SOPRASEAL STICK 1100T, SOPRASOLIN HD and SOPRAVAP'R Self-Adhesive Air/Vapour Barrier Membranes

SOPREMA Inc.

ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025:2006 and ISO 21930:2017

ASTM INTERNATIONAL

SOPREMA is pleased to present this Environmental Product Declaration (EPD) for the SOPRASEAL STICK 1100 T, SOPRASOLIN HD and SOPRAVAP'R. This EPD was developed in compliance with ISO 14025 and ISO 21930 and has been verified by Lindita Bushi, Ph.D., Athena Sustainable Materials Institute.

The LCA and the EPD were prepared by Vertima Inc. The EPD includes cradle-to-gate life cycle assessment (LCA) results.

For more information about SOPREMA, visit www.soprema.ca.

For any explanatory material regarding this EPD, please contact the program operator.

1. GENERAL INFORMATION

PCR GENERAL INFORMATION			
Reference PCR	Water-Resistive and Air Barriers ASTM International September 2017 to September 2023 (validity period)		
The PCR review was conducted by:	*Thomas P. Gloria (chair)* *Industrial Ecology Consultants* *t.gloria@industrial-ecology.com*	*Graham Finch* *RDH Builiding Science, Inc.*	*Paul H. Shipp* *USG Corporation*

EPD GENERAL INFORMATION		
Program Operator	ASTM International 100 Barr Harbor Drive, West Conshohocken, PA 19428 www.astm.org	
Declared Products	**SOPRASEAL STICK 1100 T** **SOPRASOLIN HD** **SOPRAVAP'R**	
EPD Registration Number EPD 509	**EPD Date of Issue** July 20, 2023	**EPD Period of Validity** July 19, 2028
EPD Recipient Organization	SOPREMA 1688, Jean-Berchmans-Michaud Drummondville (Quebec) J2C 8E9 Canada www.soprema.ca	

EPD Type/Scope and Declared Unit	**Year of Reported Manufacturer Primary Data**
Product specific cradle-to-gate EPD with declared unit of 1 m^2 of membrane	2021

Geographical Scope	**LCA Software**	**LCI Databases**	**LCIA Methodology**
North America	OpenLCA v.1.11.0	Ecoinvent 3.9.1 and US LCI	TRACI 2.1, CED LHV v1.0 and HHV v.1.01

This LCA and EPD were prepared by:	Chantal Lavigne, M.A Sc Vertima Inc. www.vertima.ca
This EPD and LCA were independently verified in accordance with ISO 14025:2006, ISO 14040:2006, ISO 14044:2006 and ASTM International PCR "Water-Resistive and Air Barriers." ☐ Internal ☒ External	Lindita Bushi Lindita Bushi, Ph.D. Athena Sustainable Materials Institute

LIMITATIONS

Environmental declarations from different programs (ISO 14025) may not be comparable.[1]

Furthermore, "*comparison of construction products using an EPD shall be carried out in the context of the construction works. Consequently, comparisons of the environmental performance of construction products using the EPD shall consider all the relevant information modules over the full life cycle of the products within the construction works. Such a comparison requires scenarios in the construction works context. The provision of ISO 14025:2066, 6.7.2 on comparability shall apply.*"[2] In sum, "EPDs based on a declared unit shall not be used for comparisons."[3]

The EPDs prepared from this report are not comparable as they are cradle-to-gate EPDs.

[Photo courtesy of SOPREMA]

2. PRODUCT SYSTEM DESCRIPTION

SOPREMA is an international manufacturer specializing in the production of innovative products for waterproofing, insulation, soundproofing and vegetated solutions for the roofing, building envelope and civil engineering sectors. SOPREMA manufactures several types of water barriers and air barriers.

2.1. PRODUCT DESCRIPTION

SOPRASEAL STICK 1100 T membrane
[Photo courtesy of SOPREMA].

SOPRASEAL STICK 1100 T[1] is a self-adhesive air/vapour barrier membrane composed of SBS modified bitumen and a tri-laminated woven polyethylene facer used on walls. The tri-laminated woven polyethylene is compatible for the use of sprayed polyurethane foam insulation. The underface is covered with a silicone release paper or film. It can also be used as masonry and through-wall flashing membrane as well as waterproofing membrane at openings and transitions.

SOPRASOLIN HD[2] is a self-adhesive air/vapour barrier membrane composed of SBS modified bitumen protected by aluminum foil to resist bad weather and UV rays. It is designed to waterproof details around penetrations, such as vents, vent ducts, skylights, and chimneys.

SOPRASOLIN HD membrane
[Photo courtesy of SOPREMA].

[1] SOPRASEAL STICK 1100 T is classified under the Construction Specification Institute (CSI) MasterFormat code 07 27 13 Modified Bituminous Sheet Air Barriers.

[2] SOPRASOLIN HD is classified under the Construction Specification Institute (CSI) MasterFormat code 07 27 13 Modified Bituminous Sheet Air Barriers.

SOPRAVAP'R[3] is a self-adhesive air and vapour barrier membrane composed of a tri-laminated woven polyethylene facer and SBS modified bitumen. The underface is covered with a silicone release film. SOPRAVAP'R is used as a vapour barrier on insulated roof systems. The width of the membrane has been specifically determined to allow the membrane to fit with most structural steel decks.

SOPRAVAP'R membrane
[Photo courtesy of SOPREMA].

2.2. TECHNICAL DATA

Properties	Standards	SOPRASEAL STICK 1100 T	SOPRAVAP'R
Tensile strength, MD/XD	ASTM D5147	13.1 / 9.6 kN/m (74 / 55 lb/in)	9.5 / 12 kN/m (54 / 68 lb/in)
Ultimate elongation, MD/XD	ASTM D5147	40 / 25%	33 / 20%
Water vapour transmission	ASTM E96 (Procedure B)	< 2.5 ng/Pa•s•m² (< 0.04 perm)	< 2.5 ng/Pa.s.m² (< 0.04 perm)
Air permeability, 75 Pa	ASTM E2178	< 0.0005 L/s•m² (< 0.00001 cfm/pi²)	< 0.001 L/s•m2
Air leakage resistance	ASTM E2357	< 0.002 L/s•m²	n/a
Air permeance of membrane	CAN/ULC S741	< 0.001 L/s•m²	n/a
Air leakage rate classification	CAN/ULC S742	A1	n/a

(All values are nominal)

Properties	Standards	SOPRASOLIN HD
Tensile strength, MD/XD	CAN/CGSB-37.56-M 9th draft	4.7 / 4.7 kN/m
Ultimate elongation, MD/XD	CAN/CGSB-37.56-M 9th draft	210 / 210%
Tear resistance, MD/XD	CAN/CGSB-37.56-M 9th draft	20 / 35 N

(All values are nominal)

[3] SORPAVAP'R is classified under the Construction Specification Institute (CSI) MasterFormat code 07 27 13 Modified Bituminous Sheet Air Barriers.

