



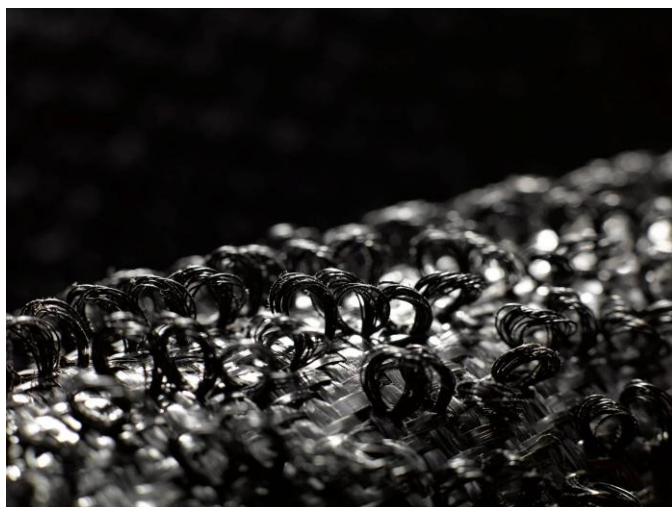
**Environmental
Product
Declaration**

According to ISO14025 and EN15804+A2
(+indicators A1)



This declaration is for:
Geotextile MIRAFI® Robulon PP

Provided by:
Solmax



program operator
Stichting MRPI®
publisher
Stichting MRPI®
www.mrpi.nl

MRPI® registration
1.1.00713.2024
date of first issue
27-11-2024
date of this issue
27-11-2024
expiry date
27-11-2029



COMPANY INFORMATION



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MRPI® REGISTRATION

1.1.00713.2024

DATE OF ISSUE

27-11-2024

EXPIRY DATE

27-11-2029

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Tim Mol, Ecoreview. The LCA study has been done by Darryl Kofi Safo, Solmax. The certificate is based on an LCA-dossier according to EN15804+A2 (+indicators A1). It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPD's of construction products may not be comparable if they do not comply with EN15804+A2. Declaration of SVHC that are listed on the 'Candidate list of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

Stichting MRPI®
Kingsfordweg 151
1043 GR
Amsterdam

Ing. L. L. Oosterveen MSc. MBA
Managing Director MRPI

PRODUCT

Geotextile **MIRAFI®** Robulon PP

DECLARED UNIT/FUNCTIONAL UNIT

1m²

DESCRIPTION OF PRODUCT

A geocomposite with a woven PP base layer

VISUAL PRODUCT



MORE INFORMATION

<https://www.solmax.com/emea/en/products/MIRAFI/MIRAFI-robulon-pp>

DEMONSTRATION OF VERIFICATION

CEN standard EN15804 serves as the core PCR(a)

Independent verification of the declaration on data
according to

ISO14025 and EN15804+A2 (+indicators A1)

internal:

external: x

Third party verifier: Tim Mol. Ecoreview

[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

MIRAFI Robulon PP is a high strength geocomposite, with a 3-dimensional structure designed for erosion control. The PP base layer is resistant to heavy and temporary loads needed for soil retention and slope reinforcement along roadways. The combination of both reinforcement and retention makes **MIRAFI Robulon PP** the ideal mat for erosion control in various applications including railways and other civil structures.

MIRAFI Robulon PP is available in various types. The types range from:
MIRAFI Robulon PP 40 to **MIRAFI Robulon PP 80**.

