NOX ASEAN

VERIFIED by SCS Global Services
ENVIRONMENTAL PRODUCT DECLARATION
BASED ON LCA

Declaration Owner

NOX ASEAN Company Ltd.
Road 8, Nhon Trach Industrial Zone 6
Long Tho Commune, Nhon Trach District
Dong Nai Province
Viet Nam
www.noxglobal.com | 84-93-153-2147

Products

- *ORCHID+ LVT – 2.0mm*
- *ORCHID+ LVT – 2.5mm*
- *ECOLAY+, ECOCLICK+, ECOLOCK+ LVT - 4.5mm*
- *ECOLAY+, ECOCLICK+, ECOLOCK+ LVT - 5.0mm*
- *SUPREMWOOD+/ SUPREMSTONE+ 5.0mm*

EPD represents delivery of product to customers globally.

Functional Unit

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

EPD Number and Period of Validity

SCS-EPD-10286
EPD Valid November 7, 2024 through November 6, 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
2000 Powell Street, Ste. 600, Emeryville, CA 94608
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SCSglobal SERVICES

Declaration Owner:	NOX ASEAN Company Ltd.
Address:	Road 8, Nhon Trach Industrial Zone 6, Long Tho Commune, Nhon Trach District, Dong Nai Province, Viet Nam
Declaration Number:	SCS-EPD-10286
Declaration Validity Period:	November 7, 2024 through November 6, 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 v2.1 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:	Tess Garvey, Ph.D., SCS Global Services
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:	Thomas Gloria, Ph.D., Industrial Ecology Consultants
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.

The owner of the declaration shall be liable for the underlying information and evidence; SCS shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence supplied or made available to SCS.

1. NOX Corporation

NOX Corporation is a prominent leader in the global flooring industry, specializing in the production of Luxury Vinyl Tiles (LVT) and other innovative flooring solutions. With over 60 years of expertise, NOX has developed a comprehensive range of products including LVT, Luxury Vinyl Sheets (LVS+), and LOOM+ , etc. The products are designed to meet high standards of sustainability and quality, leveraging advanced technology and eco-friendly practices. NOX's unique Integrated Vertical Production (IVP) system supports their commitment to producing high-quality, recyclable flooring materials using eco-friendly raw materials.

The grand opening of NOX ASEAN marked the company's commitment to serving customers globally with its innovative and sustainable flooring solutions. This move is part of NOX's broader vision to redefine the industry and create new market opportunities through continuous innovation and bold vision. By establishing a presence in ASEAN, NOX aims to enhance its customer base and distribution network, further solidifying its position as a global flooring leader.

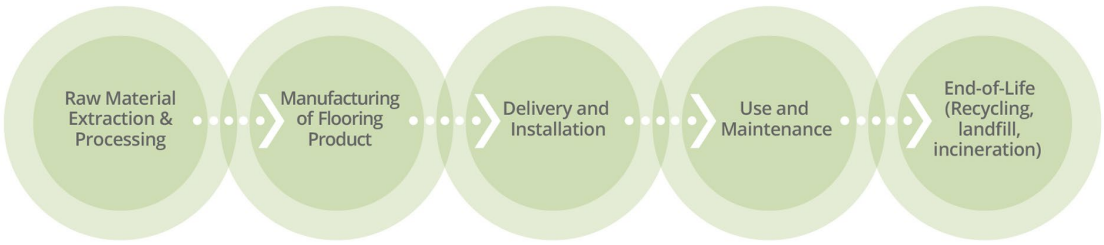
2. Product

2.1 PRODUCT DESCRIPTION

Product Name	Representative thickness	Description
NOX ORCHID+	2.0 mm; 2.5 mm	The NOX Orchid+ is an advanced vinyl flooring solution from NOX Corporation, designed with a focus on sustainability and innovation. Utilizing the world's first circular integrated vertical production system, it ensures high quality and minimal environmental impact. Made with eco-friendly materials and fully recyclable, NOX Orchid+ offers a blend of durability, aesthetic appeal, and environmental responsibility, positioning it as a top choice for sustainable flooring solutions. For more details, visit NOX Corporation.
ECOLAY+, ECOLOCK+, ECOCLICK+	4.5 mm; 5.0 mm	ECOLAY+, ECOclick+, and ECOlock+ are all crafted for superior sustainability and performance. These products incorporate NOX EMT™ core technology, which delivers exceptional dimensional stability and eco-friendliness. Known for their glueless installation, these solutions simplify the installation process and offer versatile applications, enhancing ease of use and minimizing environmental impact. They ensure long-term durability and stability. Additionally, each product features NOX EPT™ Shield technology, providing excellent surface protection, making them perfect for both residential and commercial environments.
NOX SUPREMWOOD+/ SUPREMSTONE+	5.0 mm	NOX Supremwood+ and Supremstone+ are innovative, high-performance flooring solutions designed by NOX Corporation. They offer the natural aesthetics of wood and stone with enhanced durability and stability, ideal for various interior applications. This flooring incorporates NOX's EMT™ Core technology, which provides superior dimensional stability and impact resistance, ensuring a long-lasting, resilient surface. Additionally, it features a premium matte finish with EPT™ Shield for exceptional scratch resistance and easy maintenance, making it a practical choice for high-traffic areas. Both Supremwood+ and Supremstone+ come with advanced noise absorption ,ensuring a safe and quiet environment.

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

2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-grave, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal. The assessment is conducted following an attributional LCA approach. Cut-off and allocation procedures are described below and conform to the PCR and ISO standards.

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

Table 1. *Life cycle phases included in the NOX luxury vinyl 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 products are summarized in Table 2 through Table 6.

Table 2. *Product characteristics for the **ORCHID+ 2.0mm** flooring product.*

Characteristic			Description			
Sustainable certifications			ISO 14001			
VOC emissions test method			FloorScore®, Indoor Air Comfort Gold			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			2.00 (0.08)	mm (in)	2.00 (0.08)	2.00 (0.08)
Wear layer thickness (where applicable)			0.15 (0.01)	mm (in)	0.15 (0.01)	0.30 (0.01)
Product weight			3,300 (10.8)	g/m^2 (oz/ft^2)	3,300 (10.8)	3,300 (10.8)
Product Form	Tiles	Width	177.8 (7.00)	mm (in)	100.0 (3.94)	914.4 (36.0)
		Length	1,219 (48)	mm (in)	305 (12)	1,505 (59)

Table 3. *Product characteristics for the **ORCHID+ 2.5mm** flooring product.*

Characteristic			Description			
Sustainable certifications			ISO 14001			
VOC emissions test method			FloorScore®, Indoor Air Comfort Gold			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			2.50 (0.10)	mm (in)	2.50 (0.10)	2.50 (0.10)
Wear layer thickness (where applicable)			0.15 (0.01)	mm (in)	0.15 (0.01)	0.70 (0.03)
Product weight			4,270 (14.0)	g/m^2 (oz/ft^2)	4,270 (14.0)	4,270 (14.0)
Product Form	Tiles	Width	177.8 (7.00)	mm (in)	100.0 (3.94)	914.4 (36.0)
		Length	1,219 (48)	mm (in)	305 (12)	1,505 (59)

Table 4. *Product characteristics for the **ECOLAY+/ECOCLICK+/ECOLOCK+ 4.5mm** flooring product.*

Characteristic			Description			
Sustainable certifications			ISO 14001			
VOC emissions test method			FloorScore®, Indoor Air Comfort Gold			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			4.50 (0.18)	mm (in)	4.00 (0.16)	6.00 (0.24)
Wear layer thickness (where applicable)			0.55 (0.02)	mm (in)	0.30 (0.01)	0.70 (0.03)
Product weight			7,500 (24.6)	g/m^2 (oz/ft^2)	7,500 (24.6)	7,500 (24.6)
Product Form	Tiles	Width	177.8 (7.00)	mm (in)	100.0 (3.94)	914.4 (36.0)
		Length	1,219 (48)	mm (in)	450 (18)	1,505 (59)

Table 5. *Product characteristics for the **ECOLAY+/ECOCLICK+/ECOLOCK+ 5.0mm** flooring product.*

Characteristic			Description			
Sustainable certifications			ISO 14001			
VOC emissions test method			FloorScore®, Indoor Air Comfort Gold			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			5.00 (0.20)	mm (in)	4.00 (0.16)	6.00 (0.24)
Wear layer thickness (where applicable)			0.55 (0.02)	mm (in)	0.30 (0.01)	0.70 (0.03)
Product weight			8,100 (26.5)	g/m^2 (oz/ft^2)	8,100 (26.5)	8,100 (26.5)
Product Form	Tiles	Width	177.8 (7.00)	mm (in)	152.4 (6.00)	914.4 (36.0)
		Length	1,219 (48)	mm (in)	305 (12)	1,505 (59)

Table 6. *Product characteristics for the **SUPREMWOOD+/SUPREMSTONE+ 5.0mm** flooring product.*

Characteristic			Description			
Sustainable certifications			ISO 14001			
VOC emissions test method			FloorScore®, Indoor Air Comfort Gold			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			5.00 (0.20)	mm (in)	4.00 (0.16)	6.00 (0.24)
Wear layer thickness (where applicable)			0.55 (0.02)	mm (in)	0.30 (0.01)	0.70 (0.03)
Product weight			6,260 (20.5)	g/m^2 (oz/ft^2)	6,260 (20.5)	6,260 (20.5)
Product Form	Tiles	Width	185.0 (7.28)	mm (in)	185.0 (7.28)	462.0 (18.2)
		Length	1,212 (48)	mm (in)	610 (24)	1,505 (59)

2.6 MARKET PLACEMENT/APPLICATION RULES

Technical specifications and product performance results for the LVT products can be found on the manufacturer's website: https://www.noxglobal.com.

