

ENVIRONMENTAL PRODUCT DECLARATION

SBS MODIFIED BITUMEN
ROOFING MEMBRANE
COLD ADHESIVE



GENERAL INFORMATION

The Life Cycle Assessment (LCA) was prepared in conformity with ISO 14025, ISO 14040, ISO 14044, PCR Part A: Life Cycle Assessment Calculation Rules and Report Requirements (UL 10010, Version 4.0) and Sub-category PCR: Part B: Asphalt Shingles, Built-up Asphalt Membrane Roofing and Modified Bituminous Membrane Roofing (UL 100010-11, 2024). This EPD is intended for business-to-business (B-to-B) audiences.



Holcim Building Envelope

26 Century Boulevard, Suite 205
Nashville, Tennessee 37214



Beech Grove Plant

3525 S. Arlington Avenue
Beech Grove, Indiana 46203



Program Operator

ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428
610-832-9500
www.astm.org

EPD#907

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LCA/EPD Developer

Climate Earth, Inc.
137 Park Place, Suite 204
Pt Richmond, CA 94801
415-391-2725
www.climateearth.com

UL's PCR Part A: LCA Calculation Rules and Report Requirements (UL 10010, Version 4.0): serves as the core PCR. Product Category Rules for Asphalt Shingles, Build-Up Asphalt Membrane, and Modified Bituminous Asphalt Membrane Roofing (UL 100010-11, 2024) serves as the sub-category PCR

- Sub-category PCR review was conducted by **Thomas P. Gloria, PhD.** (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants
- Independent verification of the declaration, according to ISO 21930:2017 and ISO 14025:2006.: internal external
- Third party verifier Thomas P. Gloria, PhD. (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants
- For additional explanatory material Manufacturer Representative: Sherrie MacWilliams (sherrie.macwilliams@holcim.com)
This LCA EPD was prepared by: Leila Schein LCA and EPD Project Manager • Climate Earth (www.climateearth.com)
- EPDs are comparable only if they comply with ISO 21930 (2017), use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.



PRODUCER

Holcim Solutions and Products US LLC delivers high-performance solutions that make the entire building envelope more sustainable for customers around the world. We are committed to raising the standards of building solutions by delivering superior quality and innovation while addressing industry needs.

Our offerings cover a comprehensive range of residential and commercial roofing, wall and lining systems, insulation, and waterproofing solutions for a variety of industries from construction to marine and aerospace. Our powerful portfolio of brands includes Elevate, Duro-Last, Malarkey Roofing Products, GenFlex, Gaco, and Enverge. Holcim Solutions and Products US LLC is a division of the Holcim Group. Visit HolcimBE.com to learn more.

Holcim's Beech Grove, IN facility is ISO 9000 certified and manufactures Elevate APP and SBS modified bitumen roofing membrane for use in commercial roofing systems. The facility is 225,000 square feet.

