SENTINEL HOLDING
INSTITUT

SHI-PRODUKTPASS

Produkte finden - Gebäude zertifizieren

SHI-Produktpass-Nr.:

15130-10-1010

EverGuard TPO

Warengruppe: Dach & Fassade - Dachbahnen

BMI

BMI Deutschland GmbH
Frankfurter Landstraße 2-4
61440 Oberursel

Produktqualitäten:

- QNG Qualitätssiegel Nachhaltiges Gebäude ✓
- DGNB NEUBAU 2023.2 ✓
- DGNB NEUBAU 2023 ✓
- DGNB NEUBAU 2018 ✓
- BNB-BN NEUBAU V2015 ✓
- BREEAM DE NEUBAU 2018 ✓
- LEED v4.1 (outside US) ✓

GEPRÜFT NACHHALTIGES PRODUKT
SHI PRODUKT PASS
SENTINEL HOLDING INSTITUT
www.sentinel-holding.eu/pruefkriterien

Köttner

Helmut Köttner
Wissenschaftlicher Leiter
Freiburg, den 16.08.2026

Produkt:
EverGuard TPO

SHI Produktpass-Nr.:
15130-10-1010

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Wir sind stolz darauf, dass die SHI-Datenbank, die erste und einzige Datenbank für Bauprodukte ist, die ihre umfassenden Prozesse sowie die Aktualität regelmäßig von dem unabhängigen Prüfunternehmen SGS-TÜV Saar überprüfen lässt.

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QNG - Qualitätssiegel Nachhaltiges Gebäude

Das Qualitätssiegel Nachhaltiges Gebäude, entwickelt durch das Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen (BMWSB), legt Anforderungen an die ökologische, soziokulturelle und ökonomische Qualität von Gebäuden fest. Das Sentinel Holding Institut prüft Bauprodukte gemäß den QNG-Anforderungen für eine Zertifizierung und vergibt das QNG-ready Siegel. Das Einhalten des QNG-Standards ist Voraussetzung für den KfW-Förderkredit. Für bestimmte Produktgruppen hat das QNG derzeit keine spezifischen Anforderungen definiert. Diese Produkte sind als nicht bewertungsrelevant eingestuft, können jedoch in QNG-Projekten genutzt werden.

Kriterium	Pos. / Bauproduktgruppe	Betrachtete Stoffe	QNG Freigabe
3.1.3 Schadstoffvermeidung in Baumaterialien			QNG-ready nicht bewertungsrelevant

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Produkt:
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SHI Produktpass-Nr.:
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DGNB Neubau 2023.2

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt			nicht bewertungsrelevant

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Produkt:
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DGNB Neubau 2023

Das DGNB-System (Deutsche Gesellschaft für Nachhaltiges Bauen) bewertet die Nachhaltigkeit von Gebäuden verschiedener Art. Das System ist sowohl anwendbar für private und gewerbliche Großprojekte als auch für kleinere Wohngebäude. Die Version 2023 setzt hohe Standards für ökologische, ökonomische, soziokulturelle und funktionale Aspekte während des gesamten Lebenszyklus eines Gebäudes.

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt, 03.05.2024 (3. Auflage)	31b Bahnenförmige Abdichtungen	Methylchlorphenoxypropionsäure (MCPP) "Mecoprop"	Qualitätsstufe: 4
Nachweis: Technisches Datenblatt Stand 01/2022			

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt, 29.05.2025 (4. Auflage)	nicht zutreffend		nicht bewertungsrelevant

SENTINEL HOLDING
INSTITUT

Produkt:
EverGuard TPO

SHI Produktpass-Nr.:
15130-10-1010

BMI

DGNB Neubau 2018

Das DGNB-System (Deutsche Gesellschaft für Nachhaltiges Bauen) bewertet die Nachhaltigkeit von Gebäuden verschiedener Art. Das System ist sowohl anwendbar für private und gewerbliche Großprojekte als auch für kleinere Wohngebäude.

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt			nicht bewertungsrelevant

SENTINEL HOLDING
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Produkt:
EverGuard TPO

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BNB-BN Neubau V2015

Das Bewertungssystem Nachhaltiges Bauen ist ein Instrument zur Bewertung von Büro- und Verwaltungsgebäuden, Unterrichtsgebäuden, Laborgebäuden sowie Außenanlagen in Deutschland. Das BNB wurde vom damaligen Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (BMUB) entwickelt und unterliegt heute dem Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen.

Kriterium	Pos. / Bauprodukttyp	Betrachtete Schadstoffgruppe	Qualitätsniveau
1.1.6 Risiken für die lokale Umwelt			nicht bewertungsrelevant

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Produkt:
EverGuard TPO

SHI Produktpass-Nr.:
15130-10-1010

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BREEAM DE Neubau 2018

BREEAM (Building Research Establishment Environmental Assessment Methodology) ist ein britisches Gebäudebewertungssystem, welches die Nachhaltigkeit von Neubauten, Sanierungsprojekten und Umbauten einstuft. Das Bewertungssystem wurde vom Building Research Establishment (BRE) entwickelt und zielt darauf ab, ökologische, ökonomische und soziale Auswirkungen von Gebäuden zu bewerten und zu verbessern.

Kriterium	Produktkategorie	Betrachtete Stoffe	Qualitätsstufe
Hea 02 Qualität der Innenraumluft			nicht bewertungsrelevant

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Produkt:
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SHI Produktpass-Nr.:
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LEED v4.1

LEED (Leadership in Energy and Environmental Design) ist ein international anerkanntes Gebäudezertifizierungssystem des U.S. Green Building Council. Es zählt zu den weltweit am weitesten verbreiteten Nachhaltigkeitsstandards für Gebäude und wird insbesondere bei international ausgerichteten Projekten eingesetzt. LEED bewertet Gebäude ganzheitlich in Kategorien wie Energieeffizienz, Ressourcenschonung, Materialauswahl, Innenraumqualität und Standortqualität. Je nach erreichter Punktzahl werden die Zertifizierungsstufen LEED Certified, Silver, Gold oder Platinum vergeben.

Kriterium	Produktkategorie	Betrachtete Stoffe	Bewertung
EQ Credit: Low-Emitting Materials			nicht bewertungsrelevant

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Produkt:
EverGuard TPO

SHI Produktpass-Nr.:
15130-10-1010

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Produktsiegel

In der Baubranche spielt die Auswahl qualitativ hochwertiger Materialien eine zentrale Rolle für die Gesundheit in Gebäuden und deren Nachhaltigkeit. Produktlabels und Zertifikate bieten Orientierung, um diesen Anforderungen gerecht zu werden. Allerdings besitzt jedes Zertifikat und Label eigene Prüfkriterien, die genau betrachtet werden sollten, um sicherzustellen, dass sie den spezifischen Bedürfnissen eines Bauvorhabens entsprechen.

Produkte mit dem QNG-ready Siegel des Sentinel Holding Instituts eignen sich für Projekte, für welche das Qualitätssiegel Nachhaltiges Gebäude (QNG) angestrebt wird. QNG-ready Produkte erfüllen die Anforderungen des QNG Anhangdokument 3.1.3 "Schadstoffvermeidung in Baumaterialien". Das KfW-Kreditprogramm Klimafreundlicher Neubau mit QNG kann eine höhere Fördersumme ermöglichen.

Produktsie

NSF Certification, LLC ist eine zertifizierende Einheit innerhalb des NSF-Netzwerks mit Standort in den USA. Sie bietet unabhängige Prüfungen, Auditierungen und Zertifizierungen an und stellt sicher, dass Produkte und Verfahren den hohen Anforderungen hinsichtlich Umwelt, Qualität und Sicherheit genügen. Bei der Verifizierung von Environmental Product Declarations (EPDs) prüft NSF Certification, LLC, ob die zugrundeliegenden Daten und Analysen den internationalen Standards (z. B. ISO 14025) und den spezifischen Vorgaben der jeweiligen Produktkategorie entsprechen.

