

ENVIRONMENTAL PRODUCT DECLARATION ISO 14025 and ISO 21930



Membrane for tunnels

EPD

Foundation for Environmental
Declarations in Industry



NEPD no.: 100
Approved: 01.10.2007
Valid until: 29.09.2012

Bjørn Green

Independent verification of conformity

We confirm that this environmental declaration has been carried out according to ISO 14044, ISO 14025 and ISO 21930, and Product category rules (PCR) for "Mechanical fixed single ply roof waterproofing membranes (EN 13956)". The documentation has been carried out with the EcoDec-tool.

The declaration has been prepared by:

SINTEF Byggforsk **SINTEF**

Cathrine Gjønn
Oslo: 01.10.2007

Svein Fossdal
Independent verifier

Manufacturer

PROTAN AS
Postboks 420 Brakerøya N-3002 Drammen Norway
Organisation no. NO 91 569 809 MVA
ISO 14001: : NS-EN ISO 14001:NO 97-OSL-SYMI-8015
Market area: Europa

Contact person: Lars Anisdahl
Telephone: +4732221600
Fax: +4732221700
e-mail: lars.anisdahl@protan.no

Product information

Scope: Cradle to grave
Year of study: 2007
Expected service life of building: 50 years
Service life of product: 50 years

Functional unit (FU): m² installed tunnel membrane and 50 years

Product description

This product is a plastic coated technical textile. It consists of plasticised PVC and a polyester reinforcement. It is intended to be use in tunnels.

Product specification

	Part %	Quantity (kg/FU)
PVC	33,5 %	0,23
Polyester textile	28,6 %	0,20
Plasticiser (DINP)	22,6 %	0,16
Fire-, heat- and UV-stabiliser	15,3 %	0,11
SUM	100,0 %	0,70

Environmental Indicators

Global warming	2,2	kg CO2 equiv.
Energy use	11,0	kWh
Recycled materials	0	%
Indoor air classification (Classification according to CR 1752:1999)	Not relevant	

Use of resources

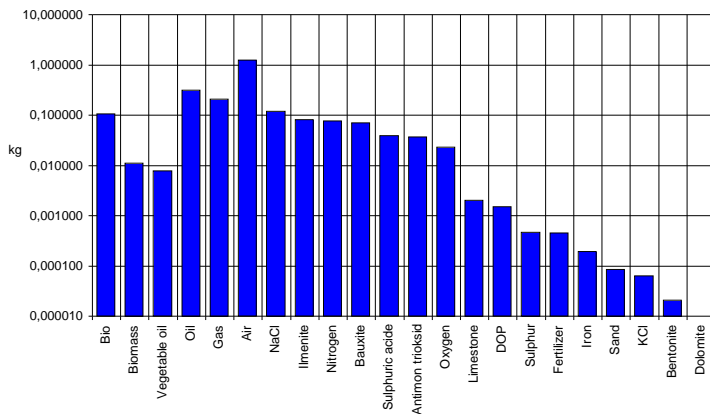
Material resources

R = Recycled materials
* = Feedstock

All figures refer to functional unit (FU)

	Type	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
Renewable materials									
Bio	*	kg		1,07E-01					1,07E-01
Biomass	*	kg	1,11E-02						1,11E-02
Vegetable oil	*	kg	7,74E-03						7,74E-03
Non-renewable materials									
Oil	*	kg	3,09E-01	5,81E-04					3,10E-01
Gas	*	kg	2,05E-01	3,73E-04					2,06E-01
Air		kg	1,26E+00						1,26E+00
NaCl		kg	1,18E-01						1,18E-01
Ilmenite		kg	8,21E-02						8,21E-02
Nitrogen		kg	7,76E-02						7,76E-02
Bauxite		kg	7,11E-02						7,11E-02
Sulphuric acide		kg	3,94E-02						3,94E-02
Antimon trioksid		kg	3,66E-02						3,66E-02
Oxygen		kg	2,30E-02						2,30E-02
Limestone		kg	2,05E-03						2,05E-03
DOP		kg	1,52E-03						1,52E-03
Sulphur		kg	4,61E-04						4,61E-04
Fertilizer		kg	4,54E-04						4,54E-04
Iron		kg	1,95E-04						1,95E-04
Sand		kg	8,49E-05						8,49E-05
KCl		kg	6,26E-05						6,26E-05
Bentonite		kg	2,08E-05						2,08E-05
Dolomite		kg	9,83E-07						9,83E-07
Feedstock	*	kWh							7,07E+00