Manufacturing process

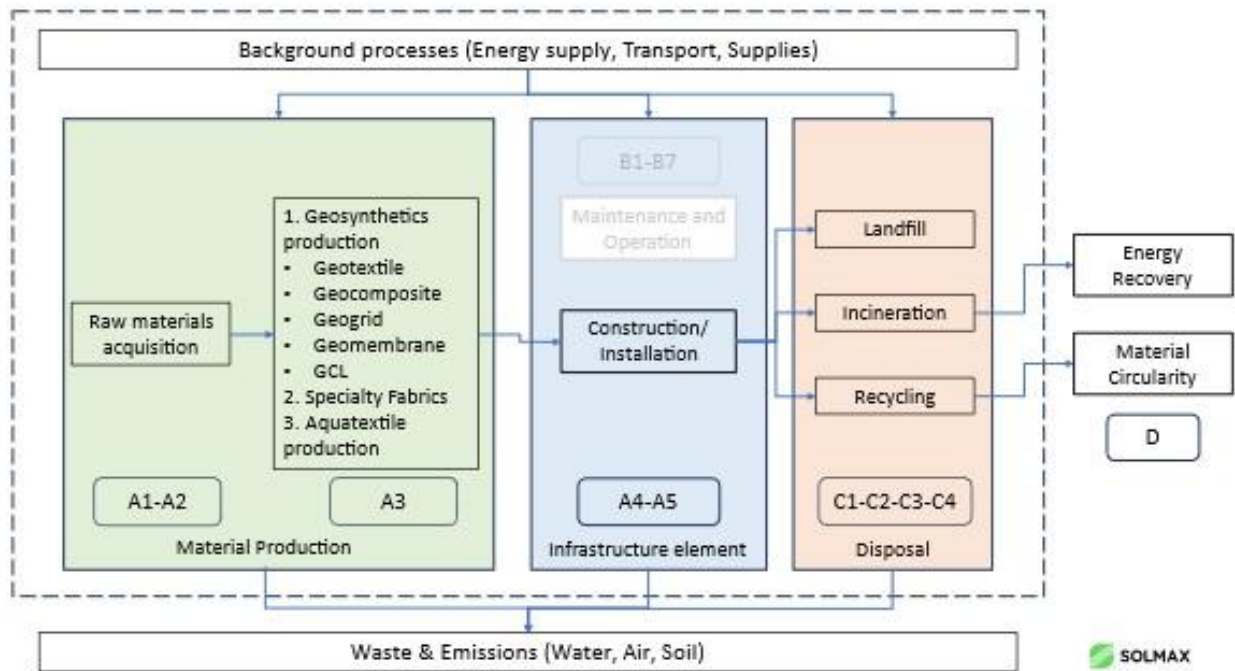
The principle of manufacturing geosynthetics is based on the processing and refinement of polymeric material. Depending on specific requirements, the manufacturing process of geosynthetics typically involves the selection of polymers which are processed with additives, such as stabilisers or dyes for the desired properties. **MIRAFI Robulon PP** manufacturing involves a two step-process. The first step consists of geotextile manufacturing. The second step consists of tufting which completes the fabrication. Tufting involves the insertion of tuft yarn into a backing material. The yarn is loaded onto needles that quickly punch through a base fabric (woven geotextile). The needles pull the yarn loops to the desired height to create the pile. In preparation for shipment to customer, the finished geotextile is wound onto paperboard cores and wrapped with PE-film.

Component (> 1%)	(kg / %)
PP yarn	54-58%
PP geotextile	42-46%

SCOPE AND TYPE

The geographical location is EMEA and the product is manufactured in Hengelo, the Netherlands. The product has various potential applications as a construction material or as a component in construction materials. Background database used for the calculations is Ecoinvent version 3.6 in combination with the Ecochain Helix 4.3.1 LCA software. The EPD is a Cradle-to-grave EPD.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USER STAGE								END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	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	X	X	X	X	X	X	X	X	X	X	
X= Modules Assessed ND= Not Declared																	



REPRESENTATIVENESS

In this study a specific product is considered, produced at a specific production site.

