MAGIS

ENVIRONMENTAL PRODUCT DECLARATION

Bell Chair

Magis SpA

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Note: a*n EPD should provide up-to-date information and can be updated if conditions change. The declared validity is therefore subject to registration and continuous publication on www.environdec.com.*

Magis Spa, via Triestina, Accesso E - Z.I. Ponte Tezze 30020 Torre di Mosto - Ve / Italia
Telephone number & e-mail adress: Tel. +39 0421 319600| info@magisdesign.com

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Company and product

For more than 40 years we have been creating design products for the home, office and contract. Magis was founded in 1976 in Northern Italy. Since then we have become a global player in the world of design, always remaining faithful to our essence: to redefine the horizons of design. We are always looking for new ideas, new design languages and innovative production methods. Our portfolio therefore ranges from the most puristic to the most expressive lines. Some will say that Magis is eclectic. We are a family-run company and we believe in strong family values. We help each other to grow together. What we care about is building lasting and positive relationships with our employees, customers and partners. To strengthen our community, we produce in Italy. In this way, we help preserve the exceptional craftsmanship for which our region has been known for centuries. Each Magis product is made to the highest possible quality and reflects the extraordinary skills and expertise of our employees. True to our vision, we are always looking for exceptional talent in design. Many of them have become famous around the world during this journey: figures such as Jasper Morrison, Konstantin Grcic, Philippe Starck, Ronan & Erwan Bouroullec and Jerszy Seymour have been with us.

The structure of the Bell Chair is in regenerated polypropylene mixed with glass fibre, obtained from the waste generated by the production of Magis furniture and by the local automotive industry. The chairs are available in 3 colours: *Sunrise*, *High Noon* and *Midnight*. This EPD is valid for all three Bell Chair colours. This document therefore reports the results of the *High Noon* Bell Chair as it has the highest environmental impact compared to the other versions, as verified through a sensitivity analysis.
Table 1 contains the materials used for the construction of the chair and for the packaging.

CHAIR			**PACKAGING**		
Material	**kg**	**%**	**Material**	**kg**	**%**
Polypropylene with glass fibre	2,73	95,97	Wood	0,825	52,43
			Cardboard	0,567	36,01
Master	0,114	3,87	Polypropylene	0,174	11,06
			Polyethylene	0,007	0,45
Polyethylene	0,0045	0,16	Paper	0,001	0,05
Total	2,8485	100	**Total**	1,574	100

Table 1 - List of materials of Bell Chair and its packaging related to a chair.

Environmental information

The aim of this EPD is the LCA assessment of the entire Bell Chair life cycle through the quantification of environmental impacts.

LCA approach

The approach used to conduct the LCA study is attributive. The attributive model of the life cycle of a product represents the evaluation of the real, average or specifically estimated supply chain.

Declared unit

In accordance with the guidelines contained in the PCR 2009:02 v3.0 [4], the functional unit of the LCA is represented by a unit of furniture (including its packaging) maintained during its life, in this case the Bell Chair. The life span of the product corresponds to the time during which the chair maintains its function. In the absence of statistical data, the life expectancy of Bell Chair is set with the default value of 15 years.

System boundaries

The system boundaries considered for this study are "from cradle to grave", therefore from the extraction of raw materials to the final disposal of the product.

The Bell Chair life cycle study is divided into Upstream, Core and Downstream processes, as required by PCR 2009:02 v3.0 [4] (Figure 1).

