Preverco

Hardwood flooring and engineered wood flooring

Environmental Product Declaration

Preverco Inc is pleased to present this environmental product declaration (EPD) for **hardwood and engineered wood flooring products in Quebec, Canada.** This EPD was developed in compliance with CAN/CSA-ISO 14025 and ISO 21930 and has been verified under Jean-François Ménard, from the International Reference Centre for Life Cycle Assessment and Sustainable Transition (CIRAIG).

This EPD includes life cycle assessment (LCA) results for production, construction, use and end-of-life stages (cradle-to-grave). The LCA was performed by Groupe AGÉCO.

For more information about Preverco Inc., please go to https://preverco.com/en/.

CSA Environmental Product Declaration

CSA Group Registered Based on ISO 14025 and Other Requirements
For more information visit
csaregistries.ca/epd

8511-5112
February 2024-February 2029

This product-specific environmental product declaration (EPD) for hardwood flooring and engineered wood flooring products is in accordance with the PCRs noted below, CAN/CSA-ISO 14040, ISO 14044, ISO 14025 and ISO 21930 standards. EPDs within the same product category but from different programs may not be comparable. This EPD reports environmental impacts based on established life cycle impact assessment methods. The reported environmental impacts are estimates, and their level of accuracy may differ for a particular product line and reported impact. LCAs do not generally address site-specific environmental issues related to resource extraction or toxic effects of products on human health. Unreported environmental impacts include (but are not limited to) factors attributable to human health, land use change and habitat destruction. Forest certification systems and government regulations address some of these issues. In this EPD, wood flooring products conform to American Wood Protection Association (AWPA) standards; Canadian Standards Association (CSA) standards; Standards of Wood Preservation Canada (WPC). EPDs do not report product environmental performance against any benchmark.

PROGRAM OPERATOR	CSA Group 178 Rexdale Blvd Toronto, ON Canada M9W 1R3 www.csagroup.org
PRODUCT	Engineered wood flooring (Flex 16™, Flex 19™ and Max 19MC) and hardwood flooring (SolidClassicMC) products
EPD RECIPIENT ORGANIZATION	Preverco Inc. 285 rue de Rotterdam, Saint-Augustin-de-Desmaures, Québec, G3A 2E5. https://preverco.com/en/
EPD REGISTRATION NUMBER	8511-5112
DECLARATION PRODUCT & DECLARED UNIT	One square meter (1 m^2) of floor covering produced in Québec, Canada for 75 years
REFERENCE PCR AND VERSION NUMBER	Part A: Life-Cycle Assessment Calculation Rules and Report Requirements (version 4) UL Environment Valid from March 2022 to March 2027 Part B: Flooring Products EPD Requirements (version 2) UL Environment Valid from September 2018 to March 2024
MARKET OF APPLICABILITY	North America
DATE OF ISSUE (APPROVAL)	February 15, 2024
PERIOD OF VALIDITY	February 15, 2024 - February 13, 2029
EPD TYPE	Product-specific
EPD SCOPE	Cradle-to-grave (A1 to C4)

YEAR(S) OF REPORTED PRIMARY DATA	January 2022 – December 2022
LCA SOFTWARE & VERSION NUMBER	SimaPro 9.5
LCI DATABASE(S) & VERSION NUMBER	ecoinvent 3.8
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1

The PCR review was conducted by	Lindita Bushi, PhD, Chair Athena Sustainable Materials Institute 280 Albert St, Suite 404, Ottawa, ON, Canada, K1P 5G8 Tel: 613 729 9996 lindita.bushi@athenasmi.org
This EPD and related data were independently verified by an external verifier, Jean-François Ménard from CIRAIG, according to CAN/CSA-ISO 14025:2006	Jean-François Ménard Jean-François Ménard, CIRAIG jean-francois.menard@polymtl.ca
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Groupe AGÉCO 1995, rue Frank-Carrel, suite 219 Quebec (Quebec) G1N 4H9 www.groupeageco.ca

Limitations

Environmental declarations from different programs (ISO 14025) may not be comparable.

Comparison of the environmental performance using EPD information shall consider all relevant information modules over the full life cycle of the products within the building.

This PCR allows EPD comparability only when the same functional requirements between products are ensured and the requirements of ISO 21930:2017 are met. It should be noted that different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

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EPD Summary Sheet

Hardwood flooring and engineered wood flooring

This is a summary of the product-specific environmental product declaration (EPD) describing the environmental performance of hardwood and engineered wood flooring products produced in Quebec, Canada.

With the support of

Preverco | Quebec Wood Export Bureau | Forêts, Faune et Parcs Québec

EPD commissioner and owner
Preverco Inc.

Period of validity
February 15, 2024 – February 13, 2029

Program operator and registration number
CSA Group #8511-5112

Product Category Rule
UL Environment, PCR for Building-Related Products and Services. Part A (version 4) and Part B: Flooring products EPD Requirements (version 2)

LCA and EPD consultants
Groupe AGÉCO

Product description

Wood flooring products as manufactured by Preverco Inc in Québec, Canada and classified under NAICS 321918 and CSI 09 64 00. The products presented are the SolidClassic^{MC} (hardwood flooring), Flex 16^{TM}, Flex 19^{TM} and Max 19^{MC} (engineered flooring). Engineered wood flooring has a multilayer composition, while hardwood flooring is solid wood only.

Functional unit

Covering one square meter (1 m^2) of floor with floor covering in Canada for 75 years.

Material content (% of total product mass)

Wood: 98.3% – 99.4% (all flooring)
Varnish: 0.49 – 0.83% (all flooring)
Dye: 0.08% – 0.13% (all flooring)
Glue: 0.29% – 0.55% (SolidClassic excluded)
Nylon threads: 0.43% – 0.55% (SolidClassic excluded)

Scope and system boundary

Cradle-to-grave: stages A1 to C4.

What is a Life Cycle Assessment (LCA)?

LCA is a science-based and internationally recognized tool to evaluate the relative potential environmental and human health impacts of products and services throughout their life cycle, beginning with raw material extraction and including all aspects of transportation, production, use, and end-of-life treatment. The method is defined by the International Organization for Standardization (ISO) 14040 and 14044 standards.

Why an Environmental Product Declaration (EPD)?

This EPD and the underlying LCA aim to provide useful and clear results to inform on the environmental performance of the studied systems, and ultimately to disclose those results to external audiences. Moreover, by selecting products with an EPD, building projects can earn credits towards the Leadership in Energy and Environmental Design (LEED) rating system certification, among others. In the latest versions of the program (LEED v4 and v4.1), points are awarded in the Materials and Resources category.

