Environmental Product of Product (EPD®) of Extra Virgin Olive Oil "Nettare" Monini S.p.A.

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EPD®

01 *The All-Italian Story of a Passion*

MONINI, THE ALL-ITALIAN STORY OF A PASSION

A passion for quality that dates back over a century

The Monini company is an Italian success story based on tradition and quality. The company was founded in 1920 by Zefferino Monini, who, following his entrepreneurial instinct, decided to establish a business in the town of Spoleto, in the Italian region of Umbria. Thanks to its hills covered with olive groves, from which an oil with an intense yet balanced flavour is obtained, the Spoleto area has always been dedicated to the production of Extra Virgin Olive Oil.

The passion that Zefferino Monini Sr. developed for olives at an early age led him to dedicate himself to the production of Extra Virgin Olive Oil, whereby he founded the company "Zefferino Monini Olio di Oliva" in 1930. The knowledge and consumption of Extra Virgin Olive Oil at the time was limited and was locally confined exclusively to its areas of production. Most Italians, above all in the larger cities, either out of habit or lack of knowledge, used almost exclusively regular olive oil, rather than the extra virgin variety. By deciding to market Extra Virgin Olive Oil beyond the confines of the Umbria region, Zefferino Monini launched a new trend in the oil industry. Thanks to his initiative and his passion for the natural product of his homeland, together with the exceptional quality of the oil obtained from the hills of Umbria, Zefferino Monini succeeded in writing the first page in the history of the Extra Virgin Olive Oil market. Once brought to the attention of a wider audience, Monini extra virgin olive oil became increasingly popular and began to be demanded by customers even further afield. The company ceased operations during the war as the product was subject to rationing. Once the distribution of foodstuffs was deregulated in 1945, however, the company's operations continued with renewed energy. It was at this time that Zefferino's sons, Giuseppe and Paolo, joined the company. Giuseppe and Nello flanked their father in his traditional laboratory, learning the all the tricks of the trade.

At the time, shopkeepers sold the product in bulk. Anticipating the future needs of the market, however, the first glass bottles began flanking the traditional demijohns by the year 1950.

01 *The All-Italian Story of a Passion*

A historic oil in modern times.

Today Monini is one of the leading companies in the Extra Virgin sector with a 2020 turnover of 145 million Euros and more than 110 employees. Almost 94% of the total turnover is achieved with the Monini brand. The strategy started in the 1920's by the founder, confirmed and increased by his son Giuseppe, is still carried on by the founder's grandchildren, Zefferino and Maria Flora who, with the same passion, continue to spread the culture of Extra Virgin Olive Oil in an educational, serious and not only commercial way. For three generations, the Monini family has been selecting Extra Virgin Olive Oils, choosing only mills where the hygiene conditions, processing facilities and storage of the olives and oil are of superior quality.

A company in the vanguard in terms of structures, technology and quality control, still animated by a passion for craftsmanship to offer its consumers superior quality. Even today, Zefferino Monini personally tastes the oils to select those that will keep the promise of high quality, the same every time, just as his grandfather did.

02 *The Monini Group*

THE MONINI GROUP NORTH AMERICA, POLAND AND AUSTRALIA

A company that symbolizes the Italian Olive Oil Tradition

It is precisely this ability to spread the culture of Extra Virgin Olive Oil and to preserve the most authentic Italian oil art as a symbol of Made in Italy, which has led the Umbrian company to become a point of reference for the sector outside Italy.
In 2000 Monini North America Inc. was founded with headquarters in Norwalk, Connecticut, and a turnover that today is around 6 million dollars.

In Europe it is present with Monini Polska, a subsidiary established in 2008 with headquarters in Poznan, Poland.

03 *The Company*

THE COMPANY

Environmental policy

Today Monini is a company in the vanguard in terms of structure, technology and quality control, capable of renewing tradition through a model of responsible company management, both from the environmental, social and ethical points of view. Monini is particularly attentive to the environment, as evidenced by interventions ranging from the installation of a photovoltaic system at the plant, to the purchase of energy from certified renewable sources to the introduction of recycled glass packaging. This policy has led Monini to be the first in Italy among the large oil companies to obtain the Environmental Product Declaration (EPD®) certification.

At the basis of Monini's environmental policy there is a simple philosophy: take nothing away from nature and the land. It is in fact these elements that provide all the precious raw material that has made the Spoleto-based company famous in Italy and throughout the world for almost 100 years. An exemplary commitment that Monini assumes with responsibility towards the territory and its precious fruits, preserving them for future generations. The best possible investment in order to keep alive over time the values that have made the tradition of the art of olive oil production safeguarded by Monini so great.

In 2021 Monini has launched a carbon neutrality project involving its two best-selling extra virgin olive oils in Italy and abroad, the Classico and the Delicato Monini, which together account for 67% of the bottles produced in a year by the company. This project represents a totally voluntary commitment, which Monini has undertaken aware of the need to offer a concrete contribution to the fight against global warming.