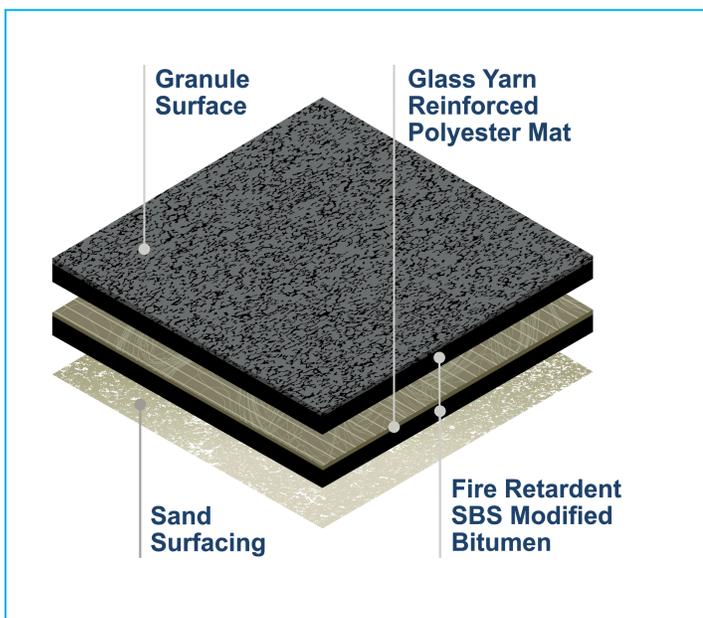


PRODUCT: SBS MODIFIED BITUMEN ROOFING MEMBRANE - COLD ADHESIVE

With superior durability, flexibility and UV resistance, SBS modified bitumen roofing membrane is a versatile roofing solution that withstands the test of time. SBS modified bitumen roof membrane can have a granulated or smooth surface and is designed to be installed with a cold adhesive. It consists of styrene-butadiene-styrene modified bitumen, and strengthened with a reinforced polyester or fiberglass mat which results in a flexible, durable and puncture resistant membrane. The addition of SBS rubber optimizes the natural waterproofing characteristics of asphalt and increases system performance. This proprietary compound provides resistance to thermal and physical forces over a wide range of temperatures. It is ideal for both new construction and re-roofing applications. Additionally, UltraWhite SBS modified bitumen roofing membrane can contribute to LEED® certification.

This study consists of SBS modified bitumen cap sheet and base sheet.

FIGURE 1
SBS Modified Bitumen Roofing Membrane



The products covered in this EPD meet the following physical properties:

TABLE 1
Typical Properties (Meets or exceeds ASTM D 4637, Type I)

Properties	Test Method	Performance Minimum	Typical Performance
Product Thickness	D 5147	130 mil (3.3 mm)	160 mil (4.1 mm)
Net Mass	D 146	90 lb/100 ft ² (4,394 g/m ²)	102 lb/100 ft ² (4,980 g/m ²)
Bottom Side Coating	D 5147	N/A	39 mil (1.0 mm)
Peak Load at 0 °F (-18 °C)	D 5147	100 lbf/in, MD (18 kN/m, MD) 100 lbf/in, XMD (18 kN/m, XMD)	105 lbf/in, MD (18 kN/m, MD) 105 lbf/in, XMD (18 kN/m, XMD)
Elongation at Peak Load at 0 °F (-18 °C)	D 5147	20%, MD 20%, XMD	30%, MD XMD 30%
Peak Load at 73 °F (23 °C)	D 5147	70 lbf/in, MD (12 kN/m, MD) 70 lbf/in, XMD (12 kN/m, XMD)	75 lbf/in, MD (13 kN/m, MD) 75 lbf/in, XMD (13 kN/m, XMD)
Elongation at Peak Load at 73 °F (23 °C)	D 5147	50%, MD 50%, XMD	55%, MD 55%, XMD
Ultimate Elongation at 5% of Peak Load 73 °F (23 °C)	D 5147	60%, MD 60%, XMD	65%, MD 65%, XMD
Tear Strength at 73 °F (23 °C)	D 5147, D 4073	70 lbf, MD (311 N, MD) 70 lbf, XMD (311 N, XMD)	75 lbf, MD (334 N, MD) 75 lbf, XMD (334 N, MD)
Low Temperature Flexibility	D 5147	0 °F (-18 °C)	-15 °F (-26 °C)
Dimensional Stability	D 5147, D 1204	1% Change, MD 1% Change, XMD	0.2% Change, MD 0.2% Change, XMD
Compound Stability	D 5147	215 °F (102 °C)	250 °F (121 °C)
Granule Loss	D 4977	2g	0.5g

TABLE 2
Product Components

MATERIAL	% WEIGHTED AVERAGE COMPOSITION
Asphalt	30-35%
Surfacing	20-50%
Mineral Filler/Fire Retardant	20-25%
Polymer	3-5%
Polyester Mat	1-5%

LIFE CYCLE ASSESSMENT

DECLARED UNIT

The declared unit is 1 m² of single-ply roofing membrane for a stated product thickness.

SYSTEM BOUNDARY

This EPD is a cradle-to-grave covering A1-C4 stages of the life cycle.

TABLE 3

Life Cycle Product Stages

PRODUCTION STAGE (MANDATORY)			CONSTRUCTION STAGE		USE STAGE					END-OF-LIFE STAGE			
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Deconstruction / Demolition	Transport to waste processing or disposal	Waste processing	Disposal of waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4
X	X	X	X	X	MND	MND	MND	MND	MND	X	X	X	X

NOTE: MND = module not declared; X = module included.