Produkt:
EverGuard TPO

SHI Produktpass-Nr.:
15130-10-1010

Rechtliche Hinweise

(*) Die Kriterien dieses Steckbriefs beziehen sich auf das gesamte Bauobjekt. Die Bewertung erfolgt auf der Ebene des Gebäudes. Im Rahmen einer sachgemäßen Planung und fachgerechten Installation können einzelne Produkte einen positiven Beitrag zum Gesamtergebnis der Bewertung leisten. Das Sentinel Holding Institut stützt sich einzig auf die Angaben des Herstellers.

Alle Kriterien finden Sie unter:
https://www.sentinel-holding.eu/de/Themenwelten/Pr%C3%BCfkriterien%20f%C3%BCr%20Produkte

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Herausgeber

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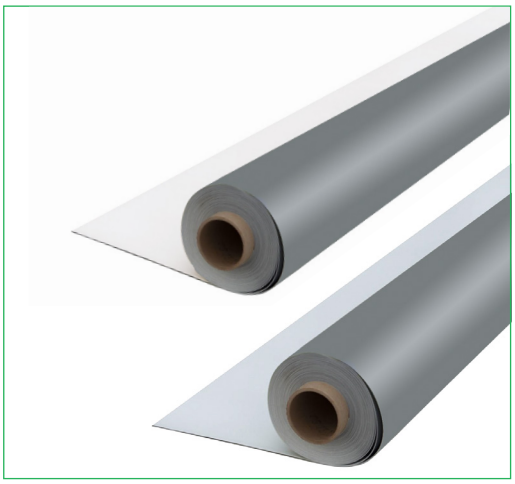
WOLFIN

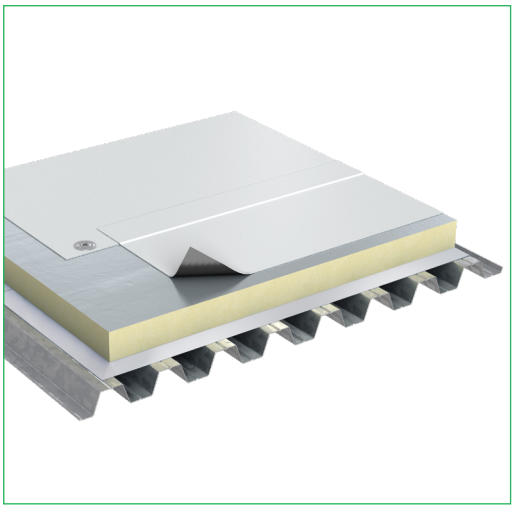
EverGuard TPO

EverGuard TPO ist eine halogenfreie Dachabdichtungsbahn aus weichmacherfreiem, flexiblem Polyolefin (FPO) auf Basis einer speziellen PP (Polypropylen) Rezeptur gefertigt.

EverGuard TPO fällt unter die Stoffgruppe FPO, Bezeichnung nach DIN SPEC 20000-201: DE / E1 FPO-BV-V-PG -1,5 (1,8 / 2,0)

BAHNENTYP UND EINSATZGEBIETE	
EverGuard TPO	Mit mittiger Polyesterverstärkung
Bahnenbreite	1.520 mm / 1.000 mm
Nenndicke	1,5 mm / 1,8 mm / 2,0 mm
Farbe	Hellgrau, Weiß
Neubau und Sanierung	▪ Mechanische Befestigung ▪ Unter Auflast
Everguard TPO ist geprüft, zugelassen und klassifiziert gemäß	▪ DIN EN 13956 (CE-Zertifikat Nr.1213-CPR-6897 ▪ DIN SPEC 20000-201 (Dachabdichtungen) ▪ DIN 18531 (Dachabdichtungen) ▪ DIN CEN/TS 1187 ▪ DIN EN 13501-5 $B_{Roof(t1)}$* ▪ DIN 4102-7 (harte Bedachung)* ▪ Factual Mutual (FM-Approval, Class 4470) ▪ Umweltproduktdeklaration (EPD)
Eigenschaftsprofil Everguard TPO	▪ Besonders reißfest dank Polyesterverstärkung mit Querverstrebungen ▪ Weichmacherfrei ▪ Halogenfrei ▪ Biozidfrei ▪ Ozon- und UV-stabil ▪ Dämmstoffneutral ▪ Bitumenverträglich ▪ Frei von toxischen Schwermetallen ▪ Frei von halogenierten Brandschutzmitteln ▪ Heißluftschweißbar ▪ Wurzel- und Rhizombeständig nach FLL-Prüf-verfahren ▪ Kältebeständig ▪ Warm verformbar (Detailbahn) ▪ Recyclebar ▪ Erfüllt die Anforderungen nachhaltiger Gebäude-zertifizierungen, wie z.B. QNG, DGNB, BNB und Leed





Systemteile und -zubehör	
	▪ Innen-, Außen-, und Universalecke ▪ Homogene Bahn (EverGuard Detailbahn) zur Detailausbildung ▪ Verbundbleche (Tafeln / Coils) ▪ Blitzschutzeinfassungen und Rohrdurchführungen ▪ Bahn für Wartungswege (EverGuard TPO W red)
	▪ Kehlbefestigungsschiene Vedafix LRB verzinkt ▪ Klebstoffe für die Anschlussverklebung von Klein- und Großflächen ▪ Vedaseal Reinigungsverdünnung für die Nahtreinigung ▪ Drill-Tec Flachdachbefestiger ▪ Brandlastarme Dampfsperrbahn Alu-Tec FR

* Im geprüften Dachaufbau

TECHNISCHE DATEN

Produktdaten gemäß DIN EN 13956

- Freiliegende Verlegung (mechanisch befestigt)
- Unter Auflast (Kies, Begrünung)

Eigenschaft	Prüfnorm	Einheit	Ergebnis* 1,5 mm	Ergebnis* 1,8 mm	Ergebnis* 2,0 mm
Sichtbare Mängel	DIN EN 1850-2	-	bestanden	bestanden	bestanden
Länge	DIN EN 1848-2	m	30	20	20
Breite	DIN EN 1848-2	m	1,52 / 1,0	1,52 / 1,0	1,52 / 1,0
Geradheit	DIN EN 1848-2	mm	≤ 30	≤ 30	≤ 30
Planlage	DIN EN 1848-2	mm	≤ 10	≤ 10	≤ 10
Flächengewicht	DIN EN 1849-2	kg/m²	1,53	1,84	2,05
Effektive Dicke	DIN EN 1849-2	mm	1,5	1,8	2,0
Wasserdichtheit	DIN EN 1928 Verfahren B	kPa	bestanden	bestanden	bestanden
Beanspruchung durch Feuer von außen	DIN CEN/TS 1187	-	B_{Roof}(t1) (EN 13501-5)** harte Bedachung (DIN 4102-7)**		
Brandverhalten	DIN EN 13501-1	-	Klasse E	Klasse E	Klasse E
Schälwiderstand d. Fügenaht	DIN EN 12316-2	N/50 mm	≥ 150	≥ 150	≥ 150
Scherwiderstand d. Fügenaht	DIN EN 12317-2	N/50 mm	≥ 800	≥ 800	≥ 800
Zugfestigkeit längs und quer	DIN EN 12311-2	N/50 mm	≥ 1.150	≥ 1.150	≥ 1.150
Zugdehnung längs und quer	DIN EN 12311-2	%	≥ 20	≥ 20	≥ 20
Widerstand gegen stoßartige Belastung Verfahren A) Verfahren B)	DIN EN 12691 DIN EN 12691	mm	≥ 400 ≥ 1.500	≥ 400 ≥ 1.500	≥ 400 ≥ 1.500
Widerstand gegen statische Belastung Verfahren A) Verfahren B)	DIN EN 12730 DIN EN 12730	kg	≥ 20 ≥ 15	≥ 20 ≥ 15	≥ 20 ≥ 15
Dauerhaftigkeit Wasserdichtheit gegen Alterung	DIN EN 1928 DIN EN 1296	-	bestanden	bestanden	bestanden
Dauerhaftigkeit Wasserdichtheit gegen Chemikalien	DIN EN 1928 DIN EN 1847	-	bestanden	bestanden	bestanden
Widerstand gegen Weiterreißen längs / quer	DIN EN 12310-2	N	≥ 375 / ≥ 475	≥ 375 / ≥ 475	≥ 375 / ≥ 475
Widerstand gegen Durchwurzelung	DIN EN 13948 / FLL-Prüfverfahren	-	bestanden	bestanden	bestanden
Maßhaltigkeit längs / quer	DIN EN 1107-2	%	≤ 0,4 / ≤ 0,3	≤ 0,4 / ≤ 0,3	≤ 0,4 / ≤ 0,3
Falzen in der Kälte	DIN EN 495-5	°C	≤ -25	≤ -25	≤ -25
UV-Beanspruchung (> 5.000 h)	DIN EN 1297	visuell	bestanden	bestanden	bestanden
Hagelschlagbeständigkeit harter / weicher Untergrund	DIN EN 13583	m/s	≥ 25 / ≥ 33	≥ 28 / ≥ 36	≥ 31 / ≥ 39
Wasserdampfdurchlässigkeit	DIN EN 1931	µ	100.000 ± 30.000		
Bitumenverträglichkeit	DIN EN 1548	-	bestanden	bestanden	bestanden

