

# ENVIRONMENTAL PRODUCT DECLARATION ISO 14025 and ISO 21930



## Protan Turf Roof Membrane

## EPD

Foundation for Environmental  
Declarations in Industry



**NEPD no.:** 098  
Approved: 01.10.2007  
Valid until: 29.09.2012

### 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**

Oslo: 01.10.2007

Independent verifier

### Manufacturer

PROTAN AS  
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Organisation no. NO 91 569 809 MVA  
ISO 14001: : NS-EN ISO 14001:NO 97-OSL-SYMI-8015  
Market area: Europe

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### Product information

Scope	Cradle to grave
Year of study	2007
Expected service life of building	60 years
Service life of product	30 years

Functional unit (FU) m<sup>2</sup> installed plastic turf roof membrane and 60 years

### Product description

Protan Turf Roof Membrane is especially designated for use on turf roofs.

### Product specification

	Part %	Quantity (kg/FU)
PVC	41,1 %	0,81
Polyester textile	13,1 %	0,26
Plasticiser (DINP)	30,9 %	0,61
Fire-, heat- and UV-stabiliser	14,8 %	0,29
SUM	100,0 %	1,98

### Environmental Indicators

Global warming	9,4	kg CO2 equiv.
Energy use	44,9	kWh
Recycled materials	0	%
Indoor air classification (Classification according to EN 15251:2007)	Not relevant	

## Use of resources

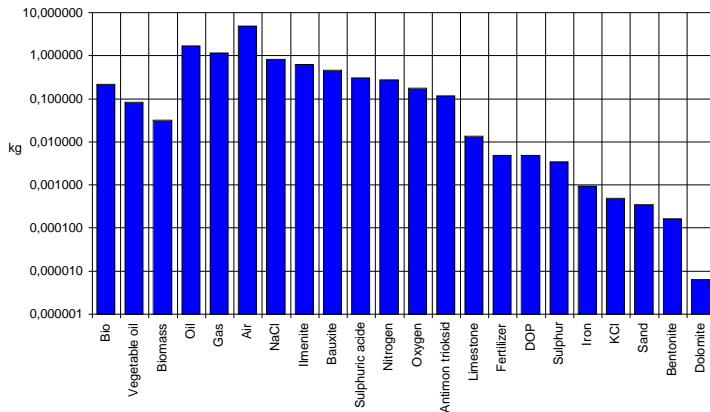
### Material resources

R = Recycled materials  
\* = Feedstock

All figures refer to functional unit (FU)

	Type	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
<b>Renewable materials</b>									
Bio	*	kg		2,13E-01					2,13E-01
Vegetable oil	*	kg	8,37E-02						8,37E-02
Biomass	*	kg	3,17E-02						3,17E-02
<b>Non-renewable materials</b>									
Oil	*	kg	1,71E+00	1,16E-03					1,71E+00
Gas	*	kg	1,14E+00	7,45E-04					1,14E+00
Air		kg	4,83E+00						4,83E+00
NaCl		kg	8,19E-01						8,19E-01
Ilmenite		kg	6,36E-01						6,36E-01
Bauxite		kg	4,61E-01						4,61E-01
Sulphuric acide		kg	3,05E-01						3,05E-01
Nitrogen		kg	2,73E-01						2,73E-01
Oxygen		kg	1,78E-01						1,78E-01
Antimon trioksid		kg	1,16E-01						1,16E-01
Limestone		kg	1,36E-02						1,36E-02
Fertilizer		kg	4,90E-03						4,90E-03
DOP		kg	4,82E-03						4,82E-03
Sulphur		kg	3,44E-03						3,44E-03
Iron		kg	9,27E-04						9,27E-04
KCl		kg	4,85E-04						4,85E-04
Sand		kg	3,45E-04						3,45E-04
Bentonite		kg	1,61E-04						1,61E-04
Dolomite		kg	6,37E-06						6,37E-06
Feedstock	*	kWh							3,82E+01

Material resources total



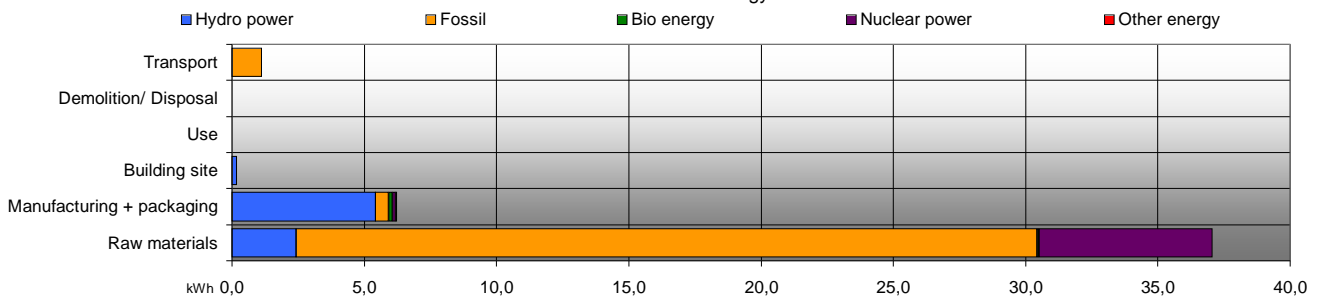
Renewable materials 0 %, Non-renewable materials 100 %, Recycled materials 0 %

The product does not contain tropical wood. No chemicals from the Norwegian observation list are used.

