Corotop S.A.

ENVIRONMENTAL PRODUCT DECLARATION

Product Name	Site Plants:
COROTOP® air, wind, vapour and water barrier membranes for roof and façade application: Corotop® Light Corotop® Smart Corotop® Classic Corotop® Blue Corotop® R2 Corotop® Strong Corotop® Red Strong Corotop® R3 Corotop® Ultra Corotop® Power	**Corotop S.A.** **46-053 Chrząstowice** **ul. Ozimska 2A Poland** **Corotop S.A.** **46-040 Ozimek** **ul. Kolejowa 1, Poland**

in accordance with **ISO 14025 and EN 15804:2012+A2:2019/AC:2021**

Program Operator Publisher	EPDItaly, www.epditaly.it EPDItaly
Declaration Number Registration Number	
Issue Date Valid to	

1. B.1 General information

Table 1 EPD- basic information table

Addresses of declaration owner	Corotop S.A. 46-053 Chrząstowice ul. Ozimska 2A; Poland
Production sites:	Corotop S.A., 46-053 Chrząstowice, ul. Ozimska 2A, Poland Corotop S.A., 46-040 Ozimek, ul. Kolejowa 1, Poland
Name of the person responsible for EPD & LCA Report:	Wioletta Kopyto, +48 798 731 154 w.kopyto@corotop.com
Program operator & publisher	EPDItaly; www.epditaly.it Via Gaetano De Castillia, 10; 20124 – MILANO, Italy Version of EPDItaly regulations 5.2
EPD Type	Product EPD – concerning a specific product by a specific manufacturer, EPD is Cradle to Grave.
Independent Verification	Independent verification of the declaration and data carried out according to ISO 14025:2010. [ ] Internal [X] External Third-party verification carried out by: SGS Italia S.p.A. via Caldera, 21, 20153 - Milan T +39 02 73 931 - F +39 02 70 12 46 30 / www.it.sgs.com Accredited by: ACCREDIA; accreditation number SGS 005VV
Identification of LCA report:	LCA Report - Air, wind and water barrier membranes produced by Corotop
Declared unit	1 square meter (each type of membrane)
Short description of application, technical functions	This Environmental Product Declaration (EPD) is valid for air, wind and water barrier membranes designed by Corotop S.A. in Poland. Roof membranes are intended for use as an initial roofing layer for ventilated and non-ventilated inclined roofs, Vapour insulation membranes are used to control the inflow of water vapour into structures and thermal insulations, Façade membranes (wind barriers) are used to protect structures and thermal insulation of walls against humidity, water, snow and draughts. The life cycle assessment (LCA) is representative for the products introduced in the declaration for the given system boundaries. The type of declaration is related to 10 specific products by Corotop.
Identification of the product CPC Code:	36 Rubber and plastics products 369 Other plastics products **3699** Articles of plastics n.e.c.
Geographical area	Europe / World (raw materials) Poland (Production) Europe (the main sales market),

	Europe was chosen as the location for End of Life - due to the location of the main customers for the product
Temporary coverage	Reference year 2022
EPD information	This declaration has been developed referring to EPDItaly, following the 'Regolamento di EPDItaly"; further information and the document itself are available at: www.epditaly.it.
Version of standard	**ISO 14025 and EN 15804:2012+A2:2019 AC:2021**
Version of PCR	PCR ICMQ-001/15 rev 3.0 EN 15804+A2 AC:2021 is the framework reference for PCRs.
Orientation where more information can be found	https://corotop.com.pl/en/why-corotop/
Comparability	EPDs relating to the same product category but belonging to different programs may not be comparable. EPD for construction products may not be comparable unless it complies with EN 15804
Liability	EPDItaly declines any responsibility regarding the manufacturer's information, data, and results of the life-cycle assessment, and also nonconformity of environmental legislation.
LCA Software and data base	SimaPro v 9.5.0.0 and Ecoinvent database 3.9.1
Technical support	CRMP Wojciech Piskorski, ul. Ledóchowskich 10, 33-101 Tarnów {PL} Wojciech Piskorski; wojciech.piskorski@carbonium.pl Ryszard Ścigała; ryszard.scigala@carbonium.pl **Carbonium Expert Team;** www.carbonium.pl

2. B.1 Company information

Corotop® is a Polish brand that manufactures components for roofing systems. It was established in 2000 in Opole by the CB S.A. and now is a leader in the construction industry sector, providing the highest quality roof and facade membranes, vapour barrier films and roofing accessories. Corotop® products are popular with customers and contractors in 50 countries around the world. Corotop S.A. develops its product portfolio and provide the necessary know-how with them in mind. The owner of the Corotop® brand is a company with 27 years' of experience in the construction industry, successfully reinforcing its position in Poland and on further foreign markets – from EU countries to New Zealand.

Company started up one of the most modern lines in Europe for the production of functional PP/PE films, using pouring technology (CAST), with a module for longitudinal film stretching MDO (Machine Direction Orientation). The longitudinal stretching module allows the size of the micropores formed to be controlled, thus controlling the vapour permeability parameter. A line for the production of non-woven synthetic fabric has also been launched, thanks to which we produce 2- or 3-layer membranes with high and low vapour permeability.

A technologically advanced machine park allows to produce membranes in compliance with the highest European standards from scratch. This is confirmed by numerous certificates that meet the highest criteria. Corotop S.A. specializes in spunbonded non-wovens fabric extrusion technologies, thermobonding lamination processes and powder or hot-melt adhesive bonding, also known as hot-melt process.

The membrane manufacturing process, from design to distribution, is carried out in accordance with the requirements of the integrated management system based on ISO 9001, ISO 14001 and ISO 45001 standards.

3. C.1 Product information

Corotop S.A. produces membranes in 3 product groups: roof, vapour, facade. All membranes are produced at plant located in Ozimek, using uniform technology and analogous raw materials. Not far from Ozimek is a second location, Chrząstowice, where the packaging process is carried out.

Membranes within the product groups differ in the additives that give them the expected properties and in the methods of final processing. It was therefore possible to develop a uniform LCA for individual products.

COROTOP® **roof** membranes are intended for use as an initial roofing layer for ventilated and non-ventilated inclined roofs with a minimum drop of 11° depending on the membrane specification and their wind insulation.

COROTOP® **vapour** insulation membranes are used to control the inflow of water vapour into structures and thermal insulations of dividing structures and to protect the dividing structures against draught. The vapour barrier should be selected and used according to a technical project developed in accordance with the construction regulations, their intended purpose and functionality,

COROTOP® **Façade** membranes (wind barriers) are used to protect structures and thermal insulation of walls against humidity, water, snow and draughts inside the building, as well as drive-off moisture from inside the building to the outside.

The document covers two types of membranes: roof and façade.

Each membrane consists of two or more layers made of plastics with polypropylene as the main material. The membranes also include and polyethylene and other plastics, with chalk being the main additive in terms of weight affecting the membrane properties. Additional materials added in small quantities (about 0,5%) are chemicals that act as flame retardants and stabilizers.

The figure shows the construction of membranes - as a product consisting of several layers:

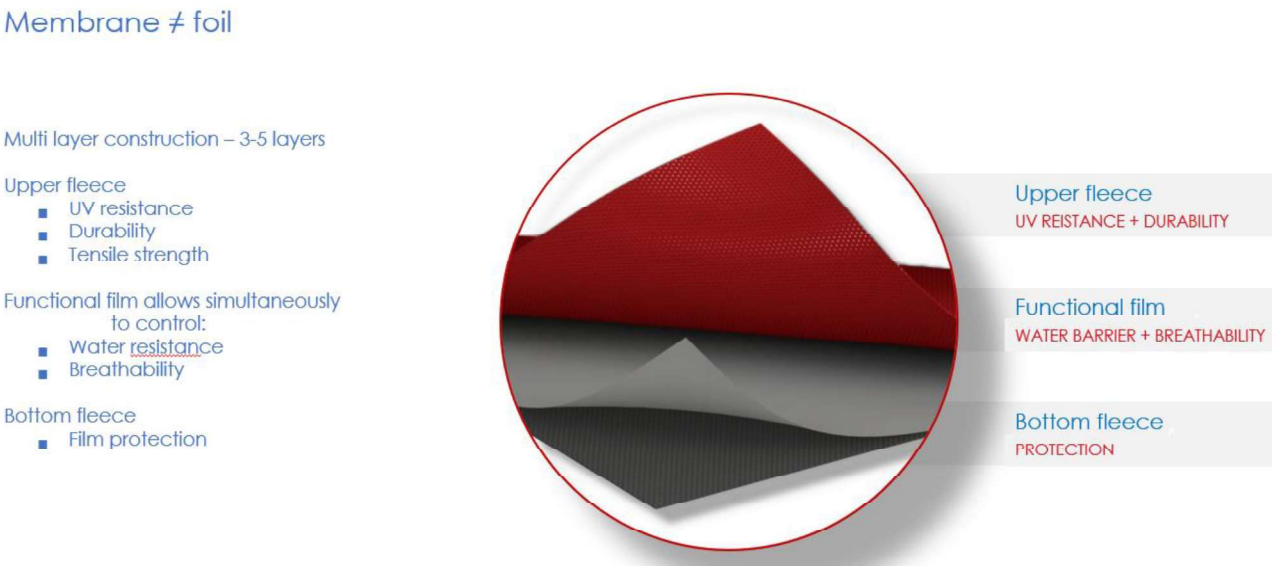

Figure 1 Construction of membrane

A summary of the products covered by this EPD, along with their basic characteristics, is presented below

Table 2 List of the products

Name	Weight, g/m2	Product group	Structure
Corotop® Light	100	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP
Corotop® Smart	120	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP
Corotop® Classic	130	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP
Corotop® Blue	140	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP
Corotop® R2	150	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP
Corotop® Strong	160	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP
Corotop® Red Strong	180	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP
Corotop® R3	190	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP
Corotop® Ultra	220	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP
Corotop® Power	250	Roof, facade membrane	Non-woven PP/ Functional film/Non-woven PP Needle Punch

Table 3 Properties of the products

Product group			MEMBRANES									
Product name			Corotop Light	Corotop Smart	Corotop Classic	Corotop Blue	Corotop R2	Corotop Strong	Corotop Red Strong	Corotop R3	Corotop Ultra	Corotop Power
Main characteristics	Structure		PP/FILM/PP	PP/FILM/PP	PP/FILM/PP	PP/FILM/PP	PP/FILM/PP	PP/FILM/PP	PP/FILM/PP	PP/FILM/PP	PP/FILM/PP	PP/FILM/ PP NEEDLE PUNCH
	Number of layers		3	3	3	3	3	3	3	3	3	3
	Available with 2 adhesive strips		-	-	x	x	x	x	x	x	x	x
	Fleece colour	upper	grey	beige	grey	blue	grey	beige	red	anthracite	anthracite	grey
		bottom	natur	natur	anthracite	anthracite	anthracite	natur	anthracite	anthracite	anthracite	grey
	Weight (g/m²)		100	120	130	140	143	160	180	190	220	250
	Tolerance (%)		10	10	10	10	10	10	10	10	10	10
	UV resistance (months)		3	3	3	3	3	3	3	3	3	3
	Roof pitch (°)		≥35°	≥35°	≥35°	≥26°	≥25°	≥21°	≥15°	≥13°	≥11°	≥11°
	Temperature resistance (°C)		-40 +80	-40 +80	-40 +80	-40 +80	-40 +80	-40 +80	-40 +80	-40 +80	-40 +80	-40 +80
Application	Full boarded roofs		-	-	-	x	x	x	x	x	x	x
	Partially boarded roofs		x	x	x	x	x	x	x	x	x	x
	Can be used on facade		x	x	x	x	x	x	x	x	x	x
	Reaction to fire (class)		E	E	E	E	E	E	E	E	E	E
Mechanical properties	Sd value (m)		0,02 [-0,01/+0,03]	0,02 [-0,01/+0,03]	0,02 [-0,01/+0,03]	0,02 [-0,01/+0,03]	0,03 [+0,02/-0,02]	0,02 [-0,01/+0,03]	0,02 [-0,01/+0,04]	0,04 [+0,03/-0,01]	0,02 [-0,01/+0,03]	0,07 [±0,03]
	Tensile strength (N/50mm)	MD	250	285	310	350	320	380	450	450	480	750
		CD	150	180	200	230	250	280	300	375	310	700
		tol%	±30	±30	±30	±30	±30	±30	±30	±30	±30	±30
	Elongation (%)	MD	70	70	60	65	70	75	65	65	60	50
		CD	110	110	100	80	85	120	130	70	90	70
		tol%	±30	±30	±30	±30	±30	±30	±30	±30	±30	±30
	Tear resistance (N)	MD	100	130	170	180	220	200	250	280	260	300
		CD	125	170	240	250	245	275	350	310	380	300
			±20	±20	±20	±20	±20	±20	±20	±20	±30	±30
Certificates	ZVDH	DE	-	-	x*	x*	-	x*	x*	-	x	x
	BBA	UK	x	x	x	x	-	x	-	-	-	-
	NSAI	IR	x	x	-	x	-	x	x	-	-	-
	SINTEF	NO	x	-	x	-	-	-	x	-	-	-
	GOST	RU	x	x	x	x	-	x	x	-	x	x
	RUE	BY	x	x	x	-	-	x	x	-	x	x
	CSTB	FR	-	-	-	-	x		-	x	-	-
			-	*Driving rain test - TU Berlin*	*Driving rain test - TU Berlin*	*Driving rain test - TU Berlin*	-	*Driving rain test - TU Berlin*	*Driving rain test - TU Berlin*	-	*Driving rain test - TU Berlin*	*Driving rain test - TU Berlin*
Additional information			▪ especially for walls of framed houses ▪ wind protection	▪ walls of framed houses ▪ wind protection	▪ resistant to hard wind and heavy rain	▪ resistant to strong wind and heavy rain ▪ walls of framed houses	▪ meets the requirements of the French market	▪ resistant to strong wind and heavy rain	▪ resistant to strong wind and heavy rain ▪ bestseller	▪ meets the requirements of the French market	▪ resistant to mechanical damage ▪ roofer's choice	▪ anti-condensation special PP needle punch ▪ high mechanical properties

Production process

A Corotop® roof membrane typically consists of two layers of polypropylene nonwoven fabric with a functional film sandwiched between them, responsible for waterproofing and vapor permeability.