CUT-OFF

Items excluded from system boundary include:

- production, manufacture and construction of manufacturing capital goods and infrastructure;
- production and manufacture of production equipment, delivery vehicles, and laboratory equipment;
- personnel-related activities (travel, furniture, and office supplies); and
- energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

ALLOCATION PROCEDURE

Allocation follows the requirements and guidance of ISO 14044:2006, Clause 4.3.4; and ISO 21930:2017 section 7.2. Recycling and recycled content is modeled using the cut-off rule.

MANUFACTURING

A1-A3, Production Stage

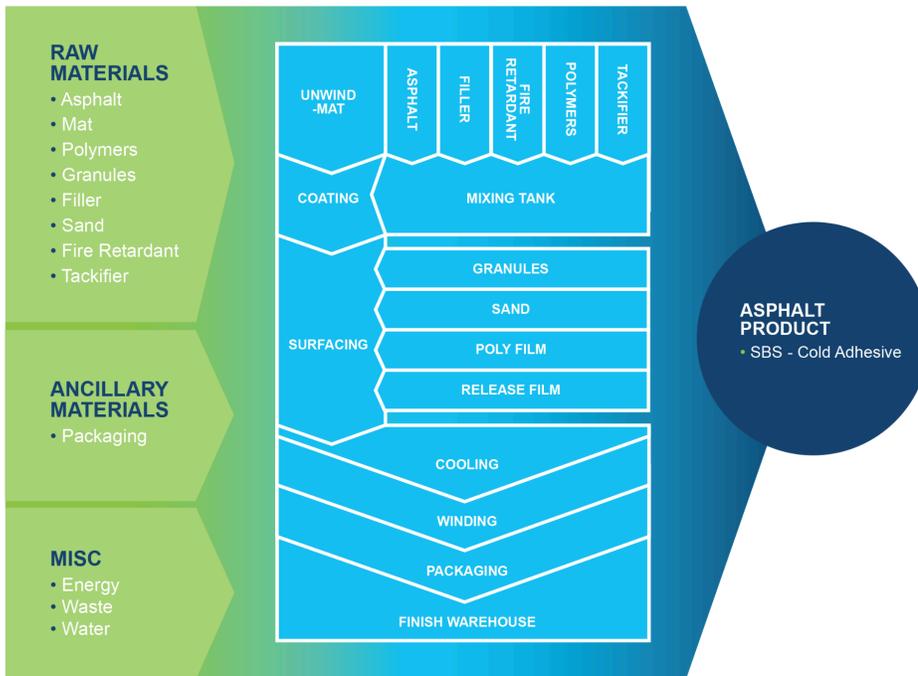
APP Modified Bitumen Roof Membrane Manufacturing

The main material input into the manufacturing process is asphalt, polymer, filler, sand, granules and fiberglass mat. Asphalt and sand are delivered by truck and pumped into storage tanks. Raw materials are blended together in a mixing tank. Fiberglass mat rolls are placed on a let-off stand at the front end of the coater process. The fiberglass mat sheets are fed through several loops into the coater section. During this process, the asphalt is pumped from the mixing tank and is applied to the fiberglass mat.

Once the fiberglass is coated with asphalt, granules and sand are applied. The coated fiberglass mat sheet is cooled by a water spray. The final product goes into a winder where it is cut into approximately 100-pound rolls, placed on a pallet, wrapped with plastic stretch wrap.

FIGURE 2

Process Flow Diagram of SBS Modified Bitumen Roofing Membrane



A4, TRANSPORTATION

An average truck and transport distance from the plant to the construction site is assumed.

A5, INSTALLATION

The installation scenario includes the energy and ancillary materials typically consumed to install SBS modified bitumen membrane using cold adhesive on a standard-shaped roof of 20,000 square feet, with a total membrane weight of 23,061 pounds.

B1 – B5 USE STAGE

As defined in the PCR, the Building Estimated Service Life (ESL) is 75 years. Use stage information modules have been omitted from this LCA Study.

C1 – C4 END-OF-LIFE STAGE

At the end of building service life and during roof replacement, the SBS modified bitumen roofing membranes may be reused, recovered and repurposed, or disposed of. This study does not take reuse and recovery into account, and it is assumed that insulation is removed when the building is decommissioned and disposed of in a landfill, for which an average distance and specific end of life LCI is applied.

LIFE CYCLE ASSESSMENT RESULTS

TABLE 4: **Asphalt SBS Modified Bitumen Roofing Membrane, Cold Adhesive Products**, per 1 m²*, of average thickness.

