SIKA ARCHITECTURAL AND PROTECTIVE WALL COATINGS

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ENVIRONMENTAL PRODUCT DECLARATION

Included wall coating systems

Sikagard® Duroplast® (incl. 100 N, 150 N and EE)
Sikagard® SN-100
Sikagard® SN-40 Lo-VOC
Sikagard®-550 W Elastic

The development of this environmental product declaration (EPD) for architectural and protective wall coating systems manufactured in Canada was commissioned by Sika Canada. This EPD was developed in compliance with CAN/CSA-ISO 14025 and ISO 21930 by Groupe AGÉCO and has been verified by Athena Sustainable Materials Institute.

This EPD includes life cycle assessment (LCA) results for the production, construction, use and end-of-life stages (cradle-to-grave).

For more information about Sika Canada, please go to www.sika.ca

Issue date: July 10, 2019

Minor Amendment: August 1, 2024; validity period extension.

Environmental Product Declaration

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

7992-1736
July 2019-January 2025

In order to support comparative assertions, 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 EPDs from different manufacturers, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the building level per ISO 21930 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis. This declaration shall solely be used in a Business to Business (B2B) capacity.

Program operator	**CSA Group** 178 Rexdale Blvd, Toronto, ON, Canada M9W 1R3 | www.csagroup.org
Product	Sika architectural and protective wall coatings
EPD registration number	7992-1736
EPD recipient organization	**Sika Canada** 601 Delmar Ave., Pointe-Claire (Quebec) H9R 4A9 | www.sika.ca
Reference PCR	PCR for Architectural Coatings NSF International | Valid until June 23, 2022
Date of issue (approval)	July 10, 2019
Period of validity	July 10, 2019 – January 09, 2025

The PCR review was conducted by	Thomas P. Gloria, Ph. D. Mr. Bill Sthough Dr. Michael Overcash
The LCA and EPD were prepared by	**Groupe AGÉCO** | www.groupeageco.ca | ageco@groupeageco.ca
This EPD and related data were independently verified by an external verifier, Lindita Bushi, according to CAN/CSA-ISO 14025:2006 and ISO 21930.	__ Internal **x External** Lindita Bushi Lindita Bushi, Ph.D. Athena Sustainable Materials Institute 280 Albert St., Suite 404, Ottawa, Ontario, Canada K1P 5G8 lindita.bushi@athenasmi.org | www.athenasmi.org

Functional unit	1 m^2 of covered and protected substrate for a period of 60 years
Market and technical lifetimes	Market: 5 to 10 years | Technical: 3 to 5 years
Content of the products	See section 2 for complete description
Data quality assessment score	Good
Manufacturing location	Pointe-Claire, Quebec, Canada

Environmental Product Declaration Summary Sheet

Sika Canada | Sika Architectural and Protective Wall Coatings

This is a summary of the environmental product declaration (EPD) describing the environmental performance of architectural and protective wall coatings manufactured by Sika Canada in Quebec, Canada.

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EPD commissioner and owner	Period of validity	Program operator and registration number	Product Category Rule	LCA and EPD consultants
Sika Canada	July 10, 2019 – January 09, 2025	CSA Group 7992-1736	PCR for Architectural Coatings (NSF, 2017)	Groupe AGÉCO

What is a Life Cycle Assessment (LCA)?

LCA is a science-based and internationally recognized tool to evaluate the relative potential environmental 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. For EPD development, Product Category Rules (PCR) give additional guidelines on how to conduct the LCA of the product.

Why an EPD?

Sika Canada is seeking to provide the industry, decision-makers, influencers, and the general public with more transparency, in terms of its sustainability efforts and environmental performance of its products, relying on a rigorous and recognized communication tool, the EPD. By selecting products with an EPD, building projects can earn credits towards the Leadership in Energy and Environmental Design (LEED) rating system certification. In the latest LEED version (v4), points are awarded in the Materials and Resources category

Product description

Resinous wall coating systems, including epoxy, silane and acrylic-based products

Functional unit

One square meter (1 m^2) of covered and protected substrate for a period of 60 years.

Systems included in the EPD

Sikagard® Duroplast® (incl. 100 N, 150 N and EE)
Sikagard® SN-40 Lo-VOC • Sikagard® SN-100
Sikagard®-550 W Elastic

Scope and system boundary

Cradle-to-grave: production (A1-A3), construction (A4-A5), use (B1-B7) and end-of-life (C1-C4) stages.

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Potential environmental impacts

The potential environmental impacts of **1 m² of covered and protected substrate for a period of 60 years** are summarized below for each wall system, service life, and main environmental indicator assessed (based on life cycle impact assessment method TRACI 2.1). For each wall system, there are two different service life values: a technical service life, for which coating systems are designed for, and a market service life, a typical period after which users replace coating systems. Refer to the full EPD for more detailed results.

Total cradle-to-grave (A1-C4) results of 1 m² of architectural and protective wall coating

Systems	Service life type*	Service life*	GWP kg CO_2 eq.	AP kg SO_2 eq.	EP kg N eq.	SFP kg O_3 eq.	ODP kg CFC-11 eq.
Sikagard® Duroplast®	Market	5	3.79E+1	1.62E-1	1.47E-1	9.67E+0	8.44E-5
	Technical	3	5.88E+1	2.56E-1	2.33E-1	1.49E+1	8.69E-5
Sikagard® SN-100	Market	10	4.04E+0	1.89E-2	1.22E-2	1.18E+1	2.01E-6
	Technical	5	7.80E+0	3.73E-2	2.33E-2	2.35E+1	4.00E-6
Sikagard® SN-40 Lo-VOC	Market	10	8.58E+0	4.11E-2	2.60E-2	2.30E+1	2.35E-6
	Technical	5	1.69E+1	8.18E-2	5.10E-2	4.59E+1	4.68E-6
Sikagard®-550 W Elastic	Market	10	8.27E+0	3.92E-2	3.27E-2	5.72E+0	1.11E-6
	Technical	5	1.53E+1	7.25E-2	6.08E-2	1.06E+1	2.05E-6

*Note: "2.8E-1" means 0.28. GWP = Global warming potential (GWP100); AP = Acidification potential; EP = Eutrophication potential; SFP = Smog formation potential; ODP = Ozone depletion potential. * Service life for commercial and industrial applications.*

Additional environmental information

This section provides additional relevant environmental information about the manufacturer and the wall systems that was not derived from the LCA.

Sika's Commitment to sustainability

Providing long lasting and high-performance solutions to the benefit of our customers, Sika is committed to pioneering sustainable solutions that are safer, have the lowest impact on resources and address global environmental challenges. Therefore, Sika assumes the responsibility to provide sustainable solutions in order to improve material, water and energy efficiency in construction and transportation. Sika strives to create more value for all its stakeholders with its products, systems and solutions along the whole value chain and throughout the entire life span of its products. Sika is committed to measure, improve and communicate sustainable value creation: "More value, less impact" refers to the company's commitment to maximize the value of its solutions to all stakeholders while reducing resource consumption and impact on the environment.

VOC content

Individual coating products in this EPD contain between 43 and 335 grams of VOC per litre. The VOC content was measured according to EPA 24 or ASTM D2369 standard methods. All products were compliant with the Canadian "Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations" at the time of the study. Sika Canada discloses the VOC content of its products.

Waste packaging management

Sika Canada encourages its customers to responsibly dispose of used packaging. Most of them are recyclable. To make recycling easier, it is recommended to separate used packaging according to their material (paper, plastic and metal). Ask information to local municipalities about recycling programs for industrial coating packaging.

For more information: www.sika.ca

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1. Description of Sika Canada

Sika Canada Inc., a member of the Sika Group, is a leader in the field of specialty chemicals for construction. Sika's product portfolio encompasses a vast range of construction solutions, "From Foundations Upwards", including waterproofing solutions, concrete production (ready mix and precast), concrete repair and protection, joint sealing, elastic & structural bonding, specialized flooring including industrial, commercial, institutional & decorative systems, architectural and protective wall coating systems and roofing systems. This extensive range of products enables tailor-made solutions, in new construction as well as refurbishment. Beyond the quality and performance of its products, Sika has earned its reputation by offering an unparalleled level of expertise and support, from conception to completion.

2. Description of product

2.1. Definition and product classification

This EPD developed with the Product Category Rules (PCR) for Architectural Coatings from NSF covers 4 resinous wall coating systems, including epoxy, silane and acrylic-based products.

The main substances entering the composition of resinous wall coating systems are presented in **Table 1**.