### Energy resources

	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
<b>Renewable energy</b>								
Hydro power	kWh	2,43E+00	5,43E+00	1,71E-01				8,03E+00
Bio energy	kWh	7,00E-02	1,40E-01					2,11E-01
<b>Non-renewable energy</b>								
Oil	kWh	1,16E+01	4,14E-01	4,45E-04			1,14E+00	1,31E+01
Gas	kWh	1,28E+01	1,46E-01	1,46E-03				1,30E+01
Coal	kWh	3,41E+00	1,78E-01	1,89E-03				3,59E+00
Brown coal	kWh	1,65E-01						1,65E-01
Nuclear power	kWh	6,57E+00	1,41E-01	4,16E-03				6,71E+00
Other energy	kWh	-2,13E-03	2,86E-02	9,55E-04				2,75E-02
							Total	4,49E+01

Energy use



### Water

Potable water	6,3E-02	m <sup>3</sup>
Land used	0,00	m <sup>2</sup>

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## Emissions and environmental impacts

### Environmental impacts

All figures refer to functional unit (FU)

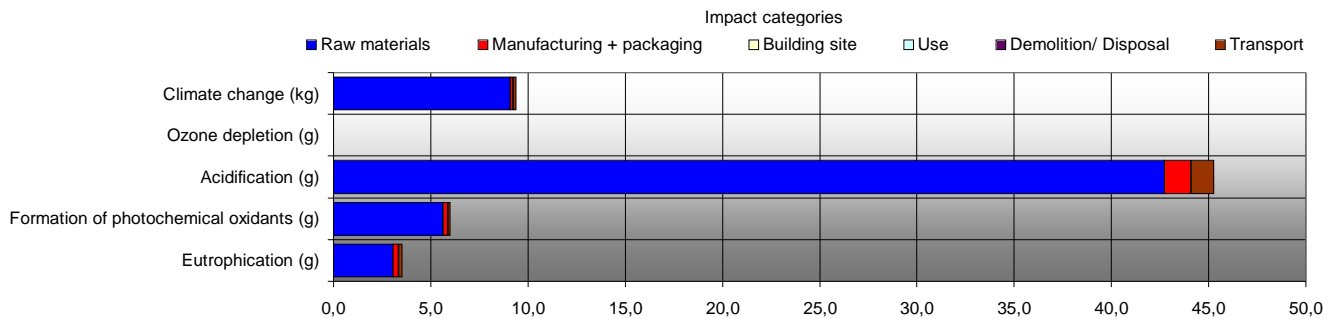
	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
Climate change	kg CO <sub>2</sub> - equiv.	9,10E+00	1,56E-01	1,47E-03			1,52E-01	9,41E+00
Ozone depletion	kg ODP - equiv.	2,41E-10	3,16E-13	1,00E-14				2,41E-10
Acidification	kg SO <sub>2</sub> - equiv.	4,27E-02	1,36E-03	2,03E-06			1,19E-03	4,53E-02
Formation of photochemical oxidants	kg POCP- equiv.	5,64E-03	2,39E-04	2,29E-07			1,39E-04	6,02E-03
Eutrophication	kg PO <sub>4</sub> - equiv.	3,05E-03	2,98E-04	2,17E-07			2,08E-04	3,56E-03

### Emissions to air

	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
CO <sub>2</sub>	g	8,00E+03	1,37E+02	1,23E+00			1,50E+02	8,29E+03
CO	g	3,18E+01	1,31E+00	4,89E-04			6,63E-01	3,37E+01
SO <sub>2</sub>	g	2,69E+01	6,71E-01	9,46E-04			7,41E-02	2,76E+01
NO <sub>x</sub>	g	2,23E+01	9,81E-01	1,49E-03			1,60E+00	2,49E+01
NM VOC	g	6,16E+00	3,40E-01	1,83E-04			1,75E-01	6,67E+00
Particles	g	3,73E+00	3,44E-01	2,49E-04			1,14E-01	4,19E+00
CH <sub>4</sub>	g	4,31E+01	4,25E-01	8,73E-03			6,90E-03	4,36E+01
N <sub>2</sub> O	g	3,25E-02	1,83E-02	1,17E-04			1,73E-03	5,27E-02
NH <sub>3</sub>	g	1,57E-02	7,18E-04	2,27E-05				1,65E-02
Pb	g	1,18E-01	1,27E-06	4,03E-08			5,18E-06	1,18E-01
Hg	g	1,40E-01	1,27E-06	4,03E-08				1,40E-01
HF	g	7,60E-03	1,86E-07	5,89E-09				7,60E-03
HCl	g	2,39E-01	2,19E-04	3,71E-08				2,40E-01
Benzene	g	9,00E-06	3,16E-07	1,00E-08			3,45E-03	3,46E-03
KCFC-22	g	7,08E-06	9,30E-09	2,94E-10				7,09E-06
Hydrocarbons	g	1,00E+01						1,00E+01
Organics	g	4,81E+00						4,81E+00
Aromatic HC not specified	g	1,70E-01						1,70E-01
Metals	g	1,58E-01						1,58E-01
H <sub>2</sub>	g	4,01E-02						4,01E-02
Sb	g	1,92E-02						1,92E-02

