Environmental Product Declaration

THRACE Needle-Punched Nonwoven Geotextiles

In accordance with ISO 14025 and EN 15804 + A1

EPD Registration Number	Publication Date	Date of Validity	Program	Program operator	CPC
S-P-02479	18/02/2021	17/02/2026	The International EPD® System www.environdec.com	EPD International AB	369 Other plastic products

Programme Information

Program

The International EPD® System

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Product category rules (PCR):	PCR 2012:01 Construction products and construction services
PCR review was conducted by:	The Technical Committee of the International EPD System Contact via info@envrirondec.com
Independent third-party verification of the declaration and data, according to ISO 14025:	☐ EPD process certification ☒ EPD verification (external)
Accredited by:	European Inspection and Certification Company S.A. www.eurocert.gr
Technical support:	SustChem Consulting S.A. www.sustchem.gr

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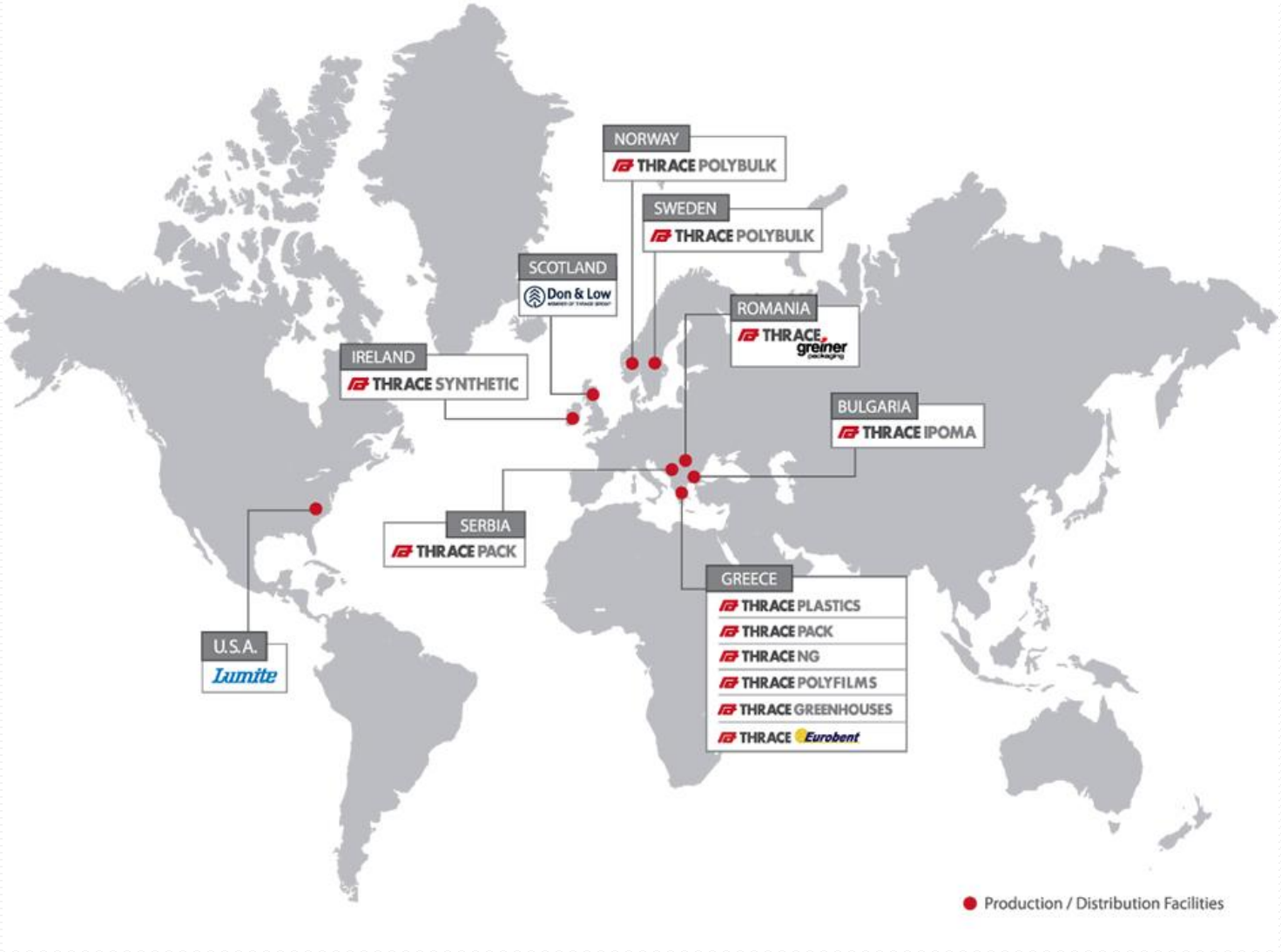
Thrace Group

- Converting 110K tons PP/PE per year
- Sales network in 80 countries
- 58% production in Greece
- 16 member companies
- 2,100 employees
- Operations in 10 countries
- 1,800 customers worldwide
- 28 production technologies
- 17% sales in Greece



Thrace NG

Thrace Nonwovens & Geosynthetics S.A. was established in 2010, assuming all the Technical Fabrics activities of Thrace Plastics, which was originally founded in 1979. Today Thrace NG is producing PP technical fabrics and yarns/fibres.