SOPRASOLIN HD has not been tested for air permeability and air leakage because it is used as a complementary product in an air barrier assembly. It is used when a portion of the air barrier system must be exposed. Because of its composition, SOPRASOLIN HD would have the same performances as SOPRASEAL STICK 1100T if it were tested by itself.

2.3. PROPERTIES OF DECLARED PRODUCT AS DELIVERED

Specifications	SOPRASEAL STICK 1100 T (complete roll)	SOPRASEAL STICK 1100 TC (pre-cut roll)
Thickness	1.0 mm (40 mil)	
Dimensions	0.91 m x 22.9 m (3 ft x 75 ft)	100 mm x 22.9 m (4 in x 75 ft) 150 mm x 22.9 m (6 in x 75 ft) 225 mm x 22.9 m (9 in x 75 ft) 300 mm x 22.9 m (12 in x 75 ft) 400 mm x 22.9 m (18 in x 75 ft)
Weight including release film	0.975 kg/m^2 (0.2 lb/ft2)	
Selvedge width	50 mm (2 in)	-
Surface	Tri-laminated woven polyethylene	
Underface	Silicone release paper	Silicone release polyester film
More details are available at	https://www.soprema.ca/en/products-systems/sopraseal-stick-1100-t	

(All values are nominal)

Specifications	SOPRASOLIN HD	SOPRAVAP'R
Thickness	1.0 mm (40 mil)	0.8 mm (31 mil)
Dimensions	1 m x 10 m (3.3 ft x 33 ft)	1.14 m x 40.8 m (3.7 x 134 ft)
Weight including release film	1.025 kg/m^2 (0.210 lb/ft2)	0.763 kg/m2 (0.16 lb/ft2)
Selvedge width	n/a	75 mm (3 in)
Surface	Foil laminate	Tri-layer laminated polyethylene
Underface	Silicone release film	Silicone release film
More details are available at	https://www.soprema.ca/en/products-systems/soprasolin-hd	https://www.soprema.ca/en/products-systems/sopravap-r

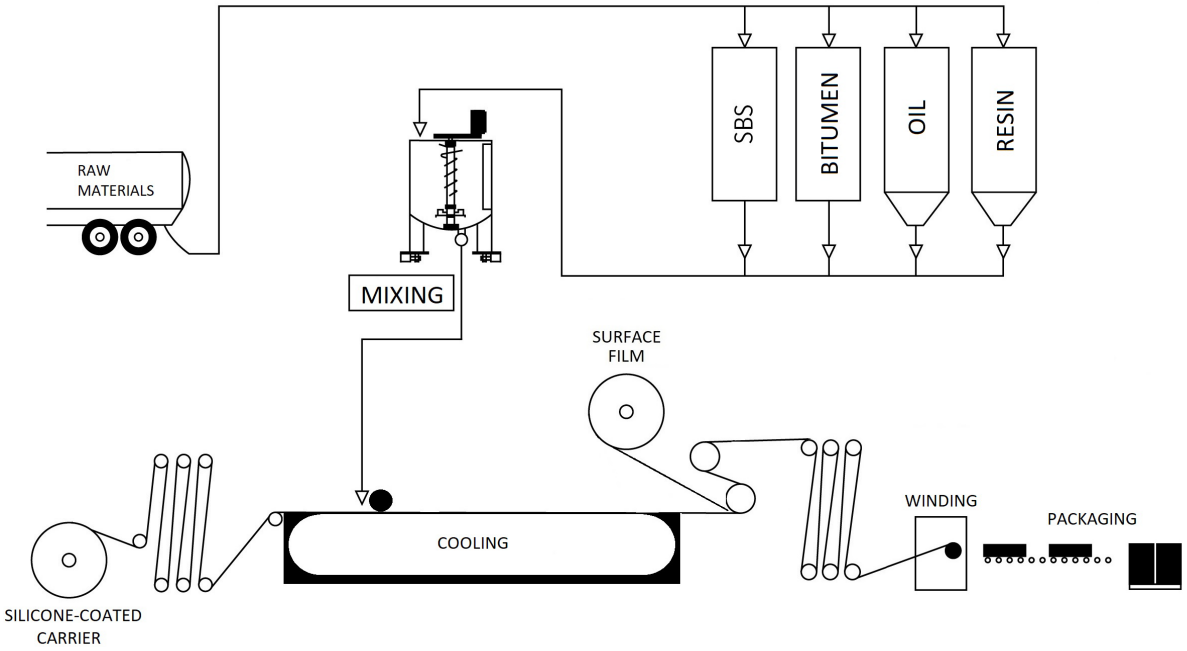
(All values are nominal)

2.4. MATERIAL COMPOSITION

Component/Material	SOPRASEAL STICK 1100 T (production average)	SOPRASOLIN HD	SOPRAVAP'R
SBS-modified bitumen mixture	80.7%	85.9%	81.3%
Tri-laminated woven polyethylene	12.5%	0.0%	15.5%
Foil laminate	0.0%	11.7%	0.0%
Silicon-coated release film	0.0%	2.4%	3.3%
Silicon-coated release paper	2.4%	0.0%	0.0%
Silicon-coated release polyester	4.4%	0.0%	0.0%
TOTAL	100.0%	100.0%	100.0%

2.5. MANUFACTURING

Manufacturing SBS-modified bitumen air barrier sheet materials, as shown in the figure below, involves the deposition of a thin layer of SBS-modified asphalt between a high strength facer (tri-laminated woven polyethylene or foil laminate) and a silicone-coated release layer. The SBS-modified asphalt is produced by mixing the appropriate proportions of polymer (SBS), asphalt (also called bitumen), oil, and resin. The product is cooled, wound into rolls, and packaged for shipment.



SOPRASEAL STICK 1100 T, SOPRASOLIN HD and SOPRAVAP'R manufacturing process.

2.6. PACKAGING

Products are rolled on a cardboard tube on which a cardboard lip has been glued to add protection to the end of the roll. Tape is applied on the rolls to keep them from unrolling. Prior to stacking the rolls on a wooden pallet, a silicone-coated paper is placed on the pallet to prevent the rolls from sticking to the pallet. The pallets are covered by a labelled pallet bag and can be further shrink wrapped when products are sent to stores.

SOPRASEAL STICK 1100 T, SOPRASOLIN HD and SOPRAVAP'R Packaging Materials per DU

Packaging	Material	SOPRASEAL STICK 1100 T	SOPRASOLIN HD	SOPRAVAP'R
Pallet	Wood (kg/m^2)	1.98E-02	2.08E-02	1.55E-02
Cardboard tube, tube lip	Cardboard (kg/m^2)	1.08E-02	1.14E-02	8.45E-03
Pallet bag, stretch film	LDPE (kg/m^2)	1.70E-03	1.79E-03	1.33E-03
Adhesive tape	PVC (kg/m^2)	1.77E-04	1.87E-04	1.39E-04
Pallet labels	Paper (kg/m^2)	3.75E-06	3.94E-06	2.93E-06
Ribbon	PP (kg/m^2)	1.21E-07	1.27E-07	9.46E-08
Glue	PVA (kg/m^2)	1.10E-04	1.15E-04	8.58E-05
Si-coated paper	Paper, polyethylene, Si (kg/m^2)	2.65E-04	2.78E-04	2.07E-04

2.7. PRODUCT INSTALLATION

SOPRASEAL STICK 1100 T, SOPRASOLIN HD and SOPRAVAP'R are self-adhesive membranes. To apply, peel off the top portion of the silicone release film/paper and adhere the membrane to the substrate, making sure that the membrane is well aligned. Gradually peel off the remaining silicone release film, making sure the membrane is kept tight and adheres completely to avoid air pockets and wrinkles. Once the membrane is installed, use a hard roller to apply pressure over the entire surface to ensure uniform adhesion to the substrate. Refer to the table below for details on gross/net coverage per roll and application temperatures.

