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Richlite® Paper Composite Surfaces

Environmental Product Declaration

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General information
Summary

Founded in 1943 and based in Tacoma, Washington, Richlite Company manufactures composite surfaces materials made from resin-infused paper. Richlite is known for being highly durable, versatile, and sustainable. Originally developed for machine tooling in the aerospace industry, the material was later adopted by the commercial food sector for its sanitary and robust properties. Its water-resistant nature made it appealing to the marine industry, while its strength and durability attracted the action sports industry for skatepark construction. Since the early 2000s, Richlite has been widely used in architectural and design applications for both interior and exterior purposes. Today, it remains in use across various consumer products as well as industrial applications.

This updated LCA assesses the environmental impacts of 1 square meter of Richlite Composite Surfaces covering the entire product life cycle from cradle to grave. The assessment includes three stages: Production and Installation, Use, and End-of-Life (EoL). The Production and Installation stage encompasses raw material extraction, transportation to the manufacturing facility, and product fabrication. The EoL stage includes deconstruction, transportation to waste processing facilities, and final disposal. The Use phase was excluded from this study due to insufficient data and its expected minimal environmental impact.

Environmental Product Declaration

This comparative screen LCA reports the impacts for 1 square meter of Richlite composite surfaces, for use in business-to-business (B2B) applications in accordance with ISO 14040:2006 and ISO 14044:2006 standards.

Product Names	Richlite Composite Surfaces
Manufacturer Name and Address (Head Office)	Richlite, Tacoma Plant, WA, 624 E 15th St, Tacoma, WA 98421
Plant Address	624 E 15th St, Tacoma, WA 98421

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Reference PCR and Version Number	ISO 14040:2006 ISO 14044:2006 ISO 21930:2017
Defined functional or declared unit	1 square meter
Product's intended Application and Use	business-to-business (B-to-B) audiences
Product RSL (Reference Service Life)	10 years
Markets of Applicability	North America
Date of Issue	April 15, 2025 (valid for 5 years)
Year(s) of Reported Manufacturer Primary Data	2024
LCA Software and Version Number	SimaPro 9.6
LCI Database(s)	Ecoinvent, USLCI, US-EI
LCIA Methodology and Version Number	TRACI 2.1 v1.04 CML methodologies
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Clean Agency CLEAN

Product

Richlite is a paper-based fiber composite surfacing material made from sheets of paper that are saturated with resin, then pressed and baked into durable, solid panels. These materials are manufactured using either Forest Stewardship Council (FSC)-Certified paper or post-consumer recycled paper, depending on the product line. FSC Mix Credit and FSC Recycled Credit classifications reflect the responsible sourcing and sustainability of the paper inputs.

Richlite products are engineered for strength, durability, and environmental performance, making them ideal for a wide range of applications including countertops, wall cladding, and decorative panels. Richlite surfaces are made with recycled paper from Forest Stewardship Council (FSC) certified companies each offering unique characteristics while meeting high standards of quality and environmental responsibility. In addition to architectural uses, the same technology is applied in specialty lines such as Skatelite, designed for extreme durability in outdoor and high-impact environments like skateparks.

Table 1. Product descriptions

Product Name	FSC Certification	Product Collection	Typical Use Cases	Panel Size (ft)	Thickness (in)	Weight (lb/ft²)	Notes
Richlite FSC Recycled Credit	FSC Recycled Credit	Northwest / Cascade	composite architectural surfaces	5×12	0.25	1.56	Made from 100% recycled paper content.
Richlite FSC Mix Credit	FSC Mix Credit	Heritage	composite architectural surfaces	5×12	0.25	1.56	Combines recycled and renewable paper sources.
Skatelite FSC Mix Credit	FSC Mix Credit	Heritage	Skatepark ramps, action sports surfaces	4×8	0.25	1.56	Designed for high-impact resistance and durability in skatepark applications.

LCA Study

Life cycle assessment (LCA) is a method used to evaluate the environmental impacts of a product, process, or service from a life-cycle perspective. It is widely applied and serves as a learning tool for gaining insight into the environmental performance of various systems.