### Emissions to water

	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
Substance/fibre	g	8,91E+00	1,04E-01					9,01E+00
COD	g	2,44E+00	5,17E+00	7,25E-08				7,61E+00
BOD	g	6,24E-01	4,90E-01	4,03E-08				1,11E+00
Phosphorus P	g	2,85E-03	1,27E-06	4,03E-08				2,85E-03
Nitrogen N	g	1,98E-02	5,06E-06	5,88E-08				1,98E-02
SO <sub>4</sub> --	g	6,33E+00						6,33E+00
Na+	g	6,30E+00						6,30E+00
Cl	g	6,14E+00						6,14E+00



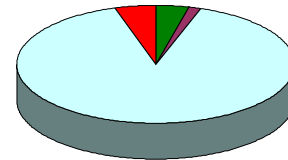
Emissions to indoor environment are not relevant for this product

## Waste treatment

All figures refer to functional unit (FU)

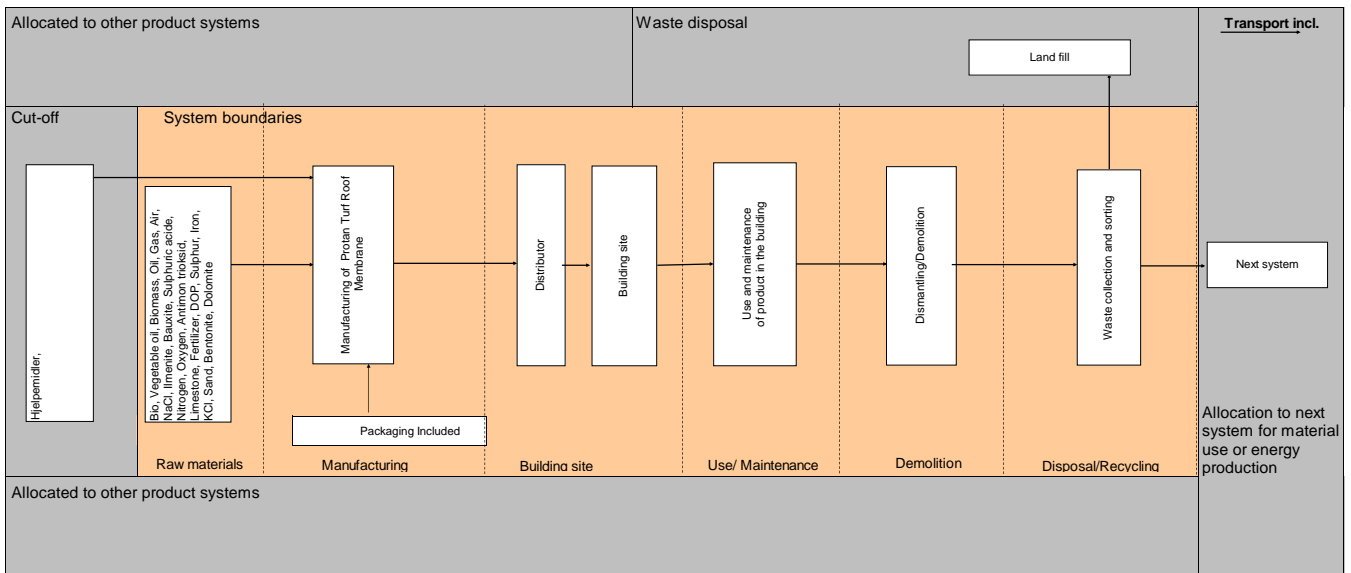
	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Total
Reuse/ recycling	kg	1,31E-01	9,45E-02				2,26E-01
Energy production	kg	8,35E-02	4,02E-04				8,39E-02
Waste to land fill	kg	7,59E-01	1,26E-01	3,96E-02		4,31E+00	5,24E+00
Hazardous waste	kg	2,69E-01	6,17E-05				2,69E-01
Radioactive waste	g	1,18E+00	4,87E-04				1,18E+00

### Waste treatment



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

## System boundaries



Uncertainty	±	11 %
Scope of data (average)		100 %
Materials with product specific data		56 %
Cut-off		0,24 %

References: Sintef Byggforsk Report 21905