Our vision is to be the most valuable partner for our customers and suppliers and to consistently increase shareholders' value while ensuring a prosperous future for all individuals working in THRACE GROUP.

Thrace Nonwovens & Geosynthetics S.A. is certified to ISO 9001, ISO 14001, ISO 45001 and ISO 50001

Expertise

At Thrace NG we strive for excellence and that shapes every aspect of our procedures, our processes and our people. Thrace NG`s strategy is to sustain growth through long term client relations, by the implementation of the latest manufacturing technologies and innovation.

Products

Polypropylene woven flat and circular fabrics, needle-punched and spunbond nonwoven fabrics, geogrids and geocomposites, staple fibres, multifilament yarns and tapes, HDPE tape and monofilament nets, polypropylene ropes, webbings, monofilament yarns, vapour control layers, roofing membranes and specialty textile materials.

Areas of Application

Geosynthetics, agri & horticulture, building construction, industrial fabrics, packaging, furniture & bedding, filtration, disposables, medical, workwear.

Markets

Thrace NG exports all over the world, in more than 80 countries.

WHAT MAKES US DIFFERENT

At Thrace NG we recognize that personalized customer service can make the difference between success and failure when it comes down to selecting the proper product for the corresponding application. Thrace NG`s dedicated staff follows a one-to-one relationship approach with our clients in order to understand their needs and provide them with effective solutions.

Nonwoven Geotextiles

The Nonwoven geotextiles products covered by the present EPD are divided in two main product categories:
The first one includes **NW Standard**, **SNW Superior** & **PNW Protection** products, while the other includes **CNW Medium**, **G_EX**, **Black versions**, **Anthacite** and **Grey** Nonwoven geotextiles.

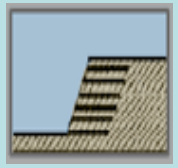
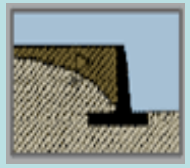
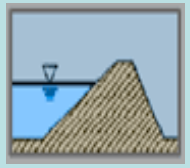
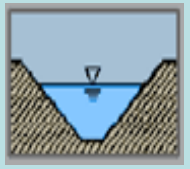
The reference CPC code according to the UN CPC classification system is 369 “Other plastic products”.

Nonwoven geotextiles are ideal for the following applications:

Intended use	Technical Specification	Function			
		Filtration	Separation	Reinforcement	Drainage
Roads and other trafficked areas	EN 13249	+	+	+	
Railways	EN 13250	+	+	+	
Earthworks, foundations and retaining structures	EN 13251	+	+	+	
Drainage control	EN 13252	+	+		+
Erosion control	EN 13253	+	+	+	
Reservoir and dams	EN 13254	+	+	+	
Canals	EN 13255	+	+	+	
Solid waste disposal	EN 13257	+	+	+	

NW, SNW Superior, PNW Protection, C_NW, G_EX, Black, Anthacite and Grey Nonwoven geotextiles products are UV stabilized polypropylene needle punched non-woven geotextile and are manufactured at one of Thrace Nonwovens & Geosynthetics S.A. facilities that have achieved ISO 9001 certification for its systematic approach to quality, as well as ISO 14001 for its safe environmental practices.

The construction of the geotextile makes them ideal for the following applications.

								
EN 13249	EN 13250	EN 13251	EN 13252	EN 13253	EN 13254	EN 13255	EN 13257	**EN 13265**
F	F	F	F	F	F	F	F	**F**
R	R	R	D	R	R	R	R	**R**
F+S	F+S	F+S	F+S	F+S	F+S	F+S	F+S	**F+R**
R+S	R+S	R+S	F+D	R+S	R+S	R+S	R+S	
F+R	F+R	F+R	F+S+D	F+R	F+R	F+R	F+R	
F+R+S	**F+R+S**	**F+R+S**		**F+R+S**	**F+R+S**	**F+R+S**	**F+R+S**	

F = Filtration, R = Reinforcement, S = Separation, D = Drainage, P = Protection

Nonwoven Geotextiles

Product description

The studied products are UV stabilized polypropylene needle punched nonwoven geotextiles. Nonwoven geotextiles are resistant to commonly encountered soil chemicals, mildew and insects and is non-biodegradable. Also, nonwoven geotextiles are highly resistant to acid and alkaline environments. The products are manufactured at one of Thrace's Nonwovens & Geosynthetics S.A. facilities that have achieved ISO 9001 certification for its systematic approach to quality, as well as ISO 14001 for its safe environmental practices.

The products covered in the EPD represent the 81.66% of the total Nonwoven geotextiles production (*of the reference year*).

Intended use

Nonwoven geotextiles are used in many civil engineering and building applications. They are specifically designed to offer filtration, separation, and erosion control functions.