IMPACT ASSESSMENT UNIT	PRODUCTION (A1-A3)	TRANSPORT (A4)	INSTALLATION (A5)	EOL (C1)	EOL (C2)	EOL (C3)	EOL (C4)	TOTAL
Global warming potential (GWP)¹ (kg CO₂ eq)								
SBS Cold Adhesive	6.45	1.10	0.15	0.00	0.05	0.00	0.18	7.92
Depletion potential of the stratospheric ozone layer (ODP) (kg CFC-11 eq)								
SBS Cold Adhesive	5.81E-07	4.58E-11	1.84E-07	0.00	2.02E-12	0.00	3.67E-08	8.01E-07
Eutrophication potential (EP) (kg N eq)								
SBS Cold Adhesive	0.01	8.70E-04	5.51E-04	0.00	3.20E-05	0.00	0.01	0.02
Acidification potential of soil and water sources (AP) (kg SO₂ eq)								
SBS Cold Adhesive	0.02	0.01	1.61E-03	0.00	5.36E-04	0.00	8.51E-04	0.04
Formation potential of tropospheric ozone (POCP) (kg O₃ eq)								
SBS Cold Adhesive	0.35	0.37	0.01	0.00	0.01	0.00	0.02	0.77
Resource Use								
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*								
SBS Cold Adhesive	5.18E-06	0.00	6.98E-08	0.00	0.00	0.00	1.39E-07	5.38E-06
Abiotic depletion potential for fossil resources (ADP_{fossil}) (MJ, NCV)								
SBS Cold Adhesive	128.74	15.53	15.17	0.00	0.68	0.000	2.63	163
Renewable primary energy resources as energy (fuel), (RPRE²)* (MJ, NCV)								
SBS Cold Adhesive	3.36	0.00	0.04	0.00	0.00	0.00	0.03	3.43
Renewable primary resources as material, (RPRM²)* (MJ, NCV)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-renewable primary resources as energy (fuel), (NRPRE²)* (MJ, NCV)								
SBS Cold Adhesive	135.11	15.53	15.33	0.00	0.68	0.00	2.75	169.00
Non-renewable primary resources as material, (NRPRM²)* (MJ, NCV)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumption of fresh water, (FW2) (m³)								
SBS Cold Adhesive	6.00E-02	0.00	3.59E-03	0.00	0.00	0.00	3.17E-03	6.85E-02
Secondary Material, Fuel and Recovered Energy								
Secondary Materials, (SM2) * (kg)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Renewable secondary fuels, (RSF²)* (MJ, NCV)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-renewable secondary fuels (NRSF²)* (MJ, NCV)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recovered energy, (RE²)* (MJ, NCV)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste & Output Flows								
Hazardous waste disposed, (HW²) * (kg)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-hazardous waste disposed, (NHWD²) * (kg)								
SBS Cold Adhesive	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.47
High-level radioactive waste, (HLRW²) * (kg)								
SBS Cold Adhesive	2.85E-09	0.00	8.42E-11	0.00	0.00	0.00	5.49E-11	2.99E-09

¹ GWP 100; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5). CO₂ from biogenic secondary fuels used in kiln are climate-neutral (CO₂ sink = CO₂ emissions), ISO 21930, 7.2.7.
² Calculated per ACLCA ISO 21930 Guidance.

Intermediate and low-level radioactive waste, (ILLRW2)* (kg)								
SBS Cold Adhesive	1.53E-08	0.00	6.18E-10	0.00	0.00	0.00	2.64E-10	1.62E-08
Components for reuse, (CRU2)* (kg)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Materials for recycling, (MR2)* (kg)								
SBS Cold Adhesive	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.21
Materials for energy recovery, (MER2)* (kg)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recovered energy exported from the product system, (EE2)* (MJ, NCV)								
SBS Cold Adhesive	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 5: **Asphalt SBS Modified Bitumen Roofing Membrane with Fire Retardant**, Cold Adhesive Products FR, per 1 m², of average thickness.