The LCA framework consists of four distinct phases.

The first phase is the definition of goals and scope, where the objectives, target audience, system boundaries, data quality, and functional unit for the study are established.

The second phase involves life-cycle inventory analysis (LCI), where resources and emissions throughout the life cycle are mapped. This includes tracking raw materials, energy consumption, transportation methods, the product's end-of-life (EoL) and waste management.

In the third phase, known as life-cycle impact assessment (LCIA), the inventory data are translated into environmental impacts using characterization methods.

In the fourth and final phase, the results of the LCIA are interpreted through various analyses, such as contribution analysis, to draw conclusions and provide recommendations based on the study's defined goals and scope. It's important to note that the LCA process is iterative, meaning parts of the study may be adjusted or redefined as new insights emerge. A schematic overview of the framework is shown in Figure 1. The LCA is conducted in accordance with ISO 14040:2006 and ISO 14044:2006 standards.

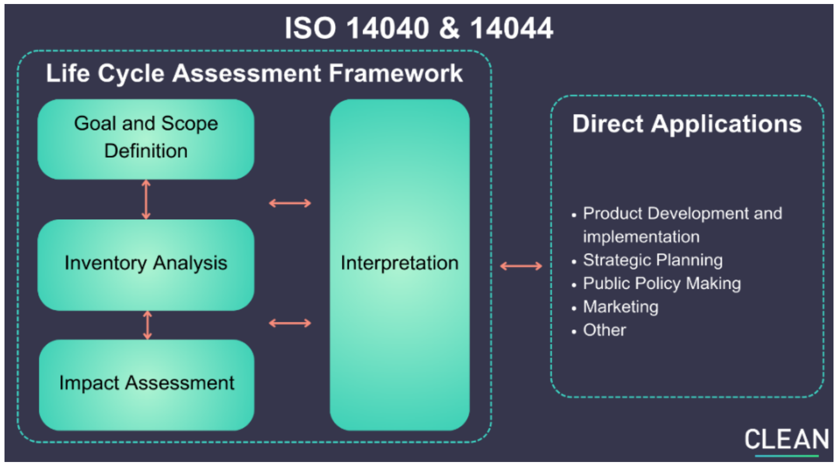

Figure 1. Illustration of the LCA method

System boundary

This study captures the following mandatory cradle-to-grave (A1-C4) life cycle product stages (as illustrated in Figure 2).

A1–A3: Product Stage (Cradle to Gate)

This stage includes all upstream processes required to produce the finished product:

- A1 – Raw Material Supply: Extraction and processing of raw materials (e.g., paper, resin)
- A2 – Transport: Transportation of raw materials to the manufacturing site
- A3 – Manufacturing: Fabrication of the product at the production facility

This phase is the foundation of the LCA and is always included in construction product EPDs.

A4–A5: Construction Stage

- A4 – Transport: Delivery of the product from the factory to the construction or installation site
- A5 – Installation: On-site processes required to install the product, including energy and material use, as well as waste generation

B1–B7: Use Stage

This stage accounts for impacts occurring during the product's service life:

- B1 – Use: Direct emissions or impacts during use (if any)
- B2 – Maintenance, B3 – Repair, B4 – Replacement, B5 – Refurbishment: These cover any interventions to maintain or restore function
- B6 – Operational Energy Use and B7 – Operational Water Use: Typically relevant for products requiring energy or water in use (e.g., appliances), but often excluded for passive materials like composite surfaces due to negligible impacts

C1–C4: End-of-Life Stage

- C1 – Deconstruction/Demolition
- C2 – Transport to waste processing
- C3 – Waste Processing (e.g., sorting, incineration prep)
- C4 – Final Disposal (e.g., landfill, incineration without energy recovery)

These stages capture the environmental burdens of removing and discarding the product after use.