* Werte im Neuzustand
** Im geprüften Dachaufbau

Stand: 01/2022. Erstellung nach letztem technischen Stand und Wissen.
Technische Änderungen aufgrund von Weiterentwicklungen sind möglich. Technischer Stand: 07/2021.

Die entsprechenden Leistungserklärungen finden Sie unter www.bmigroup.de im Bereich Downloads.

Technische Beratung
Wolfin
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E awt.beratung.de@bmigroup.com

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61440 Oberursel
bmigroup.de

BMI Flachdachsysteme GmbH,
Frankfurter Landstr. 2-4, 61440 Oberursel

KUNDENINFORMATION

HERSTELLERERKLÄRUNG

Oberursel, 11.10.2023

HERSTELLERERKLÄRUNG FÜR BMI Kunststoffdachbahnen

Hiermit erklärt das Unternehmen:

BMI Flachdachsysteme GmbH
Frankfurter Landstraße 2-4
61440 Oberursel

dass die Produkte:

Wolfin IB, Wolfin M, Wolfin M FR, Wolfin GWSK, Wolfin PBS, Tectofin RG, Tectofin RV, Tectofin RV plus, Tectofin SK, Tectofin R, EverGuard TPO, Cosmofin GG plus, Cosmofin FG R, Cosmofin FG, Cosmofin F und die dazugehörigen Formteile (Innen-, Außen- und Univeralecken, Rohr- und Blitzschutzeinfassungen) der einzelnen Produktgruppen (Wolfin, Tectofin, Cosmofin und EverGuard)

weder Cadmium, Zinn- und Bleistabilisatoren sowie reproduktionstoxische Phthalat-Weichmacher enthalten. Des Weiteren werden keine Stoffe der Kandidatenliste der besonders besorgniserregenden Stoffe (SVHC) in den oben genannten Produkten verwendet.

Wir hoffen, Ihnen hiermit weitergeholfen zu haben und stehen bei weiteren Fragen gerne zur Verfügung.

Mit freundlichen Grüßen
BMI Flachdachsysteme GmbH

i.V. Arno Forsbach
Leiter Anwendungstechnik
Produkte & Systeme

i.A. Daniel Knaupp
Anwendungstechniker
Produkte & Systeme

BMI Flachdachsysteme GmbH
Frankfurter Landstraße 2-4, 61440 Oberursel, Deutschland · www.bmigroup.de
Geschäftsführer: Eugenio Cecchin, Carsten Römgens
Sitz der Gesellschaft: Oberursel/Taunus · Registergericht Bad Homburg v.d.H., HRB 5490 · USt-IdNr. DE 205688330



EverGuard® TPO Roofing Membrane

Smooth Back

Environmental Product Declaration

Program Operator	NSF Certification, LLC 789 N. Dixboro Ann Arbor, MI 48105 www.nsf.org
General Program instructions and Version Number	Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report, Institut Bauen und Umwelt e.V., V, 2018
Manufacturer Name and Address	BMI Group 20 Air Street, London, United Kingdom, W1B 5AN
Declaration Number	EPD10292
Declared Product and Functional Unit	EverGuard® TPO Membrane Smooth 1 m_2 of installed roofing membrane, with a thickness of 1.2 mm, 1.5 mm, 1.8 mm or 2.0 mm for a period of its Reference Service Life.
Included Products	EverGuard® TPO Membrane Smooth in 1.2-, 1.5-, 1.8- or 2.0-mm thicknesses and all color options. Product can be manufactured at one of the facilities listed below: Gainesville Facility--1301 Corporate Dr, Gainesville, TX 76240, USA; New Columbia Facility--2093 Old Rte 15, New Columbia, PA 17856, USA
Reference PCR and Version Number	Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report V1.7, IBU Part B: Requirements on the EPD for Plastic and Elastomer Roofing and Sealing Sheet Systems
Product's intended Application and Use	Roofing
Product RSL	25 Years
Markets of Applicability	Europe
Date of Issue	December 11th, 2019
Period of Validity	5 years from date of issue
EPD Type	Product Specific
Range of Dataset Variability	N/A
EPD Scope	Cradle to Grave
Year of reported manufacturer primary data	2018
LCA Software and Version Number	GaBi 9.2,0.58
LCI Database and Version Number	GaBi Database Service Pack 39
LCIA Methodology and Version Number	TRACI 2.1 CML 2001-Jan 2016
The sub-category PCR review was conducted by:	IBU - Institut Bauen und Umwelt e.V.
This declaration was independently verified in accordance with ISO 14025: 2006 and the reference PCR: Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report V1.7, IBU Part B: Requirements on the EPD for Plastic and Elastomer Roofing and Sealing Sheet Systems. ▬ Internal ▬ External	Jenny Oorbeck joorbeck@nsf.org
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting, LLC
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Angela Fisher Aspire Sustainability angela@aspiresustainability.com

Limitations:
Environmental declarations from different programs (ISO 14025) may not be comparable.
Comparison of the environmental performance of Plastic and Elastomer Roofing and Sealing Sheet Systems using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR.
Full conformance with the PCR for Plastic and Elastomer Roofing and Sealing Sheet Systems allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

Company Description

Established in 1852, BMI Group is the largest manufacturer of flat and pitched roofing and waterproofing solutions throughout Europe with a significant presence in parts of Asia and Africa. BMI Group is a Standard Industries company. The company's products include a comprehensive portfolio of roofing and waterproofing solutions for residential and commercial properties as well as for civil engineering applications. For more information about BMI Group, visit https://www.bmigroup.com.

Product Description and Application

EverGuard® TPO membrane is a single-ply roofing style product and is designed to be used as an outer roof layer, either in new construction or re-covering applications. The membrane can be mechanically fastened to the roof deck. It is made of two layers of thermoplastic polyolefin (TPO) bonded to a layer of polyester scrim in the middle. This configuration meets all the inherent properties and performance which TPO is known for, including excellent seam strength, long-term weathering, natural resistance to fungi, energy savings, and more.



Technical Data

Table 1: Product Performance Properties

Product	Everguard TPO Smooth Back Membrane				Unit	Test Method
Product Form	Dual layers of TPO reinforced with a layer of PET scrim					-
Nominal Thickness	1.2	1.5	1.8	2.0	mm	DIN EN 1849-2
Waterproof	Pass					DIN EN 1928
Tensile Strength	≥1150				N/50 mm	DIN EN 12311-2
Tensile Strain	≥20				%	DIN EN 12311-2
Peel Resistance of the Seam Joint	≥150				N/50 mm	DIN EN 12316-2
Shear Resistance of the Seam Joint	≥800				N/50 mm	DIN EN 12317-2
Tear Propagation Resistance (longitudinal/ Transversal)	≥375/≥475				N	DIN EN 12310-2
UV-stress (>5000 hr)	Pass					
Dimensional Change to Warm Storage (Longitudinal/Transversal)	≤ 0.4 / ≤0.3				%	DIN EN 1107-2
Folding in the Cold	≤ -25				oC	DIN EN 495-5
Bitumen Compatibility	Pass				-	DIN EN 1548
Resistance against Impulsive Load	≥ 400				mm	DIN EN 12691 Method A
	≥ 1150					Method B