IMPACT ASSESSMENT UNIT	PRODUCTION (A1-A3)	TRANSPORT (A4)	INSTALLATION (A5)	EOL (C1)	EOL (C2)	EOL (C3)	EOL (C4)	TOTAL
Global warming potential (GWP) ³ (kg CO ₂ eq)								
SBS Cold Adhesive FR	5.61	0.92	0.12	0.00	0.04	0.00	0.15	6.85
Depletion potential of the stratospheric ozone layer (ODP) (kg CFC-11 eq)								
SBS Cold Adhesive FR	0.00	0.00	1.55E-07	0.00	1.70E-12	0.00	3.09E-08	6.95E-07
Eutrophication potential (EP) (kg N eq)								
SBS Cold Adhesive FR	0.01	7.33E-04	4.64E-04	0.00	2.69E-05	0.00	0.01	0.02
Acidification potential of soil and water sources (AP) (kg SO ₂ eq)								
SBS Cold Adhesive FR	0.02	0.01	1.35E-03	0.00	4.51E-04	0.00	7.16E-04	0.04
Formation potential of tropospheric ozone (POCP) (kg O ₃ eq)								
SBS Cold Adhesive FR	0.34	0.31	0.01	0.00	0.01	0.00	0.02	0.69
Resource Use								
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*								
SBS Cold Adhesive FR	4.52E-06	0.00	5.88E-08	0.00	0.00	0.00	1.17E-07	4.70E-06
Abiotic depletion potential for fossil resources (ADP _{fossil}) (MJ, NCV)								
SBS Cold Adhesive FR	111.00	13.07	12.78	0.00	0.58	0.00	2.22	140.00
Renewable primary energy resources as energy (fuel), (RPRE ⁴)* (MJ, NCV)								
SBS Cold Adhesive FR	2.88	0.00	0.04	0.00	0.00	0.00	0.03	2.94
Renewable primary resources as material, (RPRM2)* (MJ, NCV)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-renewable primary resources as energy (fuel), (NRPRE2)* (MJ, NCV)								
SBS Cold Adhesive FR	116.00	13.07	12.91	0.00E	0.58	0.00	2.32	146.00
Non-renewable primary resources as material, (NRPRM2)* (MJ, NCV)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumption of fresh water, (FW2) (m ³)								
SBS Cold Adhesive FR	0.05	0.00	3.03E-03	0.00	0.00	0.00	2.67E-03	5.87E-02
Secondary Material, Fuel and Recovered Energy								
Secondary Materials, (SM2)* (kg)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Renewable secondary fuels, (RSF2)* (MJ, NCV)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-renewable secondary fuels (NRSF2)* (MJ, NCV)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

³ GWP 100; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5). CO₂ from biogenic secondary fuels used in kiln are climate-neutral (CO₂ sink = CO₂ emissions), ISO 21930, 7.2.7.
⁴ Calculated per ACLCA ISO 21930 Guidance.

Recovered energy, (RE2) *(MJ, NCV)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste & Output Flows								
Hazardous waste disposed, (HW2) * (kg)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-hazardous waste disposed, (NHWD2) * (kg)								
SBS Cold Adhesive FR	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.27
High-level radioactive waste, (HLRW2) * (kg)								
SBS Cold Adhesive FR	2.43E-09	0.00	7.09E-11	0.00	0.00	0.00	4.62E-11	2.55E-09
Intermediate and low-level radioactive waste, (ILLRW2)* (kg)								
SBS Cold Adhesive FR	1.51E-08	0.00	5.20E-10	0.00	0.00	0.00	2.22E-10	1.58E-08
Components for reuse, (CRU2) * (kg)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Materials for recycling, (MR2) * (kg)								
SBS Cold Adhesive FR	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.30
Materials for energy recovery, (MER2) * (kg)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recovered energy exported from the product system, (EE2) * (MJ, NCV)								
SBS Cold Adhesive FR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 6: **Asphalt SBS Modified Bitumen Roofing Membrane, Self Adhered**, Cold Adhesive, SA Products, per 1 m²*, of average thickness.