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EPD Summary Sheet

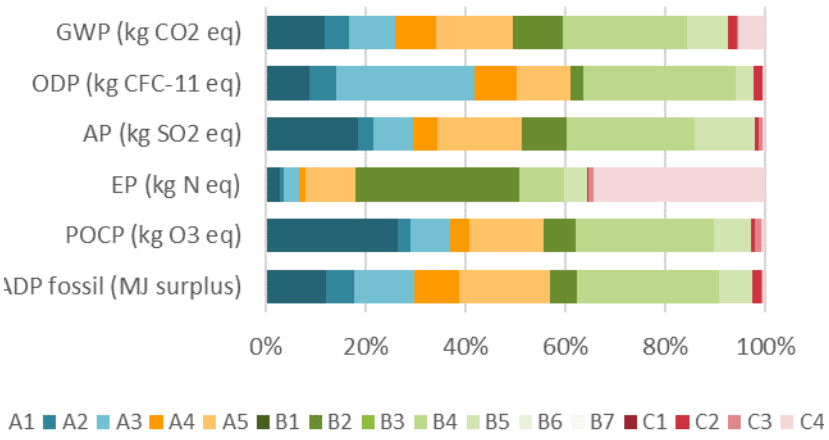
Hardwood flooring and engineered wood flooring

Environmental impacts

The environmental impacts of 1 m^2 of wood flooring products over the cradle-to-grave life cycle (A1 to C4 modules[1]) are summarized below for the main environmental indicators (based on life cycle impact assessment method TRACI 2.1). Refer to the LCA report or full EPD for more detailed results. Results on resource use, waste generated, and output flows are presented in the full EPD.

Environmental indicators	Legend	Engineered wood flooring			Hardwood flooring
		Flex 16™	Flex 19™	Max 19MC	SolidClassicMC
Global warming potential (kg CO_2 eq)	GWP	1.61E+01	1.85E+01	1.88E+01	1.67E+01
Ozone depletion potential (kg CFC-11 eq)	ODP	3.48E-06	3.94E-06	3.98E-06	3.33E-06
Acidification potential (kg SO_2 eq)	AP	6.85E-02	7.69E-02	7.64E-02	7.35E-01
Eutrophication potential (kg N eq.)	EP	1.10E-01	1.22E-01	1.25E-01	1.42E-01
Smog creation potential (kg O_3 eq.)	POCP	1.20E+00	1.37E+00	1.36E+00	1.47E+00
Abiotic Resource Depletion Potential of Non-renewable (fossil) Energy Sources (MJ surplus)	ADP_{fossil}	3.01E+01	3.43E+01	3.40E+01	2.85E+01

Relative contribution of each life cycle module to the overall environmental impacts for Flex 16™ engineered wood flooring



Data was collected from Preverco Inc. in March 2023 for manufacturing operations occurring between January 2022 and December 2022 to produce wood floor.

Results for environmental indicators show that replacement module (B4) is the main contributor for four environmental impact indicators with a relative contribution between 25% and 31%. The production stage (A1 to A3) has a relative contribution between 26% and 42% for five environmental impact indicators. Finally, we note that the relative contribution of EP and ADP_{fossil} indicators is more dispersed over the entire life cycle.

[1]*The modules cover the following processes: raw material supply (A1), transport of raw material supply to manufacturing plant (A2), wood flooring manufacturing (A3), transport to installation site (A4), installation (A5), use (B1), maintenance (B2), repair (B3), replacement (B4), refurbishment (B5), operational energy use (B6), operational water use (B7), deconstruction/demolition (C1), transport to waste processing or disposal (C2), waste processing (C3) and disposal of waste (C4).*

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For more information: https://preverco.com

1. DESCRIPTION OF PREVERCO

Preverco Inc. is a family-owned company created in 1988 at Saint-Augustin-de-Desmaures in Quebec that specializes in flooring manufacturing. Preverco Inc. offers flooring platforms produced from a large variety of wood species with a wide range of stain and finish choices. The company owns one wood mill at Daveluyville in Quebec and two manufacturing plants, also in Quebec: one at Saint-Augustin-de-Desmaures and one at Boisbriand.

The Quebec Wood Export Bureau (QWEB), a non-profit organization, and the Ministère des Forêts, de la Faune et des Parcs (MFFP) are currently offering a grant to manufacturers for the completion of EPDs for their products. In this context, Preverco Inc., a wood flooring manufacturer, has mandated Groupe AGÉCO – a firm specialized in life cycle assessment (LCA) and corporate responsibility – to develop one (1) product-specific (type III – third-party reviewed) environmental product declaration (EPD) on its hardwood flooring (SolidClassic^{MC}) and engineered wood flooring (Max 19^{MC}, Flex 19^{TM} and Flex 16^{TM}) products.

LCAs and EPDs are increasingly integrated in many buildings' certification schemes, including LEED® (v4.1) which now accounts for the environmental performance of a product throughout its entire life cycle. EPDs is a tool that has become the North American standard to position products based on environmental performance.

The LCA presented in this report was conducted in accordance with the product category rule (PCR) "Part A: Life-Cycle Assessment Calculation Rules and Report Requirements" (version 4) (UL Environment, 2022) and "Part B: Flooring Products EPD Requirements" (version 2) (UL Environment, 2018). It has been conducted according to the requirements of the International Organization for Standardization (ISO) 14040:2006, ISO 14044:2006 and ISO 21930:2017 standards. The PCR also covers wood flooring products manufactured in accordance with current American Wood Protection Association (AWPA) standards; Canadian Standards Association (CSA) standards; Standards of Wood Preservation Canada (WPC); or an ICC Evaluation Service, LLC (ICC-ES) Evaluation Report (ESR). This product-specific type III EPD will be published under the CSA Program, hence the requirements of the CSA's program instructions (CSA Group, 2013) have been followed.

2. DESCRIPTION OF PRODUCT

2.1. Definition and product classification

The EPD covers wood flooring, which is classified under NAICS 321918 and CSI code 09 64 00.

The wood flooring products are manufactured by Preverco Inc. in Quebec, Canada at two locations. Green or dry hardwood and softwood boards are provided by several suppliers in North America (mainly northeastern), including their own wood mill located in Quebec, Canada, that provides exclusively green boards. The wood flooring products are then used in residential and commercial projects. It is mostly used for building construction purposes.

The list of Preverco products under study is presented at table 1. Each flooring product is offered in two types of finish, matte or satin, and four types of color, dark, intermediate, light or natural.

Table 1: Product illustration

ENGINEERED WOOD FLOORING			HARDWOOD FLOORING
			
Flex 16MC	**Flex 19MC**	**Max 19MC**	**SolidClassicMC**

The table 2 gives a description of the products studied, as well as the arithmetic average mass on a wet basis at 7.8% moisture content, for 1 m^2 of wood flooring.