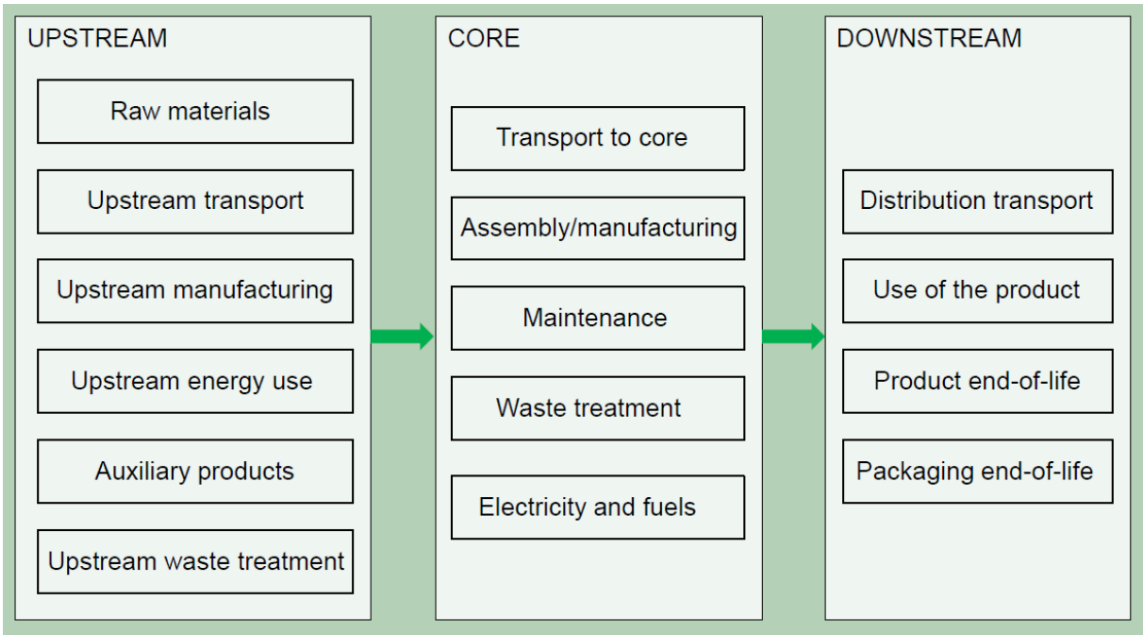

Figure 1 - System boundaries according to PCR 2009:02 v3.0 [4].

Specifically, in this study, the Upstream processes include the extraction of raw materials and their transport, the production of finished products (polypropylene, fiberglass, etc.), the production of the chair, the chair feet, its pallet and packaging.

The Core processes include: the transport of the monobloc chair from the supplier to the Magis storage warehouse and the consumption of the company itself. The production and assembly of the product are carried out at a Magis supplier company.

Downstream processes include the distribution of the packaged product, the use phase and the end of life of the packaging and the product.

Geographic and temporal representativeness of the data

Magis headquarters are in Torre di Mosto in the province of Venice. The primary data, used for the most significant processes, refer to production in 2020. The secondary data are present in the ecoinvent v3.7.1 database, published in 2020 [5].

Specific data are used to describe the production phase of the elements of the chair, assembly and storage in the warehouse; generic data are used to describe the procurement phases of raw materials, packaging and downstream phases (use phase, recycling, disposal). Specific data comes from the manufacturer and major suppliers, while generic data is selected from the LCA database of ecoinvent v3.7.1 [5].

The data assumptions at the disposal stage are justified by the recycling properties of the materials and generic disposal data typical of each country.

The study refers to the Italian situation for upstream production processes. The product is sold in Italy and abroad.

Allocation

Allocation represents the allocation procedure according to which the inputs and outputs of the system are divided between the different products in order to reflect the underlying physical relationships. The production processes of the raw materials in this study do not involve the formation of by-products, for which it is therefore not necessary to apply criteria for allocating environmental loads.

As regards the allocation related to the end of life, the “cut-off” approach is adopted. With this type of approach, the outputs subject to recycling are considered inputs for the next life cycle, so no type of allocation is made for materials subject to recycling. Neither the gains nor the environmental burdens resulting from the recycling process are assigned to the waste stream. However,

the collection and transport of waste to the recycling plant are included in the analysis.

The allocation was applied on the basis of the mass criterion of the packaged product and of the total mass of the pieces produced in 2020 for the consumption of electricity, heat, water and the company waste produced. Only the consumption inherent in the warehouse is considered, while consumption related to offices is excluded.

Simplifications in the LCA

- It has been assumed that the company's capital assets (such as machinery and buildings) do not make a significant contribution to the life cycle assessment, therefore they are not considered in the analysis of the product system;
- Maintenance and use phase of the chair have been excluded;
- The ecoinvent database was used for secondary data [5];
- To facilitate the calculations of the LCA and the presentation of the results, the LCA software SimaPro v.9.3 [6] was used.

Emissions of CO_2

The carbon footprint calculation uses the 100-year global warming potential (GWP100). The carbon footprint includes greenhouse gas emissions and removals from fossil fuels, biogenic sources and direct land use change. The emissions are distinct for the different sources.

Other environmental information

None of the substances present in the current version of the “Candidate List” European regulation 1907/2006 / EC (REACH Registration, Evaluation, Authorization and Restriction of Chemicals) is present in a concentration greater than 0,1% by weight in the marketed product. Furthermore, we declare that the product is not subject to classification or labelling pursuant to Directive 67/548 / EC and Regulation EC No. 1272/2008 (CLP) as it is considered an article and therefore outside their scope of application.