IMPACT ASSESSMENT UNIT	PRODUCTION (A1-A3)	TRANSPORT (A4)	INSTALLATION (A5)	EOL (C1)	EOL (C2)	EOL (C3)	EOL (C4)	TOTAL
Global warming potential (GWP) ⁵ (kg CO ₂ eq)								
SBS Cold Adhesive SA	5.76	0.96	0.13	0.00	0.04	0.00	0.16	7.04
Depletion potential of the stratospheric ozone layer (ODP) (kg CFC-11 eq)								
SBS Cold Adhesive SA	5.76E-07	4.00E-11	1.61E-07	0.00	1.76E-12	0.00	3.21E-08	7.69E-07
Eutrophication potential (EP) (kg N eq)								
SBS Cold Adhesive SA	0.01	7.61E-04	4.82E-04	0.00	2.80E-05	0.00	0.01	0.02
Acidification potential of soil and water sources (AP) (kg SO ₂ eq)								
SBS Cold Adhesive SA	0.02	0.01	1.40E-03	0.00	4.69E-04	0.00	7.44E-04	0.04
Formation potential of tropospheric ozone (POCP) (kg O ₃ eq)								
SBS Cold Adhesive SA	0.34	0.32	0.01	0.00	0.01	0.00	0.02	0.70
Resource Use								
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*								
SBS Cold Adhesive SA	4.29E-06	0.00	6.10E-08	0.00	0.00	0.00	1.22E-07	4.48E-06
Abiotic depletion potential for fossil resources (ADP _{fossil}) (MJ, NCV)								
SBS Cold Adhesive SA	123.00	13.58	13.27	0.00	0.60	0.00	2.30	153.00
Renewable primary energy resources as energy (fuel), (RPRE ⁶)* (MJ, NCV)								
SBS Cold Adhesive SA	2.89	0.00	0.04	0.00	0.00	0.00	0.03	2.96
Renewable primary resources as material, (RPRM2)* (MJ, NCV)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-renewable primary resources as energy (fuel), (NRPRE2)* (MJ, NCV)								
SBS Cold Adhesive SA	128.00	13.58	13.40	0.00	0.60	0.00	2.40	159.00
Non-renewable primary resources as material, (NRPRM2)* (MJ, NCV)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

⁵ GWP 100; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5). CO₂ from biogenic secondary fuels used in kiln are climate-neutral (CO₂ sink = CO₂ emissions), ISO 21930, 7.2.7.
⁶ Calculated per ACLCA ISO 21930 Guidance.

Consumption of fresh water, (FW2) (m3)								
SBS Cold Adhesive SA	0.05	0.00E+00	3.14E-03	0.00E+00	0.00E+00	0.00E+00	2.77E-03	5.97E-02
Secondary Material, Fuel and Recovered Energy								
Secondary Materials, (SM2) * (kg)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Renewable secondary fuels, (RSF2)* (MJ, NCV)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-renewable secondary fuels (NRSF2)* (MJ, NCV)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recovered energy, (RE2) *(MJ, NCV)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste & Output Flows								
Hazardous waste disposed, (HW2) * (kg)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-hazardous waste disposed, (NHWD2) * (kg)								
SBS Cold Adhesive SA	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.41
High-level radioactive waste, (HLRW2) * (kg)								
SBS Cold Adhesive SA	2.48E-09	0.00	7.36E-11	0.00	0.00	0.00	4.80E-11	2.60E-09
Intermediate and low-level radioactive waste, (ILLRW2)* (kg)								
SBS Cold Adhesive SA	1.37E-08	0.00	5.40E-10	0.00	0.00	0.00	2.31E-10	1.45E-08
Components for reuse, (CRU2) * (kg)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Materials for recycling, (MR2) * (kg)								
SBS Cold Adhesive SA	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.18
Materials for energy recovery, (MER2) * (kg)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recovered energy exported from the product system, (EE2) * (MJ, NCV)								
SBS Cold Adhesive SA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 7: **Asphalt SBS Modified Bitumen Roofing Membrane Self Adhered with Fire Retardant, Cold Adhesive, SA Products with FR, per 1 m2*, of average thickness.**

