



**Environmental
Product
Declaration**

According to EN15804+A2 (+indicators A1)



This declaration is for:
Flagon TPO EP/PR - EP/PR-F

Provided by:
SOPREMA SRL



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

MRPI® registration
1.1.00547.2024
date of first issue
27-1-2021
date of this issue
8-7-2024
expiry date
27-1-2026



COMPANY INFORMATION



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MRPI® REGISTRATION

1.1.00547.2024

DATE OF ISSUE

8-7-2024

EXPIRY DATE

27-1-2026

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Pieter Stadhouders, Ecoreview NL b.v. The LCA study has been done by Riccardo Novelli/Davide Burlon, LCE. 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
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Ing. L. L. Oosterveen MSc. MBA
Managing Director MRPI

PRODUCT

Flagon TPO EP/PR - EP/PR-F

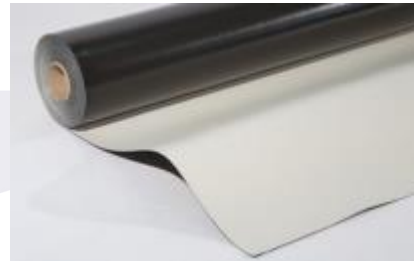
DECLARED UNIT/FUNCTIONAL UNIT

1 m2 of installed membrane with a RLS of 30 years

DESCRIPTION OF PRODUCT

flexible sheets for roof waterproofing

VISUAL PRODUCT



MORE INFORMATION

www.soprema.it

DEMONSTRATION OF VERIFICATION

CEN standard EN15804 serves as the core PCR(a)

Independent verification of the declaration an data according to

EN15804+A2 (+indicators A1)

internal:

external: x

Third party verifier: Pieter Stadhouders, Ecoreview NL b.v.

[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

REINFORCED WITH POLYESTER NET AND COUPLED WITH A POLYESTER NON-WOVEN FABRIC (EP/PR-F), UV-RESISTANT.

Suitable for flat or sloped roofing. The waterproofing system is mechanically fixed to the support, in order to prevent the wind from removing or damaging it. Such system must resist to atmospheric agents and UV rays, as well as to a moderate pedestrian use due to maintenance.

This EPD is valid for Flagon® membranes with a thickness of 1,5 mm.

Component (> 1%)	(kg / %)
TPO	65%
Additives and charges	31%
Reinforcing material	4%
Polypropylene non-woven fabric	<1%

SCOPE AND TYPE

GEOGRAPHICAL SCOPE

Global

SOFTWARE

Simapro 9

DATABASE

Ecoinvent 3.5, Plastics Europe

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	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	X	X	X	X
X= Modules Assessed ND= Not Declared																	

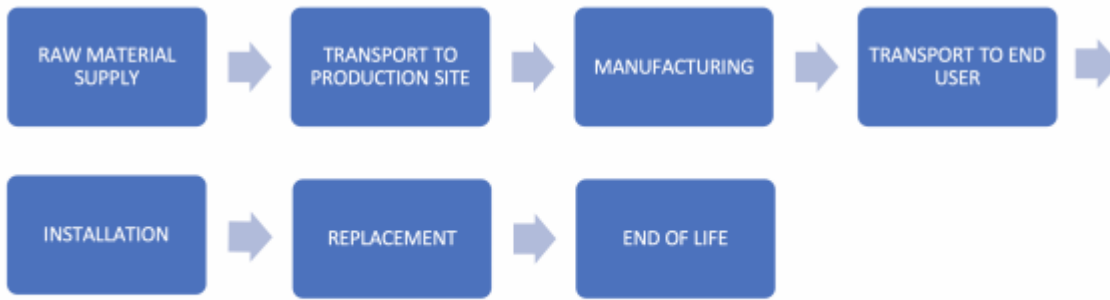


Figure: LCA process diagram according to EN 15804 (7.2.1)