Figure 1: Example of a protective wall coating applied on a building

Table 1: Composition of resinous wall coating systems included in this EPD

System	Components	Role
Sikagard® Duroplast®	Sikagard® Duroplast® EE	Primer
	Sikagard® Duroplast®-100 N	Bed coat
	Sika® Duochem F.R. Mesh	Glass fabric
	Sikagard® Duroplast®-100 N	Glass fabric binder
	Sikagard® Duroplast®-100 N	Smoothing coat
	Sikagard® Duroplast®-150 N	Top coat
Sikagard® SN-40 Lo-VOC	Sikagard® SN-40 Lo-VOC	Base coat
Sikagard® SN-100	Sikagard® SN-100	Base coat
Sikagard®-550 W Elastic	Sikagard®-550 W Elastic	Base coat

More information on these systems is available on Sika Canada's website:
https://can.sika.com/en/solutions-and-products.html

2.2. Material content

The material composition of each component as disclosed in SDS (Safety Data Sheets) are provided in **Table 2** as required by the PCR. The complete component formulations were used to calculate the LCA results.

Table 2: Composition of components as disclosed in SDS

Components	Ingredients[1]	CAS No.	Concentration (%w/w)
Sika® Duochem F.R. Mesh	No SDS available for this product		
Sikagard® Duroplast® EE	Fatty acids, C18-unsatd., dimers, reaction products with polyethylenepolyamines	68410-23-1	>= 5 - < 10
Sikagard® Duroplast®-100 N	(Part A) Quartz (SiO2)	14808-60-7	>= 30 - < 60
	(Part A) bisphenol-A-(epichlorhydrin) epoxy resin	25068-38-6	>= 30 - < 60
	(Part A) oxirane, mono[(C12-14-alkyloxy)methyl]derivatives	68609-97-2	>= 2 - < 5
	(Part A) Isopropanol	67-63-0	>= 2 - < 5
	(Part A) Quartz (SiO2) <5µm	14808-60-7	>= 0 - < 1
	(Part A) 2-octyl-2H-isothiazole-3-one	26530-20-1	>= 0 - < 1
	(Part B) Isophoronediamine	2855-13-2	>= 30 - < 60
	(Part B) Benzyl alcohol	100-51-6	>= 15 - < 40
	(Part B) salicylic acid	69-72-7	>=2 - <5
	(Part B) Isopropanol	67-63-0	>= 1 - < 2
Sikagard® Duroplast®-150 N	2-(propyloxy)ethanol	2807-30-9	>= 2 - < 5
	Glycidated Alcohol (Proprietary)	Not Assigned	>= 0.1 - < 1
Sikagard® SN-100	No hazardous ingredients reported in the SDS		
Sikagard® SN-40 Lo-VOC	No hazardous ingredients reported in the SDS		
Sikagard®-550 W Elastic	No hazardous ingredients reported in the SDS		

3. Scope of EPD

3.1. Functional unit

The functional unit of this cradle-to-grave EPD is defined as follows:

One square meter (1 m^2) of covered and protected substrate for a period of 60 years

To determine the amount of product needed to satisfy the functional unit, a service life is estimated. The values for the wall coating systems are reported in **Table 3**. For each system, there are at least two different service life values: a technical service life, for which coating systems are designed for, and a market service life, a typical period after which users replace coating systems.

[1] Components are usually sold in two or three separate parts that are mixed on site prior to application. When this is the case, the part in which the ingredient is contained is indicated with a letter.

Table 3: Estimated service life (in years)

System	Coating type	For commercial and industrial applications Market service life	Technical service life*
Sikagard® Duroplast®	Interior coating	5	3
Sikagard® SN-100	Exterior coating	10	5
Sikagard® SN-40 Lo-VOC	Exterior coating	10	5
Sikagard®-550 W Elastic	Exterior coating	10	5

** The PCR for architectural coatings determines the technically service life (design life) according to specific durability tests. No eligible durability test results could be used for these products. Therefore, the shortest service life had to be used according to the PCR. For this reason, the technical service life is lower than the market service life.*

3.2. System boundaries

This cradle-to-grave LCA includes modules related to the production, construction, use, and end-of-life stages as shown in Table 4 and described in this section. All modules required by the PCR for architectural coatings from NSF were included. Figure 2 on page 10 shows the cradle-to-grave processes for wall coating systems included in this EPD.

Table 4: Life cycle stages included or not considered in the system boundaries

Production stage			Construction 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 materials	Transport	Manufacturing	Transport	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 system boundaries *MND: Module not declared*

A1 – Raw material supply

Wall coatings are composed of components made of many different ingredients (intermediate materials), such as epoxy. They are manufactured in other parts of Canada, United States, Europe, South America, Asia and Australia. This module includes the production of the ingredients needed for the mixing at the Sika plants, including raw material extraction and transformation, and energy production.

A2 – Transport to manufacturing plants

Materials are transported from suppliers to the Sika's manufacturing plants by truck, and boat if shipped from oversees. This module includes the transport air emissions as well as fuel, vehicle, and infrastructure production. Primary data on transportation distances and modes were used.

A3 – Manufacturing

This module covers the manufacturing of coating components. Once delivered to the Sika manufacturing plant, liquid materials for resinous components are stored until their use. Then, materials are mixed together in a tank according to a recipe. The mix goes under quality control, is packed in polyethylene (PE) or metallic pails and stored until shipping. Cardboard is also used for packaging.

Electricity is the main source of energy used at the manufacturing plant. In Quebec, the electricity grid mix is mainly composed of hydroelectricity. Natural gas is used for heating.

Most of the liquid waste is generated at the mixing stations and is mainly sent to incineration.

This module also includes the production and transport of primary packaging for the final products. Sika products are sold in a variety of packaging as described in Table 5.

Table 5: Packaging description

Packaging type	End-of-life treament	Mass (in kg)	Source	Biogenic carbon content** (kg C)
Paper bag (contains 25 kg)	Landfill	0.10	Estimated	0.05
Paper bag (contains 25 kg)	Landfill	0.11	Estimated	0.055
Cardboard box (contains 4 x 4 l)	Landfill	0.42	Estimated	0.21
Metallic can (3.78 l)	Landfill*	0.43	Estimated	0
PE canister (4 l)	Landfill	0.5	Estimated	0
PE pail (10 l)	Landfill	1.0	Manufacturer	0
PE pail (20 l)	Landfill	1.5	Manufacturer	0
PE pail (5 l)	Landfill	0.5	Manufacturer	0
Metallic pail (12 l)	Landfill*	0.77	Manufacturer	0
Metallic pail (15 l)	Landfill*	0.88	Manufacturer	0
Metallic pail (21 l)	Landfill*	1.13	Manufacturer	0
Metallic pail (7.56 l)	Landfill*	0.59	Estimated	0
PE sleeve	Landfill	0.13	Estimated	0

** Metallic containers may be recycled at the construction site, especially in a LEED project. However, it was judge that it would not be a representative case of how this packaging waste is usually treated.*
*** Source: ecoinvent (default 50 % C-content assumption)*

A4 – Transport to Site

Coating components, including their packaging, are transported from the manufacturing plant to their distributor warehouse and project sites by truck. This module includes the transport air emissions as well as fuel, vehicle, and infrastructure production. The default PCR transportation modes and distances were used.

A5 – Installation

The installation is included in B1 according to the PCR. Therefore, curing emissions, and packaging waste are included in module B1. The production of leftover coatings (waste) is included in this module.

B1 – Use

Impacts associated to drying were considered in this module, as well as packaging waste.

B2 – Maintenance

No maintenance was taken into account over the product lifetime.

B3 – Repair / B4 – Replacement / B5 – Refurbishment

It was assumed that repairs (module B3) are negligible during the whole product service lifetime and were therefore not considered for any system.

Recoats are needed to reach the 60-year building lifetime defined by the functional unit. Impacts of the replacement scenarios described in Table 6 for each system were calculated the same way as in the production and construction stages (A1 to A5 modules), as well as in the B1 module (i.e. curing emissions and packaging waste).

Table 6: Replacement scenarios of the architectural and protective wall coatings

System	Replacement scenario
Sikagard® Duroplast®	Additional new top coat
Sikagard® SN-40 Lo-VOC	Additional new top coat
Sikagard® SN-100	Additional new top coat
Sikagard®-550 W Elastic	Additional new top coat

No impact was reported in module B5, since no refurbishment takes place.

B6 – Operational energy use and B7 – Operational water use

No impact was reported in these modules, since the systems consume neither energy nor water.

C1 – Deconstruction/demolition

It is considered that no impacts from the deconstruction or demolition are attributable to the studied products since it is not likely to be separated from the substrate and recovered from deconstruction or demolition waste.

C2 – Waste transport

Applied coatings are transported to landfill as well as water-based unused coatings from installation (A5 and B1) and replacements (B4). Unused solvent-based coatings from these modules are sent to incineration for energy recovery. This module includes the transport air emissions as well as fuel, vehicle, and infrastructure production. The default PCR transportation modes and distances were used.