Packaging plant

The Monini S.p.A. production site is located in Spoleto (Italy) SS Flaminia Km 129.
Monini S.p.A. packages over 30,000,000 litres per year, of which approximately 87% is Extra Virgin Olive Oil. 44% of the 2020 turnover comes from the export market, which involves more than 52 countries. The company covers an area of 22,000 square metres, of which 11,800 square metres are covered, where there are seven packaging lines that guarantee a maximum production capacity of 15,000 litres per hour in various formats and a filtering line for raw materials.

03 *The Company*

THE COMPANY

Supply chain control

Oils made from olives of different varieties, origins and maturity, and stored under different conditions and for different time frames, naturally possess different characteristics. For this reason, Zefferino Monini Jr., together with some of his closest expert collaborators, select the best oils in a special tasting room on a daily basis, recording the intensity and the different flavour and olfactory characteristics of each oil sampled. Approximately 15,000 oil tasting sessions are held each year during the selection and receipt of the raw materials, as well as before packaging. These control activities are not only limited to the raw materials themselves, but the quality of the final product is also guaranteed by the loyalty, collaboration, and control activities performed by the entire supply chain.

Quality control

A state-of-the-art analytical laboratory monitors the quality and purity of each oil. These highly complex analyses are used to reveal the presence of any oils other than olive oil, as well as the presence of any undesired substances contained within the oils themselves due to treatments with agrochemicals (pesticides, herbicides or fungicides) or simply due to environmental pollution. Modern analytical techniques and sophisticated equipment allow for contaminants to be detected in tenths of parts per billion: this means that it is possible to detect the presence of even just one gram of a contaminant dissolved in 10,000 tonnes of oil.

The Monini analysis laboratory performs approximately 20,000 sets of analysis per year, controlling approximately 90,000 parameters. Most of the controls are performed upon the incoming product, thus allowing for non-compliant batches of oil to be rejected, while further controls are also carried out during the packaging stage. Subsequently, the quality levels of the oils destined for the national and international markets are sampled and monitored.

04 *Calculation of environmental performance*

CALCULATION OF ENVIRONMENTAL PERFORMANCE

Monini “Nettare” Extra Virgin Oil 1-litre, 0,75- litre, 0,5-litre bottles.

This EPD® refers to the product Extra Virgin Olive Oil "Nettare d’Oliva".

In the last five years, on average, Extra Virgin Olive Oil Nettare has been produced from olives grown in Italy, Spain, Portugal and Greece. The data used to calculate the environmental performance reported in this EPD® are updated to the olive production and oil extraction campaign of 2020.
The Extra Virgin Nettare Oil is packaged in green glass bottles; the primary packaging consists of two paper labels (front and back) applied to the bottle and an aluminium cap with plastic pourer; the standard secondary packaging consists of a cardboard tray and a shrink film, while tertiary packaging consists of the pallet and a transparent outer film.

In this EPD®, the density of Extra Virgin Olive Oil is considered to be 0.913 kg/litre.

Functional unit

In accordance with PCR 2010:07, the functional unit for the life cycle refers to one (1) litre of Extra Virgin Olive Oil, including his packaging.

04 *Calculation of environmental performance*

GEOGRAPHICAL ORIGIN

Monini Nettare Extra Virgin Oil

The supply area for the production of Monini Nettare Extra Virgin Olive Oil corresponds to the following countries:
(the areas of cultivation are listed in dark green)

Italy
Puglia.

Spain
Andalusia, Murcia, Estremadura, Castilla y Leon, Navarra, La Rioja, Aragona, Catalogna, Castilla La Mancha, Madrid, Valencia.

Portugal
Guarda, Beja, Enora, Portalegre.

Greece
Crete, Peloponnese.

04 *Calculation of environmental performance*

CHARACTERISTICS OF THE EXTRA VIRGIN OLIVE OIL

Monini Nettare Extra Virgin Oil

Nettare is a selection of oils made from olives harvested at the peak of ripeness and is an ideal complement, in cooking and raw, for a modern, delicate and light cuisine.

For Cooking

In cooking and for all uses. A condiment for cooked vegetables, delicate soups, sauces, roast white meats, boiled meats and salads.