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

The products are delivered for installation in the form of tiles and planks.

2.8 MATERIAL COMPOSITION

The flooring products (UNSPSC Class Code 30161700/CSI Code 09 65 00) are manufactured at a production facility in Vietnam. The primary materials include polyvinyl chloride (PVC), plasticizers, fillers and various stabilizers and coatings.

Table 7. *Material content for the luxury vinyl flooring products in kg per square meter and percent of total mass.*

Component	ORCHID+ 2.0mm	ORCHID+ 2.5mm	ECOLAY+/ECOCLICK+/ ECOLOCK+ 4.5mm	ECOLAY+/ECOCLICK+/ ECOLOCK+ 5.0mm	SUPREMWOOD+/SUPREMSTONE+ 5.0mm
PVC	0.916	1.31	1.83	2.12	2.00
	28%	31%	24%	26%	32%
Regrind	0.825	1.07	1.88	2.03	1.57
	25%	25%	25%	25%	25%
Filler	1.24	1.40	2.78	2.78	2.30
	38%	33%	37%	34%	37%
Plasticizer	0.260	0.401	0.816	0.953	0.117
	7.9%	9.4%	11%	12%	1.9%
Stabilizer	$3.71x10^{-2}$	$6.41x10^{-2}$	0.113	0.123	0.141
	1.1%	1.5%	1.5%	1.5%	2.3%
Glass Fiber	0.00	0.00	$5.63x10^{-2}$	$5.54x10^{-2}$	$7.04x10^{-2}$
	0%	0%	0.75%	0.68%	1.1%
Coating	$2.48x10^{-2}$	$2.56x10^{-2}$	$2.81x10^{-2}$	$3.69x10^{-2}$	$2.35x10^{-2}$
	0.75%	0.6%	0.38%	0.46%	0.38%
Polyethylene	0.00	0.00	0.00	0.00	$4.70x10^{-2}$
	0%	0%	0%	0%	0.75%
Total Product	**3.30**	**4.27**	**7.50**	**8.10**	**6.26**
	100%	**100%**	**100%**	**100%**	**100%**

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

2.9 MANUFACTURING

The NOX vinyl tile flooring is manufactured in Vietnam. 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.

The vinyl flooring is made primarily from polyvinyl chloride (PVC), calcium carbonate (mineral reinforcement), plasticizers and additives (i.e., pigments and stabilizers). The product is structured with multiple layers including PVC backing, a PVC wear layer and a UV protective layer.

The production of vinyl tile flooring involves the following general manufacturing processes:

- Polyvinyl chloride resins are mixed with calcium carbonate, plasticizers, and pigments in a large industrial mixer.
- The core is extruded to a dough-like consistency. The dough-like substance is then put through calender rollers and squeezed into sheets.
- The LVT sheets are embossed, adhered to the core and then cut into individual planks, profiled, a foamed backing layer adhered and then packaged for shipment.

The manufacturer provided material-specific scrap rates which are 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 8. *Material content for the NOX LVT flooring product packaging, in kg per square meter and percent of total mass.*

Component	ORCHID+ 2.0mm	ORCHID+ 2.5mm	ECOLAY+/ECOCLICK+/ ECOLOCK+ 4.5mm	ECOLAY+/ECOCLICK+/ ECOLOCK+ 5.0mm	SUPREMWOOD+/ SUPREMSTONE+ 5.0mm
Corrugate/Paper	$6.29x10^{-2}$	$9.23x10^{-2}$	0.135	0.138	0.168
	37%	42%	40%	35%	42%
Plastic	$1.26x10^{-3}$	$1.54x10^{-3}$	$2.40x10^{-3}$	$3.08x10^{-3}$	$2.79x10^{-3}$
	0.74%	0.69%	0.71%	0.77%	0.69%
Wood	0.105	0.128	0.200	0.256	0.233
	62%	58%	59%	64%	58%
Total Packaging	**0.169**	**0.222**	**0.337**	**0.398**	**0.403**
	100%	**100%**	**100%**	**100%**	**100%**

2.11 PRODUCT INSTALLATION

Installation of the product is accomplished using hand tools with negligible impacts and waste. For the current assessment, approximately 4.5% 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 products is 30 years based on the manufacturer's estimated lifetime. 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 may be disposed of in a landfill or via incineration. Although in some instances, vinyl flooring can be recycled into other products, the practice is not typical, nor widely available as a disposal route for the products in the consumer markets considered. 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.noxglobal.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 for use over a 75-year period. The corresponding reference flow for each product system is presented in Table 9. For the present assessment, a reference service lifetime (RSL) corresponding to the manufacturer's warranted lifetime is assumed. The total number of required product lifecycles during the 75-year period over which the product system is modeled is also summarized for the product in Table 9.

Table 9. *Reference flows and RSL for the Luxury Vinyl Tile flooring product.*

Product Name	Reference Flow (kg/m^2)	Reference Service Life – RSL (years)	Replacement Cycle (ESL/RSL-1)
ORCHID+ 2.0mm	3.47	30	1.5
ORCHID+ 2.5mm	4.49	30	1.5
ECOLAY+/ECOCLICK+/ECOLOCK+ 4.5mm	7.84	30	1.5
ECOLAY+/ECOCLICK+/ECOLOCK+ 5.0mm	8.50	30	1.5
SUPREMWOOD+/SUPREMSTONE+ 5.0mm	6.66	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 10 and illustrated in Figure 1.

Table 10. *The modules and unit processes included in the scope for the NOX flooring products.*

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

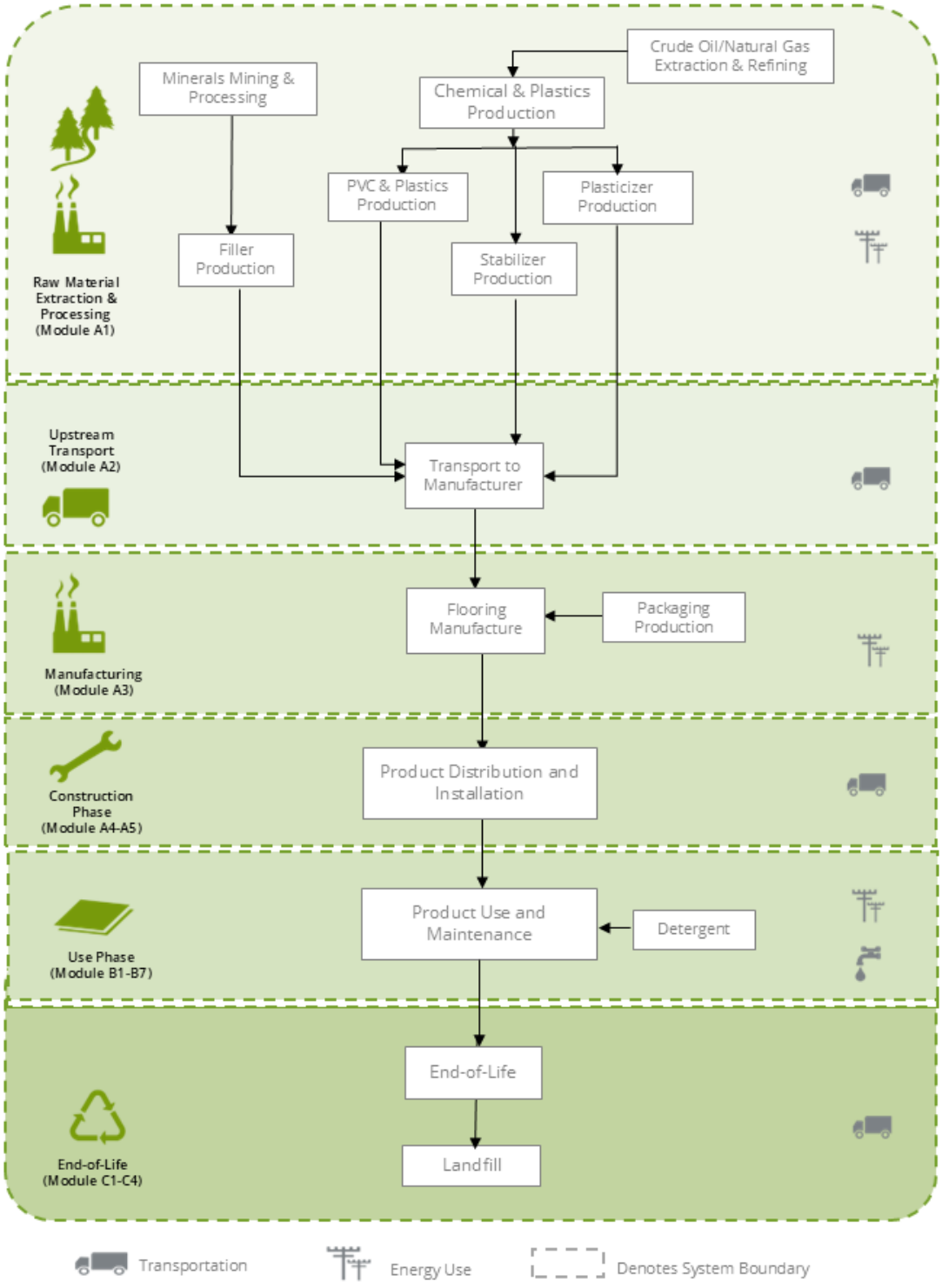


Figure 1. *Flow Diagram for the life cycle of the NOX luxury vinyl flooring product system.*

