

ENVIRONMENTAL PRODUCT DECLARATION

Product Name

**Ondutiss® air, wind, vapour and water barrier membranes
for roof and façade application:**

Site:

ONDULINE
5-7 rue Frédéric
Clavel - 92150
Suresnes - France

Ondutiss® Facade 100

Ondutiss® Air 110

Ondutiss® Air 135

Ondutiss® Air 140

Ondutiss® Air HDV Resist R2 150

Ondutiss® Air 160

Ondutiss® Air 180

Ondutiss® Air HDV Resist R3 190

Ondutiss® Air 220

Ondutiss® Air Power 250

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

Program Operator	EPDItaly, www.epditaly.it
Publisher	EPDItaly
Declaration Number	EPDONDULINE01_2022_rev.1.0
Registration Number	EPDITALY1279
Release Date	09/02/2026
Expire date	08/02/2031



1. B.1 General information

Table 1 EPD - basic information table

Addresses of declaration owner	ONDULINE 5-7 rue Frédéric Clavel – 92150 Suresnes – France
Production sites:	46-053 Chrzastowice, ul. Ozimska 2A, Poland 46-040 Ozimek, ul. Kolejowa 1, Poland
Name of the person responsible for EPD & LCA Report:	Martin FOUTEL Quality and Compliance manager mfoutel@ofitech.fr +33 (0) 6 13 53 29 55
Program operator & publisher	EPDItaly; www.epditaly.it Via Gaetano De Castilia, 10; 20124 – MILANO, Italy Version of EPDItaly regulations 7.1
EPD Type	Product EPD – concerning a specific product by a specific manufacturer, EPD is Cradle to Grave. This EPD refers to products sold by the EPD owner (trader) and is based on the manufacturer's published EPD – Declaration number EPD-COTOP-Membranes-Part-A-001, registration number EPDITALY1123; case B of the Annex 8 of the EPDItaly Regulation 7.1
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 ICS Italia srl , 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 ICS Italia srl number 02242
Comparability	Environmental statements published within the same product category, but from different programmes, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804:2012+A2:2019.
Statement Responsibility	The EPD Owner releases EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence. EPDItaly accepts no responsibility for the information, data and results provided by the EPD Owner for the life cycle assessment.
Identification of LCA report:	LCA Report - Air, wind and water barrier membranes
Declared unit	1 square meter (each type of membrane)
Summary description and technical information of products	This Environmental Product Declaration (EPD) is valid for air, wind and water barrier membranes.

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 type of declaration is related to 10 specific products by Onduline:

Ondutiss® Facade 100	Ondutiss® Air 160
Ondutiss® Air 110	Ondutiss® Air 180
Ondutiss® Air 135	Ondutiss® Air HDV Resist R3 190
Ondutiss® Air 140	Ondutiss® Air 220
Ondutiss® Air HDV Resist R2 150	Ondutiss® Air Power 250

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 3.2 EN 15804+A2 AC:2021 is the framework reference for PCRs.
Orientation where more information can be found	https://www.onduline.com/en
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 Ścigala; ryszard.scigala@carbonium.pl Carbonium Expert Team; www.carbonium.pl

2. B.1 Company information

Founded in France in 1944, Onduline has grown into a global leader in lightweight roofing systems. The company's headquarters are located in France at 5-7 Rue Frédéric Clavel, 92150 Suresnes. Specializing in innovative roofing solutions, Onduline operates in over 100 countries and employs approximately 900 people worldwide. This extensive international presence allows the company to better understand and meet market needs with the right solutions.

Onduline is renowned for its high-quality roofing and waterproofing products. The company caters to residential, commercial, storage applications, providing reliable and durable roofing solutions. The company's commitment to quality is reflected in its state-of-the-art production facilities and adherence to stringent European standards. Onduline's products are certified to meet high criteria to ensure performance and durability.

Onduline continues to innovate and expand its product portfolio, offering solutions that combine sustainability, performance, and aesthetic appeal. With a strong focus on customer satisfaction, Onduline works closely with clients and contractors to deliver tailored roofing solutions that meet specific project requirements.

Onduline collaborates with selected suppliers, including the Polish Corotop factory in Chrzęstowice (PL), where the membranes covered by this declaration are manufactured. Onduline monitors the requirements and quality of the supplied membranes, overseeing the entire technological process to ensure the highest quality roofing and facade membranes, as well as vapor barrier films. The membrane production process is based on cast extrusion of a polyolefin compound with additives, followed by material stretching using a Machine Direction Orientation (MDO) module. This enables precise control over the size of micropores, allowing for optimal adjustment of vapor permeability. Additionally, a production line for synthetic non-woven fabric has been launched, enabling the manufacture of 2- and 3-layer membranes with varying levels of vapor permeability. A technologically advanced machine park allows for the production of membranes that meet the highest European standards—from raw material to the finished product. Numerous certificates confirm compliance with strict industry criteria. The entire manufacturing process, from design to distribution, is carried out in Poland 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

Onduline markets underlay membranes under the **ONDUTISS®** brand. This product range encompasses membranes designed for roofing and façade applications, as well as foils for general construction purposes. These membranes are mainly used to protect structures and thermal insulation of roofs and walls against humidity, water, snow and draughts inside the building, as well as drive-off moisture from inside the building to the outside.

The **ONDUTISS®** range is divided into the following categories:

ONDUTISS® AIR:

These are breathable membranes for roofing, installed on the cold side of the roof beneath the primary roofing materials, such as clay or cement tiles, slates, or metal sheets. Their primary function is to evacuate moisture from the roof area through their breathability while ensuring watertightness during roofing works

and throughout the roof's lifecycle after tile installation. ONDUTISS® AIR membranes comply with EN 13859-1:2010, with several also conforming to EN 13859-2:2010.

ONDUTISS® FAÇADE:

These membranes are designed for façade applications and are installed on the cold side of the cladding. Their functions include facilitating the evacuation of moisture from the wall areas while ensuring watertightness during construction and throughout the building's lifecycle after the installation of cladding materials. ONDUTISS® FAÇADE membranes comply with EN 13859-2, with some products additionally conforming to EN 13859-1:2010.



Figure 1. Example of use of Ondutiss membrane

Membranes are composed of two or more layers made primarily from plastics, with polypropylene serving as the main material. The membranes also incorporate polyethylene and other plastics, with chalk being the primary additive by weight, influencing the membrane's properties. Additionally, small quantities (approximately 0.5%) of chemicals are included as flame retardants and stabilisers.

The picture illustrates the structure of the membranes, showcasing their multi-layered composition:

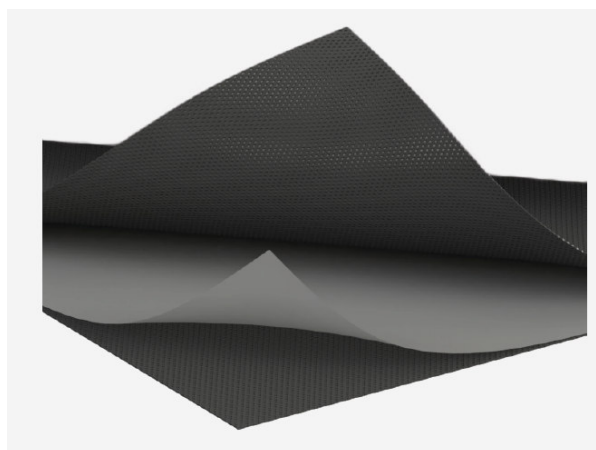


Figure 2 Construction of membrane

Upper Fleece: Provides mechanical and UV resistance for a greater durability of the membrane.

Inner layer: the Functional film serves both as a water barrier and breathability

Bottom fleece: Protects the functional film, providing mechanical performance.

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

Table 2 List of the products

	Ondutiss® PRODUCT TRADE NAMES	Weight g/m2	Structure	Product Group	PRODUCT CODES
1	Ondutiss® Air 110	110	Non-woven PP/ Functional film/Non-woven PP	Roof and Facade membrane	A0011050BSA20
2	Ondutiss® Air 135	135	Non-woven PP/ Functional film/Non-woven PP	Roof and Facade membrane	A0013550BSA20, A0213550BSA20
3	Ondutiss® Air 140	140	Non-woven PP/ Functional film/Non-woven PP	Roof and Facade membrane	A0014050BBSA20, A0014050ASA20
4	Ondutiss® Air 160	160	Non-woven PP/ Functional film/Non-woven PP	Roof and Facade membrane	A0016050BBSA20, A0016050ASA20
5	Ondutiss® Air 180	180	Non-woven PP/ Functional film/Non-woven PP	Roof and Facade membrane	A0018050BSA20, A0218050BSA20
6	Ondutiss® Air 220	220	Non-woven PP/ Functional film/Non-woven PP	Roof and Facade membrane	A0022050BSA20, A0122050BSA20, A0222050BSA20
7	Ondutiss® Air Power 250	250	Non-woven PP/ Functional film/Non-woven PP Needle Punch	Roof and Facade membrane	APG025050BSA20, APG225050BSA20
8	Ondutiss® Air HDV Resist R2 150	150	Non-woven PP/ Functional film/Non-woven PP	Roof and Facade membrane	A633901SA20, A2633901SA20,
9	Ondutiss® Air HDV Resist R3 190	190	Non-woven PP/ Functional film/Non-woven PP	Roof and Facade membrane	A635001SA20, A2635001SA20
10	Ondutiss® Facade 100	100	Non-woven PP/ Functional film/Non-woven PP	Roof and Facade membrane	B0010010027SA20, B0010050BSA20

