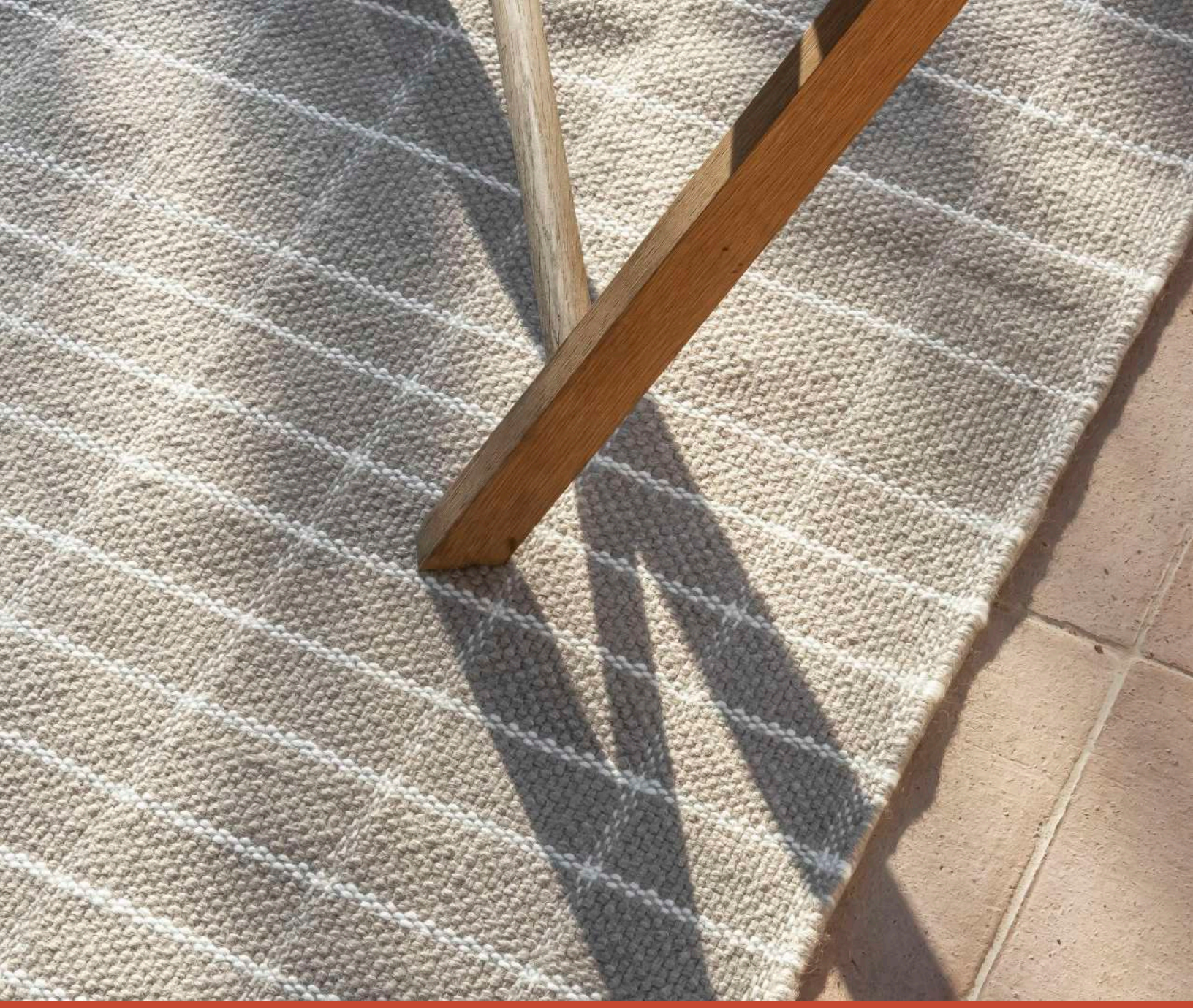


Self-declared EPD

Recycled PET Dhurrie

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.

