16%	6.9 2.8%	250 100%
Global Warming Potential	kg CO_2 eq	7.9 50%	1.9 12%	2.2 14%	3.6 23%	16 100%
Ozone Depletion Potential	kg CFC-11 eq	2.8×10^{-7} 35%	3.4×10^{-8} 4.3%	3.5×10^{-7} 44%	1.3×10^{-7} 17%	8.0×10^{-7} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	1.4×10^{-3} 43%	3.9×10^{-4} 12%	8.7×10^{-4} 27%	6.0×10^{-4} 18%	3.3×10^{-3} 100%
Acidification Potential	kg SO_2 eq	2.6×10^{-2} 45%	9.3×10^{-3} 16%	2.0×10^{-2} 34%	2.8×10^{-3} 4.8%	5.8×10^{-2} 100%
Eutrophication Potential	kg PO_4^{3-} eq	6.1×10^{-3} 26%	1.4×10^{-3} 5.8%	3.1×10^{-3} 13%	1.3×10^{-2} 55%	2.3×10^{-2} 100%
Primary Energy, Non-Renewable	MJ	210 76%	18 6.7%	39 14%	7.3 2.6%	280 100%
Primary Energy, Renewable	MJ	12 84%	1.2 8.0%	0.87 5.9%	0.29 2.0%	15 100%

Table 39. *Table C: Cradle to grave impacts over 60 year building service life for 1 m^2 of PVC with IXPE Backing (4.5mm). Results are calculated using CML-IA.*

Impact Category	Units	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Abiotic Depletion Potential (Elements)	kg Sb eq	1.3×10^{-5} 25%	8.4×10^{-7} 1.6%	1.9×10^{-5} 36%	1.7×10^{-5} 33%	2.5×10^{-6} 4.8%	5.3×10^{-5} 100%
Abiotic Depletion Potential (Fossil Fuels)	MJ	550 69%	54 6.8%	110 14%	59 7.4%	21 2.6%	800 100%
Global Warming Potential	kg CO_2 eq	24 46%	5.7 11%	6.7 13%	4.0 8.0%	11 21%	51 100%
Ozone Depletion Potential	kg CFC-11 eq	8.3×10^{-7} 27%	1.0×10^{-7} 3.2%	1.1×10^{-6} 34%	7.4×10^{-7} 24%	4.0×10^{-7} 13%	3.1×10^{-6} 100%
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	4.2×10^{-3} 37%	1.2×10^{-3} 10%	2.6×10^{-3} 23%	1.4×10^{-3} 13%	1.8×10^{-3} 16%	1.1×10^{-2} 100%
Acidification Potential	kg SO_2 eq	7.9×10^{-2} 40%	2.8×10^{-2} 14%	5.9×10^{-2} 30%	2.2×10^{-2} 11%	8.3×10^{-3} 4.2%	0.20 100%
Eutrophication Potential	kg PO_4^{3-} eq	1.8×10^{-2} 24%	4.1×10^{-3} 5.3%	9.2×10^{-3} 12%	7.5×10^{-3} 10%	3.8×10^{-2} 49%	7.7×10^{-2} 100%
Primary Energy, Non-Renewable	MJ	630 71%	55 6.2%	120 13%	64 7.2%	22 2.5%	900 100%
Primary Energy, Renewable	MJ	37 70%	3.5 6.7%	2.6 4.9%	8.9 17%	0.88 1.7%	53 100%

Table 40. *Table B: Average 1 year use stage impacts for 1 m^2 for luxury vinyl flooring products in this EPD. Results are calculated using CML-IA.*

Impact Category	Units	Average 1 year Use and Maintenance Impacts
Abiotic Depletion Potential (Elements)	kg Sb eq	$2.9x10^{-7}$
Abiotic Depletion Potential (Fossil Fuels)	MJ	0.98
Global Warming Potential	kg CO_2 eq	$6.7x10^{-2}$
Ozone Depletion Potential	kg CFC-11 eq	$1.2x10^{-8}$
Photochemical Oxidant Formation Potential	kg C_2H_4 eq	$2.4x10^{-5}$
Acidification Potential	kg SO_2 eq	$3.6x10^{-4}$
Eutrophication Potential	kg PO_4^{3-} eq	$1.3x10^{-4}$
Primary Energy, Non-Renewable	MJ	1.1
Primary Energy, Renewable	MJ	0.15

Table 41. *Cradle to install and end of life LCIA results for 1 m^2 for luxury vinyl flooring products in this EPD. Results are calculated using TRACI 2.1.*