ENVIRONMENT IMPACT per functional unit or declared unit (core indicators A1)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb eq.	1,91 E-05	2,31 E-06	3,91 E-07	2,18 E-05	3,15 E-07	1,20 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,70 E-08	1,52 E-07	3,08 E-07	0,00 E+00	-8,23 E-07
ADPF	MJ	5,16 E+01	1,38 E+00	7,54 E+00	1,87 E-01	1,89 E-01	3,11 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,34 E-01	9,12 E-02	2,28 E-01	0,00 E+00	-1,33 E+01
GWP	kg CO2 eq.	1,74 E+00	9,04 E-02	4,48 E-01	2,28 E+00	1,23 E-02	2,02 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,72 E-03	5,97 E-03	1,11 E+00	0,00 E+00	-6,62 E-01
ODP	Kg CFC11 eq.	6,65 E-08	1,60 E-08	4,39 E-08	1,26 E-07	2,19 E-09	7,14 E-09	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,64 E-09	1,06 E-09	1,57 E-09	0,00 E+00	-7,31 E-08
POCP	Kg ethene eq.	1,18 E-03	5,46 E-05	6,78 E-05	1,30 E-03	7,45 E-06	7,60 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,86 E-06	3,60 E-06	8,85 E-06	0,00 E+00	-1,34 E-04
AP	kg SO2 eq.	5,98 E-03	3,98 E-04	4,46 E-04	6,82 E-03	5,43 E-05	3,77 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	7,18 E-05	2,62 E-05	1,27 E-04	0,00 E+00	-6,06 E-04
EP	kg (PO4) 3- eq.	6,80 E-04	7,81 E-05	9,28 E-05	8,51 E-04	1,07 E-05	5,91 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,62 E-05	5,15 E-06	4,52 E-05	0,00 E+00	-9,42 E-05

Toxicity indicators for Dutch market

HTP	kg DCB- Eq	3,49 E-01	3,81 E-02	3,56 E-02	4,23 E-01	5,20 E-03	7,20 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,00 E-03	2,51 E-03	4,05 E-02	0,00 E+00	-4,30 E-02
FAETP	kg DCB- Eq	1,07 E-02	1,11 E-03	5,85 E-04	1,24 E-02	1,52 E-04	1,54 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,17 E-05	7,33 E-05	1,26 E-02	0,00 E+00	-6,09 E-04
MAETP	kg DCB- Eq	2,81 E+01	4,00 E+00	2,39 E+00	3,45 E+01	5,46 E-01	3,91 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,78 E-01	2,64 E-01	1,84 E+01	0,00 E+00	-2,12 E+00
TETP	kg DCB- Eq	2,41 E-03	1,35 E-04	2,91 E-04	2,84 E-03	1,84 E-05	1,81 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,82 E-06	8,88 E-06	6,47 E-05	0,00 E+00	-1,59 E-04
ECI	euro	1,58 E-01	1,09 E-02	2,92 E-02	1,98 E-01	1,49 E-03	1,95 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,33 E-03	7,19 E-04	6,23 E-02	0,00 E+00	-4,18 E-02
ADPF	kg Sb eq.	2,48 E-02	6,65 E-04	3,63 E-03	2,91 E-02	9,08 E-05	1,49 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	6,43 E-05	4,39 E-05	1,09 E-04	0,00 E+00	-6,41 E-03

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator
ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