The grammature is the nominal value

Production process

A Onduline 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 flowchart of the membrane manufacturing process:

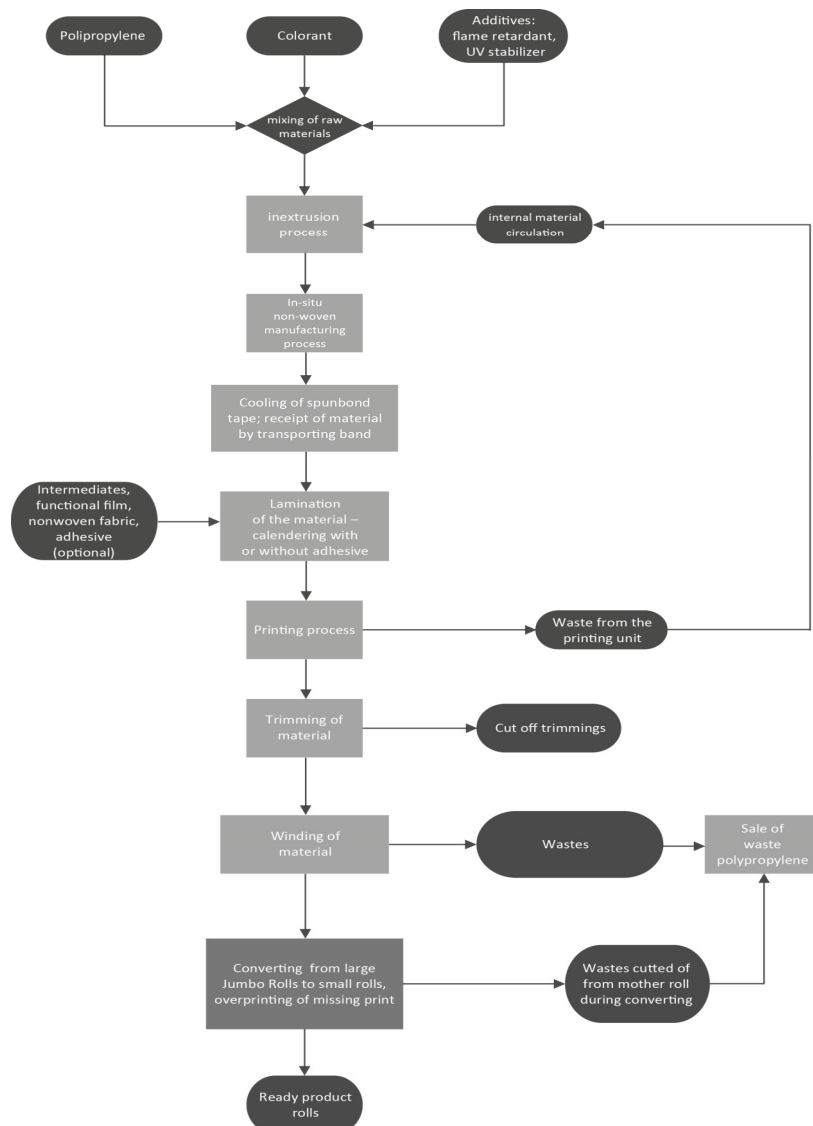


Figure 3 The production flowchart

Main product content

The composition of the membranes covered in this report is as follows:

Table 3 Bill Of Material

Name	Ondutiss® Air 110	Ondutiss® Air 135	Ondutiss® Air 140	Ondutiss® Air 160	Ondutiss® Air 180	Ondutiss® Air 220	Ondutiss® Air Power 250	Ondutiss® Air HDV Resist R2 150	Ondutiss® Air HDV Resist R3 190	Ondutiss® Facade 100
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
Mixed plastics (mainly PP)	0,9544	0,9736	0,9572	0,9635	0,9632	0,9931	1,0375	0,9779	0,9949	0,8935
Minerals	0,1401	0,1275	0,1380	0,1444	0,1224	0,1035	0,0833	0,1020	0,0966	0,1962
Other additives	0,0117	0,0155	0,0207	0,0097	0,0264	0,0063	0,0062	0,0121	0,0057	0,0132
unit ->	% mass	% mass	% mass	% mass	% mass	% mass	% mass	% mass	% mass	% mass
Mixed plastics (mainly PP)	86,28%	87,19%	85,77%	86,21%	86,62%	90,05%	92,06%	89,55%	90,68%	81,02%
Minerals	12,67%	11,42%	12,37%	12,92%	11,01%	9,38%	7,39%	9,34%	8,81%	17,79%
Other additives	1,06%	1,39%	1,86%	0,87%	2,37%	0,57%	0,55%	1,11%	0,52%	1,20%
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 Onduline 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 m²) of membrane. The grammage varies from 100 g/m² to 250 g/m² 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 4 Modules declared

Product stage			Construction stage		Use Stage							End of Life				Benefits & 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
X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

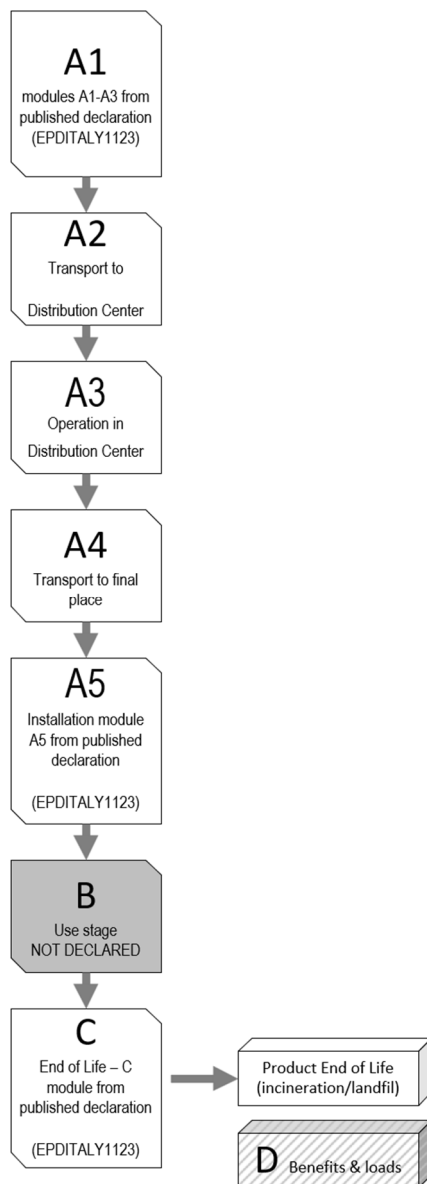


Figure 4 System boundaries

Table 5 LCA modules

Module	Description for Onduline membrane LCA
A1	The data are derived from the already published EPD of the manufacturer. Module A1 covers modules A1-A3 from the manufacturer's declaration – Declaration number EPD-COTOP-Membranes-Part-A-001, registration number EPDITALY1123.
A2	The calculations used a model of transport from manufacturing plant to distribution centers based on actual logistic data from Onduline system. The transport work was calculated on the basis of actual deliveries to the distribution centers based on logistics data (weighted average), including delivery distances taken from the Onduline billing system (>32 t, EURO 4, RER).

Module	Description for Onduline membrane LCA
A3	Finished membranes are delivered to the distribution center in packaging ready for shipment to end customers. As there are no additional packaging or labelling operations requiring energy or fuel consumption, the impact of this module can be considered insignificant.
A4	Transport between distribution centers and end customers has been adopted based on the European Commission's recommendation ¹ as 100% local: 250 km round trip by van (lorry <7.5 t, EURO 3).
A5	The data are derived from the already published EPD of the manufacturer – Declaration number EPD-COTOP-Membranes-Part-A-001, registration number EPDITALY1123. 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 incineration.
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 requirements, 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**:

¹ COMMISSION RECOMMENDATION (EU) 2021/2279 of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations

Table 6 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-terrestrial)	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 emissions (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 be used with care as uncertainties on these results are high or as there is limited experience 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 A2: The transport work was calculated on the basis of actual deliveries to the distribution centers based on logistics data, including delivery distances taken from the Onduline billing system (weighted average). Module A4 - transport between distribution centers and end customers has been adopted based on the European Commission's recommendation 2. as 100% local: 250 km round trip by van (lorry <7.5 t, EURO 3).
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 .

² COMMISSION RECOMMENDATION (EU) 2021/2279 of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations

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 7 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 A3: Operations at the distribution centre were deemed insignificant and were excluded from the analysis.	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 8 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

Data Quality Rating

The LCA analysis used data that ensures authoritativeness and eliminates bias and uncertainty as much as possible. The best quality data available was used. Data quality was characterized by both quantitative and qualitative aspects.

