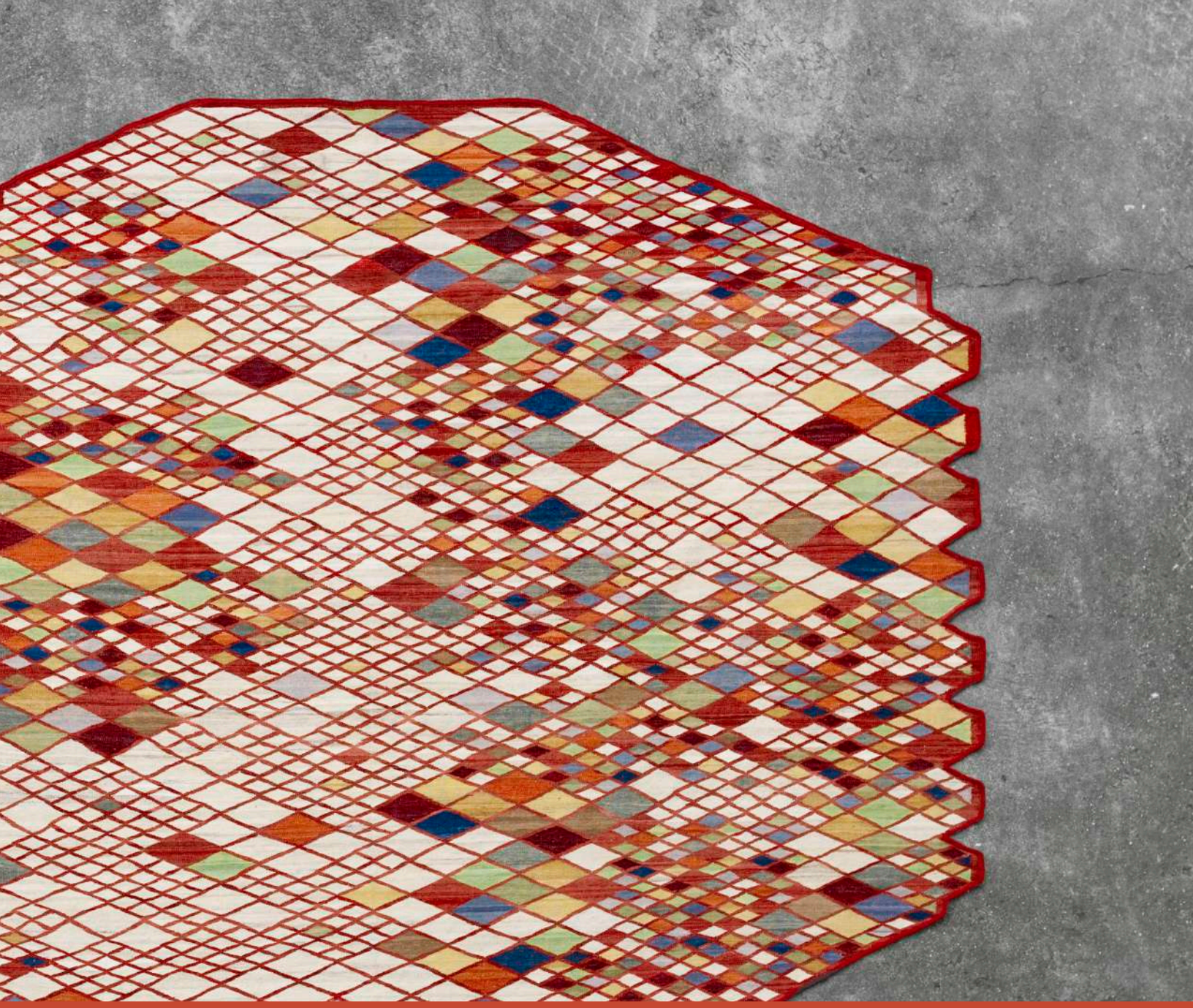


Self-declared EPD

Afghan wool Kilim

by **nutcreatives** for **nanimarquina**

Contents

1. Introduction

1.1 Scope and goals

The present document is a **self–declared Environmental Product Declaration (EPD)** and is the result of a Life Cycle Assessment (LCA), carried out between May and July of 2022 by the sustainability consulting agency Nutcreatives for Nanimarquina.

Despite being able to assure and prove the veracity of the given data, its maturation is still required before performing a third-party verified EPD. Nanimarquina decided voluntarily to share the present results as a sign of transparency towards its stakeholders and customers and to state its commitment to its sustainability journey. The results obtained will be used to implement eco-design strategies with the aim of reducing the environmental impact of rugs.

1.2 Nanimarquina

Nani Marquina founded her eponymous company in 1987 in Barcelona, breaking into the market with a new vision at that time: turning the classic rug into a contemporary design product.

Today, 35 years later, nanimarquina is an international reference in the design of handcrafted rugs with a long trajectory creating products for private and public projects.

By combining tradition with research and conceiving sustainability from a practical point of view, nanimarquina has been a responsible company from the beginning.