NUTRITION DECLARATION for 100 ml	
Energy	3404 kJ
	828 kcal
Fats	92 g
Of which	
Satured Fatty Acids	14 g
Monosatured Fatty Acids	69 g
Polyunsatured Fatty Acids	9 g
Carbohydrates	0 g
Of which Sugar	0 g
Fibres	0 g
Protein	0 g
Salt	0 g
Vitamin E	17 mg*
*** 142% of nutrient reference values**	

04 *Calculation of environmental performance*

CHEMICAL AND PHYSICAL PROPERTIES

Monini Nettare Extra Virgin Oil

MONINI QUALITY SPECIFICATIONS	Monini values	Values provided by law	Reference standards
Free acidity (% expressed as oleic acid)	0.40	≤ 0.8	(1-2-3)
Peroxides	9.0	≤ 20	(1-2-3)
UV adsorption:			
K_{232}	1.90	≤ 2.5	(1-3)
K_{270}	0.120	≤ 0.22	(1-2-3)
ΔK	-0.002	≤ 0.01	(1-2-3)
Waxes (mg/kg)	80.0	≤ 150	(1-2-3)
Biophenols (mg/kg)	200		

(1) REG. (EEC) N.2568/91 on the characteristics of olive oil and relevant methods of analysis
(2) CODEX STAN 33-1981 Standards for olive oils and olive-pomace oils
(3) INTERNATIONAL OLIVE COUNCIL COI/T. 15/NC N.3/Rev. 12 Trade standard applying to olive oils and olive pomace oils

04 *Calculation of environmental performance*

CHEMICAL AND PHYSICAL PROPERTIES

Monini Nettare Extra Virgin Oil

MAIN CONTAMINANTS RESIDUES		Monini values	Values provided by law	Reference standards
PAH: Polycyclic Aromatic Hydrocarbons (mg/kg)	B(a)P	< standard limit values	≤2	Reg. 1881/2006/UE and further modifications
	B(a)P B(a)A B(b)F CHR	< standard limit values	≤10	
Phthalates (mg/kg)		<3.0 (sum) <1.0 (each compound)	-	Internal method
Pesticide residues (mg/kg)		< standard limit values	Values of the reference standard	Reg. 396/2005/UE and further modifications

04 *Calculation of environmental performance*

BOUNDARIES OF THE SYSTEM

Upstream, core and downstream processes

In accordance with PCR 2010:07, the life cycle of the Extra Virgin Olive Oil is divided into the Upstream, Core and Downstream phases.

The Upstream phase includes the following processes:

- The operations required for the establishment of the olive groves and the transformation of the terrain's use were not taken into consideration because the life cycle of an olive grove is greater than 25 years.
- The production of the olives used later in the Core process, involving the following processes:

- The production of the inputs utilized, such as for example, fertilisers and agrochemical products.

- Waste management. The use of the wood resulting from pruning or from the end of the olive trees' life cycle.

- The transportation of the inputs to the region and to the olive production sites.

- The extraction and use of the water.

- The auxiliary materials used to harvest the olives (nets, cages, detergents, etc.).

- The production of the fuel and electricity used at the plantations.

- The production of packaging and auxiliary materials used for extracting oil at the oil mill and for filtration and fine filtering at the Monini plant.

04 *Calculation of environmental performance*

BOUNDARIES OF THE SYSTEM

Upstream, core e downstream processes

The Core phase includes the following processes:

- The transportation of the olives to the mill
- The extraction of the oil from the olives.
- Waste management.
- The preservation of the oil.
- Transportation to the packaging plant.
- The packaging of the oil at the Monini facility in Spoleto.

In accordance with the 2010 PCR: 07, the construction of machinery (more than three years old) and the factories were not included. In addition, the packaging of chemical products and auxiliary materials used during the cultivation, at the olive mill and in the packaging stage,

- The transportation of the raw materials and energy inputs to the Core process.

The Downstream phase includes the following processes:

• Transportation from the final production/ storage site to a distribution platform.

• Transportation to the retailer.

