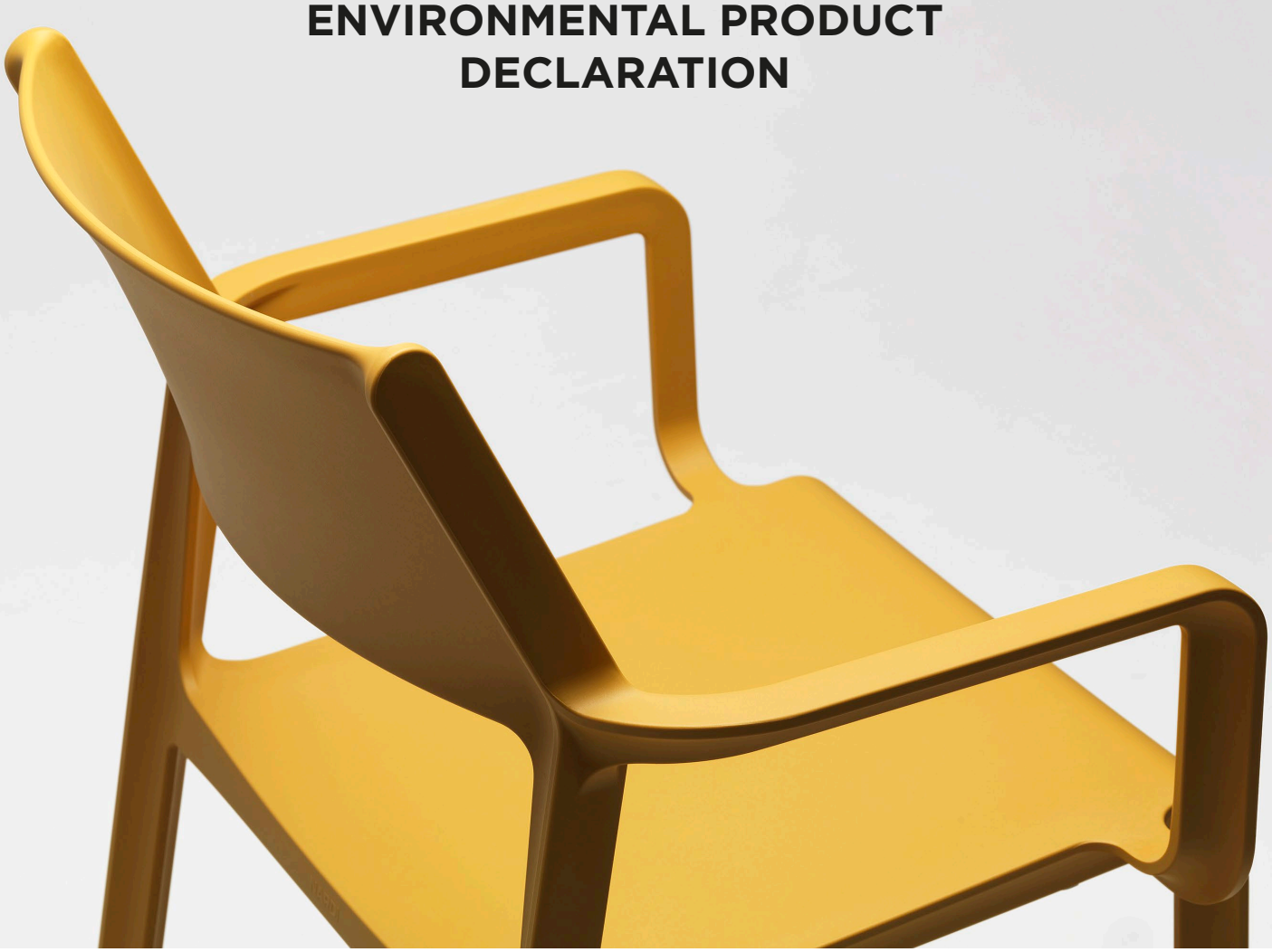
NARDI
YOUR OUTDOOR LIVING

TRILL ARMCHAIR

ENVIRONMENTAL PRODUCT DECLARATION



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INDICE

THE COMPANY AND THE PRODUCT

NARDI

Nardi designs and produces outdoor furniture tailored to people's well-being and relaxation. The company believes in a glocal approach: an international vision and a propensity for technological innovation go hand in hand with promoting local resources and organising production around a very short supply chain. All in line with Nardi's identity based on original, high-quality designer products made in Italy.