Inventory analysis

This LCA study is based on primary data for the fundamental aspects of the study, such as the weight of the components and packaging materials. The primary data of the LCA were collected by Magis and concern the weights of all the components of the chair, packaging, some production processes and sales data.

Secondary data is used for all processes for which primary data are not available, such as the production of packaging, the processing of some raw materials and the disposal of the final product and its packaging. The ecoinvent database v.3.7.1 is used for the secondary data used in the study [5], allocation, cut-off by classification and literature data is used. The ecoinvent database is available in the SimaPro v9.3 software used for the calculations [6].

For the main components of the chair, primary data relating to the materials making up the chair and the consumption of the production processes were obtained from the supplier. The components of the chair for which primary data have been made available are: the monobloc chair in regenerated polypropylene mixed glass fibre and the pallet of the same material, the polyethylene feet and the relative packaging.

The energy consumption for the production of the chair was obtained by considering the primary data relating to consumption, pieces produced per hour and weight of the individual pieces. The process “Electricity, medium voltage {IT} | market for” from the ecoinvent database was modified using the national residual energy mix, both for Magis' electricity consumption and for their supplier company. The chair is manufactured at the Magis supplier's factory.

For the packaging methods of the Bell Chairs, the information obtained from the 2020 sales data was used: 12 monobloc Bell Chair chairs with a Bell Pallet were stacked for each packaging.

For the Magis plant, consumption was allocated on the basis of the mass criterion of the packaged product and the total mass of parts produced in 2020.

For the distribution and disposal of the product, the 2020 sales figures were considered, taking into account the countries in which it is distributed, considering 90% of the production of the Bell Chair. The remaining 10% of production sent to other states was redistributed on 90%.

The distribution phase considers the distance between Magis and a final reseller of the product to the customer. For land transport in European countries, road transport is assumed (ecoinvent database process: “Transport, freight, lorry 16-32 metric ton, euro5” and “Transport, freight, lorry> 32 metric ton, euro4”) from the plant of Magis up to the evaluated country. The distance from a final reseller to the customer was also considered in the mileage of road transport. For transport by sea to non-European countries, a transport by ship is assumed (ecoinvent database process: “Transport, freight, sea, container ship”) from the Magis site to the evaluated country. distances were calculated with Google Maps [7] e SeaRates [8].

For the start-up of the product and packaging at the end of its life, a road transport is assumed (ecoinvent database process: “Transport, freight, lorry 16-32 metric ton, euro4”) for 100 km. Eurostat and OECD data were used to set up the disposal scenario [9][10] in reference to the sales data of the product.

The use of proxy data does not exceed the limit of 10% of the overall impact of the main impact categories, as required by the reference PCR.

Impact assessment

To evaluate the environmental performance of the product, the PCR method was used, created with the indicators indicated in the same document.

PCR method

For the evaluation of the environmental performance of the product, the method defined by the PCR 2009:02 v3.0 [4].

The environmental indicators indicated by the PCRs consist of:

- Impact categories: global warming - total, global warming - fossil fuels, global warming - biogenic carbon, global warming - land use, acidification, eutrophication, photochemical oxidation, depletion of abiotic resources - elements, depletion of abiotic resources - fossil fuels, water scarcity footprint;
- Resource use indicators: consumption of resources (renewable and non-renewable), secondary materials and fuels and fresh water;
- Waste indicators: hazardous waste, non-hazardous waste and radioactive waste;
- Outflow indicators: materials for recycling and energy recovery;
- Other indicators: human toxicity (carcinogenic and non-carcinogenic effects), ecotoxicity of fresh water and land use.

Impact categories come from baseline CML, non-baseline CML, USEtox 1.04 recommended + interim, Recipe H / A 2008 and AWARE methods.

For the calculation of material resources, the quantities of renewable and non-renewable input materials required for 1 Bell Chair session (including packaging) with the related lower calorific values (PCI) obtained from the literature were considered [12]. The contributions of renewable and non-renewable energy resources were obtained accordingly by considering the total indicators calculated with the CED method (LHV).