 REPRESENTATIVENESS

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.	3,20 E-07	1,18 E-08	1,74 E-08	3,50 E-07	4,31 E-10	1,49 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	0,00 E+00	9,45 E-11	1,99 E-07	0,00 E+00	-1,28 E-08
ADPF	MJ	1,09 E+02	2,76 E+00	5,54 E+00	1,17 E+02	3,09 E+00	4,15 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	6,75 E-01	-4,48 E-03	0,00 E+00	-4,15 E+01
GWP	kg CO2 eq.	4,05 E+00	1,97 E-01	3,53 E-01	4,60 E+00	2,17 E-01	2,33 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	4,77 E-02	2,93 E+00	0,00 E+00	-2,75 E+00
ODP	Kg CFC11 eq.	1,05 E-06	3,67 E-08	4,02 E-09	1,09 E-06	4,07 E-08	1,70 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	0,00 E+00	8,94 E-09	3,76 E-10	0,00 E+00	-2,74 E-07
POCP	kg ethene eq.	1,02 E-03	1,95 E-05	4,28 E-05	1,08 E-03	3,36 E-05	9,45 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	0,00 E+00	6,82 E-06	6,91 E-06	0,00 E+00	-4,94 E-04
AP	kg SO2 eq.	1,34 E-02	6,89 E-04	8,00 E-04	1,49 E-02	1,04 E-03	1,24 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	2,12 E-04	2,20 E-04	0,00 E+00	-1,13 E-02
EP	kg (PO4) 3- eq.	3,98 E-03	1,31 E-04	7,34 E-05	4,18 E-03	2,06 E-04	1,56 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	0,00 E+00	4,33 E-05	5,60 E-05	0,00 E+00	-9,00 E-04

Toxicity indicators for Dutch market

HTP	kg DCB-Eq	2,93 E-01	5,54 E-02	2,36 E-02	3,72 E-01	6,16 E-02	5,06 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	1,14 E-02	9,90 E-02	0,00 E+00	-1,71 E+01
FAETP	kg DCB-Eq	4,38 E-02	1,99 E-03	1,06 E-03	4,69 E-02	2,64 E-03	1,26 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	5,22 E-04	1,62 E-02	0,00 E+00	-6,79 E-03
MAETP	kg DCB-Eq	5,85 E+02	1,04 E+01	6,50 E+01	6,60 E+02	1,16 E+01	1,02 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	0,00 E+00	2,29 E+00	8,47 E+00	0,00 E+00	-6,36 E+02
TETP	kg DCB-Eq	1,15 E-03	1,58 E-04	1,13 E-04	1,42 E-03	1,91 E-04	2,39 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	3,65 E-05	1,53 E-05	0,00 E+00	-9,36 E-04
ECI	euro	3,89 E-01	2,01 E-02	3,07 E-02	4,39 E-01	2,39 E-02	1,80 E-02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,96 E-03	1,58 E-01	0,00	-2,75 E-01
ADPF	kg Sb eq.	5,24 E-02	1,33 E-03	2,66 E-03	5,64 E-02	1,48 E-03	2,00 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	3,25 E-04	-2,16 E-06	0,00 E+00	-2,00 E-02