The relationships, interaction and importance of the team are the basis of relations with each partner. The company is constantly striving for a positive, proactive working environment, where everyone can express their full potential.

As an advocate of a sustainable approach, the company has always worked towards promoting a green culture, also in its everyday business activities. In 2019, Nardi created a production line called Regeneration specifically for furniture made of post-consumer plastic. Every year, the company proposes and promotes new products in recycled polypropylene. Regeneration allows Nardi to experiment with eco-friendly solutions that can be applied on a large scale to the entire production cycle. All steps are involved, from the concept creation of individual furniture items to their packaging. On the subject of packaging, since 2020 Nardi has received the PRS Green Label, an award assigned by PRS, a supplier of pallets made of PEFC-certified wood (compliant with specific sustainable forest management criteria), which has been supporting their recovery and responsible re-use for over 20 years. In 2020 and 2021, Nardi received a Green Good Design Award for its Komodo Ecowall and Sipario modular partitions. This international award recognises important examples of sustainable design.

In 2019, Nardi introduced LCA analysis on several products in order to gradually implement further actions to improve its environmental performance.

PRODUCT DESCRIPTION

Trill Armchair is a stackable monobloc chair with armrest, made for both indoor and outdoor use. The chair is made of uniformly colored fiberglass polypropylene resins with UV additives and matt finish. Trill Armchair is available in nine colors: bouquet pink, grey, white, antracite, turtledove, agave, octanium, tobacco and mustard.

This EPD is valid for all nine colors of Trill Armchair. Results are reported for Trill Armchair white since this version has a higher environmental impact compared to other 8 versions, which show differences lower than 10%, verified through a sensitivity analysis.

Trill chairs are packed 6 pieces per carton with a distribution packaging.

Table 1 lists the materials declaration of 1 Trill Armchair and its packaging.

CHAIR			PACKAGING		
Materials	**kg**	**%**	**Materials**	**kg**	**%**
Polyurethane (PU)	0,029	0,62	Cardboard	0,486	38,62
Fiberglass PP	2,803	59,64	Wood	0,354	28,15
Homopolymer PP	0,817	17,38	Polyethylene (PE)	0,013	1,00
Copolymer PP	0,934	19,87	Paper	0,004	0,28
Master	0,117	2,49	Polypropylene (PP)	0,402	31,93
Lubricant	0,0003	0,01	Polyvinyl chloride (PVC)	0,0002	0,02
Total	**4,701**	**100**	**Total**	**1,258**	**100**

Table 1: Materials of Trill Armchair.

ENVIRONMENTAL INFORMATION

DECLARED UNIT

The declared unit is represented by 1 seat (packaging included) with a lifetime of 15 years. Product life time corresponds to the time the seat maintains its function: in absence of statistical data, life time is assumed equal to the default value of 15 years.

SYSTEM BOUNDARIES

The system boundaries are “from cradle to grave”, that is from the production of raw materials up to end of life of the product and its packaging.

Specifically, Upstream processes consist of raw materials and their transport, production of materials (polypropylene, fiber glass...) and packaging.
Core processes include: production of chair components, transport to the production sites and storage warehouse, consumption of electricity and water for storage, and waste treatment of manufacturing waste.
Downstream processes include the distribution of the packed product, use phase and end of life stage of both product and packaging.

No cut-off rules were applied.

