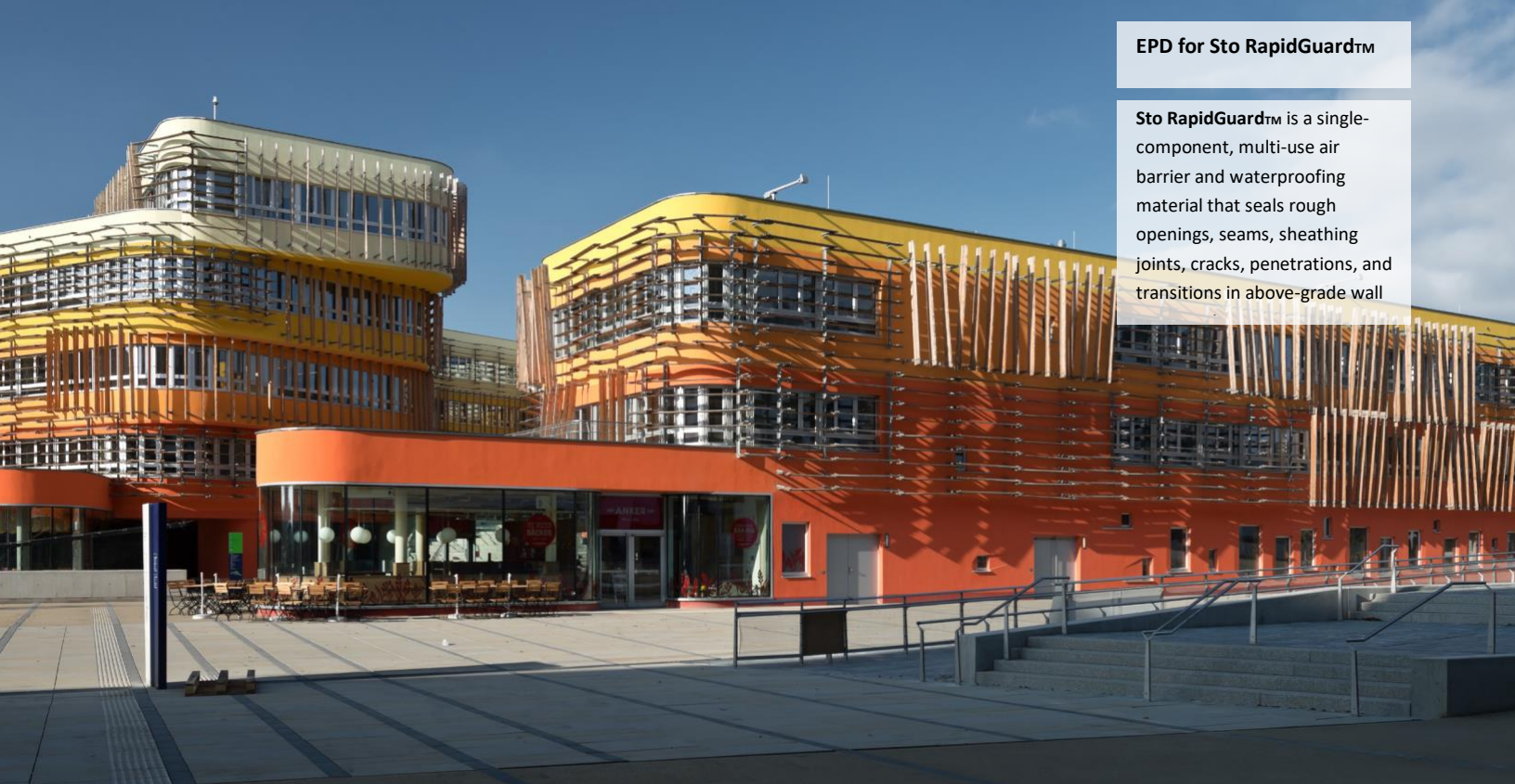


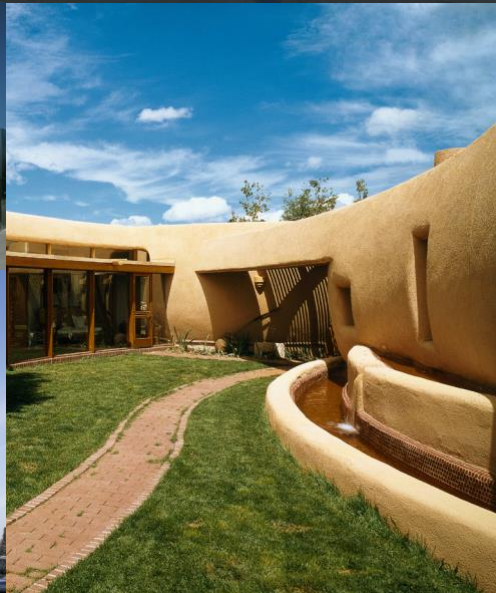


Building with conscience.



EPD for Sto RapidGuard™

Sto RapidGuard™ is a single-component, multi-use air barrier and waterproofing material that seals rough openings, seams, sheathing joints, cracks, penetrations, and transitions in above-grade wall





Manufacturer Name	Sto Corp. 3800 Camp Creek Parkway SW, Building 1400, Suite 120, Atlanta, GA 30331 www.stocorp.com (800) 221-2397
EPD Program Operator	Epsten Group 101 Marietta St. Suite 2600, Atlanta, GA 30303 www.epstengroup.com
Compliance to ISO21930:2017	Yes
Product Name	Sto RapidGuard™
Product's Intended Application and Use	Air Barrier and Waterproofing Membrane
Declaration Number	01-006
Date of Certification	December 18 th , 2019
Period of Validity	5 years from date of certification
Functional Unit	One square meter of covered substrate for 60 years
Reference Service Life used in assessment	10 Years
Overall Data Quality Assessment Score	Good
Manufacturing Location	Facility in Guelph, ON, Canada
LCA Software and Version Number	GaBi 9.2.0.58
LCI Database and Version Number	GaBi Database, Service Pack 39
ISO 21930: 2017 serves as the core PCR Independent verification of the declaration and data, according to ISO 21930:2017 and ISO 14025:2006 <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External	Kate McFeaters kmcfeaters@epstengroup.com <i>Katherine McFeaters</i>
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting, LLC
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Kate McFeaters kmcfeaters@epstengroup.com <i>Katherine McFeaters</i>

Comparability

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.

>> Company

We believe in ‘**Building with conscience**’.

That means ensuring that all building products are not only safe, effective and easy to install, but also environmentally responsible and sustainable. We know you’re always looking for the smartest and newest technology to create energy efficient buildings with superior aesthetics.