The characterization of data quality addressed the following issues:

- (a) temporal scope: the age of the data and the minimum period over which the data should be collected;
- (b) geographic coverage: the geographic area from which unit process data should be collected to meet the purpose of the CFP study;
- (c) technology coverage: a specific technology or combination of technologies;
- (d) precision: a measure of the variability of each expressed data value (e.g., variance);

To assess the quality of the data, the DQR index was used, understood as an evaluation of the quality criteria of the dataset on the basis of technological, geographic, time-related representativeness and precision. The DQR index was estimated in accordance with the European Commission Recommendation EU 2021/2279 according to the formula.

$$DQR = \frac{TeR + GeR + TiR + P}{4}$$

Where the respective symbols stand for:

TeR - Technological Representativeness

GeR - Geographical Representativeness

TiR - Time-related Representativeness

P – Precision

The table summarizes the indicators and values used to assess data quality

Table 9 Data quality criteria and indicators

DQR Data quality level	DQL Data quality level	Overall DQR	Overall data quality level
1	Excellent	$DQR \leq 1,5$	Excellent quality
2	Very Good	$1,5 < DQR \leq 2,0$	Very Good quality
3	Good	$2,0 < DQR \leq 3,0$	Good quality
4	Fair	$3 < DQR \leq 4,0$	Fair quality
5	Poor	$DQR > 4$	Poor quality

In order to determine the values of the indicators characterising the quality of the data, the descriptive parameter matrix used in SimPro software was used. This matrix coincides with the table presented in Annex E of the ISO 15804 standard, with the exception that it still contains an additional criterion related to the Precision parameter:

Table 10 Data quality criteria matrix

DQR	Time-related coverage (TeR)	Geographical coverage (GeR)	Technology coverage (TiR)	Precision (P)
1	Less than 3 years difference between the reference year according to the documentation, and the time period for which data are representative	Data from area under study	Data from processes and products under study. Same state of technology applied as defined in goal and scope (i.e. identical technology)	Verified data based on measurements
2	Less than 6 years of difference between the reference year according to the documentation, and the time period for which data are representative	Average data from larger area in which the area under study is included	Data from processes and products under study (with similar technology). Evidence of deviations in state of technology, e.g. different by-product.	Verified data partly based on assumptions or unverified data based on measurements
3	Less than 10 years of difference between the reference year according to the documentation, and the time period for which data are representative	Data from area with similar production conditions	Data from processes and products under study but from different technology. This score is also applied when not technology is specified; e.g. wheat (no further specification)	Unverified data partly based on qualified estimates
4	Less than 15 years of difference between the reference year according to the documentation, and the time period for which data are representative	Data from area with slightly similar production conditions	Data on related processes or products; organic wheat under study, data for organic rye provided.	Qualified assessment (e.g. by an industry expert)
5	Age of data unknown or more than 15 years of difference between the	Data from unknown or distinctly different area (North America instead of Middle East, OECD-	Data on related processes on but with a different scale or from different technology;	Non-qualified estimate

	reference year according to the documentation, and the time period for which data are representative	Europe instead of Russia)	organic wheat under study, data for conventional wheat provided.	
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The data used in quantification should be selected to eliminate bias and uncertainty to the maximum extent possible. Site-specific data should be used for those unit processes that are most important. The most important processes are understood to be those processes that collectively contribute at least 80% to the CFP from the largest to the smallest contributions after applying cut-off criteria.

Quantitative assessment of data quality has been carried out on the basis of the contribution of the individual footprint components listed below, which together account for 90% of the total footprint:

Module	Process	Time-related coverage (TeR)	Geographical coverage (GeR)	Technology coverage (TiR)	Precision (P)
C4, D	Municipal solid waste {RoW} treatment of municipal solid waste, incineration Cut-off, S	1	1	1	1
A1	Polypropylene, granulate {RER} polypropylene production, granulate Cut-off, S	3	1	1	1
A1	Textile, nonwoven polypropylene {GLO} market for textile, nonwoven polypropylene Cut-off, S	2	2	1	1
A3, D	Electricity, high voltage {CZ} electricity production, hard coal Cut-off, S	2	3	2	2
A2, A3, A4	Transport, freight, lorry 16-32 metric ton, EURO4 {RER} transport, freight, lorry 16-32 metric ton, EURO4 Cut-off, S	1	1	1	3
A1	Textile, nonwoven polyester {GLO} market for textile, nonwoven polyester Cut-off, S	2	2	1	1
A3, D	Electricity, high voltage {PL} electricity production, lignite Cut-off, S	3	1	2	1
Average value		2,00	1,57	1,29	1,43
DQR		1,57	Very good quality		

5. D.1 LCA results

Below are tables with the calculation results related to the declared unit, i.e. one square meter (1 m²), 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 11. Ondutiss® Air 110

Membrane: Ondutiss® Air 110												
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change	kg CO2 eq	3,35E-01	2,49E-02	0,00E+00	3,35E-01	2,18E-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	3,32E-01	2,49E-02	0,00E+00	3,32E-01	2,18E-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	1,74E-03	1,53E-05	0,00E+00	1,74E-03	1,01E-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	1,06E-03	9,00E-06	0,00E+00	1,06E-03	8,11E-06	4,22E-05	0,00E+00	1,13E-06	0,00E+00	2,22E-06	-1,44E-04
Ozone depletion	kg CFC11 eq	4,30E-09	5,48E-10	0,00E+00	4,30E-09	4,76E-10	1,02E-07	0,00E+00	5,36E-11	0,00E+00	8,52E-11	-4,38E-09
Acidification	mol H+ eq	1,56E-03	1,02E-04	0,00E+00	1,56E-03	1,14E-04	2,19E-04	0,00E+00	9,60E-06	0,00E+00	2,57E-05	-3,16E-04
Eutrophication, freshwater	kg P eq	1,31E-04	1,77E-06	0,00E+00	1,31E-04	1,78E-06	1,34E-05	0,00E+00	1,70E-07	0,00E+00	2,97E-06	-3,93E-05
Eutrophication, marine	kg N eq	2,80E-04	3,80E-05	0,00E+00	2,80E-04	4,58E-05	1,68E-04	0,00E+00	3,64E-06	0,00E+00	9,77E-05	-6,86E-05
Eutrophication, terrestrial	mol N eq	2,75E-03	4,15E-04	0,00E+00	2,75E-03	5,00E-04	5,74E-04	0,00E+00	3,89E-05	0,00E+00	1,02E-04	-6,17E-04
Photochemical ozone formation	kg NMVOC eq	1,12E-03	1,57E-04	0,00E+00	1,12E-03	1,64E-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	1,28E-06	7,04E-08	0,00E+00	1,28E-06	1,01E-07	2,87E-07	0,00E+00	7,85E-09	0,00E+00	7,07E-09	-1,89E-07
Resource use, fossils	MJ	8,89E+00	2,90E-02	0,00E+00	8,89E+00	2,85E-02	7,20E-01	0,00E+00	3,46E-02	0,00E+00	3,41E-02	-1,93E+00
Water use	m3 depriv.	1,37E-01	1,67E-03	0,00E+00	1,37E-01	1,21E-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.	1,23E-08	4,11E-04	0,00E+00	1,23E-08	5,55E-04	2,78E-09	0,00E+00	1,72E-10	0,00E+00	2,69E-10	-2,13E-09
Ionising radiation	kBq U-235 eq	1,59E-02	2,26E-02	0,00E+00	1,59E-02	3,42E-02	2,30E-03	0,00E+00	5,60E-05	0,00E+00	9,24E-05	-2,54E-02
Ecotoxicity, freshwater	CTUe	9,08E-01	2,04E-02	0,00E+00	9,08E-01	2,11E-02	4,41E-01	0,00E+00	1,75E-02	0,00E+00	2,45E-01	-6,69E-01
Human toxicity, cancer	CTUh	1,30E-10	2,36E-10	0,00E+00	1,30E-10	2,25E-10	4,51E-11	0,00E+00	9,82E-12	0,00E+00	9,78E-12	-1,12E-10
Human toxicity, non-cancer	CTUh	2,78E-09	3,69E-01	0,00E+00	2,78E-09	1,26E-01	6,76E-10	0,00E+00	2,19E-10	0,00E+00	3,52E-10	-5,90E-10
Land use	Pt	6,85E-01	1,90E-05	0,00E+00	6,85E-01	1,36E-05	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	2,42E-01	5,66E-03	0,00E+00	2,42E-01	6,94E-03	4,46E-02	0,00E+00	6,05E-04	0,00E+00	1,39E-03	-1,79E-01
PERM	MJ	3,51E-03	0,00E+00	0,00E+00	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	2,46E-01	5,66E-03	0,00E+00	2,46E-01	6,94E-03	4,46E-02	0,00E+00	6,05E-04	0,00E+00	1,39E-03	-1,79E-01
PENRE	MJ	5,50E+00	2,91E-02	0,00E+00	5,50E+00	2,86E-02	5,73E-01	0,00E+00	3,46E-02	0,00E+00	3,41E-02	-1,93E+00
PENRM	MJ	3,39E+00	0,00E+00	0,00E+00	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	8,89E+00	2,91E-02	0,00E+00	8,89E+00	2,86E-02	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	4,18E-03	2,44E-06	0,00E+00	4,18E-03	2,12E-06	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	4,29E-04	3,16E-02	0,00E+00	4,29E-04	9,44E-03	8,19E-03	0,00E+00	7,94E-07	0,00E+00	1,23E-02	-3,69E-05
Non-hazardous waste disposed (NHWD)	kg	3,32E-02	1,01E-07	0,00E+00	3,32E-02	1,38E-07	8,06E-02	0,00E+00	1,43E-03	0,00E+00	5,28E-02	-4,98E-03
Radioactive waste disposed (RWD)	kg	4,00E-06	0,00E+00	0,00E+00	4,00E-06	0,00E+00	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 Ondutiss® Air 135