The production of the upper nonwoven fabric is done as follows: homopolypropylene, flame retardant, UV stabilizer, and in some cases, color masterbatch (pigment) are loaded into dispensers. The granulate mixture, in the appropriate proportions, is transferred to an intermediate tank and then to an extruder. The granulate mixture is plasticized in a single-screw extruder, after which threads are extruded through screens and dies. In air cabins, the material is cooled, and it gravitates down onto a conveyor belt. The extruded material is then bonded with the functional film and additional nonwoven fabric (the bottom layer, either purchased externally or extruded in a separate process) using heated calenders at the appropriate temperatures. The functional film and the bottom

nonwoven fabric are supplied to calenders by the series of unwinders and spreading rollers. On one line, the product is transported through a printing module. The resulting membrane is cut into the appropriate lengths before being wound onto spools. The obtained Jumbo Rolls are typically transported to the second production facility in Chrząstowice, where they are further processed into smaller rolls according to orders, usually 50 meters in length.

The flowchart of the membrane manufacturing process:

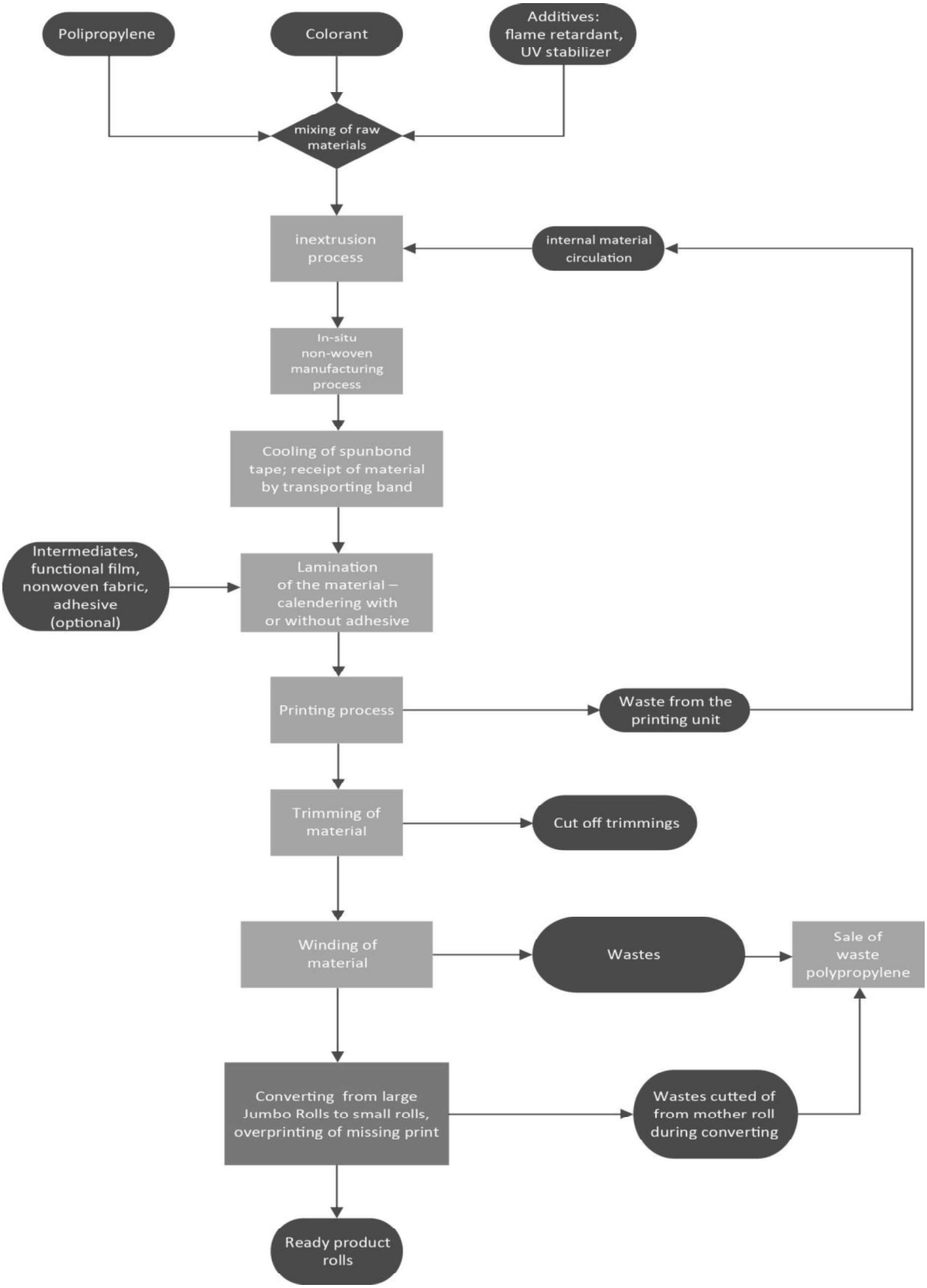

Figure 2 The production flowchart

Main product content

The composition of the membranes manufactured at Corotop S.A. and covered in this report is as follows:

Table 4 Bill Of Material

Name	Light	Smart	Classic	Blue	R2	Strong	Red Strong	R3	Ultra	Power
unit ->	gross kg/kg	gross kg/kg	gross kg/kg	gross kg/kg	gross kg/kg	gross kg/kg	gross kg/kg	gross kg/kg	gross kg/kg	gross kg/kg
EVA	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,1310
Paint	0,0074	0,0063	0,0056	0,0050	0,0044	0,0044	0,0038	0,0000	0,0000	0,0029
Chalk	0,1962	0,1401	0,1275	0,1380	0,1020	0,1444	0,1224	0,0966	0,1035	0,0833
PE	0,0688	0,0491	0,0452	0,0490	0,0362	0,0507	0,0434	0,0343	0,0367	0,0296
others	0,0058	0,0054	0,0100	0,0157	0,0077	0,0053	0,0226	0,0057	0,0063	0,0033
PP	0,5328	0,6551	0,6219	0,6317	0,4232	0,6677	0,6196	0,5183	0,6233	0,0419
PP non voven	0,2918	0,2501	0,3064	0,2765	0,5185	0,2451	0,3002	0,4424	0,3331	0,8350
unit ->	% mass	% mass	% mass	% mass	% mass	% mass	% mass	% mass	% mass	% mass
EVA	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	11,62%
Paint	0,67%	0,57%	0,50%	0,45%	0,41%	0,40%	0,34%	0,00%	0,00%	0,26%
Chalk	17,79%	12,67%	11,42%	12,37%	9,34%	12,92%	11,01%	8,81%	9,38%	7,39%
PE	6,24%	4,44%	4,05%	4,39%	3,31%	4,53%	3,91%	3,12%	3,33%	2,62%
others	0,53%	0,48%	0,89%	1,41%	0,70%	0,47%	2,03%	0,52%	0,57%	0,29%
PP	48,31%	59,22%	55,70%	56,61%	38,75%	59,74%	55,72%	47,23%	56,52%	3,72%
PP non voven	26,46%	22,61%	27,44%	24,78%	47,48%	21,93%	26,99%	40,32%	30,20%	74,10%
Total	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%

Substances of very high concern (SVHC)

With reference to:

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the "Registration, Evaluation, Authorization and Restriction of Chemicals" (REACH), as subsequently amended specifically with:
- Annex XIV of REACH: "List of substances subject to authorization"
- Annex XVII: "List of restricted substances"
- the "Candidate List of Substances of Very High Concern" published by the European Chemicals Agency

according to the information currently available to us, all membranes and related accessories manufactured and distributed by Corotop S.A. do not contain any restricted, prohibited and SVHC substances. They do not release any dangerous substances during the use stage.

4. D.1 Life Cycle Assessment Information

Declared Unit

The declared unit is defined as square meter (1 m^2) of membrane. The grammage varies from 100 g/m^2 to 250 g/m^2 depending on the product.

Reference Service Life

Due to the lack of a specific PCR relating strictly to the membranes, the Reference Service Life is not specified, although it can be assumed that their lifetime may be analogous to that of the buildings and structures into which the membranes have been incorporated. It can be assumed that membranes are regarded as having 50 years Reference Service Life (RLS) independent of their material - the same service life as the building.

System and its boundaries

As the boundaries of the system, the Cradle to Gate with options, module C1-C4, and module D (A1-A3+C+D and additional modules) was adopted.

Table 5 Modules declared

Product stage			Construction stage		Use Stage							End of Life				Benefists & Loads
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	**Manufacturing**	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Energy Use	Water Use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery, recycling potential
√	√	√	√	√	ND	ND	ND	ND	ND	ND	ND	√	√	√	√	√

Installation and de-installation phases are under cut-off because are performed manually. For these products, there is no need for maintenance.