Table 2 : Product description

Product name	Type of flooring	Dimensions	Weight average (g/m^2)	Available species
Flex 16MC	Engineered wood	Thickness: 16 mm Width: 111 or 130 mm Length: from 35 cm to 2,13 m	7,482	White and red oak, maple, ash, birch, sapele
Flex 19MC	Engineered wood	Thickness: 19 mm Width: 111, 130, 156 or 181 mm Length: from 35 cm to 2,13 m	9,055	White and red oak, maple, ash, hickory birch, walnut, sapele
Max 19MC	Engineered wood	Thickness: 19 mm Width: 130 or 181 mm Length: random	9,565	White and red oak, maple, ash, hickory
SolidClassicMC	Hardwood	Thickness: 19 mm Width: 57, 108, 83, or 127 mm Length: from 25,4 cm to 2,13 m	12,679	White and red oak, maple, ash, hickory, birch

2.2. Material content

A description of the composition of hardwood flooring and engineered wood flooring products is presented in table 3. Table 4 presents the packaging weight for each m² of floor covering.

Table 3: Wood flooring composition on a wet mass basis (7.8% moisture content)

Materials	Flex 16™	Flex 19™	Max 19MC	SolidClassicMC
Wood	98.3%	98.6%	98.4%	99.4%
Varnish	0.77%	0.63%	0.60%	0.45%
Dye	0.13%	0.10%	0.10%	0.07%
Glue	0.33%	0.27%	0.51%	-
Nylon threads	0.51%	0.42%	0.40%	-

Table 4: Packaging for 1 m² of product

Product name	Packaging	Weight kg
Flex 16™	Plastic foam (PET)	0.007
Flex 19™		
Max 19MC		
SolidClassicMC		
Flex 16™	Cardboard	0.207
Flex 19™		
Max 19MC		
SolidClassicMC		

2.3. Wood flooring manufacturing at Preverco

There is two types of wood flooring in this study, hardwood flooring and engineered wood flooring. The former is made of dried hardwood, dye and varnish, while the ladder is made of dried hardwood, dried softwood, dye, varnish, glue and nylon threads. Figure 1 shows the cradle-to-grave processes for the products included in this EPD.

All products go through the same treatment process, which mainly involves kiln drying of green boards, sawing, cutting, gluing, assembling, and finishing with dyes and varnish. Engineered wood flooring is manufactured by stacking and gluing hardwood and softwood together with nylon threads to solidify the product. A finish (dye and varnish) is then applied on the product. Hardwood flooring is made entirely of hardwood, and a finish is applied (dye and varnish) on the product.

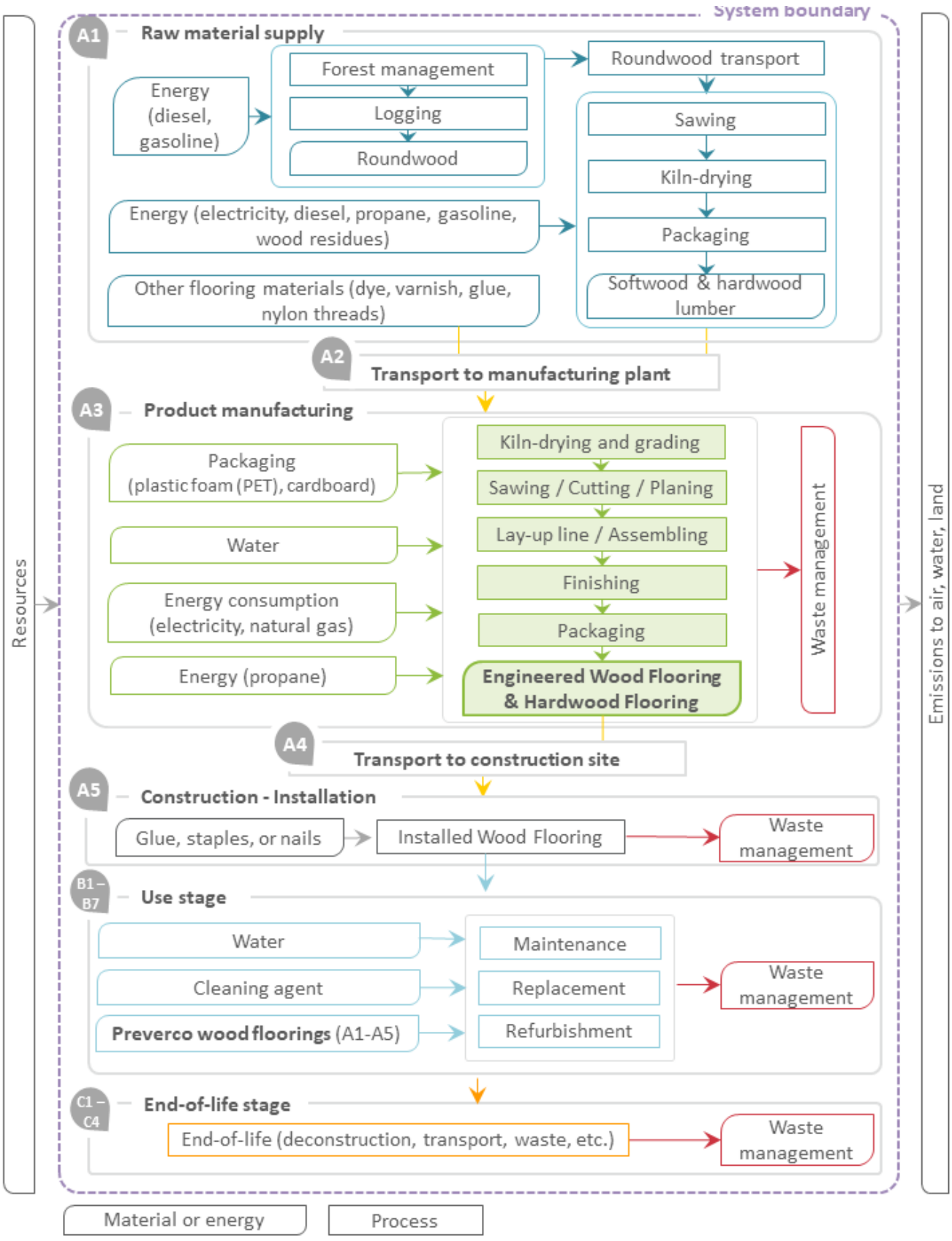

Figure 1: Process flow for all life cycle stages considered in the study

3. SCOPE OF EPD

3.1. Functional unit

The functional unit for flooring products is defined as "*covering one (1) m² of floor with floor covering in Canada during 75 years*".