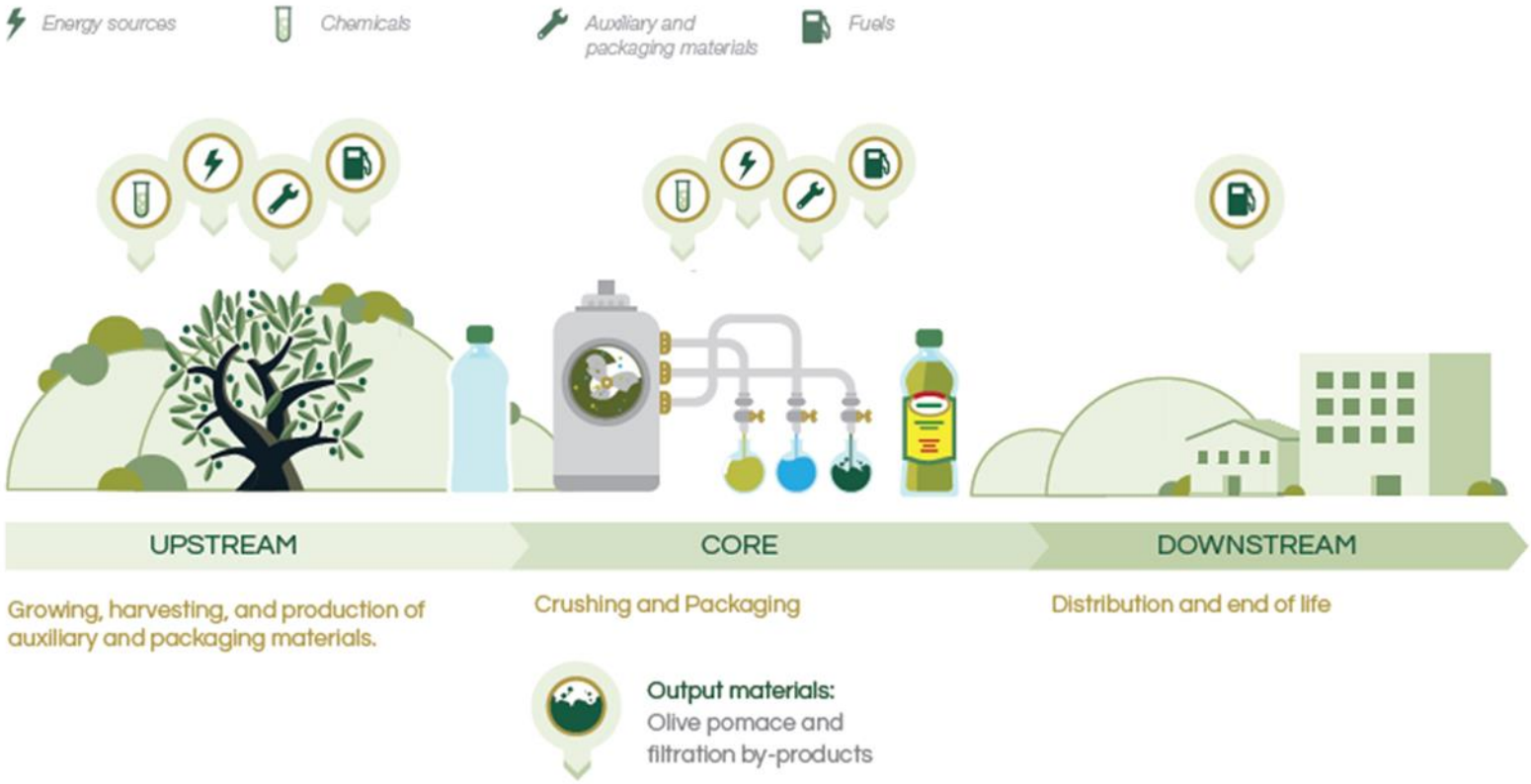
• Waste management.

• The use of the product.

as well as the product labels and neck collar applied on the oil bottles, the shrink film and the adhesives applied to the pallet, they were not included for the cut-off rule (which excludes material flows of less than 1% of the total inventory).

04 *Calculation of environmental performance*

BOUNDARIES OF THE SYSTEM



04 *Calculation of environmental performance*

DATA QUALITY

The inventory analysis was carried out using specific data from:
Monini S.p.A. and from the companies involved in the study regarding the cultivation and harvesting of the olives, oil extraction and storage, transport to the bottling site, packaging stage and distribution of the product.
Selected generic data were used from:
- Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91.
- The Methodology of the FAO Study: "global food losses and food waste - extent, causes and prevention" - FAO, 2011 by SIK - Swedish Institute for Food and Biotechnology, 2013.
-Eurostat,
http://epp.eurostat.ec.europe.eu/portal/page/portal/eurostat/home
- International databases (in particular Ecoinvent 3.7.1) for the production processes of semi-finished products, packaging materials, electrical and thermal energy and means of transport, as well as for water supply and end-of-life.

In accordance with the General Program Instructions of the International EPD® System, version 3.01 of 18/09/2019, the contribution of other generic data to the impact indicators is less than 10%.

In addition, transport distance data were calculated using the online Google Maps and Sea Rates calculator for land and sea transport distances respectively.

04 *Calculation of environmental performance*

DATA QUALITY

The Monini supply chain

The direct relationship with the private or co-operative oil mill (sometimes through the figure of a mediator to co-ordinate logistical and economic aspects) does not contribute to determining a favourable situation for data collection for the process unit belonging to the farm, involved in the cultivation of the olive tree. Nevertheless, compared to the previous version, the sample of suppliers (growers and mills) that actively participated in the collection of specific data has been maintained in this EPD®.
The availability of a more representative sample has significantly improved the quality of the processed data, which have been refined to the point where they are probably very close to the actual value.

Comparison of EPD® within the same product category

The oils included in this document are based on the specification PCR 2010:07 version 3.0 updated on 31/03/2020, developed in accordance with the General Program Instructions of the International EPD® System, version 3.01 dated 18/09/2019.

EPDs® within the same product category but from different programmes may not be comparable, nor are EPDs® within the same product category and programme but differing in packaging format.