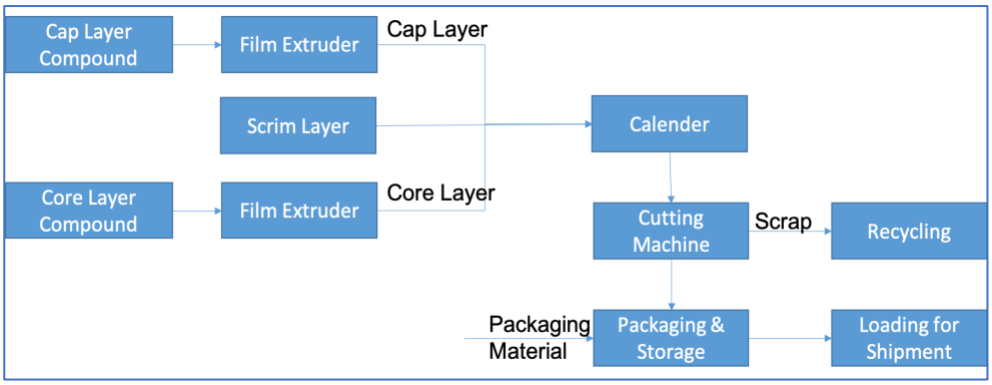
Delivery Status
EverGuard® TPO membrane is delivered in rolls with a width of 1.52 m and a length of 20 m or 30 m depending on the thickness.

Material Composition

Table 2: Composition

Material	Mass %
Thermoplastic Olefin	90-96
Proprietary additives	
Polyester	4-8
Internal Recycled Content	0-2

Manufacturing
This stage includes an aggregation of raw material extraction, supplier processing, delivery, manufacturing and packaging by the manufacturing facilities.



EverGuard® TPO membrane is constructed of three layers, as shown in the table above. The cap and core layers are made of TPO-based compounds and are processed on site. The scrim is purchased in its ready-to-use form from an off-site supplier. To produce the cap and core layers, pre-mixed compounds are fed into extruders, heated and pressurized and then extruded through a die to form films of a required thickness. The cap layer and core layer will join the scrim layer between a series of heated rollers. In this manner, the layers are bound together to form the final membrane. Once bound, the membrane will go through the cutter where it will be cut into specified dimensions. The finished membrane is reeled to a roll, packaged, labelled and moved into storage until it shipped to a job site for customer use.

Environment and Health During Manufacturing
During the manufacturing of EverGuard® TPO membrane, all legal regulations regarding emissions to air, wastewater discharge, solid waste disposal and noise emissions are followed.

Packaging
After manufacturing, the product is prepared for shipment to the customer. The membrane is reeled on a cardboard core and wrapped in plastic film. Additional packaging materials include product labels, a cardboard protective sheet and steel strap. The product is then shipped on wooden pallets to the customer.

Product Installation
EverGuard® TPO membrane can be installed with mechanical fasteners. For additional environmental information regarding the specific installation options for your project, please contact BMI Group.

Some equipment may be necessary during the installation phase. This includes weld seaming adjacent membranes using a hot-air welder. Such installation equipment is required though not included in the study as these are multi-use tools and the impacts per declared unit are assumed to be negligible. However, electricity used to power this equipment during the installation process was evaluated.

Condition of Use
With professional installation and proper use, the condition and material content of EverGuard® TPO membrane remains unchanged throughout the service life.

Environment and Health During Use
No impacts to the environment or the health of the users during the use phase is expected.

Reference Service Life (RSL)
The reference life of each product in the EPD is assumed to be 25 years, based on the preliminary technical test results and the manufacturer's internal technical review. Note that this service life may be adjusted in future iterations of this report as more real-world data become available.

Extraordinary Effects Fire
EverGuard® TPO membrane is classified in Construction Material Class E, as defined by EN 13501-1.

Extraordinary Effects Water
No environmental impacts are expected due to water exposure of properly installed EverGuard® TPO membrane.

Extraordinary Effects Mechanical Destruction
EverGuard® TPO membrane has excellent mechanical strength. No environmental impact is known to result from unexpected mechanical damage.

Re-Use Phase
In general, EverGuard® TPO membrane can be recycled if local recycling facilities are available. Re-use after service is not recommended.

Disposal
EverGuard® TPO membrane can be recycled, landfilled or incinerated at the end of the use stage. As prescribed by the PCR Part A, the impact results of all the three scenarios are declared separately. BMI EverGuard® TPO membrane can be classified under Waste Code 17 09 04 according to the European Waste Catalogue.

Further information

More information about BMI and its products can be found at www.bmigroup.com.

Functional Unit

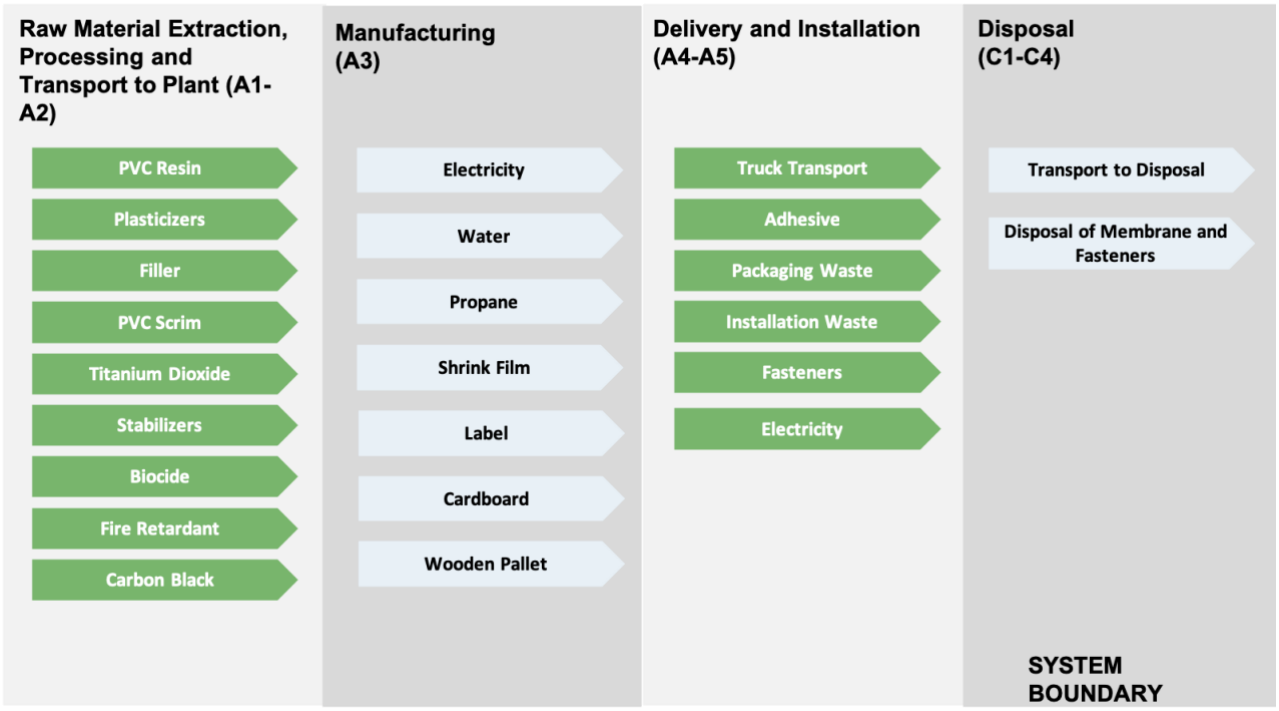
The environmental impacts are declared based on 1 m_2 of installed EverGuard® TPO membrane.

Table 3: Reference Flow for a Reference Service Life

EverGuard® TPO Smooth Back Membrane				
Functional Unit	1 m_2 of installed roofing membrane with a thickness listed below for a RSL.			
Thickness [mm]	1.2 mm	1.5 mm	1.8 mm	2.0 mm
Installation Option	Mechanical Fixing			
Mass [kg]	1.50	1.80	2.10	2.37
Fasteners [kg]	0.0922			

System Boundary

The overall system boundary is identified in the flow chart below. This EPD discloses impacts for the required cradle-to-gate lifecycle modules and the optional end of life modules. The optional use phase modules are not declared due to the uncertainly around the product service life and the number of replacement cycles.



