

ENVIRONMENTAL PRODUCT DECLARATION

SBS-MODIFIED ASPHALT ROOFING

CERTAINTEED ROOFING

SELF-ADHERED, HOT ASPHALT OR COLD ADHESIVE, AND TORCH APPLIED BASE AND CAP SHEETS



SBS-Modified Asphalt roofing products manufactured with styrene-butadiene-styrene infused asphalt which increases flexibility, especially in low temperatures and comes in three different application types: self-adhered, hot asphalt or cold adhesive, and torch applied.

CertainTeed
SAINT-GOBAIN

CertainTeed Corporation, a subsidiary of Saint-Gobain, is a leading North American manufacturer of building materials, which include commercial and residential roofing, vinyl siding, trim, fence, railing and decking, as well as interior building materials including gypsum, ceilings, and insulation. CertainTeed, and Saint-Gobain, are committed to providing sustainable building products and to limiting our impacts on the environment while doing so. (See our CSR at <https://www.saint-gobain.com/en/commitments/saint-gobains-csr-commitments>.)

We are also committed to market transparency through third party verified EPDs. In 2016, Saint-Gobain became the group with the most EPDs registered in the International EPD System. This third party verified EPD for Commercial Roofing continues that commitment.

For more information visit:
www.CertainTeed.com



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SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025, ISO 21930:2017 & EN 15804:2012

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. **Exclusions:** EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. **Accuracy of Results:** EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. **Comparability:** EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.



PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	CertainTeed Corporation
DECLARATION NUMBER	4789064623.103.1
DECLARED PRODUCT	SBS-Modified Commercial Roofing: Self-Adhered, Hot Asphalt or Cold Adhesive & Torch Applied
REFERENCE PCR	UL Part B: Asphalt Shingles, Built-up Asphalt Membrane Roofing and Modified Bituminous Membrane Roofing v.2.0 July 2019
REFERENCE PCR STANDARD	<input checked="" type="checkbox"/> EN 15804 (2012) <input type="checkbox"/> ISO 21930 (2007) <input checked="" type="checkbox"/> ISO 21930 (2017)
DATE OF ISSUE	April 1, 2020
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications
The PCR review was conducted by:	PCR Peer Review Panel Dr. Tom Gloria (Chair) epd@ul.com
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL	 Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	 Thomas Gloria, Industrial Ecology Consultants

This EPD conforms with ISO 21930:2017 and EN 15804:2012

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Product Documentation

Product Description

Commercial Roofing systems for low-slope roofing are asphalt based systems with a base sheet and a cap sheet. Roof systems may consist of one or multiple materials depending on the desired performance, warranty, and cost (see Figure 1). CertainTeed offers over forty roll good products, which equates to hundreds of system configurations and specification options. This EPD is specific to the SBS-Modified Asphalt Commercial Roofing products. SBS-modified asphalt products are manufactured with styrene-butadiene-styrene infused asphalt which increases flexibility, especially in low temperatures. CertainTeed SBS-modified asphalt roofing systems are available in three different application types: self-adhered, hot asphalt or cold adhesive, and torch applied. Additionally, some products listed at "FR" are manufactured with proprietary additives to increase fire resistance.

Reinforcement mats serve as the structure to asphalt based low-slope roll goods. The mats are impregnated and coated with SBS-modified asphalt and are available with either fiberglass or polyester mats at varying thicknesses. Fiberglass stands up well to heat and tension. Its inherently high melting point affords superior fire resistance when combined with a fire-retardant asphalt formulation. Fiberglass-reinforced products applied in hot asphalt retain excellent dimensional stability. Additionally, fiberglass has superior tensile strength. When combined with SBS-modified asphalt, the sheets will resist roof movement until the stress absorbed in the mat forces a break. Polyester's predominant benefits are puncture resistance and high elongation. Polyester products handle rooftop foot traffic better. They can also cyclically absorb the strain of building movement and return back to their original dimension.

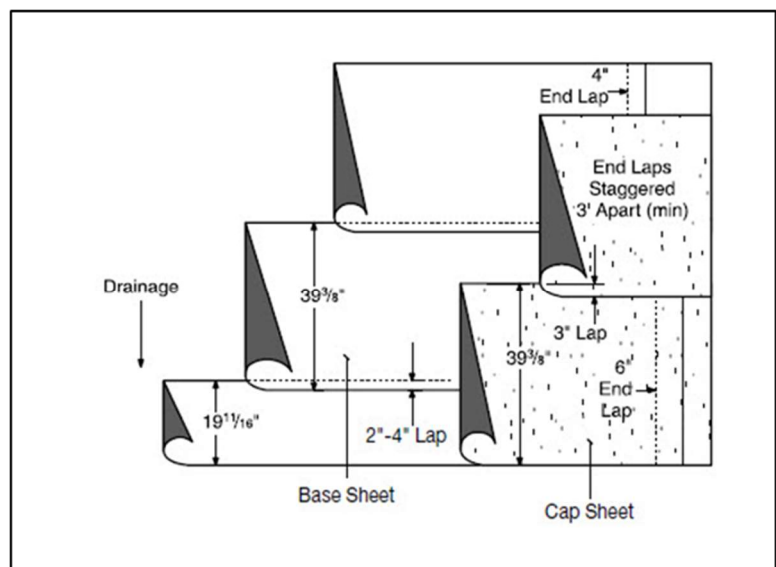


Figure 1: Diagram of Commercial Roofing System

CertainTeed SBS-Modified Asphalt Commercial Roofing systems are available in three application types: Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch applied. Self-Adhered sheets are faster to train labor and install, have very good adhesion when applied correctly and require no kettle for heating so there are no fumes, and no burn/fire risk. Self-Adhered sheets are yet widely commercially accepted and require a temperature of 50°F or greater. Hot asphalt application is proven, durable, and cost-effective, but are limited by fumes/odor, burn risk, and require the availability of trained labor and appropriate equipment. Cold adhesive application has very good adhesion when applied correctly and requires no kettle and only minimal tools. Cold adhesive application may take up to 60 days to cure and has high fumes/odor. Torch application is faster than hot asphalt or cold adhesive and has very good adhesion when applied correctly. The limitations of the torch application include a burn/fire risk, a risk of improper application, cost of propane needed, and require trained labor.

The SBS-Modified Asphalt Commercial Roofing Base Sheets and Cap Sheets included in this EPD and the underlying Life Cycle Assessment Study are shown in Table 1.



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SBS-Modified Asphalt Commercial Roofing
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SBS-Modified Asphalt Commercial Roofing Self-Adhered					
Product	Thickness	Roll Weight (includes packaging)	Coverage per Roll	Mat Type	Base or Cap Sheet
Black Diamond Base Sheet	1.4mm (55 mils)	78 lbs.	200 ft ²	Fiberglass	Base
Flintlastic Ultra Glass SA	3.0mm (120 mils)	72 lbs.	100 ft ²	Fiberglass	Base
Flintlastic SA Plybase	1.5mm (60 mils)	86 lbs.	200 ft ²	Fiberglass	Base
Flintlastic SA Nailbase	1.5mm (60 mils)	82 lbs.	200 ft ²	Fiberglass	Base
Flintlastic SA Midply	2.8mm (110 mils)	63 lbs.	100 ft ²	Fiberglass	Base
Flintlastic SA Cap	4.0mm (160 mils)	95 lbs.	100 ft ²	Polyester	Cap
Flintlastic SA Cap CoolStar	4.0mm (160 mils)	98 lbs.	100 ft ²	Polyester	Cap
Flintlastic SA Cap FR	3.2mm (125 mils)	88 lbs.	100 ft ²	Fiberglass	Cap
Flintlastic SA Cap FR CoolStar	3.2mm (125 mils)	90 lbs.	100 ft ²	Fiberglass	Cap
SBS-Modified Asphalt Commercial Roofing Hot Asphalt or Cold Adhesive Applied					
Product	Thickness	Roll Weight (includes packaging)	Coverage per Roll	Mat Type	Base or Cap Sheet
Flintlastic Ultra Poly SMS	3.7mm (145 mils)	89 lbs.	100 ft ²	Polyester	Base
Flintlastic Poly SMS	2.0mm (79 mils)	89 lbs.	200 ft ²	Polyester	Base
Flintlastic Base 20	2.3mm (91 mils)	88 lbs.	150 ft ²	Fiberglass	Base
All Weather/Empire Base	1.3mm (51 mils)	70 lbs.	200 ft ²	Fiberglass	Base
Flintlastic FR Cap 30	3.3mm (130 mils)	85 lbs.	100 ft ²	Fiberglass	Cap
Flintlastic FR Cap 30 CoolStar	3.3mm (130 mils)	88 lbs.	100 ft ²	Fiberglass	Cap
Flintlastic FR P	4.2mm (168 mils)	100 lbs.	100 ft ²	Polyester	Cap
Flintlastic FR P CoolStar	4.2mm (168 mils)	102 lbs.	100 ft ²	Polyester	Cap
Flintlastic GMS	3.7mm (145 mils)	93 lbs.	100 ft ²	Polyester	Cap
Flintlastic GMS CoolStar	3.7mm (145 mils)	96 lbs.	100 ft ²	Polyester	Cap
Flintlastic Premium FR P	4.2mm (168 mils)	100 lbs.	100 ft ²	Polyester	Cap
Flintlastic Premium FR P CoolStar	4.2mm (168 mils)	100 lbs.	100 ft ²	Polyester	Cap
SBS-Modified Asphalt Commercial Roofing Torch Applied					
Product	Thickness	Roll Weight (includes packaging)	Coverage per Roll	Mat Type	Base or Cap Sheet
Flintlastic Base 20 T	3.0mm (120 mils)	80 lbs.	100 ft ²	Fiberglass	Base
Flintlastic FR Cap 30 T	3.8mm (150 mils)	96 lbs.	100 ft ²	Fiberglass	Cap
Flintlastic FR Cap 30 T CoolStar	3.8mm (150 mils)	98 lbs.	100 ft ²	Fiberglass	Cap
Flintlastic GTS FR	4.0mm (160 mils)	103 lbs.	100 ft ²	Polyester	Cap
Flintlastic GTS FR CoolStar	4.0mm (160 mils)	105 lbs.	100 ft ²	Polyester	Cap

Table 1: SBS-Modified Asphalt Commercial Roofing Products



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Flow Diagram

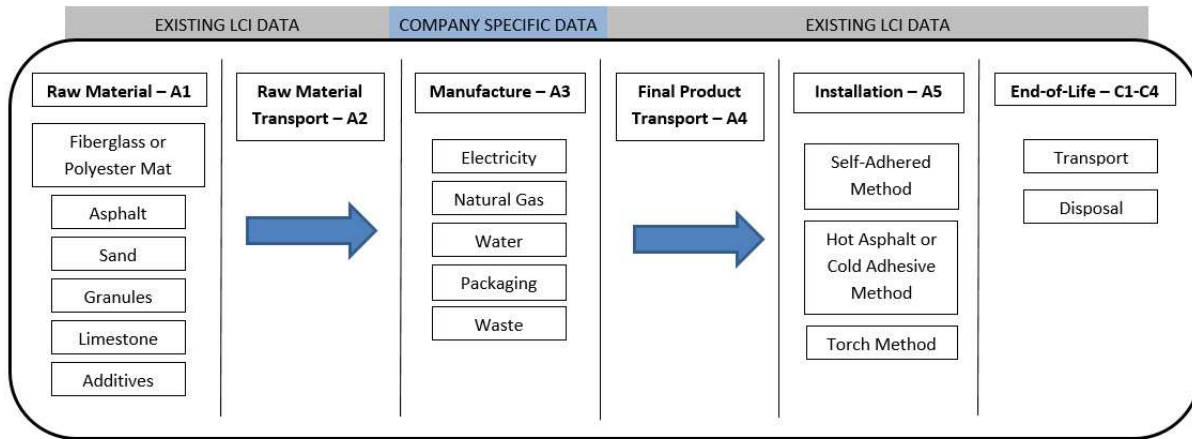


Figure 2: SBS-Modified Asphalt Commercial Roofing Product Flow Diagram

Description of Organization

All CertainTeed SBS-Modified Asphalt Commercial Roofing Products are manufactured at the Little Rock, AR and Shakopee, MN manufacturing locations in the United States.