04 *Calculation of environmental performance*

CULTIVATION AND HARVESTING OF THE OLIVES

Puglia, Italy

In terms of Extra Virgin Olive Oil production, Puglia is Italy's leading olive oil producing region. The region's most productive provinces are those of Foggia, Bari and Barletta-Andria-Trani. On the plains of Tavoliere, the olive growing process is a form of specialized farming with a regular line configuration, incorporating an irrigation system with the vase pruning system, and harvesting is mainly performed using pneumatic combs.
The olive-growing techniques in the provinces of Bari and Barletta-Andria-Trani tend towards a more modern style of olive-growing, with the tree arrangements assuming an intensive and fairly regular configuration, and an average of about 300 trees/ha cultivated using the vase pruning system. Harvesting is performed mechanically, using harvesting machinery.

Spain

In Spain there are two systems of cultivation: traditional and super intensive. The cultivars grown according to the traditional system are the Picual and Cornicabra varieties, which are still found in the areas of Jaen (Andalusia) and Toledo/Ciudad Real (Castilla la Mancha). With regard to the super intensive system, there are two cultivars, the Arbequina and Arbosana varieties, with reduced vegetative development, to the point that they are planted with a density of 1,600 - 2,000 trees/ha.

Super Intensive System is a technology of cultivation of olive trees which took origin in this Country in the early 90s and that allows a considerable increase in profitability compared to conventional systems.
When they made the first plantations the doubts that arose on the new model of cultivation were many: planting lifetime, selection of a suitable area, choice of appropriate olives varieties, system of pruning, fertilization, irrigation, ...

The experience gained over the years in different situations has allowed us to refine the main technical criteria and to dispel the many initial doubts. The keys to the success of the super intensive system are: 100% mechanized harvest, the rapid entry into production (starting from 2nd-3rd year of the campaign), a consistently high profitability and Extra Virgin Olive Oil good quality.

04 *Calculation of environmental performance*

CULTIVATION AND HARVESTING OF THE OLIVES

Greece

In Greece, the areas dedicated to the cultivation of olive groves have increased steadily over the years, thanks to the planting of new high-density rows of 250- 300 trees/ha. The olive groves involved in the production of olive oil have been widely used in many semi-mountainous and coastal areas. The Koroneiki olive is considered to be the best variety for the production of oil. Trees have a short trunk pruned sapling like. It has its origins in the Korone area, in Messinia region, Peloponnese.
The tendency is to enhance production through mechanisation, land levelling and localised irrigation, using the wells belonging to the various farms.

The ancient olive groves with large centuries-old trees have been replaced by new and intensive plantations, while the more traditional plantations can still be found on the smaller islands and in the higher mountainous regions.

Portugal

Cultivation of the olive tree in Portugal has advanced considerably in recent decades thanks to the exploitation of EU funding. It predominantly involves intensive and super-intensive fully mechanised cultivation techniques, with the plant-by plant-irrigation of three main cultivars, which, in order of importance, are the Arbequina, the Fenugreek and the Cobrançosa varieties.

04 *Calculation of environmental performance*

EXTRACTION OF THE OIL FROM THE OLIVES

Washing, crushing and malaxation

The Extra Virgin Olive Oil production technique is almost identical in all the considered Countries except for some difference due to local traditions.

Washing and pressing

When the olives arrive at the mill they are immersed in a tank of water or, in modern plants, in special washing machines that maintain forced water movement in order to improve the results of the operation. After washing, the next step is the crushing, which in modern continuous-cycle facilities is carried out using a hammer crusher. With this system, the pulp is broken down by the impacts of high-speed rotary devices, and only in part by the mechanical action of the pit's fragments.
The processing is performed within an extremely short time frame.

Malaxation

Malaxation or mixing is an operation that follows crushing, the purpose of which is to break down the emulsion between water and oil, thus allowing the micelles of oil to merge into larger droplets, which tend to separate spontaneously from the water. This is performed in machines called mixers or maloxers. The technical reference parameters during the mixing stage are the temperature and the duration. The temperature is critical for the yield in the subsequent extraction process and is closely related to the stability of the water-oil emulsion. With a low degree of emulsification, malaxation can be performed at temperatures slightly higher than the ambient temperature (from 22-24°C to 27°C); this is referred to as malaxation or cold extraction. With more stable emulsions, a more aggressive heating of the paste is required, with temperatures ranging from 27°C to 30°C.
The yield of the extraction increases with the temperature of the malaxation, but the quality of the paste decreases once the temperature of 30°C is reached.

04 *Calculation of environmental performance*

EXTRACTION OF THE OIL FROM THE OLIVES

From malaxation to centrifugation

Centrifugation

The olive paste resulting from the malaxation process is subjected to centrifugation in a rotating conical drum, with a horizontal axis commonly referred to as a decanter.
Due to the different specific weights of water, oil, and olive pulp, the centrifugation separates them over 2 to 3 phases. The 3-phase decanter is the most consolidated and utilized type found in Italy.
In this case, three parts are separated by centrifugation:

- the olive pomace;
- the oil must, containing a small amount of water;
- the vegetation water, containing a small amount of oil.