Cut-Off Rules
All inputs for which data were available were included. Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit. Some raw materials were excluded. This was due to lack of adequate representative secondary data within GaBi. However, the excluded materials were significantly below the cut off criteria and include minor additives such as proprietary binders.

Estimates and Assumptions
The compositional data of EverGuard® TPO membrane is based upon typical product performance and is subject to normal manufacturing tolerance and variance. The LCA study is based on nominal values.

Background data
Primary data was collected onsite by the manufacturing facilities' associates. This includes electrical and thermal energy, water consumption, waste generation, bill of materials and suppliers.

Secondary data was sourced from GaBi Database Version 8.7, Service Pack 35.

Data Quality
The geographical scope of the manufacturing portion of the life cycle is Gainesville of Texas USA and New Columbia of Pennsylvania, USA. Site-specific data are collected, and the average are weighted based on the production at each facility. All primary data were collected by the manufacturing facilities. The geographic coverage of primary data is considered excellent. The primary data provided by the manufacturer represent all information for calendar year 2018. Using this data meets the PCR requirements. Time coverage of this data is considered good. Primary data provided by the manufacturer is specific to the technology that the facilities use in manufacturing their product. It is site-specific and considered of good quality. It is worth noting that the energy and water used in manufacturing the product includes overhead energy such as lighting, heating and sanitary use of water. Sub-metering would improve the technological coverage of data quality. Data necessary to model cradle-to-gate unit processes was sourced from GaBi LCI datasets.

Period under Review
Data used in this study was representative of production in calendar year 2018.

Allocation
General principles of allocation were based on ISO 14040/44. Where possible, allocation was avoided. When allocation was necessary it was done on a physical mass basis. To derive a per-unit value for manufacturing inputs such as electricity, water, propane and natural gas, a series of allocation calculations were adopted. The facility level of utility data was allocated based on production values of different type of membrane products in the same manufacturing facility. Then the data is further allocated among membranes of different thickness based on the mass

Comparability
The user of the EPD should take care when comparing EPDs from different companies. Assumptions, data sources, and assessment tools may all impact the uncertainty of the final results and make comparisons misleading. Even for similar products, differences in use and end-of-life stage assumptions and data quality may produce incomparable results. The user should not compare EPDs unless they are experts in the nuances of Life Cycle Assessment (LCA) practice and methodology and follow comparability best practices.

Scenarios and Additional Technical Information

Transportation to the Construction Site (A4)

Parameter	Value for Truck Usage in the US	Value for freight ship usage	Value for Truck Usage in Europe	Unit
Fuel type	Diesel	Heavy fuel oil	Diesel	-
Distance	613.16	9947.4	804.67	km
Liters of fuel	39.0625	0.00023	33.1	l/100km for truck kg/100km for freight ship
Vehicle type	Truck – Trailer, basic enclosed/ 45,000 lb. payload	Container ship, 5,00 to 200, 000 dwt payload capacity, ocean going	Truck-trailer, Euro 0 - 6 mix, 34 - 40t gross weight / 27t payload capacity	-
Capacity Utilization	78	70	61	%
Gross density of products transported	175.75	-	353.36	kg/m3
Maximum weight of products transported	20,411.657	-	27,000	kg
Volume of products transported	116.14	-	76.41	m3
Capacity utilization volume factor	1	-	1	-

Installation into the Building (A5)

Name	Value	Unit
Metal Fasteners	0.0922	kg
Water Consumption	0	kg
Adhesive	0	kg
Electricity Consumption	0.0132	kWh
Other Energy Carriers	0	MJ
Packaging Waste-Cardboard	0.0327	kg
Packaging Waste-Plastic	4.54E-03	kg
Packaging Waste-Metal	9.08E-04	kg

Name	Value	Unit
Packaging Waste-Wood	6.81E-02	kg
Material Loss	10	%
Output Substances Following Waste Treatment on Site	0	kg
Dust in the Air	0	kg
Installation Losses	0	kg
VOC in the air	-	kg
Overlap (membrane)	8.3	%

End-of-Life Stage (C1-C4)

Name	1.2 mm	1.5 mm	1.8 mm	2.0 mm	Unit
Collected as Mixed Construction Waste	1.44	1.71	1.98	2.23	kg
Reuse	0	0	0		kg
Recycling	100*				%
Energy Recovery	100*				%
Landfilling	100*				%
*Results of each scenarios are separately declared.					

LCA Results

All results in this section are given per functional unit, as shown in Table 3. The results of stage A5 and C2-C4 vary with the end-of-disposal methods. Their results are reported separately based on the disposal methods—Landfilling (L), Recycling (R), and Incineration (I). Environmental Impacts were calculated using the GaBi software platform. Impact results have been calculated using CML 2001-Jan 2016 characterization factors. LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks

Description of the System Boundary

Product Stage			**Construction Process Stage**		**Use Stage***							**End of Life Stage**				**Benefits and Loads Beyond the System Boundaries**
Raw Material Supply	Transportation	Manufacturing	Transportation	Installation	Use	Maintenance	Repair	Refurbishment	Replacement	Operational Energy Use	Operational Water Use	De-construction	Transportation	Waste Processing	Disposal	Reuse-Recovery-Recycling-Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	MNR*	MNR	MNR	X	X	X	X	X	X	MND**
*MNR=Module not relevant, **MND=Module not declared																

Impact Indicators

Abbreviation	Parameter (unit)
CML 2001-Jan 2016	
ADP-elements	Abiotic depletion potential for non-fossil resources (kg Sb eq)
ADP-fossil	Abiotic depletion potential for fossil resources (MJ, net calorific value)
AP	Acidification potential of soil and water (kg SO_2 eq)
EP	Eutrophication potential (kg Phosphate eq)
GWP	Global warming potential (kg CO_2 eq)
ODP	Depletion of stratospheric ozone layer (kg CFC 11 eq)
POCP	Photochemical ozone creation potential (kg Ethene eq)

Abbrv.	Parameter (Unit)
Resource Use Parameters	
PERE	Renewable primary energy as energy carrier (MJ, net calorific value)
PERM	Renewable primary energy resources as material utilization (MJ, net calorific value)
PERT	Total use of renewable primary energy resources (MJ, net calorific value)
PENRE	Non-renewable primary energy as energy carrier (MJ, net calorific value)
PENRM	Non-renewable primary energy as material utilization (MJ, net calorific value)
PENRT	Total use of non-renewable primary energy resources (MJ, net calorific value)
SM	Use of secondary material (kg)
RSF	Use of renewable secondary fuels (MJ, net calorific value)
NRSF	Use of non-renewable secondary fuels (MJ, net calorific value)
FW	Use of fresh water (m^3)
Output Flows and Waste Parameters	
HWD	Hazardous waste disposed (kg)
NHWD	Non-hazardous waste disposed (kg)
RWD	Radioactive waste disposed (kg)
CRU	Components for reuse (kg)
MFR	Materials for recycling (kg)
MER	Materials for energy recovery (kg)
EEE	Exported electrical energy (MJ)
EET	Exported thermal energy (MJ)