C3 – Waste processing

All unused solvent-based coatings from the B1 and B4 modules are assumed to be incinerated for energy recovery at their end of life. Credits for energy recovery are considered negligible and are not accounted for in module D.

C4 – Disposal

All applied coatings are assumed to be sent to landfill as well as unused water-based coatings from the B1 and B4 modules.

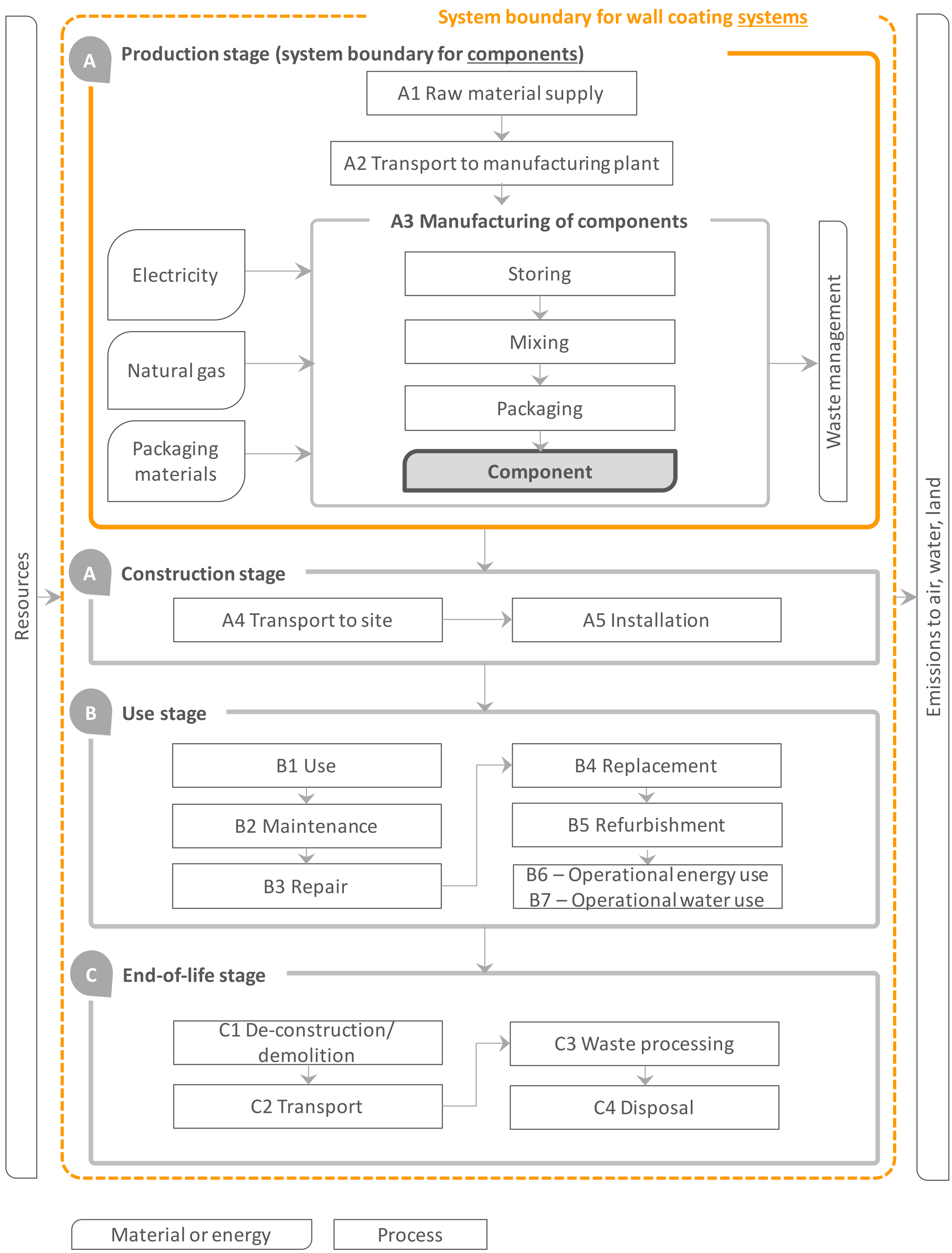

Figure 2: Process flow for all life cycle modules considered

3.3. Geographical and temporal boundaries

The geographical boundaries are representative of current equipment and processes associated with resinous wall coating system manufacturing, use and disposal in Canada. Since the data were collected for the year 2017, they are considered temporally representative (i.e. less than 5 years old). All data were modelled using the ecoinvent 3.4 database released in 2017 (ecoinvent, 2017), which meets the PCR requirements.

4. Potential environmental impacts assessment

This cradle-to-grave life cycle assessment has been conducted according to ISO 14040 and 14044 standards and the PCR for Architectural Coatings (NSF, 2017). Potential environmental impacts were calculated with the impact assessment method TRACI 2.1 (US EPA, 2012). The description of these indicators reported are provided in the glossary (section 6.2).

4.1. Assumptions

When specific data was not available, generic data which fulfilled the minimum criteria of the PCR were used. The ecoinvent database v3.4 recycled content allocation served as the main source of secondary data. It should be noted that most, though not all, of the data within ecoinvent is of European origin and developed to represent European industrial conditions and processes. Therefore, in some cases, these modules were further adapted in order to enhance their representativeness of the products and contexts being examined. However, in the recent updates of the ecoinvent database, a lot of efforts have been put into creating market groups for regions, countries and products. Other assumptions included in this LCA were related to raw material modelling, colours and transportation.

4.2. Criteria for the exclusion of inputs and outputs

Processes or elementary flows may be excluded if the life cycle inventory (LCI) data amounts to a minimum of 95 % of total inflows in terms of mass and energy to the upstream and core module. The following processes were excluded from the study due to their expected low contribution and the lack of readily available data:

- Personnel impacts
- Research and development activities
- Business travel
- Any secondary packaging
- All point of sale infrastructure
- Coating applicator

4.3. Data quality

Data sources

Specific data were collected from Sika Canada for operations occurring in 2017 (less than 5 years old). **Generic data** collected for the upstream and downstream stages were representative of the Canadian context and technologies used.

The LCA model was developed with the SimaPro 8.5 software using ecoinvent 3.4 database, which was released in 2017 (less than 2 years). 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 assessed.

Data quality

The overall data quality ratings show that the data used were 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.

4.4. Allocation

Allocation of multi-output processes

When unavoidable allocation was done by mass, or other physical relationship. Economic value allocation was not used.

Allocation at Sika's manufacturing plant

Sika's plants produce many different products, including several that are not part of the scope of this study. Product ingredients were available for each product and did not need to be allocated. However, general inputs such as electricity, natural gas, and water were allocated based on the production volume in tonnes. Percentages were calculated by the manufacturers through the data collection.

Allocation for end-of-life processes

As stated in the PCR, a recycled content approach (i.e. cut-off approach) was applied when a product is recycled. The impacts associated with the recycling process are thus attributed to the products using these materials.

ecoinvent processes with allocation

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 accepts the allocation method used by ecoinvent for those processes. The ecoinvent system model used was "Allocation, cut-off". It should be noted that the allocation methods used in ecoinvent for background processes (i.e. processes representing the complete supply chain of a good or service used in the life cycle of a wall coating system) may be inconsistent with the approach used to model the foreground system (i.e. to model the manufacturing of a wall coating system with data collected in the literature and from manufacturers). While this allocation is appropriate for foreground processes, continuation of this methodology into the background datasets would add complexity without substantially improving the quality of the study.

4.5. Life cycle impact assessment – results

The following tables (6 to 13) present the results for 1 m^2 of wall coating systems over the production, use, and end-of-life stages (A to C) according to each estimated service life in Table 3. Cradle-to-gate results (modules A1 to A3) of individual components are presented in appendix.