1.3 Consulting agency

Nutcreatives is an agency based in Barcelona founded in 2011. They are specialized in sustainable design and environmental consulting for a wide variety of sectors, from furniture to lighting, houseware, packaging and fashion.

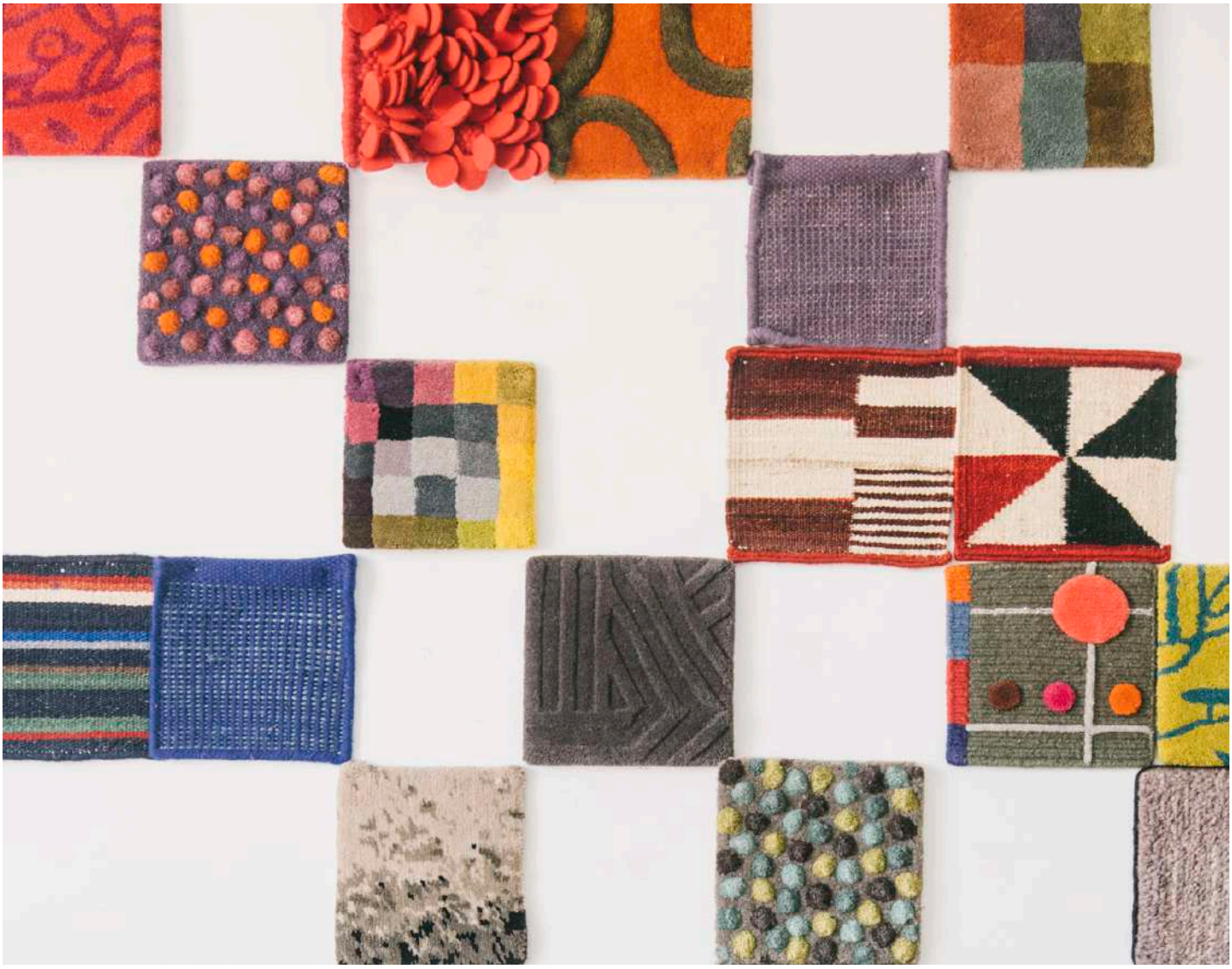
They collaborate with companies and organizations during all phases of design and development of new products, from conceptualization, design, technical development and prototyping, to the proposals for environmental impact improvement and the measurement of environmental impacts.

2. Product

2.1 Design Rugs

Nanimarquina designs and sells a great variety of hand-made rugs. On a very practical level, there are two variables that define the product, beyond the visual design. On the one hand the **manufacturing technique** and on the other hand the **type of material**.

These two features have the greatest influence on the life-cycle of the product. The assessment process has been standardized in such a way that the results are valid for all the rugs that share the same manufacturing technique and the same type of material.



2.2 Product Description

The present self-declared Environmental Product Declaration portrays the life-cycle of a hand loomed Kilim made of afghan wool which is one of the company's top selling products.

Hand loomed Kilim

A Kilim is a flat-weave rug in which the warp strands attached to the loom are interwoven with the weft strands. One of the main characteristics of this technique is that the weft is much tighter and denser than the warp, making it bear the weight of the pattern.