That’s exactly what our products help you achieve. Products like our wall systems, coatings and finishes are consistent favorites among design professionals, contractors and property owners alike. Whatever your needs or vision may be, we offer products for every type of building project; whether it’s new construction, restoration or panelization, commercial or residential work.

An architect or specifier focuses on aesthetics and feasibility, a contractor needs products that are easy to work with, and a building owner requires high value and low costs on properties. Sto understands these unique needs, and delivers the smart, innovative materials and solutions that make this all possible. That’s why Sto remains the innovative leader in integrated exterior wall systems.

When you combine that commitment to product support and innovation with value-added offerings like consultative design and color services through Sto Studio or training in proper application techniques through the Sto Institute, you get an integrated exterior wall system solution unmatched in the industry.

>> Manufacturing Sites Covered in this EPD

Manufacturing location is Guelph, ON, Canada

>> Performance Features

Waterproof Material
Vapor Permeable

No mesh/fabric/tapes needed at rough
openings and sheathing joints
Fast Cure

Cures in wet weather and on damp
substrates
Gun Applied



>> Product Identification

RapidGuard™ is offered in two packaging options. Table 1 lists the products declared in this EPD.

Table 1: List of RapidGuard™ Products

Product Name	Product Number
Sto RapidGuard™ Cartridge	81571-740
Sto RapidGuard™ Sausage	81571-741

>> Product Description

Sto RapidGuard™ is a single-component, multi-use air barrier and waterproofing material that seals rough openings, seams, sheathing joints, cracks, penetrations, and transitions in above-grade wall construction.