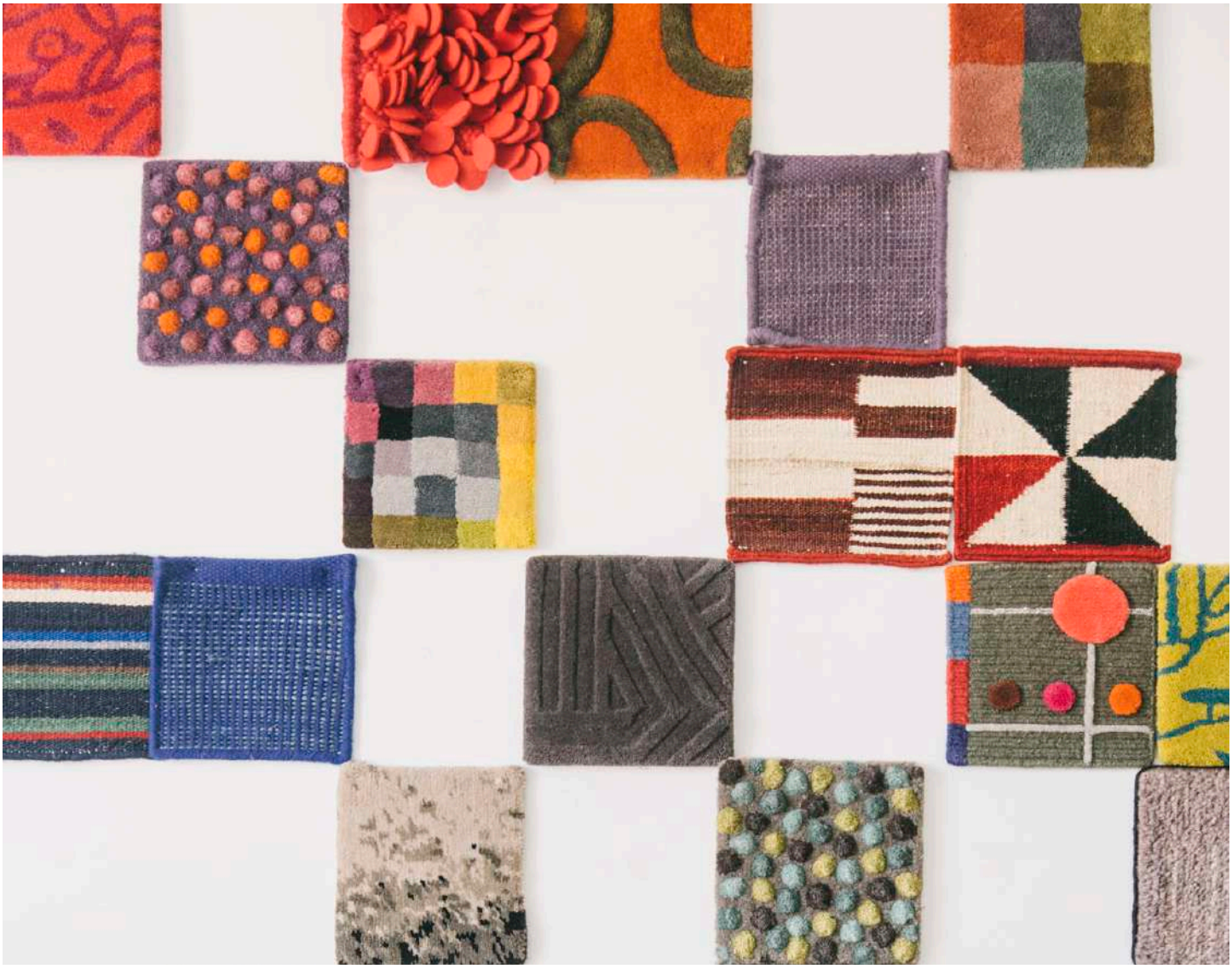
They collaborate with companies and organizations during all phases of design and development of new products, from conceptualization, design, technical development and prototyping, to the proposals for environmental impact improvement and the measurement of environmental impacts.