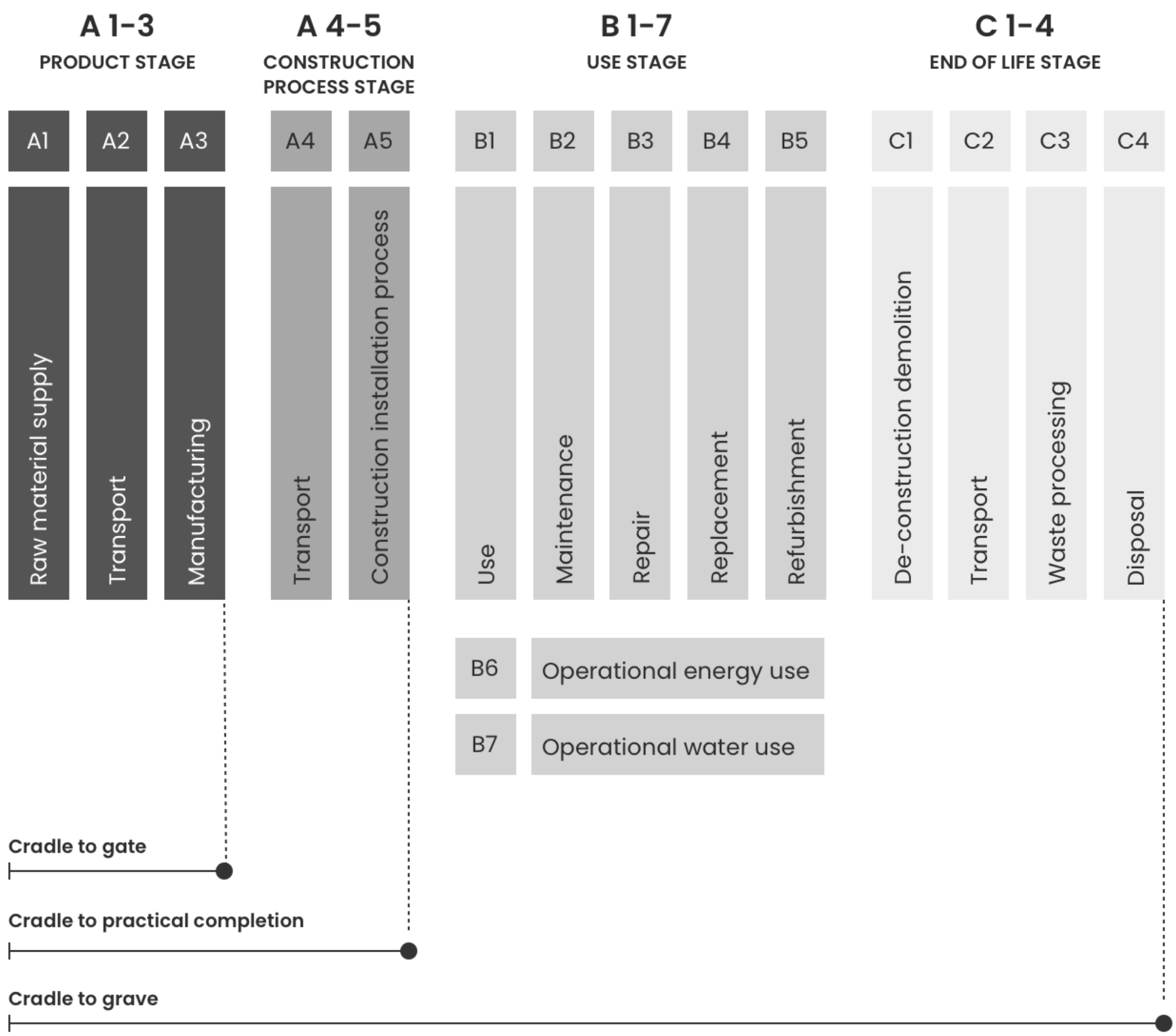

Figure 2. Life-Cycle Stages and Modules

Function and Functional Unit

In order to conduct an ISO-compliant LCA, all flows within the system boundaries must be normalized to a unit summarizing the function of the system, enabling the calculation of the function on a quantitative basis, and in some cases, enabling the quantification of a comparison of products or systems on an equivalent basis.