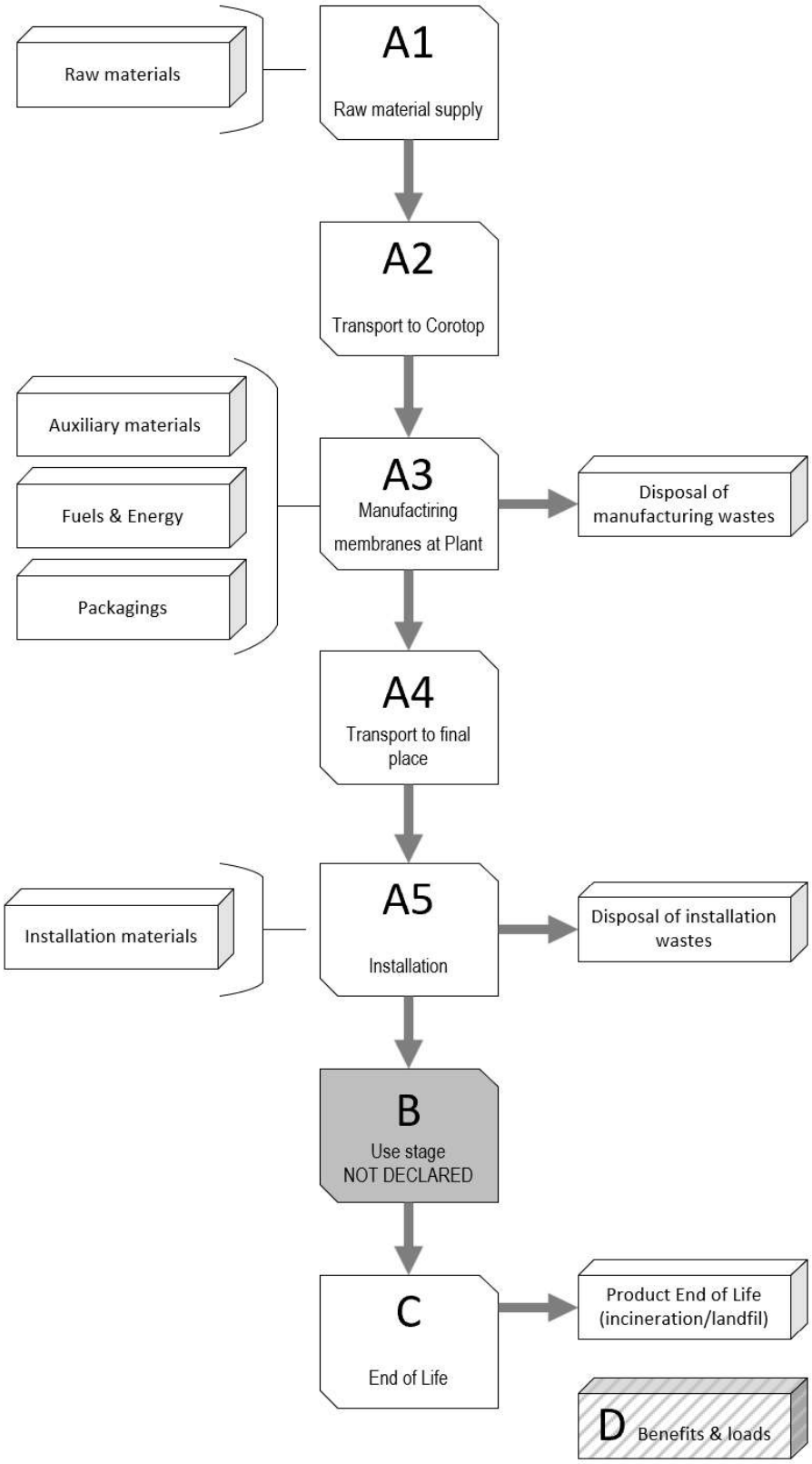

Figure 3 System boundaries

Table 6 LCA modules

Module	Description for Corotop membrane LCA
A1	the calculations used a model for individual raw materials, In particular, the manufacture of plastics and additives necessary for the production of membranes. The Ecoinvent database and SimaPro software were used. In the case of composite materials, e.g. PE+chalk, the calculation separates the material into the basic raw materials according to the percentage of the individual components.
A2	the calculations used a model of transport from sources to manufacturing plant of materials based on actual logistic data from Corotop system
A3	the calculations used actual data on consumption of electricity, fuels, water, and also took into account emissions to the environment, internal tranport and handling of production waste; Raw materials for packaging are included in Module A3
A4	In view of the large number of individual customers making it impossible to calculate in detail the transport distances of deliveries from the place of production to the place of application of the membranes, the European scenario described in the COMMISSION RECOMMENDATION (EU) 2021/2279 of 15 December 2021on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations: The following is the default transport scenario from factory to client represented as intracontinental supply chain: 3500 km by truck (>32 t, EURO 4)
A5	module considers all membranes installation steps (including auxiliaries production such as clips or adhesive bands) also packaging waste processing (recycling, incineration, disposal). Credits from potential energy substitution are declared in module D.
B1-B7	ND
C1	a scenario of zero impact was considered. C1 - we assume zero impact because the membrane is a lightweight product that is easy to remove by hand and separate from the rest of the construction materials. There is no need for additional machinery or energy.
C2	considers transportation of the deconstructed membrane to a recycling or disposal process. Distance to disposal site after demolition is assumed to be 100 km
C3	a scenario of zero impact was considered; we do not anticipate that used membranes will be specially selected for full energy recovery as secondary fuels. For this reason, in accordance with the standard of section D.3.3 of Module C, it has been assumed that used membranes will be subjected to thermal waste conversion in a plant with a capacity of less than 60%, which is subject to demonstration in Module C4.
C4	module includes all waste disposal processes including pre-treatment and management of the disposal site. It was assumed that the fouled membrane was not recyclable after its useful life and a scenario was envisaged as municipal solid waste incinaration

Module	Description for Corotop membrane LCA
D	Module D includes benefits from all net flows in the end-of-life stage that leave the product boundary system after having passed the end-of-waste stage. Benefits from packaging incineration (electricity and thermal energy) are declared within module D. In particular, the sale of plastics waste for further use from module A3 was taken into account, where these wastes were excluded according to polluter pay rrequirements, but the potential benefits of replacing the primary materials with these wastes were taken into account in module D. The electricity and heat energy recoverable using the municipal waste incineration scenario from module C4 was also taken into account.

Impact categories, resources & wastes production indicators

The information obtained from the inventory analysis is aggregated according to the effects related to the various environmental issues. According to EN 15804:2012+A2:2019 AC:2021 the environmental impact indicators must be determined using the characterization factors and impact assessment methods. The following indicators were taken into account in the **calculations:**

Table 7 Impact categories

Impact category	Description	Unit (expressed per declared unit)
CORE ENVIRONMENTAL IMPACT INDICATORS		
Climate change - total	Global Warming Potential total (GWP-total)	kg CO_2 eq.
Climate change - fossil	Global Warming Potential total (GWP-fossil)	kg CO_2 eq.
Climate change - biogenic	Global Warming Potential total (GWP- biogenic)	kg CO_2 eq.
Climate change - land use and land use change	Global Warming Potential total (GWP-luluc)	kg CO_2 eq.
Ozone Depletion	Depletion potential of the stratospheric ozone layer (ODP).	kg of CFC-11 eq.
Acidification	Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.
Eutrophication aquatic freshwater	Eutrophication potential, fraction of nutrients reaching fresh water end compartment (EP- freshwater)	kg P eq.
Eutrophication, marine	Eutrophication potential, fraction of nutrients reaching fresh water end compartment (EP-marine)	kg N eq
Eutrophication, terrestrial	Eutrophication potential, Accumulated Exceedance (EP-terrestial)	mol N eq
Photochemical ozone formation	Formation potential of tropospheric ozone (POCP)	kg of NMVOC eq.
Depletion of abiotic resources -minerals and metals /[2]	Abiotic Depletion for non-fossil resources potential (ADP-minerals&metals)	kg Sb eq.
Depletion of abiotic resources - fossil fuels /[2]	Abiotic Depletion for non-fossil resources potential (ADP-fossil)	MJ, net calorific value
Water use /[2]	Water deprivation potential, deprivation- weighted water consumption (WDP)	m^3 world eq. deprived

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS		
Particulate matter emissions	Potential incidence of disease due to PM emissoins (PM)	disease incidence
Ionising radiation, human health /[1]	Potential Human exposure efficiency relative to U235 (IRP)	kBq U235 eq
Eco-toxicity (freshwater) /[2]	Potential Comparative Toxic Unit for Ecosystems	CTUe
Human toxicity, cancer effects /[2]	Potential Comparative Toxic Unit for humans (HTP-c)	CTUh
Human toxicity, non-cancer effects /[2]	Potential Comparative Toxic Unit for humans (HTP-nc)	CTUh
Land use related impacts / Soil quality	Potential soil quality index (SQP)	dimensionless
Disclaimers: /[1] – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of nuclear fuel cycle accidents, occupational exposure nor due to radioactive disposal in underground facilities. Potential ionizing radiation from soil, from radon and from some construction materials is also not measured by this indicator /[2] - The results of this environmental impact indicator shall by used with care as uncertainties on these results are high or as there is limited experienced with the indicator		

PARAMETERS DESCRIBING RESOURCE USE	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials (PERE)	MJ, net calorific value
Use of renewable primary energy resources used as raw materials (PERM)	MJ, net calorific value
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE)	MJ, net calorific value
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ, net calorific value
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ, net calorific value
Use of secondary raw materials (MS)	kg
Use of renewable secondary fuels (RSF)	MJ, net calorific value
Use of non-renewable secondary fuels (NRSF)	MJ, net calorific value
Net use of fresh water (FW)	m^3

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES	
Hazardous waste disposed (HWD)	kg
Non-hazardous waste disposed (NHWD)	kg
Radioactive waste disposed (RWD)	kg

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS	
Components for re-use (CRU)	kg
Material for recycling (MFR)	kg
Materials for energy recovery (MER)	kg
Exported thermal energy (ETE)	MJ
Exported electricity energy (EEE)	MJ

Assumptions

The list of assumptions are as follows:

1. Module A4: In view of the large number of individual customers making it impossible to calculate in detail the transport distances of deliveries from the place of production to the place of application of the membranes, the European scenario described in the COMMISSION RECOMMENDATION (EU) 2021/2279 of 15 December 2021on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations: *The following is the default transport scenario from factory to client represented as intracontinental supply chain: 3 500 km by truck (>32 t, EURO 4)*
2. Module C2: Distance to disposal site after demolition is assumed to be 100 km. In module C, transport of 100 km was used according to COMMISSION RECOMMENDATION (EU) 2021/2279 of 15 December 2021 and also according to verified EPDs of other manufacturers, e.g. declaration number 2021M10140, registration number EPDITALY0140 - Air, wind and water barrier membranes and Vapor control layers - valid to 18/05/2026.
3. Due to the fact that the membranes are mainly sold to European customers, it was assumed that the waste scenario record links to ecoinvent incineration and landfill waste treatment processes – the recycling waste treatment processes linked to were created by PRé Sustainability. This datasheet is valid for the municipal solid waste of EU27. Europe without Switzerland incineration and landfill processes were used. Data for European countries were retrieved from the Eurostat table packaging wastes by waste management operation, extracted in 27 October 2021.
4. While potential benefits from energy recovery (module A5 and C4) were calculated and European grid mix values were used as a basis (Europe without Switzerland market)
5. Assumptions for module A5 regarding the consumption of metal clips and adhesive tape, including the material from which the tape is made. Due to the lack of detailed data on the composition of the tape to be used in the installation of the membranes, non-woven polyester was assumed as the main component of the tape.
6. Mass of packaging waste and the waste, dismantled membrane equals the amount of input materials
7. It is assumed that natural gas consumption is related only to the social part (heating of offices and common spaces);

Cut-off

The cut-off rule was applied to the following input streams, which in terms of factors such as mass; energy requirements and environmental significance are irrelevant for the quantification of environmental impacts. Data excluded from the LCA study due to the cut-off are listed in the table

Table 8 Components and elements excluded from the boundaries of the analysis on a cut-off basis

Process, material	Reason for exclusion		
	Low mass	Negligible energies	Low environmental impact
Module A1: Colorant used in the manufacture of membranes at the fabrication site, as well as membrane additives such as flame retardants, stabilisers, whose mass fraction is negligible and whose composition is unknown or not present in the databases	X	NA	X
Module A3: Waste handling of cardboard, plastic and paint sludge is included in the calculations. The rest of the waste, representing less than 1% by weight, was excluded on a cut-off basis. The cut-off also included auxiliares such as materials used during the overhaul - welding gases, electrodes, lubricants, etc.	X	NA	X
Module A5/C1: Electrical energy consumption during assembly and disassembly of membranes, e.g. for hand-held devices such as drills.	NA	X	X

The check of the cut-off rules was done on the basis of expert judgement based on experience with similar product systems and a partial sensitivity analysis, which assessed how the 'cut-off' input or output affected the final results. For individual products, the sum of the masses of substances that were excluded from the cut-off calculations did not exceed 1%, so it can be assumed that the resulting LCIA calculations are meaningful.

Allocation principles

Since measurements of **electricity, heat, water, fuel consumption and generated waste** are recorded for the entire plant without dividing it by the types of membranes produced, an allocation of the aforementioned utilities by membranes weight was applied.

Biogenic Carbon Content

Due to the biogenic carbon content of more than 5% by mass in packaging, it is necessary to take this figure into account in the LCA. The assessment of carbon content was based on the types of materials used for packaging. No biogenic carbon was identified in the other materials, in particular the raw materials used for the membranes. A summary of the materials making up the packaging and the biogenic carbon content is presented below.

Table 9 Bio-carbon content

Packaging material	Content kg/kg	bio-carbon, kg/kg
White Cardboard	0,0592	0,0257
PCV	0,0005	
PE	0,1780	
PET	0,0313	
PP	0,0077	
Wood / plywood	0,0491	0,0197
Steel	0,0012	
Cardboard	0,6730	0,2916
	Total bio-C	**0,3370**

The carbon content of cardboard and wood was assessed using data from the Ecoinvent database:

For wood according to the model Waste treatment of waste wood it is 401470 ppm

For cardboard according to the model Waste paperboard {CH}| treatment of waste paperboard, municipal incineration with fly ash extraction | Cut-off, U it is 433270 ppm

5. D.1 LCA results

Below are tables with the calculation results related to the declared unit, i.e. one square meter (1 m^2), of each membrane. A list of indicators and their descriptions can be found earlier in this paper.