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 Dhurrie made of recycled PET which is one of the top selling outdoor rugs.

Hand loomed Dhurrie

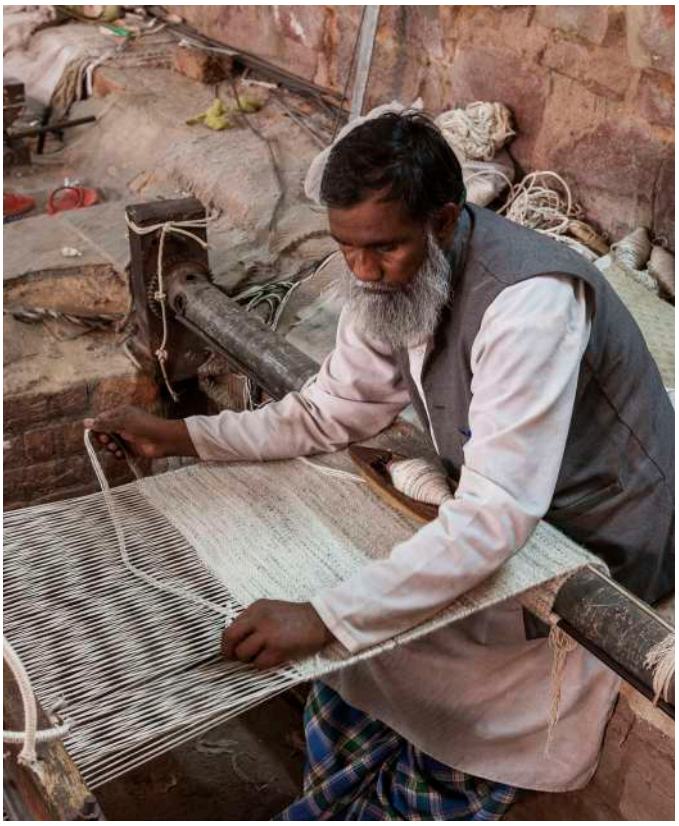
The Dhurrie is characterized by being a flat-structure rug, formed from the crossover between the weft and the warp strands. It can be done on both vertical and horizontal looms. The technique offers infinite finishes and the use of different materials.

These slim and lightweight rugs usually depict geometric patterns, presenting a firm, resistant and knotless surface, which make dhurries clean and easy to maintain.

Recycled PET

This material is produced through the process of recovery and reuse of polyethylene (PET) waste, from which a lightweight fiber is obtained. Recycled PET presents a high resistance to wear and offers good thermal properties, which makes it a perfect fiber for outdoor rugs.

The environmental benefits of this process are countless: it reduces environmental impact, avoids the use of non-renewable natural resources and reduces energy consumption.