The Little Rock, AR and Shakopee, MN Roofing manufacturing facilities operate integrated Environmental, Health, and Safety Management Systems that align with the ISO 14001 and ISO 45001 standards.

Little Rock	Shakopee
2701 E. Roosevelt Rd. Little Rock, AR 72206	3303 East Fourth Ave. Shakopee, MN 55379

Product Average EPD

A weighted average of the overall square meter production of each product within the SBS-Modified Asphalt Commercial Roofing product family was used for the results in this EPD. The weighted average of each application type base sheet and cap sheet will be shown as well as a summary of the results for each individual product.

Application

SBS-Modified Asphalt Commercial Roofing systems are intended for use as low-slope roofing materials on commercial, institutional or residential buildings.



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Material Content

SBS-Modified Asphalt Commercial Roofing Base Sheets			
Material	SBS Self-Adhered Base Sheet Average	SBS Hot Asphalt/Cold Adhesive Base Sheet Average	SBS Torch Base Sheet Average
Fiberglass Mat	4.55%	3.93%	3.02%
Polyester Mat	0.00%	1.03%	0.00%
Sand	5.87%	23.73%	10.55%
Asphalt	53.23%	41.78%	50.64%
SBS Coating	6.06%	2.96%	4.98%
Piccotac	1.76%	0.00%	0.00%
Limestone	27.83%	26.58%	30.64%
Permanent Film	0.69%	0.00%	0.19%
Total kg/m²:	1.960	1.888	3.860
SBS-Modified Asphalt Commercial Roofing Cap Sheets			
Material	SBS Self-Adhered Cap Sheet Average	SBS Hot Asphalt/Cold Adhesive Cap Sheet Average	SBS Torch Cap Sheet Average
Fiberglass Mat	0.04%	0.0003%	0.61%
Polyester Mat	4.49%	4.12%	4.16%
Sand	0.00%	6.12%	0.00%
Granules	32.83%	27.65%	30.07%
Asphalt	42.78%	40.84%	45.28%
SBS Coating	3.63%	2.91%	3.34%
Piccotac	1.36%	0.00%	0.00%
Limestone	14.47%	17.54%	0.00%
Carbon Black	0.19%	0.33%	0.00%
Fire Retardant Metals	0.20%	0.49%	16.36%
Permanent Film	0.00%	0.00%	0.18%
Total kg/m²:	4.296	4.224	4.579
Base Sheet + Cap Sheet System Total kg/m²:	6.255	6.112	8.439

Table 2: SBS-Modified Asphalt Commercial Roofing Material Content



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Technical Data

SBS-Modified Asphalt Commercial Roofing Self-Adhered	
UNSPSC Code: 301515 CSI Code: 07 52 16	
Product	ASTM
Black Diamond Base Sheet	D4601, Type I, D1970
Flintlastic Ultra Glass SA	D6163, Grade S, Type I, D1970
Flintlastic SA Plybase	D4601, Type II, D1970
Flintlastic SA Nailbase	D4601, Type II
Flintlastic SA Midply	D6163, Grade S, Type I, D1970
Flintlastic SA Cap	D6164, Grade G, Type I, D7505, D1970
Flintlastic SA Cap CoolStar	D6164, Grade G, Type I, D7505
Flintlastic SA Cap FR	D6163, Grade G, Type I, UL 2218 Class 4, D7530
Flintlastic SA Cap FR CoolStar	D6163, Grade G, Type I, UL 2218 Class 4, D7530
SBS-Modified Asphalt Commercial Roofing Hot Asphalt or Cold Adhesive Applied	
UNSPSC Code: 301515 CSI Code: 07 52 16	
Product	ASTM
Flintlastic Ultra Poly SMS	D6164, Grade S, Type I
Flintlastic Poly SMS	D4601, Type II
Flintlastic Base 20	D6163, Grade S, Type I, D4601, Type II
All Weather/Empire Base	D4601, Type II, D6757
Flintlastic FR Cap 30	D6163, Grade G, Type I
Flintlastic FR Cap 30 CoolStar	D6163, Grade G, Type I
Flintlastic FR P	D6164, Grade G, Type I
Flintlastic FR P CoolStar	D6164, Grade G, Type I
Flintlastic GMS	D6164, Grade G, Type I
Flintlastic GMS CoolStar	D6164, Grade G, Type I
Flintlastic Premium FR P	D6164, Grade G, Type II
Flintlastic Premium FR P CoolStar	D6164, Grade G, Type II
SBS-Modified Asphalt Commercial Roofing Torch Applied	
UNSPSC Code: 301515 CSI Code: 07 52 16	
Product	ASTM
Flintlastic Base 20 T	D4601, Type II, D6163, Grade S, Type I
Flintlastic FR Cap 30 T	D6163, Grade G, Type I
Flintlastic FR Cap 30 T CoolStar	D6163, Grade G, Type I
Flintlastic GTS FR	D6164, Grade G, Type II
Flintlastic GTS FR CoolStar	D6164, Grade G, Type II

Table 3: Technical Data for SBS-Modified Asphalt Commercial Roofing



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Methodological Framework

Declared Unit

Declared Unit = 1 m ² (10.8 ft ²)		
Product System	Mass (kg/m ²)	Thickness to achieve Declared Unit (mm)
SBS-Modified Asphalt Self-Adhered Base Sheet	1.960	1.560
SBS-Modified Asphalt Self-Adhered Cap Sheet	4.296	3.988
SBS- Modified Asphalt Self-Adhered System	6.255	5.548
SBS-Modified Asphalt Hot Asphalt/Cold Adhesive Base Sheet	1.888	1.591
SBS-Modified Asphalt Hot Asphalt/Cold Adhesive Cap Sheet	4.224	3.715
SBS-Modified Asphalt Hot Asphalt or Cold Adhesive Applied System	6.112	5.306
SBS-Modified Asphalt Torch Applied Base Sheet	3.860	3.000
SBS-Modified Asphalt Torch Applied Cap Sheet	4.579	3.949
SBS-Modified Asphalt Torch Applied System	8.439	6.949

Table 4: Declared Unit Information

System Boundary

The life cycle analysis performed for this EPD is classified as a “cradle-to-gate w/options” study. The system boundary includes raw material supply, manufacture, and transport; the SBS-Modified Asphalt Roofing products manufacture in Little Rock, AR and Shakopee, MN, and packaging; product transportation to building site; installation; and product end-of-life.

Description of the System Boundary (X=included in LCA; MND=module not declared)																
Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits & Loads Beyond System Boundaries
Raw Material Supply	Transport	Manufacturing	Transport from the gate to the site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-construction demolition	Transport	Waste Processing	Disposal	Reuse-Recover-Recycling Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	MND

Table 5: System Boundary



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Allocation

The Little Rock, AR is the only CertainTeed location that produces all of the SBS-Modified Asphalt Commercial Roofing products, except the Black Diamond Self-Adhered Base Sheet which is manufactured in the Shakopee, MN location. The SBS-Modified Asphalt Commercial Roofing products are not the only products produced at these facilities. Allocation was conducted based on the square meter production of each individual product line as a percentage of the overall square meter production of the facility.

Cut-Off Criteria

The cut-off criteria established for the study include materials, energy, and emissions data. For the purposes of this study, the criteria are as follows:

- Mass – Chemicals with a combined weight less than 1% of the mass of the modeled product may be excluded, providing its environmental relevance is not a concern.
- Human activity factors were not included in the scope of this study.
- Capital equipment factors were not included in the scope of this study.

Data Sources

GaBi version 8.2 software system was used for modeling the life cycle of the SBS-Modified Asphalt Commercial Roofing products. Each background dataset was taken from the GaBi Thinkstep US Ecoinvent, USLCI databases, and Ecoinvent v3.

Data Quality

Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. The data sources used are complete and representative of North America and Europe (depending on the material source) in terms of the geographic and technological coverage and are less than 10 years old. Any deviations from these initial data quality requirements for secondary data are documented in the report. Overall, the primary data from the manufacturing location is of very high quality, being directly tracked and measured by facility personnel. Secondary data sets are of fair-to-good quality.

Period Under Review

Data for this LCA was collected for the 2018 calendar year.



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Comparability

Comparison of the environmental performance of building and construction products using EPD information shall be based on the product's use and impacts at the building level. In general, EPDs may not be used for comparability purposes when not considered in a building context. Given the PCR ensures products meet the same functional requirements, comparability is permissible provided the information given for such comparison is transparent and the limitations of comparability are explained.

Estimates and Assumptions

Estimates and assumptions are required in life cycle analysis to constrain the project boundary or model when little or not data is available. In this study of SBS-Modified Asphalt Commercial Roofing, estimates or assumptions were made regarding the background dataset for some of the fire retardant materials as specific datasets were not available in the software. Estimates were also used for the transportation distances of some raw materials and packaging material as only the state (OH, AR, GA, TX, etc) was specifically available. The PCR also specifies the assumptions required for the transportation and installation of the products. All estimates and assumptions are appropriately noted in the report.

Technical Information and Scenarios

Manufacturing

The process begins with the roll of fiberglass or polyester mat being mounted and fed into the mat accumulator machine. This machine accumulates the mat in accordion-style so that the machine can continue to run when the mat roll is exhausted and a new one is being mounted. The mat is then fed through the coater machine where the mats are pre-coated with the batch of asphalt and polymers. The mix of asphalt must be heated in order to be applied as a thick liquid. Any films associated with the product being manufactured are applied at this point. The next coat is the filler of granules or sand and any other specified chemicals for the product being made. Cooling the mat is done with through evaporative cooling. Once the mat is cooled and dried, it is wound on to the cardboard core and the finished roll is packaged.

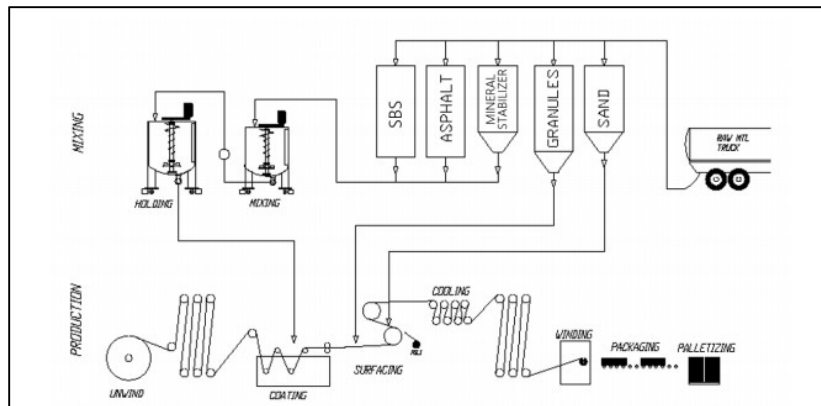


Figure 3: Manufacture of Commercial Roofing Products



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Packaging

Packaging of the final product after production is included in the life cycle assessment. Per the PCR, the release film used on the SBS-Modified Asphalt Self-Adhered product is to be included as packaging material. Additional packaging material are the cardboard cores the material is wound on, cardboard cartons, plastic bags, tape, and pallets.

Transportation

Final products are transported via truck throughout the United States.