The abbreviations used in the tables refer to parameters describing resource use:

PERE - Use of renewable primary energy excluding renewable primary energy resources used as raw material

PERM - Use of renewable primary energy resources used as raw material

PERT - Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)

PENRE - Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material

PENRM - Use of non-renewable primary energy resources used as raw material

PENRT - Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)

Table 10 Corotop® Light - results

Membrane: Corotop Light												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	1,92E-01	1,24E-02	8,06E-02	2,85E-01	5,90E-02	1,26E-01	0,00E+00	2,10E-03	0,00E+00	9,47E-02	-8,22E-02
Climate change - Fossil	kg CO2 eq	1,91E-01	1,24E-02	7,97E-02	2,83E-01	5,89E-02	5,79E-02	0,00E+00	2,10E-03	0,00E+00	2,70E-02	-8,08E-02
Climate change - Biogenic	kg CO2 eq	4,10E-04	1,12E-05	9,59E-04	1,38E-03	5,36E-05	6,76E-02	0,00E+00	1,63E-06	0,00E+00	6,77E-02	-1,22E-03
Climate change - Land use and LU change	kg CO2 eq	1,02E-03	6,00E-06	2,72E-05	1,05E-03	2,88E-05	4,18E-05	0,00E+00	9,66E-07	0,00E+00	1,90E-06	-1,19E-04
Ozone depletion	kg CFC11 eq	1,77E-09	2,69E-10	1,82E-09	3,86E-09	1,29E-09	1,02E-07	0,00E+00	4,60E-11	0,00E+00	7,31E-11	-3,63E-09
Acidification	mol H+ eq	8,01E-04	4,03E-05	5,09E-04	1,35E-03	2,44E-04	2,16E-04	0,00E+00	8,23E-06	0,00E+00	2,20E-05	-2,60E-04
Eutrophication, freshwater	kg P eq	3,27E-05	8,64E-07	8,01E-05	1,14E-04	4,15E-06	1,30E-05	0,00E+00	1,46E-07	0,00E+00	2,54E-06	-3,21E-05
Eutrophication, marine	kg N eq	1,48E-04	1,38E-05	8,20E-05	2,44E-04	9,30E-05	1,49E-04	0,00E+00	3,12E-06	0,00E+00	8,37E-05	-5,67E-05
Eutrophication, terrestrial	mol N eq	1,54E-03	1,46E-04	7,13E-04	2,40E-03	9,93E-04	5,62E-04	0,00E+00	3,33E-05	0,00E+00	8,72E-05	-5,09E-04
Photochemical ozone formation	kg NMVOC eq	6,82E-04	6,02E-05	2,26E-04	9,69E-04	3,57E-04	2,18E-04	0,00E+00	1,21E-05	0,00E+00	3,31E-05	-2,05E-04
Resource use, minerals and metals	kg Sb eq	9,60E-07	3,97E-08	1,19E-07	1,12E-06	1,90E-07	2,86E-07	0,00E+00	6,73E-09	0,00E+00	6,06E-09	-1,60E-07
Resource use, fossils	MJ	6,25E+00	1,75E-01	9,10E-01	7,34E+00	8,40E-01	7,15E-01	0,00E+00	2,97E-02	0,00E+00	2,92E-02	-1,59E+00
Water use	m3 depriv.	9,72E-02	7,14E-04	1,09E-02	1,09E-01	3,43E-03	1,07E-02	0,00E+00	1,13E-04	0,00E+00	2,39E-03	-1,67E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	7,91E-09	9,83E-10	1,72E-09	1,06E-08	4,83E-09	2,75E-09	0,00E+00	1,48E-10	0,00E+00	2,30E-10	-1,79E-09
Ionising radiation	kBq U-235 eq	1,08E-02	2,34E-04	2,65E-03	1,37E-02	1,12E-03	2,28E-03	0,00E+00	4,80E-05	0,00E+00	7,92E-05	-2,06E-02
Ecotoxicity, freshwater	CTUe	4,69E-01	8,64E-02	2,74E-01	8,29E-01	4,15E-01	4,05E-01	0,00E+00	1,50E-02	0,00E+00	2,10E-01	-5,68E-01
Human toxicity, cancer	CTUh	4,73E-11	5,61E-12	6,05E-11	1,13E-10	2,69E-11	4,41E-11	0,00E+00	9,82E-12	0,00E+00	8,38E-12	-9,50E-11
Human toxicity, non-cancer	CTUh	1,29E-09	1,23E-10	1,04E-09	2,44E-09	5,92E-10	6,36E-10	0,00E+00	2,19E-10	0,00E+00	3,02E-10	-4,90E-10
Land use	Pt	3,05E-01	1,04E-01	2,15E-01	6,24E-01	5,01E-01	2,18E-01	0,00E+00	1,69E-01	0,00E+00	3,54E-02	-1,44E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,35E-01	2,72E-03	7,41E-02	2,11E-01	1,31E-02	4,44E-02	0,00E+00	5,19E-04	0,00E+00	1,19E-03	-1,46E-01
PERM	MJ	0,00E+00	0,00E+00	3,01E-03	3,01E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,35E-01	2,72E-03	7,71E-02	2,14E-01	1,31E-02	4,44E-02	0,00E+00	5,19E-04	0,00E+00	1,19E-03	-1,46E-01
PENRE	MJ	3,54E+00	1,75E-01	8,80E-01	4,59E+00	8,40E-01	5,68E-01	0,00E+00	2,97E-02	0,00E+00	2,92E-02	-1,59E+00
PENRM	MJ	2,71E+00	0,00E+00	3,07E-02	2,74E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	6,25E+00	1,75E-01	9,10E-01	7,33E+00	8,40E-01	7,15E-01	0,00E+00	2,97E-02	0,00E+00	2,92E-02	-1,59E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	1,49E-03	2,13E-05	1,99E-03	3,50E-03	1,02E-04	3,14E-04	0,00E+00	3,68E-06	0,00E+00	6,57E-05	-7,61E-04
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	6,26E-05	4,33E-06	3,03E-04	3,70E-04	2,08E-05	7,04E-03	0,00E+00	6,81E-07	0,00E+00	1,05E-02	-3,03E-05
Non-hazardous waste disposed (NHWD)	kg	1,38E-02	8,55E-03	8,41E-03	3,08E-02	4,11E-02	7,05E-02	0,00E+00	1,22E-03	0,00E+00	4,52E-02	-4,12E-03
Radioactive waste disposed (RWD)	kg	2,72E-06	5,69E-08	6,55E-07	3,44E-06	2,73E-07	5,64E-07	0,00E+00	1,18E-08	0,00E+00	1,95E-08	-5,28E-06
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,22E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,84E-03
Materials for energy recovery (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	8,04E-02	0,00E+00
Exported thermal energy (ETE)	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	6,25E-01	0,00E+00
Exported electricity energy (EEE)	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	3,10E-01	0,00E+00

Table 11 Corotop® Smart - results

Membrane: Corotop Smart												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	2,29E-01	1,24E-02	9,41E-02	3,35E-01	6,88E-02	1,40E-01	0,00E+00	2,45E-03	0,00E+00	1,11E-01	-1,00E-01
Climate change - Fossil	kg CO2 eq	2,27E-01	1,23E-02	9,29E-02	3,32E-01	6,87E-02	6,11E-02	0,00E+00	2,45E-03	0,00E+00	3,15E-02	-9,87E-02
Climate change - Biogenic	kg CO2 eq	6,13E-04	1,12E-05	1,12E-03	1,74E-03	6,26E-05	7,89E-02	0,00E+00	1,90E-06	0,00E+00	7,90E-02	-1,50E-03
Climate change - Land use and LU change	kg CO2 eq	1,02E-03	5,99E-06	3,18E-05	1,06E-03	3,36E-05	4,22E-05	0,00E+00	1,13E-06	0,00E+00	2,22E-06	-1,44E-04
Ozone depletion	kg CFC11 eq	1,91E-09	2,68E-10	2,12E-09	4,30E-09	1,50E-09	1,02E-07	0,00E+00	5,36E-11	0,00E+00	8,52E-11	-4,38E-09
Acidification	mol H+ eq	9,26E-04	4,02E-05	5,94E-04	1,56E-03	2,84E-04	2,19E-04	0,00E+00	9,60E-06	0,00E+00	2,57E-05	-3,16E-04
Eutrophication, freshwater	kg P eq	3,65E-05	8,63E-07	9,35E-05	1,31E-04	4,84E-06	1,34E-05	0,00E+00	1,70E-07	0,00E+00	2,97E-06	-3,93E-05
Eutrophication, marine	kg N eq	1,70E-04	1,38E-05	9,56E-05	2,80E-04	1,09E-04	1,68E-04	0,00E+00	3,64E-06	0,00E+00	9,77E-05	-6,86E-05
Eutrophication, terrestrial	mol N eq	1,78E-03	1,46E-04	8,31E-04	2,75E-03	1,16E-03	5,74E-04	0,00E+00	3,89E-05	0,00E+00	1,02E-04	-6,17E-04
Photochemical ozone formation	kg NMVOC eq	7,97E-04	6,01E-05	2,64E-04	1,12E-03	4,17E-04	2,24E-04	0,00E+00	1,41E-05	0,00E+00	3,86E-05	-2,49E-04
Resource use, minerals and metals	kg Sb eq	1,10E-06	3,96E-08	1,39E-07	1,28E-06	2,22E-07	2,87E-07	0,00E+00	7,85E-09	0,00E+00	7,07E-09	-1,89E-07
Resource use, fossils	MJ	7,65E+00	1,75E-01	1,06E+00	8,89E+00	9,80E-01	7,20E-01	0,00E+00	3,46E-02	0,00E+00	3,41E-02	-1,93E+00
Water use	m3 depriv.	1,23E-01	7,13E-04	1,27E-02	1,37E-01	4,00E-03	1,10E-02	0,00E+00	1,31E-04	0,00E+00	2,79E-03	-2,01E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	9,30E-09	9,82E-10	2,01E-09	1,23E-08	5,63E-09	2,78E-09	0,00E+00	1,72E-10	0,00E+00	2,69E-10	-2,13E-09
Ionising radiation	kBq U-235 eq	1,26E-02	2,34E-04	3,10E-03	1,59E-02	1,31E-03	2,30E-03	0,00E+00	5,60E-05	0,00E+00	9,24E-05	-2,54E-02
Ecotoxicity, freshwater	CTUe	5,03E-01	8,63E-02	3,19E-01	9,08E-01	4,84E-01	4,41E-01	0,00E+00	1,75E-02	0,00E+00	2,45E-01	-6,69E-01
Human toxicity, cancer	CTUh	5,34E-11	5,60E-12	7,06E-11	1,30E-10	3,14E-11	4,51E-11	0,00E+00	9,82E-12	0,00E+00	9,78E-12	-1,12E-10
Human toxicity, non-cancer	CTUh	1,45E-09	1,23E-10	1,21E-09	2,78E-09	6,91E-10	6,76E-10	0,00E+00	2,19E-10	0,00E+00	3,52E-10	-5,90E-10
Land use	Pt	3,31E-01	1,04E-01	2,50E-01	6,85E-01	5,84E-01	2,25E-01	0,00E+00	1,69E-01	0,00E+00	4,13E-02	-1,76E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,53E-01	2,72E-03	8,64E-02	2,42E-01	1,52E-02	4,46E-02	0,00E+00	6,05E-04	0,00E+00	1,39E-03	-1,79E-01
PERM	MJ	0,00E+00	0,00E+00	3,51E-03	3,51E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,53E-01	2,72E-03	8,99E-02	2,46E-01	1,52E-02	4,46E-02	0,00E+00	6,05E-04	0,00E+00	1,39E-03	-1,79E-01
PENRE	MJ	4,30E+00	1,75E-01	1,03E+00	5,50E+00	9,80E-01	5,73E-01	0,00E+00	3,46E-02	0,00E+00	3,41E-02	-1,93E+00
PENRM	MJ	3,35E+00	0,00E+00	3,58E-02	3,39E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	7,65E+00	1,75E-01	1,06E+00	8,89E+00	9,80E-01	7,20E-01	0,00E+00	3,46E-02	0,00E+00	3,41E-02	-1,93E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	1,84E-03	2,13E-05	2,32E-03	4,18E-03	1,19E-04	3,23E-04	0,00E+00	4,29E-06	0,00E+00	7,66E-05	-9,26E-04
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	7,17E-05	4,33E-06	3,53E-04	4,29E-04	2,43E-05	8,19E-03	0,00E+00	7,94E-07	0,00E+00	1,23E-02	-3,69E-05
Non-hazardous waste disposed (NHWD)	kg	1,49E-02	8,54E-03	9,81E-03	3,32E-02	4,79E-02	8,06E-02	0,00E+00	1,43E-03	0,00E+00	5,28E-02	-4,98E-03
Radioactive waste disposed (RWD)	kg	3,18E-06	5,68E-08	7,64E-07	4,00E-06	3,19E-07	5,67E-07	0,00E+00	1,37E-08	0,00E+00	2,27E-08	-6,51E-06
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,92E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,65E-03
Materials for energy recovery (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	1,00E-01	0,00E+00
Exported thermal energy (ETE)	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	7,72E-01	0,00E+00
Exported electricity energy (EEE)	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	3,83E-01	0,00E+00