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 NOX manufacturing facility was allocated to the products based on the product area as a fraction of the total production.
- The NOX facility under review is located in Vietnam. Ecoinvent inventory datasets for the country-specific energy grid was used to model resource use and emissions from electricity use at the manufacturing facility.
- The Reference Service Life (RSL) of the products was modeled based on information provided by the manufacturer assuming their products are installed and maintained as recommended and used for the specific application noted.
- Downstream transport was modeled based on information provided by the manufacturer representing transport for global product distribution.
- The maintenance phase of the product life cycle was modeled based on information provided by the manufacturer including recommended installation and cleaning methods, as well as cleaning frequency.
- For the product end-of-life, disposal of product and product packaging is modeled based on the PCR guidance regarding recycling rates of product and packaging materials.
- For final disposal of the packaging material and flooring products at end-of-life, all materials are assumed to be transported 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.

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 11. *Data sources for the NOX flooring product system.*

Component	Dataset	Data Source	Publication data
PRODUCT			
PVC			
Polyvinyl Chloride	polyvinylchloride production, bulk polymerisation | polyvinylchloride, bulk polymerised | Cutoff, S/RoW	EI v3.10	2023
Filler			
Calcium Carbonate	limestone production, crushed, washed | limestone, crushed, washed | Cutoff, S/RoW	EI v3.10	2023
Plasticizer			
PVC Plasticizer	dioctyl terephthalate production | dioctyl terephthalate | Cutoff, S/GLO	EI v3.10	2023
Stabilizer			
Stabilizer	market for chemical, organic | chemical, organic | Cutoff, S/GLO	EI v3.10	2023
	market for chemicals, inorganic | chemical, inorganic | Cutoff, S/GLO	EI v3.10	2023
	market for limestone, crushed, washed | limestone, crushed, washed | Cutoff, S/RoW	EI v3.10	2023
	market for zinc oxide | zinc oxide | Cutoff, S/GLO	EI v3.10	2023
Other			
Organic chemicals	market for chemical, organic | chemical, organic | Cutoff, S/GLO	EI v3.10	2023
Glass Fibre	glass fibre production | glass fibre | Cutoff, S/RoW	EI v3.10	2023
Urethane Acrylate	market for polyurethane, flexible foam | polyurethane, flexible foam | Cutoff, S/RoW	EI v3.10	2023
PACKAGING			
Cardboard	containerboard production, linerboard, kraftliner | containerboard, linerboard | Cutoff, S/RoW	EI v3.10	2023
Wrapping Film	packaging film production, low density polyethylene | packaging film, low density polyethylene | Cutoff, S/RoW	EI v3.10	2023
Polyester Strapping	polyethylene terephthalate production, granulate, amorphous | polyethylene terephthalate, granulate, amorphous | 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
MAINTENANCE			
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 DISPOSAL			
Landfill	treatment of municipal solid waste, sanitary landfill | municipal solid waste | Cutoff, S/RoW	EI v3.10	2023
MANUFACTURING RESOURCES			
Grid electricity	market for electricity, medium voltage | electricity, medium voltage | Cutoff, S/VN	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

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

3.9 PERIOD UNDER REVIEW

The period of review is calendar year 2023.

3.10 ALLOCATION

Manufacturing resource use was allocated to the products based on surface area. Area-based allocation was deemed most appropriate for the flooring products as total facility production was available as total square meters of product produced. Impacts from transportation were allocated based on the mass of material and distance transported.

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

3.11 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 13.

Table 13. *Product distribution parameters, per 1 m^2.*

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 (kg)**	**Transport Distance (km)**	
		Road	**Ship**
ORCHID+ 2.0mm (LVT)	3.47	900	13,500
ORCHID+ 2.5mm (LVT)	4.49	900	13,500
ECOLAY+/ECOCLICK+/ECOLOCK+ 4.5mm (LVT)	7.84	900	13,500
ECOLAY+/ECOCLICK+/ECOLOCK+ 5.0mm (LVT)	8.50	900	13,500
SUPREMWOOD+/SUPREMSTONE+ 5mm	6.66	900	13,500

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 method 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 for disposal practices in the US. The relevant disposal statistics used for the packaging are summarized in Table 14. For material not recycled, 80% are assumed landfilled and 20% incinerated.

Modeling parameters for product installation are summarized in Table 15.

Table 14. *Recycling rates for packaging materials at end-of-life.*

Material	Recycling rate (%)
Recycling Rates	
Plastics	9.0%
Paper & Pulp	68%
Wood	0%
Disposal of Non-recyclables	
Landfill	80%
Incineration	20%

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

Parameter		ORCHID+ 2.0mm	ORCHID+ 2.5mm	ECOLAY+/ ECOCLICK+/ ECOLOCK+ 4.5mm	ECOLAY+/ ECOCLICK+/ ECOLOCK+ 5.0mm	SUPREMWOOD+/ SUPREMSTONE+ 5mm
Ancillary materials (kg)		neg.	neg.	neg.	neg.	neg.
Net freshwater consumption (m^3)		-	-	-	-	-
Electricity consumption (kWh)		-	-	-	-	-
Product loss per functional unit (kg)		0.132	0.171	0.300	0.324	0.250
Waste materials generated by product installation (kg)		0.301	0.393	0.637	0.722	0.654
Output materials resulting from on-site waste processing (kg)		n/a	n/a	n/a	n/a	n/a
Mass of packaging waste (kg)	Plastic	$1.26x10^{-3}$	$1.54x10^{-3}$	$2.40x10^{-3}$	$3.08x10^{-3}$	$2.79x10^{-3}$
	Corrugate	$6.29x10^{-2}$	$9.23x10^{-2}$	0.135	0.138	0.168
	Wood	0.105	0.128	0.200	0.256	0.233
Biogenic carbon contained in packaging (kg CO_2)		0.308	0.404	0.614	0.724	0.734
Direct emissions (kg)		-	-	-	-	-

Use stage (B1)

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

Maintenance stage (B2)

According to the manufacturer, typical maintenance involves regular sweeping and damp mopping. The present assessment is based on a recommended weekly cleaning schedule including sweeping and damp mopping with a neutral cleaner.

Table 16. *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	$kg/m^2/yr$	0.0119
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

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 17. Impacts associated with the production, transport, waste processing, and disposal of all materials required for the replacement of the product, including packaging, over the 75-year assessment period are included in this life cycle phase.

Table 17. *Product replacement parameters for the flooring products, per 1 m^2.*

Parameter	Units	ORCHID+ 2.0mm	ORCHID+ 2.5mm	ECOLAY+/ ECOCLICK+/ ECOLOCK+ 4.5mm	ECOLAY+/ ECOCLICK+/ ECOLOCK+ 5.0mm	SUPREMWOOD+/ SUPREMSTONE+ 5mm
Reference service life	Years	30	30	30	30	30
Replacement cycle	-	1.5	1.5	1.5	1.5	1.5
Energy input	kWh	0	0	0	0	0
Freshwater consumption	m^3	0	0	0	0	0
Ancillary materials	kg	Negligible	Negligible	Negligible	Negligible	Negligible
Replacement parts	kg	5.67	7.34	12.8	13.9	10.9
Direct emissions	kg	0	0	0	0	0

Building operation stage (B6 – B7)

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

Disposal stage (C1 - C4)

The disposal stage includes 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. The recycling rates used for the product packaging are based on the PCR. No recycling of the product materials is assumed at end-of-life. End-of-life modeling parameters are summarized in Table 18.

Table 18. *End-of-life disposal scenario parameters for the flooring products.*

Parameter		ORCHID+ 2.0mm	ORCHID+ 2.5mm	ECOLAY+/ ECOCLICK+/ ECOLOCK+ 4.5mm	ECOLAY+/ ECOCLICK+/ ECOLOCK+ 5.0mm	SUPREMWOOD+/ SUPREMSTONE+ 5mm
Assumptions for scenario development		100% landfill	100% landfill	100% landfill	100% landfill	100% landfill
Collection process		-		-	-	-
Collected with mixed construction waste (kg)		3.30	4.27	7.50	8.10	6.26
Recovery		n/a	n/a	n/a	n/a	n/a
Disposal	Landfill (kg)	3.30	4.27	7.50	8.10	6.26
Removals of biogenic carbon (kg CO_2)		n/a	n/a	n/a	n/a	n/a

5. LCA: Results

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

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 six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.