These rugs usually contain many colors and generally display geometric motifs. The process permits the use of strands of different thicknesses and origins. Traditionally, the Kilim is a high-density, durable and resistant rug, even in the case of very lightweight rugs.

Afghan wool

It's produced with hand-spun wool from indigenous sheep of Afghanistan. This fiber has a low environmental impact since the rugs are woven in nearby Pakistan. Traditionally, wool is the most widely used material for rugs.

Presenting key characteristics, wool offers quality, flexibility, and is 100% biodegradable. It is hypoallergenic, easy to care for, and ages well. In addition, it is considered a great thermal and acoustic insulator as well as naturally regulating humidity.

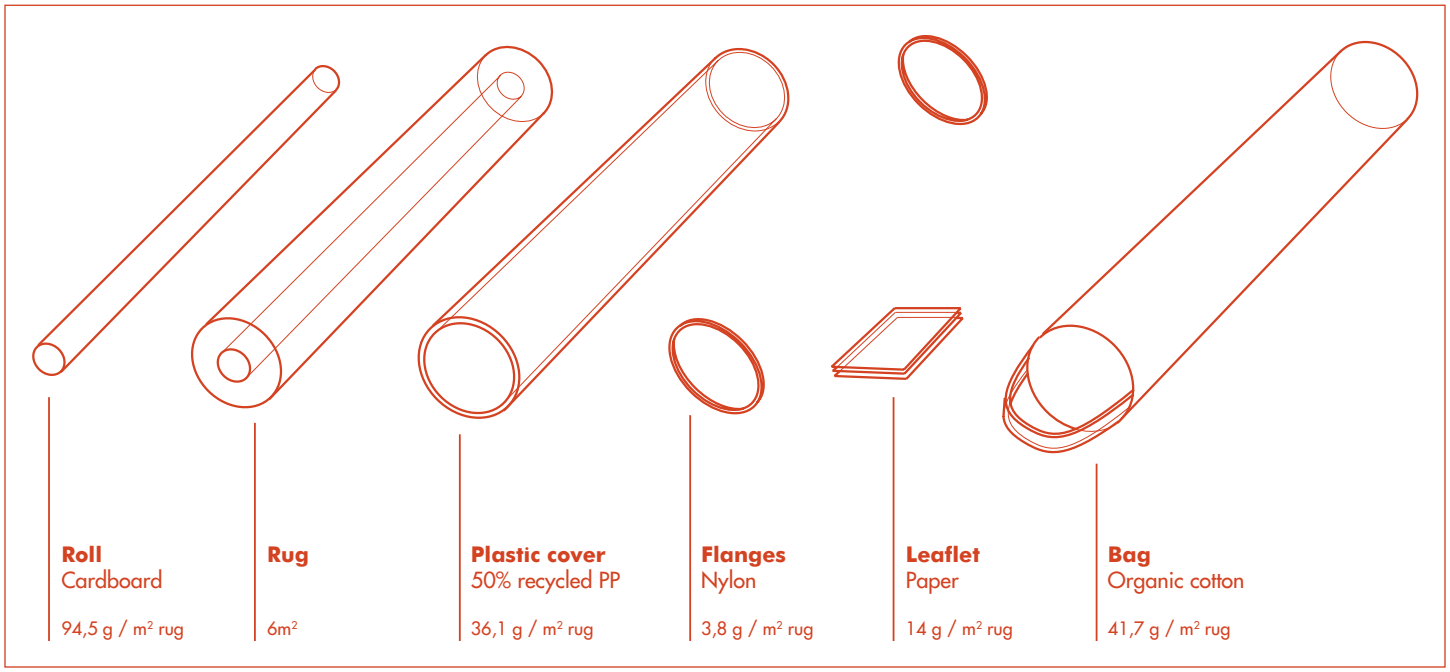
2.3 Content Declaration

Although the Kilim is mainly made of wool, it also contains other materials. This section describes the composition of the Kilim made with afghan wool and all the components of the packaging.

PRODUCT CONTENT – 1M² OF RUG

Material	Weight in kg	% of total weight
AFGHAN WOOL	1,915	92,5
COTTON	0,096	4,6
DYE	0,030	1,4
ANTI-SLIDE	0,030	1,4