Bell Chair, *High Noon*		Unit	Total	Upstream	Core	Downstream
Environmental impact categories	Global warming, total	kg CO_2 eq	9,06E+00	4,97E+00	4,25E-01	3,66E+00
	Global warming, fossil fuels	kg CO_2 eq	8,49E+00	5,34E+00	3,55E-01	2,79E+00
	Global warming, biogenic carbon	kg CO_2 eq	5,62E-01	-3,79E-01	7,07E-02	8,70E-01
	Global warming, land use	kg CO_2 eq	5,38E-03	5,03E-03	3,59E-05	3,18E-04
	Acidification	kg SO_2 eq	3,81E-02	3,07E-02	1,27E-03	6,18E-03
	Eutrophication	kg PO_4^{3-} eq	1,30E-02	8,47E-03	5,08E-04	4,06E-03
	Photochemical oxidant formation	kg NMVOC eq	2,57E-02	1,86E-02	8,04E-04	6,25E-03
	Abiotic depletion	kg Sb eq	3,72E-05	3,39E-05	5,88E-07	2,69E-06
	Abiotic depletion, fossil fuels	MJ	8,86E+01	7,21E+01	4,49E+00	1,19E+01
	Water scarcity footprint	m^3	2,58E+00	2,32E+00	2,21E-01	4,36E-02
Use of resources	Renewable resources, energy	MJ	9,66E+00	9,22E+00	2,81E-01	1,60E-01
	Renewable resources, materials	MJ	1,40E+01	1,40E+01	0,00E+00	0,00E+00
	Renewable resources, total	MJ	2,37E+01	2,32E+01	2,81E-01	1,60E-01
	Non-renewable resources, energy	MJ	1,02E+02	8,40E+01	5,45E+00	1,22E+01
	Non-renewable resources, materials	MJ	3,50E+00	3,50E+00	0,00E+00	0,00E+00
	Non-renewable resources, total	MJ	1,05E+02	8,75E+01	5,45E+00	1,22E+01
	Secondary materials	kg	2,31E+00	2,31E+00	0,00E+00	0,00E+00
	Net consumption of fresh water	m^3	7,64E-02	6,90E-02	5,48E-03	1,94E-03
Waste indicators	Hazardous waste	kg	1,58E-04	1,23E-04	5,42E-06	2,96E-05
	Non-hazardous waste	kg	2,25E+00	8,80E-01	9,06E-02	1,28E+00
	Radioactive waste	kg	3,89E-04	2,89E-04	1,78E-05	8,24E-05
Output flows	Materials for recycling	kg	2,60E+00	2,10E-02	1,45E-01	2,43E+00
	Materials for energy recovery	kg	1,23E+00	0,00E+00	1,49E-02	1,21E+00
Other environmental indicators	Human toxicity, cancer	cases	5,64E-07	4,63E-07	1,63E-08	8,41E-08
	Human toxicity, non-cancer	cases	1,92E-06	1,46E-06	4,08E-08	4,21E-07
	Fresh water ecotoxicity	PAF.m^3.day	6,11E+04	5,51E+04	1,67E+03	4,27E+03
	Land use	species.yr	7,35E-09	7,01E-09	5,53E-11	2,86E-10

Table 2 - Bell Chair environmental impact indicators required by PCR 2009:02 v3.0 [4].

Information on the company and certification

MAGIS CONTACT INFORMATION

The LCA and this EPD were carried out by Magis in collaboration with 2B Srl (www.to-be.it). The company references are:

Magis SpA

Via Triestina, Accesso E - Z.I. Ponte Tezze 30020 Torre di Mosto - Ve / Italia

web-site: https://www.magisdesign.com/it/

CERTIFICATION AND CERTIFICATION BODY INFORMATION

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EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, info@environdec.com PCR 2009:02, version 3.0 (UN CPC 3811, Seats), 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 product certification □ EPD verification Third party verifier: DNV Business Assurance Italia Accredited by: Accredia
Procedure for follow-up of data during EPD validity involves third party verifier: ■ Yes □ No The owner of the EPD has sole ownership, liability and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable.

ADDITIONAL INFORMATION

This EPD certification is developed within the EPD® International System program. This document is available on the website of the Swedish Environmental Management Council (www.environdec.com).

EPDs belonging to the same product category may not be comparable. The comparison of the EPDs must always take place with due caution, particular attention must be paid to the boundaries of the systems and the sources of the data used.

DIFFERENCES COMPARED TO PREVIOUS VERSIONS

Compared to the previous EPD version, the ecoinvent and SimaPro database versions were related to this version 3.7.1 and 9.3. The republication of this EPD concerns the correct remuneration of the weight of the final packaging to the declared unit. Furthermore, as regards the RE-LIFE polypropylene treatment process, compared to the previously published EPD, the inputs for the polypropylene material are not considered for the cut-off approach as it is a post-industrial type of regenerated material. Finally, the previously used energy mix was modified with the national residual energy mix.

References

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