Specifications	Gross / Net coverage per roll	Application temperature
SOPRASEAL STICK 1100 T	20.8 / 19.7 m^2 (215 / 205 ft^2)	-10 to 10°C (14 to 50°F) – winter 10 to 50°C (50 to 122°F) - summer
SOPROASOLIN HD	10 m^2 gross coverage	10 to 50°C (50 to 122°F)
SOPRAVAP'R	46.5 / 43.5 m^2 (500 / 468 ft^2)	> 10°C (14°F)

2.8. REFERENCE SERVICE LIFE AND CONDITION OF USE

For this EPD, the system boundaries encompass a cradle-to-gate scope. Environmental impacts of products in the use phase are excluded from this declaration, per ASTM PCR Water-Resistive and Air Barriers.[3]

2.9. DISPOSAL

At their end-of-life, SOPREMA membranes are sent to landfill.

3. LCA CALCULATION RULES

3.1. DECLARED UNIT

The selected declared unit (DU) for this study is **1 m² of membrane**.

Description	SOPRASEAL STICK 1100T (production average)	SOPRASOLIN HD	SOPRAVAP'R
Declared unit	1 m²	1 m²	1 m²
Mass (kg /m²)	0.975	1.025	0.763
Product density (kg/m³)	975.0	1281.8	763.0
Thickness (mm)	1.0	0.8	1.0

3.2. PRODUCTION AVERAGE

In this EPD, a weighted average is used for the

- SOPRASEAL STICK 1100 T, winter and summer, with silicone release paper and SOPRASEAL STICK 1100 TC, winter and summer, with silicone release film, produced at a facility located in Quebec (Canada).

No average is used for the other studied products:

- SOPRASOLIN HD produced at one facility located in Quebec (Canada)
- SOPRAVAP'R produced at one facility located in Quebec (Canada)

3.3. SYSTEM BOUNDARIES

According to ASTM's PCR,[3] the LCA modelling system boundaries can be **cradle-to-gate**, i.e., only cover the production life cycle stage as illustrated in Table 1. Within this life cycle stage, three (3) modules are considered, namely A-1) Extraction and upstream production, A-2) Transport to factory and A-3) Manufacturing. Construction (A-4; A-5), use (B-1 to B-7) and end-of-life (C-1 to C-4) stages are not included in this EPD. Figure 1 present the process flow diagram for SOPREMA's products. Neither green power nor CO_2 credits are used within the scope of this project.

Table 1: Description of the system boundary life cycle stages and related information modules

PRODUCTION STAGE			CONSTRUC-TION PROCESS STAGE		USE STAGE							END-OF-LIFE STAGE			
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Extraction and Upstream Production	Transport to Factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport to Waste Processing or	Waste Processing	Disposal of Waste
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Key: X = included; MND = module not declared (excluded)

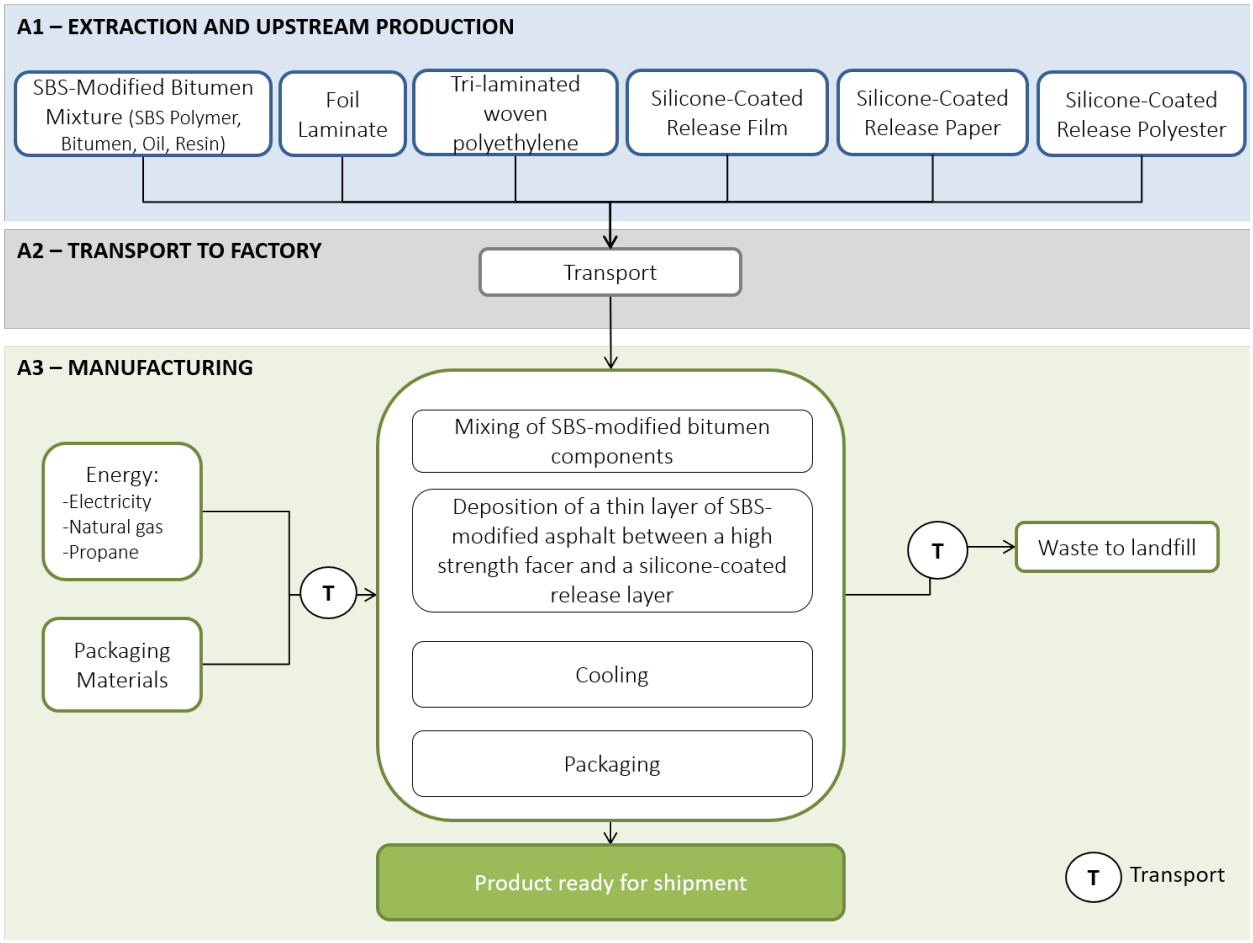


Figure 1: System Boundaries of Cradle-to-Gate LCA of SOPREMA's SOPRASEAL STICK 1100 T, SOPRASOLIN HD and SOPRAVAP'R membranes.