Nonwoven geotextiles are offered for various applications such road, railway, and drainage applications. They act as a separator to prevent the intermixing of the different soil layer types, and as a filter to allow the flow of fluids while preventing the passage of soil particles.

Technical data

Indicatively, the technical data of a Nonwoven geotextile will be presented.

Property	NW	S_NW	P_NW	C_NW	Unit
Tensile Strength (EN ISO 10319)	6-84	6-30	5-150	4.5-140	kN/m
Elongation MD/CD (EN ISO 10319)	36/42-80/80	36/4265/65	40/40-75/75	39/39-70/70	%
Resistance to static puncture (EN ISO 12236)	0.86-14	1.05-4.8	1.5-25	0.588-19	kN
Water flow rate (EN ISO 11058)	35-144	45-144	7-180	20-137	l/ (m^2· s)
Mass/ Unit area (EN ISO 9864)	80-1200	80-300	100-2000	90-2000	g/m^2
Dynamic Perforation resistance (EN ISO 13433)	0-48	10-48	0-38	0-40	mm
Characteristic Opening Size (O_{90})	60-128	60-128	50-130	50-130	µm

Property	Test Procedure	G_EX	Unit
Grab Tensile Strength	ASTM D4632	90-380	lbs
Grab Elongation	ASTM D4632	50	%
Trapezoid Tear	ASTM D4533	40-145	lbs
CBR Puncture	ASTM D6241	265-1050	lbs
UV Stability (500 hrs)	ASTM D4355	70	%
Weight	ASTM D5261	3.5-16	oz/yd^2
Permittivity	ASTM D4491	0.7-2.0	sec^{-1}
Water Flow Rate	ASTM D4491	50-150	gpm/ft^2
A.O.S.	ASTM D4751	70-100	U.S. Sieve

For further information, details and/ or explanation, please contact the relevant department qualitycontrol@thraceplastics.gr

Nonwoven Geotextiles

Base materials

The composition of the reference products is reported in the following tables. The content of SVHC does not exceed 0.1% of the total weight.
The products covered in the EPD represent the 81.66% of the total Nonwoven geotextiles production.

NW, SNW Superior & PNW Protection

Contribution (% in weight) of materials to the declared unit – 1 kg of Nonwoven geotextile	
Polypropylene	98.77
Spin Finish Oil	0.80
UV stabilizer	0.43

CNW, G_EX, Black, Anthacite & Grey

Contribution (% in weight) of materials to the declared unit – 1 kg of Nonwoven geotextile	
Polypropylene	97.7 – 98.67
Colour Masterbatch (carbon black)	0.1 – 1.5
Spin Finish Oil	0.8
UV Masterbatch	0 – 0.43

Nonwoven Geotextiles

The names and densities of the products described in the EPD are defined in the following tables:

Model	Nominal density (g/m^2)	Declared range (g/m^2)
1000CNW	1000	900-1100
100NW	83, 85, 90, 100	74-110
1100NW	1100	990-1210
110NW	110	99-121
120NW	120, 130	108-143
130NW	130	117-143
140NW	120, 127, 130, 140	108-154
170NW	170	153-187
200CNW	200	180-220
200NW	185, 190, 200	166-220
240NWA	240	216-264
270NW	240, 260, 270	216-297
285CNW	270	243-297
300CNW	285, 300	256-330
300NW	295, 300	265-330
325NWA	325	292-358
400NW	330, 400	297-440
500CNW	470	423-517
85NW	85	76-94
850CNW	850	765-935
90CNW	90	81-99

Model	Nominal density (g/m^2)	Declared range (g/m^2)
AS280	170, 180	153-198
AU140NW	140	123-154
AU160NW	160	144-176
CL150NW	150	135-165
CL170NW	170	153-187
CL200NW	190, 200	171-220
CL250NW	250	225-275
G120EX	104	93-115
G125EX	113, 119	101-131
G130EX	129	116-142
G150EX	194	174-214
G160EX	237	213-261
G180EX	271	243-299
G250EX	356	320-392
G275EX	407	366-448
S8NW-C	105	94-116
ME1000NW	1000	900-1100
ME350NW	350, 355	315-391
MES8NW	108	97-119
P150NW	150	135-165
P400NW	400	360-440
P450NW	450	405-495
P500NW	470, 500	423-550
P600NW	570, 600	513-660

Model	Nominal density (g/m^2)	Declared range (g/m^2)
PPN100	100	90-110
PPN155	163	146-180
PPN200	210	189-231
S10NW	120	108-132
S12NW	140	126-154
S13NW	150	135-165
S14NW	155, 160	139-176
S15NW	170	153-187
S16NW	180	162-198
S18NW	200	180-220
S20NW	220, 225, 250	198-275
S22NW	270	243-297
S25NW	285, 300	256-330
S30NW	380	342-418
S6NW	80	72-88
S8NW	100	90-110
S9NW	150, 110	94-121
S8NW-C	105	95-116
NT2	70	63-77
NT3	88	79-97
NT4	128	115-141
NT5	178	160-196
NT6	220	205-245

Nonwoven Geotextiles

More available models covered by this EPD are mentioned in the following tables:

Model	
80NW	315NW-GRK5
90NW	100NWA
190NW	105NWA
220NW-C	125NWA
330NW-C	155NWA
520NW	180NWA
600NW	200NWA
650NW	215NWA
750NW	250NWA
800NW	285NWA
1000NW	400NWA
1200NW	500NWA
160NW-GRK3	600NWA
200NW-GRK3	700NWA
265NW-GRK4	800NWA

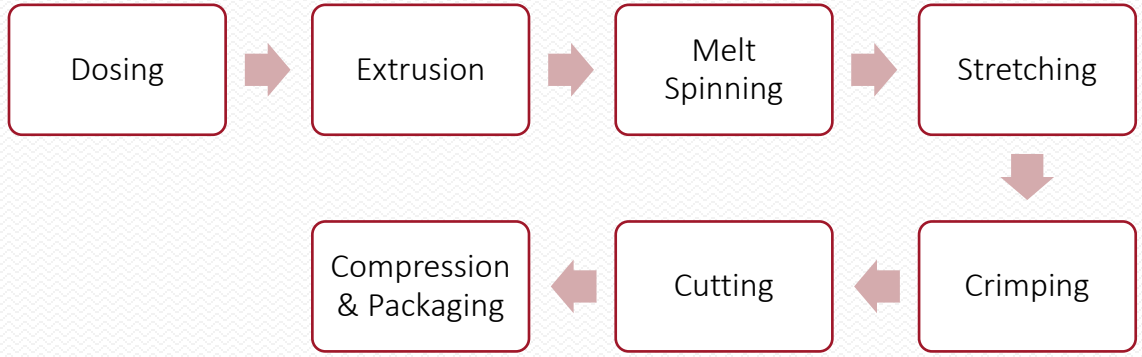
Model	
P100NW	CL100NW
P200NW	CL130NW
P250NW	CL140NW
P300NW	CL160NW
P350NW	CL180NW
P430NW-PR	CL220NW
P700NW	CL240NW
P800NW	CL300NW
P900NW	100CNW
P1000NW	120CNW
P1100NW	150CNW
P1200NW	160CNW
P1300NW	170CNW
P1600NW	250CNW
P2000NW	350CNW

Model	
400CNW	ME300NW
450CNW	ME400NW
600CNW	G140EX
650CNW	G145EX
700CNW	G225EX
800CNW	G245EX
900CNW	G350EX
1100CNW	NT6
1200CNW	100NW black
2000CNW	120NW black
MES10NW	140NW black
MES14NW	200NW black
MES20NW	270NW black
ME140NW	S8NW black
ME200NW	S12NW black

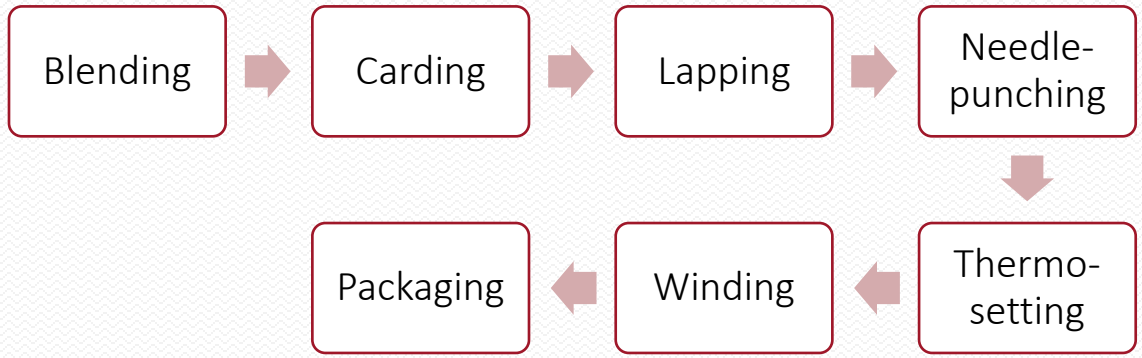
Model
S14NW black
S16NW black
S18NW black
P150NW black
90NW Anthr.
100NW Anthr.
PPN100 Grey
PPN155 Grey
PPN200 Grey
350NW
500NW
P550NW

Manufacturing Process

Staple Fibers production



Fabric Production



This EPD describes the impacts of NW, SNW Superior & PNW Protection, and CNW, G_EX, Black, Anthacite & Grey Nonwoven geotextiles produced in Thrace's NG manufacturing site in Xanthi, Greece, using for each product category weighted average values. The results reported in this EPD, through the two selected reference products, are representative for the two product categories.

Reference service life

The reference service life does not have to be declared, because this LCA does not declare the entire Life Cycle. Therefore, it is a voluntary statement. According to the manufacturer the reference service lifetime of Nonwoven geotextiles is about 100 years in soil temperatures <25 ^{o}C.

Life Cycle Assessment - LCA

Declared Unit

The declared unit is 1 kg of Nonwoven geotextile with densities in a wide range as described in Product Information chapter.

System boundary

This EPD only covers the Cradle-to-gate (stages A1-A3) as represented in the following table, because the rest of the Life Cycle stages are very dependent on the development of particular scenarios.