The functional unit for this study is one square meter of installed composite surfaces, for a period of ten years. The products has an effective useful life of 20 years. It is used in commercial and residential applications.

Impact categories and methodology

The life cycle impact categories used in this study are presented in Table 2.

Table 2. Definition of Impact Categories

Impact Categories	
GWP (kg CO2 eq)	Global Warming Potential measures the product's contribution to global warming by quantifying greenhouse gas emissions, expressed in kilograms of CO_2 equivalents.
Acidification potential (kg SO2-Eq)	Assesses the potential of emissions to cause acid rain, which harms soil, water, and vegetation, expressed in sulfur dioxide equivalents.
Eutrophication (kg N-Eq)	Evaluates the impact of nutrient emissions on water bodies, leading to excessive algae growth, in nitrogen equivalents.
Land occupation (m2a)	Indicates the amount of land used over time for the product's life cycle, affecting ecosystems and biodiversity.
Ecotoxicity (CTUe)	Measures the potential harm of toxic emissions to ecosystems, impacting aquatic and terrestrial species.
Bulk waste (kg)	Quantifies the solid waste generated by the product, contributing to landfill and disposal issues.

Cut-off Criteria

Items excluded from system boundary include production, manufacture, and construction of manufacturing capital goods and infrastructure; production and manufacture of production equipment, delivery vehicles, and laboratory equipment; personnel-related activities (travel, furniture, and office supplies); and energy and water use related to company management and sales activities that may be located either within the factory site or at another location. No known flows were deliberately excluded from this EPD.

Allocation Procedure

Allocation of the production data for this product was based on a total facility mass basis.

Data Quality

The quality of LCI data used in this study is evaluated based on the following characteristics:

Technological representativeness (technology): the degree to which the data reflects the actual technology(ies) used.

Temporal representativeness (time): the degree to which the information collected reflects the actual time of the study. Foreground data shall be the average of twelve consecutive months during the last five years. Background data should not be older than ten years.

Geographical representativeness (geography): the degree to which the data reflects the actual geographic location of the activity. The geographic region of the relevant life-cycle stages included in the calculation of data should be documented.

Completeness: the degree to which the data are statistically representative of the relevant activity and obtained over an adequate period of time to even out normal fluctuations.

Reliability: the degree to which the sources, data collection methods, and verification procedures used to obtain the data are dependable

Data quality is rated “very good”, “good”, “fair”, or “poor” for characteristics of each process.

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Assumptions

LCA studies are typically based on a set of core assumptions that facilitate the modeling of the studied systems. In this study our assumptions were:

- Energy, water, and emissions from the manufacturing facility are proportionally assigned to Richlite products based on mass output (not volume or economic value)
- A4 represents the transportation of the finished product from the manufacturing facility to the customer or job site, modeled using a weighted average of truck (2,181 km), rail (117 km), and sea (953 km) transport distances based on actual 2024 distribution data.
- For A5, Installation impacts are excluded from the LCA due to minimal material and energy requirements; however, a 10% fabrication scrap rate is assumed and modeled as landfilled.
- The use phase is excluded from the study, as Richlite composite surfaces do not require energy, water, maintenance, repair, or replacement during their reference service life.
- For EoL, the product is assumed to be 70% recycled/reused and 30% sent to landfill at end-of-life, with an average transport distance of 32 km by truck.

Environmental Impacts

Cradle-to-Grave Impact Results are reported in Table 3-5

Table 3. Cradle-to-Grave Impact Results for product 1 (per 1 m2)