The following 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 fresh water 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. Module D is not declared. In the interest of space and table readability, these modules are not included in the results presented below.

Table 19. *Life Cycle Impact Assessment results for the vinyl 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.* ***(ORCHID+ 2.0mm)***

Impact Category	A1	A2	A3	A4	A5	B2	B4	C2	C4
CML									
GWP (kg CO_2 eq)	4.36	0.143	1.38	1.07	0.420	4.63	14.3	0.738	1.40
	15%	0.5%	4.9%	3.8%	1.5%	16%	50%	2.6%	4.9%
AP (kg SO_2 eq)	$1.45x10^{-2}$	$1.67x10^{-3}$	$8.69x10^{-3}$	$1.29x10^{-2}$	$1.69x10^{-3}$	$1.71x10^{-2}$	$6.40x10^{-2}$	$2.80x10^{-3}$	$3.64x10^{-4}$
	12%	1.3%	7%	10%	1.4%	14%	52%	2.3%	0.29%
EP (kg $(PO_4)^{3-}$ eq)	$6.23x10^{-3}$	$2.99x10^{-4}$	$3.82x10^{-3}$	$1.75x10^{-3}$	$2.53x10^{-3}$	$1.20x10^{-2}$	$6.60x10^{-2}$	$6.44x10^{-4}$	$2.87x10^{-2}$
	5.1%	0.24%	3.1%	1.4%	2.1%	9.8%	54%	0.53%	24%
POCP (kg C_2H_4 eq)	$1.71x10^{-3}$	$4.97x10^{-5}$	$3.62x10^{-4}$	$3.92x10^{-4}$	$1.29x10^{-4}$	$9.71x10^{-4}$	$4.59x10^{-3}$	$1.25x10^{-4}$	$2.97x10^{-4}$
	20%	0.58%	4.2%	4.5%	1.5%	11%	53%	1.4%	3.4%
ODP (kg CFC-11 eq)	$2.31x10^{-6}$	$1.47x10^{-9}$	$1.73x10^{-8}$	$1.25x10^{-8}$	$9.44x10^{-8}$	$6.04x10^{-8}$	$3.68x10^{-6}$	$9.02x10^{-9}$	$8.67x10^{-10}$
	37%	0.024%	0.28%	0.2%	1.5%	0.98%	59%	0.15%	0.014%
ADPF (MJ eq)	82.0	1.73	14.5	14.0	5.07	79.7	192	9.51	0.955
	21%	0.43%	3.6%	3.5%	1.3%	20%	48%	2.4%	0.24%
ADPE (kg Sb eq)	$1.22x10^{-5}$	$1.03x10^{-7}$	$4.84x10^{-7}$	$1.04x10^{-6}$	$5.70x10^{-7}$	$1.07x10^{-5}$	$2.20x10^{-5}$	$2.27x10^{-7}$	$4.44x10^{-8}$
	26%	0.22%	1%	2.2%	1.2%	23%	46%	0.48%	0.094%
TRACI									
GWP (kg CO_2 eq)	4.30	0.142	1.35	1.06	0.396	4.58	13.7	0.732	1.14
	16%	0.52%	4.9%	3.9%	1.4%	17%	50%	2.7%	4.2%
AP (kg SO_2 eq)	$1.59x10^{-2}$	$1.92x10^{-3}$	$8.53x10^{-3}$	$1.40x10^{-2}$	$1.84x10^{-3}$	$1.82x10^{-2}$	$6.96x10^{-2}$	$3.57x10^{-3}$	$6.05x10^{-4}$
	12%	1.4%	6.4%	10%	1.4%	14%	52%	2.7%	0.45%
EP (kg N eq)	$1.30x10^{-2}$	$2.19x10^{-4}$	$8.66x10^{-3}$	$1.19x10^{-3}$	$6.51x10^{-3}$	$2.62x10^{-2}$	0.164	$3.65x10^{-4}$	$7.92x10^{-2}$
	4.3%	0.073%	2.9%	0.4%	2.2%	8.8%	55%	0.12%	26%
SFP (kg O_3 eq)	0.206	$4.56x10^{-2}$	$8.90x10^{-2}$	0.276	$3.11x10^{-2}$	0.215	1.14	0.108	$7.48x10^{-3}$
	9.7%	2.2%	4.2%	13%	1.5%	10%	54%	5.1%	0.35%
ODP (kg CFC-11 eq)	$2.83x10^{-6}$	$2.03x10^{-9}$	$2.91x10^{-8}$	$1.69x10^{-8}$	$1.16x10^{-7}$	$8.84x10^{-8}$	$4.50x10^{-6}$	$1.21x10^{-8}$	$1.21x10^{-9}$
	37%	0.027%	0.38%	0.22%	1.5%	1.2%	59%	0.16%	0.016%
FFD (MJ eq)	10.6	0.237	1.09	2.02	0.643	9.09	24.2	1.43	0.129
	21%	0.48%	2.2%	4.1%	1.3%	18%	49%	2.9%	0.26%

Table 20. *Resource use and waste flows for the vinyl 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.* ***(ORCHID+ 2.0mm)***

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Resources									
RPR_E (MJ)	3.64	$4.08x10^{-2}$	6.73	0.155	0.304	4.49	11.8	$4.15x10^{-2}$	$2.72x10^{-2}$
	13%	0.15%	25%	0.57%	1.1%	16%	43%	0.15%	0.1%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.122	0.00	4.78	0.00	0.00
	0%	0%	0%	0%	2.5%	0%	98%	0%	0%
$NRPR_E$ (MJ)	68.9	1.77	14.7	14.2	5.26	82.0	173	9.55	0.989
	19%	0.48%	4%	3.8%	1.4%	22%	47%	2.6%	0.27%
$NRPR_M$ (MJ)	17.4	0.00	0.00	0.00	$1.86x10^{-3}$	0.00	26.2	0.00	0.00
	40%	0%	0%	0%	0.0043%	0%	60%	0%	0%
SM (kg)	$8.25x10^{-3}$	0.00	0.00	0.00	$3.30x10^{-4}$	0.00	$1.29x10^{-2}$	0.00	0.00
	38%	0%	0%	0%	1.5%	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)	0.327	$1.77x10^{-3}$	$7.61x10^{-2}$	$9.23x10^{-3}$	$1.69x10^{-2}$	0.775	0.655	$3.57x10^{-3}$	$1.63x10^{-3}$
	18%	0.095%	4.1%	0.49%	0.91%	42%	35%	0.19%	0.087%
Wastes									
HWD (kg)	$1.49x10^{-3}$	$1.08x10^{-5}$	$3.56x10^{-5}$	$8.85x10^{-5}$	$6.89x10^{-5}$	$9.78x10^{-4}$	$2.65x10^{-3}$	$6.70x10^{-5}$	$6.40x10^{-6}$
	28%	0.2%	0.66%	1.6%	1.3%	18%	49%	1.2%	0.12%
NHWD (kg)	0.276	$1.37x10^{-2}$	0.213	0.412	0.273	0.169	6.81	$4.54x10^{-2}$	3.31
	2.4%	0.12%	1.8%	3.6%	2.4%	1.5%	59%	0.39%	29%
HLRW (kg)	$1.83x10^{-5}$	$1.62x10^{-7}$	$5.93x10^{-7}$	$6.98x10^{-7}$	$8.10x10^{-7}$	$1.10x10^{-5}$	$3.13x10^{-5}$	$2.16x10^{-7}$	$1.48x10^{-7}$
	29%	0.26%	0.94%	1.1%	1.3%	17%	50%	0.34%	0.23%
ILLRW (kg)	$4.77x10^{-5}$	$4.00x10^{-7}$	$1.42x10^{-6}$	$1.65x10^{-6}$	$2.10x10^{-6}$	$2.52x10^{-5}$	$8.12x10^{-5}$	$5.08x10^{-7}$	$3.72x10^{-7}$
	30%	0.25%	0.88%	1%	1.3%	16%	51%	0.32%	0.23%
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	$4.46x10^{-2}$	0.00	$6.69x10^{-2}$	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 results for the vinyl 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.* ***(ORCHID+ 2.5mm)***