Material resources total



Renewable materials 0 %, Non-renewable materials 100 %, Recycled materials 0 %

The product does not contain tropical wood.

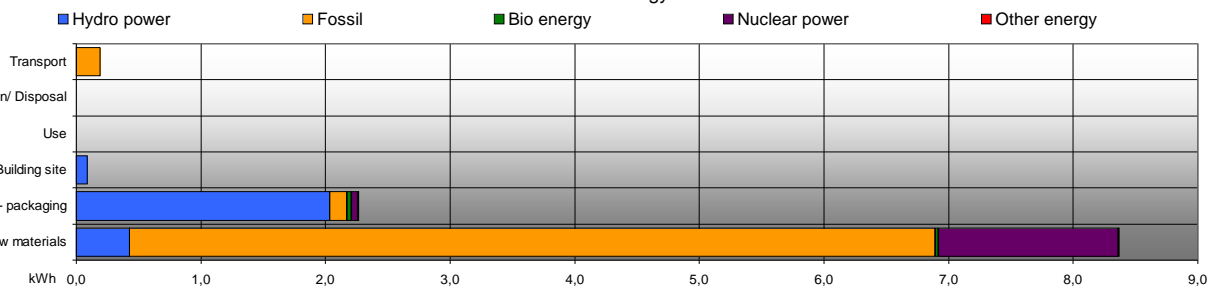
Consumption of chemicals on the Norwegian observation list

CAS-number	Risk phrases	Quantity	Unit
CAS-84-74-2	R-61, R-62	3,42E+00	g
CAS-26471-62-5	R-40	1,07E+00	g
			g
			g
			g
			g
			g
Total		4,49E+00	g

Energy resources

	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
Renewable energy								
Hydro power	kWh	4,27E-01	2,04E+00	8,53E-02				2,55E+00
Bio energy	kWh	2,61E-02	3,51E-02					6,13E-02
Non-renewable energy								
Oil	kWh	2,19E+00	1,39E-01	2,23E-04			1,96E-01	2,53E+00
Gas	kWh	3,17E+00	4,22E-02	7,30E-04				3,21E+00
Coal	kWh	1,08E+00	5,19E-02	9,45E-04				1,13E+00
Brown coal	kWh	2,13E-02						2,13E-02
Nuclear power	kWh	1,44E+00	5,17E-02	2,08E-03				1,50E+00
Other energy	kWh	7,98E-03	1,09E-02	4,77E-04				1,94E-02
							Total	1,10E+01

Energy use



Water

Potable water 5,8E-03 m³

Land

Land used 0,00 m²

© 2020 version 02

Tuomola V10 E 1007Reva_GP.xls

Emissions and environmental impacts

Environmental impacts

All figures refer to functional unit (FU)