Transport to the Building Site	Unit	Value
Fuel type	-	Diesel
Liters of fuel	l/100km	39
Vehicle type	-	Standard Diesel Freight Trailer
Transport Distance	km	800
Capacity utilization	%	100
Gross density of product transported		kg/m ³
SBS-Modified Asphalt Self-Adhered Base Sheet		275.403
SBS-Modified Asphalt Self-Adhered Cap Sheet		277.614
SBS- Modified Asphalt Self-Adhered System		553.016
SBS-Modified Asphalt Hot Asphalt/Cold Adhesive Base Sheet		264.338
SBS-Modified Asphalt Hot Asphalt/Cold Adhesive Cap Sheet		264.916
SBS-Modified Asphalt Hot Asphalt or Cold Adhesive Applied System		529.254
SBS-Modified Asphalt Torch Applied Base Sheet		281.696
SBS-Modified Asphalt Torch Applied Cap Sheet		274.717
SBS-Modified Asphalt Torch Applied System		556.413
Capacity utilization volume factor	-	1

Table 6: Transport to the Building Site



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Installation

The Asphalt Roofing PCR specifies the equipment and energy consumption requirements for the different installation types used for Commercial Roofing. Depending on the installation, there are additional ancillary material requirements; however, the type and amounts of materials varies widely. In order to remain consistent with industry standards, this study adopts the additional material specifications and VOC emissions detailed in the Asphalt Roofing Manufacturers Association (ARMA) study completed by ThinkStep in 2015 for each of the three installation types. CertainTeed Roofing installation experts, estimate a 15% scrap rate during installation.

Installation into the Building	Unit	SBS-Modified Asphalt (Self-Adhered)	SBS-Modified Asphalt (Hot Asphalt/Cold Adhesive Applied)	SBS-Modified Asphalt (Torch Applied)
Ancillary materials	kg	0.302	2.78	0.198
Primer (per ARMA study 2015)	kg	0.145	0.000	0.000
Flashing (per ARMA study 2015)	kg	0.117	0.100	0.117
Asphalt (per ARMA study 2015)	kg	0.000	2.600	0.000
Granules (per ARMA study 2015)	kg	0.040	0.080	0.081
Net freshwater consumption	m ³	0.000	0.000	0.00
Other resources	kg	0.000	0.000	0.00
Electricity consumption	kWh	0.000	0.000	0.00
Other energy carriers (from Table 4.10)	MJ	0.000	2.600	2.390
Product loss per square meter	kg	0.911	0.902	1.212
Waste materials at the construction site before waste processing, generated by product installation	kg	0.000	0.000	0.000
Output materials resulting from on-site waste processing	kg	0.000	0.000	0.000
Mass of packaging waste	kg	0.206	0.076	0.076
Biogenic carbon contained in packaging	kg CO ₂	0.925	0.249	0.246
Direct emissions to ambient air, soil, and water	kg	0.000	0.000	0.000
NMVOC emissions (per ARMA study 2015)	kg/m ²	0.0037	0.008	0.012

Table 7: Installation into the Building



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Disposal

Deconstruction (module C1) of Commercial Roofing is typically done with manual labor, typically with roofing shovels. At this time there are no recycling scenarios and processing scenarios (module C3) for Commercial Roofing products at the end of the service life. This study assumes the deconstruction and waste processing modules to be burden free. Disposal in a municipal landfill or in commercial incineration facilities is permissible and should be done in accordance with local, provincial, and federal regulations.

Parameter		Unit	Value		
Assumptions for scenario development		-	Disposal inert in landfill, including transport of 161 km (100 miles) per PCR		
			SBS-Modified Asphalt (Self-Adhered)	SBS-Modified Asphalt (Hot Asphalt/Cold Adhesive Applied)	SBS-Modified Asphalt (Torch Applied)
Collection Process	Collected separately	kg	0.00	0.00	0.00
	Collected with mixed construction waste	kg	6.255	6.112	8.439
Recovery	Reuse	kg	0.00	0.00	0.00
	Recycling	kg	0.00	0.00	0.00
	Landfill	kg	6.255	6.112	8.439
	Incineration	kg	0.00	0.00	0.00
	Incineration with energy recovery	kg	0.00	0.00	0.00
	Energy conversion efficiency rate	-	0.00	0.00	0.00
Disposal	Product or material for final deposition	kg	6.255	6.112	8.439
Biogenic Carbon	Removals of biogenic carbon (excluding packaging)	kg CO ₂	0.348	0.227	0.276

Table 8: End-of-Life Scenario



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LCA Results

SBS-Modified Asphalt Commercial Roofing Self-Adhered Results

SBS-Modified Asphalt Base Sheets (Self-Adhered) – TRACI Environmental Impacts						
	Global Warming Potential	Ozone Depletion Potential	Acidification Potential	Eutrophication Potential	Smog Creation Potential	Abiotic Depletion Potential (fossil)
	kg CO ₂ eq	kg CFC 11 eq	kg SO ₂ eq	kg N eq	kg O ₃ eq	MJ
Raw Materials (A1)	9.93E-01	6.67E-11	2.94E-03	1.84E-04	3.82E-02	3.57E+00
Raw Material Transport (A2)	6.52E-02	5.74E-13	3.02E-04	2.49E-05	1.00E-02	1.23E-01
Manufacture (A3)	5.79E-01	1.26E-10	1.99E-03	3.38E-04	2.89E-02	1.55E+00
Total A1-A3:	1.64E+00	1.93E-10	5.23E-03	5.47E-04	7.71E-02	5.25E+00
Final Product Transport (A4)	1.13E-01	9.98E-13	5.26E-04	4.32E-05	1.74E-02	2.14E-01
Installation (A5)	7.68E-01	3.61E-11	2.96E-03	1.68E-04	4.15E-02	2.53E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	2.28E-02	2.01E-13	1.06E-04	8.70E-06	3.50E-03	4.31E-02
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	8.30E-02	1.30E-12	3.88E-04	1.97E-05	7.65E-03	1.67E-01
Total Cradle-to-Gate w/Options:	2.62E+00	2.31E-10	9.22E-03	7.87E-04	1.47E-01	8.20E+00
SBS-Modified Asphalt Cap Sheets (Self-Adhered) – TRACI Environmental Impacts						
	Global Warming Potential	Ozone Depletion Potential	Acidification Potential	Eutrophication Potential	Smog Creation Potential	Abiotic Depletion Potential (fossil)
	kg CO ₂ eq	kg CFC 11 eq	kg SO ₂ eq	kg N eq	kg O ₃ eq	MJ
Raw Materials (A1)	2.29E+00	6.67E-11	4.31E-03	2.63E-04	7.59E-02	7.68E+00
Raw Material Transport (A2)	1.37E-01	5.74E-13	6.36E-04	5.22E-05	2.10E-02	2.59E-01
Manufacture (A3)	5.14E-01	1.26E-10	1.78E-03	3.38E-04	2.64E-02	1.53E+00
Total A1-A3:	2.94E+00	1.93E-10	6.72E-03	6.53E-04	1.23E-01	9.47E+00
Final Product Transport (A4)	2.50E-01	2.20E-12	1.16E-03	9.53E-05	3.83E-02	4.73E-01
Installation (A5)	1.00E+00	3.50E-11	3.37E-03	1.97E-04	5.36E-02	3.24E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	5.02E-02	2.01E-13	2.33E-04	1.92E-05	7.71E-03	9.51E-02
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	1.83E-01	1.30E-12	8.55E-04	4.34E-05	1.69E-02	3.67E-01
Total Cradle-to-Gate w/Options:	4.43E+00	2.32E-10	1.23E-02	1.01E-03	2.40E-01	1.37E+01
Total System: Self-Adhered Base Sheets + Cap Sheets:	7.05E+00	4.54E-10	2.15E-02	1.80E-03	3.87E-01	2.19E+01

Table 9: SBS-Modified Asphalt Base Sheets and Cap Sheets, Self-Adhered, TRACI 2.1 Environmental Impacts



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

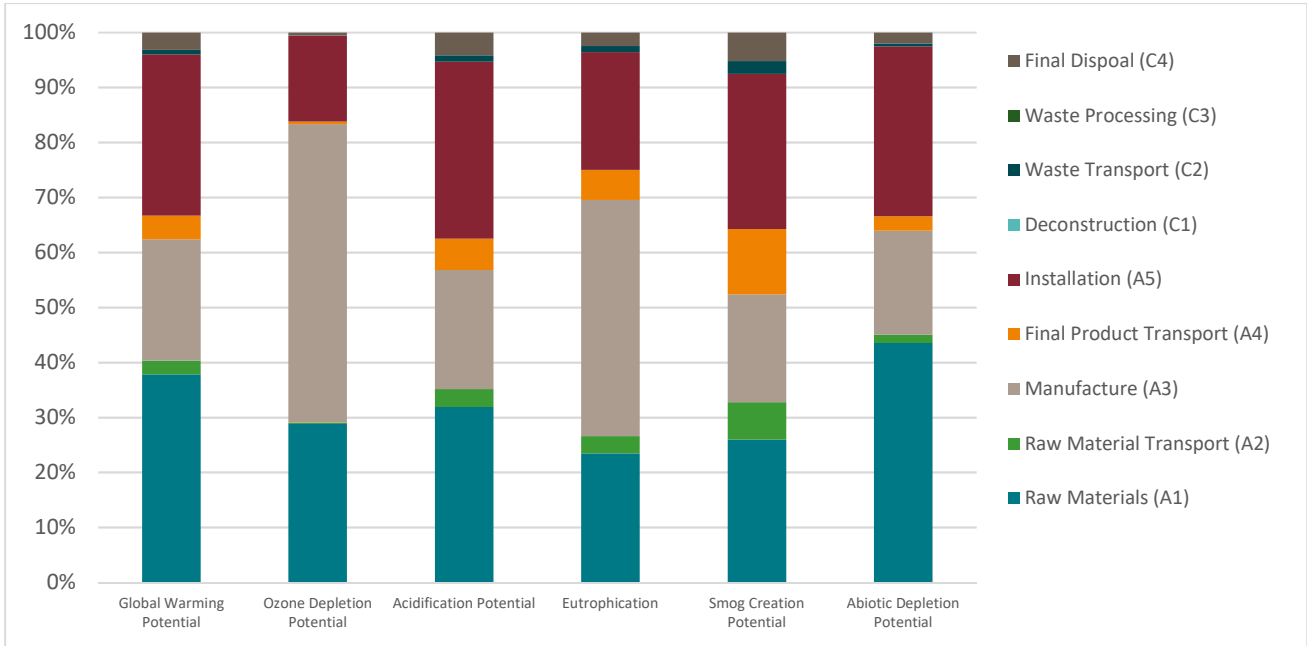


Figure 4: SBS-Modified Asphalt Base Sheets (Self-Adhered) TRACI 2.1 Environmental Impacts