1 EverGuard® TPO 1.2-mm Smooth Back Membrane

1.1 CML Results

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
ADP-elements [kg Sb eq]	7.71E-07	5.02E-08	1.68E-05	1.68E-05	1.68E-05	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
ADP-fossil fuel [MJ]	8.23E+01	4.24E+00	1.18E+01	1.17E+01	1.17E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
AP [kg SO_2 eq]	7.62E-03	6.54E-03	2.14E-03	2.13E-03	2.14E-03	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EP [kg Phosphate eq]	6.65E-04	7.91E-04	2.51E-04	2.28E-04	2.30E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
GWP [kg CO_2 eq]	2.79E+00	3.24E-01	7.18E-01	7.10E-01	1.13E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
ODP [kg CFC 11 eq]	3.59E-14	3.41E-17	8.62E-12	8.63E-12	6.10E-15	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
POCP [kg Ethene eq]	5.31E-04	1.41E-04	1.63E-04	1.55E-04	1.63E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
ADP-elements [kg Sb eq]	0.00E+00	2.72E-10	2.11E-09	2.72E-10	0.00E+00	0.00E+00	2.31E-08	1.87E-08	0.00E+00	0.00E+00	MND
ADP-fossil fuel [MJ]	0.00E+00	4.17E-02	3.24E-01	4.17E-02	0.00E+00	0.00E+00	5.64E-01	1.48E+00	0.00E+00	0.00E+00	MND
AP [kg SO_2 eq]	0.00E+00	1.78E-05	1.38E-04	1.78E-05	0.00E+00	0.00E+00	2.37E-04	2.68E-04	0.00E+00	0.00E+00	MND
EP [kg Phosphate eq]	0.00E+00	4.55E-06	3.54E-05	4.55E-06	0.00E+00	0.00E+00	5.54E-05	2.60E-04	0.00E+00	0.00E+00	MND
GWP [kg CO_2 eq]	0.00E+00	3.05E-03	2.37E-02	3.05E-03	0.00E+00	0.00E+00	4.23E+00	9.80E-02	0.00E+00	0.00E+00	MND
ODP [kg CFC 11 eq]	0.00E+00	7.66E-19	5.95E-18	7.66E-19	0.00E+00	0.00E+00	5.00E-16	3.38E-16	0.00E+00	0.00E+00	MND
POCP [kg Ethene eq]	0.00E+00	-7.87E-06	-6.11E-05	-7.87E-06	0.00E+00	0.00E+00	2.61E-05	2.99E-05	0.00E+00	0.00E+00	MND

1.2 Resource Use

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
PERE [MJ]	6.12E+00	8.52E-02	1.14E+00	1.13E+00	1.14E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PERM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PERT [MJ]	6.12E+00	8.52E-02	1.14E+00	1.13E+00	1.14E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRE [MJ]	8.61E+01	4.26E+00	1.24E+01	1.23E+01	1.23E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRT [MJ]	8.61E+01	4.26E+00	1.24E+01	1.23E+01	1.23E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
FW [m_3]	1.27E-02	2.25E-04	1.87E-03	1.87E-03	2.79E-03	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
PERE [MJ]	0.00E+00	2.49E-03	1.94E-02	2.49E-03	0.00E+00	0.00E+00	1.13E-01	1.05E-01	0.00E+00	0.00E+00	MND
PERM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
PERT [MJ]	0.00E+00	2.49E-03	1.94E-02	2.49E-03	0.00E+00	0.00E+00	1.13E-01	1.05E-01	0.00E+00	0.00E+00	MND
PENRE [MJ]	0.00E+00	4.19E-02	3.26E-01	4.19E-02	0.00E+00	0.00E+00	6.80E-01	1.53E+00	0.00E+00	0.00E+00	MND
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
PENRT [MJ]	0.00E+00	4.19E-02	3.26E-01	4.19E-02	0.00E+00	0.00E+00	6.80E-01	1.53E+00	0.00E+00	0.00E+00	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m_3]	0.00E+00	4.20E-06	3.26E-05	4.20E-06	0.00E+00	0.00E+00	9.26E-03	2.60E-05	0.00E+00	0.00E+00	MND

1.3 Waste

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
HWD [kg]	4.23E-08	5.05E-08	1.31E-08	1.40E-08	1.25E-08	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
NHWD [kg]	2.87E-02	1.35E-04	1.69E-01	2.53E-02	2.81E-02	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
RWD [kg]	1.50E-03	8.73E-06	2.29E-04	2.27E-04	2.31E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.83E-01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.73E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
HWD [kg]	0.00E+00	2.33E-09	1.81E-08	2.33E-09	0.00E+00	0.00E+00	5.14E-10	6.48E-09	0.00E+00	0.00E+00	MND
NHWD [kg]	0.00E+00	3.53E-06	2.75E-05	3.53E-06	0.00E+00	0.00E+00	2.82E-02	1.44E+00	0.00E+00	0.00E+00	MND
RWD [kg]	0.00E+00	8.59E-08	6.67E-07	8.59E-08	0.00E+00	0.00E+00	4.63E-05	2.03E-05	0.00E+00	0.00E+00	MND
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E+00	0.00E+00	0.00E+00	0.00E+00	MND
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.60E+01	0.00E+00	0.00E+00	0.00E+00	MND

2 EverGuard® TPO 1.5-mm Smooth Back Membrane

2.1 CML Results

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
ADP-elements [kg Sb eq]	9.02E-07	5.96E-08	1.68E-05	1.68E-05	1.68E-05	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
ADP-fossil fuel [MJ]	9.77E+01	5.03E+00	1.34E+01	1.33E+01	1.33E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
AP [kg SO_2 eq]	9.06E-03	7.76E-03	2.42E-03	2.40E-03	2.41E-03	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EP [kg Phosphate eq]	7.78E-04	9.38E-04	2.82E-04	2.54E-04	2.57E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
GWP [kg CO_2 eq]	3.31E+00	3.84E-01	7.78E-01	7.69E-01	1.27E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
ODP [kg CFC 11 eq]	3.93E-14	4.05E-17	8.63E-12	8.63E-12	6.45E-15	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
POCP [kg Ethene eq]	6.14E-04	1.67E-04	1.74E-04	1.65E-04	1.74E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
ADP-elements [kg Sb eq]	0.00E+00	3.23E-10	2.51E-09	3.23E-10	0.00E+00	0.00E+00	2.76E-08	2.23E-08	0.00E+00	0.00E+00	MND
ADP-fossil fuel [MJ]	0.00E+00	4.95E-02	3.85E-01	4.95E-02	0.00E+00	0.00E+00	6.52E-01	1.76E+00	0.00E+00	0.00E+00	MND
AP [kg SO_2 eq]	0.00E+00	2.11E-05	1.64E-04	2.11E-05	0.00E+00	0.00E+00	2.92E-04	3.19E-04	0.00E+00	0.00E+00	MND
EP [kg Phosphate eq]	0.00E+00	5.40E-06	4.20E-05	5.40E-06	0.00E+00	0.00E+00	6.69E-05	3.12E-04	0.00E+00	0.00E+00	MND
GWP [kg CO_2 eq]	0.00E+00	3.62E-03	2.82E-02	3.62E-03	0.00E+00	0.00E+00	5.08E+00	1.17E-01	0.00E+00	0.00E+00	MND
ODP [kg CFC 11 eq]	0.00E+00	9.10E-19	7.07E-18	9.10E-19	0.00E+00	0.00E+00	5.79E-16	4.03E-16	0.00E+00	0.00E+00	MND
POCP [kg Ethene eq]	0.00E+00	-9.35E-06	-7.26E-05	-9.35E-06	0.00E+00	0.00E+00	3.17E-05	3.56E-05	0.00E+00	0.00E+00	MND

2.2 Resource Use

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
PERE [MJ]	6.83E+00	1.01E-01	1.22E+00	1.20E+00	1.22E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PERM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PERT [MJ]	6.83E+00	1.01E-01	1.22E+00	1.20E+00	1.22E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRE [MJ]	1.02E+02	5.05E+00	1.41E+01	1.40E+01	1.40E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRT [MJ]	1.02E+02	5.05E+00	1.41E+01	1.40E+01	1.40E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
FW [m_3]	1.48E-02	2.67E-04	2.09E-03	2.09E-03	3.19E-03	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
PERE [MJ]	0.00E+00	2.96E-03	2.30E-02	2.96E-03	0.00E+00	0.00E+00	1.32E-01	1.25E-01	0.00E+00	0.00E+00	MND
PERM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
PERT [MJ]	0.00E+00	2.96E-03	2.30E-02	2.96E-03	0.00E+00	0.00E+00	1.32E-01	1.25E-01	0.00E+00	0.00E+00	MND
PENRE [MJ]	0.00E+00	4.98E-02	3.87E-01	4.98E-02	0.00E+00	0.00E+00	7.86E-01	1.82E+00	0.00E+00	0.00E+00	MND
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
PENRT [MJ]	0.00E+00	4.98E-02	3.87E-01	4.98E-02	0.00E+00	0.00E+00	7.86E-01	1.82E+00	0.00E+00	0.00E+00	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m_3]	0.00E+00	4.98E-06	3.87E-05	4.98E-06	0.00E+00	0.00E+00	1.11E-02	3.10E-05	0.00E+00	0.00E+00	MND