Table 12 Corotop® Classic - results

Membrane: Corotop Classic												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	2,73E-01	1,40E-02	1,08E-01	3,94E-01	7,86E-02	1,55E-01	0,00E+00	2,80E-03	0,00E+00	1,26E-01	-1,17E-01
Climate change - Fossil	kg CO2 eq	2,71E-01	1,40E-02	1,06E-01	3,91E-01	7,85E-02	6,43E-02	0,00E+00	2,80E-03	0,00E+00	3,60E-02	-1,15E-01
Climate change - Biogenic	kg CO2 eq	7,79E-04	1,27E-05	1,28E-03	2,07E-03	7,15E-05	9,02E-02	0,00E+00	2,17E-06	0,00E+00	9,03E-02	-1,75E-03
Climate change - Land use and LU change	kg CO2 eq	1,05E-03	6,79E-06	3,63E-05	1,10E-03	3,84E-05	4,25E-05	0,00E+00	1,29E-06	0,00E+00	2,54E-06	-1,67E-04
Ozone depletion	kg CFC11 eq	2,35E-09	3,04E-10	2,43E-09	5,08E-09	1,72E-09	1,02E-07	0,00E+00	6,13E-11	0,00E+00	9,74E-11	-5,07E-09
Acidification	mol H+ eq	1,11E-03	4,56E-05	6,79E-04	1,84E-03	3,25E-04	2,22E-04	0,00E+00	1,10E-05	0,00E+00	2,93E-05	-3,67E-04
Eutrophication, freshwater	kg P eq	4,50E-05	9,79E-07	1,07E-04	1,53E-04	5,53E-06	1,37E-05	0,00E+00	1,94E-07	0,00E+00	3,39E-06	-4,59E-05
Eutrophication, marine	kg N eq	2,07E-04	1,57E-05	1,09E-04	3,32E-04	1,24E-04	1,86E-04	0,00E+00	4,16E-06	0,00E+00	1,12E-04	-7,96E-05
Eutrophication, terrestrial	mol N eq	2,16E-03	1,66E-04	9,50E-04	3,28E-03	1,32E-03	5,86E-04	0,00E+00	4,44E-05	0,00E+00	1,16E-04	-7,16E-04
Photochemical ozone formation	kg NMVOC eq	9,53E-04	6,81E-05	3,02E-04	1,32E-03	4,76E-04	2,29E-04	0,00E+00	1,61E-05	0,00E+00	4,41E-05	-2,89E-04
Resource use, minerals and metals	kg Sb eq	1,30E-06	4,49E-08	1,59E-07	1,50E-06	2,54E-07	2,88E-07	0,00E+00	8,97E-09	0,00E+00	8,08E-09	-2,18E-07
Resource use, fossils	MJ	8,99E+00	1,98E-01	1,21E+00	1,04E+01	1,12E+00	7,25E-01	0,00E+00	3,96E-02	0,00E+00	3,90E-02	-2,25E+00
Water use	m3 depriv.	1,37E-01	8,08E-04	1,45E-02	1,52E-01	4,57E-03	1,14E-02	0,00E+00	1,50E-04	0,00E+00	3,19E-03	-2,32E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	1,12E-08	1,11E-09	2,30E-09	1,46E-08	6,44E-09	2,82E-09	0,00E+00	1,97E-10	0,00E+00	3,07E-10	-2,45E-09
Ionising radiation	kBq U-235 eq	1,48E-02	2,65E-04	3,54E-03	1,86E-02	1,50E-03	2,31E-03	0,00E+00	6,40E-05	0,00E+00	1,06E-04	-2,97E-02
Ecotoxicity, freshwater	CTUe	6,16E-01	9,79E-02	3,65E-01	1,08E+00	5,53E-01	4,77E-01	0,00E+00	2,00E-02	0,00E+00	2,81E-01	-7,68E-01
Human toxicity, cancer	CTUh	6,45E-11	6,35E-12	8,07E-11	1,52E-10	3,59E-11	4,62E-11	0,00E+00	9,82E-12	0,00E+00	1,12E-11	-1,28E-10
Human toxicity, non-cancer	CTUh	1,76E-09	1,40E-10	1,38E-09	3,28E-09	7,89E-10	7,17E-10	0,00E+00	2,19E-10	0,00E+00	4,02E-10	-6,83E-10
Land use	Pt	4,01E-01	1,18E-01	2,86E-01	8,05E-01	6,67E-01	2,32E-01	0,00E+00	1,69E-01	0,00E+00	4,72E-02	-2,05E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,82E-01	3,08E-03	9,88E-02	2,84E-01	1,74E-02	4,48E-02	0,00E+00	6,92E-04	0,00E+00	1,58E-03	-2,09E-01
PERM	MJ	0,00E+00	0,00E+00	4,01E-03	4,01E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,82E-01	3,08E-03	1,03E-01	2,88E-01	1,74E-02	4,48E-02	0,00E+00	6,92E-04	0,00E+00	1,58E-03	-2,09E-01
PENRE	MJ	5,07E+00	1,98E-01	1,17E+00	6,44E+00	1,12E+00	5,78E-01	0,00E+00	3,96E-02	0,00E+00	3,90E-02	-2,25E+00
PENRM	MJ	3,92E+00	0,00E+00	4,09E-02	3,96E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	8,99E+00	1,98E-01	1,21E+00	1,04E+01	1,12E+00	7,25E-01	0,00E+00	3,96E-02	0,00E+00	3,90E-02	-2,25E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	2,07E-03	2,41E-05	2,65E-03	4,75E-03	1,36E-04	3,32E-04	0,00E+00	4,90E-06	0,00E+00	8,75E-05	-1,08E-03
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	8,63E-05	4,91E-06	4,03E-04	4,95E-04	2,77E-05	9,35E-03	0,00E+00	9,07E-07	0,00E+00	1,40E-02	-4,29E-05
Non-hazardous waste disposed (NHWD)	kg	1,85E-02	9,69E-03	1,12E-02	3,94E-02	5,48E-02	9,07E-02	0,00E+00	1,63E-03	0,00E+00	6,03E-02	-5,77E-03
Radioactive waste disposed (RWD)	kg	3,73E-06	6,44E-08	8,73E-07	4,67E-06	3,64E-07	5,71E-07	0,00E+00	1,57E-08	0,00E+00	2,60E-08	-7,60E-06
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,62E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,46E-03
Materials for energy recovery (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	1,17E-01	0,00E+00
Exported thermal energy (ETE)	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	9,03E-01	0,00E+00
Exported electricity energy (EEE)	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	4,48E-01	0,00E+00

Table 13 Corotop® Blue - results

Membrane: Corotop Blue												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	2,93E-01	1,58E-02	1,19E-01	4,28E-01	8,72E-02	1,67E-01	0,00E+00	3,10E-03	0,00E+00	1,40E-01	-1,28E-01
Climate change - Fossil	kg CO2 eq	2,92E-01	1,58E-02	1,18E-01	4,25E-01	8,70E-02	6,72E-02	0,00E+00	3,10E-03	0,00E+00	3,99E-02	-1,26E-01
Climate change - Biogenic	kg CO2 eq	8,99E-04	1,43E-05	1,42E-03	2,33E-03	7,93E-05	1,00E-01	0,00E+00	2,40E-06	0,00E+00	1,00E-01	-1,92E-03
Climate change - Land use and LU change	kg CO2 eq	1,06E-03	7,65E-06	4,02E-05	1,11E-03	4,26E-05	4,28E-05	0,00E+00	1,43E-06	0,00E+00	2,81E-06	-1,84E-04
Ozone depletion	kg CFC11 eq	2,49E-09	3,43E-10	2,69E-09	5,52E-09	1,91E-09	1,02E-07	0,00E+00	6,79E-11	0,00E+00	1,08E-10	-5,59E-09
Acidification	mol H+ eq	1,19E-03	5,14E-05	7,53E-04	1,99E-03	3,60E-04	2,25E-04	0,00E+00	1,22E-05	0,00E+00	3,25E-05	-4,04E-04
Eutrophication, freshwater	kg P eq	4,77E-05	1,10E-06	1,18E-04	1,67E-04	6,13E-06	1,40E-05	0,00E+00	2,15E-07	0,00E+00	3,76E-06	-5,04E-05
Eutrophication, marine	kg N eq	2,20E-04	1,77E-05	1,21E-04	3,59E-04	1,37E-04	2,02E-04	0,00E+00	4,61E-06	0,00E+00	1,24E-04	-8,77E-05
Eutrophication, terrestrial	mol N eq	2,31E-03	1,87E-04	1,05E-03	3,55E-03	1,47E-03	5,96E-04	0,00E+00	4,92E-05	0,00E+00	1,29E-04	-7,88E-04
Photochemical ozone formation	kg NMVOC eq	1,02E-03	7,68E-05	3,34E-04	1,44E-03	5,28E-04	2,34E-04	0,00E+00	1,79E-05	0,00E+00	4,89E-05	-3,18E-04
Resource use, minerals and metals	kg Sb eq	1,41E-06	5,06E-08	1,76E-07	1,63E-06	2,81E-07	2,89E-07	0,00E+00	9,95E-09	0,00E+00	8,96E-09	-2,41E-07
Resource use, fossils	MJ	9,76E+00	2,24E-01	1,35E+00	1,13E+01	1,24E+00	7,29E-01	0,00E+00	4,39E-02	0,00E+00	4,32E-02	-2,47E+00
Water use	m3 depriv.	1,53E-01	9,11E-04	1,60E-02	1,70E-01	5,06E-03	1,16E-02	0,00E+00	1,66E-04	0,00E+00	3,53E-03	-2,56E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	1,20E-08	1,25E-09	2,55E-09	1,58E-08	7,13E-09	2,85E-09	0,00E+00	2,18E-10	0,00E+00	3,40E-10	-2,71E-09
Ionising radiation	kBq U-235 eq	1,61E-02	2,99E-04	3,92E-03	2,03E-02	1,66E-03	2,33E-03	0,00E+00	7,09E-05	0,00E+00	1,17E-04	-3,26E-02
Ecotoxicity, freshwater	CTUe	6,41E-01	1,10E-01	4,04E-01	1,16E+00	6,13E-01	5,09E-01	0,00E+00	2,22E-02	0,00E+00	3,11E-01	-8,50E-01
Human toxicity, cancer	CTUh	6,89E-11	7,16E-12	8,95E-11	1,65E-10	3,98E-11	4,72E-11	0,00E+00	9,82E-12	0,00E+00	1,24E-11	-1,42E-10
Human toxicity, non-cancer	CTUh	1,88E-09	1,57E-10	1,53E-09	3,56E-09	8,75E-10	7,52E-10	0,00E+00	2,19E-10	0,00E+00	4,46E-10	-7,52E-10
Land use	Pt	4,20E-01	1,33E-01	3,17E-01	8,71E-01	7,40E-01	2,38E-01	0,00E+00	1,69E-01	0,00E+00	5,23E-02	-2,25E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,95E-01	3,47E-03	1,09E-01	3,08E-01	1,93E-02	4,50E-02	0,00E+00	7,66E-04	0,00E+00	1,76E-03	-2,29E-01
PERM	MJ	0,00E+00	0,00E+00	4,44E-03	4,44E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,95E-01	3,47E-03	1,14E-01	3,12E-01	1,93E-02	4,50E-02	0,00E+00	7,66E-04	0,00E+00	1,76E-03	-2,29E-01
PENRE	MJ	5,46E+00	2,24E-01	1,30E+00	6,98E+00	1,24E+00	5,82E-01	0,00E+00	4,39E-02	0,00E+00	4,32E-02	-2,47E+00
PENRM	MJ	4,30E+00	0,00E+00	4,54E-02	4,35E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	9,76E+00	2,24E-01	1,35E+00	1,13E+01	1,24E+00	7,29E-01	0,00E+00	4,39E-02	0,00E+00	4,32E-02	-2,47E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	2,29E-03	2,72E-05	2,94E-03	5,25E-03	1,51E-04	3,39E-04	0,00E+00	5,44E-06	0,00E+00	9,70E-05	-1,18E-03
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	9,20E-05	5,53E-06	4,47E-04	5,45E-04	3,08E-05	1,03E-02	0,00E+00	1,01E-06	0,00E+00	1,55E-02	-4,72E-05
Non-hazardous waste disposed (NHWD)	kg	1,93E-02	1,09E-02	1,24E-02	4,26E-02	6,07E-02	9,95E-02	0,00E+00	1,81E-03	0,00E+00	6,69E-02	-6,35E-03
Radioactive waste disposed (RWD)	kg	4,05E-06	7,26E-08	9,68E-07	5,09E-06	4,04E-07	5,74E-07	0,00E+00	1,74E-08	0,00E+00	2,88E-08	-8,35E-06
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,23E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,16E-03
Materials for energy recovery (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	1,27E-01	0,00E+00
Exported thermal energy (ETE)	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	9,91E-01	0,00E+00
Exported electricity energy (EEE)	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	4,92E-01	0,00E+00