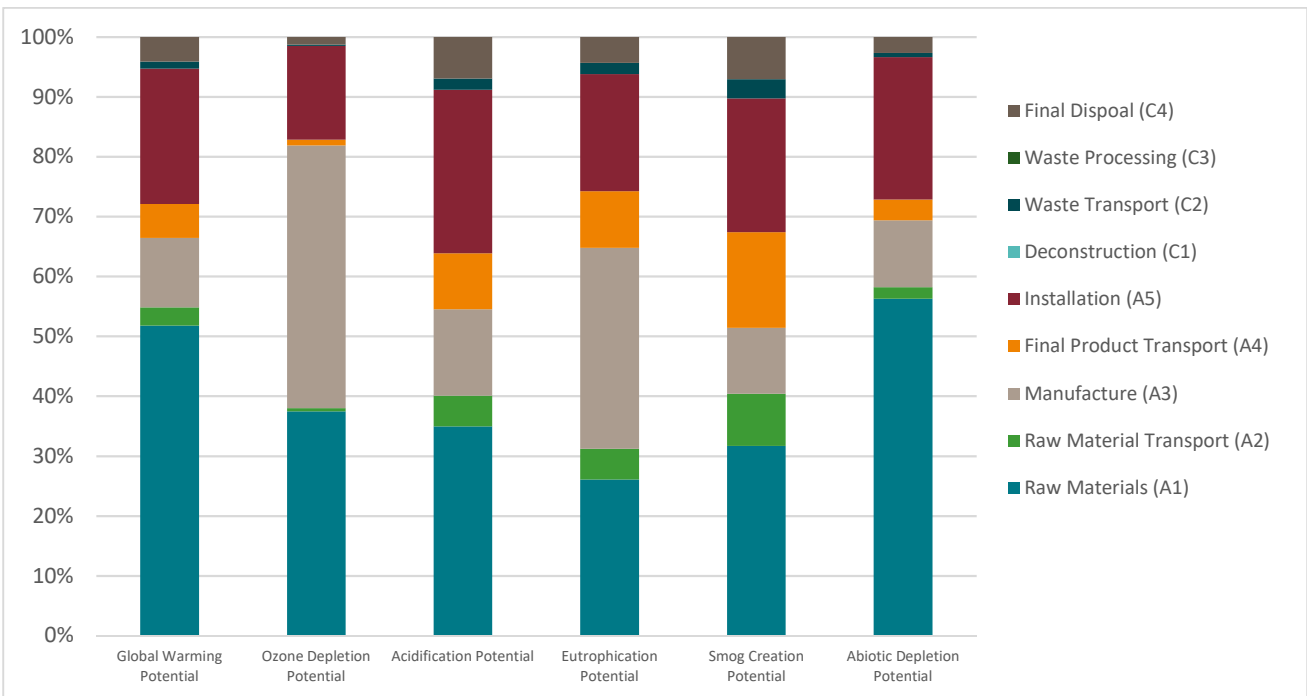


Figure 5: SBS-Modified Asphalt Cap Sheets (Self-Adhered) TRACI 2.1 Environmental Impacts



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Self-Adhered) – Use of Primary Resources				
	RPR_E: <i>Renewable primary energy used as energy carrier (fuel)</i>	RPR_M: <i>Renewable primary resources with energy content used as material</i>	NRPR_E: <i>Non-renewable primary resources used as an energy carrier (fuel)</i>	NRPR_M: <i>Non-renewable primary resources with energy content used as material</i>
	MJ	MJ	MJ	MJ
Raw Materials (A1)	5.86E-01	1.67E-11	2.70E+01	2.02E-04
Raw Material Transport (A2)	2.29E-02	3.00E-14	9.22E-01	1.72E-05
Manufacture (A3)	2.90E+00	7.16E-01	1.36E+01	8.17E-05
Total A1-A3:	3.51E+00	7.16E-01	4.15E+01	3.00E-04
Final Product Transport (A4)	3.98E-02	5.21E-14	1.60E+00	2.99E-05
Installation (A5)	1.54E+00	1.07E-01	2.04E+01	2.72E-04
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	8.00E-03	1.05E-14	3.22E-01	6.02E-06
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	9.12E-02	2.55E-12	1.33E+00	2.44E-05
Total Cradle-to-Gate w/Options:	5.20E+00	8.23E-01	6.52E+01	6.33E-04
SBS-Modified Asphalt Cap Sheets (Self-Adhered) – Use of Primary Resources				
	RPR_E: <i>Renewable primary energy used as energy carrier (fuel)</i>	RPR_M: <i>Renewable primary resources with energy content used as material</i>	NRPR_E: <i>Non-renewable primary resources used as an energy carrier (fuel)</i>	NRPR_M: <i>Non-renewable primary resources with energy content used as material</i>
	MJ	MJ	MJ	MJ
Raw Materials (A1)	1.98E+00	6.29E-11	5.84E+01	4.51E-04
Raw Material Transport (A2)	4.81E-02	6.30E-14	1.94E+00	3.62E-05
Manufacture (A3)	2.76E+00	7.16E-01	1.27E+01	7.17E-05
Total A1-A3:	4.79E+00	7.16E-01	7.30E+01	5.59E-04
Final Product Transport (A4)	8.77E-02	1.15E-13	3.53E+00	6.59E-05
Installation (A5)	1.76E+00	1.07E-01	2.57E+01	3.22E-04
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	1.76E-02	2.31E-14	7.10E-01	1.33E-05
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	2.01E-01	5.62E-12	2.93E+00	5.38E-05
Total Cradle-to-Gate w/Options:	6.85E+00	8.23E-01	1.06E+02	1.01E-03
Total System: Self-Adhered Base Sheets + Cap Sheets:	1.21E+01	1.65E+00	1.71E+02	1.64E-03

Table 10: SBS-Modified Asphalt Base Sheets and Cap Sheets, Self-Adhered, Use of Primary Resources



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Self-Adhered) – Use of Secondary Resources					
	SM: Secondary materials	RSF: Renewable secondary fuels	NRSF: Non-renewable secondary fuels	RE: Recovered energy	FW: Use of net fresh water resources
	kg	MJ	MJ	MJ	m ³
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.27E-01
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-03
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-07
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.29E-01
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.48E-01
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.44E-04
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.44E-04
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.89E-02
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E+00
SBS-Modified Asphalt Cap Sheets (Self-Adhered) – Use of Secondary Resources					
	SM: Secondary materials	RSF: Renewable secondary fuels	NRSF: Non-renewable secondary fuels	RE: Recovered energy	FW: Use of net fresh water resources
	kg	MJ	MJ	MJ	m ³
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.47E-03
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-07
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E+00
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E+00
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-03
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-03
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.58E-02
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E+00
Total System: Self-Adhered Base Sheets + Cap Sheets:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E+00

Table 11: SBS-Modified Asphalt Base Sheets and Cap Sheets, Self-Adhered, Use of Secondary Resources



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Self-Adhered) – Waste Flows				
	Hazardous waste disposed	Non-hazardous waste disposed	High level radioactive waste, conditioned	Intermediate and low level radioactive waste
	kg	kg	kg	kg
Raw Materials (A1)	1.78E-08	5.41E-02	3.59E-07	9.03E-06
Raw Material Transport (A2)	7.53E-09	3.40E-05	2.44E-09	6.52E-08
Manufacture (A3)	8.32E-09	3.29E-01	5.01E-07	1.36E-05
Total A1-A3:	3.37E-08	3.83E-01	8.63E-07	2.27E-05
Final Product Transport (A4)	1.31E-08	5.91E-05	4.23E-09	1.13E-07
Installation (A5)	1.44E-08	5.56E-01	6.79E-07	1.40E-05
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	2.63E-09	1.19E-05	8.52E-10	2.28E-08
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	4.75E-09	1.90E+00	1.64E-08	4.13E-07
Total Cradle-to-Gate w/Options:	6.85E-08	2.84E+00	1.56E-06	3.73E-05
SBS-Modified Asphalt Cap Sheets (Self-Adhered) – Waste Flows				
	Hazardous waste disposed	Non-hazardous waste disposed	High level radioactive waste, conditioned	Intermediate and low level radioactive waste
	kg	kg	kg	kg
Raw Materials (A1)	2.43E-08	6.65E-02	1.33E-06	2.71E-05
Raw Material Transport (A2)	1.58E-08	7.15E-05	5.12E-09	1.37E-07
Manufacture (A3)	7.63E-09	2.58E-01	3.92E-07	1.06E-05
Total A1-A3:	4.78E-08	3.24E-01	1.73E-06	3.79E-05
Final Product Transport (A4)	2.88E-08	1.30E-04	9.33E-09	2.50E-07
Installation (A5)	2.02E-08	8.91E-01	8.13E-07	1.64E-05
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	5.80E-09	2.62E-05	1.88E-09	5.02E-08
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	1.05E-08	4.19E+00	3.62E-08	9.09E-07
Total Cradle-to-Gate w/Options:	1.13E-07	5.41E+00	2.59E-06	5.55E-05
Total System: Self-Adhered Base Sheets + Cap Sheets:	1.82E-07	8.25E+00	4.15E-06	9.28E-05

Table 12: SBS-Modified Asphalt Base Sheets and Cap Sheets, Self-Adhered, Waste Flows



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Self-Adhered) – Output Material Flows				
	Components for reuse	Materials for recycling	Materials for energy recovery	Recovered energy exported
	kg	kg	kg	kg
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SBS-Modified Asphalt Cap Sheets (Self-Adhered) – Output Material Flows				
	Components for reuse	Materials for recycling	Materials for energy recovery	Recovered energy exported
	kg	kg	kg	kg
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total System: Self-Adhered Base Sheets + Cap Sheets:	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 13: SBS-Modified Asphalt Base Sheets and Cap Sheets, Self-Adhered, Output Material Flows



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Commercial Roofing Hot Asphalt/Cold Adhesive Applied Results

SBS-Modified Asphalt Base Sheets (Hot Asphalt/Cold Adhesive) – TRACI Environmental Impacts						
	Global Warming Potential	Ozone Depletion Potential	Acidification Potential	Eutrophication Potential	Smog Creation Potential	Abiotic Depletion Potential (fossil)
	kg CO ₂ eq	kg CFC 11 eq	kg SO ₂ eq	kg N eq	kg O ₃ eq	MJ
Raw Materials (A1)	7.25E-01	7.89E-11	2.19E-03	1.37E-04	2.65E-02	2.15E+00
Raw Material Transport (A2)	5.05E-02	4.45E-13	2.34E-04	1.93E-05	7.74E-03	9.55E-02
Manufacture (A3)	4.81E-01	1.73E-10	8.74E-04	1.55E-04	1.41E-02	9.71E-01
Total A1-A3:	1.26E+00	2.53E-10	3.30E-03	3.12E-04	4.83E-02	3.21E+00
Final Product Transport (A4)	1.12E-01	9.84E-13	5.18E-04	4.26E-05	1.71E-02	2.11E-01
Installation (A5)	9.28E-01	4.69E-11	2.20E-03	1.45E-04	5.90E-02	3.49E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	2.25E-02	1.98E-13	1.04E-04	8.57E-06	3.45E-03	4.25E-02
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	8.19E-02	1.28E-12	3.82E-04	1.94E-05	7.54E-03	1.64E-01
Total Cradle-to-Gate w/Options:	2.40E+00	3.02E-10	6.50E-03	5.27E-04	1.35E-01	7.12E+00
SBS-Modified Asphalt Cap Sheets (Hot Asphalt/Cold Adhesive) – TRACI Environmental Impacts						
	Global Warming Potential	Ozone Depletion Potential	Acidification Potential	Eutrophication Potential	Smog Creation Potential	Abiotic Depletion Potential (fossil)
	kg CO ₂ eq	kg CFC 11 eq	kg SO ₂ eq	kg N eq	kg O ₃ eq	MJ
Raw Materials (A1)	1.93E+00	8.63E-11	3.40E-03	2.12E-04	6.13E-02	6.21E+00
Raw Material Transport (A2)	1.21E-01	1.07E-12	5.61E-04	4.61E-05	1.86E-02	2.29E-01
Manufacture (A3)	4.81E-01	1.73E-10	8.74E-04	1.55E-04	1.41E-02	9.71E-01
Total A1-A3:	2.53E+00	2.61E-10	4.83E-03	4.14E-04	9.40E-02	7.41E+00
Final Product Transport (A4)	2.48E-01	2.18E-12	1.15E-03	9.45E-05	3.80E-02	4.69E-01
Installation (A5)	1.16E+00	4.85E-11	2.61E-03	1.73E-04	7.10E-02	4.20E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	4.98E-02	4.39E-13	2.31E-04	1.90E-05	7.65E-03	9.43E-02
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	1.82E-01	2.83E-12	8.48E-04	4.30E-05	1.67E-02	3.64E-01
Total Cradle-to-Gate w/Options:	4.16E+00	3.15E-10	9.67E-03	7.43E-04	2.27E-01	1.25E+01
Total System: Hot Asphalt/Cold Adhesive Base Sheets + Cap Sheets:	6.57E+00	6.17E-10	1.62E-02	1.27E-03	3.63E-01	1.97E+01