Impact Category	A1	A2	A3	A4	A5	B2	B4	C2	C4
CML									
GWP (kg CO_2 eq)	6.36	0.176	1.44	1.38	0.563	4.63	18.9	0.954	1.75
	18%	0.49%	4%	3.8%	1.6%	13%	52%	2.6%	4.8%
AP (kg SO_2 eq)	$2.11x10^{-2}$	$2.21x10^{-3}$	$8.84x10^{-3}$	$1.67x10^{-2}$	$2.19x10^{-3}$	$1.71x10^{-2}$	$8.27x10^{-2}$	$3.62x10^{-3}$	$4.62x10^{-4}$
	14%	1.4%	5.7%	11%	1.4%	11%	53%	2.3%	0.3%
EP (kg $(PO_4)^{3-}$ eq)	$9.09x10^{-3}$	$3.74x10^{-4}$	$4.31x10^{-3}$	$2.27x10^{-3}$	$3.26x10^{-3}$	$1.20x10^{-2}$	$8.65x10^{-2}$	$8.33x10^{-4}$	$3.75x10^{-2}$
	5.8%	0.24%	2.8%	1.5%	2.1%	7.7%	55%	0.53%	24%
POCP (kg C_2H_4 eq)	$2.55x10^{-3}$	$6.50x10^{-5}$	$3.79x10^{-4}$	$5.08x10^{-4}$	$1.78x10^{-4}$	$9.71x10^{-4}$	$6.32x10^{-3}$	$1.62x10^{-4}$	$3.71x10^{-4}$
	22%	0.57%	3.3%	4.4%	1.5%	8.4%	55%	1.4%	3.2%
ODP (kg CFC-11 eq)	$3.49x10^{-6}$	$1.82x10^{-9}$	$1.95x10^{-8}$	$1.62x10^{-8}$	$1.42x10^{-7}$	$6.04x10^{-8}$	$5.53x10^{-6}$	$1.17x10^{-8}$	$1.12x10^{-9}$
	38%	0.02%	0.21%	0.17%	1.5%	0.65%	60%	0.13%	0.012%
ADPF (MJ eq)	120	2.13	14.9	18.2	6.96	79.7	263	12.3	1.23
	23%	0.41%	2.9%	3.5%	1.3%	15%	51%	2.4%	0.24%
ADPE (kg Sb eq)	$1.77x10^{-5}$	$1.22x10^{-7}$	$5.38x10^{-7}$	$1.35x10^{-6}$	$8.09x10^{-7}$	$1.07x10^{-5}$	$3.13x10^{-5}$	$2.94x10^{-7}$	$5.70x10^{-8}$
	28%	0.19%	0.86%	2.1%	1.3%	17%	50%	0.47%	0.091%
TRACI									
GWP (kg CO_2 eq)	6.27	0.175	1.41	1.37	0.531	4.58	18.2	0.948	1.42
	18%	0.5%	4%	3.9%	1.5%	13%	52%	2.7%	4.1%
AP (kg SO_2 eq)	$2.32x10^{-2}$	$2.51x10^{-3}$	$8.70x10^{-3}$	$1.81x10^{-2}$	$2.40x10^{-3}$	$1.82x10^{-2}$	$9.05x10^{-2}$	$4.63x10^{-3}$	$7.90x10^{-4}$
	14%	1.5%	5.1%	11%	1.4%	11%	54%	2.7%	0.47%
EP (kg N eq)	$1.90x10^{-2}$	$2.64x10^{-4}$	$9.94x10^{-3}$	$1.54x10^{-3}$	$8.35x10^{-3}$	$2.62x10^{-2}$	0.215	$4.72x10^{-4}$	0.104
	4.9%	0.069%	2.6%	0.4%	2.2%	6.8%	56%	0.12%	27%
SFP (kg O_3 eq)	0.300	$5.80x10^{-2}$	$9.22x10^{-2}$	0.357	$4.07x10^{-2}$	0.215	1.50	0.140	$9.61x10^{-3}$
	11%	2.1%	3.4%	13%	1.5%	8%	55%	5.2%	0.35%
ODP (kg CFC-11 eq)	$4.28x10^{-6}$	$2.50x10^{-9}$	$3.21x10^{-8}$	$2.19x10^{-8}$	$1.74x10^{-7}$	$8.84x10^{-8}$	$6.79x10^{-6}$	$1.56x10^{-8}$	$1.56x10^{-9}$
	38%	0.022%	0.28%	0.19%	1.5%	0.77%	60%	0.14%	0.014%
FFD (MJ eq)	15.5	0.293	1.13	2.62	0.894	9.09	33.7	1.85	0.167
	24%	0.45%	1.7%	4%	1.4%	14%	52%	2.8%	0.26%

Table 22. *Resource use and waste flows for the vinyl 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.* ***(ORCHID+ 2.5mm)***

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Resources									
RPR_E (MJ)	5.30	$4.75x10^{-2}$	8.12	0.200	0.392	4.49	15.2	$5.37x10^{-2}$	$3.44x10^{-2}$
	16%	0.14%	24%	0.59%	1.2%	13%	45%	0.16%	0.1%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.160	0.00	6.24	0.00	0.00
	0%	0%	0%	0%	2.5%	0%	98%	0%	0%
$NRPR_E$ (MJ)	101	2.17	15.1	18.4	7.23	82.0	237	12.4	1.27
	21%	0.46%	3.2%	3.9%	1.5%	17%	50%	2.6%	0.27%
$NRPR_M$ (MJ)	24.9	0.00	0.00	0.00	$2.28x10^{-3}$	0.00	37.4	0.00	0.00
	40%	0%	0%	0%	0.0037%	0%	60%	0%	0%
SM (kg)	$1.07x10^{-2}$	0.00	0.00	0.00	$4.27x10^{-4}$	0.00	$1.67x10^{-2}$	0.00	0.00
	38%	0%	0%	0%	1.5%	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)	0.476	$2.07x10^{-3}$	$7.85x10^{-2}$	$1.19x10^{-2}$	$2.32x10^{-2}$	0.775	0.897	$4.62x10^{-3}$	$2.07x10^{-3}$
	21%	0.091%	3.5%	0.53%	1%	34%	40%	0.2%	0.091%
Wastes									
HWD (kg)	$2.15x10^{-3}$	$1.31x10^{-5}$	$3.79x10^{-5}$	$1.15x10^{-4}$	$9.77x10^{-5}$	$9.78x10^{-4}$	$3.75x10^{-3}$	$8.67x10^{-5}$	$8.25x10^{-6}$
	30%	0.18%	0.52%	1.6%	1.4%	14%	52%	1.2%	0.11%
NHWD (kg)	0.400	$1.58x10^{-2}$	0.268	0.533	0.351	0.169	8.86	$5.87x10^{-2}$	4.28
	2.7%	0.11%	1.8%	3.6%	2.4%	1.1%	59%	0.39%	29%
HLRW (kg)	$2.66x10^{-5}$	$1.89x10^{-7}$	$7.04x10^{-7}$	$9.04x10^{-7}$	$1.17x10^{-6}$	$1.10x10^{-5}$	$4.51x10^{-5}$	$2.79x10^{-7}$	$1.87x10^{-7}$
	31%	0.22%	0.82%	1%	1.4%	13%	52%	0.32%	0.22%
ILLRW (kg)	$6.96x10^{-5}$	$4.67x10^{-7}$	$1.67x10^{-6}$	$2.14x10^{-6}$	$3.03x10^{-6}$	$2.52x10^{-5}$	$1.17x10^{-4}$	$6.57x10^{-7}$	$4.69x10^{-7}$
	32%	0.21%	0.76%	0.97%	1.4%	11%	53%	0.3%	0.21%
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	$6.54x10^{-2}$	0.00	$9.81x10^{-2}$	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 23. *Life Cycle Impact Assessment results for the vinyl 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.* ***(ECOLAY+/ECOCLICK+/ECOLOCK+ 4.5mm)***