Impact Category	Units	Vinyl Floor Tile (3mm)	Vinyl Floor Tile (2mm)	Loose Lay	PVC Click	Click Composite Core with Cork Backing	PVC Rigid with IXPE Backing	PVC with IXPE Backing
Ozone depletion	kg CFC-11 eq	$1.0x10^{-6}$	$7.2x10^{-7}$	$1.9x10^{-6}$	$1.6x10^{-6}$	$1.4x10^{-6}$	$1.5x10^{-6}$	$1.0x10^{-6}$
Global warming	kg CO_2 eq	15	10	25	23	22	25	15
Smog	kg O_3 eq	0.87	0.60	1.4	1.4	1.3	1.5	0.88
Acidification	kg SO_2 eq	$5.9x10^{-2}$	$4.1x10^{-2}$	0.10	$9.2x10^{-2}$	$9.2x10^{-2}$	$9.8x10^{-2}$	$6.0x10^{-2}$
Eutrophication	kg N eq	$4.9x10^{-2}$	$3.3x10^{-2}$	$8.4x10^{-2}$	$7.9x10^{-2}$	$7.1x10^{-2}$	$7.9x10^{-2}$	$4.9x10^{-2}$
Fossil fuel depletion	MJ surplus	29	21	52	43	41	51	30

Table 42. *Cradle to grave impacts over 60 year building service life for 1 m^2 luxury vinyl flooring products in this EPD. Results are calculated using TRACI 2.1.*

Impact Category	Units	Vinyl Floor Tile (3mm)	Vinyl Floor Tile (2mm)	Loose Lay	PVC Click	Click Composite Core with Cork Backing	PVC Rigid with IXPE Backing	PVC with IXPE Backing
Ozone depletion	kg CFC-11 eq	$3.9x10^{-6}$	$2.9x10^{-6}$	$6.4x10^{-6}$	$5.5x10^{-6}$	$5.1x10^{-6}$	$5.2x10^{-6}$	$3.9x10^{-6}$
Global warming	kg CO_2 eq	48	35	78	72	71	78	49
Smog	kg O_3 eq	2.8	2.0	4.6	4.3	4.2	4.6	2.9
Acidification	kg SO_2 eq	0.20	0.14	0.33	0.30	0.30	0.31	0.20
Eutrophication	kg N eq	0.16	0.12	0.27	0.25	0.23	0.25	0.16
Fossil fuel depletion	MJ surplus	94	68	160	140	130	160	96

Table 43. *Average 1 year use stage impacts for 1 m^2 for luxury vinyl flooring products in this EPD. Results are calculated using TRACI 2.1.*

Impact Category	Units	Average 1 year Use and Maintenance Impacts
Ozone depletion	kg CFC-11 eq	1.3×10^{-8}
Global warming	kg CO_2 eq	6.6×10^{-2}
Smog	kg O_3 eq	3.7×10^{-3}
Acidification	kg SO_2 eq	3.6×10^{-4}
Eutrophication	kg N eq	2.6×10^{-4}
Fossil fuel depletion	MJ surplus	0.10

SUPPORTING TECHNICAL INFORMATION

Unit processes are developed with SimaPro 8.3 software, drawing upon data from multiple sources. Primary data were provided by Bay Resource Group Inc. for their manufacturing processes. The primary sources of secondary LCI data are from Ecoinvent, Overcash, and PlasticsEurope Eco-profiles.