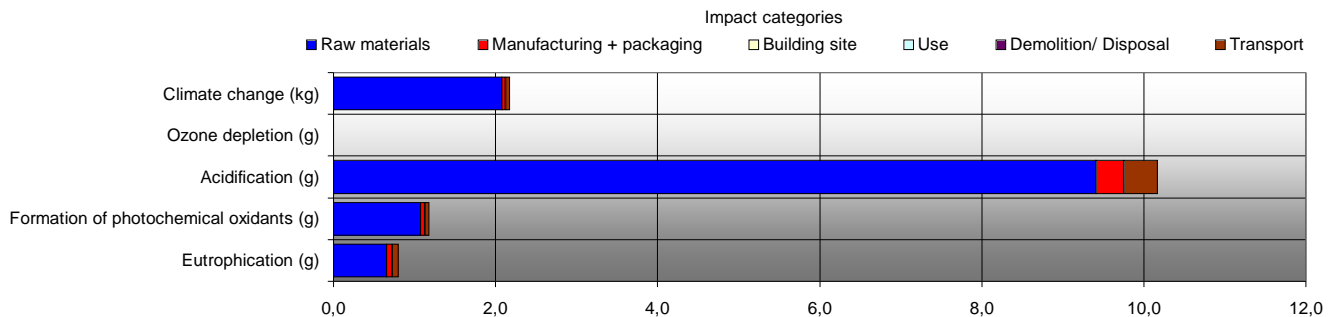
	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
Climate change	kg CO ₂ - equiv.	2,08E+00	4,48E-02	7,35E-04			5,25E-02	2,18E+00
Ozone depletion	kg ODP - equiv.	3,76E-11	1,19E-13	5,01E-15				3,78E-11
Acidification	kg SO ₂ - equiv.	9,41E-03	3,48E-04	1,01E-06			4,16E-04	1,02E-02
Formation of photochemical oxidants	kg POCP- equiv.	1,07E-03	6,07E-05	1,14E-07			4,80E-05	1,18E-03
Eutrophication	kg PO ₄ - equiv.	6,55E-04	7,53E-05	1,09E-07			7,22E-05	8,03E-04

Emissions to air

	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
CO ₂	g	1,78E+03	3,91E+01	6,16E-01			5,16E+01	1,87E+03
CO	g	6,00E+00	3,29E-01	2,45E-04			2,27E-01	6,56E+00
SO ₂	g	6,02E+00	1,72E-01	4,73E-04			2,73E-02	6,22E+00
NO _x	g	4,73E+00	2,51E-01	7,46E-04			5,55E-01	5,54E+00
NM VOC	g	9,71E-01	8,58E-02	9,16E-05			6,01E-02	1,12E+00
Particles	g	8,82E-01	8,69E-02	1,25E-04			3,90E-02	1,01E+00
CH ₄	g	1,21E+01	1,41E-01	4,36E-03			2,36E-03	1,22E+01
N ₂ O	g	5,17E-03	5,05E-03	5,85E-05			5,91E-04	1,09E-02
NH ₃	g	2,49E-03	2,70E-04	1,14E-05				2,77E-03
Pb	g	1,53E-02	4,78E-07	2,01E-08			1,77E-06	1,53E-02
Hg	g	1,81E-02	4,78E-07	2,01E-08				1,81E-02
HF	g	2,55E-03	6,99E-08	2,94E-09				2,55E-03
HCl	g	7,43E-02	5,48E-05	1,86E-08				7,44E-02
Benzene	g	1,29E-06	1,19E-07	5,01E-09			1,18E-03	1,18E-03
KCFC-22	g	1,11E-06	3,49E-09	1,47E-10				1,11E-06
Hydrocarbons	g	5,00E+00						5,00E+00
Organics	g	2,41E+00						2,41E+00
Aromatic HC not specified	g	8,49E-02						8,49E-02
Metals	g	7,92E-02						7,92E-02
H ₂	g	2,01E-02						2,01E-02
Sb	g	9,61E-03						9,61E-03

Emissions to water

	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
Substance/fibre	g	1,46E+00	2,59E-02					1,49E+00
COD	g	5,03E-01	1,29E+00	3,63E-08				1,79E+00
BOD	g	2,34E-01	1,22E-01	2,01E-08				3,57E-01
Phosphorus P	g	3,69E-04	4,78E-07	2,01E-08				3,69E-04
Nitrogen N	g	2,56E-03	1,50E-06	2,94E-08				2,56E-03
SO ₄ --	g	8,77E-01						8,77E-01
Na+	g	8,49E-01						8,49E-01
Cl	g	7,93E-01						7,93E-01