Impact Category	A1	A2	A3	A4	A5	B2	B4	C2	C4
CML									
GWP (kg CO_2 eq)	10.4	0.324	1.59	2.42	0.895	4.63	30.9	1.68	3.31
	18%	0.58%	2.8%	4.3%	1.6%	8.3%	55%	3%	5.9%
AP (kg SO_2 eq)	$3.45x10^{-2}$	$3.79x10^{-3}$	$9.14x10^{-3}$	$2.91x10^{-2}$	$3.42x10^{-3}$	$1.71x10^{-2}$	0.131	$6.37x10^{-3}$	$8.43x10^{-4}$
	15%	1.6%	3.9%	12%	1.5%	7.3%	56%	2.7%	0.36%
EP (kg $(PO_4)^{3-}$ eq)	$1.47x10^{-2}$	$6.77x10^{-4}$	$5.78x10^{-3}$	$3.96x10^{-3}$	$5.33x10^{-3}$	$1.20x10^{-2}$	0.145	$1.46x10^{-3}$	$6.46x10^{-2}$
	5.8%	0.27%	2.3%	1.6%	2.1%	4.7%	57%	0.58%	26%
POCP (kg C_2H_4 eq)	$4.60x10^{-3}$	$1.13x10^{-4}$	$4.22x10^{-4}$	$8.86x10^{-4}$	$3.03x10^{-4}$	$9.71x10^{-4}$	$1.10x10^{-2}$	$2.84x10^{-4}$	$7.03x10^{-4}$
	24%	0.59%	2.2%	4.6%	1.6%	5%	57%	1.5%	3.7%
ODP (kg CFC-11 eq)	$6.34x10^{-6}$	$3.33x10^{-9}$	$2.59x10^{-8}$	$2.83x10^{-8}$	$2.57x10^{-7}$	$6.04x10^{-8}$	$1.00x10^{-5}$	$2.05x10^{-8}$	$1.98x10^{-9}$
	38%	0.02%	0.15%	0.17%	1.5%	0.36%	60%	0.12%	0.012%
ADPF (MJ eq)	195	3.92	15.7	31.7	11.0	79.7	422	21.6	2.18
	25%	0.5%	2%	4.1%	1.4%	10%	54%	2.8%	0.28%
ADPE (kg Sb eq)	$4.41x10^{-5}$	$2.32x10^{-7}$	$6.45x10^{-7}$	$2.35x10^{-6}$	$1.93x10^{-6}$	$1.07x10^{-5}$	$7.48x10^{-5}$	$5.17x10^{-7}$	$1.02x10^{-7}$
	33%	0.17%	0.48%	1.7%	1.4%	7.9%	55%	0.38%	0.075%
TRACI									
GWP (kg CO_2 eq)	10.2	0.321	1.54	2.40	0.842	4.58	29.5	1.66	2.69
	19%	0.6%	2.9%	4.5%	1.6%	8.5%	55%	3.1%	5%
AP (kg SO_2 eq)	$3.79x10^{-2}$	$4.36x10^{-3}$	$9.05x10^{-3}$	$3.16x10^{-2}$	$3.78x10^{-3}$	$1.82x10^{-2}$	0.144	$8.12x10^{-3}$	$1.36x10^{-3}$
	15%	1.7%	3.5%	12%	1.5%	7%	56%	3.1%	0.53%
EP (kg N eq)	$3.07x10^{-2}$	$4.94x10^{-4}$	$1.38x10^{-2}$	$2.68x10^{-3}$	$1.37x10^{-2}$	$2.62x10^{-2}$	0.361	$8.30x10^{-4}$	0.178
	4.9%	0.079%	2.2%	0.43%	2.2%	4.2%	57%	0.13%	28%
SFP (kg O_3 eq)	0.495	0.104	$9.85x10^{-2}$	0.623	$6.56x10^{-2}$	0.215	2.47	0.245	$1.71x10^{-2}$
	11%	2.4%	2.3%	14%	1.5%	5%	57%	5.7%	0.39%
ODP (kg CFC-11 eq)	$7.93x10^{-6}$	$4.58x10^{-9}$	$4.08x10^{-8}$	$3.83x10^{-8}$	$3.22x10^{-7}$	$8.84x10^{-8}$	$1.25x10^{-5}$	$2.75x10^{-8}$	$2.77x10^{-9}$
	38%	0.022%	0.19%	0.18%	1.5%	0.42%	60%	0.13%	0.013%
FFD (MJ eq)	25.2	0.536	1.22	4.57	1.43	9.09	54.8	3.26	0.295
	25%	0.53%	1.2%	4.6%	1.4%	9.1%	55%	3.2%	0.29%

Table 24. *Resource use and waste flows for the vinyl 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.* ***(ECOLAY+/ECOCLICK+/ECOLOCK+ 4.5mm)***

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Resources									
RPR_E (MJ)	8.57	$9.19x10^{-2}$	11.2	0.350	0.574	4.49	22.3	$9.43x10^{-2}$	$6.34x10^{-2}$
	18%	0.19%	23%	0.73%	1.2%	9.4%	47%	0.2%	0.13%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.244	0.00	9.50	0.00	0.00
	0%	0%	0%	0%	2.5%	0%	98%	0%	0%
$NRPR_E$ (MJ)	171	4.00	15.9	32.1	11.5	82.0	387	21.7	2.26
	23%	0.55%	2.2%	4.4%	1.6%	11%	53%	3%	0.31%
$NRPR_M$ (MJ)	34.8	0.00	0.00	0.00	$3.56x10^{-3}$	0.00	52.3	0.00	0.00
	40%	0%	0%	0%	0.0041%	0%	60%	0%	0%
SM (kg)	$1.88x10^{-2}$	0.00	0.00	0.00	$7.50x10^{-4}$	0.00	$2.93x10^{-2}$	0.00	0.00
	38%	0%	0%	0%	1.5%	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)	0.755	$3.98x10^{-3}$	$8.28x10^{-2}$	$2.08x10^{-2}$	$3.52x10^{-2}$	0.775	1.36	$8.12x10^{-3}$	$3.79x10^{-3}$
	25%	0.13%	2.7%	0.68%	1.2%	25%	45%	0.27%	0.12%
Wastes									
HWD (kg)	$3.25x10^{-3}$	$2.44x10^{-5}$	$4.27x10^{-5}$	$2.00x10^{-4}$	$1.49x10^{-4}$	$9.78x10^{-4}$	$5.75x10^{-3}$	$1.52x10^{-4}$	$1.46x10^{-5}$
	31%	0.23%	0.4%	1.9%	1.4%	9.3%	54%	1.4%	0.14%
NHWD (kg)	0.625	$3.09x10^{-2}$	0.442	0.930	0.584	0.169	15.4	0.103	7.52
	2.4%	0.12%	1.7%	3.6%	2.3%	0.65%	60%	0.4%	29%
HLRW (kg)	$4.34x10^{-5}$	$3.65x10^{-7}$	$9.19x10^{-7}$	$1.58x10^{-6}$	$1.90x10^{-6}$	$1.10x10^{-5}$	$7.34x10^{-5}$	$4.91x10^{-7}$	$3.45x10^{-7}$
	33%	0.27%	0.69%	1.2%	1.4%	8.2%	55%	0.37%	0.26%
ILLRW (kg)	$1.13x10^{-4}$	$9.01x10^{-7}$	$2.15x10^{-6}$	$3.74x10^{-6}$	$4.89x10^{-6}$	$2.52x10^{-5}$	$1.89x10^{-4}$	$1.15x10^{-6}$	$8.69x10^{-7}$
	33%	0.26%	0.63%	1.1%	1.4%	7.4%	56%	0.34%	0.25%
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	$9.54x10^{-2}$	0.00	0.143	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 25. *Life Cycle Impact Assessment results for the vinyl 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.* ***(ECOLAY+/ECOCLICK+/ECOLOCK+ 5.0mm)***

Impact Category	A1	A2	A3	A4	A5	B2	B4	C2	C4
CML									
GWP (kg CO_2 eq)	12.0	0.339	1.63	2.62	1.00	4.63	34.4	1.81	3.50
	19%	0.55%	2.6%	4.2%	1.6%	7.5%	56%	2.9%	5.6%
AP (kg SO_2 eq)	$4.00x10^{-2}$	$4.15x10^{-3}$	$9.27x10^{-3}$	$3.16x10^{-2}$	$3.82x10^{-3}$	$1.71x10^{-2}$	0.145	$6.87x10^{-3}$	$9.01x10^{-4}$
	15%	1.6%	3.6%	12%	1.5%	6.6%	56%	2.7%	0.35%
EP (kg $(PO_4)^{3-}$ eq)	$1.70x10^{-2}$	$7.17x10^{-4}$	$6.07x10^{-3}$	$4.30x10^{-3}$	$6.11x10^{-3}$	$1.20x10^{-2}$	0.159	$1.58x10^{-3}$	$7.02x10^{-2}$
	6.1%	0.26%	2.2%	1.6%	2.2%	4.3%	57%	0.57%	25%
POCP (kg C_2H_4 eq)	$5.35x10^{-3}$	$1.23x10^{-4}$	$4.37x10^{-4}$	$9.60x10^{-4}$	$3.43x10^{-4}$	$9.71x10^{-4}$	$1.24x10^{-2}$	$3.07x10^{-4}$	$7.43x10^{-4}$
	25%	0.57%	2%	4.4%	1.6%	4.5%	57%	1.4%	3.4%
ODP (kg CFC-11 eq)	$7.38x10^{-6}$	$3.51x10^{-9}$	$3.07x10^{-8}$	$3.07x10^{-8}$	$2.99x10^{-7}$	$6.04x10^{-8}$	$1.16x10^{-5}$	$2.21x10^{-8}$	$2.13x10^{-9}$
	38%	0.018%	0.16%	0.16%	1.5%	0.31%	60%	0.11%	0.011%
ADPF (MJ eq)	227	4.10	16.0	34.4	12.6	79.7	479	23.3	2.35
	26%	0.47%	1.8%	3.9%	1.4%	9.1%	55%	2.7%	0.27%
ADPE (kg Sb eq)	$4.83x10^{-5}$	$2.38x10^{-7}$	$6.91x10^{-7}$	$2.55x10^{-6}$	$2.11x10^{-6}$	$1.07x10^{-5}$	$8.18x10^{-5}$	$5.58x10^{-7}$	$1.09x10^{-7}$
	33%	0.16%	0.47%	1.7%	1.4%	7.3%	56%	0.38%	0.074%
TRACI									
GWP (kg CO_2 eq)	11.9	0.337	1.58	2.60	0.947	4.58	32.9	1.80	2.84
	20%	0.57%	2.7%	4.4%	1.6%	7.7%	55%	3%	4.8%
AP (kg SO_2 eq)	$4.39x10^{-2}$	$4.74x10^{-3}$	$9.20x10^{-3}$	$3.42x10^{-2}$	$4.22x10^{-3}$	$1.82x10^{-2}$	0.160	$8.77x10^{-3}$	$1.48x10^{-3}$
	15%	1.7%	3.2%	12%	1.5%	6.4%	56%	3.1%	0.52%
EP (kg N eq)	$3.56x10^{-2}$	$5.12x10^{-4}$	$1.46x10^{-2}$	$2.91x10^{-3}$	$1.57x10^{-2}$	$2.62x10^{-2}$	0.396	$8.96x10^{-4}$	0.193
	5.2%	0.075%	2.1%	0.42%	2.3%	3.8%	58%	0.13%	28%
SFP (kg O_3 eq)	0.572	0.111	0.101	0.676	$7.35x10^{-2}$	0.215	2.72	0.265	$1.84x10^{-2}$
	12%	2.3%	2.1%	14%	1.5%	4.5%	57%	5.6%	0.39%
ODP (kg CFC-11 eq)	$9.23x10^{-6}$	$4.82x10^{-9}$	$4.73x10^{-8}$	$4.15x10^{-8}$	$3.75x10^{-7}$	$8.84x10^{-8}$	$1.46x10^{-5}$	$2.97x10^{-8}$	$2.99x10^{-9}$
	38%	0.02%	0.19%	0.17%	1.5%	0.36%	60%	0.12%	0.012%
FFD (MJ eq)	29.2	0.563	1.26	4.96	1.64	9.09	62.3	3.52	0.318
	26%	0.5%	1.1%	4.4%	1.5%	8.1%	55%	3.1%	0.28%