Membrane: Ondutiss® Air 135												
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change	kg CO2 eq	3,94E-01	2,49E-02	0,00E+00	3,94E-01	2,18E-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	3,91E-01	2,49E-02	0,00E+00	3,91E-01	2,18E-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	2,07E-03	1,53E-05	0,00E+00	2,07E-03	1,01E-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	1,10E-03	9,00E-06	0,00E+00	1,10E-03	8,11E-06	4,25E-05	0,00E+00	1,29E-06	0,00E+00	2,54E-06	-1,67E-04
Ozone depletion	kg CFC11 eq	5,08E-09	5,48E-10	0,00E+00	5,08E-09	4,76E-10	1,02E-07	0,00E+00	6,13E-11	0,00E+00	9,74E-11	-5,07E-09
Acidification	mol H+ eq	1,84E-03	1,02E-04	0,00E+00	1,84E-03	1,14E-04	2,22E-04	0,00E+00	1,10E-05	0,00E+00	2,93E-05	-3,67E-04
Eutrophication, freshwater	kg P eq	1,53E-04	1,77E-06	0,00E+00	1,53E-04	1,78E-06	1,37E-05	0,00E+00	1,94E-07	0,00E+00	3,39E-06	-4,59E-05
Eutrophication, marine	kg N eq	3,32E-04	3,80E-05	0,00E+00	3,32E-04	4,58E-05	1,86E-04	0,00E+00	4,16E-06	0,00E+00	1,12E-04	-7,96E-05
Eutrophication, terrestrial	mol N eq	3,28E-03	4,15E-04	0,00E+00	3,28E-03	5,00E-04	5,86E-04	0,00E+00	4,44E-05	0,00E+00	1,16E-04	-7,16E-04
Photochemical ozone formation	kg NMVOC eq	1,32E-03	1,57E-04	0,00E+00	1,32E-03	1,64E-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	1,50E-06	7,04E-08	0,00E+00	1,50E-06	1,01E-07	2,88E-07	0,00E+00	8,97E-09	0,00E+00	8,08E-09	-2,18E-07
Resource use, fossils	MJ	1,04E+01	2,90E-02	0,00E+00	1,04E+01	2,85E-02	7,25E-01	0,00E+00	3,96E-02	0,00E+00	3,90E-02	-2,25E+00
Water use	m3 depriv.	1,52E-01	1,67E-03	0,00E+00	1,52E-01	1,21E-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.	1,46E-08	4,11E-04	0,00E+00	1,46E-08	5,55E-04	2,82E-09	0,00E+00	1,97E-10	0,00E+00	3,07E-10	-2,45E-09
Ionising radiation	kBq U-235 eq	1,86E-02	2,26E-02	0,00E+00	1,86E-02	3,42E-02	2,31E-03	0,00E+00	6,40E-05	0,00E+00	1,06E-04	-2,97E-02
Ecotoxicity, freshwater	CTUe	1,08E+00	2,04E-02	0,00E+00	1,08E+00	2,11E-02	4,77E-01	0,00E+00	2,00E-02	0,00E+00	2,81E-01	-7,68E-01
Human toxicity, cancer	CTUh	1,52E-10	2,36E-10	0,00E+00	1,52E-10	2,25E-10	4,62E-11	0,00E+00	9,82E-12	0,00E+00	1,12E-11	-1,28E-10
Human toxicity, non-cancer	CTUh	3,28E-09	3,69E-01	0,00E+00	3,28E-09	1,26E-01	7,17E-10	0,00E+00	2,19E-10	0,00E+00	4,02E-10	-6,83E-10
Land use	Pt	8,05E-01	1,90E-05	0,00E+00	8,05E-01	1,36E-05	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	2,84E-01	5,66E-03	0,00E+00	2,84E-01	6,94E-03	4,48E-02	0,00E+00	6,92E-04	0,00E+00	1,58E-03	-2,09E-01
PERM	MJ	4,01E-03	0,00E+00	0,00E+00	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	2,88E-01	5,66E-03	0,00E+00	2,88E-01	6,94E-03	4,48E-02	0,00E+00	6,92E-04	0,00E+00	1,58E-03	-2,09E-01
PENRE	MJ	6,44E+00	2,91E-02	0,00E+00	6,44E+00	2,86E-02	5,78E-01	0,00E+00	3,96E-02	0,00E+00	3,90E-02	-2,25E+00
PENRM	MJ	3,96E+00	0,00E+00	0,00E+00	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	1,04E+01	2,91E-02	0,00E+00	1,04E+01	2,86E-02	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	4,75E-03	2,44E-06	0,00E+00	4,75E-03	2,12E-06	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	4,95E-04	3,16E-02	0,00E+00	4,95E-04	9,44E-03	9,35E-03	0,00E+00	9,07E-07	0,00E+00	1,40E-02	-4,29E-05
Non-hazardous waste disposed (NHWD)	kg	3,94E-02	1,01E-07	0,00E+00	3,94E-02	1,38E-07	9,07E-02	0,00E+00	1,63E-03	0,00E+00	6,03E-02	-5,77E-03
Radioactive waste disposed (RWD)	kg	4,67E-06	0,00E+00	0,00E+00	4,67E-06	0,00E+00	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 Ondutiss® Air 140

Membrane: Ondutiss® Air 140													
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D	
Climate change	kg CO2 eq	4,28E-01	2,49E-02	0,00E+00	4,28E-01	2,18E-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	4,25E-01	2,49E-02	0,00E+00	4,25E-01	2,18E-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	2,33E-03	1,53E-05	0,00E+00	2,33E-03	1,01E-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	1,11E-03	9,00E-06	0,00E+00	1,11E-03	8,11E-06	4,28E-05	0,00E+00	1,43E-06	0,00E+00	2,81E-06	-1,84E-04	
Ozone depletion	kg CFC11 eq	5,52E-09	5,48E-10	0,00E+00	5,52E-09	4,76E-10	1,02E-07	0,00E+00	6,79E-11	0,00E+00	1,08E-10	-5,59E-09	
Acidification	mol H+ eq	1,99E-03	1,02E-04	0,00E+00	1,99E-03	1,14E-04	2,25E-04	0,00E+00	1,22E-05	0,00E+00	3,25E-05	-4,04E-04	
Eutrophication, freshwater	kg P eq	1,67E-04	1,77E-06	0,00E+00	1,67E-04	1,78E-06	1,40E-05	0,00E+00	2,15E-07	0,00E+00	3,76E-06	-5,04E-05	
Eutrophication, marine	kg N eq	3,59E-04	3,80E-05	0,00E+00	3,59E-04	4,58E-05	2,02E-04	0,00E+00	4,61E-06	0,00E+00	1,24E-04	-8,77E-05	
Eutrophication, terrestrial	mol N eq	3,55E-03	4,15E-04	0,00E+00	3,55E-03	5,00E-04	5,96E-04	0,00E+00	4,92E-05	0,00E+00	1,29E-04	-7,88E-04	
Photochemical ozone formation	kg NMVOC eq	1,44E-03	1,57E-04	0,00E+00	1,44E-03	1,64E-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	1,63E-06	7,04E-08	0,00E+00	1,63E-06	1,01E-07	2,89E-07	0,00E+00	9,95E-09	0,00E+00	8,96E-09	-2,41E-07	
Resource use, fossils	MJ	1,13E+01	2,90E-02	0,00E+00	1,13E+01	2,85E-02	7,29E-01	0,00E+00	4,39E-02	0,00E+00	4,32E-02	-2,47E+00	
Water use	m3 depriv.	1,70E-01	1,67E-03	0,00E+00	1,70E-01	1,21E-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.	1,58E-08	4,11E-04	0,00E+00	1,58E-08	5,55E-04	2,85E-09	0,00E+00	2,18E-10	0,00E+00	3,40E-10	-2,71E-09	
Ionising radiation	kBq U-235 eq	2,03E-02	2,26E-02	0,00E+00	2,03E-02	3,42E-02	2,33E-03	0,00E+00	7,09E-05	0,00E+00	1,17E-04	-3,26E-02	
Ecotoxicity, freshwater	CTUe	1,16E+00	2,04E-02	0,00E+00	1,16E+00	2,11E-02	5,09E-01	0,00E+00	2,22E-02	0,00E+00	3,11E-01	-8,50E-01	
Human toxicity, cancer	CTUh	1,65E-10	2,36E-10	0,00E+00	1,65E-10	2,25E-10	4,72E-11	0,00E+00	9,82E-12	0,00E+00	1,24E-11	-1,42E-10	
Human toxicity, non-cancer	CTUh	3,56E-09	3,69E-01	0,00E+00	3,56E-09	1,26E-01	7,52E-10	0,00E+00	2,19E-10	0,00E+00	4,46E-10	-7,52E-10	
Land use	Pt	8,71E-01	1,90E-05	0,00E+00	8,71E-01	1,36E-05	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	3,08E-01	5,66E-03	0,00E+00	3,08E-01	6,94E-03	4,50E-02	0,00E+00	7,66E-04	0,00E+00	1,76E-03	-2,29E-01	
PERM	MJ	4,44E-03	0,00E+00	0,00E+00	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	3,12E-01	5,66E-03	0,00E+00	3,12E-01	6,94E-03	4,50E-02	0,00E+00	7,66E-04	0,00E+00	1,76E-03	-2,29E-01	
PENRE	MJ	6,98E+00	2,91E-02	0,00E+00	6,98E+00	2,86E-02	5,82E-01	0,00E+00	4,39E-02	0,00E+00	4,32E-02	-2,47E+00	
PENRM	MJ	4,35E+00	0,00E+00	0,00E+00	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	1,13E+01	2,91E-02	0,00E+00	1,13E+01	2,86E-02	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	5,25E-03	2,44E-06	0,00E+00	5,25E-03	2,12E-06	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	5,45E-04	3,16E-02	0,00E+00	5,45E-04	9,44E-03	1,03E-02	0,00E+00	1,01E-06	0,00E+00	1,55E-02	-4,72E-05	
Non-hazardous waste disposed (NHWD)	kg	4,26E-02	1,01E-07	0,00E+00	4,26E-02	1,38E-07	9,95E-02	0,00E+00	1,81E-03	0,00E+00	6,69E-02	-6,35E-03	
Radioactive waste disposed (RWD)	kg	5,09E-06	0,00E+00	0,00E+00	5,09E-06	0,00E+00	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 Ondutiss® Air 160