Product Stage			Construction Process Stage		Use Stage								End of Life Stage				Resource Recovery Stage
Raw material	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction, demolition	Transport	Waste processing	Disposal	Reuse, recycling, or energy recovery potentials
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

MND: Module Not Declared

Therefore, the stages included in the study are:

- **Raw Materials supply (A1).** Production of raw materials used in the manufacturing of the products.
- **Transportation of raw materials to the site (A2).**
- **Manufacturing of Nonwoven geotextiles (A3).** The electricity used in the manufacturing processes is from the Greek national grid. The reference year of the study is from May 2019 to April 2020.

Life Cycle Assessment - LCA

Cut-off criteria

All flows whose influence is higher than 1% of the total mass, energy or environmental impact are included in the Life Cycle Assessment. It is assumed, that the total neglected input flows are much less than 1% of energy and mass. All associated processes specific data are determined and modelled by the use of generic data provided by the integrated GaBi databases. Disposal or reuse of production wastes were not taken into account.

Assumptions, Allocation, and Estimates

- Regarding the exclusion of product life cycle stages and processes, the use, end-of-life, and reuse stage have not been accounted for. Also, the capital goods (construction of the manufacturing site) are not included in the LCA study.
- Producer specific data used for calculations refer to the inventory of one full year and more specifically, data from 2019 to 2020 were used as reference.
- An uncertainty regarding the packaging process was raised due to the complexity of monitoring the stored packaging materials. Thus, an assumption made which described the packaging material used for the packaging of the manufactured product. PVC cores and Polyethylene film, in percentages 95% and 5% respectively, were assumed to be the main packaging materials used.
- UV Masterbatch was assumed to consist of polypropylene exclusively. Coloring Masterbatch (carbon black) was assumed to comprise of 55% polypropylene and 45% carbon black.
- A default mean of road transportation (Truck Euro 5 – 2.7t payload – 7.5t gross weight) has been assumed. Weighted average of the distance covered, and times needed were taken into account. Regarding the ship transportation, an “Average ship, 3,500t payload capacity” was assumed due to lack of actual data.
- 9% of the total raw material flows that entered the product system were excluded from the study, as they were used as inputs in another product system. Therefore, raw material data used for the calculation of the potential impact categories are allocated according to the 91% of the total input flows.
- Regarding the energy consumption and the raw material consumption in the manufacturing process, an allocation based on the mass of the finished products from the site has been applied. The Nonwoven geotextiles included in the EPD are accounted for the 81.66% of the total production.

Background data and data quality

For all processes primary data was collected and provided by Thrace Nonwovens & Geosynthetics S.A. The primary data refers to May 2019 to April 2020 as reference period. For the data, which are not influenced by the manufacturer, generic data is used. The GaBi-database was used for the generic data. This database is updated regularly.
The LCA software GaBi ts version 9.1.0.53 was used for inventory and impact assessment calculations based on data entry of the developed model. A compilation of Ecoinvent v.3.5 and Professional databases was used.

Comparability

- EPDs within the same product category but from different program may not be comparable.
- EPDs of construction products may not be comparable if they do not comply with EN 15084.
- This EPD and the PCR CPC 54 “Construction products and construction services” are available on the website of The International EPD® System (www.environdec.com).

Life Cycle Assessment - LCA

Parameters describing the environmental impacts

The following tables present the environmental impact potentials for different parameters, for the material flows as well as for the waste and other outputs.
The results refer to 1 kg of Nonwoven geotextile.

NW Standard, SNW Superior & PNW Protection:

Environmental Impact Categories		Impact/ 1 kg of NW Standard, SNW Superior & PNW Protection Nonwoven geotextile			
	Unit	A1	A2	A3	Total
Depletion of abiotic resources (elements)	kg Sb eq.	1.369E-06	6.2763E-09	1.69E-07	**1.544E-06**
Depletion of abiotic resources (fossil)	MJ net calorific value	79.3056	1.0931	10.7054	**91.1041**
Acidification Potential	kg SO_2 eq.	0.00523	0.0004288	0.00392	**0.00958**
Eutrophication Potential	kg PO_4^{-3} eq.	5.531E-04	1.093E-04	1.769E-04	**8.39E-04**
Global Warming Potential (GWP100)	kg CO_2 eq.	2.401	0.07981	1.0335	**3.5140**
Ozone Layer Depletion Potential	kg R-11 eq.	1.313E-14	1.3321E-17	1.775E-14	**3.090E-14**
Photochemical Ozone Creation Potential	Kg C_2H_4 eq.	8.182E-04	-1.889E-04	2.202E-04	**8.494E-04**

Impact Category – Waste categories		Impact/ 1 kg of NW Standard, SNW Superior & PNW Protection Nonwoven geotextile			
	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	1.726E-08	6.127E-08	3.292E-09	**8.182E-08**
Non-hazardous waste disposed	kg	0.02179	8.917E-05	0.003763	**0.0256**
Radioactive waste disposed	kg	0.001313	1.488E-06	0.0001238	**0.001438**

