



Self-declared EPD

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**Indian wool Tufting**

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

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# 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.







## 2.2 Product Description

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

### Hand Tufting

This technique requires a pistol-like tool to punch the fiber strands into a previously stretched fabric in a frame. To start the process, the strands are punched into the areas marked by the mapping. Next, the protruding strands are cut and shaved to achieve the desired pile height. The design is contoured with scissors or a needle in order to correctly define the different areas of the motif.

Once the motif is defined, a layer of latex is applied to the reverse side of the rug to ensure that the strands remain attached to the structure. To finish, a layer of fabric is affixed to act as a lining, offering a quality finish.



### Indian wool

Indian in origin, this wool reduces the environmental impact as it is produced in the same place where the rugs are made. It presents a similar quality to that of New Zealand wool but with a more intense raw base color.

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. Wool rugs help create cozy and comfortable environments.



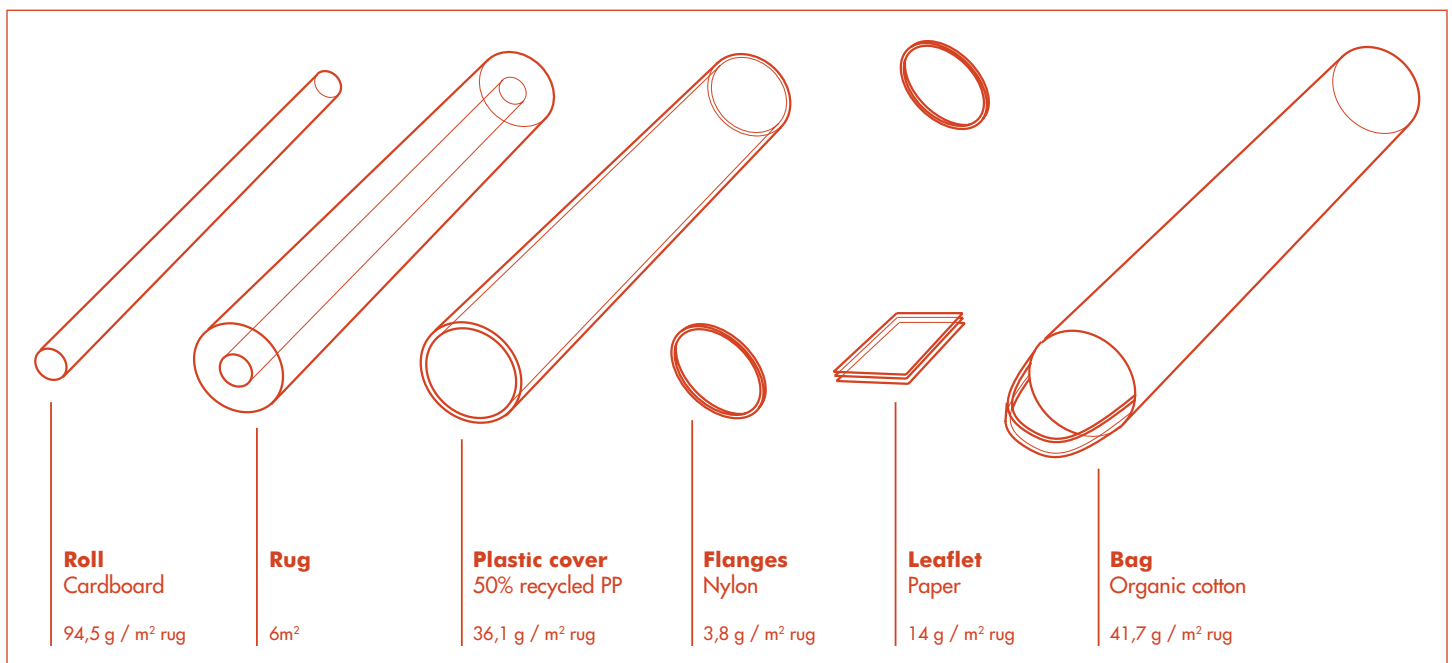
## 2.3 Content Declaration

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

### PRODUCT CONTENT – 1M<sup>2</sup> OF RUG

Material	Weight in kg	% of total weight
INDIAN WOOL	4,2	96,4
COTTON	0,083	1,9
DYE	0,063	1,4
LATEX	0,03	0,7