Membrane: Ondutiss® Air 160													
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D	
Climate change	kg CO2 eq	4,80E-01	2,49E-02	0,00E+00	4,80E-01	2,18E-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	4,76E-01	2,49E-02	0,00E+00	4,76E-01	2,18E-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	2,71E-03	1,53E-05	0,00E+00	2,71E-03	1,01E-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	1,12E-03	9,00E-06	0,00E+00	1,12E-03	8,11E-06	4,31E-05	0,00E+00	1,61E-06	0,00E+00	3,17E-06	-2,07E-04	
Ozone depletion	kg CFC11 eq	6,11E-09	5,48E-10	0,00E+00	6,11E-09	4,76E-10	1,02E-07	0,00E+00	7,66E-11	0,00E+00	1,22E-10	-6,30E-09	
Acidification	mol H+ eq	2,22E-03	1,02E-04	0,00E+00	2,22E-03	1,14E-04	2,29E-04	0,00E+00	1,37E-05	0,00E+00	3,67E-05	-4,54E-04	
Eutrophication, freshwater	kg P eq	1,87E-04	1,77E-06	0,00E+00	1,87E-04	1,78E-06	1,44E-05	0,00E+00	2,43E-07	0,00E+00	4,24E-06	-5,67E-05	
Eutrophication, marine	kg N eq	3,98E-04	3,80E-05	0,00E+00	3,98E-04	4,58E-05	2,23E-04	0,00E+00	5,20E-06	0,00E+00	1,40E-04	-9,87E-05	
Eutrophication, terrestrial	mol N eq	3,93E-03	4,15E-04	0,00E+00	3,93E-03	5,00E-04	6,10E-04	0,00E+00	5,55E-05	0,00E+00	1,45E-04	-8,87E-04	
Photochemical ozone formation	kg NMVOC eq	1,60E-03	1,57E-04	0,00E+00	1,60E-03	1,64E-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	1,83E-06	7,04E-08	0,00E+00	1,83E-06	1,01E-07	2,90E-07	0,00E+00	1,12E-08	0,00E+00	1,01E-08	-2,71E-07	
Resource use, fossils	MJ	1,28E+01	2,90E-02	0,00E+00	1,28E+01	2,85E-02	7,35E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,78E+00	
Water use	m3 depriv.	1,97E-01	1,67E-03	0,00E+00	1,97E-01	1,21E-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.	1,75E-08	4,11E-04	0,00E+00	1,75E-08	5,55E-04	2,89E-09	0,00E+00	2,46E-10	0,00E+00	3,84E-10	-3,05E-09	
Ionising radiation	kBq U-235 eq	2,28E-02	2,26E-02	0,00E+00	2,28E-02	3,42E-02	2,34E-03	0,00E+00	8,00E-05	0,00E+00	1,32E-04	-3,66E-02	
Ecotoxicity, freshwater	CTUe	1,26E+00	2,04E-02	0,00E+00	1,26E+00	2,11E-02	5,50E-01	0,00E+00	2,51E-02	0,00E+00	3,51E-01	-9,58E-01	
Human toxicity, cancer	CTUh	1,85E-10	2,36E-10	0,00E+00	1,85E-10	2,25E-10	4,84E-11	0,00E+00	9,82E-12	0,00E+00	1,40E-11	-1,60E-10	
Human toxicity, non-cancer	CTUh	3,96E-09	3,69E-01	0,00E+00	3,96E-09	1,26E-01	7,98E-10	0,00E+00	2,19E-10	0,00E+00	5,03E-10	-8,47E-10	
Land use	Pt	9,60E-01	1,90E-05	0,00E+00	9,60E-01	1,36E-05	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	3,42E-01	5,66E-03	0,00E+00	3,42E-01	6,94E-03	4,52E-02	0,00E+00	8,64E-04	0,00E+00	1,98E-03	-2,58E-01	
PERM	MJ	5,01E-03	0,00E+00	0,00E+00	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	3,47E-01	5,66E-03	0,00E+00	3,47E-01	6,94E-03	4,52E-02	0,00E+00	8,64E-04	0,00E+00	1,98E-03	-2,58E-01	
PENRE	MJ	7,89E+00	2,91E-02	0,00E+00	7,89E+00	2,86E-02	5,88E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,78E+00	
PENRM	MJ	4,89E+00	0,00E+00	0,00E+00	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	1,28E+01	2,91E-02	0,00E+00	1,28E+01	2,86E-02	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	5,97E-03	2,44E-06	0,00E+00	5,97E-03	2,12E-06	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	6,12E-04	3,16E-02	0,00E+00	6,12E-04	9,44E-03	1,17E-02	0,00E+00	1,13E-06	0,00E+00	1,75E-02	-5,32E-05	
Non-hazardous waste disposed (NHWD)	kg	4,69E-02	1,01E-07	0,00E+00	4,69E-02	1,38E-07	1,11E-01	0,00E+00	2,04E-03	0,00E+00	7,54E-02	-7,15E-03	
Radioactive waste disposed (RWD)	kg	5,73E-06	0,00E+00	0,00E+00	5,73E-06	0,00E+00	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 15 Ondutiss® Air 180

Membrane: Ondutiss® Air 180													
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D	
Climate change	kg CO2 eq	5,68E-01	2,49E-02	0,00E+00	5,68E-01	2,18E-02	2,08E-01	0,00E+00	4,08E-03	0,00E+00	1,84E-01	-1,70E-01	
Climate change - Fossil	kg CO2 eq	5,63E-01	2,49E-02	0,00E+00	5,63E-01	2,18E-02	7,62E-02	0,00E+00	4,08E-03	0,00E+00	5,25E-02	-1,68E-01	
Climate change - Biogenic	kg CO2 eq	3,21E-03	1,53E-05	0,00E+00	3,21E-03	1,01E-05	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	1,17E-03	9,00E-06	0,00E+00	1,17E-03	8,11E-06	4,37E-05	0,00E+00	1,88E-06	0,00E+00	3,70E-06	-2,43E-04	
Ozone depletion	kg CFC11 eq	7,30E-09	5,48E-10	0,00E+00	7,30E-09	4,76E-10	1,02E-07	0,00E+00	8,94E-11	0,00E+00	1,42E-10	-7,40E-09	
Acidification	mol H+ eq	2,64E-03	1,02E-04	0,00E+00	2,64E-03	1,14E-04	2,34E-04	0,00E+00	1,60E-05	0,00E+00	4,28E-05	-5,35E-04	
Eutrophication, freshwater	kg P eq	2,21E-04	1,77E-06	0,00E+00	2,21E-04	1,78E-06	1,50E-05	0,00E+00	2,83E-07	0,00E+00	4,95E-06	-6,69E-05	
Eutrophication, marine	kg N eq	4,77E-04	3,80E-05	0,00E+00	4,77E-04	4,58E-05	2,53E-04	0,00E+00	6,07E-06	0,00E+00	1,63E-04	-1,16E-04	
Eutrophication, terrestrial	mol N eq	4,72E-03	4,15E-04	0,00E+00	4,72E-03	5,00E-04	6,30E-04	0,00E+00	6,48E-05	0,00E+00	1,70E-04	-1,04E-03	
Photochemical ozone formation	kg NMVOC eq	1,90E-03	1,57E-04	0,00E+00	1,90E-03	1,64E-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	2,15E-06	7,04E-08	0,00E+00	2,15E-06	1,01E-07	2,91E-07	0,00E+00	1,31E-08	0,00E+00	1,18E-08	-3,18E-07	
Resource use, fossils	MJ	1,50E+01	2,90E-02	0,00E+00	1,50E+01	2,85E-02	7,43E-01	0,00E+00	5,77E-02	0,00E+00	5,69E-02	-3,28E+00	
Water use	m3 depriv.	2,19E-01	1,67E-03	0,00E+00	2,19E-01	1,21E-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.	2,09E-08	4,11E-04	0,00E+00	2,09E-08	5,55E-04	2,95E-09	0,00E+00	2,87E-10	0,00E+00	4,48E-10	-3,58E-09	
Ionising radiation	kBq U-235 eq	2,67E-02	2,26E-02	0,00E+00	2,67E-02	3,42E-02	2,37E-03	0,00E+00	9,33E-05	0,00E+00	1,54E-04	-4,33E-02	
Ecotoxicity, freshwater	CTUe	1,52E+00	2,04E-02	0,00E+00	1,52E+00	2,11E-02	6,10E-01	0,00E+00	2,92E-02	0,00E+00	4,09E-01	-1,12E+00	
Human toxicity, cancer	CTUh	2,18E-10	2,36E-10	0,00E+00	2,18E-10	2,25E-10	5,02E-11	0,00E+00	9,82E-12	0,00E+00	1,63E-11	-1,87E-10	
Human toxicity, non-cancer	CTUh	4,72E-09	3,69E-01	0,00E+00	4,72E-09	1,26E-01	8,66E-10	0,00E+00	2,19E-10	0,00E+00	5,87E-10	-9,96E-10	
Land use	Pt	1,14E+00	1,90E-05	0,00E+00	1,14E+00	1,36E-05	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	4,05E-01	5,66E-03	0,00E+00	4,05E-01	6,94E-03	4,56E-02	0,00E+00	1,01E-03	0,00E+00	2,31E-03	-3,05E-01	
PERM	MJ	5,85E-03	0,00E+00	0,00E+00	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	4,10E-01	5,66E-03	0,00E+00	4,10E-01	6,94E-03	4,56E-02	0,00E+00	1,01E-03	0,00E+00	2,31E-03	-3,05E-01	
PENRE	MJ	9,21E+00	2,91E-02	0,00E+00	9,21E+00	2,86E-02	5,96E-01	0,00E+00	5,77E-02	0,00E+00	5,69E-02	-3,28E+00	
PENRM	MJ	5,78E+00	0,00E+00	0,00E+00	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	1,50E+01	2,91E-02	0,00E+00	1,50E+01	2,86E-02	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	6,85E-03	2,44E-06	0,00E+00	6,85E-03	2,12E-06	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	7,18E-04	3,16E-02	0,00E+00	7,18E-04	9,44E-03	1,36E-02	0,00E+00	1,32E-06	0,00E+00	2,04E-02	-6,27E-05	
Non-hazardous waste disposed (NHWD)	kg	5,60E-02	1,01E-07	0,00E+00	5,60E-02	1,38E-07	1,28E-01	0,00E+00	2,38E-03	0,00E+00	8,80E-02	-8,42E-03	
Radioactive waste disposed (RWD)	kg	6,70E-06	0,00E+00	0,00E+00	6,70E-06	0,00E+00	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 16 Ondutiss® Air 220