	Unit	A1	A2	A3	Total A1-A3	A4	A5	B1-7	C1-4	TOTAL
TRACI Impact Category										
Acidification	kg SO2-Eq	0.11	1.18E-02	1.91E-03	**0.12**	3.36E-02	0	MND	1.36E-03	**0.16**
Global Warming Potential	kg CO2-Eq	27.8	1.78E-02	1.48	**29.3**	2.72E+00	0	MND	1.85E+00	**33.9**
Ecotoxicity: Freshwater	CTUe	546.0	0	1.08	**547.1**	7.60E+00	0	MND	3.78E+02	**932.8**
Eutrophication	kg N-Eq	0.31	0	5.65E-04	**0.31**	1.99E-03	0	MND	2.06E-02	**0.33**
Human Toxicity: Carcinogenic	CTUh	7.02E-06	0	8.91E-09	**7.03E-06**	4.08E-08	0	MND	1.38E-07	**7.21E-06**
Human Toxicity: Non-Carcinogenic	CTUh	7.33E-06	0	4.10E-08	**7.37E-06**	3.93E-07	0	MND	4.70E-06	**1.25E-05**
Ozone Depletion	kg CFC-11-Eq	6.69E-07	0	2.17E-07	**8.86E-07**	1.14E-10	0	MND	4.30E-09	**8.90E-07**
Particulate Matter Formation	kg PM2.5-Eq	0.02	2.29E-06	1.12E-04	**1.85E-02**	9.62E-04	0	MND	6.52E-05	**1.95E-02**
Photochemical Oxidant Formation	kg O3-Eq	1.58	2.59E-02	0.03	**1.63**	8.69E-01	0	MND	3.09E-02	**2.53**
CML Impact Category										
Abiotic depletion	kg Sb eq	6.96E-05	9.20E-06	4.55E-07	7.93E-05	2.98E-09	0.00E+00	0.00E+00	3.58E-09	**7.93E-05**
Abiotic depletion (fossil)	MJ	4.73E+02	6.25E+01	1.52E+02	6.87E+02	5.59E+01	0.00E+00	0.00E+00	3.61E-01	**7.44E+02**
Inventory Assessment Category - Emissions to Air										
SOx	kg	1.01E-03	1.33E-04	1.50E-06	1.14E-03	3.44E-03	0.00E+00	0.00E+00	1.03E-05	**4.59E-03**
NOx	kg	5.55E-02	7.33E-03	7.58E-03	7.04E-02	2.53E-02	0.00E+00	0.00E+00	0.00E+00	**9.56E-02**
CO2	kg	1.76E+01	2.33E+00	8.32E+00	2.82E+01	3.61E+00	0.00E+00	0.00E+00	2.35E-02	**3.19E+01**
Methane	kg	1.09E-01	1.44E-02	2.02E-02	1.44E-01	5.05E-03	0.00E+00	0.00E+00	0.00E+00	**1.49E-01**
N2O	kg	1.42E-03	1.88E-04	5.05E-05	1.66E-03	1.48E-05	0.00E+00	0.00E+00	4.81E-07	**1.68E-03**
CO	kg	6.69E-02	8.84E-03	2.53E-03	7.83E-02	2.27E-02	0.00E+00	0.00E+00	0.00E+00	**1.01E-01**
Inventory Assessment Category - Water Usage and Emissions to Water										
Phosphates	kg	3.71E-03	4.90E-04	3.36E-05	4.23E-03	4.75E-07	0.00E+00	0.00E+00	5.69E-07	**4.24E-03**
Nitrates	kg	3.39E-02	4.47E-03	1.67E-05	3.83E-02	1.07E-07	0.00E+00	0.00E+00	1.28E-07	**3.83E-02**
Dioxin	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.53E-01	0.00E+00	0.00E+00	1.52E-01	**4.04E-01**
Heavy Metals (arsenic, lead mercury, cadmium, and chromium)	kg	9.26E-06	1.22E-06	1.34E-06	1.18E-05	1.40E-05	0.00E+00	0.00E+00	4.90E-08	**2.59E-05**
Total Water Input	kg	1.73E+02	2.29E+01	4.93E+01	2.46E+02	1.01E-02	0.00E+00	0.00E+00	1.36E-02	**2.46E+02**