### PACKAGING CONTENT – 1M<sup>2</sup> OF RUG



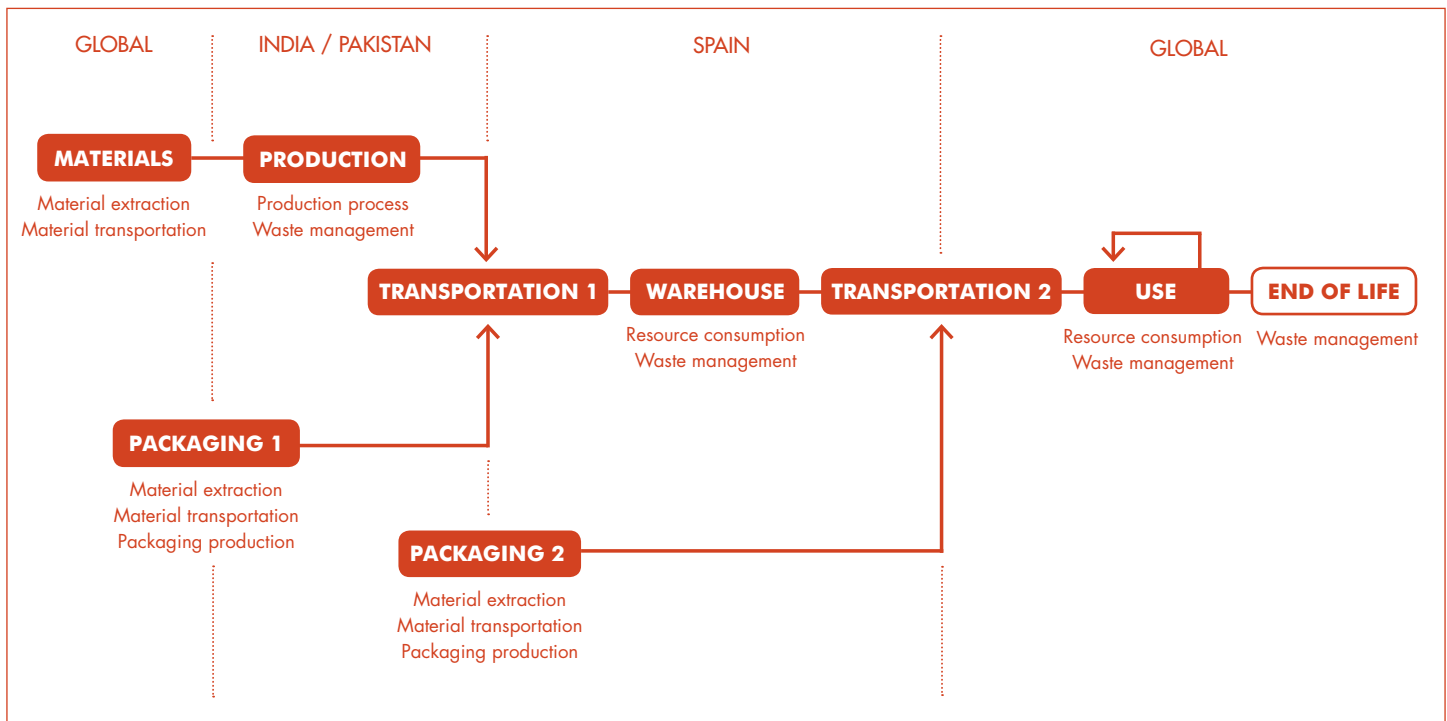
## 2.3 Life cycle

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 Tufting 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 Tufting during the **use** phase. Most of the Tuftings 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	<b>Average distance</b>	Air 7670 km   Earth 1615 km
	<b>Transport mode</b>	Air 45,6%   Earth 54,4%
WAREHOUSE	<b>Reused cardboard tube</b>	15%
	<b>Ironed products</b>	5%
	<b>Stored products</b>	86%
	<b>Average storage</b>	2,2 months
USE	<b>Average washing</b>	1 per year
	<b>Average ironing</b>	1 per year
	<b>Average vacuuming</b>	26 per year
	<b>Average lifespan</b>	10 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 <sup>2</sup> 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 <sup>-11</sup> 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 <sup>2</sup> 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 <sup>4</sup> eq
WATER SCARCITY	Indicator of the relative amount of water used, based on regionalized water scarcity factors.	m <sup>3</sup> eq