Extraction and upstream production: This module includes the extraction and transformation of raw materials needed to produce the SOPRASEAL STICK 1100 T, SOPRASOLIN HD and SOPRAVAP'R air barrier membranes.

Transport to factory: This module includes the transportation of raw materials to the manufacturing facility located in the province of Quebec (Canada).

Manufacturing: This stage includes electricity, natural gas and propane consumption as well as production waste, which is sent to the local landfill. The manufacturing process does not require water, nor does it emit emissions directly to air, water or soil.

Packaging materials to make products ready for shipment, as well as their transport to the manufacturing facility, is also covered by this stage.

3.4. CUT-OFF CRITERIA

According to ISO 21930:2017, cut-off rules shall not be applied to hide data. All data shall be included. In the case of insufficient data, the cut-off criteria shall be 1% of energy or 1% of total mass input and 1% of environmental impacts of the unit process. The total cut-off input flows per modules shall be a maximum of 5% energy, mass and environmental impacts.

No known flows are deliberately excluded from this EPD.

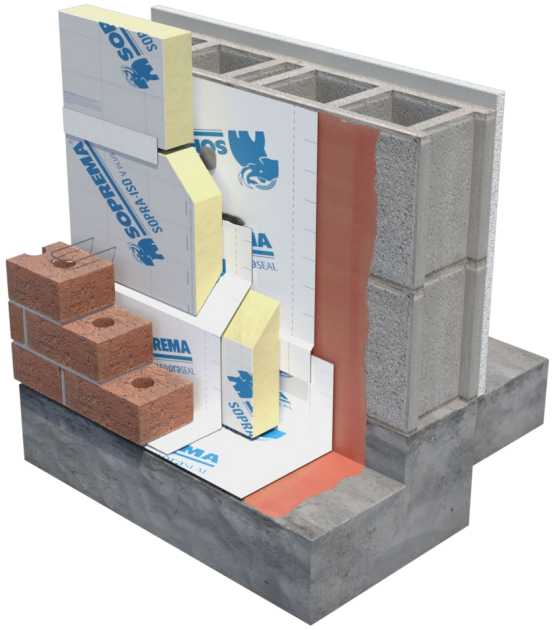
For this EPD, no data on the construction, maintenance or dismantling of the capital assets, daily transport of employees, office work, business trips or other employee activities were included in the model. The model only takes into account the processes associated with infrastructure that are already included in the ecoinvent unit processes.

3.5. ALLOCATION

Allocation, if required, shall follow the requirements and guidance of ISO 14044:2006, Section 4.3.4.[3], [4]

Energy data was provided for the entire manufacturing plants; thus, **mass** allocation was used to assign the share of energy consumed in the factory to the product under study.

Waste processing of the material flows undergoing **recycling processes** are included up to the system boundary of the end-of-waste state.[2] In other words, a **cut-off approach** was used as further processing of the recycled material is part of raw material preparation of another product system (open-loop recycling).



[Photo courtesy of SOPREMA]

3.6. DATA SOURCES AND QUALITY REQUIREMENTS

Data Quality Parameter	Data Quality Discussion
Source of manufacturing data	Manufacturing data was collected from a specific manufacturing facility, which represents 100% of product production. This data included total annual mass and area of products under study: raw materials entering the production of the products under study, losses of materials, transport distance of materials, waste treatment, and product packaging. The data also included electricity consumption for the entire manufacturing facility as well as the total annual production of all products produced.
Source of secondary data	Background data were taken from the ecoinvent 3.9.1 "cut-off" database.[5] Datasets were selected based on their representativeness of the products' composing materials. When appropriate, the dataset's grid mix was changed for the grid mix of the province or country where production takes places. Otherwise, ecoinvent data representative of the global market or "rest-of-the-world" were selected as proxies.
Geographical representativeness	Electricity consumption is based on the electricity mix provided by the electricity supplier. Geographical correlation of the material composing the product and the selected datasets are largely representative of the same area. When this was not possible, datasets representing a larger geographical area were taken.
Temporal representativeness	Primary data represents the 2021 production year. Life cycle inventory datasets from ecoinvent are not always published within the last 10 years; nevertheless, ecoinvent remains a reference LCI database.
Technological representativeness	Primary data, obtained from the manufacturer, is representative of the current technologies and materials used by this company.
Completeness	All relevant process steps were considered and modelled to satisfy the goal and scope. No known flows were cut off.

4. LIFE CYCLE ASSESSMENT RESULTS

4.1. RESULTS TABLES

It should be noted that 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.

Environmental Indicator		Unit
TRACI 2.1		
GWP_{100}-AR5(1)	Global warming potential	kg CO_2 eq.
GWP_{100}-AR4(2)	Global warming potential	kg CO_2 eq.
AP	Acidification potential	kg SO_2 eq.
EP	Eutrophication potential	kg N eq
ODP	Ozone layer depletion potential	kg CFC-11 eq.
SFP	Smog formation potential	kg O_3 eq
RDP	Resource depletion potential – fossil fuels	MJ Surplus
Resource Use		
PENR-fossil	Primary energy non-renewable, fossil	MJ, HHV
PENR-nuclear	Primary energy non-renewable, nuclear	MJ, HHV
PER-biomass	Primary energy renewable, biomass	MJ, HHV
PER-swhg	Primary energy renewable, solar, wind, hydroelectric and geothermal energy	MJ, HHV
Material Resources Consumption and Waste		
NRMR(3)	Non-renewable material resources	kg
RMR(4)	Renewable material resources	kg
NFW(5)	Net fresh water	L
HWD(6)	Hazardous waste disposed	kg
NHWD(7)	Non-hazardous waste disposed	kg

Table Notes – TRACI 2.1

(1) GWP 100, excludes biogenic CO2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

(2): GWP 100, excludes biogenic CO2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2007 Fourth Assessment Report (AR4).

Table Notes – Material Resource Consumption and Waste

(3): Calculated based on the product's material input.

(4): Calculated based on the product's material input.

(5): Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption using ReCiPe Midpoint (E) 2016.

(6): Calculated from life cycle inventory results, based on datasets classified under " treatment and disposal of hazardous waste." The manufacturer does not generate hazardous waste during the manufacturing process.

(7): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive."