PACKAGING CONTENT – 1M² OF RUG



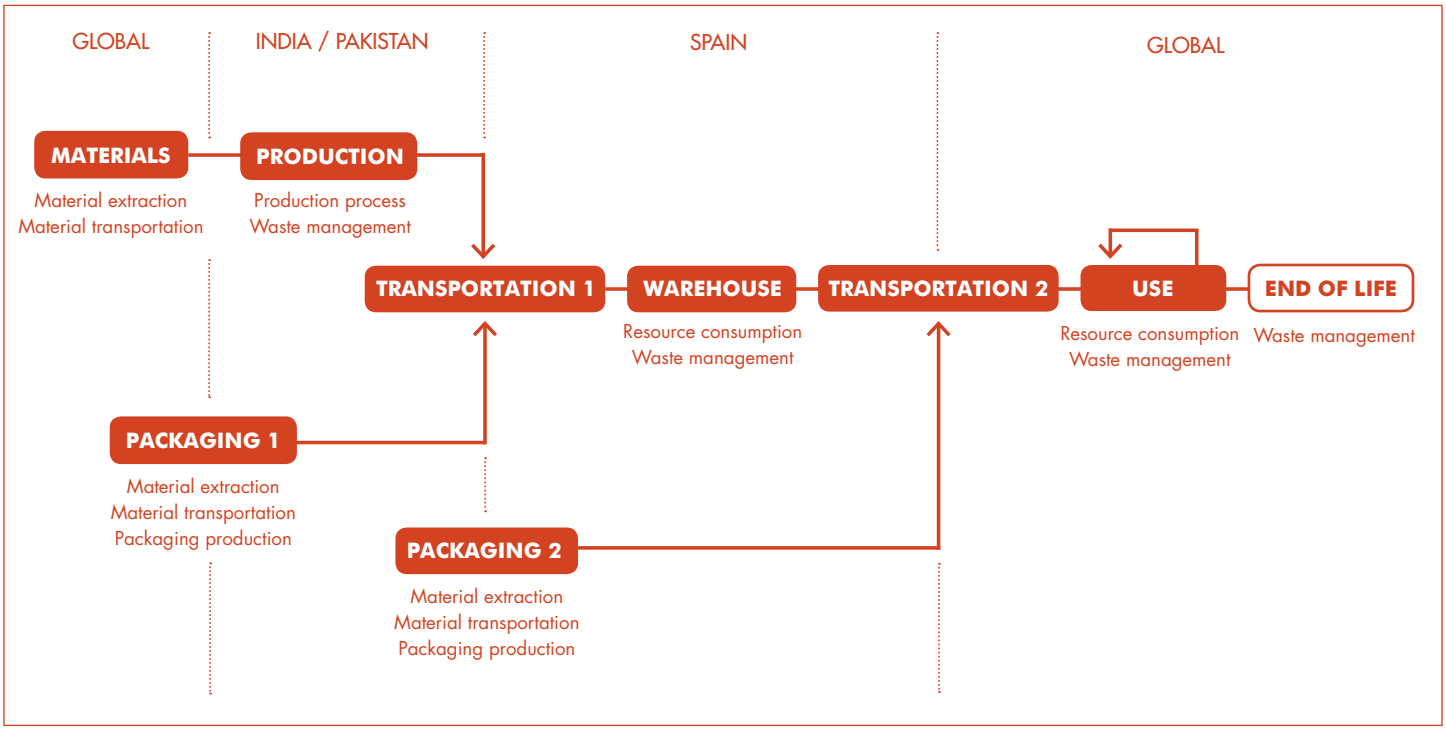
2.3 Life cycle

The life cycle has been reviewed and adapted in order to easily compare the environmental impact of each product, independently of the technique and the material. The life cycle embraces a total of nine different phases that are tightly correlated.

It all starts with the material extraction and its preparation. The materials are then transformed into the Kilim during the production phase, which happens in Pakistan. After that, the rug is enveloped with a transport packaging and transported via sea to Nanimarquina's spanish warehouse.

There, the product goes through quality control and is packaged with its final packaging. Next, the packaged product is transported via sea, air or land to its final user which will be using, cleaning and repairing the Kilim during the use phase. Most of the Kilims are used for several decades and reused by multiple users.

Due to the long life of the product and the inability to trace its end of life, this phase has been excluded from the assessment.



3. Framework

3.1 LCA Process

All the teams related to the life cycle of the product have been involved during the assessment process. People from the departments of **quality, manufacturing, logistics, management and design** of Nanimarquina have been key to the data collection. In addition, there has been a narrow collaboration with Nanimarquina's providers.

The information has been obtained by analyzing samples of materials from the warehouse and the office. In addition, real logistical data and regulated documentation provided by suppliers have been taken into account.

The gathered data was processed with the software **openLCA 1.11** and nourished by the database **Ecoinvent 3.8**.

An inventory was created for each of the eight phases of the life cycle and the data was introduced by selecting concrete inputs and outputs on each process. Finally, the environmental results were obtained by applying the EPD (2018) environmental impact assessment method.

The whole assessment process, including the development of the present documentation, has been carried out following the principles of **ISO 14040**. These establish the phases and analysis of the Life Cycle Assessment.

3.2 Key variables

Key variables are set in order to delimit the scope of the LCA and to allow the comparison between products. These variables have been defined with the best of our knowledge, based on the experts' recommendation and Nanimarquina's experience.

For rugs, the standard functional unit is **one square meter** and the analysis covers the whole lifespan of the product.

The following variables are defined for some specific phases of the rug's life cycle and have a great influence on the environmental results.