This system requires the oil paste to be diluted in advance with mains water. The 2-phase decanter is widespread throughout Spain, Portugal and Greece, and differs from the 3-phase decanter due to the decreased use of water. The centrifugation process separates only two parts:

- the olive pomace and the vegetation water;
- the oil must, containing a small amount of water.

The oil must, obtained from the extraction, always contains a residual amount of water, which is separated by the effect of the different densities of the two liquids through decanting or centrifugation.

Vertical centrifugation is the system used in all plants to separate the oil from the water. In this process, which is performed in vertical centrifugal separators, both the oil must and the vegetation water obtained from the horizontal centrifugation are processed.

04 *Calculation of environmental performance*

PACKAGING OF THE OIL

From storage to shipment

Storage

Monini S.p.A. has about 170 storage tanks for a total capacity of 5,500,000 litres, all stainless steel, interconnected and equipped with electronic level probes in order to continuously monitor the quantities of oil contained and those transferred from one tank to another.
All the tanks are temperature controlled and are connected to an inert gas (nitrogen) distribution system that ensures optimal product preservation.

Filtering

Immediately before packaging the oils are subjected to a double filtration process.
Filtering does not alter the quality and nutritional characteristics of the oil, but rather ensures better preservation over time.

Packaging

Monini S.p.A. has 7 modern packaging lines, with a daily average bottling capacity of 200,000 litres, and a maximum capacity of 260,000 litres over 24 hours. They allow the oil to be bottled in 100ml, 250ml, 500ml, 1L, 3L, and 5L containers, in order to satisfy the various needs of the market.
Every packaging line is equipped with video cameras, which systematically detect any foreign bodies present within the containers, monitor the presence of the label and cap, and verify the production batch and the oil level of each single container.
Finally, ultra-modern automatic laser-guided shuttles transfer the pallets of packaged oil to the warehouse, where they will await final shipment.

04 *Calculation of environmental performance*

DISTRIBUTION AND USE PHASE

The final stages of the product's life cycle

Distribution

The product is distributed across Italy and the world. The transport distance was calculated based on the specific distance-weighted average for each bottle size.

Use phase

The use phase of extra virgin olive oil is excluded according to PCR, however a percentage of oil which may not be consumed or disposed, after cooking, has been considered. A loss of 4% of the oil contained in the bottle was estimated, according to the 2013 study by Gustavsson et al, and in the calculation model it was considered that this quantity is treated in part by the municipal water purification system and in part sent to recovery.

End of life of packaging and oil

The end-of-life scenario for packaging has been modelled using official statistical data from ISPRA and Eurostat (referring to 2019) according to the recovery, incineration and landfill disposal of the individual packaging materials. The waste disposal processes of landfill and incineration were taken from the Ecoinvent database and are specific to the packaging material; for the recycling process, only the assumed transport of 100 km with lorries with a capacity between 16 and 32 tonnes was considered.

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

List of the impact categories/1

The environmental performance of Monini products, as detailed below, is based on the Life Cycle Assessment (LCA) methodology and has been calculated in accordance with ISO 14040 and 14044, the International EPD® system and PCR 2010:07. The management and updating of environmental data concerning EPD® products are regulated by a specific procedure within the Monini Management Systems Manual.

Environmental impact indicators

The purpose of impact assessment is to highlight the extent of the environmental changes generated by the releases into the environment and the consumption of resources caused by production activities. The fundamental objective is to attribute the consumption and emissions obtained in the inventory phase to specific impact categories.

The following is a list of impact categories
Resource consumption
A count of the total amount of energy and material resources used throughout the life cycle of products. These are divided into primary (non-renewable and renewable), secondary, and water consumption.

Global warming

It is caused by the presence of greenhouse gases in the atmosphere that absorb the infrared radiation emitted by the earth, causing an increase in average temperature.

The anthropogenic greenhouse gas of greatest concern is CO2. The method of characterization of the impacts of greenhouse gases is based on what is stated by the Intergovernmental Panel on Climate Change (IPCC) that uses as an impact indicator the kg of CO2 equivalent compared to a time horizon of 100 years (GWP 100 years, Global Warming Potential).
The GWP is based on a relative scale that compares the gas considered with an equal mass of CO2, whose GWP is by definition equal to 1.
Fossil, biogenic and land-use change emissions are reported separately.

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

List of the impact categories/2

Formation of photochemical smog

This is a phenomenon typical of peak hours in big cities, quite pronounced in the summertime, when the sun's rays cause the unburned hydrocarbons and nitrogen oxides present in the exhaust fumes to react, thus resulting in harmful ozone. The method for characterizing the impact of photo-chemical smog is based on that of the United Nations Economic Commission for Europe, which uses kg of equivalent C_2H_4 as an impact indicator. POCP is based on a relative scale, which compares the substance in question to an equal mass of equivalent C2H4, the POCP of which is by definition equal to 1.