3.2. System boundaries

The life cycle stages included in the **cradle-to-grave** system boundary are shown in table 6. This analysis includes stages related to the production, the construction, the use and the end-of-life stages. The reference service life is specified.

Table 6: Life cycle stages considered in the study

Production stage			Construc-tion stage		Use stage							End-of-life stage				
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport to manufacturing plant	Manufacturing of treated lumber products	Transport	Construction – installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	MND

Legend: **x** = *Considered in the cradle-to-grave LCA* / **MND** = *Module not declared*

More precisely, the EPD includes the following modules:

- **A1 – Raw material supply – resource extraction:** This module consists of producing and processing the raw materials needed to manufacture Preverco wood flooring (softwood boards, hardwood boards, glue, dye, varnish)
- **A2 – Transport of raw materials to manufacturing plants:** This module considers the transport of raw material supply to Preverco manufacturing plants (i.e. wood, varnish, dye, glue and nylon thread).
- **A3 – Manufacturing:** The operations carried out during this module (kiln-drying, sawing, planing, gluing, sanding and finishing) involve the consumption of water, electricity, natural gas, diesel and propane. The packaging materials needed, and the disposal of hazardous waste (i.e., varnish, dye and glue) and non-hazardous waste (i.e., packaging) are considered. Wood residues generated from Preverco activities are used on site for kiln-drying as hog fuel in one of two boilers, and the surplus are sold to external parties.
- **A4 – Transport to the construction site:** Preverco products are transported by truck in North America.

- **A5 – Installation:** Floor installation is done manually. Wood flooring waste and packaging waste are generated during this module. This module includes the loss during installation (5%).
- **B2 – Maintenance:** Maintenance includes weekly floor cleaning. The manufacturer's recommendations comply with current industry standards.
- **B4 – Replacement:** The product is replaced when its service life is ending before the end of the building's life cycle, i.e. the functional unit (75 years).
- **C1 – Deconstruction and demolition:** Floor deconstruction is considered to be done manually.
- **C2 – Transport to waste processing/disposal:** The demolished wood flooring is considered to be transported to the waste processing or disposal facilities by truck.
- **C3 – Waste processing:** A portion of the wood flooring is considered to go through the incineration process with an energy recovery.
- **C4 – Disposal of waste:** Most of the wood flooring is considered to be landfilled and a small portion is considered to be reused.

4. ENVIRONMENTAL IMPACTS

This cradle-to-grave life cycle assessment has been conducted according to ISO 14040 and 14044 standards and the Product Category Rules for Building-Related Products and Services, Parts A and B. Environmental impacts were calculated with the impact assessment method TRACI 2.1 and The Cumulative Energy Demand method (CED) (version 1.09) (Frischknecht et al., 2007) was used to calculate the indicators related to renewable and non-renewable energy and material consumption.

4.1. Assumptions

The main assumptions included in this LCA were related to the gate-to-grave modules (i.e., A4, A5, B2, B4, B5, C1, C2, C3 and C4).

- **Product transport from Preverco manufacturing plant to building site (including point of purchase):** the products are transported via a diesel-powered truck over 800 km.
- **Product transport from building site to waste processing:** the products are transported via a diesel-powered truck over 161 km.
- **Installation procedure**: the products are installed manually, without any operational energy use. Glue, staples or nails are used to install the products. A product loss of 5% is considered during the installation. As prescribed by the PCR part A, 20% of the cardboard packaging is considered to be % landfilled, while 100% of the PET foam is considered to be landfilled.
- **Product use:** no use considered.
- **Product maintenance**: the wood flooring are cleaned once a week with water and cleaning agent over the entire product life cycle.
- **Product repair**: no repair needed.
- **Product replacement**: the hardwood flooring (SolidClassic^{MC}) reference service life is 75 years, which requires no replacement over the life cycle of the building (75 years). The engineered wood flooring (Flex 16^{TM}, Flex 19^{TM} and Max 19^{MC}) reference service life is 50 years, which requires 0.5 replacement over the life cycle of the building (75 years).

- **Product refurbishment**: hardwood flooring and engineered wood flooring are refurbished 7 times over the building life cycle of the building (75 years). The same amount of varnish and dye is used during refurbishment, as well as electricity.
- **Deconstruction procedure:** the products are removed manually, without any operational energy use.
- **Product end-of-life**: 10% of the wood flooring is considered reused, 69% is considered landfilled and 21% is considered incinerated with an energy recovery.

4.2. Criteria for the exclusion of inputs and outputs

All product components and production processes were included in the study when the necessary information was readily available, or a reasonable estimate could be made. Input and output flows may have been excluded if they represented less than 1% of the cumulative mass or energy of a unit process and its environmental contribution to the total impacts is negligible (less than 2%). Based on Groupe AGÉCO's past experience or the relatively low contribution of the life cycle stages to which they pertain, the following processes were excluded from the study due to their expected low contribution and the lack of readily available data:

- Infrastructure at the production site (Preverco manufacturing plants)
- Transport infrastructure (roads)
- Machinery and transport vehicles within the plant
- Air emissions from the wood residues-biomass boilers

4.3. Data sources

Life cycle inventory (LCI) data collection mainly concerns the materials inputs, the packaging inputs, the energy consumed, the water consumed, and the waste generated at the manufacturing plants that are included in the system boundaries. Primary data have been collected directly from Preverco Inc.

To collect these data, a questionnaire was sent out in March 2023 to Preverco Inc. Follow-up phone calls and emails were exchanged with Preverco Inc. to clarify some answers. Primary data were collected for manufacturing operations occurring between January 2022 and February 2022 for the production of wood flooring. Table 7 lists the main data requested from Preverco Inc. This data is considered to be representative of Preverco activities.

Table 7: Primary data requested from Preverco Inc.

Module	Main processes	Data source	Region	Year
A1	- Product composition for material production	Preverco	Quebec	2022
A2	- Transport distance	Preverco	Quebec	2022
A3	- Energy (electricity, natural gas, diesel, propane) - Water consumption - Waste generation	Preverco	Quebec	2022

To model the impacts generated by electricity production, the specific energy mix for the province of Quebec was used for the wood flooring plant. Electricity consumed in processes not taking place at the manufacturing facilities (i.e. ancillary materials production) were not adapted to the appropriate

Canadian or provincial grid mix. Instead, the electricity grid mix already included in the LCI datasets was used to model each process.

The LCA model was developed with the SimaPro 9.5 software using ecoinvent 3.8 database, which was released in 2021 (less than 3 years). When possible, data from the Quebec context has been used. However, since most of the data within ecoinvent is of European origin and produced to represent European industrial conditions and processes, several data were adapted to enhance their representativeness of the products and contexts being examined.