ENVIRONMENT IMPACT per functional unit or declared unit (core indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,78 E+00	9,12 E-02	4,57 E-01	2,33 E+00	1,25 E-02	2,44 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,84 E-03	6,02 E-03	1,15 E+00	0,00 E+00	-6,98 E-01
GWP-fossil	kg CO2 eq.	1,80 E+00	9,12 E-02	4,40 E-01	2,33 E+00	1,24 E-02	1,77 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,84 E-03	6,02 E-03	1,11 E+00	0,00 E+00	-6,72 E-01
GWP-biogenic	kg CO2 eq.	-1,83 E-02	4,21 E-05	1,69 E-02	-1,38 E-03	5,75 E-06	6,76 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,78 E-06	2,78 E-06	3,88 E-02	0,00 E+00	-2,67 E-02
GWP-luluc)	kg CO2 eq.	1,77 E-03	3,34 E-05	5,37 E-05	1,86 E-03	4,56 E-06	9,58 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,03 E-06	2,20 E-06	8,50 E-06	0,00 E+00	-8,98 E-05
ODP	kg CFC11 eq.	6,86 E-08	2,01 E-08	4,89 E-08	1,38 E-07	2,75 E-09	7,89 E-09	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,06 E-09	1,33 E-09	1,83 E-09	0,00 E+00	-8,28 E-08
AP	mol H+ eq.	7,28 E-03	5,29 E-04	5,67 E-04	8,37 E-03	7,22 E-05	4,67 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,00 E-04	3,49 E-05	1,77 E-04	0,00 E+00	-7,76 E-04
EP-freshwater	kg PO4 eq.	5,01 E-05	9,20 E-07	8,50 E-06	5,95 E-05	1,26 E-07	3,06 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,44 E-08	6,07 E-08	2,97 E-07	0,00 E+00	-2,25 E-06
EP-marine	kg N eq.	1,35 E-03	1,86 E-04	1,68 E-04	1,71 E-03	2,54 E-05	1,19 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,39 E-05	1,23 E-05	7,69 E-05	0,00 E+00	-2,15 E-04
EP-terrestrial	mol N eq.	1,49 E-02	2,05 E-03	1,64 E-03	1,86 E-02	2,81 E-04	1,12 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,82 E-04	1,36 E-04	8,34 E-04	0,00 E+00	-2,41 E-03
POCP	kg NMVOC eq.	5,56 E-03	5,87 E-04	4,86 E-04	6,63 E-03	8,01 E-05	3,93 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,33 E-04	3,87 E-05	2,10 E-04	0,00 E+00	-8,00 E-04
ADP-minerals & metals	kg Sb eq.	1,91 E-05	2,31 E-06	3,91 E-07	2,18 E-05	3,15 E-07	1,20 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,70 E-08	1,52 E-07	3,08 E-07	0,00 E+00	-8,23 E-07
ADP-fossil	MJ, net calorific value	5,12 E+01	1,38 E+00	6,63 E+00	5,92 E+01	1,88 E-01	3,03 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,35 E-01	9,08 E-02	2,14 E-01	0,00 E+00	-1,21 E+01
WDP	m3 world eq. Deprived	1,06 E+00	4,92 E-03	5,34 E-02	1,12 E+00	6,72 E-04	5,68 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,36 E-04	3,25 E-04	2,79 E-03	0,00 E+00	-1,21 E-01

GWP-total = Global Warming Potential total
 GWP-fossil = Global Warming Potential fossil fuels
 GWP-biogenic = Global Warming Potential biogenic
 GWP-luluc = Global Warming Potential land use and land use change
 ODP = Depletion potential of the stratospheric ozone layer
 AP = Acidification Potential, Accumulated Exceedence
 EP-freshwater = Eutrophication Potential, fraction of nutrients reaching freshwater end compartment
 EP-marine = Eutrophication Potential, fraction of nutrients reaching marine end compartment
 EP-terrestrial = Eutrophication Potential, Accumulated Exceedence
 POCP = Formation potential of tropospheric ozone photochemical oxidants
 ADP-minerals&metals = Abiotic Depletion Potential for non-fossil resources [2]
 ADP-fossil = Abiotic Depletion for fossil resources potential [2]
 WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ENVIRONMENT IMPACT per functional unit or declared unit (additional indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	6,15 E-08	8,19 E-09	2,14 E-09	7,18 E-08	1,12 E-09	4,91 E-09	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,64 E-09	5,40 E-10	1,28 E-09	0,00 E+00	-6,25 E-09
IRP	kBq U235 eq.	5,33 E-02	5,76 E-03	6,03 E-03	6,51 E-02	7,87 E-04	3,55 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,71 E-04	3,80 E-04	4,92 E-04	0,00 E+00	-4,69 E-03
ETP-fw	CTUe	2,63 E+01	1,23 E+00	2,21 E+00	2,97 E+01	1,67 E-01	1,68 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,92 E-02	8,09 E-02	3,79 E-01	0,00 E+00	-1,49 E+00
HTP-c	CTUh	4,72 E-10	3,98 E-11	5,20 E-11	5,63 E-10	5,43 E-12	4,71 E-11	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,63 E-12	2,62 E-12	5,08 E-11	0,00 E+00	-6,26 E-11
HTP-nc	CTUh	1,36 E-08	1,34 E-09	1,13 E-09	1,61 E-08	1,83 E-10	1,11 E-09	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,70 E-11	8,85 E-11	1,69 E-09	0,00 E+00	-1,11 E-09
SQP	----	8,08 E+00	1,19 E+00	4,71 E-01	9,75 E+00	1,63 E-01	5,48 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,78 E-02	7,87 E-02	1,21 E-01	0,00 E+00	-9,86 E+00