» Technical Details

Table 2 : Technical Data

Performance*	Test Method	Test Criteria	Result
Water Penetration Resistance	AATCC-127 (waster column)	Resist 21.6" (55 cm) water for 5 hours	No water penetration
Tensile Strength	ASTM D412	n/a	250 psi (1724 kPa)
Elongation at Break	ASTM D412	n/a	400%
Durometer Hardness	ASTM D2240	Shore A	40-45 points
Adhesion (psi)	ASTM D4541	>50 psi (345 kPa) or substrate failure: OSB, Plywood, Concrete, CMU, Vinyl, Galvanized Steel, and Gypsum Sheathing	> 50 psi (345 kPa) > 20 psi (138 kPa) to gypsum sheathing (substrate failure)
Water Vapor Permeability (@DFT)	ASTM E96 (wet cup method)	n/a	6.18 perms @ 20 mils (353 ng/s•m ² •Pa) 5.37 perms @ 30 mils (307 ng/s•m ² •Pa)
Air Leakage Resistance	ASTM E2178	Less than 0.02 L/s/m ²	Pass
% Solids by Volume	n/a	n/a	98%
VOC Content	n/a	Compliant with EPA and South Coast AQMD requirements for Building Envelope Coatings	< 21 g/L
Building Code Compliance	Meets requirements of 2015 IBC, IRC, and IECC as an air barrier and joint treatment, ICC AC 212 and ASTM E 2570		

*Results are based on lab testing under controlled conditions. Results can vary between labs or from field tests.

» Material Composition

The material composition of RapidGuard™ is listed below:

Table 3: Material composition of RapidGuard™

Ingredient	Mass %
Calcium Carbonate	45-55%
Plasticizers	25-30%
Silane Polymer	17-24%
Colorant	2-3%
Wax	1-2%
Silica	1-2%
Other Additives	<1%

» Components related to Life Cycle Assessment

The functional unit for the LCA study was covering 1 square meter (m²) of substrate for a period of 60 years—the assumed lifetime of a building. The reference flow required for the functional unit is calculated based on the product lifespan scenarios prescribed in ISO 21930:2017. The reference service life of the product is 10 years which is the warranty of Sto's wall system. The reference flow required for one functional unit is provided in Table 4.

Table 4: Reference flow and Functional Unit

Product	Functional Unit [1 m ²]	Reference Flow [kg]
RapidGuard™	1	7.68

» Scope and Boundaries of the Life Cycle Assessment

The LCA was performed in accordance with ISO 14040 standards. The study is a cradle-to-grave LCA and includes the following life stages as prescribed in ISO 21930:2017.