Table 14: SBS-Modified Asphalt Base Sheets and Cap Sheets, Hot Asphalt/Cold Adhesive Applied, TRACI 2.1 Environmental Impacts



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

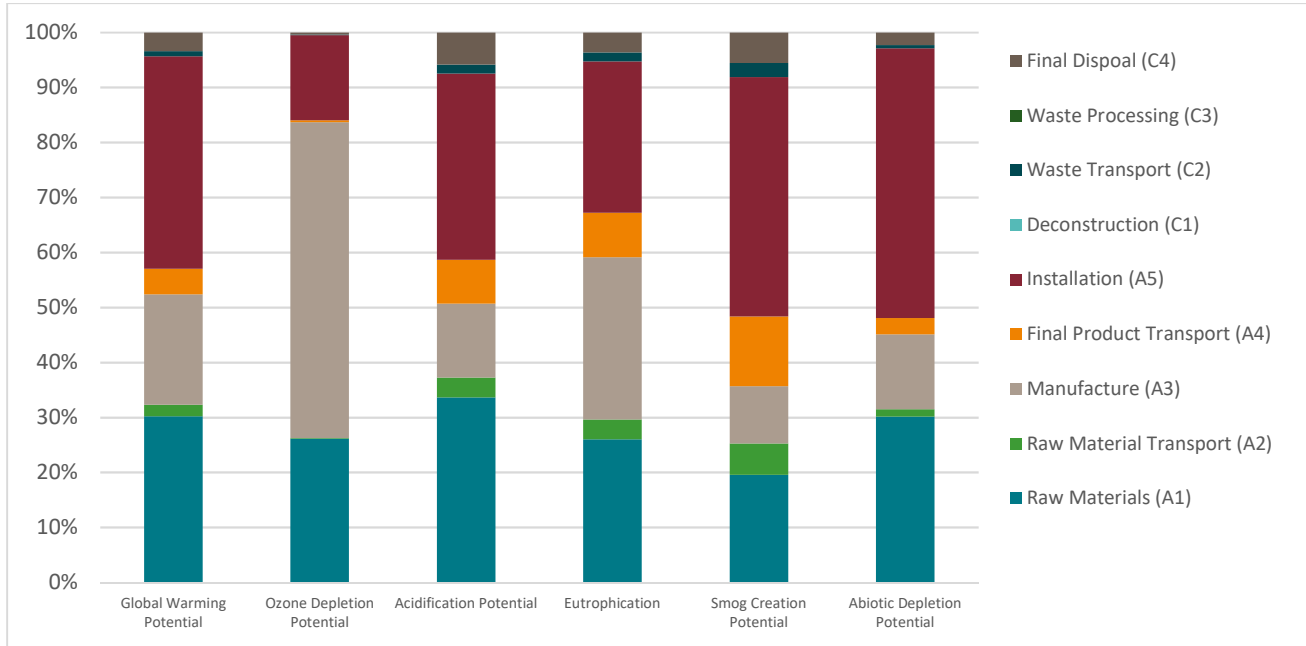


Figure 6: SBS-Modified Asphalt Base Sheets (Hot Asphalt/Cold Adhesive) TRACI 2.1 Environmental Impacts

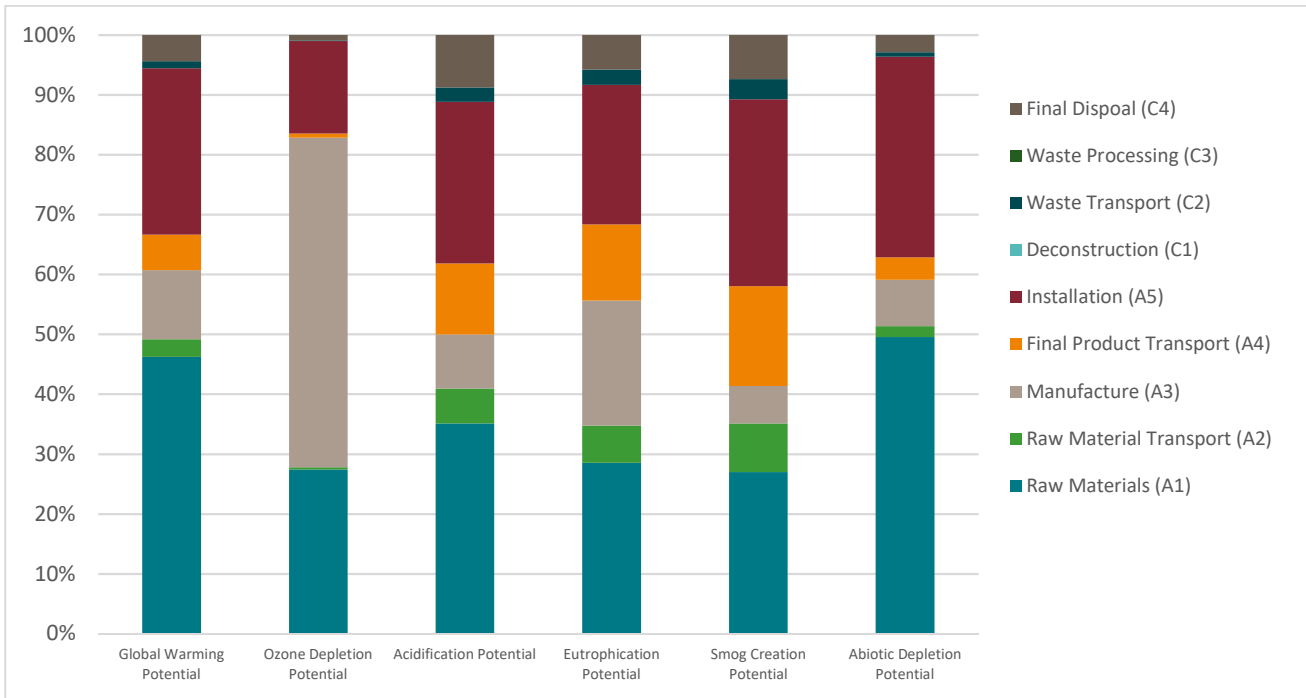


Figure 7: SBS-Modified Asphalt Cap Sheets (Hot Asphalt/Cold Adhesive) TRACI 2.1 Environmental Impacts



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Hot Asphalt/Cold Adhesive) – Use of Primary Resources				
	RPR_E: <i>Renewable primary energy used as energy carrier (fuel)</i>	RPR_M: <i>Renewable primary resources with energy content used as material</i>	NRPR_E: <i>Non-renewable primary resources used as an energy carrier (fuel)</i>	NRPR_M: <i>Non-renewable primary resources with energy content used as material</i>
	MJ	MJ	MJ	MJ
Raw Materials (A1)	6.85E-01	1.69E-11	1.73E+01	1.94E-04
Raw Material Transport (A2)	1.77E-02	2.32E-14	7.14E-01	1.33E-05
Manufacture (A3)	1.88E-01	7.28E-01	8.00E+00	2.53E-05
Total A1-A3:	8.91E-01	7.28E-01	2.60E+01	2.33E-04
Final Product Transport (A4)	3.92E-02	5.14E-14	1.58E+00	2.95E-05
Installation (A5)	1.01E+00	1.09E-01	2.67E+01	2.24E-04
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	7.89E-03	1.03E-14	3.18E-01	5.93E-06
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	8.99E-02	2.51E-12	1.31E+00	2.41E-05
Total Cradle-to-Gate w/Options:	2.03E+00	8.38E-01	5.59E+01	5.16E-04
SBS-Modified Asphalt Cap Sheets (Hot Asphalt/Cold Adhesive) – Use of Primary Resources				
	RPR_E: <i>Renewable primary energy used as energy carrier (fuel)</i>	RPR_M: <i>Renewable primary resources with energy content used as material</i>	NRPR_E: <i>Non-renewable primary resources used as an energy carrier (fuel)</i>	NRPR_M: <i>Non-renewable primary resources with energy content used as material</i>
	MJ	MJ	MJ	MJ
Raw Materials (A1)	1.81E+00	5.46E-11	4.76E+01	4.65E-04
Raw Material Transport (A2)	4.25E-02	5.56E-14	1.71E+00	3.19E-05
Manufacture (A3)	1.88E-01	7.28E-01	8.00E+00	2.53E-05
Total A1-A3:	2.04E+00	7.28E-01	5.73E+01	5.22E-04
Final Product Transport (A4)	8.69E-02	1.14E-13	3.50E+00	6.54E-05
Installation (A5)	1.20E+00	1.09E-01	3.20E+01	2.78E-04
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	1.75E-02	2.29E-14	7.04E-01	1.32E-05
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	1.99E-01	5.57E-12	2.91E+00	5.34E-05
Total Cradle-to-Gate w/Options:	3.55E+00	8.38E-01	9.64E+01	9.32E-04
Total System: Hot Asphalt/Cold Adhesive Base Sheets + Cap Sheets:	5.58E+00	1.68E+00	1.52E+02	1.45E-03

Table 15: SBS-Modified Asphalt Base Sheets and Cap Sheets, Hot Asphalt/Cold Adhesive, Use of Primary Resources



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Hot Asphalt/Cold Adhesive) – Use of Secondary Resources					
	SM: Secondary materials	RSF: Renewable secondary fuels	NRSF: Non-renewable secondary fuels	RE: Recovered energy	FW: Use of net fresh water resources
	kg	MJ	MJ	MJ	m ³
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E-01
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-03
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.96E-07
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.07E-01
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.58E-01
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E-04
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E-04
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.84E-02
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E+00
SBS-Modified Asphalt Cap Sheets (Hot Asphalt/Cold Adhesive) – Use of Secondary Resources					
	SM: Secondary materials	RSF: Renewable secondary fuels	NRSF: Non-renewable secondary fuels	RE: Recovered energy	FW: Use of net fresh water resources
	kg	MJ	MJ	MJ	m ³
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.99E-03
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.96E-07
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E+00
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.98E-01
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-03
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-03
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.51E-02
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E+00
Total System: Hot Asphalt/Cold Adhesive Base Sheets + Cap Sheets:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E+00

Table 16: SBS-Modified Asphalt Base Sheets and Cap Sheets, Hot Asphalt/Cold Adhesive, Use of Secondary Resources