Table 26. *Resource use and waste flows for the vinyl 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.* ***(ECOLAY+/ECOCLICK+/ECOLOCK+ 5.0mm)***

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Resources									
RPR_E (MJ)	9.94	$9.33x10^{-2}$	12.9	0.379	0.654	4.49	25.4	0.102	$6.76x10^{-2}$
	18%	0.17%	24%	0.7%	1.2%	8.3%	47%	0.19%	0.13%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.289	0.00	11.3	0.00	0.00
	0%	0%	0%	0%	2.5%	0%	98%	0%	0%
$NRPR_E$ (MJ)	198	4.19	16.3	34.8	13.1	82.0	438	23.5	2.44
	24%	0.52%	2%	4.3%	1.6%	10%	54%	2.9%	0.3%
$NRPR_M$ (MJ)	40.3	0.00	0.00	0.00	$4.55x10^{-3}$	0.00	60.6	0.00	0.00
	40%	0%	0%	0%	0.0045%	0%	60%	0%	0%
SM (kg)	$2.03x10^{-2}$	0.00	0.00	0.00	$8.10x10^{-4}$	0.00	$3.16x10^{-2}$	0.00	0.00
	38%	0%	0%	0%	1.5%	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)	0.876	$4.06x10^{-3}$	$8.44x10^{-2}$	$2.26x10^{-2}$	$4.02x10^{-2}$	0.775	1.56	$8.77x10^{-3}$	$4.05x10^{-3}$
	26%	0.12%	2.5%	0.67%	1.2%	23%	46%	0.26%	0.12%
Wastes									
HWD (kg)	$3.78x10^{-3}$	$2.54x10^{-5}$	$4.50x10^{-5}$	$2.17x10^{-4}$	$1.72x10^{-4}$	$9.78x10^{-4}$	$6.63x10^{-3}$	$1.64x10^{-4}$	$1.57x10^{-5}$
	31%	0.21%	0.37%	1.8%	1.4%	8.1%	55%	1.4%	0.13%
NHWD (kg)	0.724	$3.12x10^{-2}$	0.478	1.01	0.664	0.169	16.7	0.111	8.12
	2.6%	0.11%	1.7%	3.6%	2.4%	0.6%	60%	0.4%	29%
HLRW (kg)	$5.03x10^{-5}$	$3.71x10^{-7}$	$1.00x10^{-6}$	$1.71x10^{-6}$	$2.19x10^{-6}$	$1.10x10^{-5}$	$8.47x10^{-5}$	$5.30x10^{-7}$	$3.67x10^{-7}$
	33%	0.24%	0.66%	1.1%	1.4%	7.2%	56%	0.35%	0.24%
ILLRW (kg)	$1.31x10^{-4}$	$9.16x10^{-7}$	$2.35x10^{-6}$	$4.05x10^{-6}$	$5.64x10^{-6}$	$2.52x10^{-5}$	$2.19x10^{-4}$	$1.25x10^{-6}$	$9.25x10^{-7}$
	34%	0.24%	0.6%	1%	1.4%	6.5%	56%	0.32%	0.24%
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	$9.82x10^{-2}$	0.00	0.147	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 27. *Life Cycle Impact Assessment results for the vinyl 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.* ***(SUPREMWOOD+/SUPREMSTONE+ 5mm)***

Impact Category	A1	A2	A3	A4	A5	B2	B4	C2	C4
CML									
GWP (kg CO_2 eq)	7.69	0.270	1.59	2.05	0.632	4.63	24.2	1.40	2.51
	17%	0.6%	3.5%	4.6%	1.4%	10%	54%	3.1%	5.6%
AP (kg SO_2 eq)	$2.67x10^{-2}$	$3.19x10^{-3}$	$9.31x10^{-3}$	$2.48x10^{-2}$	$2.94x10^{-3}$	$1.71x10^{-2}$	0.109	$5.31x10^{-3}$	$6.69x10^{-4}$
	13%	1.6%	4.7%	12%	1.5%	8.6%	55%	2.7%	0.34%
EP (kg $(PO_4)^{3-}$ eq)	$1.15x10^{-2}$	$5.65x10^{-4}$	$5.41x10^{-3}$	$3.37x10^{-3}$	$3.12x10^{-3}$	$1.20x10^{-2}$	0.121	$1.22x10^{-3}$	$5.58x10^{-2}$
	5.3%	0.26%	2.5%	1.6%	1.5%	5.6%	57%	0.57%	26%
POCP (kg C_2H_4 eq)	$2.15x10^{-3}$	$9.49x10^{-5}$	$4.28x10^{-4}$	$7.53x10^{-4}$	$1.69x10^{-4}$	$9.71x10^{-4}$	$6.54x10^{-3}$	$2.37x10^{-4}$	$5.31x10^{-4}$
	18%	0.8%	3.6%	6.3%	1.4%	8.2%	55%	2%	4.5%
ODP (kg CFC-11 eq)	$2.72x10^{-6}$	$2.78x10^{-9}$	$2.89x10^{-8}$	$2.41x10^{-8}$	$1.12x10^{-7}$	$6.04x10^{-8}$	$4.36x10^{-6}$	$1.71x10^{-8}$	$1.63x10^{-9}$
	37%	0.038%	0.39%	0.33%	1.5%	0.83%	60%	0.23%	0.022%
ADPF (MJ eq)	143	3.27	16.1	27.0	8.84	79.7	327	18.0	1.79
	23%	0.52%	2.6%	4.3%	1.4%	13%	52%	2.9%	0.29%
ADPE (kg Sb eq)	$4.34x10^{-5}$	$1.93x10^{-7}$	$7.08x10^{-7}$	$2.00x10^{-6}$	$1.88x10^{-6}$	$1.07x10^{-5}$	$7.30x10^{-5}$	$4.31x10^{-7}$	$8.31x10^{-8}$
	33%	0.15%	0.53%	1.5%	1.4%	8.1%	55%	0.33%	0.063%
TRACI									
GWP (kg CO_2 eq)	7.59	0.268	1.55	2.04	0.610	4.58	23.2	1.39	2.04
	18%	0.62%	3.6%	4.7%	1.4%	11%	54%	3.2%	4.7%
AP (kg SO_2 eq)	$2.91x10^{-2}$	$3.66x10^{-3}$	$9.24x10^{-3}$	$2.68x10^{-2}$	$3.24x10^{-3}$	$1.82x10^{-2}$	0.120	$6.78x10^{-3}$	$1.16x10^{-3}$
	13%	1.7%	4.2%	12%	1.5%	8.3%	55%	3.1%	0.53%
EP (kg N eq)	$2.36x10^{-2}$	$4.11x10^{-4}$	$1.27x10^{-2}$	$2.28x10^{-3}$	$7.75x10^{-3}$	$2.62x10^{-2}$	0.302	$6.93x10^{-4}$	0.154
	4.4%	0.078%	2.4%	0.43%	1.5%	4.9%	57%	0.13%	29%
SFP (kg O_3 eq)	0.374	$8.66x10^{-2}$	0.102	0.530	$5.82x10^{-2}$	0.215	2.05	0.205	$1.40x10^{-2}$
	10%	2.4%	2.8%	15%	1.6%	5.9%	56%	5.6%	0.39%
ODP (kg CFC-11 eq)	$2.99x10^{-6}$	$3.83x10^{-9}$	$4.49x10^{-8}$	$3.25x10^{-8}$	$1.24x10^{-7}$	$8.84x10^{-8}$	$4.83x10^{-6}$	$2.29x10^{-8}$	$2.28x10^{-9}$
	37%	0.047%	0.55%	0.4%	1.5%	1.1%	59%	0.28%	0.028%
FFD (MJ eq)	18.4	0.447	1.26	3.89	1.15	9.09	42.2	2.72	0.243
	23%	0.56%	1.6%	4.9%	1.5%	11%	53%	3.4%	0.31%