Table 7

Product: **Sikagard® Duroplast®**

Application: **commercial and industrial**

Functional unit: **1 m² of wall coating system (cradle-to-grave)**

Estimated market service life: **5 years**

Indicators	Units	Total	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators																
GWP	kg CO_2 eq.	3.79E+1	7.68E+0	2.49E-1	7.93E-1	1.52E-2	0	0	2.80E+1	0	0	0	0	3.06E-1	8.12E-1	3.50E-2
AP	kg SO_2 eq.	1.62E-1	2.65E-2	1.68E-3	2.82E-3	1.16E-5	0	0	1.29E-1	0	0	0	0	1.71E-3	6.79E-5	2.81E-5
EP	kg N eq.	1.47E-1	2.30E-2	3.55E-4	2.33E-3	4.66E-4	0	0	1.16E-1	0	0	0	0	2.73E-4	1.50E-4	3.78E-3
SFP	kg O_3 eq.	9.67E+0	3.16E-1	4.52E-2	3.61E-2	2.02E+0	0	0	7.21E+0	0	0	0	0	4.60E-2	2.03E-3	6.48E-4
ODP	kg CFC-11 eq.	8.44E-5	7.35E-5	5.96E-8	7.35E-6	4.08E-10	0	0	3.42E-6	0	0	0	0	7.27E-8	7.12E-10	1.21E-9
Resource use																
$NRPR_E$	MJ	4.04E+2	6.63E+1	3.79E+0	7.01E+0	3.32E-2	0	0	3.21E+2	0	0	0	0	4.39E+0	6.38E-2	1.12E+0
$NRPR_M$	kg	4.40E+0	7.63E-1	0	7.63E-2	0	0	0	3.56E+0	0	0	0	0	0	0	0
RPR_E	MJ	3.58E+1	5.58E+0	5.44E-2	5.64E-1	4.38E-3	0	0	2.96E+1	0	0	0	0	2.57E-2	1.97E-3	2.91E-2
RPR_M	kg	2.29E-4	2.09E-4	0	2.09E-5	0	0	0	0	0	0	0	0	0	0	0
RE_{DWPS}	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$ADP_{fossil,E}$	MJ	3.68E+2	6.01E+1	3.73E+0	6.39E+0	2.87E-2	0	0	2.92E+2	0	0	0	0	4.35E+0	6.21E-2	1.10E+0
$ADP_{fossil,M}$	kg	4.40E+0	7.63E-1	0	7.63E-2	0	0	0	3.56E+0	0	0	0	0	0	0	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	4.43E-1	7.33E-2	7.77E-4	7.41E-3	3.88E-5	0	0	3.59E-1	0	0	0	0	5.81E-4	6.12E-5	1.24E-3
Waste																
HWD	% of waste	1 %	100 %	0	100 %	0	0	0	23 %	0	0	0	0	0	0	0
NHWD	% of waste	99 %	0	0	0	100 %	0	0	77 %	0	0	0	0	0	0	100 %

Legend

GWP	*Global warming potential (GWP_{100})*	*$ADP_{fossil,M}$*	*Abiotic depletion potential for fossil resources used as materials*	*B2*	*Maintenance*
AP	*Acidification potential*	*SM*	*Secondary materials*	*B3*	*Repair*
EP	*Eutrophication potential*	*RSF*	*Renewable secondary fuels*	*B4*	*Replacement*
SFP	*Smog formation potential*	*NRSF*	*Non-renewable secondary fuels*	*B5*	*Refurbishment*
ODP	*Ozone depletion potential*	*FW*	*Consumption of fresh water*	*B6*	*Operational energy use*
$NRPR_E$	*Non-renewable primary resources used as an energy carrier*	*HWD*	*Hazardous waste disposed*	*B7*	*Operational water use*
$NRPR_M$	*Non-renewable primary resources with energy content used as a material*	*NHWD*	*Non-hazardous waste disposed*	*C1*	*De-construction/Demolition*
RPR_E	*Renewable primary resources used as an energy carrier*	*A1-3*	*Production stage*	*C2*	*Transport*
RPR_M	*Renewable primary resources with energy content used as a material*	*A4*	*Transport to site*	*C3*	*Waste processing*
RE_{DWPS}	*Recovered energy from disposal of waste in previous systems*	*A5*	*Installation*	*C4*	*Disposal*
$ADP_{fossil,E}$	*Abiotic depletion potential for fossil resources used as energy*	*B1*	*Use*		

Note: "E±Y" means "× $10^{\pm Y}$". E.g. "2.8E-1" means 0.28. Module D is not declared.

Table 8

Product: **Sikagard® Duroplast®**

Application: **commercial and industrial**

Functional unit: **1 m² of wall coating system (cradle-to-grave)**

Estimated technical service life: **3 years**

Indicators	Units	Total	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators																
GWP	kg CO_2 eq.	5.88E+1	7.68E+0	2.49E-1	7.93E-1	1.52E-2	0	0	4.84E+1	0	0	0	0	4.38E-1	1.16E+0	5.02E-2
AP	kg SO_2 eq.	2.56E-1	2.65E-2	1.68E-3	2.82E-3	1.16E-5	0	0	2.23E-1	0	0	0	0	2.45E-3	9.73E-5	4.03E-5
EP	kg N eq.	2.33E-1	2.30E-2	3.55E-4	2.33E-3	4.66E-4	0	0	2.01E-1	0	0	0	0	3.91E-4	2.15E-4	5.41E-3
SFP	kg O_3 eq.	1.49E+1	3.16E-1	4.52E-2	3.61E-2	2.02E+0	0	0	1.24E+1	0	0	0	0	6.59E-2	2.92E-3	9.29E-4
ODP	kg CFC-11 eq.	8.69E-5	7.35E-5	5.96E-8	7.35E-6	4.08E-10	0	0	5.91E-6	0	0	0	0	1.04E-7	1.02E-9	1.73E-9
Resource use																
$NRPR_E$	MJ	6.40E+2	6.63E+1	3.79E+0	7.01E+0	3.32E-2	0	0	5.55E+2	0	0	0	0	6.29E+0	9.14E-2	1.61E+0
$NRPR_M$	kg	6.99E+0	7.63E-1	0	7.63E-2	0	0	0	6.15E+0	0	0	0	0	0	0	0
RPR_E	MJ	5.74E+1	5.58E+0	5.44E-2	5.64E-1	4.38E-3	0	0	5.11E+1	0	0	0	0	3.68E-2	2.83E-3	4.17E-2
RPR_M	kg	2.29E-4	2.09E-4	0	2.09E-5	0	0	0	0	0	0	0	0	0	0	0
RE_{DWPS}	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$ADP_{fossil,E}$	MJ	5.83E+2	6.01E+1	3.73E+0	6.39E+0	2.87E-2	0	0	5.05E+2	0	0	0	0	6.24E+0	8.91E-2	1.58E+0
$ADP_{fossil,M}$	kg	6.99E+0	7.63E-1	0	7.63E-2	0	0	0	6.15E+0	0	0	0	0	0	0	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m³	7.05E-1	7.33E-2	7.77E-4	7.41E-3	3.88E-5	0	0	6.21E-1	0	0	0	0	8.32E-4	8.77E-5	1.77E-3
Waste																
HWD	% of waste	1 %	100 %	0	100 %	0	0	0	23 %	0	0	0	0	0	0	0
NHWD	% of waste	99 %	0	0	0	100 %	0	0	77 %	0	0	0	0	0	0	100 %

Legend

GWP	*Global warming potential (GWP_{100})*	*$ADP_{fossil,M}$*	*Abiotic depletion potential for fossil resources used as materials*	*B2*	*Maintenance*
AP	*Acidification potential*	*SM*	*Secondary materials*	*B3*	*Repair*
EP	*Eutrophication potential*	*RSF*	*Renewable secondary fuels*	*B4*	*Replacement*
SFP	*Smog formation potential*	*NRSF*	*Non-renewable secondary fuels*	*B5*	*Refurbishment*
ODP	*Ozone depletion potential*	*FW*	*Consumption of fresh water*	*B6*	*Operational energy use*
$NRPR_E$	*Non-renewable primary resources used as an energy carrier*	*HWD*	*Hazardous waste disposed*	*B7*	*Operational water use*
$NRPR_M$	*Non-renewable primary resources with energy content used as a material*	*NHWD*	*Non-hazardous waste disposed*	*C1*	*De-construction/Demolition*
RPR_E	*Renewable primary resources used as an energy carrier*	*A1-3*	*Production stage*	*C2*	*Transport*
RPR_M	*Renewable primary resources with energy content used as a material*	*A4*	*Transport to site*	*C3*	*Waste processing*
RE_{DWPS}	*Recovered energy from disposal of waste in previous systems*	*A5*	*Installation*	*C4*	*Disposal*
$ADP_{fossil,E}$	*Abiotic depletion potential for fossil resources used as energy*	*B1*	*Use*		

Note: "E±Y" means "× $10^{\pm Y}$". E.g. "2.8E-1" means 0.28. Module D is not declared.