4.4. Data quality

The overall data quality ratings show that the data used were either very good or good. This data quality assessment confirms the high reliability, representativeness (technological, geographical and time-related), completeness, and consistency of the information and data used for this study.

4.5. Allocation

A common methodological decision point in LCA occurs when the system being studied is directly connected to a past or future system (e.g. another cycle of manufacturing), or produces co-products. When systems are linked in this manner, the boundaries of the system of interest must be widened to include the adjoining system, or the impacts of the linking items must be distributed—or allocated—across the systems. ISO 14044 prioritizes the methodologies related to applying allocation.

Allocation within ecoinvent processes

Many of the processes in the ecoinvent database also provide multiple functions, and allocation is required to provide inventory data per function (or per process). This study uses the cut-off implementation of the database, which uses the cut-off approach for recycled content and waste recycling, as well as economic allocation as default for coproducts. This is considered coherent with the rest of the product systems (similar products have similar allocation approaches).

Allocation at the sawmills (A1)

In A1, boards are produced in sawmills to provide boards for floor manufacturing in A3. Sawmills have different coproducts, i.e. boards and wood residues.

For the Preverco sawmill, the economic allocation based on the mill revenues from its coproducts (incl. boards sent to Preverco's floor plants) was used: 94% for boards and 6% for wood residues. The value for boards was applied to the data provided by Preverco for the whole sawmill, i.e. tap water and energy inputs and emissions (electricity, diesel and propane). The missing inputs and outputs (sawlogs, lubricating oil, sawmill building and waste mineral oil) came from ecoinvent (raw sawnwood), which are economically allocated.

For other board suppliers to the flooring manufacturing plants, ecoinvent processes were used, with their default allocation (economic).

Allocation at the manufacturing plants (A3)

There are two coproducts from floor manufacturing: wood flooring (hardwood and engineered) and wood residues. An economic allocation has been used since the sales from the wood residues represent 2% of the total sales. According to the PCR part A, allocation based on physical properties like mass is

allowed when the difference in revenue from the co-products is low, which is not the case here. The economic allocation was applied to Preverco's data on energy consumption and waste production at manufacturing plants.

Material inputs were based on products compositions (no allocation). Distinct densities of hardwood and softwood were taken into account.

5. Life cycle impact assessment - results

Table 8, 9, 10 and 11 show the results for 1 m^2 of wood coverings over the entire life cycle (A1-C4).

Table 8: Potential impacts detailed of 1 m² of Flex 16™ engineered wood flooring

Para-meter	Units	Production stage	Construction stage		Use stage							End-of-life stage			
		Produc-tion	Trans-port	Installation	Use	Maintenan-ce	Repair	Replace-ment	Refurbish-ment	Opera-tional energy use	Opera-tional water use	De-constructi on / demolition	Trans-port	Waste process-sing	Dispo-sal
		A1 – A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators															
GWP	kg CO_2 eq	4.20E+00	1.30E+00	2.47E+00	0.00E+00	1.65E+00	0.00E+00	3.99E+00	1.36E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-01	7.12E-02	8.41E-01
ODP	kg CFC-11 eq	1.46E-06	2.90E-07	3.77E-07	0.00E+00	8.78E-08	0.00E+00	1.06E-06	1.28E-07	0.00E+00	0.00E+00	0.00E+00	5.84E-08	2.10E-09	1.65E-08
AP	kg SO_2 eq	2.02E-02	3.29E-03	1.17E-02	0.00E+00	6.12E-03	0.00E+00	1.76E-02	8.20E-03	0.00E+00	0.00E+00	0.00E+00	6.62E-04	4.57E-04	3.35E-04
EP	kg N eq	7.41E-03	1.34E-03	1.10E-02	0.00E+00	3.63E-02	0.00E+00	9.88E-03	5.24E-03	0.00E+00	0.00E+00	0.00E+00	2.69E-04	1.15E-03	3.78E-02
POCP	kg O_3 eq	4.44E-01	4.69E-02	1.79E-01	0.00E+00	7.81E-02	0.00E+00	3.35E-01	8.86E-02	0.00E+00	0.00E+00	0.00E+00	9.45E-03	1.46E-02	8.79E-03
ADP_{fossil}	MJ surplus	8.84E+00	2.67E+00	5.48E+00	0.00E+00	1.66E+00	0.00E+00	8.54E+00	2.05E+00	0.00E+00	0.00E+00	0.00E+00	5.37E-01	1.89E-02	1.61E-01
Use of resources indicators															
RPR_E	MJ	2.35E+02	2.57E-01	2.04E+01	0.00E+00	2.29E+01	0.00E+00	1.93E+02	1.54E+01	0.00E+00	0.00E+00	0.00E+00	5.16E-02	7.32E-03	5.24E-02
RPR_M	MJ	1.30E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	MJ	6.32E+01	1.91E+01	4.60E+01	0.00E+00	1.56E+01	0.00E+00	6.29E+01	2.07E+01	0.00E+00	0.00E+00	0.00E+00	3.85E+00	1.57E-01	1.14E+00
$NRPR_M$	MJ	2.59E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.59E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.20E-01	2.38E-03	5.80E-02	0.00E-00	4.23E-01	0.00E+00	1.40E-01	9.35E-02	0.00E+00	0.00E+00	0.00E+00	4.79E-04	7.76E-04	1.45E-03
Waste production and output flows															
HWD	kg	2.22E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	6.35E-02	0.00E+00	7.79E-01	0.00E+00	0.00E+00	0.00E+00	8.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E+00	5.16E+00
HLRW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+01	0.00E+00