Additional Environmental Indicators		*Unit*
Resource use		
RPR_E[(1)]	Renewable primary resources used as energy carrier (fuel)	MJ, LHV
RPR_M[(2)]	Renewable primary resources with energy content used as material	MJ, LHV
RPR_T	Renewable primary resources total	MJ, LHV
$NRPR_E$[(3)]	Non-renewable primary resources used as energy carrier (fuel)	MJ, LHV
$NRPR_M$[(4)]	Non-renewable primary resources with energy content used as material	MJ, LHV
$NRPR_T$	Non-renewable primary resources total	MJ, LHV
SM(	Secondary materials	kg
RSF	Renewable secondary fuels	MJ, LHV
NRSF	Non-renewable secondary fuels	MJ, LHV
FW[(5)]	Use of net freshwater resources	m^3
Output Flows and Waste Categories		
HWD[(6)]	Hazardous waste disposed	kg
NHWD[(7)]	Non-hazardous waste disposed	kg
HLRW[(8)]	High-level radioactive waste, conditioned, to final repository	m^3
ILLRW[(9)]	Intermediate- and low-level radioactive waste, conditioned to final repository	m^3
CRU	Components for re-use	kg
MFR	Materials for recycling	kg
MER	Materials for energy recovery	kg
EE	Exported energy	MJ, LHV

Table Notes – Resource Use

(1): $RPR_E = RPR_T - RPR_M$, where RPR_T is equal to the value for renewable energy obtained using the CED LHV methodology.
(2): Calculated as per ACLCA ISO 21930 Guidance, 6.2 Renewable primary resources with energy content used as a material, RPR_M.
(3): $NRPR_E = NRPR_T - NRPR_M$, where $NRPR_T$ is equal to the value for non-renewable energy obtained using the CED LHV methodology.
(4): Calculated as per ACLCA ISO 21930 Guidance, 6.4 Non-renewable primary resources with energy content used as a material, $NRPR_M$.
(5): Represents the use of net fres water calculated from life cycle inventory results, i.e., water consumption using ReCiPe Midpoint (E) 2016.

Table Notes – Output Flows and Waste Categories

(6): Calculated from life cycle inventory results, based on datasets classified under " treatment and disposal of hazardous waste." The manufacturer does not generate hazardous waste during the manufacturing process.
(7): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive."
(8): Calculated from life cycle inventory results, based on ecoinvent waste flow "high-level radioactive waste for final repository."
(9): Calculated from life cycle inventory results, based on ecoinvent waste flow "low-level radioactive waste for final repository."

SOPRASEAL STICK 1100 T (production average)					
Environmental Indicator	Unit	A1 (per m^2)	A2 (per m^2)	A3 (per m^2)	A1 - A3 (per m^2)
TRACI 2.1					
GWP_{100}-AR5[(1)]	kg CO_2 eq.	1.78E+00	1.19E-01	5.31E-02	1.95E+00
GWP_{100}-AR4[(2)]	kg CO_2 eq.	1.76E+00	1.19E-01	5.22E-02	1.93E+00
AP	kg SO_2 eq.	6.11E-03	1.29E-03	1.39E-04	7.54E-03
EP	kg N eq	2.29E-03	9.14E-05	7.67E-05	2.46E-03
ODP	kg CFC-11 eq.	1.89E-05	3.31E-10	6.20E-08	1.89E-05
SFP	kg O_3 eq	9.61E-02	3.99E-02	2.96E-03	1.39E-01
RDP	MJ Surplus	7.01E+00	1.80E-01	2.06E-02	7.21E+00
Resource Use					
PENR-fossil	MJ, HHV	7.51E+01	1.45E+00	8.31E-01	7.73E+01
PENR-nuclear	MJ, HHV	8.21E-01	1.26E-04	4.45E-02	8.66E-01
PER-biomass	MJ, HHV	1.36E+00	2.72E-04	1.87E-01	1.55E+00
PER-swhg	MJ, HHV	6.51E-01	2.06E-03	3.43E-01	9.96E-01
Material Resource Consumption and Waste					
NRMR[(3)]	kg	9.33E-01	0.00E+00	0.00E+00	9.33E-01
RMR[(4)]	kg	4.22E-02	0.00E+00	0.00E+00	4.22E-02
NFW[(5)]	L	1.10E+01	1.51E-02	1.84E+00	1.29E+01
HWD[(6)]	kg	6.02E-01	7.96E-04	2.60E-02	6.29E-01
NHWD[(7)]	kg	3.05E-01	1.25E-03	3.34E-02	3.40E-01

Table Notes – TRACI 2.1

(1) GWP 100, excludes biogenic CO2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

(2): GWP 100, excludes biogenic CO2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2007 Fourth Assessment Report (AR4).

Table Notes – Material Resource Consumption and Waste

(3): Calculated based on the product's material input.

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(5): Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption using ReCiPe Midpoint (E) 2016.

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(7): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive."

SOPRASEAL STICK 1100 T (production average)					
Environmental Indicator	Unit	A1 (per m^2)	A2 (per m^2)	A3 (per m^2)	A1 - A3 (per m^2)
Resource Use					
RPR_E[1]	MJ, LHV	1.39E+00	2.33E-03	5.30E-01	1.93E+00
RPR_M[2]	MJ, LHV	6.17E-01	0.00E+00	0.00E+00	6.17E-01
RPR_T	MJ, LHV	2.01E+00	2.33E-03	5.30E-01	2.54E+00
$NRPR_E$[3]	MJ, LHV	2.88E+01	1.30E+00	2.64E-01	3.03E+01
$NRPR_M$[4]	MJ, LHV	3.80E+01	0.00E+00	0.00E+00	3.80E+01
$NRPR_T$	MJ, LHV	6.67E+01	1.30E+00	2.64E-01	6.83E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW[5]	m^3	1.10E-02	1.51E-05	1.84E-03	1.29E-02
Output Flows and Waste Categories					
HWD[6]	kg	6.02E-01	7.96E-04	2.60E-02	6.29E-01
NHWD[7]	kg	3.05E-01	1.25E-03	3.34E-02	3.40E-01
RWD		1.44E-07	3.36E-11	2.89E-08	1.73E-07
HLRW[8]	m^3	3.98E-10	9.26E-14	7.97E-11	4.78E-10
ILLRW[9]	m^3	3.30E-09	5.46E-13	1.75E-10	3.48E-09
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.31E-03	0.00E+00	0.00E+00	1.31E-03
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table Notes – Resource Use

(1): $RPR_E = RPR_T - RPR_M$, where RPR_T is equal to the value for renewable energy obtained using the CED LHV methodology.
(2): Calculated as per ACLCA ISO 21930 Guidance, 6.2 Renewable primary resources with energy content used as a material, RPR_M.
(3): $NRPR_E = NRPR_T - NRPR_M$, where $NRPR_T$ is equal to the value for non-renewable energy obtained using the CED LHV methodology.
(4): Calculated as per ACLCA ISO 21930 Guidance, 6.4 Non-renewable primary resources with energy content used as a material, $NRPR_M$.
(5): Represents the use of net freshwater calculated from life cycle inventory results, i.e., water consumption using ReCiPe Midpoint (E) 2016.