Table 28. *Resource use and waste flows for the vinyl 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.* ***(SUPREMWOOD+/SUPREMSTONE+ 5mm)***

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Resources									
RPR_E (MJ)	6.47	$7.62x10^{-2}$	13.0	0.297	0.508	4.49	19.8	$7.87x10^{-2}$	$4.97x10^{-2}$
	14%	0.17%	29%	0.67%	1.1%	10%	44%	0.18%	0.11%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.291	0.00	11.3	0.00	0.00
	0%	0%	0%	0%	2.5%	0%	98%	0%	0%
$NRPR_E$ (MJ)	112	3.34	16.4	27.3	9.17	82.0	283	18.1	1.85
	20%	0.6%	3%	4.9%	1.7%	15%	51%	3.3%	0.34%
$NRPR_M$ (MJ)	37.9	0.00	0.00	0.00	$4.13x10^{-3}$	0.00	57.0	0.00	0.00
	40%	0%	0%	0%	0.0044%	0%	60%	0%	0%
SM (kg)	$1.57x10^{-2}$	0.00	0.00	0.00	$6.26x10^{-4}$	0.00	$2.44x10^{-2}$	0.00	0.00
	38%	0%	0%	0%	1.5%	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)	0.605	$3.30x10^{-3}$	$8.56x10^{-2}$	$1.77x10^{-2}$	$2.90x10^{-2}$	0.775	1.13	$6.77x10^{-3}$	$3.00x10^{-3}$
	23%	0.12%	3.2%	0.67%	1.1%	29%	42%	0.26%	0.11%
Wastes									
HWD (kg)	$2.90x10^{-3}$	$2.03x10^{-5}$	$4.53x10^{-5}$	$1.70x10^{-4}$	$1.34x10^{-4}$	$9.78x10^{-4}$	$5.12x10^{-3}$	$1.27x10^{-4}$	$1.21x10^{-5}$
	31%	0.21%	0.48%	1.8%	1.4%	10%	54%	1.3%	0.13%
NHWD (kg)	0.535	$2.56x10^{-2}$	0.388	0.791	0.308	0.169	12.6	$8.61x10^{-2}$	6.28
	2.5%	0.12%	1.8%	3.7%	1.5%	0.8%	60%	0.41%	30%
HLRW (kg)	$3.20x10^{-5}$	$3.02x10^{-7}$	$1.05x10^{-6}$	$1.34x10^{-6}$	$1.42x10^{-6}$	$1.10x10^{-5}$	$5.51x10^{-5}$	$4.10x10^{-7}$	$2.69x10^{-7}$
	31%	0.29%	1%	1.3%	1.4%	11%	54%	0.4%	0.26%
ILLRW (kg)	$8.38x10^{-5}$	$7.47x10^{-7}$	$2.43x10^{-6}$	$3.18x10^{-6}$	$3.69x10^{-6}$	$2.52x10^{-5}$	$1.43x10^{-4}$	$9.63x10^{-7}$	$6.76x10^{-7}$
	32%	0.28%	0.92%	1.2%	1.4%	9.5%	54%	0.36%	0.26%
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	0.119	0.00	0.178	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

When considering the product's life cycle over the 75-year ESL, 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 few exceptions, the raw material extraction and processing (A1) phase is the largest contributor to overall impacts followed by the product use and maintenance phase (B2) and product distribution (A5) phases. Other life cycle phase contributions are minimal. Exceptions include the Eutrophication Potential indicator, dominated by the product disposal phase; and the Smog Formation and Acidification potential indicators which show large contributions from the product distribution phase.

Figure 3 presents the impact results for the flooring products from cradle-to-grave over the 30-year RSL of the products (i.e., one product life cycle). With the exception of the Eutrophication and Ozone Depletion Potential indicators, impacts over a single product life cycle are dominated by the raw material extraction and processing (A1) and the product distribution (A4) stages. The extraction and processing of the PVC and plasticizer (DOTP) material components used in the product are the main contributors to the raw material extraction stage impacts. Together these materials account for over 90% of the A1 phase impacts and ~35%-45% total life cycle impacts from cradle-to-grave.

Contributions to the Ozone Depletion potential indicator are dominated by the impacts associated with extraction and processing of plastic component materials (>90%) while the product disposal stage (C4) dominates the Eutrophication potential indicator results (~66% - 73%) due to landfilling of the product component materials.

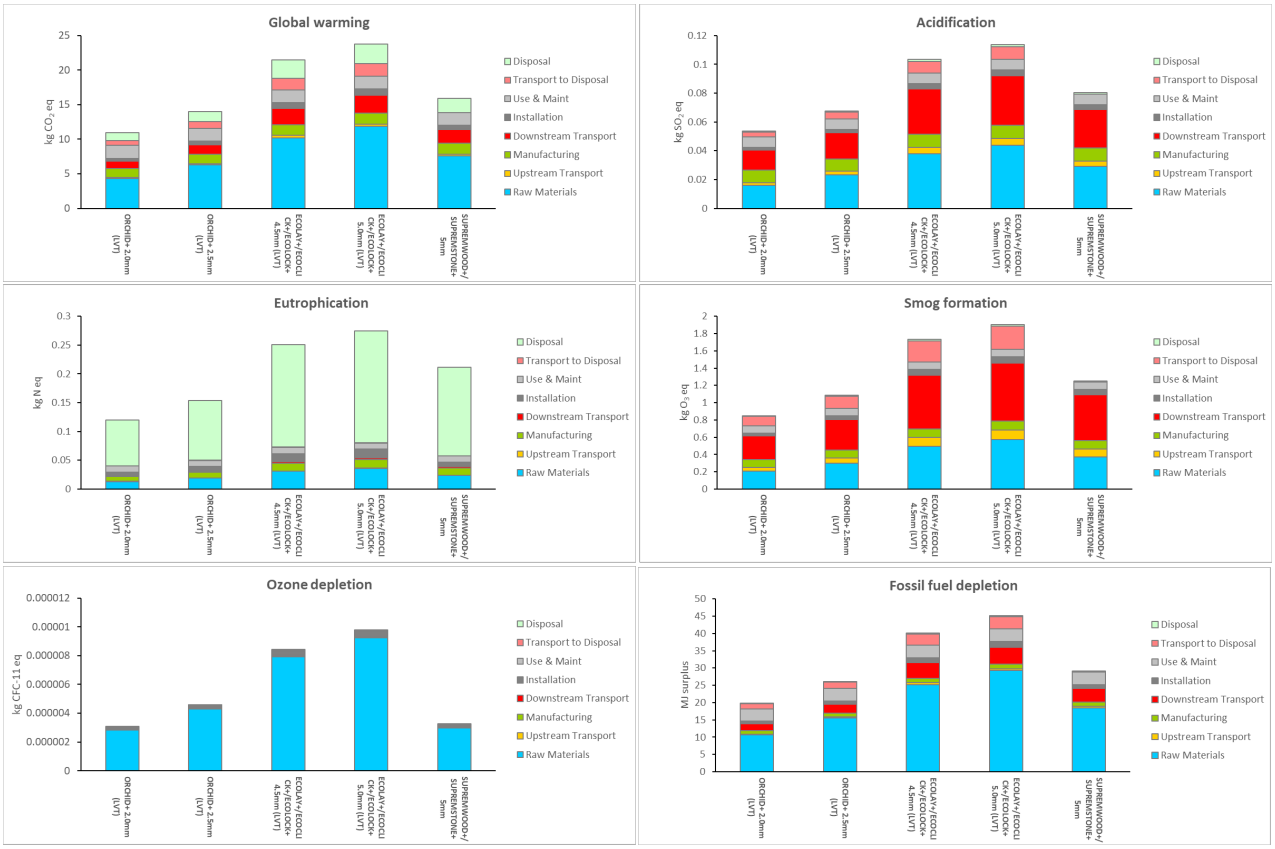


Figure 2. *Contribution results for the flooring products from cradle-to-grave over the 30-year RSL of the product (i.e., one complete product life cycle).*

7. Additional Environmental Information

7.1 ENVIRONMENT AND HEALTH DURING MANUFACTURING

The manufacturing facility is certified to ISO 9001 and ISO 14001 – Environmental management systems.

7.2 ENVIRONMENT AND HEALTH DURING INSTALLATION

The NOX LVT flooring products meet the requirements of the following:

- Indoor Air Comfort Gold (VOC certification)
- CDPH/EHLB Standard Method v1.2-2017 (California Section 01350)

7.3 ENVIRONMENTAL ACTIVITIES AND CERTIFICATIONS

For more information on NOX certifications and environmental initiatives please view the website at https://www.noxglobal.com/.

8. References

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