Table 9: Potential impacts detailed of 1 m² of Flex 19™ engineered wood flooring

Para-meter	Units	Production stage	Construction stage		Use stage							End-of-life stage			
		Produc-tion	Trans-port	Installation	Use	Maintenan-ce	Repair	Replace-ment	Refurbish-ment	Opera-tional energy use	Opera-tional water use	De-constructi on / demolition	Trans-port	Waste process-sing	Dispo-sal
		A1 – A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators															
GWP	kg CO_2 eq	5.16E+00	1.59E+00	2.51E+00	0.00E+00	1.65E+00	0.00E+00	4.63E+00	1.50E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-01	8.65E-02	1.02E+00
ODP	kg CFC-11 eq	1.68E-06	3.53E-07	3.86E-07	0.00E+00	8.78E-08	0.00E+00	1.21E-06	1.42E-07	0.00E+00	0.00E+00	0.00E+00	7.10E-08	2.55E-09	2.01E-08
AP	kg SO_2 eq	2.42E-02	4.00E-03	1.18E-02	0.00E+00	6.12E-03	0.00E+00	2.00E-02	9.17E-03	0.00E+00	0.00E+00	0.00E+00	8.05E-04	5.56E-04	4.08E-04
EP	kg N eq	8.65E-03	1.63E-03	1.10E-02	0.00E+00	3.63E-02	0.00E+00	1.07E-02	5.87E-03	0.00E+00	0.00E+00	0.00E+00	3.27E-04	1.40E-03	4.60E-02
POCP	kg O_3 eq	5.34E-01	5.71E-02	1.80E-01	0.00E+00	7.81E-02	0.00E+00	3.86E-01	9.76E-02	0.00E+00	0.00E+00	0.00E+00	1.15E-02	1.77E-02	1.07E-02
ADP_{fossil}	MJ surplus	1.09E+01	3.24E+00	5.56E+00	0.00E+00	1.66E+00	0.00E+00	9.84E+00	2.20E+00	0.00E+00	0.00E+00	0.00E+00	6.53E-01	2.29E-02	1.96E-01
Use of resources indicators															
RPR_E	MJ	2.92E+02	3.12E-01	2.07E+01	0.00E+00	2.29E+01	0.00E+00	2.36E+02	1.55E+01	0.00E+00	0.00E+00	0.00E+00	6.28E-02	8.90E-03	6.37E-02
RPR_M	MJ	1.58E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	MJ	7.65E+01	2.33E+01	4.66E+01	0.00E+00	1.56E+01	0.00E+00	7.16E+01	2.24E+01	0.00E+00	0.00E+00	0.00E+00	4.68E+00	1.91E-01	1.38E+00
$NRPR_M$	MJ	3.15E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.15E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.01E+00	2.90E-03	6.00E-02	0.00E+00	4.23E-01	0.00E+00	1.63E-01	9.62E-02	0.00E+00	0.00E+00	0.00E+00	5.83E-04	9.43E-04	1.76E-03
Waste production and output flows															
HWD	kg	2.22E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	7.72E-02	0.00E+00	8.68E-01	0.00E+00	0.00E+00	0.00E+00	9.45E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E+00	6.26E+00
HLRW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E+01	0.00E+00

Table 10: Potential impacts detailed of 1 m² of Max 19MC engineered wood flooring

Para-meter	Units	Production stage	Construction stage		Use stage							End-of-life stage			
		Produc-tion	Trans-port	Installation	Use	Maintenan-ce	Repair	Replace-ment	Refurbish-ment	Opera-tional energy use	Opera-tional water use	De-constructi on / demolition	Trans-port	Waste process-sing	Dispo-sal
		A1 – A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators															
GWP	kg CO_2 eq	5.46E+00	1.67E+00	2.27E+00	0.00E+00	1.65E+00	0.00E+00	4.70E+00	1.50E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-01	9.12E-02	1.08E+00
ODP	kg CFC-11 eq	1.73E-06	3.72E-07	3.35E-07	0.00E+00	8.78E-08	0.00E+00	1.22E-06	1.42E-07	0.00E+00	0.00E+00	0.00E+00	7.48E-08	2.69E-09	2.12E-08
AP	kg SO_2 eq	2.49E-02	4.22E-03	1.04E-02	0.00E+00	6.12E-03	0.00E+00	1.98E-02	9.17E-03	0.00E+00	0.00E+00	0.00E+00	8.49E-04	5.86E-04	4.29E-04
EP	kg N eq	9.53E-03	1.71E-03	1.05E-02	0.00E+00	3.63E-02	0.00E+00	1.09E-02	5.87E-03	0.00E+00	0.00E+00	0.00E+00	3.45E-04	1.48E-03	4.85E-02
POCP	kg O_3 eq	5.37E-01	6.01E-02	1.62E-01	0.00E+00	7.81E-02	0.00E+00	3.79E-01	9.76E-02	0.00E+00	0.00E+00	0.00E+00	1.21E-02	1.87E-02	1.13E-02
ADP_{fossil}	MJ surplus	1.15E+01	3.42E+00	4.54E+00	0.00E+00	1.66E+00	0.00E+00	9.73E+00	2.20E+00	0.00E+00	0.00E+00	0.00E+00	6.88E-01	2.42E-02	2.06E-01
Use of resources indicators															
RPR_E	MJ	2.58E+02	3.29E-01	2.55E+01	0.00E+00	2.29E+01	0.00E+00	2.49E+02	1.55E+01	0.00E+00	0.00E+00	0.00E+00	6.61E-02	9.37E-03	6.71E-02
RPR_M	MJ	1.66E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	MJ	2.69E+01	2.45E+01	3.96E+01	0.00E+00	1.56E+01	0.00E+00	6.94E+01	2.24E+01	0.00E+00	0.00E+00	0.00E+00	4.93E+00	2.02E-01	1.45E+00
$NRPR_M$	MJ	4.96E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.96E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.23E-02	3.05E-03	5.20E-02	0.00E+00	4.23E-01	0.00E+00	1.69E-01	9.62E-02	0.00E+00	0.00E+00	0.00E+00	6.14E-04	9.94E-04	1.85E-03
Waste production and output flows															
HWD	kg	3.16E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	8.20E-02	0.00E+00	8.89E-01	0.00E+00	0.00E+00	0.00E+00	9.71E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00	6.61E+00
HLRW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E+01	0.00E+00

Table 11: Potential impacts detailed of 1 m² of SolidClassic^{MC} hardwood flooring