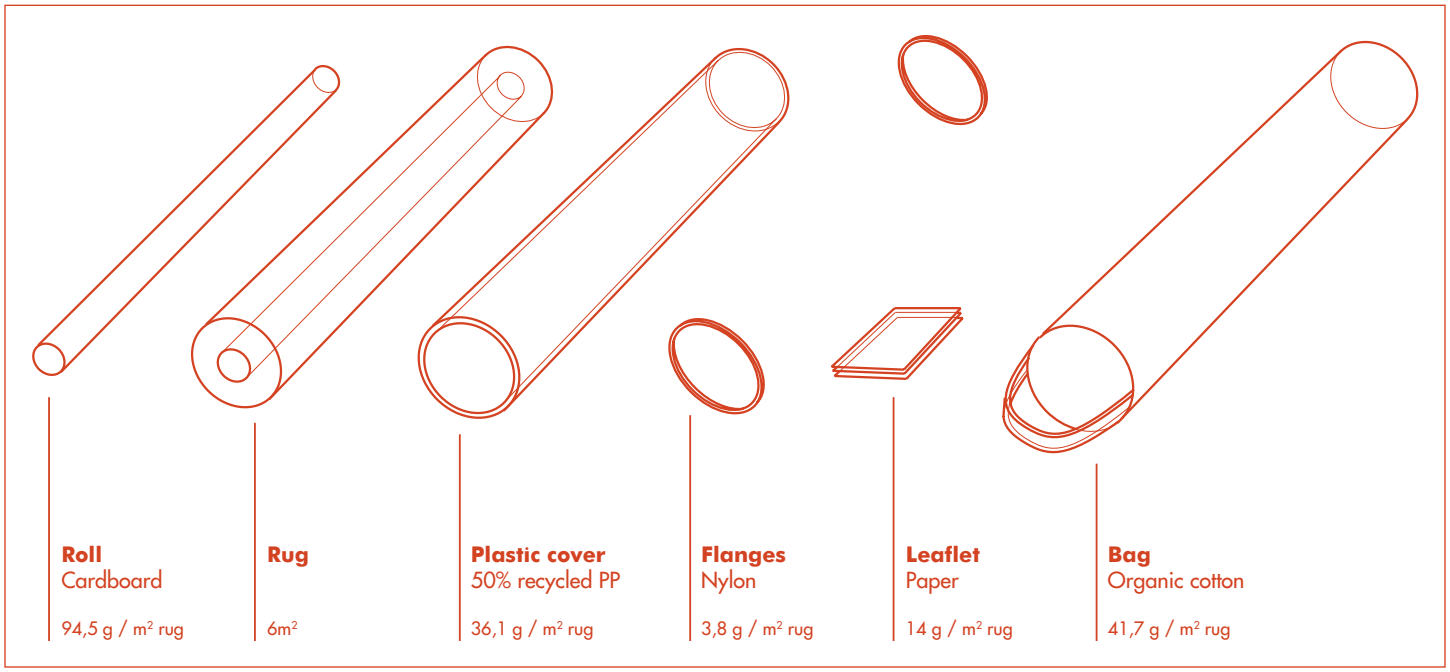
2.3 Content Declaration

Although the Dhurrie is mainly made of rPET, me must also to take into account other materials. This section describes the composition of the Dhurrie made with recycled PET and all the components of the packaging.