Table 14 Corotop® R2 - results

Membrane: Corotop R2												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	3,76E-01	1,75E-02	1,34E-01	5,28E-01	9,83E-02	1,84E-01	0,00E+00	3,50E-03	0,00E+00	1,58E-01	-1,46E-01
Climate change - Fossil	kg CO2 eq	3,74E-01	1,74E-02	1,33E-01	5,24E-01	9,82E-02	7,08E-02	0,00E+00	3,49E-03	0,00E+00	4,50E-02	-1,44E-01
Climate change - Biogenic	kg CO2 eq	1,04E-03	1,58E-05	1,60E-03	2,66E-03	8,94E-05	1,13E-01	0,00E+00	2,71E-06	0,00E+00	1,13E-01	-2,18E-03
Climate change - Land use and LU change	kg CO2 eq	1,15E-03	8,47E-06	4,54E-05	1,21E-03	4,80E-05	4,31E-05	0,00E+00	1,61E-06	0,00E+00	3,17E-06	-2,08E-04
Ozone depletion	kg CFC11 eq	3,72E-09	3,80E-10	3,03E-09	7,14E-09	2,15E-09	1,02E-07	0,00E+00	7,66E-11	0,00E+00	1,22E-10	-6,34E-09
Acidification	mol H+ eq	1,60E-03	5,69E-05	8,49E-04	2,51E-03	4,06E-04	2,29E-04	0,00E+00	1,37E-05	0,00E+00	3,67E-05	-4,58E-04
Eutrophication, freshwater	kg P eq	7,00E-05	1,22E-06	1,34E-04	2,05E-04	6,92E-06	1,44E-05	0,00E+00	2,43E-07	0,00E+00	4,24E-06	-5,73E-05
Eutrophication, marine	kg N eq	3,08E-04	1,96E-05	1,37E-04	4,64E-04	1,55E-04	2,23E-04	0,00E+00	5,20E-06	0,00E+00	1,40E-04	-9,95E-05
Eutrophication, terrestrial	mol N eq	3,24E-03	2,07E-04	1,19E-03	4,63E-03	1,66E-03	6,10E-04	0,00E+00	5,55E-05	0,00E+00	1,45E-04	-8,94E-04
Photochemical ozone formation	kg NMVOC eq	1,34E-03	8,50E-05	3,77E-04	1,80E-03	5,95E-04	2,40E-04	0,00E+00	2,02E-05	0,00E+00	5,52E-05	-3,60E-04
Resource use, minerals and metals	kg Sb eq	1,75E-06	5,60E-08	1,98E-07	2,01E-06	3,17E-07	2,90E-07	0,00E+00	1,12E-08	0,00E+00	1,01E-08	-2,72E-07
Resource use, fossils	MJ	1,17E+01	2,47E-01	1,52E+00	1,34E+01	1,40E+00	7,35E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,81E+00
Water use	m3 depriv.	1,40E-01	1,01E-03	1,81E-02	1,59E-01	5,71E-03	1,20E-02	0,00E+00	1,88E-04	0,00E+00	3,99E-03	-2,90E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	1,60E-08	1,39E-09	2,87E-09	2,03E-08	8,05E-09	2,89E-09	0,00E+00	2,46E-10	0,00E+00	3,84E-10	-3,07E-09
Ionising radiation	kBq U-235 eq	1,97E-02	3,31E-04	4,42E-03	2,44E-02	1,87E-03	2,34E-03	0,00E+00	8,00E-05	0,00E+00	1,32E-04	-3,70E-02
Ecotoxicity, freshwater	CTUe	9,86E-01	1,22E-01	4,56E-01	1,56E+00	6,91E-01	5,50E-01	0,00E+00	2,51E-02	0,00E+00	3,51E-01	-9,60E-01
Human toxicity, cancer	CTUh	9,48E-11	7,92E-12	1,01E-10	2,04E-10	4,49E-11	4,84E-11	0,00E+00	9,82E-12	0,00E+00	1,40E-11	-1,60E-10
Human toxicity, non-cancer	CTUh	2,61E-09	1,74E-10	1,73E-09	4,51E-09	9,87E-10	7,98E-10	0,00E+00	2,19E-10	0,00E+00	5,03E-10	-8,53E-10
Land use	Pt	6,16E-01	1,47E-01	3,58E-01	1,12E+00	8,34E-01	2,46E-01	0,00E+00	1,69E-01	0,00E+00	5,90E-02	-2,56E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,57E-01	3,84E-03	1,23E-01	3,84E-01	2,18E-02	4,52E-02	0,00E+00	8,64E-04	0,00E+00	1,98E-03	-2,61E-01
PERM	MJ	0,00E+00	0,00E+00	5,01E-03	5,01E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,57E-01	3,84E-03	1,28E-01	3,89E-01	2,18E-02	4,52E-02	0,00E+00	8,64E-04	0,00E+00	1,98E-03	-2,61E-01
PENRE	MJ	6,79E+00	2,47E-01	1,47E+00	8,50E+00	1,40E+00	5,88E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,81E+00
PENRM	MJ	4,90E+00	0,00E+00	5,12E-02	4,95E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,17E+01	2,47E-01	1,52E+00	1,34E+01	1,40E+00	7,35E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,81E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	2,32E-03	3,01E-05	3,31E-03	5,66E-03	1,71E-04	3,49E-04	0,00E+00	6,13E-06	0,00E+00	1,09E-04	-1,34E-03
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	1,26E-04	6,12E-06	5,04E-04	6,37E-04	3,47E-05	1,17E-02	0,00E+00	1,13E-06	0,00E+00	1,75E-02	-5,36E-05
Non-hazardous waste disposed (NHWD)	kg	3,05E-02	1,21E-02	1,40E-02	5,66E-02	6,85E-02	1,11E-01	0,00E+00	2,04E-03	0,00E+00	7,54E-02	-7,21E-03
Radioactive waste disposed (RWD)	kg	4,92E-06	8,03E-08	1,09E-06	6,09E-06	4,55E-07	5,78E-07	0,00E+00	1,96E-08	0,00E+00	3,25E-08	-9,49E-06
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,03E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,07E-03
Materials for energy recovery (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	1,47E-01	0,00E+00
Exported thermal energy (ETE)	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	1,13E+00	0,00E+00
Exported electricity energy (EEE)	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	5,59E-01	0,00E+00

Table 15 Corotop® Strong - results

Membrane: Corotop Strong												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	3,27E-01	1,79E-02	1,34E-01	4,80E-01	9,83E-02	1,84E-01	0,00E+00	3,50E-03	0,00E+00	1,58E-01	-1,45E-01
Climate change - Fossil	kg CO2 eq	3,25E-01	1,79E-02	1,33E-01	4,76E-01	9,82E-02	7,08E-02	0,00E+00	3,49E-03	0,00E+00	4,50E-02	-1,42E-01
Climate change - Biogenic	kg CO2 eq	1,09E-03	1,62E-05	1,60E-03	2,71E-03	8,94E-05	1,13E-01	0,00E+00	2,71E-06	0,00E+00	1,13E-01	-2,16E-03
Climate change - Land use and LU change	kg CO2 eq	1,07E-03	8,70E-06	4,54E-05	1,12E-03	4,80E-05	4,31E-05	0,00E+00	1,61E-06	0,00E+00	3,17E-06	-2,07E-04
Ozone depletion	kg CFC11 eq	2,68E-09	3,90E-10	3,03E-09	6,11E-09	2,15E-09	1,02E-07	0,00E+00	7,66E-11	0,00E+00	1,22E-10	-6,30E-09
Acidification	mol H+ eq	1,31E-03	5,84E-05	8,49E-04	2,22E-03	4,06E-04	2,29E-04	0,00E+00	1,37E-05	0,00E+00	3,67E-05	-4,54E-04
Eutrophication, freshwater	kg P eq	5,18E-05	1,25E-06	1,34E-04	1,87E-04	6,92E-06	1,44E-05	0,00E+00	2,43E-07	0,00E+00	4,24E-06	-5,67E-05
Eutrophication, marine	kg N eq	2,41E-04	2,01E-05	1,37E-04	3,98E-04	1,55E-04	2,23E-04	0,00E+00	5,20E-06	0,00E+00	1,40E-04	-9,87E-05
Eutrophication, terrestrial	mol N eq	2,53E-03	2,12E-04	1,19E-03	3,93E-03	1,66E-03	6,10E-04	0,00E+00	5,55E-05	0,00E+00	1,45E-04	-8,87E-04
Photochemical ozone formation	kg NMVOC eq	1,14E-03	8,72E-05	3,77E-04	1,60E-03	5,95E-04	2,40E-04	0,00E+00	2,02E-05	0,00E+00	5,52E-05	-3,57E-04
Resource use, minerals and metals	kg Sb eq	1,58E-06	5,75E-08	1,98E-07	1,83E-06	3,17E-07	2,90E-07	0,00E+00	1,12E-08	0,00E+00	1,01E-08	-2,71E-07
Resource use, fossils	MJ	1,10E+01	2,54E-01	1,52E+00	1,28E+01	1,40E+00	7,35E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,78E+00
Water use	m3 depriv.	1,78E-01	1,03E-03	1,81E-02	1,97E-01	5,71E-03	1,20E-02	0,00E+00	1,88E-04	0,00E+00	3,99E-03	-2,88E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	1,33E-08	1,43E-09	2,87E-09	1,75E-08	8,05E-09	2,89E-09	0,00E+00	2,46E-10	0,00E+00	3,84E-10	-3,05E-09
Ionising radiation	kBq U-235 eq	1,80E-02	3,40E-04	4,42E-03	2,28E-02	1,87E-03	2,34E-03	0,00E+00	8,00E-05	0,00E+00	1,32E-04	-3,66E-02
Ecotoxicity, freshwater	CTUe	6,79E-01	1,25E-01	4,56E-01	1,26E+00	6,91E-01	5,50E-01	0,00E+00	2,51E-02	0,00E+00	3,51E-01	-9,58E-01
Human toxicity, cancer	CTUh	7,57E-11	8,13E-12	1,01E-10	1,85E-10	4,49E-11	4,84E-11	0,00E+00	9,82E-12	0,00E+00	1,40E-11	-1,60E-10
Human toxicity, non-cancer	CTUh	2,06E-09	1,79E-10	1,73E-09	3,96E-09	9,87E-10	7,98E-10	0,00E+00	2,19E-10	0,00E+00	5,03E-10	-8,47E-10
Land use	Pt	4,51E-01	1,51E-01	3,58E-01	9,60E-01	8,34E-01	2,46E-01	0,00E+00	1,69E-01	0,00E+00	5,90E-02	-2,53E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,15E-01	3,95E-03	1,23E-01	3,42E-01	2,18E-02	4,52E-02	0,00E+00	8,64E-04	0,00E+00	1,98E-03	-2,58E-01
PERM	MJ	0,00E+00	0,00E+00	5,01E-03	5,01E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,15E-01	3,95E-03	1,28E-01	3,47E-01	2,18E-02	4,52E-02	0,00E+00	8,64E-04	0,00E+00	1,98E-03	-2,58E-01
PENRE	MJ	6,17E+00	2,54E-01	1,47E+00	7,89E+00	1,40E+00	5,88E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,78E+00
PENRM	MJ	4,84E+00	0,00E+00	5,12E-02	4,89E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,10E+01	2,54E-01	1,52E+00	1,28E+01	1,40E+00	7,35E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,78E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	2,63E-03	3,09E-05	3,31E-03	5,97E-03	1,71E-04	3,49E-04	0,00E+00	6,13E-06	0,00E+00	1,09E-04	-1,33E-03
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	1,01E-04	6,29E-06	5,04E-04	6,12E-04	3,47E-05	1,17E-02	0,00E+00	1,13E-06	0,00E+00	1,75E-02	-5,32E-05
Non-hazardous waste disposed (NHWD)	kg	2,05E-02	1,24E-02	1,40E-02	4,69E-02	6,85E-02	1,11E-01	0,00E+00	2,04E-03	0,00E+00	7,54E-02	-7,15E-03
Radioactive waste disposed (RWD)	kg	4,56E-06	8,25E-08	1,09E-06	5,73E-06	4,55E-07	5,78E-07	0,00E+00	1,96E-08	0,00E+00	3,25E-08	-9,39E-06
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,03E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,07E-03
Materials for energy recovery (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	1,45E-01	0,00E+00
Exported thermal energy (ETE)	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	1,11E+00	0,00E+00
Exported electricity energy (EEE)	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	5,53E-01	0,00E+00