Acidification

The acidification indicator is linked to the emission of certain acidifying substances into the atmosphere, such as nitrogen oxides and sulphur oxides, which cause the pH of lakes, forests and oceans to decrease. The method for characterizing acidification impacts is based on that of the Leiden Environmental Sciences Centre, NL (CML), which uses kg of equivalent SO_2 (AP, Acidification Potential) as an impact indicator. AP is based on a relative scale which compares the substance in question to an equal mass of equivalent SO2, whose AP is by definition equal to 1.

Eutrophication

Indicates a condition an over-abundance of nitrates and phosphates in an aquatic environment, which causes the proliferation of microscopic algae and, in turn, increased bacterial activity; the consequent lowering of oxygen in surface waters and in the soil causes a degradation of the environment which has become asphyxiated and, in the long term, results in the death of fish. The method for characterizing the impacts of eutrophication is based on that of the Leiden Environmental Sciences Centre, NL (CML), which uses kg of PO_4 as an impact indicator (NP, Nutrification Potential). NP is based on a relative scale, which compares the substance in question to an equal mass of PO4, whose NP is by definition equal to 1.

Land use

This category concerns the effects following the conversion or occupation of land. The impact is expressed in m^2 per year.

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini Nettare Extra Virgin Olive Oil

EVALUATION METHOD

The method of calculation adopted for the study of LCA at the base of this EPD® is described in the PCR 2010:07, CPC Division 21537: Virgin olive oil and its fractions; version 2.1

The characterization factors, used to convert the data from the inventory analysis of the life cycle impact categories, are listed on the website of the International EPD® System.

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini Nettare Extra Virgin Oil 0.75-litre glass bottle

PARAMETERS Environmental impacts	Unit	UPSTREAM		CORE		DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
GWP, fossil	kg CO_2 eq	2.7970	0.3293	0.0550	0.1333	0.1009	0.0058	3.4214
GWP, biogenic	kg CO_2 eq	0.0009	0.0006	0.0005	0.00004	0.000005	0.0005	0.0025
GWP, Land use and land transformation	kg CO_2 eq	0.0008	0.0054	0.000043	0.000001	0.000001	0.0000001	0.0062
TOTAL Global Warming Potential	**kg CO_2 eq**	**2.7987**	**0.3354**	**0.0555**	**0.1334**	**0.1009**	**0.0063**	**3.4301**
Acidification potential	kg SO_2 eq	0.0342	0.0011	0.0004	0.0007	0.0004	0.0000	**0.0369**
Eutrophication potential	kg PO_4--- eq	0.0296	0.0003	0.0002	0.0001	0.0001	0.0000	**0.0302**
Formation potential of tropospheric ozone	kg NMVOC eq	0.0191	0.0007	0.0004	0.0008	0.0005	0.0000	**0.0215**
Abiotic depletion potential – Elements	g Sb eq	0.0001523	0.0000021	0.000000003	0.000000005	0.00000000	0.0000000002	**0.000154**
Abiotic depletion potential – Fossil fuels	MJ	24.8770	6.3625	0.7018	1.8996	1.4485	0.0749	**35.3643**
Water scarcity potential	m^3 eq.	31,5409	0,1095	0,1115	0,0368	0,000	0,000	**31,7985**

Environmental impact in reference to the functional unit of the 0.75-litre bottle of Extra Virgin Nettare Olive Oil and its packaging

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini Nettare Extra Virgin Oil 0.75-litre glass bottle

PARAMETERS Use of resources	Unit	UPSTREAM			CORE	DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
Primary energy resources –Renewable Used as energy carriers	MJ	0.80386	0.44230	0.08225	0.19739	0.00213	0.00033	**1.53**
Primary energy resources –Renewable Used as raw materials	MJ	0.08991	0.16850	0.01390	0.00099	0.00044	0.00012	**0.2739**
Primary energy resources –Renewable TOTAL	MJ	**0.8938**	**0.6108**	**0.0962**	**0.1984**	**0.0026**	**0.0004**	**1.8021**
Primary energy resources –Non-renewable Used as energy carriers	MJ	27.66	7.48	0.96	2.03	1.54	0.08	**37.94**
Primary energy resources –Non-renewable Used as raw materials	MJ	0.00017	0.0081	0.000002	0.0000003	0.0000001	0.0000000	**0.0083**
Primary energy resources –Non-renewable TOTAL	MJ	**27.66**	**7.49**	**0.96**	**2.03**	**1.54**	**0.08**	**37.95**
Secondary material	Kg	0	0.18135	0	0	0	0	**0.18135**
Renewable secondary fuels	MJ	0	0	0	0	0	0	**0**
Non-renewable secondary fuels	MJ	0	0	0	0	0	0	**0**
Net use of fresh water	m^3	0,89569	0,00145	0,00100	0,000	0,000	0,0000	**0,89811**