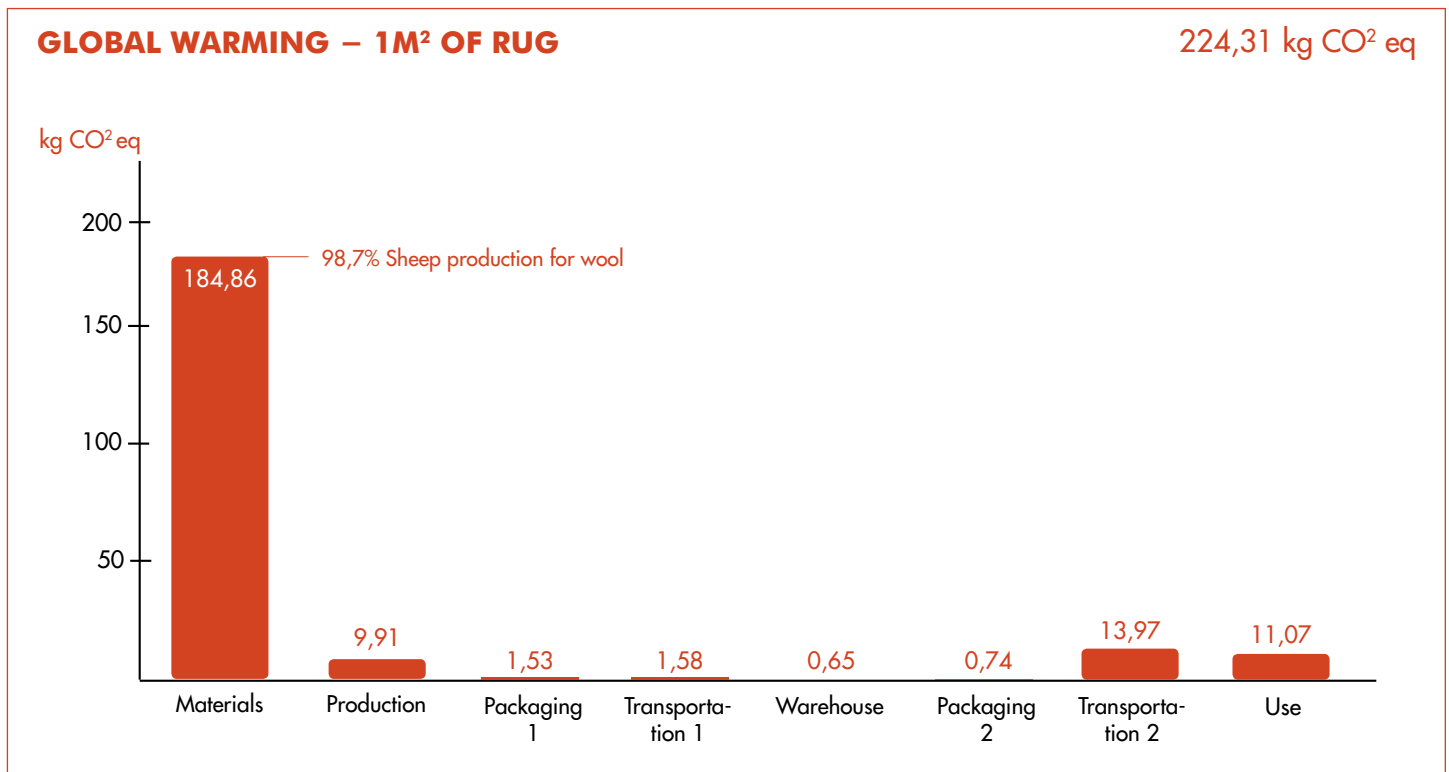
## 4.2 Obtained results

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.