Parameter	Units	Production stage	Construction stage		Use stage							End-of-life stage			
		Production	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction / demolition	Transport	Waste processing	Disposal
		A1 – A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators															
GWP	kg CO_2 eq	7.23E+00	2.24E+00	2.11E+00	0.00E+00	1.65E+00	0.00E+00	0.00E+00	1.50E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	1.22E-01	1.44E+00
ODP	kg CFC-11 eq	2.13E-06	4.98E-07	3.40E-07	0.00E+00	8.78E-08	0.00E+00	0.00E+00	1.42E-07	0.00E+00	0.00E+00	0.00E+00	1.00E-07	3.60E-09	2.84E-08
AP	kg SO_2 eq	3.99E-02	5.65E-03	1.02E-02	0.00E+00	6.12E-03	0.00E+00	0.00E+00	9.17E-03	0.00E+00	0.00E+00	0.00E+00	1.14E-03	7.85E-04	5.76E-04
EP	kg N eq	1.98E-02	2.30E-03	9.94E-03	0.00E+00	3.63E-02	0.00E+00	0.00E+00	5.87E-03	0.00E+00	0.00E+00	0.00E+00	4.62E-04	1.98E-03	6.50E-02
POCP	kg O_3 eq	9.91E-01	8.06E-02	1.70E-01	0.00E+00	7.81E-02	0.00E+00	0.00E+00	9.76E-02	0.00E+00	0.00E+00	0.00E+00	1.62E-02	2.50E-02	1.51E-02
ADP_{fossil}	MJ surplus	1.43E+01	4.58E+00	4.54E+00	0.00E+00	1.66E+00	0.00E+00	0.00E+00	2.20E+00	0.00E+00	0.00E+00	0.00E+00	9.22E-01	3.24E-02	2.77E-01
Use of resources indicators															
RPR_E	MJ	2.03E+03	4.41E-01	1.14E+02	0.00E+00	2.29E+01	0.00E+00	0.00E+00	1.55E+01	0.00E+00	0.00E+00	0.00E+00	8.87E-02	1.26E-02	9.00E-02
RPR_M	MJ	2.22E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	MJ	1.06E+02	3.29E+01	3.80E+01	0.00E+00	1.56E+01	0.00E+00	0.00E+00	2.24E+01	0.00E+00	0.00E+00	0.00E+00	6.61E+00	2.70E-01	1.95E+00
$NRPR_M$	MJ	1.30E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.46E-01	4.09E-03	5.79E-02	0.00E+00	4.23E-01	0.00E+00	0.00E+00	9.62E-02	0.00E+00	0.00E+00	0.00E+00	8.23E-04	1.33E-03	2.48E-03
Waste production and output flows															
HWD	kg	1.28E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	1.07E-01	0.00E+00	1.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	8.75E+00
HLRW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E+01	0.00E+00

5.1. Life cycle impact assessment – interpretation for Flex 16™

Environmental impact indicators

The replacement module (B4) is the main contributor for global warming potential (GWP), ozone depletion potential (ODP), acidification potential (AP) smog creation potential (POCP) and fossil fuel depletion (ADP fossil), with a contribution between 25% and 31% to the total potential impact. This is expected because it represents the production stage (A1 to A3) and the construction stage (A4 and A5) times 0.5, since the Flex 16™ flooring needs approximately 0.5 replacement in the lifespan of the building (i.e. 50-year flooring lifespan in a building for 75 years).

The production stage (A1 to A3) has a contribution between 26% and 42% for five indicators (i.e., global warming potential (GWP), ozone depletion potential (ODP), acidification potential (AP), smog creation potential (POCP) and fossil fuel depletion (ADP)), which is the second biggest contributor to the total potential impact. As for the eutrophication potential (EP) indicator, the production stage represents only 4%. The eutrophication potential (EP) indicator shows that end-of-life waste disposal (C4) is the biggest contributor, closely followed by the maintenance stage (B2), with contributions of 34% and 33% respectively.

The end-of-life stage (C1 to C4) represents a contribution under 5% for all indicators, excepts for the eutrophication potential (EP) as mentioned above.

The installation module (A5) has a contribution between 10% and 18% for all environmental indicators. This is due to the inputs required for installation and the flooring waste generated on site (i.e., 5% loss during installation).

Finally, the refurbishment module (B5) and the transport to the installation site module (A4) has a contribution between 4% and 12%, and between 1% and 9%, respectively.

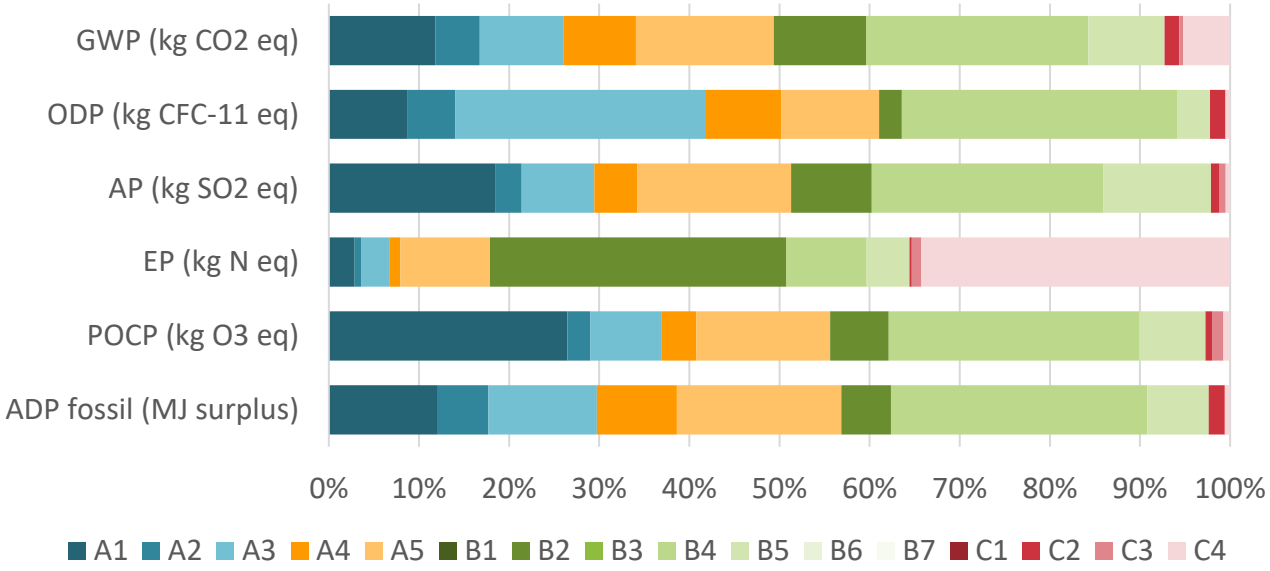

Figure 2: Relative contributions of the main processes in the production of treated lumber products

Use of resources indicators (total primary energy consumption and material resources consumption)

The detailed results for Flex 16™ are presented at Table 9. Four use of resource indicators (i.e. SM, RSF, NRSF and RE) have a result of zero. The replacement module (B4) dominates three resource use categories, i.e., 50% for $NRPR_M$, 27% for $NRPR_E$, and 40% for RPR_E. The raw material supply module (A1) contributes between 11% and 50% of the impact of FW, $NRPR_M$ $NRPR_E$ and RPR_E, while it contributes at 100% for RPR_M. The use of net freshwater resources (FW) shows that the maintenance module (B2) is the biggest contributor, followed by the manufacturing module (A3), with contributions of 45% and 21% respectively.

The installation module (A5) also contributes between 4% and 20% for RPR_E, $NRPR_E$ and FW. The transport to manufacturing plants module (A2) and the transport to installation site (A4) have a lower contribution to the $NRPR_E$ indicator, i.e., 5% and 8% respectively.