Membrane: Ondutiss® Air 220													
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D	
Climate change	kg CO2 eq	6,78E-01	2,49E-02	0,00E+00	6,78E-01	2,18E-02	2,37E-01	0,00E+00	4,78E-03	0,00E+00	2,16E-01	-2,02E-01	
Climate change - Fossil	kg CO2 eq	6,74E-01	2,49E-02	0,00E+00	6,74E-01	2,18E-02	8,27E-02	0,00E+00	4,78E-03	0,00E+00	6,15E-02	-1,98E-01	
Climate change - Biogenic	kg CO2 eq	4,35E-03	1,53E-05	0,00E+00	4,35E-03	1,01E-05	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	3,15E-04	9,00E-06	0,00E+00	3,15E-04	8,11E-06	4,43E-05	0,00E+00	2,20E-06	0,00E+00	4,34E-06	-2,87E-04	
Ozone depletion	kg CFC11 eq	8,59E-09	5,48E-10	0,00E+00	8,59E-09	4,76E-10	1,02E-07	0,00E+00	1,05E-10	0,00E+00	1,66E-10	-8,74E-09	
Acidification	mol H+ eq	3,11E-03	1,02E-04	0,00E+00	3,11E-03	1,14E-04	2,41E-04	0,00E+00	1,87E-05	0,00E+00	5,01E-05	-6,32E-04	
Eutrophication, freshwater	kg P eq	2,62E-04	1,77E-06	0,00E+00	2,62E-04	1,78E-06	1,58E-05	0,00E+00	3,31E-07	0,00E+00	5,79E-06	-7,93E-05	
Eutrophication, marine	kg N eq	5,68E-04	3,80E-05	0,00E+00	5,68E-04	4,58E-05	2,90E-04	0,00E+00	7,11E-06	0,00E+00	1,91E-04	-1,37E-04	
Eutrophication, terrestrial	mol N eq	5,66E-03	4,15E-04	0,00E+00	5,66E-03	5,00E-04	6,54E-04	0,00E+00	7,59E-05	0,00E+00	1,99E-04	-1,23E-03	
Photochemical ozone formation	kg NMVOC eq	2,27E-03	1,57E-04	0,00E+00	2,27E-03	1,64E-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	2,55E-06	7,04E-08	0,00E+00	2,55E-06	1,01E-07	2,93E-07	0,00E+00	1,53E-08	0,00E+00	1,38E-08	-3,73E-07	
Resource use, fossils	MJ	1,80E+01	2,90E-02	0,00E+00	1,80E+01	2,85E-02	7,53E-01	0,00E+00	6,76E-02	0,00E+00	6,66E-02	-3,88E+00	
Water use	m3 depriv.	2,54E-01	1,67E-03	0,00E+00	2,54E-01	1,21E-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.	2,50E-08	4,11E-04	0,00E+00	2,50E-08	5,55E-04	3,03E-09	0,00E+00	3,36E-10	0,00E+00	5,25E-10	-4,21E-09	
Ionising radiation	kBq U-235 eq	3,16E-02	2,26E-02	0,00E+00	3,16E-02	3,42E-02	2,40E-03	0,00E+00	1,09E-04	0,00E+00	1,80E-04	-5,13E-02	
Ecotoxicity, freshwater	CTUe	1,73E+00	2,04E-02	0,00E+00	1,73E+00	2,11E-02	6,83E-01	0,00E+00	3,42E-02	0,00E+00	4,79E-01	-1,32E+00	
Human toxicity, cancer	CTUh	2,57E-10	2,36E-10	0,00E+00	2,57E-10	2,25E-10	5,24E-11	0,00E+00	9,82E-12	0,00E+00	1,91E-11	-2,19E-10	
Human toxicity, non-cancer	CTUh	5,60E-09	3,69E-01	0,00E+00	5,60E-09	1,26E-01	9,47E-10	0,00E+00	2,19E-10	0,00E+00	6,87E-10	-1,18E-09	
Land use	Pt	1,30E+00	1,90E-05	0,00E+00	1,30E+00	1,36E-05	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	4,70E-01	5,66E-03	0,00E+00	4,70E-01	6,94E-03	4,60E-02	0,00E+00	1,18E-03	0,00E+00	2,71E-03	-3,61E-01	
PERM	MJ	6,85E-03	0,00E+00	0,00E+00	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	4,77E-01	5,66E-03	0,00E+00	4,77E-01	6,94E-03	4,60E-02	0,00E+00	1,18E-03	0,00E+00	2,71E-03	-3,61E-01	
PENRE	MJ	1,12E+01	2,91E-02	0,00E+00	1,12E+01	2,86E-02	6,06E-01	0,00E+00	6,76E-02	0,00E+00	6,66E-02	-3,88E+00	
PENRM	MJ	6,86E+00	0,00E+00	0,00E+00	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	1,80E+01	2,91E-02	0,00E+00	1,80E+01	2,86E-02	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	7,97E-03	2,44E-06	0,00E+00	7,97E-03	2,12E-06	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	8,42E-04	3,16E-02	0,00E+00	8,42E-04	9,44E-03	1,59E-02	0,00E+00	1,55E-06	0,00E+00	2,39E-02	-7,41E-05	
Non-hazardous waste disposed (NHWD)	kg	6,49E-02	1,01E-07	0,00E+00	6,49E-02	1,38E-07	1,48E-01	0,00E+00	2,79E-03	0,00E+00	1,03E-01	-9,94E-03	
Radioactive waste disposed (RWD)	kg	7,93E-06	0,00E+00	0,00E+00	7,93E-06	0,00E+00	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 17 Ondutiss® Air Power 250