PRODUCT CONTENT – 1M² OF RUG

Material	Weight in kg	% of total weight
rPET	2,100	91,7
DYE	0,42	8,3

PACKAGING CONTENT – 1M² OF RUG



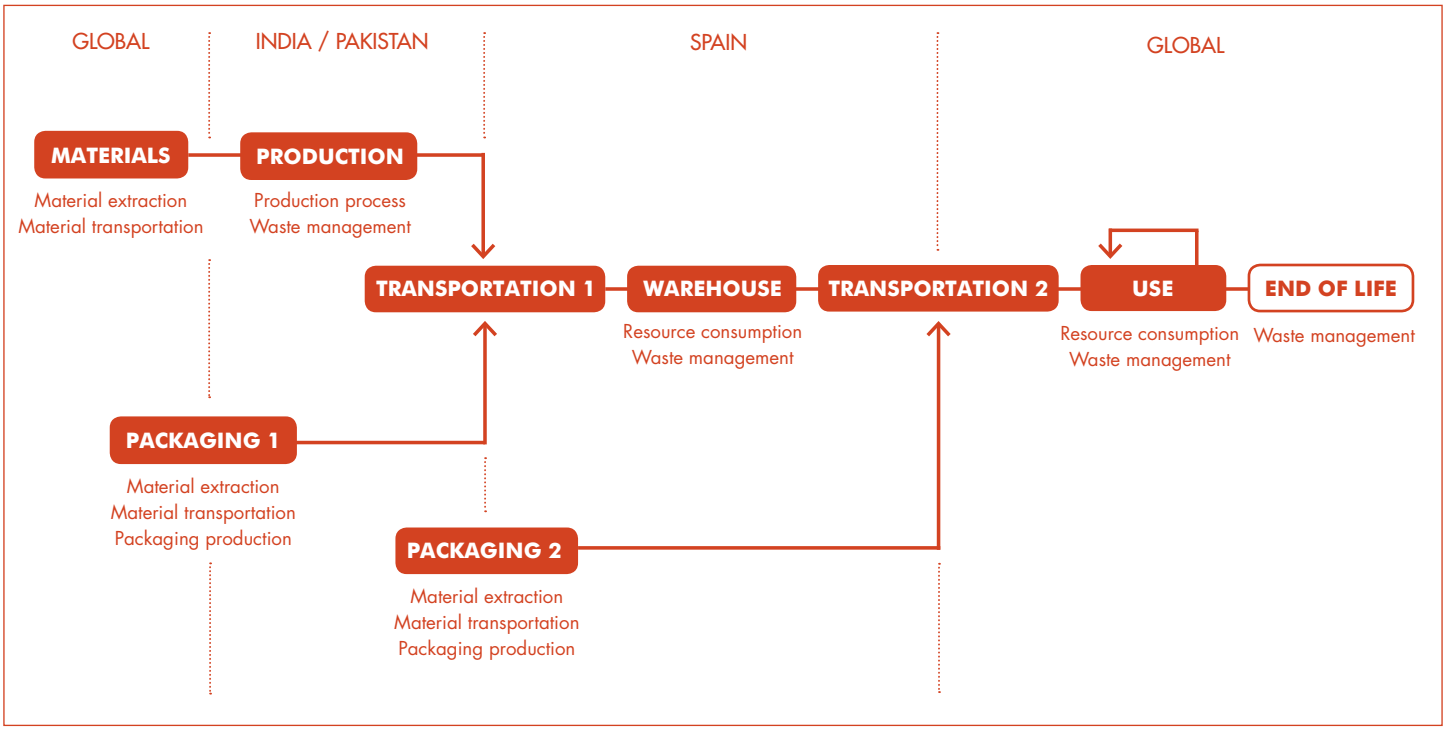
2.3 Life cycle

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 Dhurrie during the production phase, which happens in India. 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 Dhurrie during the use phase. Most of the Dhurries are used for several years.

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 7980 km | Earth 1708 km | Sea 800km
	Transport mode	Air 25,6% | Earth 73% | Sea 1,4%
WAREHOUSE	**Reused carboard tube**	10%
	Ironed products	2%
	Stored products	77%
	Average storage	2,1 months
USE	**Average washing**	1 per year
	Average vacumming	26 per year
	Average lifespan	5 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