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Hot Asphalt/Cold Adhesive) – Waste Flows				
	Hazardous waste disposed	Non-hazardous waste disposed	High level radioactive waste, conditioned	Intermediate and low level radioactive waste
	kg	kg	kg	kg
Raw Materials (A1)	1.35E-08	5.86E-02	4.64E-07	1.14E-05
Raw Material Transport (A2)	5.83E-09	2.63E-05	1.89E-09	5.05E-08
Manufacture (A3)	3.58E-09	2.39E-01	2.87E-07	7.80E-06
Total A1-A3:	2.30E-08	2.97E-01	7.53E-07	1.92E-05
Final Product Transport (A4)	1.29E-08	5.83E-05	4.17E-09	1.12E-07
Installation (A5)	2.38E-08	4.67E-01	6.26E-07	1.27E-05
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	2.60E-09	1.17E-05	8.40E-10	2.25E-08
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	4.69E-09	1.87E+00	1.62E-08	4.07E-07
Total Cradle-to-Gate w/Options:	6.69E-08	2.64E+00	1.40E-06	3.25E-05
SBS-Modified Asphalt Cap Sheets (Hot Asphalt/Cold Adhesive) – Waste Flows				
	Hazardous waste disposed	Non-hazardous waste disposed	High level radioactive waste, conditioned	Intermediate and low level radioactive waste
	kg	kg	kg	kg
Raw Materials (A1)	2.16E-08	7.29E-02	1.23E-06	2.54E-05
Raw Material Transport (A2)	1.40E-08	6.31E-05	4.52E-09	1.21E-07
Manufacture (A3)	3.58E-09	2.39E-01	2.87E-07	7.80E-06
Total A1-A3:	3.92E-08	3.12E-01	1.52E-06	3.33E-05
Final Product Transport (A4)	2.86E-08	1.29E-04	9.25E-09	2.48E-07
Installation (A5)	2.99E-08	8.11E-01	7.45E-07	1.49E-05
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	5.76E-09	2.60E-05	1.86E-09	4.98E-08
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	1.04E-08	4.16E+00	3.59E-08	9.02E-07
Total Cradle-to-Gate w/Options:	1.14E-07	5.28E+00	2.31E-06	4.94E-05
Total System: Hot Asphalt/Cold Adhesive Base Sheets + Cap Sheets:	1.81E-07	7.92E+00	3.71E-06	8.19E-05

Table 17: SBS-Modified Asphalt Base Sheets and Cap Sheets, Hot Asphalt/Cold Adhesive, Waste Flows



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Hot Asphalt/Cold Adhesive) – Output Material Flows				
	Components for reuse	Materials for recycling	Materials for energy recovery	Recovered energy exported
	kg	kg	kg	kg
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SBS-Modified Asphalt Cap Sheets (Hot Asphalt/Cold Adhesive) – Output Material Flows				
	Components for reuse	Materials for recycling	Materials for energy recovery	Recovered energy exported
	kg	kg	kg	kg
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total System: Hot Asphalt/Cold Adhesive Base Sheets + Cap Sheets:	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 18: SBS-Modified Asphalt Base Sheets and Cap Sheets, Hot Asphalt/Cold Adhesive, Output Material Flows



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Commercial Roofing Torch Applied Results

SBS-Modified Asphalt Base Sheets (Torch) – TRACI Environmental Impacts						
	<i>Global Warming Potential</i>	<i>Ozone Depletion Potential</i>	<i>Acidification Potential</i>	<i>Eutrophication Potential</i>	<i>Smog Creation Potential</i>	<i>Abiotic Depletion Potential (fossil)</i>
	<i>kg CO₂ eq</i>	<i>kg CFC 11 eq</i>	<i>kg SO₂ eq</i>	<i>kg N eq</i>	<i>kg O₃ eq</i>	<i>MJ</i>
Raw Materials (A1)	1.28E+00	9.95E-11	3.42E-03	2.21E-04	4.71E-02	4.49E+00
Raw Material Transport (A2)	9.43E-02	8.31E-13	4.37E-04	3.60E-05	1.45E-02	1.78E-01
Manufacture (A3)	4.81E-01	7.25E-11	8.70E-04	1.52E-04	1.41E-02	9.72E-01
Total A1-A3:	1.86E+00	1.73E-10	4.72E-03	4.09E-04	7.56E-02	5.64E+00
Final Product Transport (A4)	2.14E-01	1.89E-12	9.93E-04	8.17E-05	3.28E-02	4.05E-01
Installation (A5)	8.71E-01	3.50E-11	1.99E-03	1.43E-04	6.76E-02	2.63E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	4.31E-02	3.80E-13	2.00E-04	1.64E-05	6.61E-03	8.15E-02
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	1.57E-01	2.45E-12	7.33E-04	3.72E-05	1.45E-02	3.15E-01
Total Cradle-to-Gate w/Options:	3.14E+00	2.13E-10	8.64E-03	6.87E-04	1.97E-01	9.08E+00
SBS-Modified Asphalt Cap Sheets (Torch) – TRACI Environmental Impacts						
	<i>Global Warming Potential</i>	<i>Ozone Depletion Potential</i>	<i>Acidification Potential</i>	<i>Eutrophication Potential</i>	<i>Smog Creation Potential</i>	<i>Abiotic Depletion Potential (fossil)</i>
	<i>kg CO₂ eq</i>	<i>kg CFC 11 eq</i>	<i>kg SO₂ eq</i>	<i>kg N eq</i>	<i>kg O₃ eq</i>	<i>MJ</i>
Raw Materials (A1)	2.41E+00	9.80E-11	5.00E-03	3.36E-04	8.26E-02	7.45E+00
Raw Material Transport (A2)	1.83E-01	1.61E-12	8.48E-04	6.98E-05	2.81E-02	3.46E-01
Manufacture (A3)	4.81E-01	7.25E-11	8.70E-04	1.52E-04	1.41E-02	9.72E-01
Total A1-A3:	3.08E+00	1.72E-10	6.71E-03	5.58E-04	1.25E-01	8.76E+00
Final Product Transport (A4)	2.69E-01	2.37E-12	1.25E-03	1.03E-04	4.13E-02	5.09E-01
Installation (A5)	1.07E+00	3.50E-11	2.37E-03	1.70E-04	7.70E-02	3.13E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	5.41E-02	4.77E-13	2.51E-04	2.06E-05	8.30E-03	1.02E-01
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	1.97E-01	3.08E-12	9.20E-04	4.67E-05	1.82E-02	3.95E-01
Total Cradle-to-Gate w/Options:	4.66E+00	2.13E-10	1.15E-02	8.98E-04	2.69E-01	1.29E+01
Total System: Torch Applied Base Sheets + Cap Sheets:	7.81E+00	4.26E-10	2.01E-02	1.59E-03	4.67E-01	2.20E+01

Table 19: SBS-Modified Asphalt Base Sheets and Cap Sheets, Torch, TRACI 2.1 Environmental Impacts



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

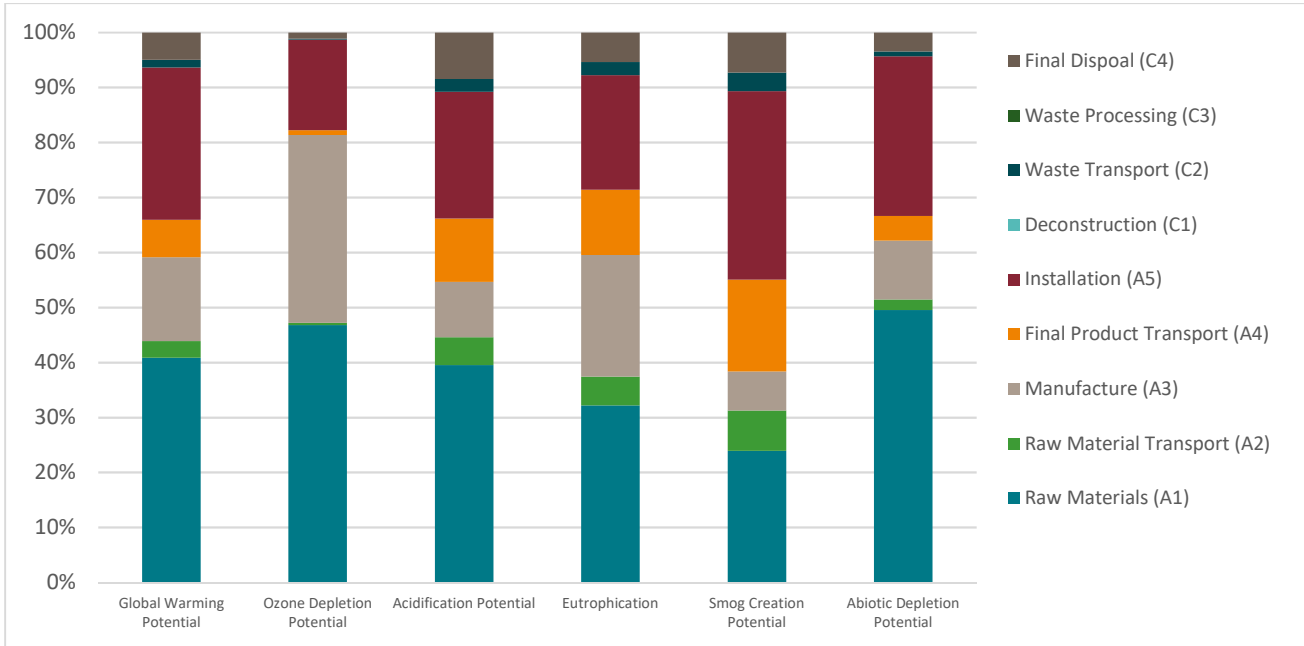


Figure 8: SBS-Modified Asphalt Base Sheets (Torch) TRACI 2.1 Environmental Impacts

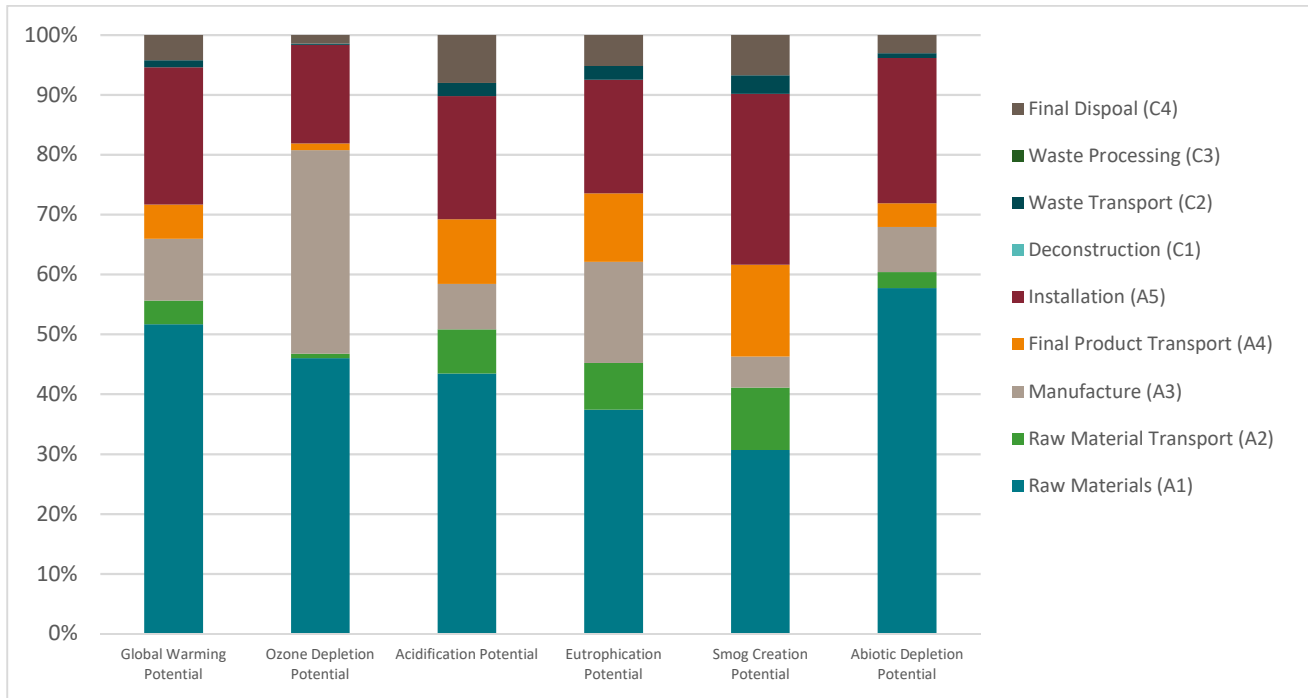


Figure 9: SBS-Modified Asphalt Cap Sheets (Torch) TRACI 2.1 Environmental Impacts