Table 44. *Data sources used for the LCA study.*

Flow	Dataset	Data Source(s)	Publication Date
Product Materials			
PVC resin	Polyvinylchloride, emulsion polymerised {RoW}| polyvinylchloride production, emulsion polymerisation | Alloc Rec, U	Ecoinvent	2016
Plasticizer	2-ethylhexyl phthalate (DEHP) {GLO} | market for | Alloc Rec U	Ecoinvent; Overcash	2016; 2004
Stabilizer	Chemical, organic {GLO}| market for | Alloc Rec, U; Zinc sulfide {GLO}| market for | Alloc Rec, U; Calcium chloride {GLO}| market for | Alloc Rec, U; Sodium hydroxide, without water, in 50% solution state {GLO}| market for | Alloc Rec, U	MSDS; Ecoinvent	2016
Ink	Carbon black {GLO}| production | Alloc Rec, U	Ecoinvent	2016
Filler	Limestone, crushed, for mill {GLO}| market for | Alloc Rec, U	Ecoinvent	2016
Film	Polyvinylchloride, emulsion polymerised {GLO}| market for | Alloc Rec, U; Vinyl chloride {GLO}| market for | Alloc Rec, U; Carbon black {GLO}| market for | Alloc Rec, U; Solvent, organic {GLO}| market for | Alloc Rec, U	MSDS; Ecoinvent	2016
Wearlayer	Polyvinylchloride, emulsion polymerised {GLO}| market for | Alloc Rec, U; 2-ethylhexyl phthalate (DEHP) {GLO} | market for | Alloc Rec U; Chemical, organic {GLO}| market for | Alloc Rec, U	MSDS; Ecoinvent	2016
UV Coating	Chemical, organic {GLO}| production | Alloc Rec, U	Ecoinvent	2016
IXPE	Polyethylene, linear low density, granulate {GLO}| market for | Alloc Rec, U; Chemical, organic {GLO}| market for | Alloc Rec, U	Ecoinvent	2016
LP-90	Styrene {GLO}| market for | Alloc Rec, U; Chemical, organic {GLO}| market for | Alloc Rec, U	Ecoinvent	2016
Stearic acid	Chemical, organic {GLO}| production | Alloc Rec, U	Ecoinvent	2016
DL-50	Polymethyl methacrylate, beads {RoW}| production | Alloc Rec, U	PlasticsEurope; Ecoinvent	2015
PE Wax	Polyethylene, low density, granulate {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Fiberglass	Glass fibre {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Anti-slip film	Chemical, organic {GLO}| production | Alloc Rec, U	Ecoinvent	2016
Cork	Cork slab {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Glue	Polyurethane adhesive {CN}| production | Alloc Rec, U	Ecoinvent	2016
Electricity/Heat			
Electricity	Electricity, medium voltage {SGCC}| market for | Alloc Rec, U	Ecoinvent	2016
Steam	Steam, in chemical industry {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Packaging			
Label	Kraft paper, bleached {GLO}| market for | Alloc Rec, U; Ethylene vinyl acetate copolymer {GLO}| market for | Alloc Rec, U	Ecoinvent	2016
Instructions	Kraft paper, bleached {GLO}| market for | Alloc Rec, U	Ecoinvent	2016
Pallet	EUR-flat pallet {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Color box	Corrugated board box {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Corner protection strip	Corrugated board box {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Wrapping	Packaging film, low density polyethylene {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Air bags	Kraft paper, unbleached {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Strapping	Polypropylene, granulate {RoW}| production | Alloc Rec, U	Ecoinvent	2016
Transportation			
Truck	Transport, freight, lorry 16-32 metric ton, EURO4 {GLO}| market for | Alloc Rec, U	Ecoinvent	2016
Truck (disposal)	Transport, freight, lorry 16-32 metric ton, EURO4 {GLO}| market for | Alloc Rec, U	Ecoinvent	2016
Ship	Transport, freight, sea, transoceanic ship {GLO}| market for | Alloc Rec, U	Ecoinvent	2016

Data Quality

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 10 years old. All of the primary data used represented an average of one year's worth of data collection. Manufacturer-supplied data are based on calendar year 2016.
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. Actual processes for upstream operations are primarily in China, while downstream processes are primary North American. Representative data used in the assessment are representative of China, North America, Global, or "Rest-of-World" (average for all countries in the world with uncertainty adjusted). Datasets chosen are considered sufficiently similar to actual processes.
Technology Coverage Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative datasets, specific to the type of material or as a proxy, are used to represent the actual processes where primary data were not available.
Precision Measure of the variability of the data values for each data expressed (e.g. variance)	Precision of results are not quantified due to a lack of data. Manufacturer data, and representative data used for upstream processes 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 luxury vinyl flooring. In some instances, surrogate datasets used to represent upstream processes may be missing some data which is propagated in the model. Missing data represent less than 5% of the mass or energy flows.
Representativeness Qualitative assessment of the degree to which the data set reflects the true population of interest (i.e. geographical coverage, time period and technology coverage)	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 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 represent an annual average and are considered of good 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. A mass and energy balance check was completed during the data collection period. For secondary LCI datasets, Ecoinvent, Overcash, and PlasticsEurope Eco-profiles databases are used, with a bias towards Ecoinvent data.
Uncertainty of the Information Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the luxury vinyl flooring and packaging is low. Primary data for upstream processes were not available; as such, the study relied upon use of existing representative datasets for these cases. These representative datasets contained relatively recent data (~10 years, or more recent), but in some instances lacked perfect geographical and technological representativeness. Uncertainty related to the impact assessment methods used in the study are relatively high. The impact assessment method includes impact potentials that lack characterization of thresholds or tipping points.

Allocation

Resource use at the manufacturing facility in China (e.g., water and energy) was allocated to the product based on the product mass as a fraction of the total facility production volume.

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

Impacts from transportation were allocated based on the mass of material and distance transported.

Cut-off criteria

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact must be included in the inventory. In the present study, except as noted, all known materials and processes were included in the life cycle inventory.

ADDITIONAL ENVIRONMENTAL INFORMATION

Luxury Vinyl Tiles and Loose Lay products are certified by Beta Analytic, Inc. to contain 2% biobased carbon content in accordance with ASTM D6866-16 Method B (AMS). This result only applies to relative carbon content, not to relative mass content of product.

Luxury vinyl flooring products under this EPD are certified by Professional Testing Laboratory, Inc. to contain less than 0.1 ppm heavy metals tested in accordance with ASTM F963.

For additional information regarding Bay Resource Group's sustainability efforts, visit:
http://www.harbingerfloors.com/sustainability

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