Life Cycle Assessment - LCA

NW Standard, SNW Superior & PNW Protection:

Impact Category – Use of resources	Unit	Impact/ 1 kg of NW Standard, SNW Superior & PNW Protection Nonwoven geotextile			
		A1	A2	A3	Total
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value	3.4587	0.0636	3.5015	**7.0239**
Use of renewable primary energy resources used as raw materials	MJ, net calorific value	0	0	0	**0**
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value	3.4587	0.0636	3.5015	**7.0239**
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value	38.2442	1.097	11.0223	**50.3637**
Use of non-renewable primary energy resources used as raw materials	MJ, net calorific value	44.7057	0	0	**44.7057**
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value	82.9499	1.097	11.0223	**95.0694**
Use of secondary material	kg	0	0	0	**0**
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	**0**
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	**0**
Use of net fresh water	m^3	0.01536	1.076E-04	0.006847	**0.0223**

Life Cycle Assessment - LCA

CNW Medium, G_EX, Black versions, Anthacite & Grey Nonwoven geotextile

Environmental Impact Categories		Impact/ 1 kg of CNW Medium, G_EX, Black versions, Anthacite & Grey Nonwoven geotextile			
	Unit	A1	A2	A3	Total
Depletion of abiotic resources (elements)	kg Sb eq.	1.367E-06	6.474E-09	1.69E-07	**1.542E-06**
Depletion of abiotic resources (fossil)	MJ net calorific value	79.219	1.1279	10.7054	**91.0525**
Acidification Potential	kg SO_2 eq.	0.005238	0.0004404	0.00392	**0.00960**
Eutrophication Potential	kg PO_4^{-3} eq.	5.528E-04	1.122E-04	1.769E-04	**8.42E-04**
Global Warming Potential (GWP100)	kg CO_2 eq.	2.4001	0.08193	1.0335	**3.5155**
Ozone Layer Depletion Potential	kg R-11 eq.	1.309E-14	1.375E-17	1.775E-14	**3.086E-14**
Photochemical Ozone Creation Potential	Kg C_2H_4 eq.	8.179E-04	-1.931E-04	2.202E-04	**8.451E-04**

Impact Category – Waste categories		Impact/ 1 kg of CNW Medium, G_EX, Black versions, Anthacite & Grey Nonwoven geotextile			
	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	1.717E-08	6.3207E-08	3.292E-09	**8.367E-08**
Non-hazardous waste disposed	kg	0.02166	9.198E-05	0.003763	**0.02552**
Radioactive waste disposed	kg	0.001305	1.535E-06	0.000123	**0.00143**

Life Cycle Assessment - LCA

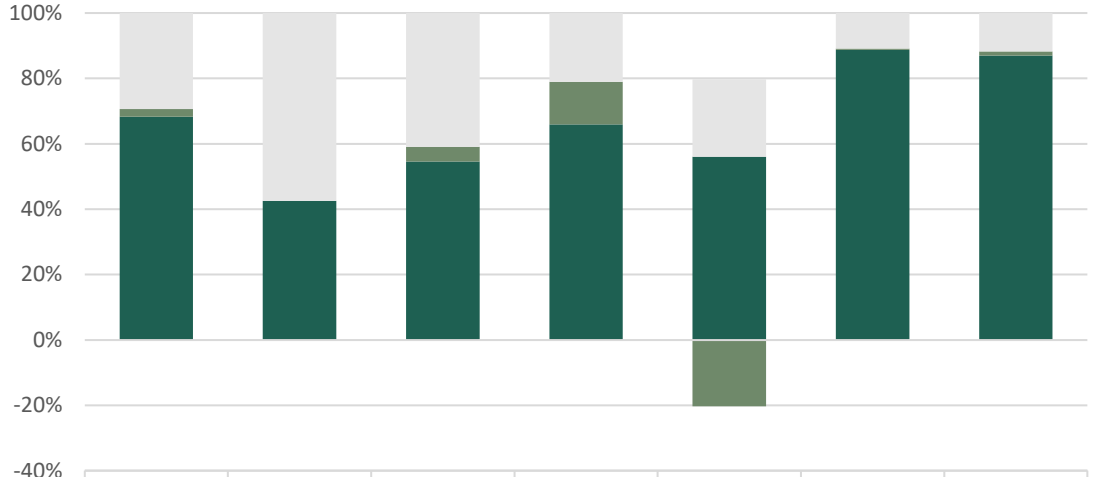
CNW Medium, G_EX, Black versions, Anthacite & Grey Nonwoven geotextile

Impact Category – Use of resources	Unit	Impact/ 1 kg of CNW Medium, G_EX, Black versions, Anthacite & Grey Nonwoven geotextile			
		A1	A2	A3	Total
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value	3.4449	0.06563	3.4816	**6.9922**
Use of renewable primary energy resources used as raw materials	MJ, net calorific value	0	0	0	**0**
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value	3.4449	0.06563	3.4816	**6.9922**
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value	38.4606	1.1319	11.0223	**50.6149**
Use of non-renewable primary energy resources used as raw materials	MJ, net calorific value	44.3927	0	0	**44.3927**
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value	82.8533	1.1319	11.0223	**95.0076**
Use of secondary material	kg	-	-	-	**-**
Use of renewable secondary fuels	MJ, net calorific value	-	-	-	**-**
Use of non-renewable secondary fuels	MJ, net calorific value	-	-	-	**-**
Use of net fresh water	m^3	0.01545	1.109E-04	0.006847	**0.0224**