Table Notes – Output Flows and Waste Categories

(6): Calculated from life cycle inventory results, based on datasets classified under "treatment and disposal of hazardous waste." The manufacturer does not generate hazardous waste during the manufacturing process.
(7): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive."
(8): Calculated from life cycle inventory results, based on ecoinvent waste flow "high-level radioactive waste for final repository."
(9): Calculated from life cycle inventory results, based on ecoinvent waste flow "low-level radioactive waste for final repository."

SOPRASOLIN HD					
Environmental Indicator	Unit	A1 (per m^2)	A2 (per m^2)	A3 (per m^2)	A1 - A3 (per m^2)
TRACI 2.1					
GWP_{100}-AR5[(1)]	kg CO_2 eq.	1.66E+00	2.06E-01	5.59E-02	1.92E+00
GWP_{100}-AR4[(2)]	kg CO_2 eq.	1.66E+00	2.05E-01	5.49E-02	1.92E+00
AP	kg SO_2 eq.	5.38E-03	1.88E-03	1.46E-04	7.41E-03
EP	kg N eq	1.72E-03	1.34E-04	8.06E-05	1.93E-03
ODP	kg CFC-11 eq.	8.05E-06	5.12E-10	6.51E-08	8.12E-06
SFP	kg O_3 eq	8.44E-02	5.51E-02	3.11E-03	1.43E-01
RDP	MJ Surplus	6.95E+00	2.78E-01	2.17E-02	7.25E+00
Resource Use					
PENR-fossil	MJ, HHV	7.52E+01	2.24E+00	8.75E-01	7.83E+01
PENR-nuclear	MJ, HHV	5.94E-01	2.00E-04	4.52E-02	6.40E-01
PER-biomass	MJ, HHV	1.76E-01	4.36E-04	1.96E-01	3.73E-01
PER-swhg	MJ, HHV	5.37E-01	3.31E-03	3.61E-01	9.02E-01
Material Resource Consumption and Waste					
NRMR[(3)]	kg	9.89E-01	0.00E+00	0.00E+00	9.89E-01
RMR[(4)]	kg	3.60E-02	0.00E+00	0.00E+00	3.60E-02
NFW[(5)]	L	1.02E+01	2.40E-02	1.92E+00	1.21E+01
HWD[(6)]	kg	1.67E-01	1.27E-03	2.91E-02	1.97E-01
NHWD[(7)]	kg	5.39E-01	1.94E-03	3.35E-02	5.74E-01

Table Notes – TRACI 2.1

(1) GWP 100, excludes biogenic CO2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

(2): GWP 100, excludes biogenic CO2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2007 Fourth Assessment Report (AR4).

Table Notes – Material Resource Consumption and Waste

(3): Calculated based on the product's material input.

(4): Calculated based on the product's material input.

(5): Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption using ReCiPe Midpoint (E) 2016.

(6): Calculated from life cycle inventory results, based on datasets classified under "treatment and disposal of hazardous waste." The manufacturer does not generate hazardous waste during the manufacturing process.

(7): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive."

SOPRASOLIN HD					
Environmental Indicator	Unit	A1 (per m^2)	A2 (per m^2)	A3 (per m^2)	A1 - A3 (per m^2)
Resource Use					
RPR_E[1]	MJ, LHV	2.21E-01	3.75E-03	-9.74E-01	7.83E-01
RPR_M[2]	MJ, LHV	4.92E-01	0.00E+00	0.00E+00	4.92E-01
RPR_T	MJ, LHV	7.13E-01	3.75E-03	5.58E-01	1.27E+00
$NRPR_E$[3]	MJ, LHV	2.66E+01	2.01E+00	2.77E-01	2.88E+01
$NRPR_M$[4]	MJ, LHV	4.06E+01	0.00E+00	0.00E+00	4.06E+01
$NRPR_T$	MJ, LHV	6.71E+01	2.01E+00	2.77E-01	6.94E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW[5]	m^3	1.02E-02	2.40E-05	1.92E-03	1.21E-02
Output Flows and Waste Categories					
HWD[6]	kg	1.67E-01	1.27E-03	2.91E-02	1.97E-01
NHWD[7]	kg	5.39E-01	1.94E-03	3.35E-02	5.74E-01
RWD		1.05E-07	5.33E-11	2.84E-08	1.34E-07
HLRW[8]	m^3	2.90E-10	1.47E-13	7.83E-11	3.68E-10
ILLRW[9]	m^3	3.26E-09	8.68E-13	1.66E-10	3.42E-09
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.69E-03	0.00E+00	0.00E+00	1.69E-03
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table Notes – Resource Use

(1): $RPR_E = RPR_T - RPR_M$, where RPR_T is equal to the value for renewable energy obtained using the CED LHV methodology.
(2): Calculated as per ACLCA ISO 21930 Guidance, 6.2 Renewable primary resources with energy content used as a material, RPR_M.
(3): $NRPR_E = NRPR_T - NRPR_M$, where $NRPR_T$ is equal to the value for non-renewable energy obtained using the CED LHV methodology.
(4): Calculated as per ACLCA ISO 21930 Guidance, 6.4 Non-renewable primary resources with energy content used as a material, $NRPR_M$.
(5): Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption using ReCiPe Midpoint (E) 2016.

Table Notes – Output Flows and Waste Categories

(6): Calculated from life cycle inventory results, based on datasets classified under "treatment and disposal of hazardous waste." The manufacturer does not generate hazardous waste during the manufacturing process.
(7): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive."
(8): Calculated from life cycle inventory results, based on ecoinvent waste flow "high-level radioactive waste for final repository."
(9): Calculated from life cycle inventory results, based on ecoinvent waste flow "low-level radioactive waste for final repository."

SOPRAVAP'R					
Environmental Indicator	Unit	A1 (per m^2)	A2 (per m^2)	A3 (per m^2)	A1 - A3 (per m^2)
TRACI 2.1					
GWP_{100}-AR5[(1)]	kg CO_2 eq.	1.41E+00	9.02E-02	4.16E-02	1.54E+00
GWP_{100}-AR4[(2)]	kg CO_2 eq.	1.39E+00	8.99E-02	4.09E-02	1.52E+00
AP	kg SO_2 eq.	4.83E-03	9.81E-04	1.09E-04	5.91E-03
EP	kg N eq	1.42E-03	6.94E-05	6.00E-05	1.55E-03
ODP	kg CFC-11 eq.	8.21E-06	2.52E-10	4.85E-08	8.26E-06
SFP	kg O_3 eq	7.29E-02	3.04E-02	2.32E-03	1.06E-01
RDP	MJ Surplus	5.70E+00	1.37E-01	1.62E-02	5.85E+00
Resource Use					
PENR-fossil	MJ, HHV	6.06E+01	1.10E+00	6.51E-01	6.23E+01
PENR-nuclear	MJ, HHV	5.42E-01	9.58E-05	3.37E-02	5.76E-01
PER-biomass	MJ, HHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PER-swhg	MJ, HHV	4.86E-01	1.56E-03	2.69E-01	7.56E-01
Material Resource Consumption and Waste					
NRMR[(3)]	kg	7.63E-01	0.00E+00	0.00E+00	7.63E-01
RMR[(4)]	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NFW[(5)]	L	6.72E+00	1.14E-02	1.43E+00	8.17E+00
HWD[(6)]	kg	4.48E-01	6.04E-04	2.17E-02	4.71E-01
NHWD[(7)]	kg	2.79E-01	9.46E-04	2.49E-02	3.05E-01

Table Notes – TRACI 2.1

(1) GWP 100, excludes biogenic CO2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

(2): GWP 100, excludes biogenic CO2 removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2007 Fourth Assessment Report (AR4).