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Torch) – Use of Primary Resources				
	RPR_E: <i>Renewable primary energy used as energy carrier (fuel)</i>	RPR_M: <i>Renewable primary resources with energy content used as material</i>	NRPR_E: <i>Non-renewable primary resources used as an energy carrier (fuel)</i>	NRPR_M: <i>Non-renewable primary resources with energy content used as material</i>
	MJ	MJ	MJ	MJ
Raw Materials (A1)	7.93E-01	1.82E-11	3.39E+01	3.65E-04
Raw Material Transport (A2)	3.31E-02	4.34E-14	1.33E+00	2.49E-05
Manufacture (A3)	1.61E-01	7.21E-01	8.00E+00	2.53E-05
Total A1-A3:	9.87E-01	7.21E-01	4.32E+01	4.15E-04
Final Product Transport (A4)	7.52E-02	9.85E-14	3.03E+00	5.65E-05
Installation (A5)	1.03E+00	1.08E-01	2.08E+01	2.49E-04
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	1.51E-02	1.98E-14	6.09E-01	1.14E-05
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	1.72E-01	4.82E-12	2.52E+00	4.62E-05
Total Cradle-to-Gate w/Options:	2.28E+00	8.29E-01	7.02E+01	7.78E-04
SBS-Modified Asphalt Cap Sheets (Torch) – Use of Primary Resources				
	RPR_E: <i>Renewable primary energy used as energy carrier (fuel)</i>	RPR_M: <i>Renewable primary resources with energy content used as material</i>	NRPR_E: <i>Non-renewable primary resources used as an energy carrier (fuel)</i>	NRPR_M: <i>Non-renewable primary resources with energy content used as material</i>
	MJ	MJ	MJ	MJ
Raw Materials (A1)	2.82E+00	7.73E-11	5.80E+01	6.27E-04
Raw Material Transport (A2)	6.42E-02	8.41E-14	2.59E+00	4.83E-05
Manufacture (A3)	1.61E-01	7.21E-01	8.00E+00	2.53E-05
Total A1-A3:	3.05E+00	7.21E-01	6.86E+01	7.01E-04
Final Product Transport (A4)	9.44E-02	1.24E-13	3.80E+00	7.10E-05
Installation (A5)	1.35E+00	1.08E-01	2.48E+01	2.96E-04
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	1.90E-02	2.49E-14	7.65E-01	1.43E-05
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	2.16E-01	6.05E-12	3.16E+00	5.80E-05
Total Cradle-to-Gate w/Options:	4.73E+00	8.29E-01	1.01E+02	1.14E-03
Total System: Torch Applied Base Sheets + Cap Sheets:	7.01E+00	1.66E+00	1.71E+02	1.92E-03

Table 20: SBS-Modified Asphalt Base Sheets and Cap Sheets, Torch, Use of Primary Resources



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Torch) – Use of Secondary Resources					
	SM: Secondary materials	RSF: Renewable secondary fuels	NRSF: Non-renewable secondary fuels	RE: Recovered energy	FW: Use of net fresh water resources
	kg	MJ	MJ	MJ	m ³
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E-01
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.08E-03
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.05E-07
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.08E-01
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.63E-01
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-03
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-03
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-02
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E+00
SBS-Modified Asphalt Cap Sheets (Torch) – Use of Secondary Resources					
	SM: Secondary materials	RSF: Renewable secondary fuels	NRSF: Non-renewable secondary fuels	RE: Recovered energy	FW: Use of net fresh water resources
	kg	MJ	MJ	MJ	m ³
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.52E-03
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.05E-07
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E+00
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-03
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-03
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.24E-02
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E+00
Total System: Torch Applied Base Sheets + Cap Sheets:	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.37E+00

Table 21: SBS-Modified Asphalt Base Sheets and Cap Sheets, Torch, Use of Secondary Resources



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Torch) – Waste Flows				
	Hazardous waste disposed	Non-hazardous waste disposed	High level radioactive waste, conditioned	Intermediate and low level radioactive waste
	kg	kg	kg	kg
Raw Materials (A1)	2.48E-08	8.90E-02	4.97E-07	1.28E-05
Raw Material Transport (A2)	1.09E-08	4.92E-05	3.52E-09	9.43E-08
Manufacture (A3)	3.58E-09	2.39E-01	2.88E-07	7.81E-06
Total A1-A3:	3.93E-08	3.28E-01	7.88E-07	2.07E-05
Final Product Transport (A4)	2.47E-08	1.12E-04	8.00E-09	2.14E-07
Installation (A5)	1.63E-08	6.67E-01	6.24E-07	1.28E-05
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	4.98E-09	2.25E-05	1.61E-09	4.31E-08
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	8.98E-09	3.59E+00	3.11E-08	7.80E-07
Total Cradle-to-Gate w/Options:	9.43E-08	4.59E+00	1.45E-06	3.46E-05
SBS-Modified Asphalt Cap Sheets (Self-Adhered) – Waste Flows				
	Hazardous waste disposed	Non-hazardous waste disposed	High level radioactive waste, conditioned	Intermediate and low level radioactive waste
	kg	kg	kg	kg
Raw Materials (A1)	2.95E-08	8.76E-02	1.64E-06	3.55E-05
Raw Material Transport (A2)	2.11E-08	9.54E-05	6.83E-09	1.83E-07
Manufacture (A3)	3.58E-09	2.39E-01	2.88E-07	7.81E-06
Total A1-A3:	5.42E-08	3.26E-01	1.94E-06	4.35E-05
Final Product Transport (A4)	3.11E-08	1.40E-04	1.00E-08	2.69E-07
Installation (A5)	2.00E-08	8.05E-01	7.98E-07	1.63E-05
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	6.25E-09	2.82E-05	2.02E-09	5.41E-08
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	1.13E-08	4.51E+00	3.90E-08	9.79E-07
Total Cradle-to-Gate w/Options:	1.23E-07	5.64E+00	2.79E-06	6.11E-05
Total System: Torch Applied Base Sheets + Cap Sheets:	2.17E-07	1.02E+01	4.24E-06	9.57E-05

Table 22: SBS-Modified Asphalt Base Sheets and Cap Sheets, Torch, Waste Flows



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Base Sheets (Torch) – Output Material Flows				
	Components for reuse	Materials for recycling	Materials for energy recovery	Recovered energy exported
	kg	kg	kg	kg
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SBS-Modified Asphalt Cap Sheets (Torch) – Output Material Flows				
	Components for reuse	Materials for recycling	Materials for energy recovery	Recovered energy exported
	kg	kg	kg	kg
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total A1-A3:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Final Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Cradle-to-Gate w/Options:	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total System: Torch Applied Base Sheets + Cap Sheets:	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 23: SBS-Modified Asphalt Base Sheets and Cap Sheets, Torch, Output Material Flows



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

LCA Interpretation

Based on the results of the life cycle assessment, the life cycle impacts are strongly driven by the raw materials and installation phases. Within the raw materials, the mats and coatings, and where included, the fire retardant metals, contributed significantly to the environmental impact potentials.

Installation methods vary among the products in the study and installation for specific projects varies widely depending on the project, products used, applications, etc. This makes specific installation data difficult to obtain. Due to the variable nature of the installation methods and materials, the results for the installation phase of the life cycle should be considered highly uncertain.

The results for individual products within each of the product lines specified in this study vary slightly compared to the averages reported in this EPD, typically due to the coatings and presence of fire retardant metals in the raw material composition. The results for the each individual product included in the average are reported in the appendix of this EPD.

Commercial Roofing systems are often comprised of base sheet and cap sheet combinations from different product lines. Environmental impact potentials of specific commercial roofing combinations can be calculated by adding the cradle-to-gate w/options results found in the appendix of a specified base sheet with those of a specified cap sheet.

Additional Environmental Information

Environment and Health During Manufacture

CertainTeed and Saint-Gobain have well-established Environmental, Health, and Safety (EHS) and product stewardship programs, which help to enforce proper evaluation and monitoring of chemicals and raw materials chosen to manufacture products. These programs ensure that all environmental and OSHA requirements are met or exceeded to ensure the health and safety of all employees and contractors.

The Little Rock, AR and Shakopee, MN Roofing manufacturing facilities operate integrated Environmental, Health, and Safety Management Systems that align with the ISO 14001 and ISO 45001 standards.

Environment and Health During Installation

Commercial Roofing products should be installed by trained roofing application professionals according to the installation method specified for the individual product, as indicated in the CertainTeed Application Guide. Appropriate tools and PPE should be used.



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

Extraordinary Effects

Fire

Fire classification of SBS-Modified Asphalt Commercial Roofing is dependent on the products included in the system combination as well as the installation. According to an ICC-ES Evaluation Report for CertainTeed Commercial Roofing, roof covering systems are classified as Class A, B or C roof coverings in accordance with ASTM E108 or UL 790.

Water and Mechanical Destruction

SBS- Modified Asphalt Commercial Roofing products have no known extraordinary effects concerning water, or mechanical destruction.

Further Information

<https://www.certainteed.com/commercial-roofing/>

LCA Development

This EPD and the corresponding LCA were prepared by Saint-Gobain Corporation North America in Malvern, Pennsylvania.



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

References

- Product Category Rules for Building-Related Product and Services: Part A – Life Cycle Assessment Calculation Rules and Report Requirements, Version 3.2 2018. UL Environment.
- Product Category Rule Guidance for Building-Related Products and Services: Part B – Asphalt Shingles, Built-up Asphalt Membrane Roofing and Modified Bituminous Membrane Roofing EPD Requirements. Version 1.0 2019. UL Environment
- ISO 14040: 2006 Series – Environmental Management-Life Cycle Assessment
- EN 15804 – Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products
- ISO 21930: 2017 – Sustainability in building construction – Environmental declaration of building products
- ARMA Industry Wide Commercial Roofing Life Cycle Assessment, 2015. ThinkStep
- ICC-ES Evaluation Report for CertainTeed Corporation, May 2019. ICC Evaluation Service
- CertainTeed Roofing Commercial Roofing Life Cycle Assessment Report, January 2020. Saint-Gobain North America EHS&S Department
- CertainTeed Website: <https://www.certainteed.com/commercial-roofing/>



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

Appendix: Individual Product Results for SBS-Modified Asphalt Commercial Roofing

SBS-Modified Asphalt Self-Adhered Base Sheets						
Cradle-to-Gate w/Options		Flintlastic Ultra Glass SA	Flintlastic SA Plybase	Flintlastic SA Nailbase	Flintlastic SA Midply	Black Diamond Base Sheet
TRACI 2.1 Impact Categories						
<i>Global Warming Potential</i>	kg CO ² eq	3.34E+00	2.61E+00	2.30E+00	3.16E+00	2.25E+00
<i>Ozone Depletion Potential</i>	kg CFC-11 eq	2.51E-10	1.91E-10	2.09E-10	2.15E-10	2.38E-10
<i>Acidification Potential</i>	kg SO ₂ eq	1.16E-02	9.07E-03	8.21E-03	1.09E-02	8.90E-03
<i>Eutrophication Potential</i>	kg N eq	9.57E-04	7.94E-04	7.42E-04	9.16E-04	9.18E-04
<i>Smog Creation Potential</i>	kg O ₃ eq	1.94E-01	1.47E-01	1.31E-01	1.82E-01	1.34E-01
<i>Abiotic Depletion Potential</i>	MJ	1.05E+01	8.53E+00	6.97E+00	1.03E+01	5.97E+00
Use of Primary Resources						
<i>Renewable primary energy used as energy carrier</i>	MJ	5.51E+00	5.00E+00	4.99E+00	5.30E+00	6.37E+00
<i>Renewable primary resources with energy content used as material</i>	MJ	8.23E-01	8.23E-01	8.23E-01	8.23E-01	8.27E-01
<i>Non-renewable primary resources used as an energy carrier</i>	MJ	8.23E+01	6.64E+01	5.55E+01	7.97E+01	5.17E+01
<i>Non-renewable primary resources with energy content used as material</i>	MJ	8.12E-04	6.25E-04	6.27E-04	7.68E-04	5.46E-04
Use of Secondary Resources						
<i>Secondary materials</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Non-renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Use of net fresh water resources</i>	m ³	1.48E+00	1.26E+00	1.24E+00	1.39E+00	1.52E+00
Waste Flows						
<i>Hazardous waste disposed</i>	kg	9.78E-08	6.80E-08	6.25E-08	9.03E-08	5.78E-08
<i>Non-hazardous waste disposed</i>	kg	4.28E+00	2.72E+00	2.70E+00	3.80E+00	2.30E+00
<i>High level radioactive waste</i>	kg	1.69E-06	1.41E-06	1.44E-06	1.54E-06	1.50E-06
<i>Intermediate and low level radioactive waste</i>	kg	4.04E-05	3.30E-05	3.42E-05	3.64E-05	3.57E-05
Output Material Flows						
<i>Components for reuse</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Materials for recycling</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Materials for energy recovery</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy exported</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 24: SBS-Modified Asphalt Self-Adhered Base Sheets Individual Results