Table 9

Product: **Sika Sikagard® SN-100**

Application: **commercial and industrial**

Functional unit: **1 m^2 of wall coating system (cradle-to-grave)**

Estimated market service life: **10 years**

Indicators	Units	Total	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators																
GWP	kg CO_2 eq.	4.04E+0	5.28E-1	2.13E-2	5.50E-2	1.90E-4	0	0	3.02E+0	0	0	0	0	1.08E-1	2.87E-1	1.25E-2
AP	kg SO_2 eq.	1.89E-2	2.62E-3	1.44E-4	2.76E-4	9.76E-7	0	0	1.52E-2	0	0	0	0	6.04E-4	2.40E-5	9.97E-6
EP	kg N eq.	1.22E-2	1.59E-3	3.03E-5	1.62E-4	7.21E-7	0	0	8.89E-3	0	0	0	0	9.64E-5	5.29E-5	1.35E-3
SFP	kg O_3 eq.	1.18E+1	3.09E-2	3.86E-3	3.47E-3	1.92E+0	0	0	9.78E+0	0	0	0	0	1.62E-2	7.19E-4	2.30E-4
ODP	kg CFC-11 eq.	2.01E-6	2.95E-7	5.09E-9	3.00E-8	3.44E-11	0	0	1.65E-6	0	0	0	0	2.57E-8	2.52E-10	4.28E-10
Resource use																
$NRPR_E$	MJ	3.12E+1	4.11E+0	3.24E-1	4.43E-1	3.32E-3	0	0	2.44E+1	0	0	0	0	1.55E+0	2.25E-2	3.96E-1
$NRPR_M$	kg	9.36E-1	1.42E-1	0	1.42E-2	0	0	0	7.80E-1	0	0	0	0	0	0	0
RPR_E	MJ	5.71E+0	8.57E-1	4.65E-3	8.62E-2	7.07E-4	0	0	4.74E+0	0	0	0	0	9.07E-3	6.97E-4	1.03E-2
RPR_M	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RE_{DWPS}	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$ADP_{fossil,E}$	MJ	2.46E+1	3.12E+0	3.19E-1	3.44E-1	2.59E-3	0	0	1.89E+1	0	0	0	0	1.54E+0	2.20E-2	3.90E-1
$ADP_{fossil,M}$	kg	9.36E-1	1.42E-1	0	1.42E-2	0	0	0	7.80E-1	0	0	0	0	0	0	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	1.19E-1	1.79E-2	6.64E-5	1.79E-3	4.43E-6	0	0	9.87E-2	0	0	0	0	2.05E-4	2.16E-5	4.38E-4
Waste																
HWD	% of waste	0 %	100 %	0	100 %	0	0	0	31 %	0	0	0	0	0	0	0
NHWD	% of waste	100 %	0	0	0	100 %	0	0	69 %	0	0	0	0	0	0	100 %

Legend

GWP	*Global warming potential (GWP_{100})*	*$ADP_{fossil,M}$*	*Abiotic depletion potential for fossil resources used as materials*	*B2*	*Maintenance*
AP	*Acidification potential*	*SM*	*Secondary materials*	*B3*	*Repair*
EP	*Eutrophication potential*	*RSF*	*Renewable secondary fuels*	*B4*	*Replacement*
SFP	*Smog formation potential*	*NRSF*	*Non-renewable secondary fuels*	*B5*	*Refurbishment*
ODP	*Ozone depletion potential*	*FW*	*Consumption of fresh water*	*B6*	*Operational energy use*
$NRPR_E$	*Non-renewable primary resources used as an energy carrier*	*HWD*	*Hazardous waste disposed*	*B7*	*Operational water use*
$NRPR_M$	*Non-renewable primary resources with energy content used as a material*	*NHWD*	*Non-hazardous waste disposed*	*C1*	*De-construction/Demolition*
RPR_E	*Renewable primary resources used as an energy carrier*	*A1-3*	*Production stage*	*C2*	*Transport*
RPR_M	*Renewable primary resources with energy content used as a material*	*A4*	*Transport to site*	*C3*	*Waste processing*
RE_{DWPS}	*Recovered energy from disposal of waste in previous systems*	*A5*	*Installation*	*C4*	*Disposal*
$ADP_{fossil,E}$	*Abiotic depletion potential for fossil resources used as energy*	*B1*	*Use*		

Note: "E±Y" means "× $10^{\pm Y}$". E.g. "2.8E-1" means 0.28. Module D is not declared.

Table 10

Product: **Sikagard® SN-100**

Application: **commercial and industrial**

Functional unit: **1 m² of wall coating system (cradle-to-grave)**

Estimated technical service life: **5 years**

Indicators	Units	Total	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators																
GWP	kg CO_2 eq.	7.80E+0	5.28E-1	2.13E-2	5.50E-2	1.90E-4	0	0	6.65E+0	0	0	0	0	1.43E-1	3.79E-1	1.65E-2
AP	kg SO_2 eq.	3.73E-2	2.62E-3	1.44E-4	2.76E-4	9.76E-7	0	0	3.34E-2	0	0	0	0	7.97E-4	3.17E-5	1.32E-5
EP	kg N eq.	2.33E-2	1.59E-3	3.03E-5	1.62E-4	7.21E-7	0	0	1.96E-2	0	0	0	0	1.27E-4	6.99E-5	1.78E-3
SFP	kg O_3 eq.	2.35E+1	3.09E-2	3.86E-3	3.47E-3	1.92E+0	0	0	2.15E+1	0	0	0	0	2.15E-2	9.49E-4	3.03E-4
ODP	kg CFC-11 eq.	4.00E-6	2.95E-7	5.09E-9	3.00E-8	3.44E-11	0	0	3.63E-6	0	0	0	0	3.39E-8	3.32E-10	5.65E-10
Resource use																
$NRPR_E$	MJ	6.11E+1	4.11E+0	3.24E-1	4.43E-1	3.32E-3	0	0	5.37E+1	0	0	0	0	2.05E+0	2.98E-2	5.24E-1
$NRPR_M$	kg	1.87E+0	1.42E-1	0	1.42E-2	0	0	0	1.72E+0	0	0	0	0	0	0	0
RPR_E	MJ	1.14E+1	8.57E-1	4.65E-3	8.62E-2	7.07E-4	0	0	1.04E+1	0	0	0	0	1.20E-2	9.21E-4	1.36E-2
RPR_M	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RE_{DWPS}	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$ADP_{fossil,E}$	MJ	4.80E+1	3.12E+0	3.19E-1	3.44E-1	2.59E-3	0	0	4.16E+1	0	0	0	0	2.03E+0	2.90E-2	5.15E-1
$ADP_{fossil,M}$	kg	1.87E+0	1.42E-1	0	1.42E-2	0	0	0	1.72E+0	0	0	0	0	0	0	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	2.38E-1	1.79E-2	6.64E-5	1.79E-3	4.43E-6	0	0	2.17E-1	0	0	0	0	2.71E-4	2.86E-5	5.78E-4
Waste																
HWD	% of waste	1 %	100 %	0	100 %	0	0	0	31 %	0	0	0	0	0	0	0
NHWD	% of waste	7.80E+0	5.28E-1	2.13E-2	5.50E-2	1.90E-4	0	0	6.65E+0	0	0	0	0	1.43E-1	3.79E-1	1.65E-2

Legend

GWP	*Global warming potential (GWP_{100})*	*$ADP_{fossil,M}$*	*Abiotic depletion potential for fossil resources used as materials*	*B2*	*Maintenance*
AP	*Acidification potential*	*SM*	*Secondary materials*	*B3*	*Repair*
EP	*Eutrophication potential*	*RSF*	*Renewable secondary fuels*	*B4*	*Replacement*
SFP	*Smog formation potential*	*NRSF*	*Non-renewable secondary fuels*	*B5*	*Refurbishment*
ODP	*Ozone depletion potential*	*FW*	*Consumption of fresh water*	*B6*	*Operational energy use*
$NRPR_E$	*Non-renewable primary resources used as an energy carrier*	*HWD*	*Hazardous waste disposed*	*B7*	*Operational water use*
$NRPR_M$	*Non-renewable primary resources with energy content used as a material*	*NHWD*	*Non-hazardous waste disposed*	*C1*	*De-construction/Demolition*
RPR_E	*Renewable primary resources used as an energy carrier*	*A1-3*	*Production stage*	*C2*	*Transport*
RPR_M	*Renewable primary resources with energy content used as a material*	*A4*	*Transport to site*	*C3*	*Waste processing*
RE_{DWPS}	*Recovered energy from disposal of waste in previous systems*	*A5*	*Installation*	*C4*	*Disposal*
$ADP_{fossil,E}$	*Abiotic depletion potential for fossil resources used as energy*	*B1*	*Use*		

Note: "E±Y" means "× $10^{\pm Y}$". E.g. "2.8E-1" means 0.28. Module D is not declared.