KEY VARIABLES AND ASSUMPTIONS

TRANSPORTATION 2	**Average distance**	Air 7936 km | Earth 1218 km
	Transport mode	Air 52,2% | Earth 47,8%
WAREHOUSE	**Reused carboard tube**	5%
	Ironed products	1%
	Stored products	81%
	Average storage	5,4 months
USE	**Average washing**	1 per year
	Average ironing	1 per year
	Average vacumming	26 per year
	Average lifespan	15 years

4. Results

4.1 Impact Categories

When analyzing the environmental impact of a product from different points of view, there has to be a selection of various impact categories. Impact categories help us make actionable statements about how Greenhouse Gas (GHG) emissions influence over environment. Based on the EPD (2018) method, the following impact categories have been analyzed:

IMPACT CATEGORIES – EPD (2018) METHOD

Impact Categories	Description	Units
ABIOTIC DEPLETION - ELEMENTS	Indicator of the depletion of natural non-fossil resources.	kg Sb eq
GLOBAL WARMING	Indicator of potential global warming due to emissions of greenhouse gases to air.	kg CO^2 eq
ABIOTIC DEPLETION - FOSSIL FUELS	Indicator of the depletion of natural fossil fuel resources.	MJ
OZONE LAYER DEPLETION	Indicator of emissions to air that cause the destruction of the stratospheric ozone layer.	kg CFC^{-11} eq
ACIDIFICATION	Indicator of the potential acidification of soils and water due to the release of gases such as nitrogen oxides and sulfur oxides.	kg SO^2 eq
PHOTOCHEMICAL OXIDATION	Indicator of emissions of gases that affect the creation of photochemical ozone in the lower atmosphere (smog) catalyzed by sunlight.	kg NMVOC
EUTROPHICATION	Indicator of the enrichment of the marine and terrestrial ecosystems with nutritional elements, due to the emission of nitrogen containing compounds.	kg PO^4 eq
WATER SCARCITY	Indicator of the relative amount of water used, based on regionalized water scarcity factors.	m^3 eq

4.2 Obtained results

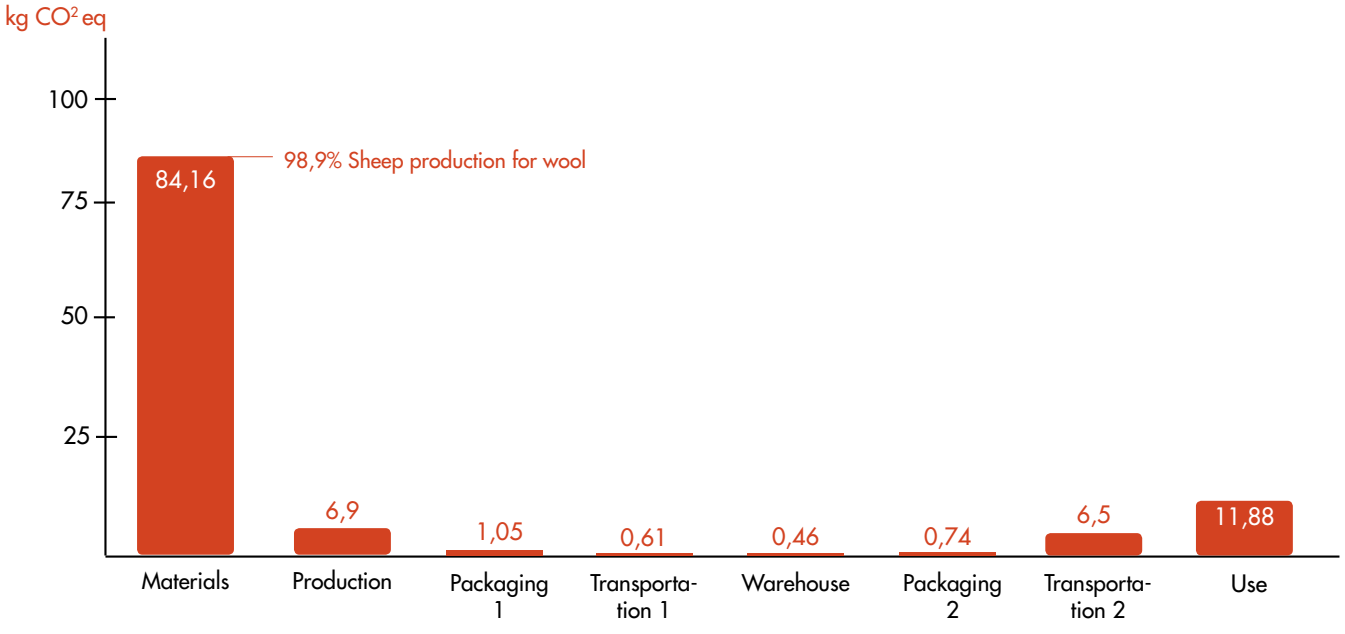
Through the use of the software openLCA, a great variety of data is obtained which has been structured from a generalist approach to a more specific standpoint.

First, the total results for the eight impact areas are shown. All the results shown in this section are equivalent to the functional unit described earlier, one square meter of rug.

