



**Environmental
Product
Declaration**

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



This declaration is for:
Geotextile MIRAFI® HMi

Provided by:
Solmax



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

MRPI® registration
1.1.00714.2024
date of first issue
27-11-2024
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27-11-2029



COMPANY INFORMATION



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MRPI® REGISTRATION

1.1.00714.2024

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®
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1043 GR
Amsterdam

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

PRODUCT

Geotextile **MIRAFI® HMi**

DECLARED UNIT/FUNCTIONAL UNIT

1m²

DESCRIPTION OF PRODUCT


A structured and stable woven geotextile composed of high modulus polypropylene (PP) fibres

VISUAL PRODUCT



MORE INFORMATION

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

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 HMi combines stability, a long service life, sustainability, and service: the all-round solution for long serving and stable roads requiring a minimum of resources and energy and for sustainable infrastructure projects. **MIRAFI** HMi woven geotextiles are engineered materials suitable for short- and long-term soil reinforcement applications.

MIRAFI HMi-5 serves as the reference product for this EPD.

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** HMi geotextiles are manufactured by creel weaving. The creel system involves multiple spools of yarn loaded onto a creel. The yarns are then threaded through a series of guides and tension devices to ensure they are fed into the loom at a consistent rate and tension to produce a uniform fabric. In preparation for shipment to customer, the finished geotextile is wound onto recyclable HDPE cores and wrapped with PE-film.