Table 11

Product: **Sikagard® SN-40 Lo-VOC**

Application: **commercial and industrial**

Functional unit: **1 m^2 of wall coating system (cradle-to-grave)**

Estimated market service life: **10 years**

Indicators	Units	Total	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators																
GWP	kg CO_2 eq.	8.58E+0	1.18E+0	4.09E-2	1.22E-1	4.05E-4	0	0	6.71E+0	0	0	0	0	1.40E-1	3.72E-1	1.62E-2
AP	kg SO_2 eq.	4.11E-2	5.83E-3	2.76E-4	6.10E-4	2.04E-6	0	0	3.36E-2	0	0	0	0	7.81E-4	3.11E-5	1.29E-5
EP	kg N eq.	2.60E-2	3.59E-3	5.83E-5	3.65E-4	1.72E-6	0	0	2.01E-2	0	0	0	0	1.25E-4	6.85E-5	1.74E-3
SFP	kg O_3 eq.	2.30E+1	7.01E-2	7.41E-3	7.75E-3	3.74E+0	0	0	1.91E+1	0	0	0	0	2.10E-2	9.31E-4	2.98E-4
ODP	kg CFC-11 eq.	2.35E-6	3.41E-7	9.78E-9	3.51E-8	6.87E-11	0	0	1.93E-6	0	0	0	0	3.33E-8	3.26E-10	5.54E-10
Resource use																
$NRPR_E$	MJ	1.02E+2	1.44E+1	6.22E-1	1.50E+0	7.25E-3	0	0	8.25E+1	0	0	0	0	2.01E+0	2.92E-2	5.13E-1
$NRPR_M$	kg	1.80E+0	2.72E-1	0	2.72E-2	0	0	0	1.50E+0	0	0	0	0	0	0	0
RPR_E	MJ	8.86E+0	1.33E+0	8.93E-3	1.34E-1	1.81E-3	0	0	7.36E+0	0	0	0	0	1.17E-2	9.03E-4	1.33E-2
RPR_M	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RE_{DWPS}	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$ADP_{fossil,E}$	MJ	9.15E+1	1.29E+1	6.12E-1	1.35E+0	5.39E-3	0	0	7.41E+1	0	0	0	0	1.99E+0	2.84E-2	5.05E-1
$ADP_{fossil,M}$	kg	1.80E+0	2.72E-1	0	2.72E-2	0	0	0	1.50E+0	0	0	0	0	0	0	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	2.19E-1	3.29E-2	1.28E-4	3.31E-3	1.22E-5	0	0	1.82E-1	0	0	0	0	2.66E-4	2.80E-5	5.67E-4
Waste																
HWD	% of waste	1 %	100 %	0	100 %	0	0	0	31 %	0	0	0	0	0	0	0
NHWD	% of waste	99 %	0	0	0	100 %	0	0	69 %	0	0	0	0	0	0	100 %

Legend

GWP *Global warming potential (GWP_{100})*
AP *Acidification potential*
EP *Eutrophication potential*
SFP *Smog formation potential*
ODP *Ozone depletion potential*
$NRPR_E$ *Non-renewable primary resources used as an energy carrier*
$NRPR_M$ *Non-renewable primary resources with energy content used as a material*
RPR_E *Renewable primary resources used as an energy carrier*
RPR_M *Renewable primary resources with energy content used as a material*
RE_{DWPS} *Recovered energy from disposal of waste in previous systems*
$ADP_{fossil,E}$ *Abiotic depletion potential for fossil resources used as energy*
$ADP_{fossil,M}$ *Abiotic depletion potential for fossil resources used as materials*
SM *Secondary materials*
RSF *Renewable secondary fuels*
NRSF *Non-renewable secondary fuels*
FW *Consumption of fresh water*
HWD *Hazardous waste disposed*
NHWD *Non-hazardous waste disposed*
A1-3 *Production stage*
A4 *Transport to site*
A5 *Installation*
B1 *Use*
B2 *Maintenance*
B3 *Repair*
B4 *Replacement*
B5 *Refurbishment*
B6 *Operational energy use*
B7 *Operational water use*
C1 *De-construction/Demolition*
C2 *Transport*
C3 *Waste processing*
C4 *Disposal*

Note: "E±Y" means "× $10^{\pm Y}$". E.g. "2.8E-1" means 0.28. Module D is not declared.

Table 12

Product: **Sikagard® SN-40 Lo-VOC**

Application: **commercial and industrial**

Functional unit: **1 m² of wall coating system (cradle-to-grave)**

Estimated technical service life: **5 years**

Indicators	Units	Total	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators																
GWP	kg CO_2 eq.	1.69E+1	1.18E+0	4.09E-2	1.22E-1	4.05E-4	0	0	1.48E+1	0	0	0	0	2.06E-1	5.48E-1	2.38E-2
AP	kg SO_2 eq.	8.18E-2	5.83E-3	2.76E-4	6.10E-4	2.04E-6	0	0	7.39E-2	0	0	0	0	1.15E-3	4.58E-5	1.90E-5
EP	kg N eq.	5.10E-2	3.59E-3	5.83E-5	3.65E-4	1.72E-6	0	0	4.42E-2	0	0	0	0	1.84E-4	1.01E-4	2.57E-3
SFP	kg O_3 eq.	4.59E+1	7.01E-2	7.41E-3	7.75E-3	3.74E+0	0	0	4.21E+1	0	0	0	0	3.10E-2	1.37E-3	4.39E-4
ODP	kg CFC-11 eq.	4.68E-6	3.41E-7	9.78E-9	3.51E-8	6.87E-11	0	0	4.25E-6	0	0	0	0	4.91E-8	4.81E-10	8.17E-10
Resource use																
$NRPR_E$	MJ	2.02E+2	1.44E+1	6.22E-1	1.50E+0	7.25E-3	0	0	1.81E+2	0	0	0	0	2.96E+0	4.30E-2	7.57E-1
$NRPR_M$	kg	3.59E+0	2.72E-1	0	2.72E-2	0	0	0	3.29E+0	0	0	0	0	0	0	0
RPR_E	MJ	1.77E+1	1.33E+0	8.93E-3	1.34E-1	1.81E-3	0	0	1.62E+1	0	0	0	0	1.73E-2	1.33E-3	1.97E-2
RPR_M	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RE_{DWPS}	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$ADP_{fossil,E}$	MJ	1.82E+2	1.29E+1	6.12E-1	1.35E+0	5.39E-3	0	0	1.63E+2	0	0	0	0	2.94E+0	4.19E-2	7.45E-1
$ADP_{fossil,M}$	kg	3.59E+0	2.72E-1	0	2.72E-2	0	0	0	3.29E+0	0	0	0	0	0	0	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m³	4.38E-1	3.29E-2	1.28E-4	3.31E-3	1.22E-5	0	0	4.00E-1	0	0	0	0	3.92E-4	4.13E-5	8.36E-4
Waste																
HWD	% of waste	1 %	100 %	0	100 %	0	0	0	31 %	0	0	0	0	0	0	0
NHWD	% of waste	99 %	0	0	0	100 %	0	0	69 %	0	0	0	0	0	0	100 %

Legend

GWP	*Global warming potential (GWP_{100})*	*$ADP_{fossil,M}$*	*Abiotic depletion potential for fossil resources used as materials*	*B2*	*Maintenance*
AP	*Acidification potential*	*SM*	*Secondary materials*	*B3*	*Repair*
EP	*Eutrophication potential*	*RSF*	*Renewable secondary fuels*	*B4*	*Replacement*
SFP	*Smog formation potential*	*NRSF*	*Non-renewable secondary fuels*	*B5*	*Refurbishment*
ODP	*Ozone depletion potential*	*FW*	*Consumption of fresh water*	*B6*	*Operational energy use*
$NRPR_E$	*Non-renewable primary resources used as an energy carrier*	*HWD*	*Hazardous waste disposed*	*B7*	*Operational water use*
$NRPR_M$	*Non-renewable primary resources with energy content used as a material*	*NHWD*	*Non-hazardous waste disposed*	*C1*	*De-construction/Demolition*
RPR_E	*Renewable primary resources used as an energy carrier*	*A1-3*	*Production stage*	*C2*	*Transport*
RPR_M	*Renewable primary resources with energy content used as a material*	*A4*	*Transport to site*	*C3*	*Waste processing*
RE_{DWPS}	*Recovered energy from disposal of waste in previous systems*	*A5*	*Installation*	*C4*	*Disposal*
$ADP_{fossil,E}$	*Abiotic depletion potential for fossil resources used as energy*	*B1*	*Use*		

Note: "E±Y" means "$\times 10^{\pm Y}$". E.g. "2.8E-1" means 0.28. Module D is not declared.