ABIOTIC DEPLETION – ELEMENTS $0{,}36^{E-3}$ kg Sb eq	**GLOBAL WARMING** 112,35 kg CO2 eq	**EUTROPHICATION** 0,56 kg PO^4 eq
ABIOTIC DEPLETION – FOSSIL FUELS 446,73 MJ	**OZONE LAYER DEPLETION** $3{,}03^{E-6}$ kg CFC^{-11} eq	**WATER SCARCITY** 72,49 m^3 eq
ACIDIFICATION 1,58 kg SO^2 eq	**PHOTOCHEMICAL OXIDATION** 0,18 kg NMVOC	**FUNCTIONAL UNIT** 1 m^2 of rug

The following graph visualizes the distribution of global warming impact on the life-cycle of the Kilim. In addition, the causes of its greatest impacts are highlighted.

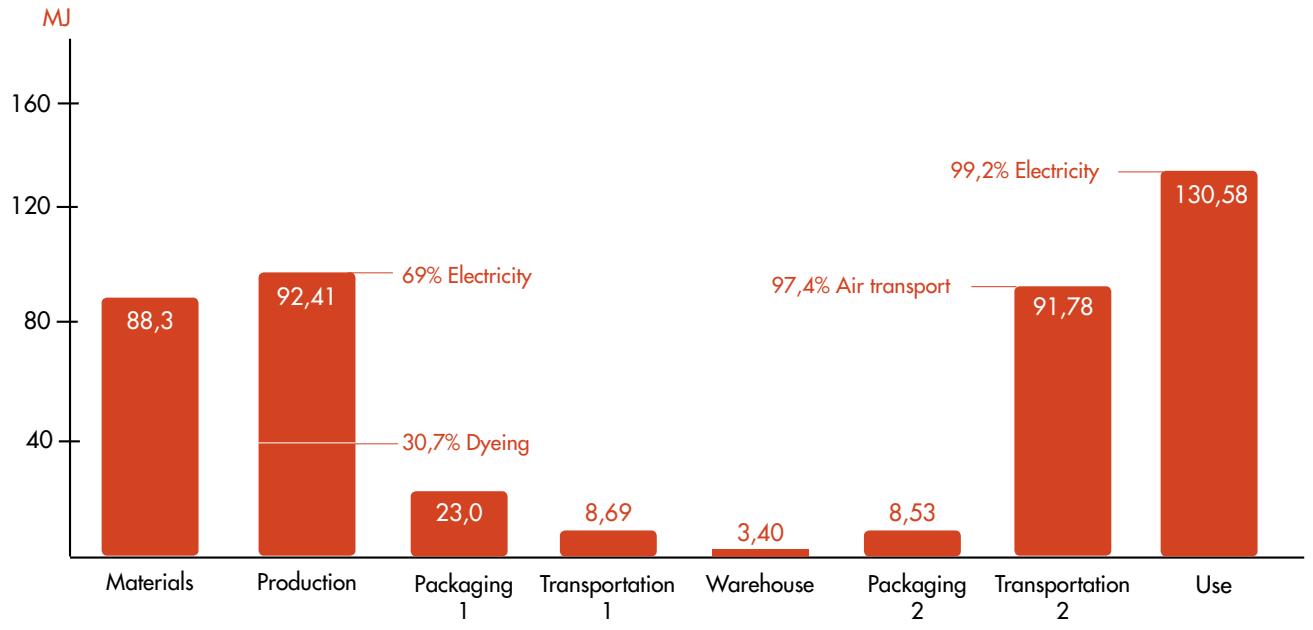
GLOBAL WARMING – 1M² OF RUG 112,35 kg CO^2 eq



In the same way, the following graphs visualize the abiotic depletion of fossil fuels and water scarcity impacts on the life-cycle of the Kilim.

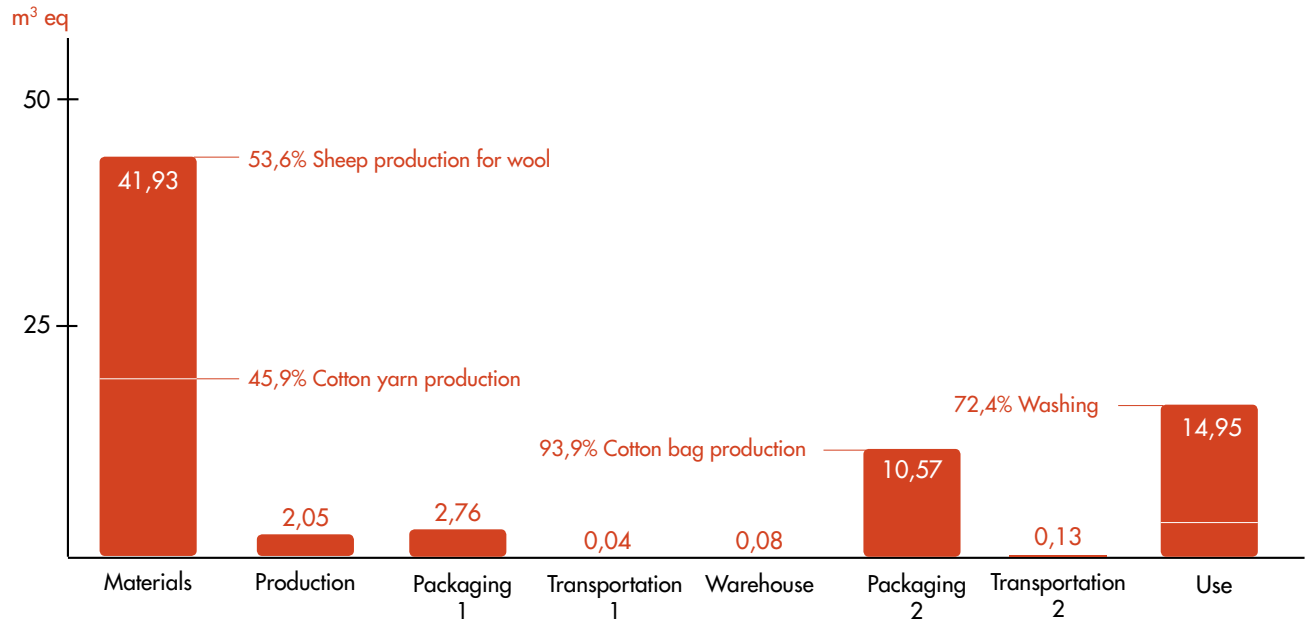
ABIOTIC DEPLETION (FOSSIL FUELS) – 1M² OF RUG