Table Notes – Material Resource Consumption and waste

(3): Calculated based on the product's material input.

(4): The product does not contain renewable material in its composition.

(5): Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption using ReCiPe Midpoint (E) 2016.

(6): Calculated from life cycle inventory results, based on datasets classified under "treatment and disposal of hazardous waste." The manufacturer does not generate hazardous waste during the manufacturing process.

(7): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive."

SOPRAVAP'R					
Environmental Indicator	Unit	A1 (per m^2)	A2 (per m^2)	A3 (per m^2)	A1 - A3 (per m^2)
Resource Use					
RPR_E[1]	MJ, LHV	7.58E-01	1.77E-03	4.15E-01	1.17E+00
RPR_M[2]	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPR_T	MJ, LHV	7.58E-01	1.77E-03	4.15E-01	1.17E+00
$NRPR_E$[3]	MJ, LHV	2.25E+01	9.87E-01	2.06E-01	2.37E+01
$NRPR_M$[4]	MJ, LHV	3.12E+01	0.00E+00	0.00E+00	3.12E+01
$NRPR_T$	MJ, LHV	5.36E+01	9.87E-01	2.06E-01	5.48E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW[5]	m^3	6.72E-03	1.14E-05	1.43E-03	8.17E-03
Output Flows and Waste Categories					
HWD[6]	kg	4.48E-01	6.04E-04	2.17E-02	4.71E-01
NHWD[7]	kg	2.79E-01	9.46E-04	2.49E-02	3.05E-01
RWD		1.04E-07	2.55E-11	2.12E-08	1.25E-07
HLRW[8]	m^3	2.85E-10	7.03E-14	5.83E-11	3.44E-10
ILLRW[9]	m^3	2.71E-09	4.15E-13	1.24E-10	2.83E-09
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.83E-04	0.00E+00	0.00E+00	9.83E-04
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table Notes – Resource Use

(1): $RPR_E = RPR_T - RPR_M$, where RPR_T is equal to the value for renewable energy obtained using the CED LHV methodology.
(2): Calculated as per ACLCA ISO 21930 Guidance, 6.2 Renewable primary resources with energy content used as a material, RPR_M.
(3): $NRPR_E = NRPR_T - NRPR_M$, where $NRPR_T$ is equal to the value for non-renewable energy obtained using the CED LHV methodology.
(4): Calculated as per ACLCA ISO 21930 Guidance, 6.4 Non-renewable primary resources with energy content used as a material, $NRPR_M$.
(5): Represents the use of net freshwater calculated from life cycle inventory results, i.e., water consumption using ReCiPe Midpoint (E) 2016.

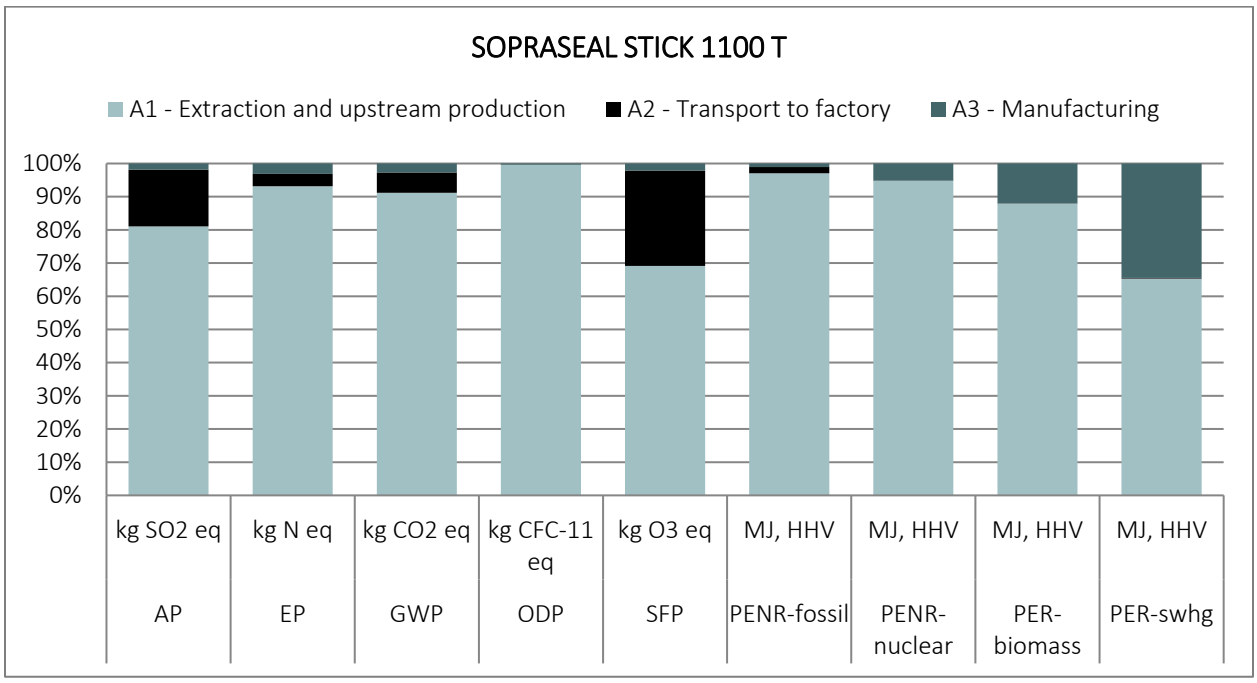
Table Notes – Output Flows and Waste Categories

(6): Calculated from life cycle inventory results, based on datasets classified under "treatment and disposal of hazardous waste." The manufacturer does not generate hazardous waste during the manufacturing process.
(7): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive."
(8): Calculated from life cycle inventory results, based on ecoinvent waste flow "high-level radioactive waste for final repository."
(9): Calculated from life cycle inventory results, based on ecoinvent waste flow "low-level radioactive waste for final repository."