Table 13

Product: **Sikagard®-550 W Elastic** Functional unit: **1 m^2 of wall coating system (cradle-to-grave)**

Application: **commercial and industrial** Estimated market service life: **10 years**

Indicators	Units	Total	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators																
GWP	kg CO_2 eq.	8.27E+0	1.90E+0	1.69E-1	2.07E-1	1.38E-2	0	0	5.74E+0	0	0	0	0	2.12E-1	0	2.77E-2
AP	kg SO_2 eq.	3.92E-2	8.66E-3	1.14E-3	9.81E-4	8.27E-6	0	0	2.70E-2	0	0	0	0	1.18E-3	0	2.36E-4
EP	kg N eq.	3.27E-2	7.80E-3	2.41E-4	8.05E-4	4.35E-4	0	0	2.32E-2	0	0	0	0	1.89E-4	0	5.05E-5
SFP	kg O_3 eq.	5.72E+0	1.09E-1	3.06E-2	1.40E-2	1.47E+0	0	0	4.06E+0	0	0	0	0	3.19E-2	0	5.62E-3
ODP	kg CFC-11 eq.	1.11E-6	2.32E-7	4.05E-8	2.72E-8	2.68E-10	0	0	7.50E-7	0	0	0	0	5.05E-8	0	1.22E-8
Resource use																
NRPR$_E$	MJ	9.78E+1	2.18E+1	2.57E+0	2.44E+0	2.50E-2	0	0	6.71E+1	0	0	0	0	3.04E+0	0	7.90E-1
NRPR$_M$	kg	9.54E-1	2.48E-1	0	2.48E-2	0	0	0	6.81E-1	0	0	0	0	0	0	0
RPR$_E$	MJ	8.34E+0	2.12E+0	3.70E-2	2.15E-1	4.91E-3	0	0	5.93E+0	0	0	0	0	1.78E-2	0	2.02E-2
RPR$_M$	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RE$_{DWPS}$	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ADP$_{fossil,E}$	MJ	9.02E+1	1.99E+1	2.53E+0	2.24E+0	1.99E-2	0	0	6.17E+1	0	0	0	0	3.02E+0	0	7.78E-1
ADP$_{fossil,M}$	kg	2.12E+0	5.51E-1	0	5.51E-2	0	0	0	1.51E+0	0	0	0	0	0	0	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	1.03E-1	2.59E-2	5.28E-4	2.64E-3	4.82E-5	0	0	7.27E-2	0	0	0	0	4.03E-4	0	8.74E-4
Waste																
HWD	% of waste	1 %	100 %	0	100 %	0	0	0	35 %	0	0	0	0	0	0	0
NHWD	% of waste	99 %	0	0	0	100 %	0	0	65 %	0	0	0	0	0	0	100 %

Legend

GWP	*Global warming potential (GWP$_{100}$)*	*ADP$_{fossil,M}$*	*Abiotic depletion potential for fossil resources used as materials*	*B2*	*Maintenance*
AP	*Acidification potential*	*SM*	*Secondary materials*	*B3*	*Repair*
EP	*Eutrophication potential*	*RSF*	*Renewable secondary fuels*	*B4*	*Replacement*
SFP	*Smog formation potential*	*NRSF*	*Non-renewable secondary fuels*	*B5*	*Refurbishment*
ODP	*Ozone depletion potential*	*FW*	*Consumption of fresh water*	*B6*	*Operational energy use*
NRPR$_E$	*Non-renewable primary resources used as an energy carrier*	*HWD*	*Hazardous waste disposed*	*B7*	*Operational water use*
NRPR$_M$	*Non-renewable primary resources with energy content used as a material*	*NHWD*	*Non-hazardous waste disposed*	*C1*	*De-construction/Demolition*
RPR$_E$	*Renewable primary resources used as an energy carrier*	*A1-3*	*Production stage*	*C2*	*Transport*
RPR$_M$	*Renewable primary resources with energy content used as a material*	*A4*	*Transport to site*	*C3*	*Waste processing*
RE$_{DWPS}$	*Recovered energy from disposal of waste in previous systems*	*A5*	*Installation*	*C4*	*Disposal*
ADP$_{fossil,E}$	*Abiotic depletion potential for fossil resources used as energy*	*B1*	*Use*		

Note: "E±Y" means "× 10 $^{\pm Y}$". E.g. "2.8E-1" means 0.28. Module D is not declared.

Table 14

Product: **Sikagard®-550 W Elastic**

Application: **commercial and industrial**

Functional unit: **1 m² of wall coating system (cradle-to-grave)**

Estimated technical service life: **5 years**

Indicators	Units	Total	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Environmental indicators																
GWP	kg CO_2 eq.	1.53E+1	1.90E+0	1.69E-1	2.07E-1	1.38E-2	0	0	1.26E+1	0	0	0	0	3.51E-1	0	4.58E-2
AP	kg SO_2 eq.	7.25E-2	8.66E-3	1.14E-3	9.81E-4	8.27E-6	0	0	5.94E-2	0	0	0	0	1.96E-3	0	3.91E-4
EP	kg N eq.	6.08E-2	7.80E-3	2.41E-4	8.05E-4	4.35E-4	0	0	5.11E-2	0	0	0	0	3.13E-4	0	8.35E-5
SFP	kg O_3 eq.	1.06E+1	1.09E-1	3.06E-2	1.40E-2	1.47E+0	0	0	8.93E+0	0	0	0	0	5.28E-2	0	9.30E-3
ODP	kg CFC-11 eq.	2.05E-6	2.32E-7	4.05E-8	2.72E-8	2.68E-10	0	0	1.65E-6	0	0	0	0	8.35E-8	0	2.02E-8
Resource use																
$NRPR_E$	MJ	1.81E+2	2.18E+1	2.57E+0	2.44E+0	2.50E-2	0	0	1.48E+2	0	0	0	0	5.03E+0	0	1.31E+0
$NRPR_M$	kg	1.77E+0	2.48E-1	0	2.48E-2	0	0	0	1.50E+0	0	0	0	0	0	0	0
RPR_E	MJ	1.55E+1	2.12E+0	3.70E-2	2.15E-1	4.91E-3	0	0	1.30E+1	0	0	0	0	2.95E-2	0	3.34E-2
RPR_M	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RE_{DWPS}	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$ADP_{fossil,E}$	MJ	1.67E+2	1.99E+1	2.53E+0	2.24E+0	1.99E-2	0	0	1.36E+2	0	0	0	0	4.99E+0	0	1.29E+0
$ADP_{fossil,M}$	kg	3.94E+0	5.51E-1	0	5.51E-2	0	0	0	3.33E+0	0	0	0	0	0	0	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m³	1.91E-1	2.59E-2	5.28E-4	2.64E-3	4.82E-5	0	0	1.60E-1	0	0	0	0	6.66E-4	0	1.44E-3
Waste*																
HWD	% of waste	1 %	100 %	0	100 %	0	0	0	35 %	0	0	0	0	0	0	0
NHWD	% of waste	99 %	0	0	0	100 %	0	0	65 %	0	0	0	0	0	0	100 %

Legend

GWP	*Global warming potential (GWP_{100})*	*$ADP_{fossil,M}$*	*Abiotic depletion potential for fossil resources used as materials*	*B2*	*Maintenance*
AP	*Acidification potential*	*SM*	*Secondary materials*	*B3*	*Repair*
EP	*Eutrophication potential*	*RSF*	*Renewable secondary fuels*	*B4*	*Replacement*
SFP	*Smog formation potential*	*NRSF*	*Non-renewable secondary fuels*	*B5*	*Refurbishment*
ODP	*Ozone depletion potential*	*FW*	*Consumption of fresh water*	*B6*	*Operational energy use*
$NRPR_E$	*Non-renewable primary resources used as an energy carrier*	*HWD*	*Hazardous waste disposed*	*B7*	*Operational water use*
$NRPR_M$	*Non-renewable primary resources with energy content used as a material*	*NHWD*	*Non-hazardous waste disposed*	*C1*	*De-construction/Demolition*
RPR_E	*Renewable primary resources used as an energy carrier*	*A1-3*	*Production stage*	*C2*	*Transport*
RPR_M	*Renewable primary resources with energy content used as a material*	*A4*	*Transport to site*	*C3*	*Waste processing*
RE_{DWPS}	*Recovered energy from disposal of waste in previous systems*	*A5*	*Installation*	*C4*	*Disposal*
$ADP_{fossil,E}$	*Abiotic depletion potential for fossil resources used as energy*	*B1*	*Use*		

Note: “E±Y” means “× 10 $^{±Y}$“. E.g. “2.8E-1” means 0.28. Module D is not declared.

4.6. Life cycle impact assessment – interpretation

Sikagard® Duroplast® (5-yr market service life)

The result interpretation of the Sikagard® Duroplast® system (Table 7) is presented in this section. Due to the high number of studied products, this system was selected as a typical wall coating system for the interpretation.