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Self-Adhered Cap Sheets					
Cradle-to-Gate w/Options		Flintlastic SA Cap FR	Flintlastic SA Cap FR CoolStar	Flintlastic SA Cap	Flintlastic SA Cap CoolStar
TRACI 2.1 Impact Categories					
<i>Global Warming Potential</i>	kg CO ² eq	4.58E+00	4.65E+00	4.41E+00	4.47E+00
<i>Ozone Depletion Potential</i>	kg CFC-11 eq	2.91E-10	2.94E-10	2.22E-10	2.23E-10
<i>Acidification Potential</i>	kg SO ₂ eq	1.46E-02	1.48E-02	1.23E-02	1.25E-02
<i>Eutrophication Potential</i>	kg N eq	1.14E-03	1.15E-03	1.00E-03	1.02E-03
<i>Smog Creation Potential</i>	kg O ₃ eq	2.57E-01	2.61E-01	2.39E-01	2.43E-01
<i>Abiotic Depletion Potential</i>	MJ	1.37E+01	1.39E+01	1.36E+01	1.39E+01
Use of Primary Resources					
<i>Renewable primary energy used as energy carrier</i>	MJ	7.61E+00	7.74E+00	6.81E+00	6.87E+00
<i>Renewable primary resources with energy content used as material</i>	MJ	8.23E-01	8.23E-01	8.23E-01	8.23E-01
<i>Non-renewable primary resources used as an energy carrier</i>	MJ	1.07E+02	1.09E+02	1.05E+02	1.07E+02
<i>Non-renewable primary resources with energy content used as material</i>	MJ	1.05E-03	1.07E-03	1.01E-03	1.04E-03
Use of Secondary Resources					
<i>Secondary materials</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Non-renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Use of net fresh water resources</i>	m ³	2.95E+00	3.03E+00	2.58E+00	2.62E+00
Waste Flows					
<i>Hazardous waste disposed</i>	kg	1.26E-07	1.29E-07	1.13E-07	1.15E-07
<i>Non-hazardous waste disposed</i>	kg	5.13E+00	5.26E+00	5.41E+00	5.54E+00
<i>High level radioactive waste</i>	kg	2.51E-06	2.56E-06	2.57E-06	2.60E-06
<i>Intermediate and low level radioactive waste</i>	kg	6.15E-05	6.27E-05	5.50E-05	5.56E-05
Output Material Flows					
<i>Components for reuse</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Materials for recycling</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Materials for energy recovery</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy exported</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 25: SBS-Modified Asphalt Self-Adhered Cap Sheets Individual Results



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Hot Asphalt/Cold Adhesive Base Sheets					
Cradle-to-Gate w/Options		Flintlastic Ultra Poly SMS	Flintlastic Poly SMS	Flintlastic Base 20	All Weather Empire Base
TRACI 2.1 Impact Categories					
<i>Global Warming Potential</i>	kg CO ² eq	3.91E+00	2.99E+00	2.86E+00	2.17E+00
<i>Ozone Depletion Potential</i>	kg CFC-11 eq	3.35E-10	3.02E-10	3.54E-10	2.91E-10
<i>Acidification Potential</i>	kg SO ₂ eq	9.48E-03	6.89E-03	8.09E-03	6.00E-03
<i>Eutrophication Potential</i>	kg N eq	7.29E-04	5.50E-04	6.31E-04	4.94E-04
<i>Smog Creation Potential</i>	kg O ₃ eq	2.18E-01	1.54E-01	1.64E-01	1.23E-01
<i>Abiotic Depletion Potential</i>	MJ	1.22E+01	9.04E+00	8.32E+00	6.41E+00
Use of Primary Resources					
<i>Renewable primary energy used as energy carrier</i>	MJ	3.61E+00	3.21E+00	2.26E+00	1.79E+00
<i>Renewable primary resources with energy content used as material</i>	MJ	8.38E-01	8.38E-01	8.38E-01	8.38E-01
<i>Non-renewable primary resources used as an energy carrier</i>	MJ	9.44E+01	7.16E+01	6.54E+01	5.03E+01
<i>Non-renewable primary resources with energy content used as material</i>	MJ	9.69E-04	7.01E-04	6.38E-04	4.49E-04
Use of Secondary Resources					
<i>Secondary materials</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Non-renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Use of net fresh water resources</i>	m ³	2.30E+00	2.16E+00	1.23E+00	1.04E+00
Waste Flows					
<i>Hazardous waste disposed</i>	kg	1.11E-07	6.87E-08	8.51E-08	6.09E-08
<i>Non-hazardous waste disposed</i>	kg	5.08E+00	2.75E+00	3.55E+00	2.32E+00
<i>High level radioactive waste</i>	kg	2.39E-06	2.23E-06	1.52E-06	1.24E-06
<i>Intermediate and low level radioactive waste</i>	kg	5.15E-05	4.73E-05	3.66E-05	2.91E-05
Output Material Flows					
<i>Components for reuse</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Materials for recycling</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Materials for energy recovery</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy exported</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 26: SBS-Modified Asphalt Hot Asphalt/Cold Adhesive Base Sheets Individual Results



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Hot Asphalt/Cold Adhesive Cap Sheets					
Cradle-to-Gate w/Options		Flintlastic FR Cap 30	Flintlastic FR P	Flintlastic GMS	Flintlastic Premium FR P
TRACI 2.1 Impact Categories					
<i>Global Warming Potential</i>	kg CO ² eq	3.80E+00	4.55E+00	4.15E+00	4.83E+00
<i>Ozone Depletion Potential</i>	kg CFC-11 eq	3.43E-10	3.25E-10	3.14E-10	3.29E-10
<i>Acidification Potential</i>	kg SO ₂ eq	1.05E-02	1.12E-02	9.62E-03	1.16E-02
<i>Eutrophication Potential</i>	kg N eq	8.34E-04	8.84E-04	7.39E-04	9.09E-04
<i>Smog Creation Potential</i>	kg O ₃ eq	2.23E-01	2.57E-01	2.26E-01	2.65E-01
<i>Abiotic Depletion Potential</i>	MJ	1.07E+01	1.34E+01	1.25E+01	1.42E+01
Use of Primary Resources					
<i>Renewable primary energy used as energy carrier</i>	MJ	2.41E+00	3.66E+00	3.54E+00	5.15E+00
<i>Renewable primary resources with energy content used as material</i>	MJ	8.38E-01	8.38E-01	8.38E-01	2.25E+00
<i>Non-renewable primary resources used as an energy carrier</i>	MJ	8.23E+01	1.03E+02	9.61E+01	1.10E+02
<i>Non-renewable primary resources with energy content used as material</i>	MJ	7.80E-04	1.03E-03	9.28E-04	1.11E-03
Use of Secondary Resources					
<i>Secondary materials</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Non-renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy</i>	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Use of net fresh water resources</i>	m ³	1.29E+00	2.32E+00	2.28E+00	2.83E+00
Waste Flows					
<i>Hazardous waste disposed</i>	kg	1.18E-07	1.30E-07	1.13E-07	1.31E-07
<i>Non-hazardous waste disposed</i>	kg	4.92E+00	5.65E+00	5.27E+00	5.63E+00
<i>High level radioactive waste</i>	kg	1.51E-06	2.35E-06	2.31E-06	2.81E-06
<i>Intermediate and low level radioactive waste</i>	kg	3.61E-05	5.06E-05	4.93E-05	5.90E-05
Output Material Flows					
<i>Components for reuse</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Materials for recycling</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Materials for energy recovery</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy exported</i>	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 27: SBS-Modified Asphalt Hot Asphalt/Cold Adhesive Cap Sheets Individual Results



ENVIRONMENTAL PRODUCT DECLARATION



SBS-Modified Asphalt Commercial Roofing
Self-Adhered, Hot Asphalt or Cold Adhesive, and Torch Applied

According to ISO 14025

SBS-Modified Asphalt Torch Applied Base and Cap Sheets				
Cradle-to-Gate w/Options		Flintlastic Base 20 T	Flintlastic FR Cap 30 T	Flintlastic GTS FR
TRACI 2.1 Impact Categories				
<i>Global Warming Potential</i>	kg CO ₂ eq	3.14E+00	4.32E+00	5.38E+00
<i>Ozone Depletion Potential</i>	kg CFC-11 eq	2.13E-10	2.71E-10	5.26E-08
<i>Acidification Potential</i>	kg SO ₂ eq	8.64E-03	1.21E-02	1.43E-02
<i>Eutrophication Potential</i>	kg N eq	6.87E-04	8.81E-04	2.72E-03
<i>Smog Creation Potential</i>	kg O ₃ eq	1.97E-01	2.58E-01	3.05E-01
<i>Abiotic Depletion Potential</i>	MJ	9.08E+00	1.11E+01	1.39E+01
Use of Primary Resources				
<i>Renewable primary energy used as energy carrier</i>	MJ	2.28E+00	6.19E+00	4.23E+00
<i>Renewable primary resources with energy content used as material</i>	MJ	8.29E-01	8.29E-01	8.29E-01
<i>Non-renewable primary resources used as an energy carrier</i>	MJ	7.02E+01	8.99E+01	1.05E+02
<i>Non-renewable primary resources with energy content used as material</i>	MJ	7.78E-04	1.17E-03	1.13E-03
Use of Secondary Resources				
<i>Secondary materials</i>	kg	0.00E+00	0.00E+00	0.00E+00
<i>Renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00
<i>Non-renewable secondary fuels</i>	MJ	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy</i>	MJ	0.00E+00	0.00E+00	0.00E+00
<i>Use of net fresh water resources</i>	m ³	1.25E+00	4.06E+00	2.81E+00
Waste Flows				
<i>Hazardous waste disposed</i>	kg	9.43E-08	1.23E-07	1.23E-07
<i>Non-hazardous waste disposed</i>	kg	4.59E+00	5.43E+00	5.72E+00
<i>High level radioactive waste</i>	kg	1.45E-06	2.94E-06	2.73E-06
<i>Intermediate and low level radioactive waste</i>	kg	3.46E-05	7.33E-05	5.69E-05
Output Material Flows				
<i>Components for reuse</i>	kg	0.00E+00	0.00E+00	0.00E+00
<i>Materials for recycling</i>	kg	0.00E+00	0.00E+00	0.00E+00
<i>Materials for energy recovery</i>	kg	0.00E+00	0.00E+00	0.00E+00
<i>Recovered energy exported</i>	kg	0.00E+00	0.00E+00	0.00E+00

Table 28: SBS-Modified Asphalt Torch Applied Base and Cap Sheets Individual Results