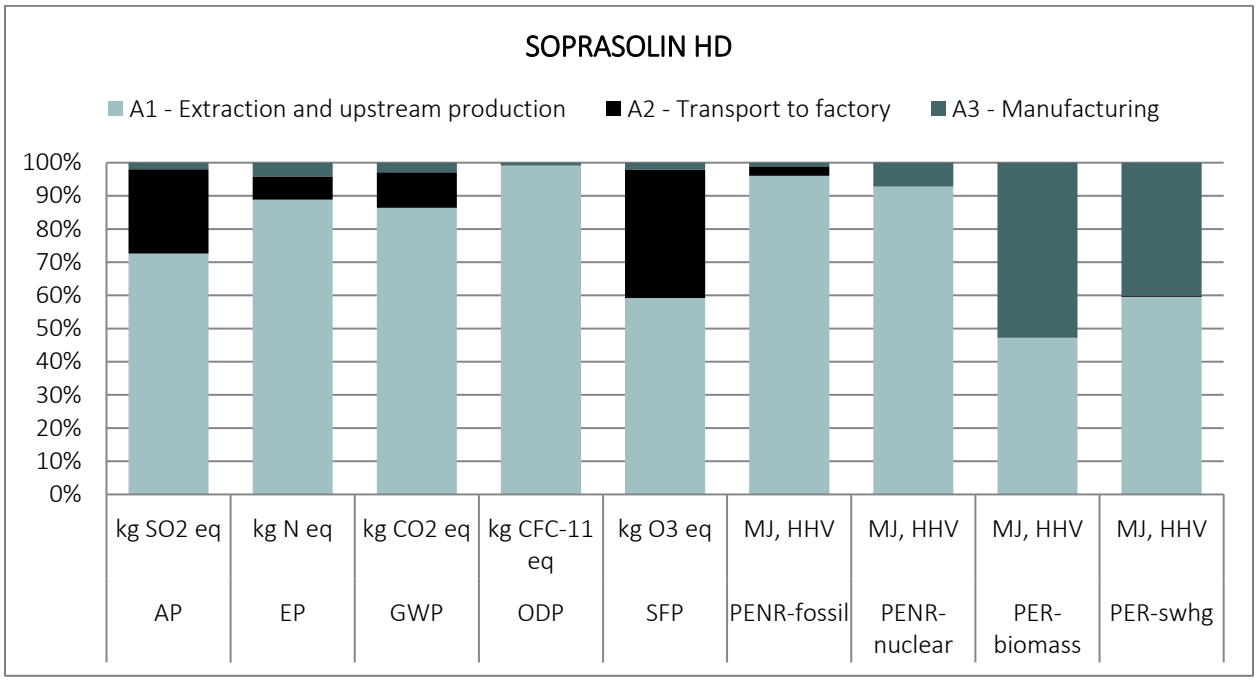
4.2. CONTRIBUTION ANALYSIS

The results for SOPRASEAL STICK 1100 T, SOPRASOLIN HD and SOPRAVAP'R, as shown in the figures below, are very similar, with extraction and upstream production (A1) as the greatest contributor to the various indicators, except for biomass primary energy resources (PER-biomass) where manufacturing (A3) contributes more or less depending on the product.

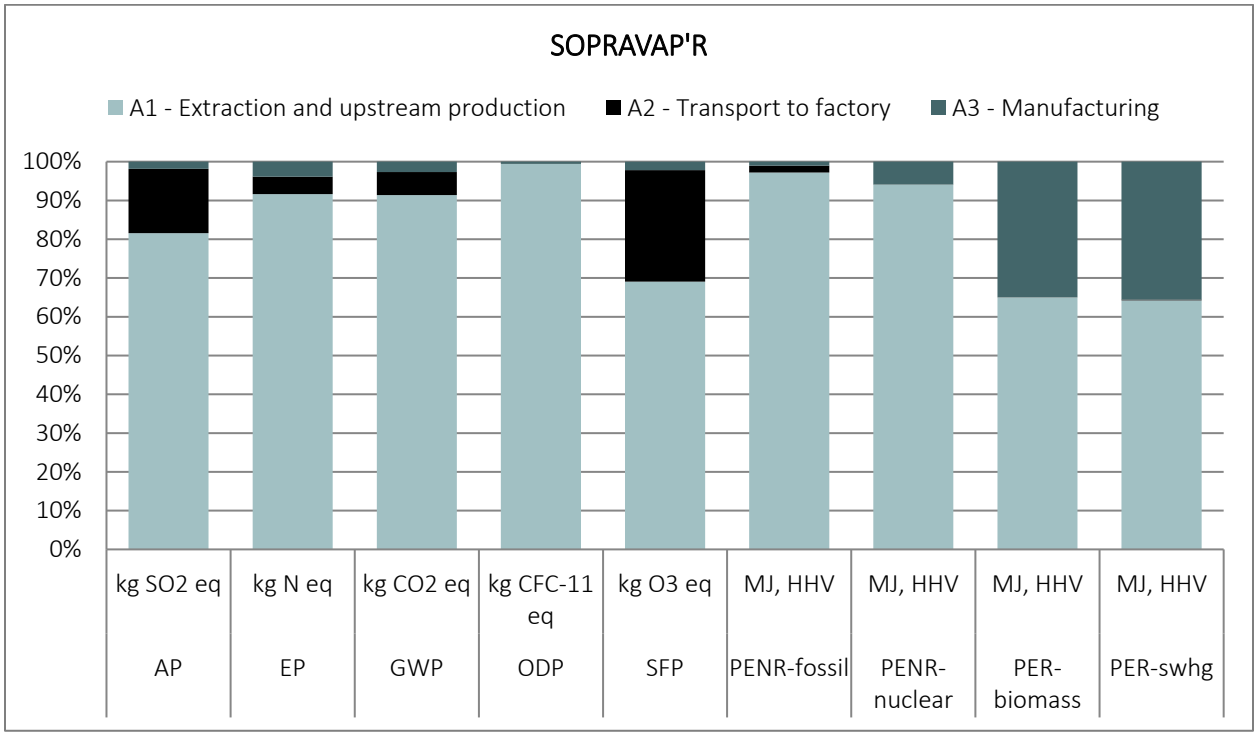
Transport to factory (A2) is not the main contributor to any of the impact categories; however, it is a large contributor to acidification potential (AP) and smog formation potential (SFP) with about 17%-27% and 29%-44%, respectively.



Contribution analysis of information modules A1-A3 of the SOPRASEAL STICK 1100 T product life cycle stage - TRACI & CED indicators.



Contribution analysis of information modules A1-A3 of the SOPRASOLIN HD product life cycle stage - TRACI & CED indicators.



Contribution analysis of information modules A1-A3 of the SOPRAVAP'R product life cycle stage - TRACI & CED indicators.

5. ADDITIONAL ENVIRONMENTAL INFORMATION

5.1. REGULATED HAZARDOUS SUBSTANCES

There are no ingredients present in the SOPRASEAL STICK 1100 T, SOPRASOLIN HD and SOPARVAP'R, which, within the current knowledge and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in the product safety data sheet.

5.2. DANGEROUS SUBSTANCES

SOPERMA's SOPRASEAL STICK 1100 T, SOPRASOLIN HD and SOPARVAP'R are not expected to release dangerous substances during normal use.

5.3. FURTHER INFORMATION

SOPREMA has also published a Health Product Declaration® for the SOPRASEAL STICK 1100 T and SOPRAVAP'R. More details are available on the HPDC public repository: https://www.hpd-collaborative.org/hpd-public-repository/.

Additional product information can be found on SOPREMA's website: (https://www.soprema.ca/en/products-systems/building-components/walls/air-and-vapour-barrier).

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