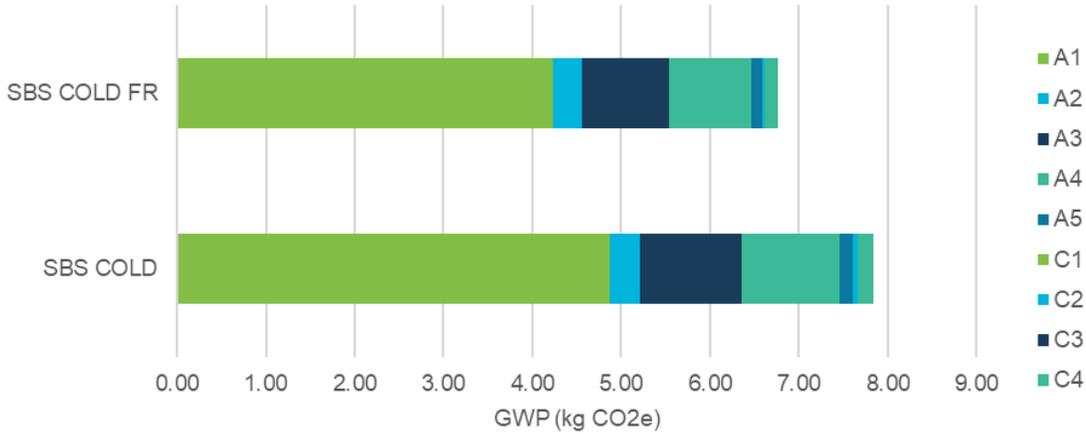
IMPACT ASSESSMENT UNIT	PRODUCTION (A1-A3)	TRANSPORT (A4)	INSTALLATION (A5)	EOL (C1)	EOL (C2)	EOL (C3)	EOL (C4)	TOTAL
Global warming potential (GWP)⁷ (kg CO₂ eq)								
SBS Cold Adhesive SA FR	4.92	0.79	0.10	0.00	0.03	0.00	0.13	5.97
Depletion potential of the stratospheric ozone layer (ODP) (kg CFC-11 eq)								
SBS Cold Adhesive SA FR	5.05E-07	3.28E-11	1.32E-07	0.00	1.45E-12	0.00	2.63E-08	6.63E-07
Eutrophication potential (EP) (kg N eq)								
SBS Cold Adhesive SA FR	0.01	6.23E-04	3.95E-04	0.00	2.29E-05	0.00	0.01	0.02
Acidification potential of soil and water sources (AP) (kg SO₂ eq)								
SBS Cold Adhesive SA FR	0.02	0.01	1.15E-03	0.00	3.84E-04	0.00	6.09E-04	0.03
Formation potential of tropospheric ozone (POCP) (kg O₃ eq)								
SBS Cold Adhesive SA FR	0.33	0.27	0.01	0.00	0.01	0.00	0.02	0.63
Resource Use								
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*								
SBS Cold Adhesive SA FR	3.64E-06	0.00	5.00E-08	0.00	0.00	0.00	9.96E-08	3.79E-06
Abiotic depletion potential for fossil resources (ADP_{fossil}) (MJ, NCV)								

⁷ GWP 100; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5). CO₂ from biogenic secondary fuels used in kiln are climate-neutral (CO₂ sink = CO₂ emissions), ISO 21930, 7.2.7.

INTERPRETATION

The GWP impacts for each information module are shown below in Figure 3.

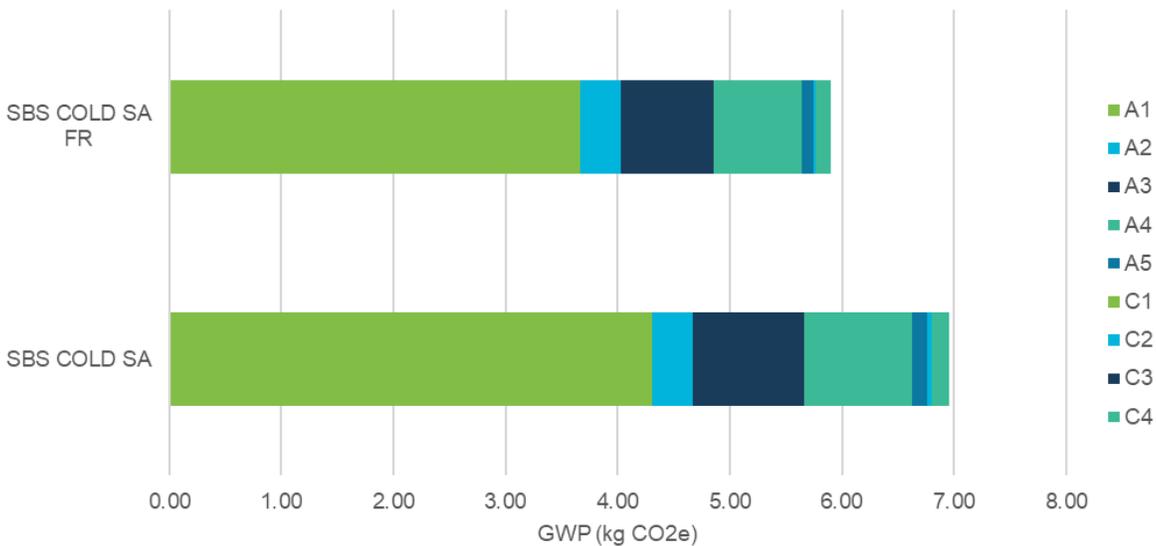
FIGURE 3
Comparison of SBS Cold and SBS Cold with Fire Retardant GWP impacts across information modules



As evidenced by Figure 3, module A1 alone clearly dominates the GWP impacts for SBS Cold and SBS Cold FR Asphalt membranes, accounting for over 60% of the impacts from all other modules, followed by contributions from Modules A3 and A4.