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Inventory Assessment Category - Energy type and Usages										
Primary Energy Demand	MJ	5.18E+02	6.84E+01	1.57E+02	7.43E+02	5.65E+01	0.00E+00	0.00E+00	3.70E-01	**8.00E+02**
Fossil Fuel Based Energy	MJ	4.73E+02	6.25E+01	1.52E+02	6.88E+02	5.59E+01	0.00E+00	0.00E+00	3.61E-01	**7.44E+02**
Nuclear Energy	MJ	2.50E+01	3.30E+00	5.05E+00	3.33E+01	5.79E-01	0.00E+00	0.00E+00	9.09E-03	**3.39E+01**
Renewable Energy	MJ	1.93E+01	2.54E+00	2.78E-01	2.21E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**2.21E+01**
Inventory Assessment Category - Waste Management										
Incineration with Energy Recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+0	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
Incineration without Energy Recovery	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**
Landfill (non-hazardous solid waste)	kg	0.00E+00	0.00E+00	3.21E-01	3.21E-01	8.36E-01	0.00E+00	0.00E+00	2.51E+00	**3.67E+00**
Hazardous Waste	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**
Landfill Avoidance (Recycling)	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**

Note: MND = module not declared

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Table 4. Cradle-to-Grave Impact Results for product 2 (per 1 m2)

	Unit	A1	A2	A3	Total A1-A3	A4	A5	B1-7	C1-4	TOTAL
TRACI Impact Category										
Acidification	kg SO2-Eq	0.11	2.61E-03	1.20E-03	**0.12**	3.32E-02	0	MND	9.19E-04	**0.15**
Global Warming Potential	kg CO2-Eq	28.9	0.02	0.94	**29.9**	2.69	0	MND	1.25	**33.8**
Ecotoxicity: Freshwater	CTUe	561.7	0	0.56	**562.3**	7.52	0	MND	255.9	**825.7**
Eutrophication	kg N-Eq	0.32	0	3.42E-04	**0.32**	1.97E-03	0	MND	1.40E-02	**0.34**
Human Toxicity: Carcinogenic	CTUh	7.33E-06	0	5.02E-09	**7.33E-06**	4.04E-08	0	MND	9.37E-08	**7.47E-06**
Human Toxicity: Non-Carcinogenic	CTUh	7.75E-06	0	2.41E-08	**7.78E-06**	3.89E-07	0	MND	3.18E-06	**1.14E-05**
Ozone Depletion	kg CFC-11-Eq	6.81E-07	2.62E-13	1.39E-07	**8.19E-07**	1.13E-10	0	MND	2.91E-09	**8.22E-07**
Particulate Matter Formation	kg PM2.5-Eq	1.97E-02	3.05E-05	6.73E-05	**1.98E-02**	9.52E-04	0	MND	4.42E-05	**2.08E-02**
Photochemical Oxidant Formation	kg O3-Eq	1.72	0.07	0.02	**1.80**	8.59E-01	0	MND	2.09E-02	**2.68**
CML Impact Category										
Abiotic depletion	kg Sb eq	7.15E-05	7.95E-06	3.94E-07	7.99E-05	2.58E-09	0.00E+00	0.00E+00	3.10E-09	**7.99E-05**
Abiotic depletion (fossil)	MJ	4.83E+02	5.37E+01	1.31E+02	6.68E+02	4.84E+01	0.00E+00	0.00E+00	3.12E-01	**7.17E+02**
Inventory Assessment Category - Emissions to Air										
SOx	kg	7.41E-04	8.24E-05	1.30E-06	8.25E-04	2.98E-03	0.00E+00	0.00E+00	8.89E-06	**3.81E-03**
NOx	kg	4.94E-02	5.49E-03	6.46E-03	6.14E-02	2.26E-02	0.00E+00	0.00E+00	0.00E+00	**8.40E-02**
CO2	kg	1.79E+01	1.98E+00	7.19E+00	2.70E+01	3.12E+00	0.00E+00	0.00E+00	2.04E-02	**3.02E+01**
Methane	kg	1.13E-01	1.26E-02	1.62E-02	1.42E-01	3.23E-03	0.00E+00	0.00E+00	0.00E+00	**1.45E-01**
N2O	kg	1.46E-03	1.62E-04	4.36E-05	1.66E-03	1.28E-05	0.00E+00	0.00E+00	4.15E-07	**1.68E-03**
CO	kg	6.69E-02	7.43E-03	3.23E-03	7.75E-02	1.94E-02	0.00E+00	0.00E+00	0.00E+00	**9.69E-02**
Inventory Assessment Category - Water Usage and Emissions to Water										
Phosphates	kg	3.81E-03	4.23E-04	2.91E-05	4.26E-03	4.10E-07	0.00E+00	0.00E+00	4.92E-07	**4.26E-03**
Nitrates	kg	3.49E-02	3.88E-03	1.44E-05	3.88E-02	9.24E-08	0.00E+00	0.00E+00	1.10E-07	**3.88E-02**
Dioxin	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-01	0.00E+00	0.00E+00	1.94E-01	**5.17E-01**
Heavy Metals (arsenic, lead mercury, cadmium, and chromium)	kg	8.49E-06	9.43E-07	1.16E-06	1.06E-05	1.21E-05	0.00E+00	0.00E+00	4.25E-08	**2.27E-05**
Total Water Input	kg	1.78E+02	1.98E+01	4.26E+01	2.41E+02	9.69E-03	0.00E+00	0.00E+00	1.16E-02	**2.41E+02**