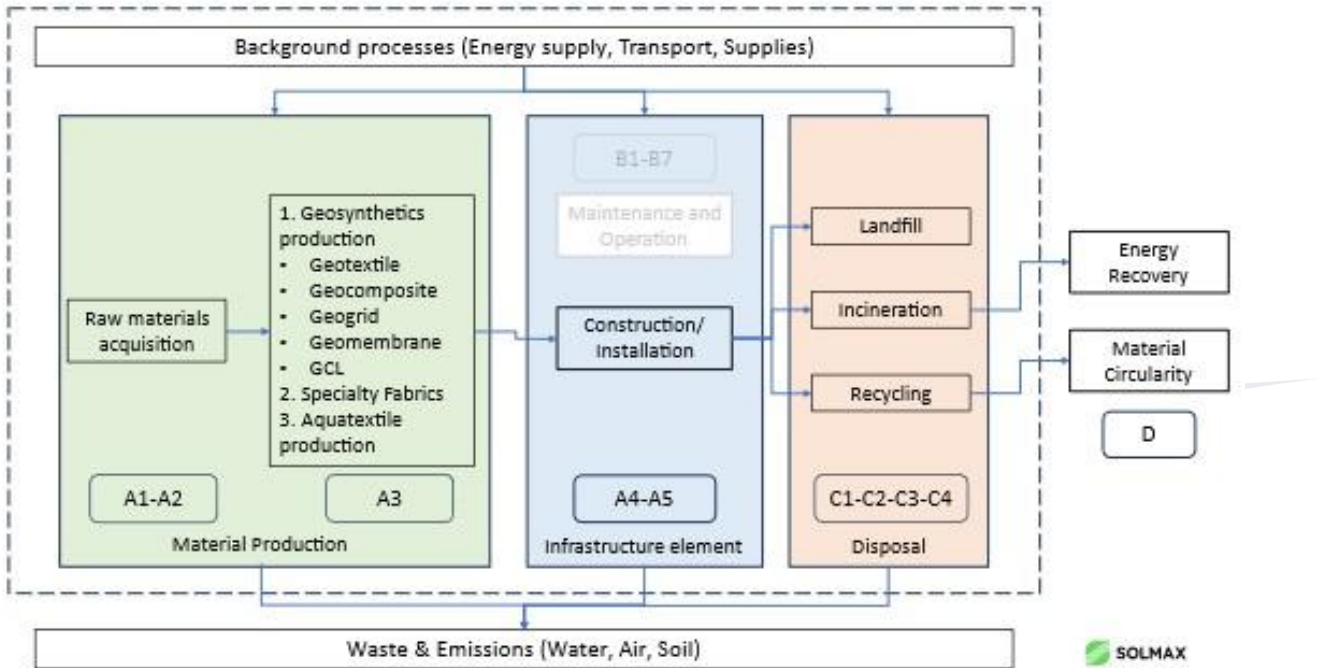
Component (> 1%)	(kg / %)
PP yarn	100%

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.	6,37 E-06	5,79 E-07	2,39 E-07	7,19 E-06	1,24 E-07	3,90 E-07	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	6,67 E-09	5,97 E-08	1,21 E-07	0,00 E+00	-2,33 E-07
ADPF	MJ	2,02 E+01	6,95 E-01	2,11 E+00	2,31 E+01	7,37 E-02	1,17 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	5,22 E-02	3,56 E-02	8,88 E-02	0,00 E+00	-5,69 E+00
GWP	kg CO2 eq.	6,55 E-01	5,26 E-02	1,39 E-01	8,47 E-01	4,82 E-03	1,08 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	3,79 E-03	2,33 E-03	4,33 E-01	0,00 E+00	-2,82 E-01
ODP	Kg CFC11 eq.	1,97 E-08	8,60 E-09	7,40 E-09	3,57 E-08	8,55 E-10	1,97 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	6,41 E-10	4,13 E-10	6,12 E-10	0,00 E+00	-3,10 E-08
POCP	kg ethene eq.	5,04 E-04	6,27 E-05	2,07 E-05	5,87 E-04	2,91 E-06	3,02 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	3,85 E-06	1,41 E-06	3,45 E-06	0,00 E+00	-5,25 E-05
AP	kg SO2 eq.	2,14 E-03	1,16 E-03	2,22 E-04	3,51 E-03	2,12 E-05	1,85 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	2,80 E-05	1,02 E-05	4,94 E-05	0,00 E+00	-2,24 E-04
EP	kg (PO4) 3- eq.	2,12 E-04	1,31 E-04	5,27 E-05	3,96 E-04	4,16 E-06	2,29 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	6,31 E-06	2,01 E-06	1,77 E-05	0,00 E+00	-2,93 E-05

Toxicity indicators for Dutch market

HTP	kg DCB-Eq	1,38 E-01	2,82 E-02	1,38 E-02	1,79 E-01	2,03 E-03	1,15 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	1,56 E-03	9,80 E-04	1,58 E-02	0,00 E+00	-1,62 E-02
FAETP	kg DCB-Eq	3,13 E-03	5,13 E-04	3,30 E-04	3,98 E-03	5,92 E-05	9,56 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	2,02 E-05	2,86 E-05	4,91 E-03	0,00 E+00	-1,89 E-04
MAETP	kg DCB-Eq	9,43 E+00	2,29 E+00	1,41 E+00	1,31 E+01	2,13 E-01	1,77 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	6,95 E-02	1,03 E-01	7,20 E+00	0,00 E+00	-7,75 E-01
TETP	kg DCB-Eq	6,48 E-04	8,48 E-05	2,01 E-04	9,34 E-04	7,17 E-06	5,09 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	3,44 E-06	3,47 E-06	2,53 E-05	0,00 E+00	-5,27 E-05
ECI	euro	5,92 E-02	1,14 E-02	9,91 E-03	8,05 E-02	5,81 E-04	7,72 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	5,19 E-04	2,81 E-04	2,43 E-02	0,00 E+00	-1,73 E-02
ADPF	kg Sb eq.	9,74 E-03	3,34 E-04	1,02 E-03	1,11 E-02	3,54 E-05	5,64 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	2,51 E-05	1,71 E-05	4,27 E-05	0,00 E+00	-2,74 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.	6,61 E-01	5,30 E-02	1,43 E-01	8,56 E-01	4,86 E-03	1,08 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	3,84 E-03	2,35 E-03	4,33 E-01	0,00 E+00	-2,86 E-01
GWP-fossil	kg CO2 eq.	6,79 E-01	5,29 E-02	1,35 E-01	8,67 E-01	4,86 E-03	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	3,84 E-03	2,35 E-03	4,33 E-01	0,00 E+00	-2,86 E-01
GWP-biogenic	kg CO2 eq.	-1,88 E-02	-8,21 E-06	7,31 E-03	-1,15 E-02	2,24 E-06	-5,74 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	1,47 E-06	1,08 E-06	-1,10 E-05	0,00 E+00	-1,55 E-04
GWP-luluc	kg CO2 eq.	4,04 E-04	3,33 E-05	3,65 E-05	4,74 E-04	1,78 E-06	2,43 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	4,01 E-07	8,60 E-07	3,32 E-06	0,00 E+00	-1,23 E-05
ODP	kg CFC11 eq.	1,90 E-08	1,08 E-08	7,56 E-09	3,74 E-08	1,07 E-09	2,10 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	8,05 E-10	5,18 E-10	7,14 E-10	0,00 E+00	-3,51 E-08
AP	mol H+ eq.	2,56 E-03	1,45 E-03	2,83 E-04	4,30 E-03	2,82 E-05	2,28 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	3,92 E-05	1,36 E-05	6,91 E-05	0,00 E+00	-2,84 E-04
EP-freshwater	kg PO4 eq.	1,62 E-05	2,78 E-07	6,99 E-06	2,35 E-05	4,90 E-08	1,19 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	2,12 E-08	2,37 E-08	1,16 E-07	0,00 E+00	-5,56 E-07
EP-marine	kg N eq.	4,31 E-04	3,62 E-04	7,55 E-05	8,68 E-04	9,93 E-06	4,90 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	1,71 E-05	4,80 E-06	3,00 E-05	0,00 E+00	-7,65 E-05
EP-terrestrial	mol N eq.	4,83 E-03	4,03 E-03	7,90 E-04	9,65 E-03	1,09 E-04	5,43 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	1,88 E-04	5,29 E-05	3,26 E-04	0,00 E+00	-8,41 E-04
POCP	kg NMVOC eq.	2,06 E-03	1,05 E-03	2,01 E-04	3,31 E-03	3,13 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	5,19 E-05	1,51 E-05	8,18 E-05	0,00 E+00	-2,96 E-04
ADP-minerals & metals	kg Sb eq.	6,34 E-06	5,77 E-07	2,38 E-07	7,16 E-06	1,23 E-07	3,89 E-07	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	6,64 E-09	5,95 E-08	1,20 E-07	0,00 E+00	-2,32 E-07
ADP-fossil	MJ, net calorific value	2,03 E+01	7,00 E-01	1,80 E+00	2,28 E+01	7,33 E-02	1,16 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	5,26 E-02	3,54 E-02	8,34 E-02	0,00 E+00	-5,14 E+00
WDP	m3 world eq. Deprived	6,18 E-01	1,35 E-03	1,35 E-02	6,33 E-01	2,62 E-04	3,19 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	9,22 E-05	1,27 E-04	1,09 E-03	0,00 E+00	-3,28 E-02