While GWP is specifically assessed in Figure 3, several other impact categories are distributed in a similar fashion.

FIGURE 4
Comparison of SBS Cold SA and SBS Cold SA with Fire Retardant GWP impacts across information modules



Similarly, Figure 4, depicts the contributions of SBS Cold SA with and without Fire Retardant, which have a very similar distribution: predominance of A1 followed by A3 and A4.

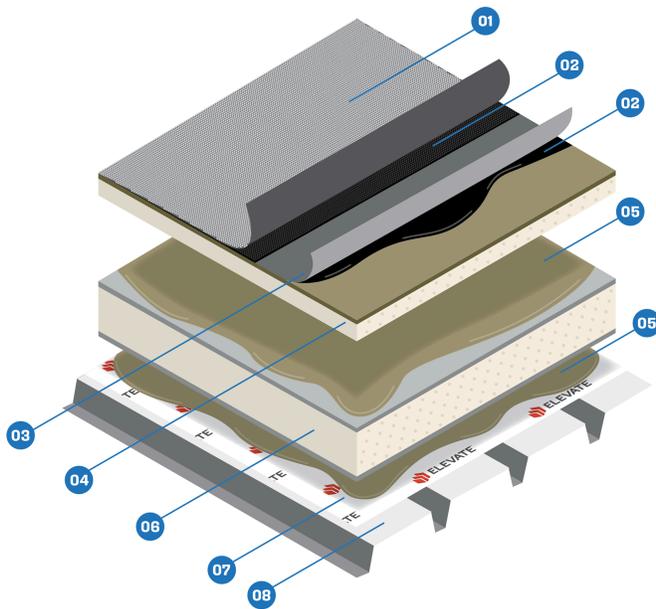
LIMITATIONS

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

Emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data from the following categories:

- renewable primary energy resources as energy (fuel), (RPRE)
- renewable primary resources as material, (RPRM)
- nonrenewable primary resources as energy (fuel), (NRPRE)
- nonrenewable primary resources as material (NRPRM)
- secondary materials (SM)
- renewable secondary fuels (RSF)
- nonrenewable secondary fuels (NRSF)
- recovered energy (RE)
- abiotic depletion potential for non-fossil mineral resources (ADPelements)
- hazardous waste disposed
- nonhazardous waste disposed
- high-level radioactive waste
- intermediate and low-level radioactive waste
- components for reuse
- materials for recycling
- materials for energy recovery; and
- recovered energy exported from the product system.

ADDITIONAL ENVIRONMENTAL INFORMATION



SBS Modified Bitumen Roof System

- 1. Elevate SBS Modified Bitumen Roofing Membrane**
- 2. Elevate Cold Adhesive**
- 3. Elevate Base Sheet**
- 4. ISOGARD HD Cover Board**
- 5. Elevate Insulation Adhesive**
- 6. ISOGARD GL or ISOGARD CG Insulation – Adhered**

- All Elevate polyisocyanurate insulations use EPA accepted blowing agents. Elevate ISOGARD HD Cover Board with ISOGARD foam technology and ISOGARD GL and ISOGARD CG insulation incorporates a HCFC-free blowing agent that does not contribute to the depletion of the ozone layer (ODP-free).
- The thermal performance of ISOGARD polyiso insulation is up to 40% better than major competitors when tested by an independent third party in cold temperature 40°F (4°C) applications according to ASTM C1289 standards. The increased R-value per inch means better thermal performance from the same roofing systems using the same amount of insulation compared to leading competitive products on the market today

- 7. Elevate V-Force Vapor Barrier**
- 8. Steel Deck**

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26 Century Boulevard, Suite 205

Nashville, TN 37214

1.800.428.4442

HolcimBE.com