PM = Potential incidence of disease due to PM emissions
 IRP = Potential Human exposure efficiency relative to U235 [1]
 ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
 HTP-c = Potential Comparative Toxic Unit for humans [2]
 HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
 SQP = Potential soil quality index [2]

Disclaimer [1]

- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle.
 It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	1,04 E-05	3,48 E-06	7,17 E-06	2,11 E-05	4,76 E-07	1,28 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,71 E-07	2,30 E-07	1,29 E-06	0,00 E+00	-1,35 E-05
NHWD	kg	1,11 E-01	8,72 E-02	2,92 E-02	2,28 E-01	1,19 E-02	2,35 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,45 E-04	5,76 E-03	1,60 E-02	0,00 E+00	-9,06 E-03
RWD	kg	4,52 E-05	9,03 E-06	6,99 E-06	6,12 E-05	1,23 E-06	3,50 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,14 E-07	5,96 E-07	6,35 E-07	0,00 E+00	-6,31 E-06
CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MFR	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,28 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,51 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,44 E+00
ETE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,58 E+00

HWD = Hazardous Waste Disposed
 NHWD = Non Hazardous Waste Disposed
 RWD = Radioactive Waste Disposed
 CRU = Components for reuse
 MFR = Materials for recycling
 MER = Materials for energy recovery
 EEE = Exported Electrical Energy
 ETE = Exported Thermal Energy

RESOURCE USE per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	2,24 E+00	0,00 E+00	1,94 E-01	2,43 E+00	0,00 E+00	1,23 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,08 E-03	0,00 E+00	0,00 E+00	0,00 E+00	-1,65 E+00
PERM	MJ	0,00 E+00	1,72 E-02	0,00 E+00	1,72 E-02	2,35 E-03	1,53 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,14 E-03	7,68 E-03	0,00 E+00	0,00 E+00
PERT	MJ	2,24 E+00	1,72 E-02	1,94 E-01	2,45 E+00	2,35 E-03	1,24 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,08 E-03	1,14 E-03	7,68 E-03	0,00 E+00	-1,65 E+00
PENRE	MJ	5,48 E+01	0,00 E+00	7,28 E+00	6,21 E+01	0,00 E+00	3,15 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,43 E-01	0,00 E+00	0,00 E+00	0,00 E+00	-1,33 E+01
PENRM	MJ	0,00 E+00	1,46 E+00	0,00 E+00	1,46 E+00	1,99 E-01	1,09 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,64 E-02	2,30 E-01	0,00 E+00	0,00 E+00
PENRT	MJ	5,48 E+01	1,46 E+00	7,28 E+00	6,36 E+01	1,99 E-01	3,26 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,43 E-01	9,64 E-02	2,30 E-01	0,00 E+00	-1,33 E+01
SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
FW	m3	2,28 E-02	1,67 E-04	2,11 E-03	2,50 E-02	2,29 E-05	1,29 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,32 E-06	1,11 E-05	1,30 E-04	0,00 E+00	-2,11 E-03

PERE = Use of renewable energy excluding renewable primary energy resources
 PERM = Use of renewable energy resources used as raw materials
 PERT = Total use of renewable primary energy resources
 PENRE = Use of non-renewable primary energy resources excluding non-renewable energy resources used as raw materials
 PENRM = Use of non-renewable primary energy resources used as raw materials
 PENRT = Total use of non-renewable primary energy resources
 SM = Use of secondary materials
 RSF = Use of renewable secondary fuels
 NRSF = Use of non-renewable secondary fuels
 FW = Use of net fresh water

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	Kg C	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
BCCpa	kg C	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,88 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-8,00 E-02

BCCpr = Biogenic carbon content in product
 BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

Cut off rules

All primary data of the production processes were considered. No materials or processes have been excluded from the study.

