





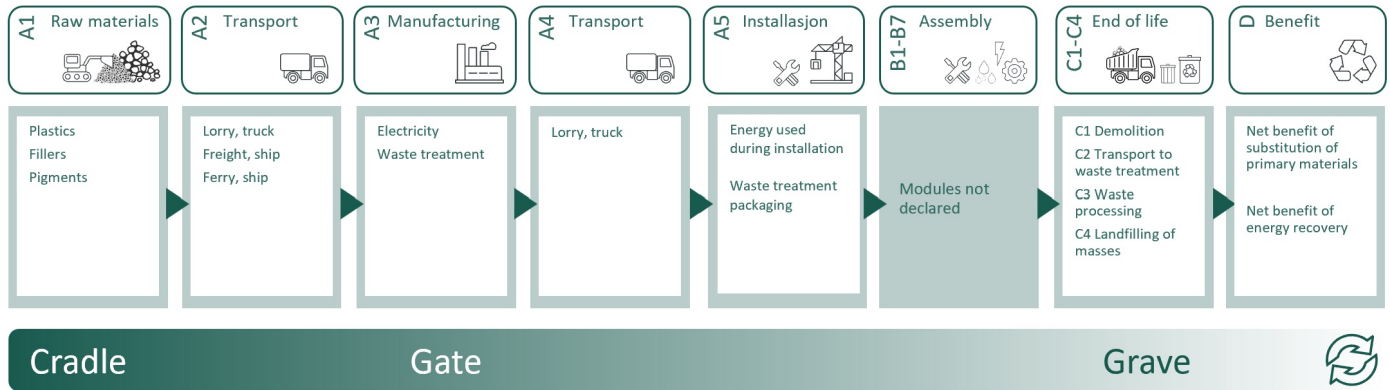


**System boundaries (X=included, MND=module not declared, MNR=module not relevant)**

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

**System boundary:**

All packaging materials on ingoing raw materials, are pelleted inhouse and reused as raw materials in mid-layers in production of membranes.
















**Additional technical information:**

[www.oldroyd.no](http://www.oldroyd.no)



## LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Environmental impact										
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D	
 GWP-total	kg CO <sub>2</sub> -eq	1,01E+00	2,71E-02	1,34E-01	0	7,68E-03	1,28E+00	4,82E-03	-1,73E-01	
 GWP-fossil	kg CO <sub>2</sub> -eq	1,08E+00	2,71E-02	5,84E-02	0	7,68E-03	1,28E+00	4,82E-03	-1,67E-01	
 GWP-biogenic	kg CO <sub>2</sub> -eq	-7,33E-02	1,12E-05	7,52E-02	0	3,18E-06	1,42E-05	2,99E-06	-3,46E-04	
 GWP-luluc	kg CO <sub>2</sub> -eq	4,18E-04	9,65E-06	2,85E-05	0	2,73E-06	1,77E-06	1,04E-06	-5,76E-03	
 ODP	kg CFC11 -eq	4,65E-08	6,14E-09	2,97E-09	0	1,74E-09	1,04E-09	9,20E-10	-1,22E-02	
 AP	mol H+ -eq	4,91E-03	7,79E-05	2,73E-04	0	2,21E-05	1,58E-04	2,40E-05	-1,38E-03	
 EP-FreshWater	kg P -eq	1,88E-05	2,17E-07	1,09E-06	0	6,13E-08	1,15E-07	5,81E-08	-1,49E-05	
 EP-Marine	kg N -eq	8,86E-04	1,54E-05	5,14E-05	0	4,37E-06	7,53E-05	8,13E-06	-4,51E-04	
 EP-Terrestrial	mol N -eq	9,93E-03	1,72E-04	5,76E-04	0	4,88E-05	8,14E-04	9,08E-05	-4,87E-03	
 POCP	kg NMVOC -eq	4,11E-03	6,60E-05	2,27E-04	0	1,87E-05	1,96E-04	2,58E-05	-1,34E-03	
 ADP-minerals&metals <sup>1</sup>	kg Sb -eq	1,15E-05	7,49E-07	7,58E-07	0	2,12E-07	5,10E-08	5,03E-08	-1,66E-06	
 ADP-fossil <sup>1</sup>	MJ	3,61E+01	4,10E-01	1,86E+00	0	1,16E-01	8,74E-02	7,13E-02	-2,39E+00	
 WDP <sup>1</sup>	m <sup>3</sup>	9,14E+01	3,96E-01	8,55E+00	0	1,12E-01	2,07E-01	3,57E-01	-2,98E+01	