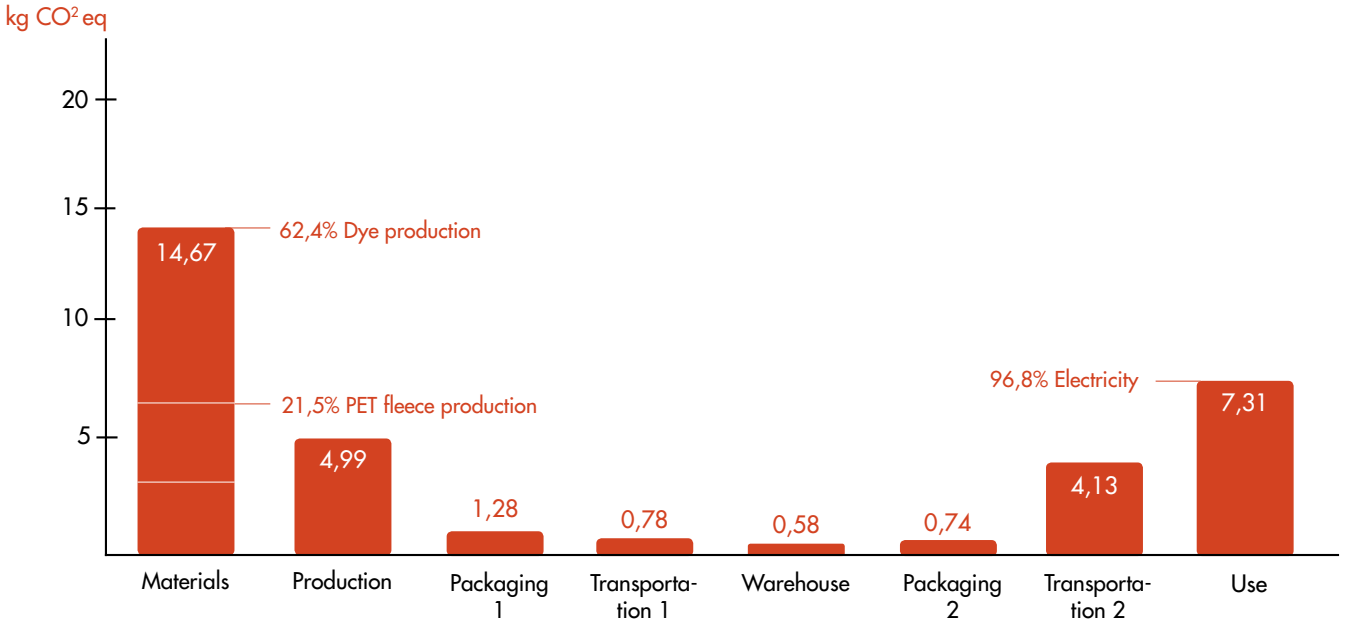
Through the use of the software openLCA, a great variety of data is obtained which has been structured from a generalist approach to a more specific standpoint.

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 0,62^{E-3} kg Sb eq	**GLOBAL WARMING** 34,48 kg CO2 eq	**EUTROPHICATION** 0,07 kg PO^4 eq
ABIOTIC DEPLETION – FOSSIL FUELS 475,85 MJ	**OZONE LAYER DEPLETION** 2,25^{E-6} kg CFC^{-11} eq	**WATER SCARCITY** 34,72 m^3 eq
ACIDIFICATION 1,77 kg SO^2 eq	**PHOTOCHEMICAL OXIDATION** 0,12 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 Dhurrie. In addition, the causes of its greatest impacts are highlighted.

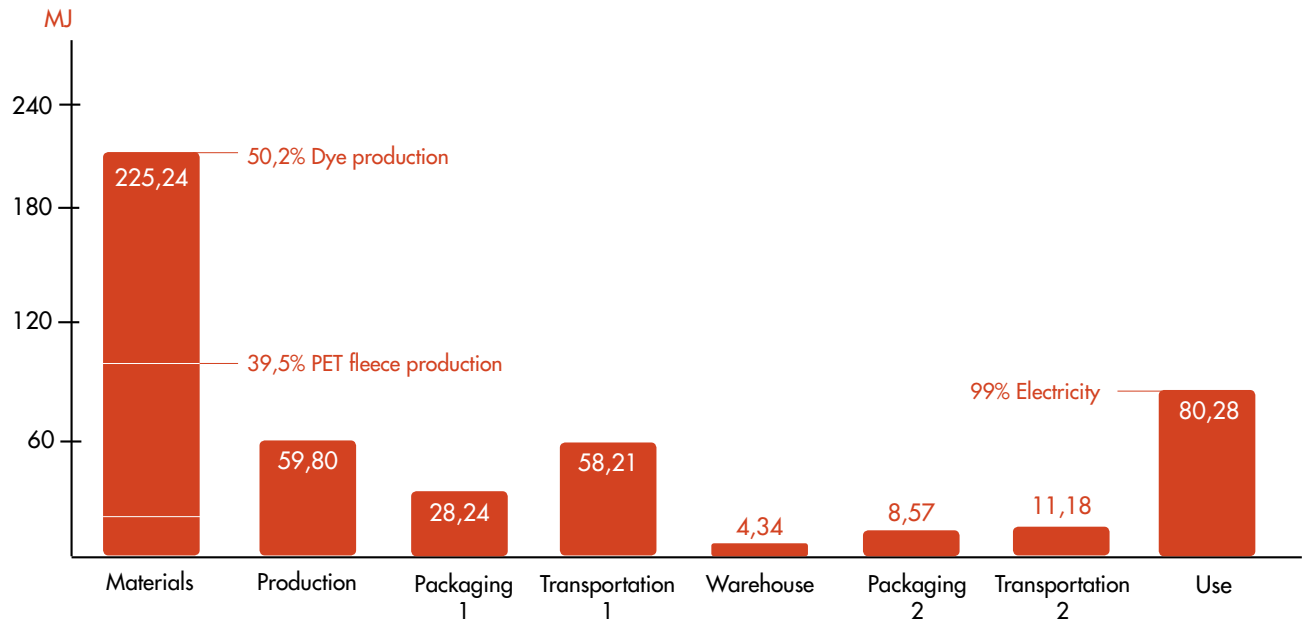
GLOBAL WARMING – 1M² OF RUG 34,48 kg CO^2 eq