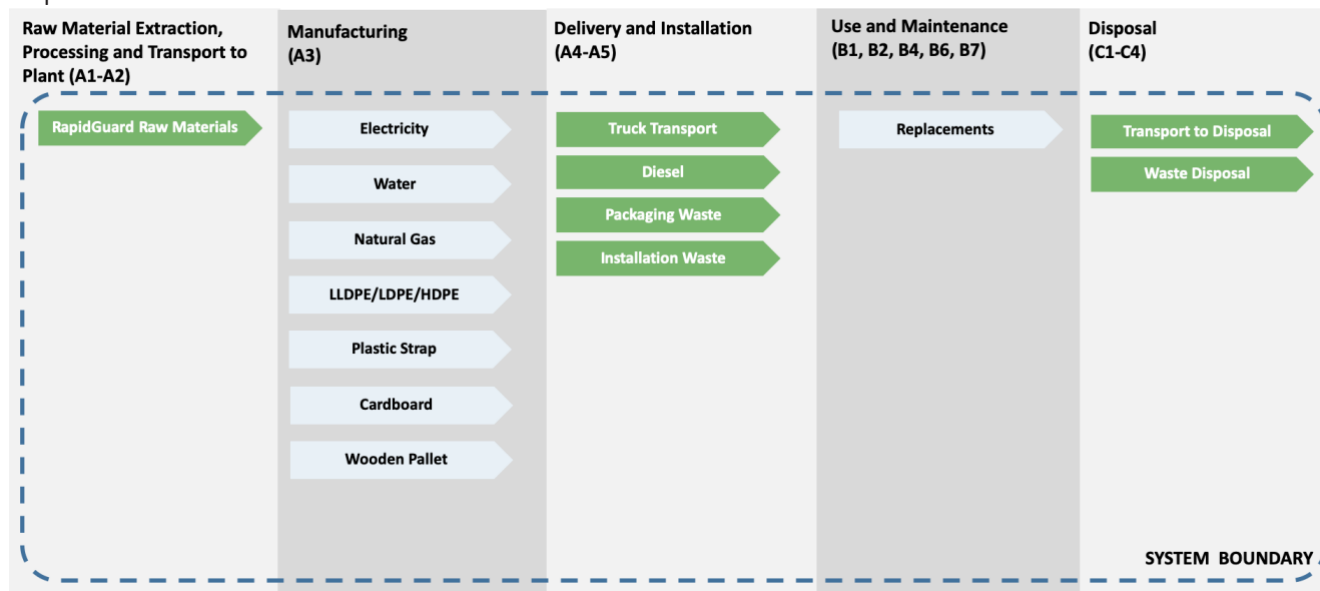


Figure 1: Life stages for the cradle-to-grave LCA

» Cut-off Criteria

Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit.

» Data Quality

The overall data quality level was determined to be good. Primary data was collected from the manufacturing facility in Guelph, ON in Canada for the 2018 reference year. When primary data did not exist, secondary data were obtained from the Gabi V9.2.0.58 Database Service Pack 39. Overall, both primary and secondary data are considered good quality in terms of geographic, temporal and technological coverage.

» Estimates and Assumption

Assumptions were made to represent the cradle-to-grave environmental performance of Sto's products. These assumptions include the transportation distances, the disposal of packaging material and the product at its end of life and use phase assumptions.

» Allocation

General principles of allocation were based on ISO 14040/44. Where possible, allocation was avoided. When allocation was necessary it was done on a physical mass basis. To derive a per unit value for manufacturing inputs such as electricity, water, heating oil and natural gas, a series of allocation calculations were adopted. The facility level of utility data was allocated based on production values of different types of products in the same manufacturing facility. Then the data is further allocated among products of different packaging specifications based on the mass because it is believed the energy consumption and water consumption correlated better on a mass basis.

» Production Stage (A1-A3)

RapidGuard™ is manufactured in Guelph, ON in Canada. This stage includes an aggregation of raw material extraction, supplier processing, delivery, manufacturing and packaging by the manufacturer. The raw materials used in the production manufacturing are sourced from the USA, Europe and China. After proper homogenization, the product is filled in 29-oz. (0.86-L) cartridges and 20-oz. (0.6-L) sausages, and then further packaged in cartons and shipped on wooden pallets from Canada to facilities in the US for distribution.

» Transport to Construction Site (A4)

RapidGuard™ is assumed to be shipped from the manufacturing facility in Canada to distribution facilities in the US via truck. From the distribution facilities, the product is shipped to construction sites. Table 5 gives the transportation details including the distances and the truck dataset used in the model. Transport distances are calculated based on the locations of the manufacturing facility, the distribution facilities, and customers' zip codes retrieved from the sales records.

Table 5: Transport Details

Parameter	Details	Unit
Type of transport	Truck	-
Fuel type	Diesel	-
Liters of fuel	39.0625	l/100km
Vehicle type	Heavy duty diesel truck/ 45,000 lb payload	-
Transport distance from the manufacturing facility to distribution facilities	1724.17	km
Transport distance from the distribution facilities to construction sites	782.21	km

» Installation (A5)

RapidGuard™ is a one-component product without the need for mixing. The product can be applied with a caulking gun and spread with a dry joint knife, trowel or spatula while material is still wet. Detailed installation instructions can be found at Sto's website.

The installation process is manual. Thus, no energy or no material input other than the product is required. The LCA study considered a 10% of product loss in the installation process. Together with the product loss, the waste derived from the packaging material coming with the product are disposed of properly. In addition, the VOC emission from the curing of applied RapidGuard™ was also taken into account.