Inventory Assessment Category - Energy type and Usages										
Primary Energy Demand	MJ	5.31E+02	5.90E+01	1.36E+02	7.26E+02	4.89E+01	0.00E+00	0.00E+00	3.20E-01	**7.75E+02**
Fossil Fuel Based Energy	MJ	4.84E+02	5.37E+01	1.31E+02	6.69E+02	4.84E+01	0.00E+00	0.00E+00	3.12E-01	**7.17E+02**
Nuclear Energy	MJ	2.58E+01	2.87E+00	4.36E+00	3.31E+01	5.01E-01	0.00E+00	0.00E+00	7.75E-03	**3.36E+01**
Renewable Energy	MJ	2.14E+01	2.38E+00	2.39E-01	2.41E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**2.41E+01**
Inventory Assessment Category - Waste Management										
Incineration with Energy Recovery	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**
Incineration without Energy Recovery	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**
Landfill (non-hazardous solid waste)	kg	0.00E+00	0.00E+00	2.78E-01	2.78E-01	7.24E-01	0.00E+00	0.00E+00	2.17E+00	**3.17E+00**
Hazardous Waste	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**
Landfill Avoidance (Recycling)	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**

Note: MND = module not declared

Table 5. Cradle-to-Grave Impact Results for product 3 (per 1 m2)

	Unit	**A1**	**A2**	**A3**	**Total A1-A3**	**A4**	**A5**	**B1-7**	**C1-4**	**TOTAL**
TRACI Impact Category										
Acidification	kg SO2-Eq	0.09	1.68E-03	1.00E-04	**0.09**	3.06E-02	0	MND	4.06E-04	**0.12**
Global Warming Potential	kg CO2-Eq	20.6	1.12E-02	7.86E-02	**20.6**	2.47	0	MND	0.55	**23.7**
Ecotoxicity: Freshwater	CTUe	402.6	0	4.72E-02	**402.7**	6.91	0	MND	113.1	**522.7**
Eutrophication	kg N-Eq	0.23	0	2.86E-05	**0.23**	1.81E-03	0	MND	6.17E-03	**0.24**
Human Toxicity: Carcinogenic	CTUh	5.23E-06	0	4.20E-10	**5.23E-06**	3.71E-08	0	MND	4.14E-08	**5.31E-06**
Human Toxicity: Non-Carcinogenic	CTUh	5.96E-06	0	2.02E-09	**5.96E-06**	3.58E-07	0	MND	1.41E-06	**7.72E-06**
Ozone Depletion	kg CFC-11-Eq	4.81E-07	0	1.16E-08	**4.92E-07**	1.04E-10	0	MND	1.29E-09	**4.94E-07**
Particulate Matter Formation	kg PM2.5-Eq	0.02	0	5.63E-06	**1.51E-02**	8.75E-04	0	MND	1.95E-05	**1.60E-02**
Photochemical Oxidant Formation	kg O3-Eq	1.32	0	1.43E-03	**1.32**	7.90E-01	0	MND	9.24E-03	**2.12**
CML Impact Category										
Abiotic depletion	kg Sb eq	4.94E-05	5.49E-06	3.62E-07	5.53E-05	2.38E-09	0.00E+00	0.00E+00	2.86E-09	**5.53E-05**
Abiotic depletion (fossil)	MJ	3.35E+02	3.73E+01	1.21E+02	4.94E+02	4.46E+01	0.00E+00	0.00E+00	2.88E-01	**5.38E+02**