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

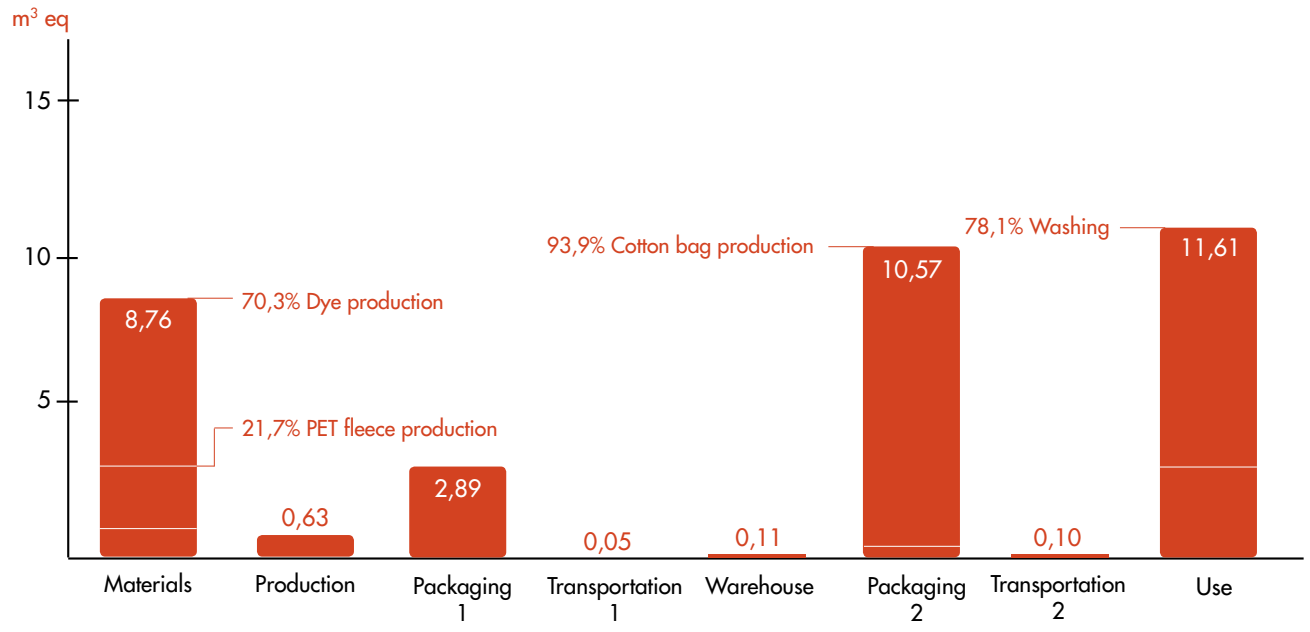
ABIOTIC DEPLETION (FOSSIL FUELS) – 1M² OF RUG