Table 6: Installation (A5)

Parameter	Value	Unit
Product loss per functional unit	7.68E-01	kg/ESL
Waste materials at the construction site before waste processing, generated by product installation	2.21E+00	kg/ESL
Plastic material recycled	1.77E-01	kg/ESL
Plastic material landfilled	1.47E+00	kg/ESL
Plastic material incinerated	3.02E-01	kg/ESL
Cardboard recycled	1.19E-01	kg/ESL
Cardboard landfilled	4.79E-02	kg/ESL
Cardboard incinerated	1.16E-02	kg/ESL
GWP based in biogenic carbon content of cardboard packaging	6.30E-01	kg CO2e/ESL
Wood material recycled	1.40E-02	kg/ESL
Wood material landfilled	5.85E-02	kg/ESL
Wood material incinerated	1.36E-02	kg/ESL
GWP based in biogenic carbon content of wood packaging	1.55E-01	kg CO2e/ESL
Direct emissions to ambient air	9.43E-02	kg/ESL

» Use Stage (B1-B5 & B6-B7)

Since the product is applied under a wall surface, there are no use phase inputs required to maintain the performance of the product other than the replacement needed through the estimated service life (ESL) of a whole building. The ESL in the study is assumed to be 60 years which is a standard established and used in many PCRs of similar product categories such as architectural coating. The RSL of the product is determined by the warranty of the product, which is ten years. Therefore, after initial installation on a building with a 60-year service life, there will be five replacements needed. Besides the emissions to the air disclosed in the above table, there are no other emissions to air, soil or water, including those of any regulated substances.

Table 7: Replacement (B4)

Parameter	Value	Unit
Reference Service Life (RSL)	10	Years
Estimated Service Life (ESL)	60	Years
Replacement cycle	5	(ESL/RSL)-1
Declared product properties	As per Product Identification section	-
Design application parameters	As per technical details in Table 2	-
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Industry Standard	-

>> End-of-Life Stage (C1-C4)

In this stage, the product at its end of life is transported to the waste disposal facility and processed. Included in this stage are the following:

- Deconstruction – There are no impacts during this stage as the product is manually removed.
- Transportation to disposal – Estimated fuel requirements made based on weight of product and average distance to landfill.
- Waste processing for landfilling – This process is included in the landfilling process.
- Waste disposal – Due to the fact that all the products in study are installed as part of a wall system including the external coating/finish, and are not able to be dismantled based on their material type, it is reasonable to assume that the products at their end-of-life stage are landfilled.

Table 8: End-of-Life Parameters

	RapidGuard™	Unit
Collected with mixed construction waste	6.82	kg/ESL
Landfilling	100	%
Product for final deposition	6.82	kg/ESL

» Life Cycle Assessment Results

As prescribed by ISO 21930:2017, TRACI 2.1 impact characterization methodology and IPCC 5th assessment report are adopted to calculate the environment impacts. Table 9 provides the acronym key of the impact indicators declared in this EPD.

Table 9: LCIA impact category and LCI Indicator keys

Abbreviation	Parameter	Unit
TRACI 2.1		
AP	Acidification potential of soil and water	kg SO ₂ eq
EP	Eutrophication potential	kg N eq
GWP	Global warming potential including biogenic carbon emission	kg CO ₂ eq
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
POCP	Photochemical ozone creation potential	kg O ₃ eq
ADP-Fossil Fuel	Abiotic depletion potential for fossil resources (An indicator derived from CML 2001-Jan 2016)	MJ, net calorific value
Resource Use Parameters		
RPR _E	Renewable primary energy as energy carrier	MJ, net calorific value
RPR _M	Renewable primary energy resources as material utilization	MJ, net calorific value
NRPR _E	Non-renewable primary energy as energy carrier	MJ, net calorific value
NRPR _M	Non-renewable primary energy as material utilization	MJ, net calorific value
SM	Use of secondary material	kg
RSF	Use of renewable secondary fuels	MJ, net calorific value
NRSF	Use of non-renewable secondary fuels	MJ, net calorific value
RE	Recovered energy	MJ, net calorific value
FW	Use of fresh water	m ³
Waste Parameters		
HWD	Disposed-of-hazardous waste	kg
NHWD	Disposed-of non-hazardous waste	kg
HLRW	High-level radioactive waste disposed	kg
ILLRW	Intermediate and low-level radioactive waste disposed	kg
Carbon Removal and Emission Parameter		
BCRP	Biogenic Carbon Removal from Product	kg CO ₂ eq
BCEP	Biogenic Carbon Emission from Product	kg CO ₂ eq
BCRK	Biogenic Carbon Removal from Packaging	kg CO ₂ eq
BCEK	Biogenic Carbon Emission from Packaging	kg CO ₂ eq
BCEW	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	kg CO ₂ eq
CCE	Calcination Carbon Emissions	kg CO ₂ eq
CCR	Carbonation Carbon Removals	kg CO ₂ eq
CWNR	Carbon Emissions from Combustion of Waste from Non- Renewable Sources used in Production Processes	kg CO ₂ eq