Interpretation

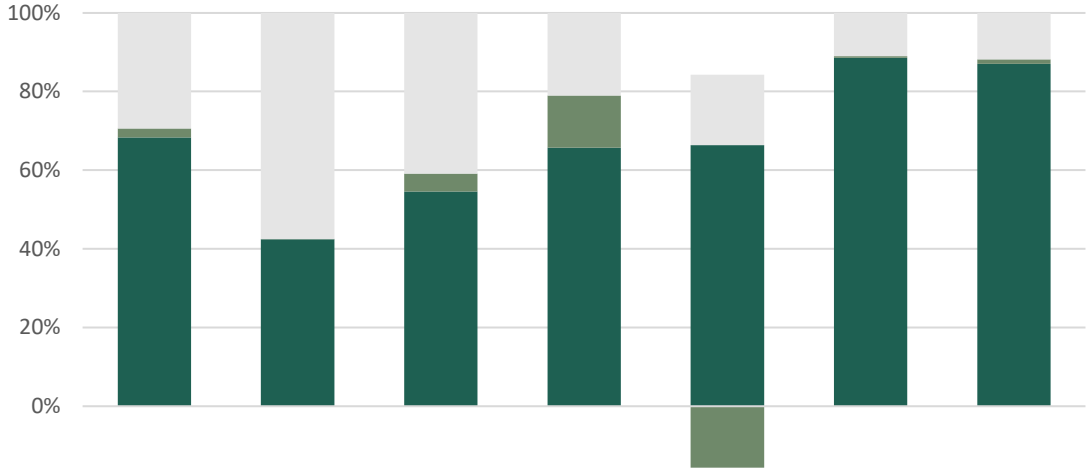
The following figures present the influence of the stages A1, A2, and A3 on the total environmental impact and it can be clearly seen that the analyzed impact categories are mainly influenced by the raw material supply (A1) and the manufacturing stage (A3). It should be noted that many of the impact categories do not differ more than ±10% between the two product sub-categories of Nonwoven geotextiles. However, the results of the environmental impacts are presented separately.

Environmental Impacts
(NW, SNW Superior & PNW Protection)



	Global Warming Potential	Ozone Depletion Potential	Acidification Potential	Eutrophication Potential	Photochemical Ozone Creation Potential	Depletion of Abiotic resources (element)	Depletion of Abiotic resources (fossil)
A3	29,4	57,5	40,9	21,1	17,9	10,9	11,8
A2	2,3	0	4,5	13	-15,4	0,4	1,2
A1	68,3	42,5	54,6	65,9	42,5	88,6	87

Environmental Impacts
(CNW, G_EX, Black, Anthacite & Grey)



	Global Warming Potential	Ozone Depletion Potential	Acidification Potential	Eutrophication Potential	Photochemical Ozone Creation Potential	Depletion of Abiotic resources (element)	Depletion of Abiotic resources (fossil)
A3	29,4	57,5	40,9	21	17,9	11	11,8
A2	2,3	0,04	4,6	13,3	-15,7	0,4	1,2
A1	68,3	42,4	54,6	65,7	66,4	88,6	87