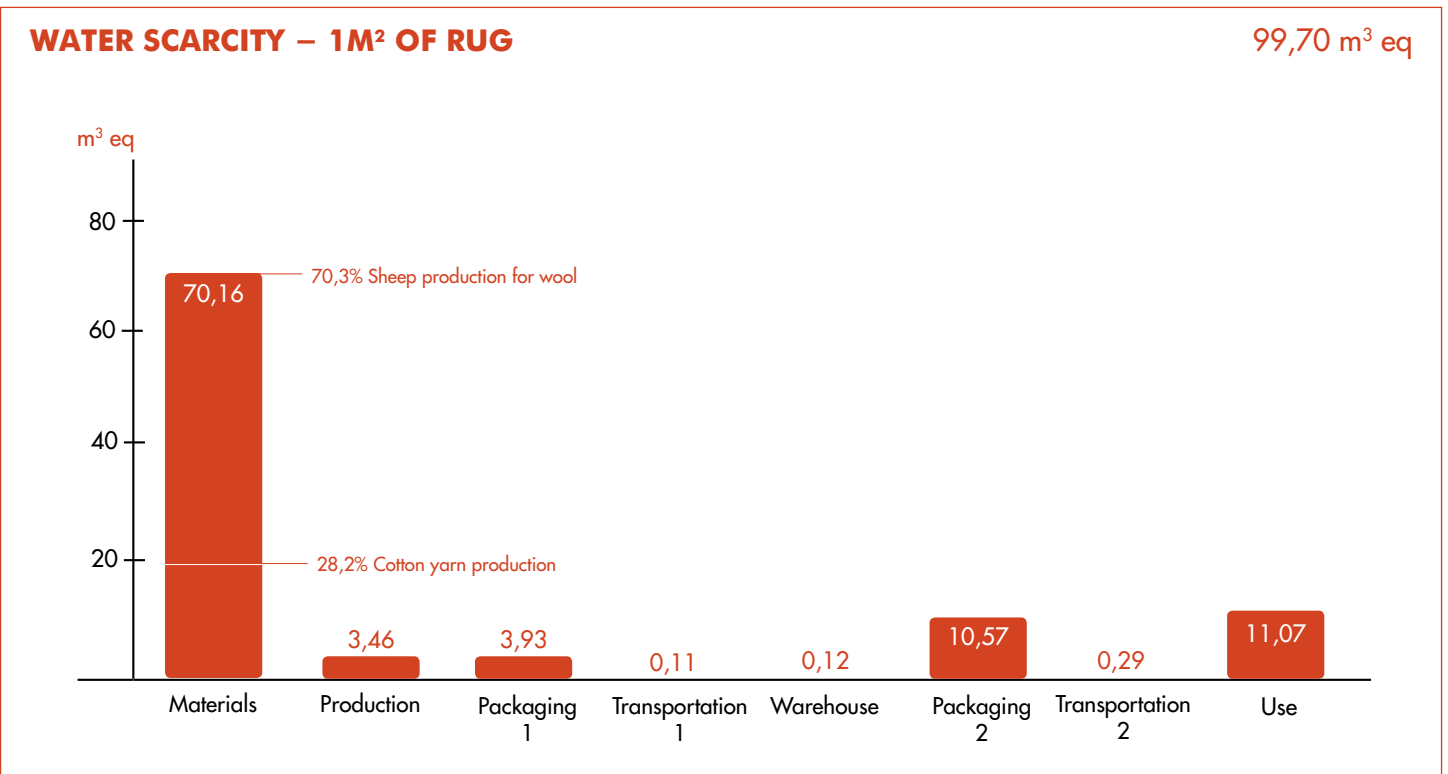
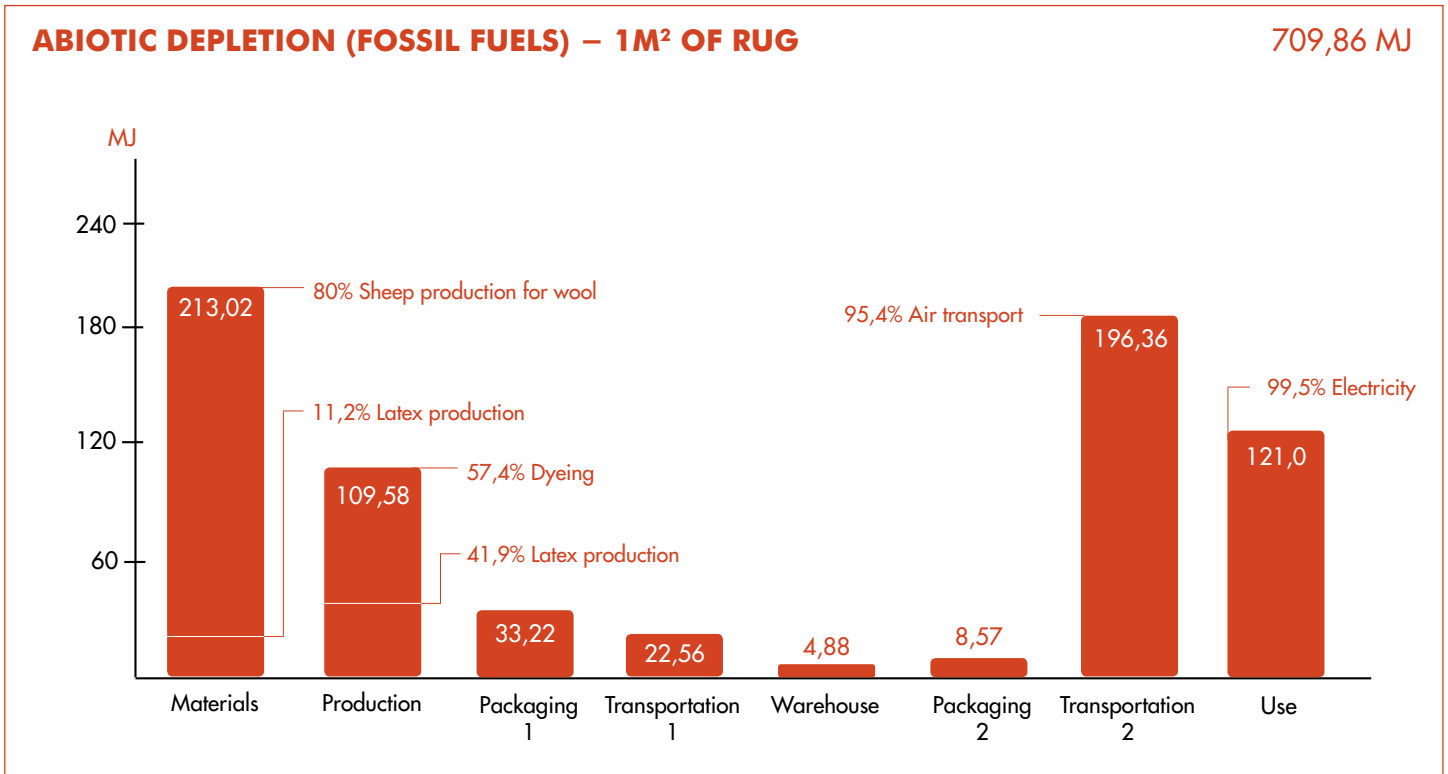
<b>ABIOTIC DEPLETION – ELEMENTS</b> 0,61 <sup>E-3</sup> kg Sb eq	<b>GLOBAL WARMING</b> 224,31 kg CO <sub>2</sub> eq	<b>EUTROPHICATION</b> 1,78 kg PO <sup>4</sup> eq
<b>ABIOTIC DEPLETION – FOSSIL FUELS</b> 709,86 MJ	<b>OZONE LAYER DEPLETION</b> 5,20 <sup>E-6</sup> kg CFC <sup>-11</sup> eq	<b>WATER SCARCITY</b> 99,70 m <sup>3</sup> eq
<b>ACIDIFICATION</b> 3,34 kg SO <sup>2</sup> eq	<b>PHOTOCHEMICAL OXIDATION</b> 0,34 kg NMVOC	<b>FUNCTIONAL UNIT</b> 1 m <sup>2</sup> of rug