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Inventory Assessment Category - Emissions to Air										
SOx	kg	7.74E-04	8.60E-05	1.20E-06	8.61E-04	2.75E-03	0.00E+00	0.00E+00	8.18E-06	**3.62E-03**
NOx	kg	4.23E-02	4.70E-03	6.72E-03	5.38E-02	2.02E-02	0.00E+00	0.00E+00	0.00E+00	**7.39E-02**
CO2	kg	1.34E+01	1.49E+00	6.63E+00	2.15E+01	2.88E+00	0.00E+00	0.00E+00	1.81E-02	**2.44E+01**
Methane	kg	7.86E-02	8.74E-03	1.34E-02	1.01E-01	6.72E-03	0.00E+00	0.00E+00	0.00E+00	**1.08E-01**
N2O	kg	1.94E-03	2.15E-04	4.03E-05	2.19E-03	1.18E-05	0.00E+00	0.00E+00	3.83E-07	**2.20E-03**
CO	kg	5.44E-02	6.05E-03	0.00E+00	6.05E-02	2.02E-02	0.00E+00	0.00E+00	0.00E+00	**8.06E-02**
Inventory Assessment Category - Water Usage and Emissions to Water										
Phosphates	kg	3.04E-03	3.37E-04	2.69E-05	3.40E-03	3.78E-07	0.00E+00	0.00E+00	4.54E-07	**3.40E-03**
Nitrates	kg	5.55E-02	6.17E-03	1.33E-05	6.17E-02	8.53E-08	0.00E+00	0.00E+00	1.02E-07	**6.17E-02**
Dioxin	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.72E-01	0.00E+00	0.00E+00	4.03E-01	**1.08E+00**
Heavy Metals (arsenic, lead mercury, cadmium, and chromium)	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**
Total Water Input	kg	8.16E-06	9.07E-07	1.07E-06	1.01E-05	1.12E-05	0.00E+00	0.00E+00	3.91E-08	**2.13E-05**
Inventory Assessment Category - Energy type and Usages										
Primary Energy Demand	MJ	3.88E+02	4.32E+01	1.25E+02	5.57E+02	4.50E+01	0.00E+00	0.00E+00		
Fossil Fuel Based Energy	MJ	3.36E+02	3.73E+01	1.21E+02	4.94E+02	4.46E+01	0.00E+00	0.00E+00	2.94E-01	**6.02E+02**
Nuclear Energy	MJ	1.92E+01	2.13E+00	4.02E+00	2.53E+01	4.64E-01	0.00E+00	0.00E+00	2.88E-01	**5.39E+02**
Renewable Energy	MJ	3.35E+01	3.72E+00	2.22E-01	3.74E+01	0.00E+00	0.00E+00	0.00E+00	8.06E-03	**2.58E+01**
Inventory Assessment Category - Waste Management										
Incineration with Energy Recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
Incineration without Energy Recovery	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**
Landfill (non-hazardous solid waste)	kg	0.00E+00	0.00E+00	2.55E-01	2.55E-01	6.65E-01	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
Hazardous Waste	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	**2.92E+00**
Landfill Avoidance (Recycling)	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**

Note: MND = module not declared

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Limitations of the results

Life cycle impact assessment (LCIA) results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins, or risks.

This EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating LCA reports from different manufacturers or programs, as the results may not be entirely comparable. The results of this report reflect the average performance by the product and its actual impacts may vary on a case-to-case basis.

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Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL Environment (December 2018, version 3.2)