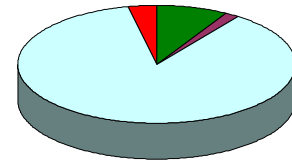
Emissions to indoor environment are not relevant for this product

Waste treatment

All figures refer to functional unit (FU)

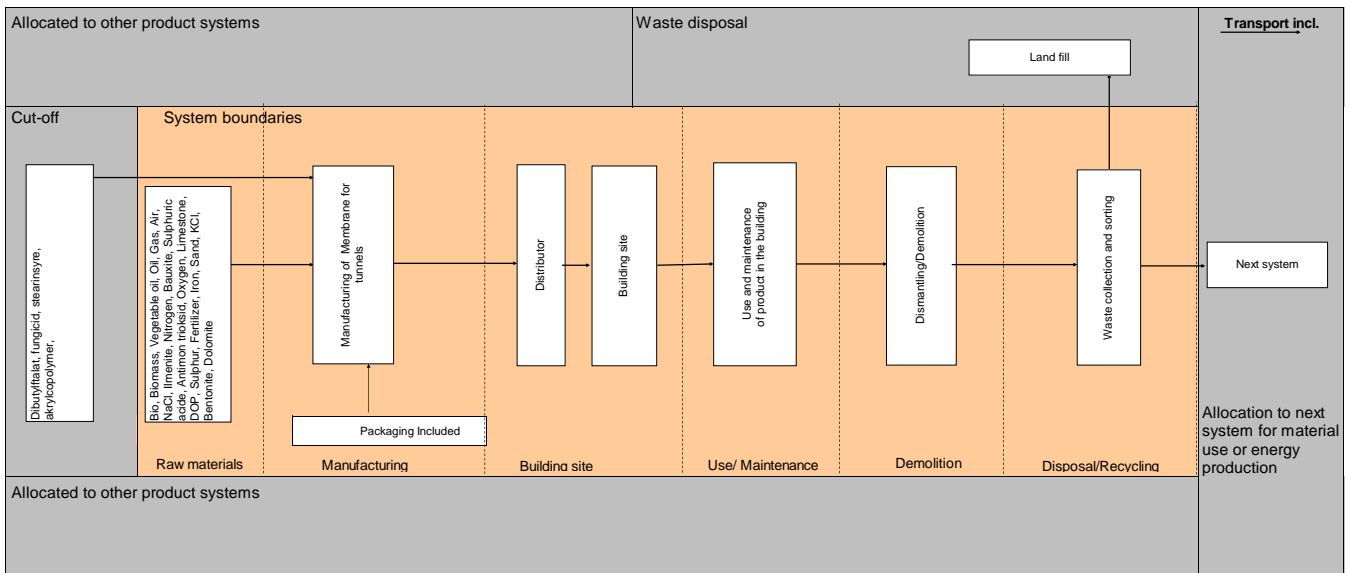
	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Total
Reuse/ recycling	kg	3,95E-02	4,72E-02				8,67E-02
Energy production	kg	1,62E-02	1,01E-04				1,63E-02
Waste to land fill	kg	1,40E-01	-7,88E-03	7,00E-03		7,63E-01	9,02E-01
Hazardous waste	kg	3,59E-02	1,54E-05				3,59E-02
Radioactive waste	g	1,60E-01	1,76E-04				1,60E-01

Waste treatment



■ Reuse/ recycling ■ Energy production
■ Waste to land fill ■ Hazardous waste

System boundaries



Uncertainty	±	10 %
Scope of data (average)		99 %
Materials with product specific data		64 %
Cut-off		0,67 %

References: Sintef Byggforsk Report 21905