- 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	2,23 E-08	2,23 E-09	9,85 E-10	2,55 E-08	4,36 E-10	1,39 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	1,03 E-09	2,11 E-10	4,98 E-10	0,00 E+00	-1,18 E-09
IRP	kBq U235 eq.	1,99 E-02	2,99 E-03	3,46 E-03	2,63 E-02	3,07 E-04	1,38 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	2,23 E-04	1,48 E-04	1,92 E-04	0,00 E+00	-1,78 E-03
ETP-fw	CTUe	5,35 E+00	4,89 E-01	1,56 E+00	7,41 E+00	6,53 E-02	3,99 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	3,48 E-02	3,16 E-02	1,48 E-01	0,00 E+00	-3,48 E-01
HTP-c	CTUh	1,80 E-10	2,87 E-11	2,26 E-11	2,31 E-10	2,12 E-12	1,46 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	1,81 E-12	1,02 E-12	1,98 E-11	0,00 E+00	-2,06 E-11
HTP-nc	CTUh	4,61 E-09	4,31 E-10	7,28 E-10	5,77 E-09	7,15 E-11	3,93 E-10	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	3,39 E-11	3,45 E-11	6,60 E-10	0,00 E+00	-3,49 E-10
SQP	----	2,82 E+00	2,08 E-01	3,40 E-01	3,37 E+00	6,36 E-02	1,83 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	6,94 E-03	3,07 E-02	4,72 E-02	0,00 E+00	-8,32 E-02

- 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	3,00 E-06	8,89 E-07	1,19 E-06	5,08 E-06	1,86 E-07	3,49 E-07	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	1,45 E-07	8,97 E-08	5,03 E-07	0,00 E+00	-5,72 E-06
NHWD	kg	2,94 E-02	1,11 E-02	1,33 E-02	5,38 E-02	4,65 E-03	5,75 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	9,56 E-05	2,25 E-03	6,24 E-03	0,00 E+00	-2,36 E-03
RWD	kg	1,68 E-05	4,81 E-06	3,52 E-06	2,51 E-05	4,81 E-07	1,35 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	3,57 E-07	2,33 E-07	2,48 E-07	0,00 E+00	-2,43 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	8,29 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	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	1,41 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	1,89 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	1,10 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	7,86 E-01	3,68 E-03	1,56 E-01	9,45 E-01	0,00 E+00	4,73 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	4,20 E-04	0,00 E+00	0,00 E+00	0,00 E+00	-1,90 E-02
PERM	MJ	0,00 E+00	1,93 E-03	0,00 E+00	1,93 E-03	9,17 E-04	5,89 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	0,00 E+00	4,43 E-04	3,00 E-03	0,00 E+00	0,00 E+00
PERT	MJ	7,86 E-01	5,61 E-03	1,56 E-01	9,47 E-01	9,17 E-04	4,79 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	4,20 E-04	4,43 E-04	3,00 E-03	0,00 E+00	-1,90 E-02
PENRE	MJ	2,18 E+01	5,80 E-01	1,94 E+00	2,43 E+01	0,00 E+00	1,21 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	5,58 E-02	0,00 E+00	0,00 E+00	0,00 E+00	-5,68 E+00
PENRM	MJ	0,00 E+00	1,64 E-01	0,00 E+00	1,64 E-01	7,78 E-02	2,96 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	3,76 E-02	8,98 E-02	0,00 E+00	0,00 E+00
PENRT	MJ	2,18 E+01	7,43 E-01	1,94 E+00	2,44 E+01	7,78 E-02	1,24 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	5,58 E-02	3,76 E-02	8,98 E-02	0,00 E+00	-5,68 E+00
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	1,13 E-02	4,72 E-05	1,02 E-03	1,24 E-02	8,92 E-06	6,29 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	3,24 E-06	4,31 E-06	5,09 E-05	0,00 E+00	-4,55 E-04

- 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	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

- 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.	0,0691	kg
Distance to disposal site (Packaging film wrap and winding core)	92,5	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	3,003	0,0081

The results are presented for **MIRAFI** HMi-5 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