- 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.	4,28 E+00	2,40 E-01	3,82 E-01	4,90 E+00	2,65 E-01	2,34 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	5,92 E-02	2,94 E+00	0,00 E+00	-2,81 E+00
GWP-fossil	kg CO2 eq.	4,24 E+00	2,40 E-01	3,82 E-01	4,87 E+00	2,65 E-01	2,34 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	5,92 E-02	2,94 E+00	0,00 E+00	-2,81 E+00
GWP-biogenic	kg CO2 eq.	3,73 E-02	8,80 E-05	4,94 E-04	3,79 E-02	9,58 E-05	2,40 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	0,00 E+00	2,43 E-05	3,88 E-06	0,00 E+00	-3,59 E-03
GWP-luluc)	kg CO2 eq.	1,10 E-03	8,46 E-05	1,72 E-04	1,36 E-03	9,19 E-05	2,10 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	0,00 E+00	2,55 E-05	1,52 E-07	0,00 E+00	-3,51 E-06
ODP	kg CFC11 eq.	1,51 E-06	5,49 E-08	7,77 E-09	1,57 E-06	6,04 E-08	1,98 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	0,00 E+00	1,32 E-08	7,96 E-10	0,00 E+00	-3,17 E-07
AP	mol H+ eq.	1,59 E-02	1,22 E-03	1,04 E-03	1,82 E-02	1,74 E-03	1,52 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	3,68 E-04	3,26 E-04	0,00 E+00	-1,34 E-02
EP-freshwater	kg PO4 eq.	1,28 E-04	1,90 E-06	7,18 E-06	1,37 E-04	2,07 E-06	1,34 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	0,00 E+00	5,40 E-07	2,28 E-07	0,00 E+00	-6,37 E-05
EP-marine	kg N eq.	2,66 E-03	4,16 E-04	2,09 E-04	3,28 E-03	6,45 E-04	3,03 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	0,00 E+00	1,36 E-04	1,51 E-04	0,00 E+00	-1,83 E-03
EP-terrestrial	mol N eq.	2,92 E-02	4,58 E-03	2,33 E-03	3,62 E-02	7,10 E-03	3,44 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	1,50 E-03	1,75 E-03	0,00 E+00	-2,04 E-02
POCP	kg NMVOC eq.	1,30 E-02	1,31 E-03	9,81 E-04	1,53 E-02	1,97 E-03	1,06 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	4,16 E-04	4,68 E-04	0,00 E+00	-6,22 E-03
ADP-minerals & metals	kg Sb eq.	1,50 E-05	6,55 E-06	2,14 E-06	2,37 E-05	7,11 E-06	1,49 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	0,00 E+00	2,12 E-06	1,98 E-07	0,00 E+00	-2,56 E-09
ADP-fossil	MJ, net calorific value	1,13 E+02	3,65 E+00	6,01 E+00	1,23 E+02	4,02 E+00	3,69 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	8,89 E-01	-4,02 E-02	0,00 E+00	-3,96 E+01
WDP	m3 world eq. Deprived	2,57 E+01	1,02 E-02	2,30 E-01	2,59 E+01	2,23 E-02	7,69 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,70 E-03	8,61 E-01	0,00 E+00	-6,54 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	1,25 E-07	1,73 E-08	8,54 E-09	1,51 E-07	2,52 E-08	1,31 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	0,00 E+00	4,94 E-09	2,76 E-09	0,00 E+00	-5,65 E-08
IRP	kBq U235 eq.	1,84 E-01	1,59 E-02	6,80 E-03	2,07 E-01	1,74 E-02	1,57 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	3,89 E-03	-5,43 E-04	0,00 E+00	-1,54 E-01
ETP-fw	CTUe	2,14 E+01	2,92 E+00	2,86 E+00	2,72 E+01	3,20 E+00	3,77 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	0,00 E+00	7,46 E-01	-2,18 E+00	0,00 E+00	-1,20 E+01
HTP-c	CTUh	8,02 E-10	8,20 E-11	8,14 E-11	9,65 E-10	1,41 E-10	1,00 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	0,00 E+00	3,36 E-11	4,10 E-10	0,00 E+00	-3,10 E-10
HTP-nc	CTUh	6,65 E-08	3,18 E-09	1,88 E-09	7,16 E-08	4,07 E-09	1,41 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	0,00 E+00	9,07 E-10	2,81 E-09	0,00 E+00	-5,24 E-09
SQP	----	4,82 E+00	2,51 E+00	9,89 E-01	8,32 E+00	2,73 E+00	1,21 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	5,24 E-01	6,64 E-03	0,00 E+00	-4,22 E-01

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	2,13 E-07	0,00 E+00	0,00 E+00	2,13 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	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
NHWD	kg	4,71 E-02	0,00 E+00	5,37 E-02	1,01 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	0,00 E+00	0,00 E+00	0,00 E+00	-1,81 E-01	0,00 E+00	0,00 E+00
RWD	kg	2,71 E-05	0,00 E+00	0,00 E+00	2,71 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	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-8,51 E-04	0,00 E+00	0,00 E+00
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	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,86 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	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,57 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	0,00 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	0,00 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	4,21 E+00	3,97 E-03	5,93 E-02	4,28 E+00	8,06 E-03	2,73 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	0,00 E+00	1,77 E-03	1,42 E-02	0,00 E+00	-3,15 E+00
PERM	MJ	0,00 E+00	0,00 E+00	1,68 E-01	1,68 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	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
PERT	MJ	4,21 E+00	3,97 E-03	2,28 E-01	4,44 E+00	8,06 E-03	2,73 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	0,00 E+00	1,77 E-03	1,42 E-02	0,00 E+00	-3,15 E+00
PENRE	MJ	5,50 E+01	2,77 E+00	1,62 E+00	5,94 E+01	3,10 E+00	4,59 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	6,79 E-01	-1,98 E-02	0,00 E+00	-4,55 E+01
PENRM	MJ	6,42 E+01	0,00 E+00	4,60 E+00	6,88 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	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
PENRT	MJ	1,19 E+02	2,77 E+00	6,22 E+00	1,28 E+00	3,10 E+00	4,59 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	6,79 E-01	-1,98 E-02	0,00 E+00	-4,55 E+01
SM	kg	7,33 E-02	0,00 E+00	0,00 E+00	7,33 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	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	1,20 E-02	1,17 E-04	8,94 E-02	1,30 E-02	1,48 E-04	1,48 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	3,20 E-05	3,58 E-01	0,00 E+00	-9,36 E+00

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	3,59 E-01	3,59 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	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00

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

CALCULATION RULES

LCA model has been processed considering all main input/output associated with core process in accordance with the threshold valued stated in PCR 2012:01 v2.3 (ch.7.6), namely the sum of the excluded material flows to the core module shall not exceed 1% of mass and energy.