446,73 MJ



WATER SCARCITY – 1M² OF RUG

72,49 m^3 eq



Finally, there is a breakdown of the eight impact categories, displaying its distribution along the whole life-cycle of the rug.

LCA RESULTS (AMOUNT) – 1M² OF RUG

Impact Categories	P1	P2	P3	P4	P5	P6	P7	P8
Global warming (in kg CO^2 eq)	84,16	6,91	1,05	0,61	0,46	0,74	6,54	11,88
Abiotic depletion – Fossil fuel (in MJ)	88,30	92,42	23,00	8,69	3,40	8,56	91,78	130,58
Ozone layer depletion (in kg CFC^{-11} eq)	$0,695^{E-6}$	$0,597^{E-6}$	$0,039^{E-6}$	$0,105^{E-6}$	$0,012^{E-6}$	$0,038^{E-6}$	$1,18^{E-6}$	$0,366^{E-6}$
Acidification (in kg SO^2 eq)	1443^{E-3}	31^{E-3}	6^{E-3}	7^{E-3}	1^{E-3}	6^{E-3}	30^{E-3}	53^{E-3}
Photochemical oxidation (in kg NMVOC)	85^{E-3}	18^{E-3}	4^{E-3}	7^{E-3}	1^{E-3}	3^{E-3}	35^{E-3}	31^{E-3}
Eutrophication (in kg PO^4 eq)	505^{E-3}	12^{E-3}	2^{E-3}	1^{E-3}	4^{E-3}	6^{E-3}	5^{E-3}	23^{E-3}
Water scarcity (in m^3 eq)	41,93	2,05	2,76	0,04	0,08	10,56	0,13	14,95

P1 - Materials
P2 - Production
P3 - Packaging 1
P4 - Transportation 1
P5 - Warehouse
P6 - Packaging 2
P7 - Transportation 2
P8 - Use

In addition, the following table shows its distribution in percentage along the whole life-cycle of the rug.

LCA RESULTS (PERCENTAGE) – 1M² OF RUG

Impact Categories	P1	P2	P3	P4	P5	P6	P7	P8
Global warming (in %)	74,91	6,15	0,93	0,54	0,41	0,66	5,82	10,57
Abiotic depletion – Fossil fuel (in %)	19,77	20,69	5,15	1,95	0,76	1,92	20,54	29,23
Ozone layer depletion (in %)	22,93	19,69	1,29	3,46	0,40	1,24	38,92	12,07
Acidification (in %)	91,50	1,97	0,38	0,44	0,06	0,38	1,90	3,36
Photochemical oxidation (in %)	46,20	9,78	2,17	3,80	0,54	1,63	19,02	16,85
Eutrophication (in %)	90,50	2,15	0,36	0,18	0,72	1,08	0,90	4,12
Water scarcity (in %)	57,83	2,83	3,81	0,06	0,11	14,57	0,18	20,62

>80%
60 - 80%
40 - 60%
20 - 40%
<20%

P1 - Materials
P2 - Production
P3 - Packaging 1
P4 - Transportation 1
P5 - Warehouse
P6 - Packaging 2
P7 - Transportation 2
P8 - Use