Data quality

Data flows have been modeled as realistically as possible. Data quality assessment is based on the principle that the primary data used for processes occurring at the production site must be of higher quality than background data of other processes. Where this is not available, other reference data is selected from appropriate sources.

Data collection period

The dataset is representative for the production processes used in 2023.

Methodology and reproducibility

The process descriptions and quantities in this study are reproducible in accordance to the reference standards that have been used. The references of all sources, both primary and public sources and literature, have been documented. In addition, to facilitate the reproducibility of this LCA, a full set of data records has been generated.

Allocation

In accordance with the respective methodologies, the allocation procedures in the background processes are deemed to be consistent.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Product stage (A1-A3)

The processes in A1-A3 consists of the extraction and processing of raw materials, transportation of the raw materials, the manufacturing process and product packaging. The required energy for production, external treatments, ancillary materials, packaging material and production emissions are included. Energy consumption was modelled based on a residual energy mix.

Construction Stage (A4-A5)

This life cycle stage details all impacts related to the transport of product to the construction site and on-site activities related to installation. This also includes any waste produced and its disposal. Transport to construction site (A4); the transport distance of single journey to the construction site of a product produced in the Netherlands is 150 km. Assembly (A5); no impacts are associated with the installation, as the product is typically unrolled off suspended rolls manually. However, the environmental impacts related to the disposal of packaging material are considered.

Description	Value	Unit
Vehicle type used for transport	Lorry unspecified	
Distance to construction site	150	km
Output materials as results of losses during construction	5	%
Output materials as results of waste processing of used packaging.	0,1315	kg
Distance to disposal site (Packaging film wrap)	92,5	km
Distance to disposal site (winding core)	30	km

Use Stage (B1-B7)

This life cycle stage details impacts related to the use phase over the entire life cycle.

There are no impacts associated with the entire use stage, as it was assumed that no activities for maintenance, repair, replacement, refurbishment nor other material and energy flows take place during the operational phase

End of Life Stage (C1-C4)

The end of life stage accounts for the deconstruction/demolition and includes the impacts of transport to waste processing sites and the disposal of said waste. The deconstruction/demolition of waste product is done by the excavation of the subsoil. It is assumed that 0.03 m³ of soil must be moved per declared unit. The transport distance of waste material from the construction/installation site to the waste incineration plant is 100 km. The transport to the waste recycling plant and to landfilling site have the same distance of 50 km. The distribution ratio for waste disposal follows the "geotextiel en geogrids grondwerken" waste stream (EN: geotextiles and geogrids for earth works) which is 70% incineration, 25% remain inground and 5% recycling.

Benefits and Loads beyond the system boundary (D)

This life cycle stage covers the net benefits and loads arising from the reuse of products or the recycling or recovery of energy from waste materials. This study models the benefits and burdens of waste combustion using an electrical efficiency of 18% and thermal efficiency of 31%. As for the calculation of the avoided burden from material recycling, a quality factor of 67% is used.

Description	Total energy recovery (MJ)	Avoided burden (kg)
Reference product	7,019	0,021

The results are presented for **MIRAFI** Robulon PP 60 as the reference product.

DECLARATION OF SVHC

None of the substances contained in the product are listed in the "Candidate List of Substances of Very High Concern for authorisation", or they do not exceed the threshold with the European Chemicals Agency.

REFERENCES

[1] 'ISO 14040: Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO14040:2006.

[2] 'ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines', International Organization for Standardization, ISO14044:2006.

[3] 'ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO14025:2006.

[4] 'NEN-EN 15804: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', NEN-EN 15804:2012+A2:2019.

[5] 'Bepalingsmethode Milieuprestatie Bouwwerken ', Stichting Nationale Milieudatabase, versie 1.1, maart 2022.

REMARKS

None