Table 16 Corotop® Red Strong - results

Membrane: Corotop Red Strong												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	3,91E-01	2,00E-02	1,57E-01	5,68E-01	1,15E-01	2,08E-01	0,00E+00	4,08E-03	0,00E+00	1,84E-01	-1,70E-01
Climate change - Fossil	kg CO2 eq	3,88E-01	2,00E-02	1,55E-01	5,63E-01	1,15E-01	7,62E-02	0,00E+00	4,08E-03	0,00E+00	5,25E-02	-1,68E-01
Climate change - Biogenic	kg CO2 eq	1,33E-03	1,81E-05	1,87E-03	3,21E-03	1,04E-04	1,32E-01	0,00E+00	3,16E-06	0,00E+00	1,32E-01	-2,55E-03
Climate change - Land use and LU change	kg CO2 eq	1,11E-03	9,69E-06	5,29E-05	1,17E-03	5,60E-05	4,37E-05	0,00E+00	1,88E-06	0,00E+00	3,70E-06	-2,43E-04
Ozone depletion	kg CFC11 eq	3,32E-09	4,34E-10	3,54E-09	7,30E-09	2,51E-09	1,02E-07	0,00E+00	8,94E-11	0,00E+00	1,42E-10	-7,40E-09
Acidification	mol H+ eq	1,58E-03	6,51E-05	9,91E-04	2,64E-03	4,74E-04	2,34E-04	0,00E+00	1,60E-05	0,00E+00	4,28E-05	-5,35E-04
Eutrophication, freshwater	kg P eq	6,41E-05	1,40E-06	1,56E-04	2,21E-04	8,07E-06	1,50E-05	0,00E+00	2,83E-07	0,00E+00	4,95E-06	-6,69E-05
Eutrophication, marine	kg N eq	2,95E-04	2,24E-05	1,59E-04	4,77E-04	1,81E-04	2,53E-04	0,00E+00	6,07E-06	0,00E+00	1,63E-04	-1,16E-04
Eutrophication, terrestrial	mol N eq	3,10E-03	2,36E-04	1,39E-03	4,72E-03	1,93E-03	6,30E-04	0,00E+00	6,48E-05	0,00E+00	1,70E-04	-1,04E-03
Photochemical ozone formation	kg NMVOC eq	1,36E-03	9,72E-05	4,40E-04	1,90E-03	6,94E-04	2,50E-04	0,00E+00	2,35E-05	0,00E+00	6,44E-05	-4,21E-04
Resource use, minerals and metals	kg Sb eq	1,85E-06	6,41E-08	2,31E-07	2,15E-06	3,70E-07	2,91E-07	0,00E+00	1,31E-08	0,00E+00	1,18E-08	-3,18E-07
Resource use, fossils	MJ	1,29E+01	2,83E-01	1,77E+00	1,50E+01	1,63E+00	7,43E-01	0,00E+00	5,77E-02	0,00E+00	5,69E-02	-3,28E+00
Water use	m3 depriv.	1,97E-01	1,15E-03	2,11E-02	2,19E-01	6,66E-03	1,25E-02	0,00E+00	2,19E-04	0,00E+00	4,65E-03	-3,39E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	1,60E-08	1,59E-09	3,35E-09	2,09E-08	9,39E-09	2,95E-09	0,00E+00	2,87E-10	0,00E+00	4,48E-10	-3,58E-09
Ionising radiation	kBq U-235 eq	2,12E-02	3,79E-04	5,16E-03	2,67E-02	2,19E-03	2,37E-03	0,00E+00	9,33E-05	0,00E+00	1,54E-04	-4,33E-02
Ecotoxicity, freshwater	CTUe	8,45E-01	1,40E-01	5,32E-01	1,52E+00	8,06E-01	6,10E-01	0,00E+00	2,92E-02	0,00E+00	4,09E-01	-1,12E+00
Human toxicity, cancer	CTUh	9,16E-11	9,06E-12	1,18E-10	2,18E-10	5,23E-11	5,02E-11	0,00E+00	9,82E-12	0,00E+00	1,63E-11	-1,87E-10
Human toxicity, non-cancer	CTUh	2,50E-09	1,99E-10	2,01E-09	4,72E-09	1,15E-09	8,66E-10	0,00E+00	2,19E-10	0,00E+00	5,87E-10	-9,96E-10
Land use	Pt	5,53E-01	1,68E-01	4,17E-01	1,14E+00	9,73E-01	2,58E-01	0,00E+00	1,69E-01	0,00E+00	6,88E-02	-2,99E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,56E-01	4,40E-03	1,44E-01	4,05E-01	2,54E-02	4,56E-02	0,00E+00	1,01E-03	0,00E+00	2,31E-03	-3,05E-01
PERM	MJ	0,00E+00	0,00E+00	5,85E-03	5,85E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,56E-01	4,40E-03	1,50E-01	4,10E-01	2,54E-02	4,56E-02	0,00E+00	1,01E-03	0,00E+00	2,31E-03	-3,05E-01
PENRE	MJ	7,22E+00	2,83E-01	1,71E+00	9,21E+00	1,63E+00	5,96E-01	0,00E+00	5,77E-02	0,00E+00	5,69E-02	-3,28E+00
PENRM	MJ	5,72E+00	0,00E+00	5,97E-02	5,78E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,29E+01	2,83E-01	1,77E+00	1,50E+01	1,63E+00	7,43E-01	0,00E+00	5,77E-02	0,00E+00	5,69E-02	-3,28E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	2,95E-03	3,44E-05	3,86E-03	6,85E-03	1,99E-04	3,64E-04	0,00E+00	7,15E-06	0,00E+00	1,28E-04	-1,57E-03
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	1,22E-04	7,01E-06	5,88E-04	7,18E-04	4,05E-05	1,36E-02	0,00E+00	1,32E-06	0,00E+00	2,04E-02	-6,27E-05
Non-hazardous waste disposed (NHWD)	kg	2,58E-02	1,38E-02	1,64E-02	5,60E-02	7,99E-02	1,28E-01	0,00E+00	2,38E-03	0,00E+00	8,80E-02	-8,42E-03
Radioactive waste disposed (RWD)	kg	5,33E-06	9,19E-08	1,27E-06	6,70E-06	5,31E-07	5,85E-07	0,00E+00	2,29E-08	0,00E+00	3,79E-08	-1,11E-05
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,20E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,42E-03
Materials for energy recovery (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	1,69E-01	0,00E+00
Exported thermal energy (ETE)	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	1,32E+00	0,00E+00
Exported electricity energy (EEE)	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	6,54E-01	0,00E+00

Table 17 Corotop® R3 - results

Membrane: Corotop R3												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	4,62E-01	2,13E-02	1,70E-01	6,53E-01	1,25E-01	2,22E-01	0,00E+00	4,43E-03	0,00E+00	2,00E-01	-1,87E-01
Climate change - Fossil	kg CO2 eq	4,60E-01	2,12E-02	1,68E-01	6,49E-01	1,24E-01	7,95E-02	0,00E+00	4,43E-03	0,00E+00	5,70E-02	-1,84E-01
Climate change - Biogenic	kg CO2 eq	1,96E-03	1,92E-05	2,03E-03	4,00E-03	1,13E-04	1,43E-01	0,00E+00	3,44E-06	0,00E+00	1,43E-01	-2,80E-03
Climate change - Land use and LU change	kg CO2 eq	2,67E-04	1,03E-05	5,75E-05	3,35E-04	6,08E-05	4,40E-05	0,00E+00	2,04E-06	0,00E+00	4,02E-06	-2,66E-04
Ozone depletion	kg CFC11 eq	4,21E-09	4,62E-10	3,84E-09	8,51E-09	2,72E-09	1,02E-07	0,00E+00	9,71E-11	0,00E+00	1,54E-10	-8,10E-09
Acidification	mol H+ eq	1,89E-03	6,92E-05	1,08E-03	3,04E-03	5,15E-04	2,38E-04	0,00E+00	1,74E-05	0,00E+00	4,65E-05	-5,86E-04
Eutrophication, freshwater	kg P eq	8,15E-05	1,49E-06	1,69E-04	2,52E-04	8,76E-06	1,54E-05	0,00E+00	3,07E-07	0,00E+00	5,37E-06	-7,35E-05
Eutrophication, marine	kg N eq	3,63E-04	2,38E-05	1,73E-04	5,60E-04	1,96E-04	2,72E-04	0,00E+00	6,59E-06	0,00E+00	1,77E-04	-1,27E-04
Eutrophication, terrestrial	mol N eq	3,85E-03	2,51E-04	1,50E-03	5,60E-03	2,10E-03	6,42E-04	0,00E+00	7,03E-05	0,00E+00	1,84E-04	-1,14E-03
Photochemical ozone formation	kg NMVOC eq	1,63E-03	1,03E-04	4,78E-04	2,21E-03	7,54E-04	2,55E-04	0,00E+00	2,55E-05	0,00E+00	6,99E-05	-4,61E-04
Resource use, minerals and metals	kg Sb eq	2,15E-06	6,82E-08	2,51E-07	2,46E-06	4,02E-07	2,92E-07	0,00E+00	1,42E-08	0,00E+00	1,28E-08	-3,46E-07
Resource use, fossils	MJ	1,48E+01	3,01E-01	1,92E+00	1,70E+01	1,77E+00	7,48E-01	0,00E+00	6,27E-02	0,00E+00	6,17E-02	-3,60E+00
Water use	m3 depriv.	1,92E-01	1,23E-03	2,29E-02	2,16E-01	7,23E-03	1,29E-02	0,00E+00	2,38E-04	0,00E+00	5,05E-03	-3,70E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	1,93E-08	1,69E-09	3,64E-09	2,46E-08	1,02E-08	2,99E-09	0,00E+00	3,12E-10	0,00E+00	4,86E-10	-3,91E-09
Ionising radiation	kBq U-235 eq	2,42E-02	4,03E-04	5,60E-03	3,02E-02	2,37E-03	2,38E-03	0,00E+00	1,01E-04	0,00E+00	1,67E-04	-4,76E-02
Ecotoxicity, freshwater	CTUe	1,03E+00	1,49E-01	5,78E-01	1,76E+00	8,75E-01	6,46E-01	0,00E+00	3,17E-02	0,00E+00	4,44E-01	-1,22E+00
Human toxicity, cancer	CTUh	1,11E-10	9,64E-12	1,28E-10	2,49E-10	5,68E-11	5,13E-11	0,00E+00	9,82E-12	0,00E+00	1,77E-11	-2,03E-10
Human toxicity, non-cancer	CTUh	3,08E-09	2,12E-10	2,19E-09	5,48E-09	1,25E-09	9,07E-10	0,00E+00	2,19E-10	0,00E+00	6,37E-10	-1,09E-09
Land use	Pt	6,60E-01	1,79E-01	4,53E-01	1,29E+00	1,06E+00	2,65E-01	0,00E+00	1,69E-01	0,00E+00	7,47E-02	-3,28E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,97E-01	4,68E-03	1,56E-01	4,58E-01	2,76E-02	4,58E-02	0,00E+00	1,09E-03	0,00E+00	2,51E-03	-3,35E-01
PERM	MJ	0,00E+00	0,00E+00	6,35E-03	6,35E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,97E-01	4,68E-03	1,63E-01	4,64E-01	2,76E-02	4,58E-02	0,00E+00	1,09E-03	0,00E+00	2,51E-03	-3,35E-01
PENRE	MJ	8,49E+00	3,01E-01	1,86E+00	1,06E+01	1,77E+00	6,01E-01	0,00E+00	6,27E-02	0,00E+00	6,17E-02	-3,60E+00
PENRM	MJ	6,29E+00	0,00E+00	6,48E-02	6,36E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,48E+01	3,01E-01	1,92E+00	1,70E+01	1,77E+00	7,48E-01	0,00E+00	6,27E-02	0,00E+00	6,17E-02	-3,60E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	3,00E-03	3,66E-05	4,20E-03	7,23E-03	2,16E-04	3,73E-04	0,00E+00	7,76E-06	0,00E+00	1,39E-04	-1,72E-03
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	1,47E-04	7,45E-06	6,39E-04	7,94E-04	4,39E-05	1,47E-02	0,00E+00	1,44E-06	0,00E+00	2,22E-02	-6,87E-05
Non-hazardous waste disposed (NHWD)	kg	3,31E-02	1,47E-02	1,78E-02	6,56E-02	8,67E-02	1,38E-01	0,00E+00	2,58E-03	0,00E+00	9,55E-02	-9,22E-03
Radioactive waste disposed (RWD)	kg	6,08E-06	9,78E-08	1,38E-06	7,56E-06	5,77E-07	5,88E-07	0,00E+00	2,48E-08	0,00E+00	4,11E-08	-1,22E-05
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,90E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,02E-02
Materials for energy recovery (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	1,89E-01	0,00E+00
Exported thermal energy (ETE)	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	1,45E+00	0,00E+00
Exported electricity energy (EEE)	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	7,19E-01	0,00E+00