Waste generation indicators

The detailed results for Flex 16™ are presented at Table 9. All hazardous waste is generated at the manufacturing plants module (A3). Hazardous waste includes all glue, dye and varnish residues generated at the plants. Non-hazardous waste is generated at the manufacturing plants (A3), the installation (A5) and at the deconstruction/demolition (C1) modules. The non-hazardous waste is mainly cardboard and plastic packaging, a mix of dye, varnish and glue, and flooring.

6. ADDITIONAL ENVIRONMENTAL INFORMATION

Biogenic carbon removal

As required by the PCR part A section 4.6, the biogenic carbon emissions and removals over the product life cycle are estimated. Table 5.1 presents the detailed calculations and results for Preverco wood flooring. Following ISO 21930, GWP values of -1 kg CO_2e/kg CO_2 and +1 kg CO_2e/kg CO_2 were used for removals and emissions, respectively.

The Appendix A "Guidance on Landfill Modeling for Biogenic Carbon" of the PCR Part B: Wood Products (v1.1) by UL Environment was used to calculate Biogenic Carbon Emissions from Product (BCRP).

Table 1: Biogenic carbon (carbon dioxide) emissions and removals for 1 m² of wood flooring

Parameters	Module	Units	Flex 16™	Flex 19™	Max 19MC	SolidClassicMC
General parameters						
Carbon content of wood		%			**50**	
Carbon content of flooring product		%			**49**	
Carbon content of cardboard		%			**45**	
Biogenic carbon parameters						
Biogenic Carbon Removal from Product (BCRP)	A1	kg CO_2	-16.1	-19.8	-21.1	-27.4
Biogenic Carbon Emission from Product (BCEP)	C3-C4	kg CO_2	3.41	4.15	4.37	5.86
Biogenic Carbon Removal from Packaging (BCRK)	A1	kg CO_2	-0.307	-0.307	-0.307	-0.307
Biogenic Carbon Emission from Packaging (BCEK)	A5	kg CO_2	0.0582	0.0582	0.0582	0.0582
Biogenic Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production (BCEW)	A3	kg CO_2	3.61	4.61	5.08	6.00

The biogenic carbon is not included in the calculation for the GWP environmental indicator. When included, the total impact for the GWP over the whole life cycle of the engineered wood flooring Flex 16™, Flex 19™ and Max 19MC and hardwood flooring SolidClassicMC represents 6.95E+00 kg CO_2 eq., 7.33E+00 kg CO_2 eq., 7.05E+00 kg CO_2 eq. and 1.14E+00 kg CO_2 eq., respectively. This represents a significant reduction since the CO_2 removal from the product is considered.

It is important to include all life cycle module (A1-C4) to have the whole picture of the impact of the product. If only the production stage (A1-A3) is considered, the results of A1-A3 for the engineered wood flooring Flex 16™, Flex 19™ and Max 19MC and hardwood flooring SolidClassicMC represent -5.00E+00 kg CO2 eq., -5.96E+00 kg CO2 eq., -6.25E+00 kg CO2 eq. and -1.14E+01 kg CO2 eq., respectively, when the biogenic carbon is included.

GLOSSARY

Acronyms

CA-QC	Canada-Quebec (for ecoinvent datasets which are representative of activities valid for Quebec, Canada)
CFC-11	Trichlorofluoromethane
CO_2	Carbon dioxide
CSA	Canadian Standards Association
CSI	Code de la sécurité intérieure
EPD	Environmental Product Declaration
eq.	Equivalent
GLO	Global (for ecoinvent datasets which represent activities that are considered an average valid for all countries in the world)
GWP	Global warming potential
ISO	International Organization for Standardization
kg	kilogram
kg CO_2 eq.	kilogram of carbon dioxide equivalent
km	kilometer
kWh	kilowatt hour
LCA	Life cycle assessment
LCI	Life cycle inventory
LCIA	Life cycle impact assessment
LEED	Leadership in Energy and Environmental Design
m^2	Square meter
MFFP	Ministère des Forêts, de la Faune et des Parcs
NAICS	North American Industry Classification System
PCR	Product Category Rules
PET	Polyethylene Terephthalate
QWEB	Quebec Wood Export Bureau
SO_2	Sulfur dioxide
U	Unit process dataset (for ecoinvent datasets containing the linked, allocated input and output flows)
US EPA	United States Environmental Protection Agency

Environmental impact categories and parameters assessed

The **global warming potential (GWP)** refers to the impact of a temperature increase on the global climate patterns (e.g. severe flooding and drought events, accelerated melting of glaciers) due to the release of greenhouse gases (GHG) (e.g. carbon dioxide and methane from fossil fuel combustion). GHG emissions contribute to the increase in the absorption of radiation from the sun at the earth's surface. These emissions are expressed in units of kg of carbon dioxide equivalents **(kg CO_2 equivalent)**.

The **ozone depletion potential (ODP)** indicator measures the potential of stratospheric ozone level reduction due to the release of some molecules such as refrigerants used in cooling systems (e.g. chlorofluorocarbons). When they react with ozone (O_3), the ozone concentration in the stratosphere diminishes and is no longer sufficient to absorb ultraviolet (UV) radiation which can cause high risks to human health (e.g. skin cancers and cataracts) and the terrestrial environment. The concentration of molecules that are responsible of ozone depletion is expressed in kilograms of trichlorofluoromethane equivalents **(kg CFC-11 equivalent).**

The **acidification potential (AP)** refers to the change in acidity (i.e. reduction in pH) in soil and water due to human activity. The increase in CO_2 emissions and other air pollutants (e.g. NO_x and SO_2) generated by the transportation and manufacturing sectors are the main causes of this impact category. The acidification of land and water has multiple consequences: degradation of aquatic and terrestrial ecosystems, endangering numerous species and food security. The concentration of the gases responsible for the acidification is expressed in sulfur dioxide equivalents **(kg SO_2 equivalent).**

The **eutrophication potential (EP)** measures the enrichment of an aquatic or terrestrial ecosystem due to the release of nutrients (e.g. nitrates, phosphates) resulting from natural or human activity (e.g. the discharge of wastewater into watercourses). In an aquatic environment, this activity results in the growth of algae which consume dissolved oxygen present in water when they degrade and thus affect species sensitive to the concentration of dissolved oxygen. Also, the increase in nutrients in soils makes it difficult for the terrestrial environment to manage the excess of biomass produced. The concentration of nutrients causing this impact is expressed in nitrogen equivalents **(kg N equivalent)**.

The **smog creation potential (POCP)** indicator covers the emissions of pollutants such as nitrogen oxides and volatile organic compounds (VOCs) into the atmosphere. They are mainly generated by motor vehicles, power plants and industrial facilities. When reacting with the sunlight, these pollutants create smog which can affect human health and cause various respiratory problems. The concentration of pollutants causing smog are expressed in kg of ozone equivalents **(kg O_3 equivalent)**.

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