Membrane: Ondutiss® Air Power 250												
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change	kg CO2 eq	9,19E-01	2,49E-02	0,00E+00	9,44E-01	2,18E-02	2,60E-01	0,00E+00	5,34E-03	0,00E+00	2,41E-01	-2,29E-01
Climate change - Fossil	kg CO2 eq	9,14E-01	2,49E-02	0,00E+00	9,39E-01	2,18E-02	8,79E-02	0,00E+00	5,34E-03	0,00E+00	6,87E-02	-2,25E-01
Climate change - Biogenic	kg CO2 eq	4,12E-03	1,53E-05	0,00E+00	4,14E-03	1,01E-05	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	1,53E-03	9,00E-06	0,00E+00	1,54E-03	8,11E-06	4,48E-05	0,00E+00	2,46E-06	0,00E+00	4,84E-06	-3,26E-04
Ozone depletion	kg CFC11 eq	1,31E-08	5,48E-10	0,00E+00	1,37E-08	4,76E-10	1,02E-07	0,00E+00	1,17E-10	0,00E+00	1,86E-10	-9,87E-09
Acidification	mol H+ eq	4,44E-03	1,02E-04	0,00E+00	4,55E-03	1,14E-04	2,46E-04	0,00E+00	2,09E-05	0,00E+00	5,60E-05	-7,16E-04
Eutrophication, freshwater	kg P eq	3,51E-04	1,77E-06	0,00E+00	3,53E-04	1,78E-06	1,63E-05	0,00E+00	3,70E-07	0,00E+00	6,47E-06	-9,02E-05
Eutrophication, marine	kg N eq	8,47E-04	3,80E-05	0,00E+00	8,85E-04	4,58E-05	3,19E-04	0,00E+00	7,95E-06	0,00E+00	2,13E-04	-1,55E-04
Eutrophication, terrestrial	mol N eq	8,55E-03	4,15E-04	0,00E+00	8,96E-03	5,00E-04	6,73E-04	0,00E+00	8,47E-05	0,00E+00	2,22E-04	-1,40E-03
Photochemical ozone formation	kg NMVOC eq	3,22E-03	1,57E-04	0,00E+00	3,37E-03	1,64E-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	3,62E-06	7,04E-08	0,00E+00	3,69E-06	1,01E-07	2,95E-07	0,00E+00	1,71E-08	0,00E+00	1,54E-08	-4,19E-07
Resource use, fossils	MJ	2,24E+01	2,90E-02	0,00E+00	2,24E+01	2,85E-02	7,61E-01	0,00E+00	7,56E-02	0,00E+00	7,44E-02	-4,40E+00
Water use	m3 depriv.	1,97E-01	1,67E-03	0,00E+00	1,99E-01	1,21E-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.	3,65E-08	4,11E-04	0,00E+00	4,11E-04	5,55E-04	3,09E-09	0,00E+00	3,76E-10	0,00E+00	5,86E-10	-4,74E-09
Ionising radiation	kBq U-235 eq	4,26E-02	2,26E-02	0,00E+00	6,52E-02	3,42E-02	2,42E-03	0,00E+00	1,22E-04	0,00E+00	2,02E-04	-5,85E-02
Ecotoxicity, freshwater	CTUe	3,06E+00	2,04E-02	0,00E+00	3,08E+00	2,11E-02	7,40E-01	0,00E+00	3,83E-02	0,00E+00	5,35E-01	-1,47E+00
Human toxicity, cancer	CTUh	3,52E-10	2,36E-10	0,00E+00	5,88E-10	2,25E-10	5,41E-11	0,00E+00	9,82E-12	0,00E+00	2,13E-11	-2,46E-10
Human toxicity, non-cancer	CTUh	8,18E-09	3,69E-01	0,00E+00	3,69E-01	1,26E-01	1,01E-09	0,00E+00	2,19E-10	0,00E+00	7,68E-10	-1,33E-09
Land use	Pt	2,04E+00	1,90E-05	0,00E+00	2,04E+00	1,36E-05	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	6,84E-01	5,66E-03	0,00E+00	6,90E-01	6,94E-03	4,63E-02	0,00E+00	1,32E-03	0,00E+00	3,02E-03	-4,11E-01
PERM	MJ	7,65E-03	0,00E+00	0,00E+00	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	6,92E-01	5,66E-03	0,00E+00	6,97E-01	6,94E-03	4,63E-02	0,00E+00	1,32E-03	0,00E+00	3,02E-03	-4,11E-01
PENRE	MJ	1,46E+01	2,91E-02	0,00E+00	1,47E+01	2,86E-02	6,14E-01	0,00E+00	7,56E-02	0,00E+00	7,44E-02	-4,40E+00
PENRM	MJ	7,79E+00	0,00E+00	0,00E+00	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	2,24E+01	2,91E-02	0,00E+00	2,24E+01	2,86E-02	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	8,92E-03	2,44E-06	0,00E+00	8,92E-03	2,12E-06	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	1,03E-03	3,16E-02	0,00E+00	3,27E-02	9,44E-03	1,77E-02	0,00E+00	1,73E-06	0,00E+00	2,67E-02	-8,41E-05
Non-hazardous waste disposed (NHWD)	kg	1,04E-01	1,01E-07	0,00E+00	1,04E-01	1,38E-07	1,64E-01	0,00E+00	3,11E-03	0,00E+00	1,15E-01	-1,12E-02
Radioactive waste disposed (RWD)	kg	1,05E-05	0,00E+00	0,00E+00	1,05E-05	0,00E+00	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

Table 18 Ondutiss® Air HDV Resist R2 150

Membrane: Ondutiss® Air HDV Resist R2 150													
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D	
Climate change	kg CO2 eq	5,28E-01	2,49E-02	0,00E+00	5,28E-01	2,18E-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	5,24E-01	2,49E-02	0,00E+00	5,24E-01	2,18E-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	2,66E-03	1,53E-05	0,00E+00	2,66E-03	1,01E-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	1,21E-03	9,00E-06	0,00E+00	1,21E-03	8,11E-06	4,31E-05	0,00E+00	1,61E-06	0,00E+00	3,17E-06	-2,08E-04	
Ozone depletion	kg CFC11 eq	7,14E-09	5,48E-10	0,00E+00	7,14E-09	4,76E-10	1,02E-07	0,00E+00	7,66E-11	0,00E+00	1,22E-10	-6,34E-09	
Acidification	mol H+ eq	2,51E-03	1,02E-04	0,00E+00	2,51E-03	1,14E-04	2,29E-04	0,00E+00	1,37E-05	0,00E+00	3,67E-05	-4,58E-04	
Eutrophication, freshwater	kg P eq	2,05E-04	1,77E-06	0,00E+00	2,05E-04	1,78E-06	1,44E-05	0,00E+00	2,43E-07	0,00E+00	4,24E-06	-5,73E-05	
Eutrophication, marine	kg N eq	4,64E-04	3,80E-05	0,00E+00	4,64E-04	4,58E-05	2,23E-04	0,00E+00	5,20E-06	0,00E+00	1,40E-04	-9,95E-05	
Eutrophication, terrestrial	mol N eq	4,63E-03	4,15E-04	0,00E+00	4,63E-03	5,00E-04	6,10E-04	0,00E+00	5,55E-05	0,00E+00	1,45E-04	-8,94E-04	
Photochemical ozone formation	kg NMVOC eq	1,80E-03	1,57E-04	0,00E+00	1,80E-03	1,64E-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	2,01E-06	7,04E-08	0,00E+00	2,01E-06	1,01E-07	2,90E-07	0,00E+00	1,12E-08	0,00E+00	1,01E-08	-2,72E-07	
Resource use, fossils	MJ	1,34E+01	2,90E-02	0,00E+00	1,34E+01	2,85E-02	7,35E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,81E+00	
Water use	m3 depriv.	1,59E-01	1,67E-03	0,00E+00	1,59E-01	1,21E-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.	2,03E-08	4,11E-04	0,00E+00	2,03E-08	5,55E-04	2,89E-09	0,00E+00	2,46E-10	0,00E+00	3,84E-10	-3,07E-09	
Ionising radiation	kBq U-235 eq	2,44E-02	2,26E-02	0,00E+00	2,44E-02	3,42E-02	2,34E-03	0,00E+00	8,00E-05	0,00E+00	1,32E-04	-3,70E-02	
Ecotoxicity, freshwater	CTUe	1,56E+00	2,04E-02	0,00E+00	1,56E+00	2,11E-02	5,50E-01	0,00E+00	2,51E-02	0,00E+00	3,51E-01	-9,60E-01	
Human toxicity, cancer	CTUh	2,04E-10	2,36E-10	0,00E+00	2,04E-10	2,25E-10	4,84E-11	0,00E+00	9,82E-12	0,00E+00	1,40E-11	-1,60E-10	
Human toxicity, non-cancer	CTUh	4,51E-09	3,69E-01	0,00E+00	4,51E-09	1,26E-01	7,98E-10	0,00E+00	2,19E-10	0,00E+00	5,03E-10	-8,53E-10	
Land use	Pt	1,12E+00	1,90E-05	0,00E+00	1,12E+00	1,36E-05	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	3,84E-01	5,66E-03	0,00E+00	3,84E-01	6,94E-03	4,52E-02	0,00E+00	8,64E-04	0,00E+00	1,98E-03	-2,61E-01	
PERM	MJ	5,01E-03	0,00E+00	0,00E+00	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	3,89E-01	5,66E-03	0,00E+00	3,89E-01	6,94E-03	4,52E-02	0,00E+00	8,64E-04	0,00E+00	1,98E-03	-2,61E-01	
PENRE	MJ	8,50E+00	2,91E-02	0,00E+00	8,50E+00	2,86E-02	5,88E-01	0,00E+00	4,95E-02	0,00E+00	4,87E-02	-2,81E+00	
PENRM	MJ	4,95E+00	0,00E+00	0,00E+00	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	1,34E+01	2,91E-02	0,00E+00	1,34E+01	2,86E-02	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	5,66E-03	2,44E-06	0,00E+00	5,66E-03	2,12E-06	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	6,37E-04	3,16E-02	0,00E+00	6,37E-04	9,44E-03	1,17E-02	0,00E+00	1,13E-06	0,00E+00	1,75E-02	-5,36E-05	
Non-hazardous waste disposed (NHWD)	kg	5,66E-02	1,01E-07	0,00E+00	5,66E-02	1,38E-07	1,11E-01	0,00E+00	2,04E-03	0,00E+00	7,54E-02	-7,21E-03	
Radioactive waste disposed (RWD)	kg	6,09E-06	0,00E+00	0,00E+00	6,09E-06	0,00E+00	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 19 Ondutiss® Air HDV Resist R3 190