» Sto RapidGuard™ – Results

TRACI Results and ADP-Fossil Fuel

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
AP [kg SO ₂ eq]	2.50E-02	1.45E-03	3.19E-04	0.00E+00	0.00E+00	0.00E+00	1.35E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.60E-06	0.00E+00	2.29E-04	MND
EP [kg N eq]	7.68E-04	1.20E-04	9.48E-05	0.00E+00	0.00E+00	0.00E+00	4.97E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.96E-07	0.00E+00	1.17E-05	MND
GWP [kg CO ₂ eq]	4.49E+00	3.02E-01	1.64E-01	0.00E+00	0.00E+00	0.00E+00	2.50E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-03	0.00E+00	4.99E-02	MND
ODP [kg CFC 11 eq]	3.13E-13	-1.62E-15	-1.19E-15	0.00E+00	0.00E+00	0.00E+00	1.54E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.47E-17	0.00E+00	-2.62E-15	MND
POCP [kg O ₃ eq]	1.94E-01	3.31E-02	2.61E-03	0.00E+00	0.00E+00	0.00E+00	1.17E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-04	0.00E+00	4.59E-03	MND
ADP-fossil fuel [MJ]	8.28E+01	4.26E+00	3.13E-01	0.00E+00	0.00E+00	0.00E+00	4.41E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.85E-02	0.00E+00	7.77E-01	MND

Resource Use

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
RPR _E [MJ]	1.80E+01	1.33E-01	2.14E-02	0.00E+00	0.00E+00	0.00E+00	9.11E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-03	0.00E+00	6.08E-02	MND
RPR _M [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRPR _E [MJ]	8.96E+01	4.29E+00	3.22E-01	0.00E+00	0.00E+00	0.00E+00	4.75E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-02	0.00E+00	7.97E-01	MND
NRPR _M [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m ³]	3.84E-02	5.14E-04	2.70E-04	0.00E+00	0.00E+00	0.00E+00	1.96E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-06	0.00E+00	9.46E-05	MND

Waste

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD [kg]	1.85E-07	3.47E-08	1.11E-09	0.00E+00	0.00E+00	0.00E+00	1.12E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.14E-10	0.00E+00	2.79E-09	MND
NHWD [kg]	4.63E-01	1.62E-04	3.48E-01	0.00E+00	0.00E+00	0.00E+00	9.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-06	0.00E+00	1.14E+00	MND
HLRW [kg]	3.62E-06	1.15E-08	4.38E-09	0.00E+00	0.00E+00	0.00E+00	1.82E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-10	0.00E+00	9.70E-09	MND
ILLRW [kg]	2.70E-03	9.49E-06	3.52E-06	0.00E+00	0.00E+00	0.00E+00	1.36E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.56E-08	0.00E+00	7.72E-06	MND

Carbon Removal and Emission

Indicator	RapidGuard™
BCRP [kg CO2 eq]	7.80E-01
BCEP [kg CO2 eq]	7.85E-01
BCRK [kg CO2 eq]	1.36E-01
BCEK [kg CO2 eq]	6.26E-02
BCEW [kg CO2 eq]	0.00E+00
CCE [kg CO2 eq]	0.00E+00
CCR [kg CO2 eq]	0.00E+00
CWNR [kg CO2 eq]	0.00E+00

>> Interpretation

In one reference service life of the product, the production stage, which includes raw material extraction, transportation from suppliers and manufacturing, is the highest contributor to all impact indicators. The impact from the remaining stages is negligible. From the perspective of a whole building lifespan, the vast majority of the impacts are derived from the number of replacements needed. This is directly related to the impacts associated with the manufacture of new products that are used to replace the original. Improving the relatively short lifespan of the product is essential to reducing the overall impact of the product.

>> Reference

- Life Cycle Assessment, LCA report for Sto Corp. WAP Sustainability, October 2019
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- ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
- ISO 21930:2007 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.
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