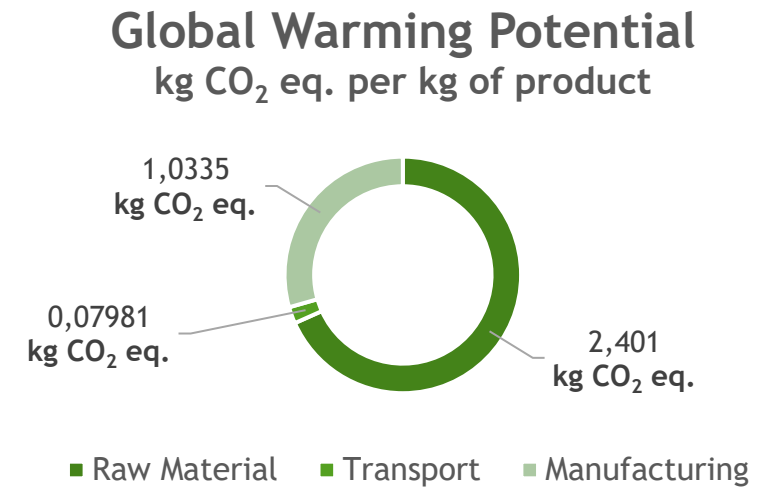
Interpretation

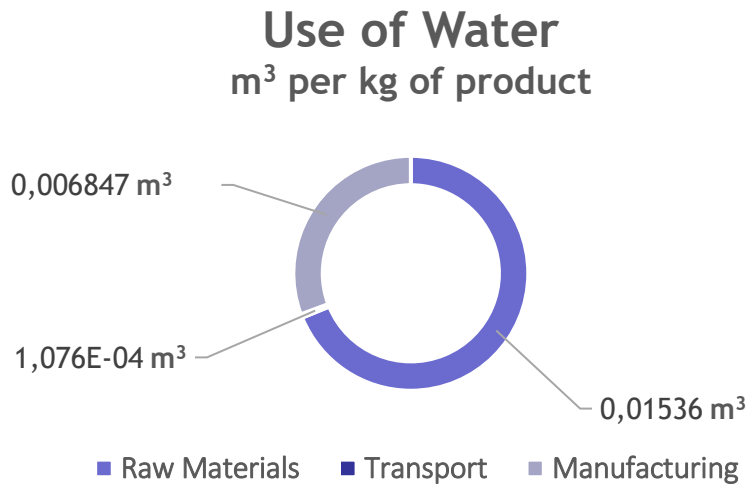
Specifically, the impact categories POCP, ADPelement and ADPfossil are largely dominated by the raw material supply stage, where impact category ODP is almost equally influenced by raw material supply and manufacturing stage.

The GWP of 1 kg of Nonwoven geotextile is dominated by 68% by the information module A1 – Raw material supply. Module A2 – Transportation contributes slightly to the impact category, whereas the manufacturing stage (A3) is responsible for the rest of contribution with a share of 29.4% of the total impact.

The provision of base materials is also mostly accountable for the formation potential of tropospheric ozone photochemical oxidants, whereby it shall be noticed that the negative values of POCP are attributable to the fact that the nitrogen monoxides during any truck transportation were calculated with a negative characterization factor.

NW , SNW Superior & PNW Protection Nonwoven geotextiles



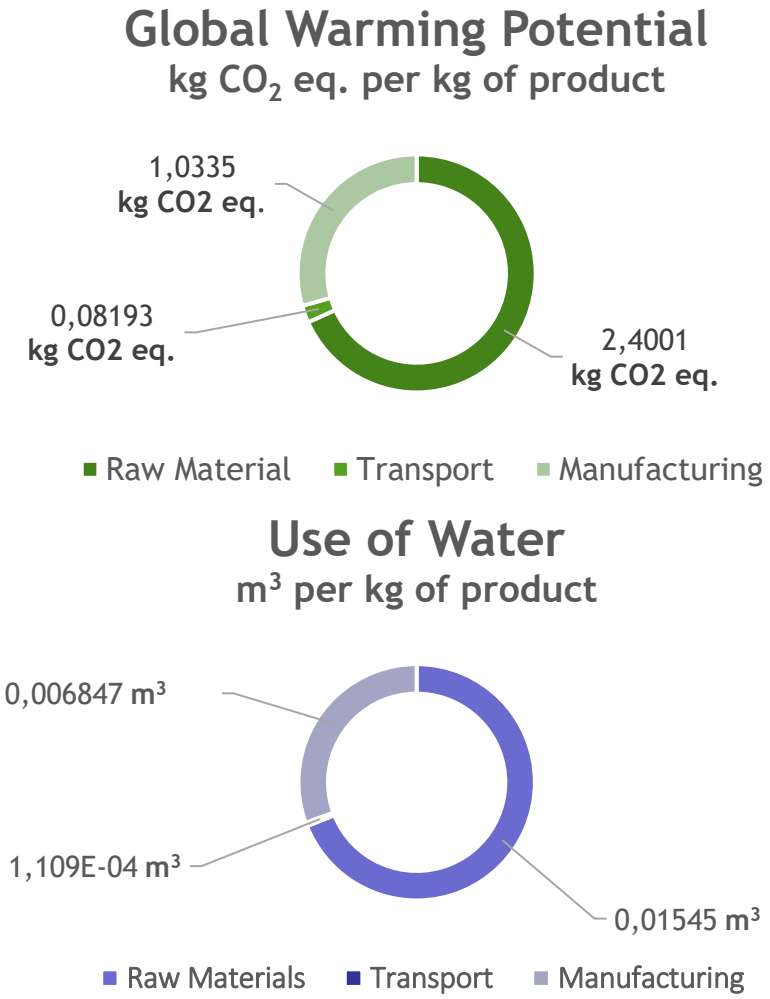


Interpretation

Contributions from the raw materials extraction and production stage (A1) and the manufacturing stage (A3) are the most important considering the formation of Acidification Potential (AP). Regarding both categories of the Nonwoven products, raw material supply is responsible for the contribution of 54.6% of the total impact, whereas a similar pattern is followed by the manufacturing processes which contribute to a percentage of 40.9% of the total impact. Transportation stage – A2 is only accountable for 4.5% of the total impact.

A relevant pattern is followed regarding the formation of Eutrophication Potential (EP). However, the transportation stage (A2) holds a larger share of the total impact in comparison to previous cases. Stage A2 is responsible for the contribution of 13% of the total impact, whereas raw material supply (A1) is dominant with a share of 66%.

CNW , G_EX, Black, Anthacite & Grey Nonwoven geotextiles



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