475,85 MJ



WATER SCARCITY – 1M² OF RUG

34,72 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)	14,66	4,99	1,28	0,78	0,59	0,74	4,13	7,31
Abiotic depletion – Fossil fuel (in MJ)	225,24	59,80	28,24	11,18	4,34	8,56	58,21	80,28
Ozone layer depletion (in kg CFC^{-11} eq)	$0,876^{E-6}$	$0,169^{E-6}$	$0,053^{E-6}$	$0,134^{E-6}$	$0,015^{E-6}$	$0,038^{E-6}$	$0,744^{E-6}$	$0,226^{E-6}$
Acidification (in kg SO^2 eq)	83^{E-3}	19^{E-3}	$6,4^{E-3}$	$8,9^{E-3}$	$1,5^{E-3}$	6^{E-3}	19^{E-3}	33^{E-3}
Photochemical oxidation (in kg NMVOC)	49^{E-3}	13^{E-3}	$5,4^{E-3}$	$8,6^{E-3}$	1^{E-3}	3^{E-3}	23^{E-3}	19^{E-3}
Eutrophication (in kg PO^4 eq)	23^{E-3}	15^{E-3}	2^{E-3}	$1,2^{E-3}$	$4,6^{E-3}$	6^{E-3}	$3,2^{E-3}$	14^{E-3}
Water scarcity (in m^3 eq)	8,76	0,63	2,89	0,05	0,11	10,56	0,10	11,62

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 %)	42,52	14,47	3,71	2,26	1,71	2,15	11,98	21,20
Abiotic depletion – Fossil fuel (in %)	47,33	12,57	5,93	2,35	0,91	1,80	12,23	16,87
Ozone layer depletion (in %)	38,85	7,49	2,35	5,94	0,67	1,69	32,99	10,02
Acidification (in %)	46,95	10,75	3,62	5,03	0,85	3,39	10,57	18,67
Photochemical oxidation (in %)	40,16	10,66	4,43	7,05	0,82	2,46	18,85	15,57
Eutrophication (in %)	33,33	21,74	2,90	1,74	6,67	8,70	4,64	20,29
Water scarcity (in %)	25,23	1,81	8,32	0,14	0,32	30,41	0,29	33,47

>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 Dhurrie made with recycled PET is a product with a long durability. Even though its average lifespan is 5 years, there has been evidence of Dhurrie that have been useful for more 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)	2,93	1,00	0,26	0,16	0,12	0,15	0,83	1,46
Abiotic depletion – Fossil fuel (in MJ)	45,05	11,96	5,65	2,24	0,87	1,71	11,64	16,06
Ozone layer depletion (in kg CFC^{-11} eq)	$17,5^{E-8}$	$3,4^{E-8}$	$1,1^{E-8}$	$2,7^{E-8}$	$0,3^{E-8}$	$0,8^{E-8}$	$14,9^{E-8}$	$4,5^{E-8}$
Acidification (in kg SO^2 eq)	$16,6^{E-3}$	$3,8^{E-3}$	$1,28^{E-3}$	$1,78^{E-3}$	30^{E-3}	$1,2^{E-3}$	$3,8^{E-3}$	$6,6^{E-3}$
Photochemical oxidation (in kg NMVOC)	$9,8^{E-3}$	$12,6^{E-3}$	$1,08^{E-3}$	$1,72^{E-3}$	$0,2^{E-3}$	$0,6^{E-3}$	$4,6^{E-3}$	$3,8^{E-3}$
Eutrophication (in kg PO^4 eq)	$4,6^{E-3}$	3^{E-3}	$0,4^{E-3}$	$0,24^{E-3}$	$0,92^{E-3}$	$1,2^{E-3}$	$0,64^{E-3}$	$2,8^{E-3}$
Water scarcity (in m^3 eq)	1,75	0,13	0,58	0,01	0,02	2,11	0,02	2,32

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