UPSTREAM	CORE	DOWNSTREAM
Raw materials	Transport to Nardi	Disrtibution
Transport of raw materials	Production of components	Use
Production (materials and packaging)	Storage	End of life

TIME BOUNDARIES

Primary data originate from Nardi and refer to 2019. Secondary data originate from the ecoinvent v3.8 database (allocation, cut-off by classification) published in 2021.

GEOGRAPHICAL BOUNDARIES

Components and materials are produced in Italy, except for copolymer polypropylene (Belgium and Austria) and homopolymer polypropylene (Germany and Poland). The product is sold both in Italy and abroad.

BOUNDARIES IN THE LIFE CYCLE

The following processes are excluded from the LCA: infrastructure, building of site, production of manufacturing equipment and personnel activities. For those LCA processes that already contained infrastructure, such as processes from the ecoinvent database, infrastructure has not been excluded. The data contained in the inventory must represent at least 99% of the total flows to the Core module. Flows not included in the LCA must be documented in the EPD.

ALLOCATION RULES

As regards end-of-life allocation, the “cut-off” approach was adopted. Raw materials and production processes are included for virgin resources. No allocation is made for materials subject to recycling. Outputs subject to recycling are regarded as inputs to the next life cycle. For energy and water consumption of the storehouse, volume allocation has been applied. For energy and water consumption and waste production of the production sites (Arso and Resin), mass allocation has been applied.

DATA QUALITY

This EPD is based on primary data for the fundamental aspects of the study, such as the weight of the chair components and packaging materials. Primary data have been collected from Nardi, while generic data originate from the ecoinvent database v3.8, allocation cut-off by classification. The ecoinvent database is available in the LCA software SimaPro v9.3 used for calculations. The use of proxy data does not exceed the limit of 10% of the default

impact categories.

Energy consumption for the production of chair components have been obtained from primary data. The ecoinvent process “Electricity, medium voltage {IT}| market for” has been modified to make it more representative of the italian situation.
The chair is produced in Resin production site whereas feet and caps are produced in Arso production site and subsequently moved to Resin for final product assembly.

For the distribution and disposal of the product, sales data of the year 2019 have been used. The distribution phase considers a road transport (ecoinvent database process: Transport, freight, lorry 16-32 metric ton, EURO4 {RER}) and the distance between Nardi headquarter and the capital city of the exporting country. In the case of transport by ship, land transport (truck 16-32 t EURO4) is assumed to cover the distance from Nardi to the nearest port and then transport by ship to the main port of the assessed foreign country. In addition, a local transport of 300 km by road (truck 16-32 t EURO4) is evaluated.

The use phase consists of a consumption of 0.1 l of hot water and 0.8 g of soap. For soap, a solution with 5% alkylbenzene sulfonate is considered, while a consumption of 5.58 MJ of thermal energy is assumed to heat water.

For the transport of the product and packaging at the end of its life, a road transport (truck 16-32 t EURO4) of 100 km is assumed. For the end of life scenario, average national data (RSU China, OECD and Eurostat data) have been used for the countries in which the product is sold.

ENVIRONMENTAL IMPACT ASSESSMENT

The environmental indicators indicated by the PCR 2009:02 v3.0 consist of:
- Environmental impact indicators: global warming potential - total, global warming potential - fossil fuels, global warming potential - biogenic carbon, global warming potential - land use, acidification potential, eutrophication potential, photochemical oxidant formation potential, abiotic depletion potentia - elements, abiotic depletion potential - fossil fuels, water scarcity footprint;
- Resource use indicators: consumption of resources (renewable and non-renewable), of secondary material and fuels and of fresh water;
- Waste indicators: hazardous waste, non-hazardous waste and radioactive waste;
- Outputflows indicators: components for reuse and materials for recycling and energy recovery;
- Other indicators: human toxicity (carcinogenic and non-carcinogenic effects), fresh water ecotoxicity and, land use.