Table 18 Corotop® Ultra - results

Membrane: Corotop Ultra												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	4,72E-01	2,25E-02	1,84E-01	6,78E-01	1,34E-01	2,37E-01	0,00E+00	4,78E-03	0,00E+00	2,16E-01	-2,02E-01
Climate change - Fossil	kg CO2 eq	4,70E-01	2,24E-02	1,81E-01	6,74E-01	1,34E-01	8,27E-02	0,00E+00	4,78E-03	0,00E+00	6,15E-02	-1,98E-01
Climate change - Biogenic	kg CO2 eq	2,14E-03	2,03E-05	2,19E-03	4,35E-03	1,22E-04	1,54E-01	0,00E+00	3,71E-06	0,00E+00	1,54E-01	-3,02E-03
Climate change - Land use and LU change	kg CO2 eq	2,42E-04	1,09E-05	6,20E-05	3,15E-04	6,56E-05	4,43E-05	0,00E+00	2,20E-06	0,00E+00	4,34E-06	-2,87E-04
Ozone depletion	kg CFC11 eq	3,95E-09	4,88E-10	4,15E-09	8,59E-09	2,94E-09	1,02E-07	0,00E+00	1,05E-10	0,00E+00	1,66E-10	-8,74E-09
Acidification	mol H+ eq	1,88E-03	7,32E-05	1,16E-03	3,11E-03	5,55E-04	2,41E-04	0,00E+00	1,87E-05	0,00E+00	5,01E-05	-6,32E-04
Eutrophication, freshwater	kg P eq	7,78E-05	1,57E-06	1,82E-04	2,62E-04	9,45E-06	1,58E-05	0,00E+00	3,31E-07	0,00E+00	5,79E-06	-7,93E-05
Eutrophication, marine	kg N eq	3,56E-04	2,52E-05	1,87E-04	5,68E-04	2,12E-04	2,90E-04	0,00E+00	7,11E-06	0,00E+00	1,91E-04	-1,37E-04
Eutrophication, terrestrial	mol N eq	3,77E-03	2,66E-04	1,62E-03	5,66E-03	2,26E-03	6,54E-04	0,00E+00	7,59E-05	0,00E+00	1,99E-04	-1,23E-03
Photochemical ozone formation	kg NMVOC eq	1,65E-03	1,09E-04	5,16E-04	2,27E-03	8,13E-04	2,61E-04	0,00E+00	2,76E-05	0,00E+00	7,54E-05	-4,98E-04
Resource use, minerals and metals	kg Sb eq	2,21E-06	7,21E-08	2,71E-07	2,55E-06	4,34E-07	2,93E-07	0,00E+00	1,53E-08	0,00E+00	1,38E-08	-3,73E-07
Resource use, fossils	MJ	1,56E+01	3,18E-01	2,07E+00	1,80E+01	1,91E+00	7,53E-01	0,00E+00	6,76E-02	0,00E+00	6,66E-02	-3,88E+00
Water use	m3 depriv.	2,28E-01	1,30E-03	2,47E-02	2,54E-01	7,80E-03	1,32E-02	0,00E+00	2,56E-04	0,00E+00	5,45E-03	-3,99E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	1,93E-08	1,79E-09	3,93E-09	2,50E-08	1,10E-08	3,03E-09	0,00E+00	3,36E-10	0,00E+00	5,25E-10	-4,21E-09
Ionising radiation	kBq U-235 eq	2,52E-02	4,26E-04	6,05E-03	3,16E-02	2,56E-03	2,40E-03	0,00E+00	1,09E-04	0,00E+00	1,80E-04	-5,13E-02
Ecotoxicity, freshwater	CTUe	9,45E-01	1,57E-01	6,23E-01	1,73E+00	9,45E-01	6,83E-01	0,00E+00	3,42E-02	0,00E+00	4,79E-01	-1,32E+00
Human toxicity, cancer	CTUh	1,09E-10	1,02E-11	1,38E-10	2,57E-10	6,13E-11	5,24E-11	0,00E+00	9,82E-12	0,00E+00	1,91E-11	-2,19E-10
Human toxicity, non-cancer	CTUh	3,01E-09	2,24E-10	2,36E-09	5,60E-09	1,35E-09	9,47E-10	0,00E+00	2,19E-10	0,00E+00	6,87E-10	-1,18E-09
Land use	Pt	6,20E-01	1,89E-01	4,89E-01	1,30E+00	1,14E+00	2,71E-01	0,00E+00	1,69E-01	0,00E+00	8,06E-02	-3,53E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,97E-01	4,94E-03	1,69E-01	4,70E-01	2,98E-02	4,60E-02	0,00E+00	1,18E-03	0,00E+00	2,71E-03	-3,61E-01
PERM	MJ	0,00E+00	0,00E+00	6,85E-03	6,85E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,97E-01	4,94E-03	1,76E-01	4,77E-01	2,98E-02	4,60E-02	0,00E+00	1,18E-03	0,00E+00	2,71E-03	-3,61E-01
PENRE	MJ	8,84E+00	3,18E-01	2,00E+00	1,12E+01	1,91E+00	6,06E-01	0,00E+00	6,76E-02	0,00E+00	6,66E-02	-3,88E+00
PENRM	MJ	6,79E+00	0,00E+00	6,99E-02	6,86E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,56E+01	3,18E-01	2,07E+00	1,80E+01	1,91E+00	7,53E-01	0,00E+00	6,76E-02	0,00E+00	6,66E-02	-3,88E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	3,40E-03	3,87E-05	4,53E-03	7,97E-03	2,33E-04	3,81E-04	0,00E+00	8,38E-06	0,00E+00	1,50E-04	-1,86E-03
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	1,45E-04	7,88E-06	6,89E-04	8,42E-04	4,74E-05	1,59E-02	0,00E+00	1,55E-06	0,00E+00	2,39E-02	-7,41E-05
Non-hazardous waste disposed (NHWD)	kg	3,02E-02	1,55E-02	1,92E-02	6,49E-02	9,36E-02	1,48E-01	0,00E+00	2,79E-03	0,00E+00	1,03E-01	-9,94E-03
Radioactive waste disposed (RWD)	kg	6,34E-06	1,03E-07	1,49E-06	7,93E-06	6,22E-07	5,92E-07	0,00E+00	2,68E-08	0,00E+00	4,44E-08	-1,32E-05
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,61E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,10E-02
Materials for energy recovery (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	2,04E-01	0,00E+00
Exported thermal energy (ETE)	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	1,56E+00	0,00E+00
Exported electricity energy (EEE)	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	7,75E-01	0,00E+00

Table 19 Corotop® Power - results

Membrane: Corotop Power												
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change	kg CO2 eq	6,89E-01	2,47E-02	2,05E-01	9,19E-01	1,50E-01	2,60E-01	0,00E+00	5,34E-03	0,00E+00	2,41E-01	-2,29E-01
Climate change - Fossil	kg CO2 eq	6,86E-01	2,47E-02	2,03E-01	9,14E-01	1,50E-01	8,79E-02	0,00E+00	5,34E-03	0,00E+00	6,87E-02	-2,25E-01
Climate change - Biogenic	kg CO2 eq	1,66E-03	2,23E-05	2,44E-03	4,12E-03	1,36E-04	1,72E-01	0,00E+00	4,14E-06	0,00E+00	1,72E-01	-3,44E-03
Climate change - Land use and LU change	kg CO2 eq	1,45E-03	1,20E-05	6,92E-05	1,53E-03	7,33E-05	4,48E-05	0,00E+00	2,46E-06	0,00E+00	4,84E-06	-3,26E-04
Ozone depletion	kg CFC11 eq	7,93E-09	5,38E-10	4,63E-09	1,31E-08	3,28E-09	1,02E-07	0,00E+00	1,17E-10	0,00E+00	1,86E-10	-9,87E-09
Acidification	mol H+ eq	3,07E-03	8,06E-05	1,30E-03	4,44E-03	6,20E-04	2,46E-04	0,00E+00	2,09E-05	0,00E+00	5,60E-05	-7,16E-04
Eutrophication, freshwater	kg P eq	1,46E-04	1,73E-06	2,04E-04	3,51E-04	1,06E-05	1,63E-05	0,00E+00	3,70E-07	0,00E+00	6,47E-06	-9,02E-05
Eutrophication, marine	kg N eq	6,11E-04	2,77E-05	2,09E-04	8,47E-04	2,37E-04	3,19E-04	0,00E+00	7,95E-06	0,00E+00	2,13E-04	-1,55E-04
Eutrophication, terrestrial	mol N eq	6,44E-03	2,93E-04	1,81E-03	8,55E-03	2,53E-03	6,73E-04	0,00E+00	8,47E-05	0,00E+00	2,22E-04	-1,40E-03
Photochemical ozone formation	kg NMVOC eq	2,52E-03	1,20E-04	5,76E-04	3,22E-03	9,08E-04	2,69E-04	0,00E+00	3,08E-05	0,00E+00	8,42E-05	-5,64E-04
Resource use, minerals and metals	kg Sb eq	3,23E-06	7,93E-08	3,03E-07	3,62E-06	4,84E-07	2,95E-07	0,00E+00	1,71E-08	0,00E+00	1,54E-08	-4,19E-07
Resource use, fossils	MJ	1,97E+01	3,50E-01	2,32E+00	2,24E+01	2,14E+00	7,61E-01	0,00E+00	7,56E-02	0,00E+00	7,44E-02	-4,40E+00
Water use	m3 depriv.	1,68E-01	1,43E-03	2,76E-02	1,97E-01	8,72E-03	1,37E-02	0,00E+00	2,86E-04	0,00E+00	6,08E-03	-4,51E-02
Additional impact category	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	disease inc.	3,02E-08	1,97E-09	4,39E-09	3,65E-08	1,23E-08	3,09E-09	0,00E+00	3,76E-10	0,00E+00	5,86E-10	-4,74E-09
Ionising radiation	kBq U-235 eq	3,54E-02	4,69E-04	6,75E-03	4,26E-02	2,86E-03	2,42E-03	0,00E+00	1,22E-04	0,00E+00	2,02E-04	-5,85E-02
Ecotoxicity, freshwater	CTUe	2,20E+00	1,73E-01	6,96E-01	3,06E+00	1,06E+00	7,40E-01	0,00E+00	3,83E-02	0,00E+00	5,35E-01	-1,47E+00
Human toxicity, cancer	CTUh	1,87E-10	1,12E-11	1,54E-10	3,52E-10	6,85E-11	5,41E-11	0,00E+00	9,82E-12	0,00E+00	2,13E-11	-2,46E-10
Human toxicity, non-cancer	CTUh	5,30E-09	2,47E-10	2,64E-09	8,18E-09	1,51E-09	1,01E-09	0,00E+00	2,19E-10	0,00E+00	7,68E-10	-1,33E-09
Land use	Pt	1,28E+00	2,09E-01	5,46E-01	2,04E+00	1,27E+00	2,83E-01	0,00E+00	1,69E-01	0,00E+00	9,00E-02	-4,01E-01
PARAMETERS DESCRIBING RESOURCE USE	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	4,90E-01	5,44E-03	1,88E-01	6,84E-01	3,32E-02	4,63E-02	0,00E+00	1,32E-03	0,00E+00	3,02E-03	-4,11E-01
PERM	MJ	0,00E+00	0,00E+00	7,65E-03	7,65E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4,90E-01	5,44E-03	1,96E-01	6,92E-01	3,32E-02	4,63E-02	0,00E+00	1,32E-03	0,00E+00	3,02E-03	-4,11E-01
PENRE	MJ	1,20E+01	3,50E-01	2,24E+00	1,46E+01	2,14E+00	6,14E-01	0,00E+00	7,56E-02	0,00E+00	7,44E-02	-4,40E+00
PENRM	MJ	7,71E+00	0,00E+00	7,81E-02	7,79E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,97E+01	3,50E-01	2,32E+00	2,24E+01	2,14E+00	7,61E-01	0,00E+00	7,56E-02	0,00E+00	7,44E-02	-4,40E+00
MS	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	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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	3,82E-03	4,26E-05	5,06E-03	8,92E-03	2,60E-04	3,96E-04	0,00E+00	9,36E-06	0,00E+00	1,67E-04	-2,11E-03
INFORMATION DESCRIBING WASTE CATEGORIES	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	2,47E-04	8,67E-06	7,70E-04	1,03E-03	5,30E-05	1,77E-02	0,00E+00	1,73E-06	0,00E+00	2,67E-02	-8,41E-05
Non-hazardous waste disposed (NHWD)	kg	6,58E-02	1,71E-02	2,14E-02	1,04E-01	1,05E-01	1,64E-01	0,00E+00	3,11E-03	0,00E+00	1,15E-01	-1,12E-02
Radioactive waste disposed (RWD)	kg	8,76E-06	1,14E-07	1,67E-06	1,05E-05	6,95E-07	5,98E-07	0,00E+00	2,99E-08	0,00E+00	4,96E-08	-1,50E-05
INFORMATION DESCRIBING OUTPUT FLOWS	**Unit**	**A1**	**A2**	**A3**	**A1 -A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (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	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,07E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,23E-02
Materials for energy recovery (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	2,38E-01	0,00E+00
Exported thermal energy (ETE)	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	1,78E+00	0,00E+00
Exported electricity energy (EEE)	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	8,84E-01	0,00E+00

Additional environmental information

More information on membranes and the environment can be found at:
https://corotop.com.pl/en/why-corotop/

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