4.3 Product life year

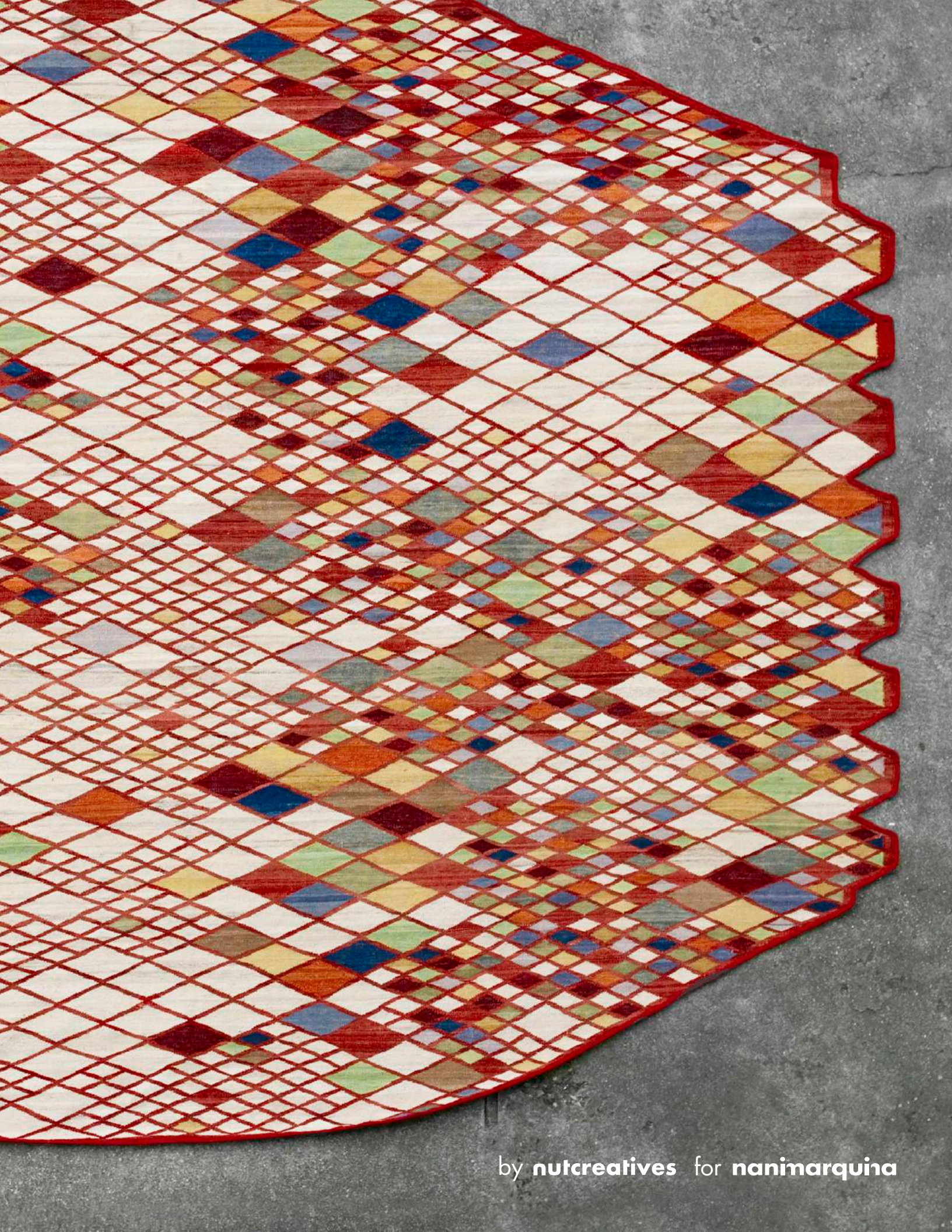
The hand-loomed Kilim made with afghan wool is a product with a long durability. Even though its average lifespan is 15 years, there has been evidence of Kilims that have been useful for more than 30 years.

All the results shown in the following table are a relative representation of the average impacts generated during **one product life year.**

AVERAGE IMPACTS GENERATED DURING ONE YEAR – 1M² OF RUG

Impact Categories	P1	P2	P3	P4	P5	P6	P7	P8
Global warming (in kg CO^2 eq)	5,61	0,46	0,07	0,04	0,03	0,05	0,44	0,79
Abiotic depletion – Fossil fuel (in MJ)	5,89	6,16	1,53	0,58	0,23	0,57	6,12	8,71
Ozone layer depletion (in kg CFC^{-11} eq)	5^{E-8}	4^{E-8}	$0,3^{E-8}$	1^{E-8}	$0,02^{E-8}$	3^{E-8}	8^{E-8}	2^{E-8}
Acidification (in kg SO^2 eq)	$96,2^{E-3}$	$2,1^{E-3}$	$0,4^{E-3}$	$0,47^{E-3}$	$0,07^{E-3}$	$0,4^{E-3}$	$2,0^{E-3}$	$3,5^{E-3}$
Photochemical oxidation (in kg NMVOC)	$5,7^{E-3}$	$1,2^{E-3}$	$0,27^{E-3}$	$0,47^{E-3}$	$0,067^{E-3}$	$0,2^{E-3}$	$2,3^{E-3}$	$2,1^{E-3}$
Eutrophication (in kg PO^4 eq)	$3,3^{E-3}$	$0,8^{E-3}$	$0,13^{E-3}$	$0,67^{E-3}$	$0,27^{E-3}$	$0,4^{E-3}$	$0,33^{E-3}$	$1,53^{E-3}$
Water scarcity (in m^3 eq)	2,80	0,14	0,18	0,00	0,01	0,70	0,01	1,00

P1 - Materials
P2 - Production
P3 - Packaging 1
P4 - Transportation 1
P5 - Warehouse
P6 - Packaging 2
P7 - Transportation 2
P8 - Use



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