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





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



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

### LCA RESULTS (AMOUNT) – 1M<sup>2</sup> OF RUG

Impact Categories	P1	P2	P3	P4	P5	P6	P7	P8
<b>Global warming</b> (in kg CO <sup>2</sup> eq)	184,86	9,91	1,53	1,58	0,65	0,74	13,97	11,07
<b>Abiotic depletion – Fossil fuel</b> (in MJ)	213,02	109,58	33,22	22,56	4,89	8,56	196,36	121,68
<b>Ozone layer depletion</b> (in kg CFC <sup>-11</sup> eq)	1,491 <sup>E-6</sup>	0,457 <sup>E-6</sup>	0,065 <sup>E-6</sup>	0,271 <sup>E-6</sup>	0,017 <sup>E-6</sup>	0,038 <sup>E-6</sup>	2,521 <sup>E-6</sup>	0,341 <sup>E-6</sup>
<b>Acidification</b> (in kg SO <sup>2</sup> eq)	3343 <sup>E-3</sup>	33 <sup>E-3</sup>	8 <sup>E-3</sup>	18 <sup>E-3</sup>	2 <sup>E-3</sup>	6 <sup>E-3</sup>	65 <sup>E-3</sup>	49 <sup>E-3</sup>
<b>Photochemical oxidation</b> (in kg NMVOC)	186 <sup>E-3</sup>	22 <sup>E-3</sup>	7 <sup>E-3</sup>	17 <sup>E-3</sup>	1 <sup>E-3</sup>	3 <sup>E-3</sup>	76 <sup>E-3</sup>	29 <sup>E-3</sup>
<b>Eutrophication</b> (in kg PO <sup>4</sup> eq)	1098 <sup>E-3</sup>	3 <sup>E-3</sup>	2 <sup>E-3</sup>	2 <sup>E-3</sup>	5 <sup>E-3</sup>	6 <sup>E-3</sup>	11 <sup>E-3</sup>	21 <sup>E-3</sup>
<b>Water scarcity</b> (in m <sup>3</sup> eq)	70,16	3,46	3,93	0,11	0,12	10,56	0,29	14,07

- 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) – 1M<sup>2</sup> OF RUG

Impact Categories	P1	P2	P3	P4	P5	P6	P7	P8
<b>Global warming</b> (in %)	82,41	4,42	0,68	0,70	0,29	0,33	6,23	4,94
<b>Abiotic depletion – Fossil fuel</b> (in %)	30,01	15,44	4,68	3,18	0,69	1,21	27,66	17,14
<b>Ozone layer depletion</b> (in %)	28,67	8,79	1,25	5,21	0,33	0,73	48,47	6,56
<b>Acidification</b> (in %)	94,86	0,94	0,23	0,51	0,06	0,17	1,84	1,39
<b>Photochemical oxidation</b> (in %)	54,55	6,45	2,05	4,99	0,29	0,88	22,29	8,50
<b>Eutrophication</b> (in %)	95,64	0,26	0,17	0,17	0,44	0,52	0,96	1,83
<b>Water scarcity</b> (in %)	68,32	3,37	3,83	0,11	0,12	10,28	0,28	13,70

>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 Tufting made with indian wool is a product with a long durability. Even though its average lifespan is 10 years, there has been evidence of Tuftings 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 – 1M<sup>2</sup> OF RUG

Impact Categories	P1	P2	P3	P4	P5	P6	P7	P8
<b>Global warming</b> (in kg CO <sup>2</sup> eq)	18,49	0,99	0,15	0,16	0,07	0,07	1,40	1,11
<b>Abiotic depletion – Fossil fuel</b> (in MJ)	21,30	10,96	3,32	2,26	0,49	0,86	19,64	12,17
<b>Ozone layer depletion</b> (in kg CFC <sup>-11</sup> eq)	14,9 <sup>E-8</sup>	4,6 <sup>E-8</sup>	0,65 <sup>E-8</sup>	2,7 <sup>E-8</sup>	0,17 <sup>E-8</sup>	0,38 <sup>E-8</sup>	25,2 <sup>E-8</sup>	3,4 <sup>E-8</sup>
<b>Acidification</b> (in kg SO <sup>2</sup> eq)	334 <sup>E-3</sup>	3,3 <sup>E-3</sup>	0,8 <sup>E-3</sup>	1,8 <sup>E-3</sup>	0,2 <sup>E-3</sup>	0,6 <sup>E-3</sup>	6,5 <sup>E-3</sup>	4,9 <sup>E-3</sup>
<b>Photochemical oxidation</b> (in kg NMVOC)	18,6 <sup>E-3</sup>	2,2 <sup>E-3</sup>	0,7 <sup>E-3</sup>	1,7 <sup>E-3</sup>	0,1 <sup>E-3</sup>	0,3 <sup>E-3</sup>	7,6 <sup>E-3</sup>	2,9 <sup>E-3</sup>
<b>Eutrophication</b> (in kg PO <sup>4</sup> eq)	110 <sup>E-3</sup>	0,3 <sup>E-3</sup>	0,2 <sup>E-3</sup>	0,2 <sup>E-3</sup>	0,5 <sup>E-3</sup>	0,6 <sup>E-3</sup>	1,1 <sup>E-3</sup>	2,1 <sup>E-3</sup>
<b>Water scarcity</b> (in m <sup>3</sup> eq)	7,02	0,35	0,39	0,01	0,01	1,06	0,03	1,41

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





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