Hence, the following aspects were considered negligible:

- Production of packaging for the raw materials input process, except for PE packaging film;
- Drill electricity consumption related to mechanical installation;
- Water emissions from core process.

ALLOCATION

Allocation occurs anytime a system is producing more than a single output. In this case it is necessary to choose a technique to proper split the environmental burdens among the output flows; international standards ISO 14044 and PCR 2012:01 v2.3 provide guidelines about how to deal with this issue, that have been implemented in this project as well. Soprema produces several product types that are not object of the study. Therefore, it is important to establish an allocation method based on physical variables to split input and output flows to the multi-products: allocation by square-metre of membrane produced has been chosen as most representative tool for the system under study.

TRANSPORTATIONS

Impacts calculations related to transports in SimaPro are performed according to the Ecolnvent model.

All the transports is assumed by truck or by ship. For Module A2, since no specific data are available, 500 km is used as average value (provided by Soprema) for raw materials transportation from suppliers to the plant. For module A4, specific information are provided, such as quantity transported and destination per each trip.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

A1 - RAW MATERIALS SUPPLY

This module considers the extraction and processing of all raw materials and energy (generation of electricity from national grid and NG supply for internal CHP system) which occur upstream to the Flagon manufacturing process.

A2 - RAW MATERIALS TRANSPORT

This module includes the raw materials transportation to the manufacturing plant, performed via road. Soprema provided the list of suppliers for all raw material, helpful to calculate the distance to the Flagon® manufacturing plant. No information was available for the externally ground PP. Hence, a distance of 50 km was used as hypothesis. Calculations in SimaPro are performed according to the Ecolnvent model.

PARAMETER	TRUCK
Vehicle type	lorry 16-32 metric ton, EURO 4
Capacity (average load factor)	5.79 ton

A3 - MANUFACTURING

This module covers the manufacturing of the Flagon TPO membranes and includes all processes linked to production. Use of electricity (overall plant energy consumption, namely considering services too), production of electricity and heat from the CHP system, water usage, manufacturing emissions to air and waste treatment (considering also waste transport) are included in this module. All data was provided by Soprema itself, related to the production site in Chignolo d'Isola. For electricity production, the 2017 Italian residual mix was used. Yearly water consumption (from grid and from well) has been allocated to the total Flagon production at the site. Regarding packaging, only PE film was considered, being all other packaging types inside 1% cut-off. Air emission data provided by Soprema per total TPO membranes production, since no specific data at product-level are given. Production waste data is provided by Soprema for the whole plant as well, hence allocated to the whole production. Distance from the manufacturing plant to the waste treatment site assumed equal to 50 km, regardless of the waste type.

A4 - TRANSPORT TO BUILDING SITE

Transports were modelled according to the Ecolnvent model. Quantity transported and destination per each trip provided by Soprema. Depending on the destination, transports were assumed by truck for European destinations (using the ACI Italian truck mix for EURO classes) and by ship for transcontinental ones. A production-weighted average distance travelled per each transportation means was assessed.

PARAMETER	TRUCK	SHIP
Transport Type	Lorry, 16-32 ton, mix ACI, Italy	Transoceanic freight ship
Weighted distance	864 km	148 km
Capacity (average load factor)	5.79 ton	65%

A5 - INSTALLATION

This module includes the environmental impacts associated with the products installation on the roof. Mechanical installation procedures is considered for this product. Product packaging (PE film) end-of-life municipal incineration is considered in this module.

PARAMETER	MECHANICAL
Contiguous membranes overlap	1.12 m ² /m ² installed
Normalised nails mass	0.0075 kg/m ²
Electricity consumption	0.02 kWh/m ²

DECLARATION OF SVHC

The product considered does not contain any of the substances listed in the "Candidate List of Substances of very High Concern for authorisation"

REFERENCES

- General Programme Instructions for the International EPD® System v. 2.5, 2015
- Product Category Rules PCR 2012:01 v 2.3 "Construction products and construction services"
- PCR 2014:12 v 1.0 "Flexible sheets for waterproofing - bitumen , plastic or rubber sheets for roof waterproofing"
- Product Category Rules PCR 2007:08 v 3.1 "Electricity, steam and hot/cold water generation and distribution"
- EN 15804:2012+A1:2013
- ISO 14040:2006
- ISO 14044:2017
- ISO 14025:2010

REMARKS

None.