Membrane: Ondutiss® Air HDV Resist R3 190													
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D	
Climate change	kg CO2 eq	6,53E-01	2,49E-02	0,00E+00	6,53E-01	2,18E-02	2,22E-01	0,00E+00	4,43E-03	0,00E+00	2,00E-01	-1,87E-01	
Climate change - Fossil	kg CO2 eq	6,49E-01	2,49E-02	0,00E+00	6,49E-01	2,18E-02	7,95E-02	0,00E+00	4,43E-03	0,00E+00	5,70E-02	-1,84E-01	
Climate change - Biogenic	kg CO2 eq	4,00E-03	1,53E-05	0,00E+00	4,00E-03	1,01E-05	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	3,35E-04	9,00E-06	0,00E+00	3,35E-04	8,11E-06	4,40E-05	0,00E+00	2,04E-06	0,00E+00	4,02E-06	-2,66E-04	
Ozone depletion	kg CFC11 eq	8,51E-09	5,48E-10	0,00E+00	8,51E-09	4,76E-10	1,02E-07	0,00E+00	9,71E-11	0,00E+00	1,54E-10	-8,10E-09	
Acidification	mol H+ eq	3,04E-03	1,02E-04	0,00E+00	3,04E-03	1,14E-04	2,38E-04	0,00E+00	1,74E-05	0,00E+00	4,65E-05	-5,86E-04	
Eutrophication, freshwater	kg P eq	2,52E-04	1,77E-06	0,00E+00	2,52E-04	1,78E-06	1,54E-05	0,00E+00	3,07E-07	0,00E+00	5,37E-06	-7,35E-05	
Eutrophication, marine	kg N eq	5,60E-04	3,80E-05	0,00E+00	5,60E-04	4,58E-05	2,72E-04	0,00E+00	6,59E-06	0,00E+00	1,77E-04	-1,27E-04	
Eutrophication, terrestrial	mol N eq	5,60E-03	4,15E-04	0,00E+00	5,60E-03	5,00E-04	6,42E-04	0,00E+00	7,03E-05	0,00E+00	1,84E-04	-1,14E-03	
Photochemical ozone formation	kg NMVOC eq	2,21E-03	1,57E-04	0,00E+00	2,21E-03	1,64E-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	2,46E-06	7,04E-08	0,00E+00	2,46E-06	1,01E-07	2,92E-07	0,00E+00	1,42E-08	0,00E+00	1,28E-08	-3,46E-07	
Resource use, fossils	MJ	1,70E+01	2,90E-02	0,00E+00	1,70E+01	2,85E-02	7,48E-01	0,00E+00	6,27E-02	0,00E+00	6,17E-02	-3,60E+00	
Water use	m3 depriv.	2,16E-01	1,67E-03	0,00E+00	2,16E-01	1,21E-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.	2,46E-08	4,11E-04	0,00E+00	2,46E-08	5,55E-04	2,99E-09	0,00E+00	3,12E-10	0,00E+00	4,86E-10	-3,91E-09	
Ionising radiation	kBq U-235 eq	3,02E-02	2,26E-02	0,00E+00	3,02E-02	3,42E-02	2,38E-03	0,00E+00	1,01E-04	0,00E+00	1,67E-04	-4,76E-02	
Ecotoxicity, freshwater	CTUe	1,76E+00	2,04E-02	0,00E+00	1,76E+00	2,11E-02	6,46E-01	0,00E+00	3,17E-02	0,00E+00	4,44E-01	-1,22E+00	
Human toxicity, cancer	CTUh	2,49E-10	2,36E-10	0,00E+00	2,49E-10	2,25E-10	5,13E-11	0,00E+00	9,82E-12	0,00E+00	1,77E-11	-2,03E-10	
Human toxicity, non-cancer	CTUh	5,48E-09	3,69E-01	0,00E+00	5,48E-09	1,26E-01	9,07E-10	0,00E+00	2,19E-10	0,00E+00	6,37E-10	-1,09E-09	
Land use	Pt	1,29E+00	1,90E-05	0,00E+00	1,29E+00	1,36E-05	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	4,58E-01	5,66E-03	0,00E+00	4,58E-01	6,94E-03	4,58E-02	0,00E+00	1,09E-03	0,00E+00	2,51E-03	-3,35E-01	
PERM	MJ	6,35E-03	0,00E+00	0,00E+00	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	4,64E-01	5,66E-03	0,00E+00	4,64E-01	6,94E-03	4,58E-02	0,00E+00	1,09E-03	0,00E+00	2,51E-03	-3,35E-01	
PENRE	MJ	1,06E+01	2,91E-02	0,00E+00	1,06E+01	2,86E-02	6,01E-01	0,00E+00	6,27E-02	0,00E+00	6,17E-02	-3,60E+00	
PENRM	MJ	6,36E+00	0,00E+00	0,00E+00	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	1,70E+01	2,91E-02	0,00E+00	1,70E+01	2,86E-02	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	7,23E-03	2,44E-06	0,00E+00	7,23E-03	2,12E-06	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	7,94E-04	3,16E-02	0,00E+00	7,94E-04	9,44E-03	1,47E-02	0,00E+00	1,44E-06	0,00E+00	2,22E-02	-6,87E-05	
Non-hazardous waste disposed (NHWD)	kg	6,56E-02	1,01E-07	0,00E+00	6,56E-02	1,38E-07	1,38E-01	0,00E+00	2,58E-03	0,00E+00	9,55E-02	-9,22E-03	
Radioactive waste disposed (RWD)	kg	7,56E-06	0,00E+00	0,00E+00	7,56E-06	0,00E+00	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 20 Ondutiss® Facade 100

Membrane: Ondutiss® Facade 100												
Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change	kg CO2 eq	2,85E-01	2,49E-02	0,00E+00	3,10E-01	2,18E-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	2,83E-01	2,49E-02	0,00E+00	3,08E-01	2,18E-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	1,38E-03	1,53E-05	0,00E+00	1,40E-03	1,01E-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	1,05E-03	9,00E-06	0,00E+00	1,06E-03	8,11E-06	4,18E-05	0,00E+00	9,66E-07	0,00E+00	1,90E-06	-1,19E-04
Ozone depletion	kg CFC11 eq	3,86E-09	5,48E-10	0,00E+00	4,41E-09	4,76E-10	1,02E-07	0,00E+00	4,60E-11	0,00E+00	7,31E-11	-3,63E-09
Acidification	mol H+ eq	1,35E-03	1,02E-04	0,00E+00	1,45E-03	1,14E-04	2,16E-04	0,00E+00	8,23E-06	0,00E+00	2,20E-05	-2,60E-04
Eutrophication, freshwater	kg P eq	1,14E-04	1,77E-06	0,00E+00	1,15E-04	1,78E-06	1,30E-05	0,00E+00	1,46E-07	0,00E+00	2,54E-06	-3,21E-05
Eutrophication, marine	kg N eq	2,44E-04	3,80E-05	0,00E+00	2,82E-04	4,58E-05	1,49E-04	0,00E+00	3,12E-06	0,00E+00	8,37E-05	-5,67E-05
Eutrophication, terrestrial	mol N eq	2,40E-03	4,15E-04	0,00E+00	2,82E-03	5,00E-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	9,69E-04	1,57E-04	0,00E+00	1,13E-03	1,64E-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	1,12E-06	7,04E-08	0,00E+00	1,19E-06	1,01E-07	2,86E-07	0,00E+00	6,73E-09	0,00E+00	6,06E-09	-1,60E-07
Resource use, fossils	MJ	7,34E+00	2,90E-02	0,00E+00	7,36E+00	2,85E-02	7,15E-01	0,00E+00	2,97E-02	0,00E+00	2,92E-02	-1,59E+00
Water use	m3 depriv.	1,09E-01	1,67E-03	0,00E+00	1,10E-01	1,21E-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.	1,06E-08	4,11E-04	0,00E+00	4,11E-04	5,55E-04	2,75E-09	0,00E+00	1,48E-10	0,00E+00	2,30E-10	-1,79E-09
Ionising radiation	kBq U-235 eq	1,37E-02	2,26E-02	0,00E+00	3,63E-02	3,42E-02	2,28E-03	0,00E+00	4,80E-05	0,00E+00	7,92E-05	-2,06E-02
Ecotoxicity, freshwater	CTUe	8,29E-01	2,04E-02	0,00E+00	8,49E-01	2,11E-02	4,05E-01	0,00E+00	1,50E-02	0,00E+00	2,10E-01	-5,68E-01
Human toxicity, cancer	CTUh	1,13E-10	2,36E-10	0,00E+00	3,49E-10	2,25E-10	4,41E-11	0,00E+00	9,82E-12	0,00E+00	8,38E-12	-9,50E-11
Human toxicity, non-cancer	CTUh	2,44E-09	3,69E-01	0,00E+00	3,69E-01	1,26E-01	6,36E-10	0,00E+00	2,19E-10	0,00E+00	3,02E-10	-4,90E-10
Land use	Pt	6,24E-01	1,90E-05	0,00E+00	6,24E-01	1,36E-05	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	2,11E-01	5,66E-03	0,00E+00	2,17E-01	6,94E-03	4,44E-02	0,00E+00	5,19E-04	0,00E+00	1,19E-03	-1,46E-01
PERM	MJ	3,01E-03	0,00E+00	0,00E+00	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	2,14E-01	5,66E-03	0,00E+00	2,20E-01	6,94E-03	4,44E-02	0,00E+00	5,19E-04	0,00E+00	1,19E-03	-1,46E-01
PENRE	MJ	4,59E+00	2,91E-02	0,00E+00	4,62E+00	2,86E-02	5,68E-01	0,00E+00	2,97E-02	0,00E+00	2,92E-02	-1,59E+00
PENRM	MJ	2,74E+00	0,00E+00	0,00E+00	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	7,33E+00	2,91E-02	0,00E+00	7,36E+00	2,86E-02	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	3,50E-03	2,44E-06	0,00E+00	3,50E-03	2,12E-06	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	3,70E-04	3,16E-02	0,00E+00	3,20E-02	9,44E-03	7,04E-03	0,00E+00	6,81E-07	0,00E+00	1,05E-02	-3,03E-05
Non-hazardous waste disposed (NHWD)	kg	3,08E-02	1,01E-07	0,00E+00	3,08E-02	1,38E-07	7,05E-02	0,00E+00	1,22E-03	0,00E+00	4,52E-02	-4,12E-03
Radioactive waste disposed (RWD)	kg	3,44E-06	0,00E+00	0,00E+00	3,44E-06	0,00E+00	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

Additional environmental information

More information on membranes and the environment can be found at:

<https://www.onduline.com/en>

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