Potential environmental impact indicators

As observed in Figure 3, the **replacement module** (B4) is the main contributors to most indicators (74 % to 80 % of impacts excluding ozone depletion), mainly because of the 5-year service life. The production of the raw materials required for each recoat is the cause of this high contribution for the GWP, AP, and EP indicators. For SFP, recoats have a significant impact because of the VOC content of the system. For this reason, the B1 module (**use**), which includes the installation according to the PCR for architectural coatings for this EPD, has a significant contribution to this indicator. For the ozone depletion indicator (ODP), the **raw material supply** (A1) is by far the most contributing module with 87 % of the total, because one of the coating contains tetrafluoroethylene, a substance that uses ozone depleting gases during its production. However, the production data used for this substance from the ecoinvent database is not up to date and today's production is not likely to have such an impact on the ozone layer, since the substance is produced in the United States, a signatory country of the Montreal Protocol banning most ozone-depleting substances. Unfortunately, more recent production data were not available.

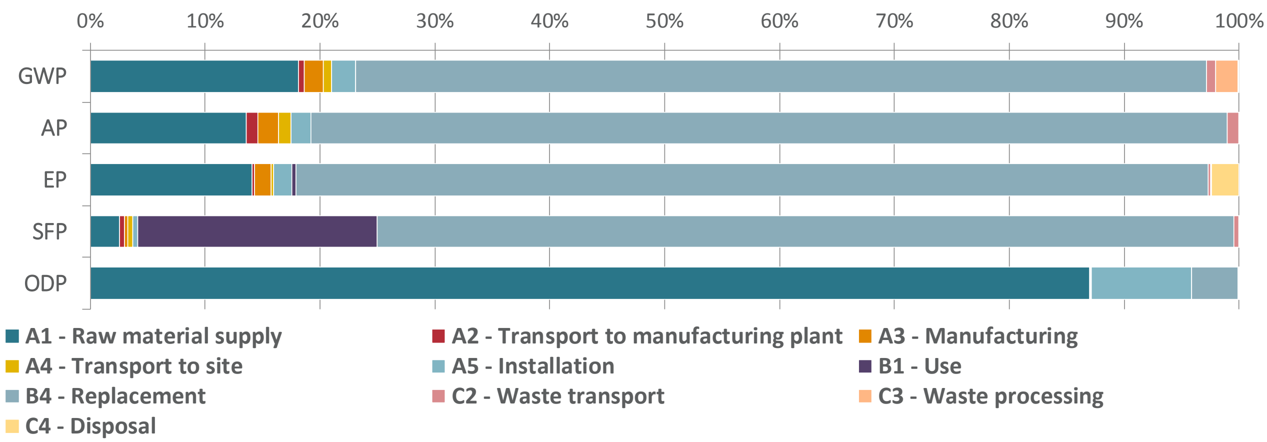

Figure 3: Relative contribution of life cycle modules to potential environmental impacts for 1 m² of Sikagard® Duroplast® system (average coverage, 5-yr market service life)[2]

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

As for global warming the resource use indicator results are dominated by the **module A1** and **B4** mainly due to the production of epoxy resin and titanium dioxide for components. Fresh water consumption has a similar contribution profile since no cleaning was included in B2 for the wall coating systems, a water intensive activity. Renewable primary energy used as a material in this system is from paper packaging.

Waste generation indicators

Most waste disposed is attributed to the C4 module, the **end of life**, and is classified as non-hazardous. It includes the initial applied system, all applied recoats and all unused coating over the 60-yr period. The non-hazardous waste disposed of in **installation** (B1) and **recoating** (B4) is packaging. A small amount of hazardous waste is generated by the **manufacturing** (A3).

[2] Modules B2, B3, B5, B6, B7, and C1 are null.

5. Additional environmental information

This section provides additional relevant environmental information about the manufacturer and the wall systems that was not derived from the LCA.

Sika's Commitment to sustainability

Providing long lasting and high-performance solutions to the benefit of our customers, Sika is committed to pioneering sustainable solutions that are safer, have the lowest impact on resources and address global environmental challenges. Therefore, Sika assumes the responsibility to provide sustainable solutions in order to improve material, water and energy efficiency in construction and transportation. Sika strives to create more value for all its stakeholders with its products, systems and solutions along the whole value chain and throughout the entire life span of its products. Sika is committed to measure, improve and communicate sustainable value creation: "More value, less impact" refers to the company's commitment to maximize the value of its solutions to all stakeholders while reducing resource consumption and impact on the environment.

With the aim of enhancing utility and reducing impacts, the company continues to work on its six strategic target areas, namely economic performance, sustainable solutions, local communities/society, energy, waste/water, and occupational safety. Year after year, Sika honors its responsibility through reporting its performance in a sustainability report in line with the highest standards, the Global Reporting Initiative (GRI). More particularly, the implementation of life-cycle thinking throughout all phases from product development to the use of the products by customers marks Sika's goal to move away from being a mere product supplier to a provider of innovative solutions which enhances the efficiency, durability, and aesthetic appeal of buildings, infrastructure, and installations.

VOC content

System components covered by this EPD contain between 43 and 335 grams of VOC per litre, which is in conformity with national standards and LEED requirements (see Table 15 for detailed VOC content per component). The VOC content was measured according to U.S.EPA 24 or ASTM D2369 standard methods.

Table 15: VOC content components

Components	VOC content (g/L)
Sika® Duochem F.R. Mesh	Not available.
Sikagard® Duroplast® EE	65
Sikagard® Duroplast®-100 N	43 (non diluted) 86 (diluted)
Sikagard® Duroplast®-150 N	43 (matte) 58 (satin) 138 (gloss)
Sikagard® SN-100	≤ 335
Sikagard® SN-40 Lo-VOC	≤ 335
Sikagard®-550 W Elastic	≤ 50

Waste packaging management

Sika Canada encourages its customers to responsibly dispose of used packaging. Most of them are recyclable. To make recycling easier, it is recommended to separate used packaging according to their material (paper, plastic and metal). Ask information to local municipalities about recycling programs for industrial coating packaging.

6. GLOSSARY

6.1. Acronyms

$ADP_{fossil,E}$	Abiotic depletion potential for fossil resources used as energy
$ADP_{fossil,M}$	Abiotic depletion potential for fossil resources used as materials
AP	Acidification potential
CSA	Canadian Standards Association
EP	Eutrophication potential
FW	Consumption of fresh water
GHG	Greenhouse gas
GWP	Global warming potential
HLRW	High-level radioactive waste
HWD	Hazardous waste disposed
ILLRW	Intermediate/low-level radioactive waste
ISO	International Organization for Standardization
kg CFC-11 eq.	Kilogram of trichlorofluoromethane equivalent
kg CO_2 eq.	Kilogram of carbon dioxide equivalent
kg N eq.	Kilogram of nitrogen equivalent
kg O_3 eq.	Kilogram of ozone equivalent
kg SO_2 eq.	Kilogram of sulphur dioxide equivalent
L	litre
LCA	Life cycle assessment
LEED	Leadership in Energy and Environmental Design
LHV	Lower heating value
MJ	Megajoule
m^2	Square meter
m^3	Cubic meter
NHWD	Non-hazardous waste disposed
NRPRE	Non-renewable primary resources used as an energy carrier
NRPRM	Non-renewable primary resources with energy content used as a material
NRSF	Non-renewable secondary fuels
ODP	Ozone depletion potential
PCR	Product category rules
RE_{DWPS}	Recovered energy from disposal of waste in previous systems
RPRE	Renewable primary resources used as an energy carrier
RPRM	Renewable primary resources with energy content used as a material
RSF	Renewable secondary fuels
SFP	Smog formation potential
SM	Secondary materials
VOC	Volatile organic compound

6.2. Environmental impact categories and parameters assessed

The **acidification potential** refers to the change in acidity (i.e. reduction in pH) in soil and water due to human activity. The increase in NO_x and SO_2 emissions generated by the transportation, manufacturing and energy 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 sulphur dioxide equivalents (**kg SO_2 equivalent**).

The **eutrophication potential** 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**).

Net fresh water consumption accounts for the imbalance in the natural water cycle created by the water evaporated, consumed by a system or released to a different watershed (i.e. not its original source). This imbalance can cause water scarcity and affect biodiversity. This indicator refers to the waste of the resource rather than its pollution. Also, it does not refer to water that is used but returned to the original source (e.g. water for hydroelectric turbines, cooling or river transportation) or lost from a natural system (e.g. due to evaporation of rainwater). The quantity of freshwater consumed is expressed as a volume of water in meter cube (**m^3 of water consumed**).

The **global warming potential** 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** 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 **smog formation potential** 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**).

The **renewable/non-renewable primary energy consumption** parameters refer to the use of energy from renewable resources (e.g., wind, solar, hydro) and non-renewable resources (e.g., natural gas, coal, petroleum). The quantity of primary energy used is expressed in megajoules, on the basis of the lower heating value of the resources (**MJ, LHV**).

The **renewable/non-renewable material resources consumption** parameters represent the quantity of material made from renewable resources or non-renewable resources used to manufacture a product, excluding recovered or recycled materials. The quantity of these resources is reported in kilograms (**kg**).

7. REFERENCES

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