2.3 Waste

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
HWD [kg]	4.98E-08	6.00E-08	1.50E-08	1.61E-08	1.43E-08	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
NHWD [kg]	3.21E-02	1.61E-04	1.96E-01	2.56E-02	2.88E-02	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
RWD [kg]	1.73E-03	1.04E-05	2.53E-04	2.51E-04	2.56E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.05E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
HWD [kg]	0.00E+00	2.77E-09	2.15E-08	2.77E-09	0.00E+00	0.00E+00	5.98E-10	7.70E-09	0.00E+00	0.00E+00	MND
NHWD [kg]	0.00E+00	4.20E-06	3.26E-05	4.20E-06	0.00E+00	0.00E+00	3.15E-02	1.71E+00	0.00E+00	0.00E+00	MND
RWD [kg]	0.00E+00	1.02E-07	7.92E-07	1.02E-07	0.00E+00	0.00E+00	5.31E-05	2.42E-05	0.00E+00	0.00E+00	MND
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E+01	0.00E+00	0.00E+00	0.00E+00	MND
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.92E+01	0.00E+00	0.00E+00	0.00E+00	MND

3 EverGuard® TPO 1.8-mm Smooth Back Membrane

3.1 CML Results

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
ADP-elements [kg Sb eq]	1.03E-06	6.90E-08	1.68E-05	1.68E-05	1.68E-05	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
ADP-fossil fuel [MJ]	1.13E+02	5.82E+00	1.51E+01	1.49E+01	1.50E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
AP [kg SO_2 eq]	1.05E-02	8.98E-03	2.69E-03	2.67E-03	2.69E-03	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EP [kg Phosphate eq]	8.91E-04	1.09E-03	3.13E-04	2.81E-04	2.85E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
GWP [kg CO_2 eq]	3.84E+00	4.45E-01	8.38E-01	8.28E-01	1.42E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
ODP [kg CFC 11 eq]	4.26E-14	4.69E-17	8.63E-12	8.63E-12	6.79E-15	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
POCP [kg Ethene eq]	6.97E-04	1.93E-04	1.86E-04	1.74E-04	1.85E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
ADP-elements [kg Sb eq]	0.00E+00	3.74E-10	2.90E-09	3.74E-10	0.00E+00	0.00E+00	3.21E-08	2.59E-08	0.00E+00	0.00E+00	MND
ADP-fossil fuel [MJ]	0.00E+00	5.73E-02	4.45E-01	5.73E-02	0.00E+00	0.00E+00	7.41E-01	2.04E+00	0.00E+00	0.00E+00	MND
AP [kg SO_2 eq]	0.00E+00	2.45E-05	1.90E-04	2.45E-05	0.00E+00	0.00E+00	3.46E-04	3.70E-04	0.00E+00	0.00E+00	MND
EP [kg Phosphate eq]	0.00E+00	6.26E-06	4.86E-05	6.26E-06	0.00E+00	0.00E+00	7.84E-05	3.64E-04	0.00E+00	0.00E+00	MND
GWP [kg CO_2 eq]	0.00E+00	4.20E-03	3.26E-02	4.20E-03	0.00E+00	0.00E+00	5.92E+00	1.35E-01	0.00E+00	0.00E+00	MND
ODP [kg CFC 11 eq]	0.00E+00	1.05E-18	8.18E-18	1.05E-18	0.00E+00	0.00E+00	6.57E-16	4.67E-16	0.00E+00	0.00E+00	MND
POCP [kg Ethene eq]	0.00E+00	-1.08E-05	-8.40E-05	-1.08E-05	0.00E+00	0.00E+00	3.73E-05	4.14E-05	0.00E+00	0.00E+00	MND

3.2 Resource Use

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
PERE [MJ]	7.54E+00	1.17E-01	1.29E+00	1.28E+00	1.29E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PERM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PERT [MJ]	7.54E+00	1.17E-01	1.29E+00	1.28E+00	1.29E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRE [MJ]	1.18E+02	5.85E+00	1.59E+01	1.57E+01	1.57E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRT [MJ]	1.18E+02	5.85E+00	1.59E+01	1.57E+01	1.57E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
FW [m_3]	1.69E-02	3.09E-04	2.30E-03	2.30E-03	3.59E-03	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
PERE [MJ]	0.00E+00	3.42E-03	2.66E-02	3.42E-03	0.00E+00	0.00E+00	1.51E-01	1.45E-01	0.00E+00	0.00E+00	MND
PERM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
PERT [MJ]	0.00E+00	3.42E-03	2.66E-02	3.42E-03	0.00E+00	0.00E+00	1.51E-01	1.45E-01	0.00E+00	0.00E+00	MND
PENRE [MJ]	0.00E+00	5.76E-02	4.48E-01	5.76E-02	0.00E+00	0.00E+00	8.92E-01	2.11E+00	0.00E+00	0.00E+00	MND
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
PENRT [MJ]	0.00E+00	5.76E-02	4.48E-01	5.76E-02	0.00E+00	0.00E+00	8.92E-01	2.11E+00	0.00E+00	0.00E+00	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m_3]	0.00E+00	5.77E-06	4.48E-05	5.77E-06	0.00E+00	0.00E+00	1.29E-02	3.59E-05	0.00E+00	0.00E+00	MND

3.3 Waste

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
HWD [kg]	5.72E-08	6.94E-08	1.68E-08	1.81E-08	1.60E-08	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
NHWD [kg]	3.55E-02	1.86E-04	2.23E-01	2.60E-02	2.95E-02	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
RWD [kg]	1.97E-03	1.20E-05	2.77E-04	2.75E-04	2.80E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.37E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
HWD [kg]	0.00E+00	3.20E-09	2.49E-08	3.20E-09	0.00E+00	0.00E+00	6.82E-10	8.93E-09	0.00E+00	0.00E+00	MND
NHWD [kg]	0.00E+00	4.86E-06	3.77E-05	4.86E-06	0.00E+00	0.00E+00	3.49E-02	1.97E+00	0.00E+00	0.00E+00	MND
RWD [kg]	0.00E+00	1.18E-07	9.17E-07	1.18E-07	0.00E+00	0.00E+00	5.99E-05	2.81E-05	0.00E+00	0.00E+00	MND
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+01	0.00E+00	0.00E+00	0.00E+00	MND
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.24E+01	0.00E+00	0.00E+00	0.00E+00	MND

4 EverGuard® TPO 2.0-mm Smooth Back Membrane

4.1 CML Results

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
ADP-elements [kg Sb eq]	1.15E-06	7.76E-08	1.68E-05	1.68E-05	1.68E-05	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
ADP-fossil fuel [MJ]	1.27E+02	6.55E+00	1.66E+01	1.64E+01	1.65E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
AP [kg SO_2 eq]	1.18E-02	1.01E-02	2.94E-03	2.91E-03	2.94E-03	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EP [kg Phosphate eq]	9.95E-04	1.22E-03	3.42E-04	3.06E-04	3.10E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
GWP [kg CO_2 eq]	4.32E+00	5.00E-01	8.94E-01	8.82E-01	1.55E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
ODP [kg CFC 11 eq]	4.57E-14	5.27E-17	8.63E-12	8.63E-12	7.11E-15	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
POCP [kg Ethene eq]	7.73E-04	2.18E-04	1.96E-04	1.83E-04	1.96E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
ADP-elements [kg Sb eq]	0.00E+00	4.20E-10	3.27E-09	4.20E-10	0.00E+00	0.00E+00	3.63E-08	2.92E-08	0.00E+00	0.00E+00	MND
ADP-fossil fuel [MJ]	0.00E+00	6.45E-02	5.01E-01	6.45E-02	0.00E+00	0.00E+00	8.23E-01	2.30E+00	0.00E+00	0.00E+00	MND
AP [kg SO_2 eq]	0.00E+00	2.76E-05	2.14E-04	2.76E-05	0.00E+00	0.00E+00	3.96E-04	4.17E-04	0.00E+00	0.00E+00	MND
EP [kg Phosphate eq]	0.00E+00	7.04E-06	5.47E-05	7.04E-06	0.00E+00	0.00E+00	8.91E-05	4.11E-04	0.00E+00	0.00E+00	MND
GWP [kg CO_2 eq]	0.00E+00	4.72E-03	3.67E-02	4.72E-03	0.00E+00	0.00E+00	6.70E+00	1.53E-01	0.00E+00	0.00E+00	MND
ODP [kg CFC 11 eq]	0.00E+00	1.19E-18	9.21E-18	1.19E-18	0.00E+00	0.00E+00	7.29E-16	5.27E-16	0.00E+00	0.00E+00	MND
POCP [kg Ethene eq]	0.00E+00	-1.22E-05	-9.46E-05	-1.22E-05	0.00E+00	0.00E+00	4.24E-05	4.67E-05	0.00E+00	0.00E+00	MND