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

"Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed

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

### Remarks to environmental impacts

Additional environmental impact indicators										
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D	
 PM	Disease incidence	3,48E-08	1,66E-09	2,05E-09	0	4,70E-10	7,66E-10	3,81E-10	-8,35E-08	
 IRP <sup>2</sup>	kgBq U235 -eq	3,39E-02	1,79E-03	2,25E-03	0	5,07E-04	1,59E-04	3,05E-04	-1,53E-02	
 ETP-fw <sup>1</sup>	CTUe	7,66E+00	3,04E-01	5,20E-01	0	8,61E-02	2,63E-01	7,42E-02	-1,30E+01	
 HTP-c <sup>1</sup>	CTUh	3,60E-10	0,00E+00	2,50E-11	0	0,00E+00	3,00E-11	3,00E-12	-2,38E-10	
 HTP-nc <sup>1</sup>	CTUh	8,16E-09	3,32E-10	6,39E-10	0	9,40E-11	1,19E-09	1,13E-10	-1,25E-08	
 SQP <sup>1</sup>	dimensionless	3,50E+00	2,87E-01	2,10E-01	0	8,12E-02	1,13E-02	1,66E-01	-1,60E+01	

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)

"Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator
2. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.




Resource use										
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D	
 PERE	MJ	4,14E+00	5,87E-03	4,99E-01	0	1,66E-03	2,82E-03	2,34E-03	-1,48E+01	
 PERM	MJ	7,22E-01	0,00E+00	-6,86E-01	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 PERT	MJ	4,86E+00	5,87E-03	-1,86E-01	0	1,66E-03	2,82E-03	2,34E-03	-1,48E+01	
 PENRE	MJ	1,65E+01	4,10E-01	8,86E-01	0	1,16E-01	8,74E-02	7,13E-02	-2,39E+00	
 PENRM	MJ	2,08E+01	0,00E+00	1,05E+00	0	0,00E+00	-2,07E+01	0,00E+00	0,00E+00	
 PENRT	MJ	3,73E+01	4,10E-01	1,94E+00	0	1,16E-01	-2,06E+01	7,13E-02	-1,27E+01	
 SM	kg	2,49E-03	0,00E+00	1,24E-04	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 RSF	MJ	3,75E-02	2,10E-04	2,12E-03	0	5,95E-05	8,41E-05	5,97E-05	-2,59E-03	
 NRSF	MJ	1,30E-02	7,50E-04	1,37E-03	0	2,13E-04	0,00E+00	4,20E-03	-8,76E-01	
 FW	m <sup>3</sup>	4,38E-02	4,38E-05	4,39E-03	0	1,24E-05	2,54E-04	6,47E-05	-1,78E-02	

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

"Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed








End of life - Waste										
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D	
 HWD	kg	1,59E-03	2,11E-05	6,32E-04	0	5,99E-06	0,00E+00	2,25E-01	-1,12E-04	
 NHWD	kg	7,18E-02	1,99E-02	7,75E-03	0	5,65E-03	0,00E+00	2,50E-02	-5,65E-02	
 RWD	kg	3,17E-05	2,79E-06	2,02E-06	0	7,91E-07	0,00E+00	4,36E-07	-1,25E-05	

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

\*Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3} = 0,009$

\*INA Indicator Not Assessed

End of life - Output flow										
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D	
 CRU	kg	0,00E+00	0,00E+00	0,00E+00	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 MFR	kg	9,71E-03	0,00E+00	8,26E-04	0	0,00E+00	0,00E+00	1,84E-05	0,00E+00	
 MER	kg	1,00E-03	0,00E+00	5,03E-05	0	0,00E+00	5,00E-01	6,25E-07	0,00E+00	
 EEE	MJ	7,05E-03	0,00E+00	3,65E-02	0	0,00E+00	8,22E-01	3,92E-06	0,00E+00	
 EET	MJ	1,07E-01	0,00E+00	5,52E-01	0	0,00E+00	1,24E+01	5,92E-05	0,00E+00	

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

\*Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3} = 0,009$

\*INA Indicator Not Assessed

Biogenic Carbon Content		
Indicator	Unit	At the factory gate
Biogenic carbon content in product	kg C	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	2,15E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>

## Additional requirements

### Greenhouse gas emissions from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Electricity mix	Data source	Amount	Unit
Electricity, Norway (kWh)	ecoinvent 3.6	24,33	g CO <sub>2</sub> -eq/kWh

### Dangerous substances

The product contains no substances given by the REACH Candidate list.

### Indoor environment

No impact

## Additional Environmental Information

Additional environmental impact indicators required in NPCR Part A for construction products									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWPIOBC	kg CO <sub>2</sub> -eq	1,04E+00	2,71E-02	5,48E-02	0	7,68E-03	0,00E+00		-1,71E-01

GWPIOBC: Global warming potential calculated according to the principle of instantaneous oxidation. In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