The impact categories originate from the following LCIA methods: CML baseline, CML non-baseline, USEtox 1.04 recommended + interim, Recipe H/A 2008 and AWARE.

The indicators are distinguished into upstream, core and downstream processes. Table 2 shows the environmental indicators of Trill Armchair.

		Unit	Total	Upstream	Core	Downstream
Environmental impacts	Global warming potential, total	kg CO_2 eq	17,6	11,8	1,8	4,1
	Global warming potential, fossil fuels	kg CO_2 eq	17,8	12,6	1,5	3,8
	Global warming potential, biogenic carbon	kg CO_2 eq	-0,2	-0,8	0,2	0,4
	Global warming potential, land use	kg CO_2 eq	0,0125	0,0115	0,0003	0,0007
	Acidification potential	kg SO_2 eq	0,074	0,059	0,005	0,010
	Eutrophication potential	kg PO_4^{3-}eq	0,022	0,014	0,001	0,007
	Photochemical oxidant formation potential	kg NMVOC eq	0,046	0,034	0,003	0,009
	Abiotic depletion potential, elements	kg Sb eq	1,13E-04	9,94E-05	7,94E-06	5,72E-06
	Abiotic depletion potential, fossil fuels	MJ	394	344	21	29,2
	Water scarcity footprint	m^3 eq	6,8	5,6	1,1	0,1
Use of resources	Renewable resources, energy	MJ	16,1	6,6	9,1	0,4
	Renewable resources, materials	MJ	15,3	15,3	0	0
	Renewable resources, total	MJ	31,4	21,8	9,1	0,4
	Non-renewable resources, energy	MJ	228	175	23	30
	Non-renewable resources, materials	MJ	186	186	0	0
	Non-renewable resources, total	MJ	414	362	23	30
	Secondary material	kg	0,183	0,183	0	0
	Renewable secondary fuels	MJ	0	0	0	0
	Non-renewable secondary fuels	MJ	0	0	0	0
	Net use of fresh water	m^3	0,164	0,136	0,024	0,004
Waste	Hazardous waste	kg	2,24E-04	1,08E-04	4,86E-05	6,78E-05
	Non-hazardous waste	kg	4,01	1,45	0,13	2,43
	Radioactive waste	kg	4,61E-04	2,63E-04	3,93E-05	1,59E-04
Output flows	Components for reuse	kg	0	0	0	0
	Material for recycling	kg	3,83	0,01	0,02	3,80
	Materials for energy recovery	kg	0	0	0	0
	Exported energy, electricity	MJ	0	0	0	0
	Exported energy, thermal	MJ	0	0	0	0
Other	Human toxicity, cancer impacts	cases	9,04E-07	7,37E-07	6,12E-08	1,05E-07
	Human toxicity, non-cancer impacts	cases	3,17E-06	2,34E-06	1,64E-07	6,66E-07
	Fresh water ecotoxicity	PAF.m^3.day	144951	126602	10719	7631
	Land use	species.yr	8,39E-09	7,43E-09	3,72E-10	5,79E-10

Table 2: Trill Armchair, environmental indicators

CONTACT AND OTHER INFORMATION

NARDI CONTACT INFORMATION

The Life Cycle Assessment (LCA) and Environmental Product Declaration (EPD) have been produced by Nardi in collaboration with 2B Srl (www.to-be.it). The company references are:

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PCR review was conducted by: Leo Breedveld, 2B Srl, available on the website of the International EPD Consortium (IEC): **www.environdec.com**

Quality audit for the declaration and the information in compliance with 14025:2006
■ EPD process certification ☐ EPD verification
Third party verifier: CSQA Certificazioni Srl,
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Accredited by: Accredia (004H)

Procedure for follow-up of data during EPD validity involves third party verifier:
■ Yes ☐ No

OTHER INFORMATION

This Environmental Product Declaration is developed under the EPD® International System. This document is available on the website of the Swedish Environmental Management Council **(www.environdec.com)**.
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