4.2 Resource Use

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
PERE [MJ]	8.19E+00	1.32E-01	1.36E+00	1.35E+00	1.36E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PERM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PERT [MJ]	8.19E+00	1.32E-01	1.36E+00	1.35E+00	1.36E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRE [MJ]	1.33E+02	6.58E+00	1.74E+01	1.72E+01	1.73E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
PENRT [MJ]	1.33E+02	6.58E+00	1.74E+01	1.72E+01	1.73E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
FW [m_3]	1.89E-02	3.47E-04	2.51E-03	2.51E-03	3.96E-03	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
PERE [MJ]	0.00E+00	3.85E-03	2.99E-02	3.85E-03	0.00E+00	0.00E+00	1.68E-01	1.64E-01	0.00E+00	0.00E+00	MND
PERM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
PERT [MJ]	0.00E+00	3.85E-03	2.99E-02	3.85E-03	0.00E+00	0.00E+00	1.68E-01	1.64E-01	0.00E+00	0.00E+00	MND
PENRE [MJ]	0.00E+00	6.49E-02	5.04E-01	6.49E-02	0.00E+00	0.00E+00	9.90E-01	2.38E+00	0.00E+00	0.00E+00	MND
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
PENRT [MJ]	0.00E+00	6.49E-02	5.04E-01	6.49E-02	0.00E+00	0.00E+00	9.90E-01	2.38E+00	0.00E+00	0.00E+00	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m_3]	0.00E+00	6.49E-06	5.04E-05	6.49E-06	0.00E+00	0.00E+00	1.46E-02	4.05E-05	0.00E+00	0.00E+00	MND

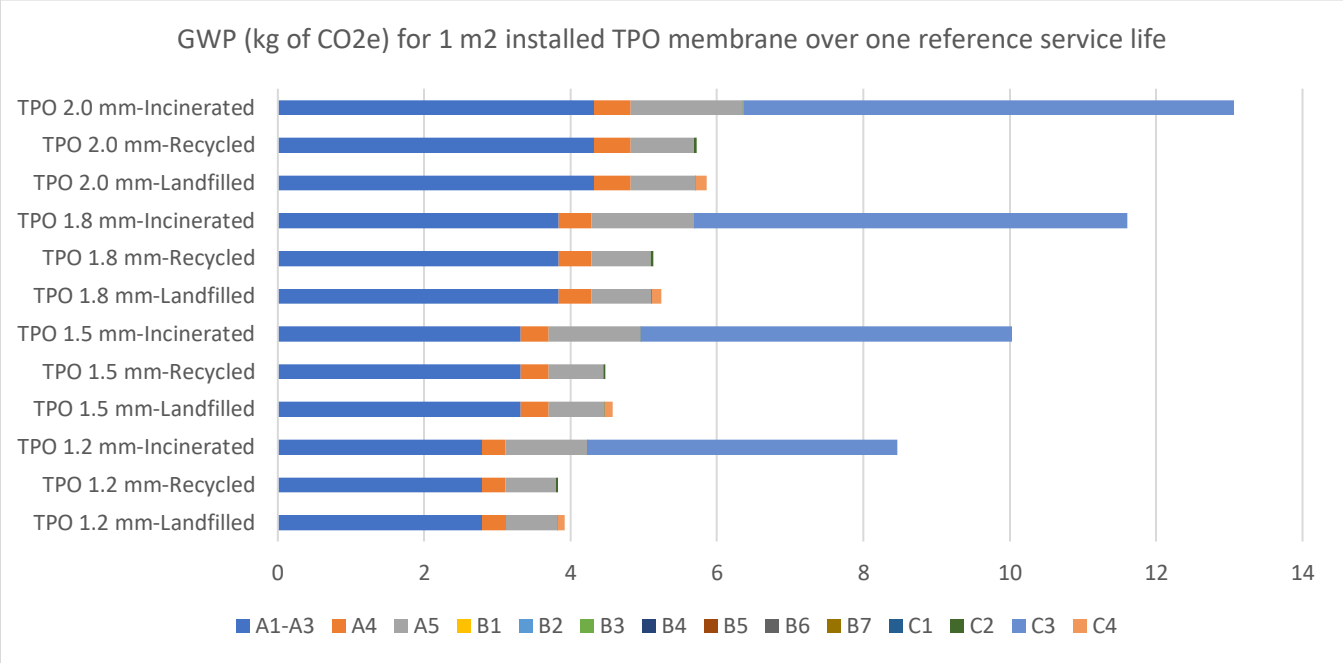
4.3 Waste

Impact Category	A1-A3	A4	A5			B1	B2	B3	B4	B5	B6	B7
			L	R	I							
HWD [kg]	6.41E-08	7.81E-08	1.85E-08	2.00E-08	1.76E-08	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
NHWD [kg]	3.87E-02	2.09E-04	2.49E-01	2.63E-02	3.01E-02	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
RWD [kg]	2.19E-03	1.35E-05	3.00E-04	2.97E-04	3.03E-04	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.66E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	0.00E+00

Impact Category	C1	C2			C3			C4			D
		L	R	I	L	R	I	L	R	I	
HWD [kg]	0.00E+00	3.60E-09	2.80E-08	3.60E-09	0.00E+00	0.00E+00	7.60E-10	1.01E-08	0.00E+00	0.00E+00	MND
NHWD [kg]	0.00E+00	5.47E-06	4.25E-05	5.47E-06	0.00E+00	0.00E+00	3.80E-02	2.22E+00	0.00E+00	0.00E+00	MND
RWD [kg]	0.00E+00	1.33E-07	1.03E-06	1.33E-07	0.00E+00	0.00E+00	6.61E-05	3.17E-05	0.00E+00	0.00E+00	MND
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+01	0.00E+00	0.00E+00	0.00E+00	MND
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.54E+01	0.00E+00	0.00E+00	0.00E+00	MND

Interpretation

Dominance analyses conducted in the LCA study and described in the project report (see reference #1), indicate that global warming potential and abiotic depletion of fossil fuels are seen to be the largest impact categories. This is a consistent finding across all different thicknesses and determined by the nature of the raw materials. Within the impact categories, A1-A3 stages, which include raw material extraction, transportation and manufacturing, are a remarkable contributor of impacts. For GWP, the disposal method how the product is treated at its end of life also matters. The GWP impact from EOL stages will exceed that from A1-A3 if the product is incinerated when disposed of. With the same disposal method, the results increases with the thickness of the product, which is understandable as thicker membrane requires more resources to manufacture, transport and dispose of. Below is an illustration of the products GWP impact of all the products covered in the study for one reference service life – 25 years.



References

1. Life Cycle Assessment, LCA Report for BMI, WAP Sustainability Consulting, October 2019
2. Product Category Rules for Building-Related Products and Services Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report, Institut Bauen und Umwelt, Version 1.7, March 16th, 2018
3. Part B: Requirements on the EPD for Plastic and elastomer roofing and sealing sheet systems, Institut Bauen und Umwelt, Version 1.0, November 4th, 2013
4. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines
5. ISO 14044: 2006/ Amd 1:2017 Environmental Management – Life cycle assessment – Requirements and Guidelines – Amendment 1.
6. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
7. ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.
8. European Standard DIN EN 15804: 2012.04+A1 2013. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products (includes Amendment A1:2013)