Environmental impact in reference to the functional unit of the 0.75-litre bottle of Extra Virgin Nettare Olive Oil and its packaging

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini Nettare Extra Virgin Oil 0.75-litre glass bottle

PARAMETERS Waste and output flows, other indicators	Unit	UPSTREAM			CORE	DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
Non-hazardous waste disposed	Kg	0	0	0	0	0	0	**0**
Hazardous waste disposed	Kg	0	0	0	0	0	0	**0**
Radioactive waste disposed	Kg	0.000162	0.000012	0.000003	0.000013	0.000011	0.000001	**0.000202**
Components for reuse	Kg	0	0	0	0	0	0	**0**
Materials for recycling	Kg	0	0	0	0	0	0.3187	**0.3187**
Materials for energy recovery	Kg	0	0	0	0	0	0	**0**
Exported energy, electricity	MJ	0	0	0	0	0	0	**0**
Exported energy, thermal	MJ	0	0	0	0	0	0	**0**
Land use	m^2a	114.28	0.0408	0.0057	0.0011	0.0001	0.0001	**114.32**
By-products	Kg	0	0	6.70	0	0	0	**6.70**

Environmental impact in reference to the functional unit of the 0.75-litre bottle of Extra Virgin Nettare Olive Oil and its packaging

NOTE: Hazardous and non-hazardous wastes are only reported if treatment takes place outside the system boundaries. The amount of radioactive waste comes from the use of nuclear energy in the national electricity generation mix of different countries along the life cycle

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini Nettare Extra Virgin Oil 0.5-litre glass bottle

PARAMETERS Environmental impacts	Unit	UPSTREAM		CORE		DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
GWP, fossil	kg CO_2 eq	2.7968	0.4501	0.0550	0.1459	0.8846	0.0065	4.3388
GWP, biogenic	kg CO_2 eq	0.0009	0.0027	0.0005	0.00004	0.00004	0.0051	0.0092
GWP, Land use and land transformation	kg CO_2 eq	0.0008	0.0081	0.000043	0.000001	0.000009	0.0000001	0.0089
TOTAL Global Warming Potential	**kg CO_2 eq**	**2.7985**	**0.4609**	**0.0555**	**0.1459**	**0.8846**	**0.0116**	**4.3570**
Acidification potential	kg SO_2 eq	0.0342	0.0013	0.0004	0.0008	0.0097	0.0000	**0.0464**
Eutrophication potential	kg PO_4--- eq	0.0296	0.0005	0.0002	0.0001	0.0017	0.0000	**0.0321**
Formation potential of tropospheric ozone	kg NMVOC eq	0.0191	0.0009	0.0004	0.0008	0.0130	0.0001	**0.0343**
Abiotic depletion potential – Elements	g Sb eq	0.0001523	0.0000029	0.000000003	0.000000006	0.00000004	0.0000000003	**0.000155**
Abiotic depletion potential – Fossil fuels	MJ	24.8752	8.1671	0.7017	2.0798	11.9571	0.0921	**47.8729**
Water scarcity potential	m^3 eq.	31.5386	0.0783	0.1115	0.0368	0.0023	0.000	**31.7675**

Environmental impact in reference to the functional unit of the 0.5-litre bottle of Extra Virgin Nettare Olive Oil and its packaging

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini Nettare Extra Virgin Oil 0.5-litre glass bottle

PARAMETERS Use of resources	Unit	UPSTREAM			CORE	DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
Primary energy resources –Renewable Used as energy carriers	MJ	0.80380	0.54572	0.08224	0.19764	0.01520	0.00066	**1.65**
Primary energy resources –Renewable Used as raw materials	MJ	0.08990	0.22086	0.01390	0.00104	0.00319	0.00020	**0.3291**
Primary energy resources –Renewable TOTAL	MJ	**0.8937**	**0.7666**	**0.0961**	**0.1987**	**0.0184**	**0.0009**	**1.9743**
Primary energy resources –Non-renewable Used as energy carriers	MJ	27.66	9.84	0.96	2.22	12.71	0.10	**51.25**
Primary energy resources –Non-renewable Used as raw materials	MJ	0.00017	0.0121	0.000002	0.0000003	0.0000024	0.0000000	**0.0122**
Primary energy resources –Non-renewable TOTAL	MJ	**27.66**	**9.85**	**0.96**	**2.22**	**12.71**	**0.10**	**51.26**
Secondary material	Kg	0	0.176	0	0	0	0	**0.176**
Renewable secondary fuels	MJ	0	0	0	0	0	0	**0**
Non-renewable secondary fuels	MJ	0	0	0	0	0	0	**0**
Net use of fresh water	m^3	0.89563	0.00213	0.00100	0.000	0.000	0.000	**0.89877**

I Environmental impact in reference to the functional unit of the 0.5-litre bottle of Extra Virgin Nettare Olive Oil and its packaging

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini Nettare Extra Virgin Oil 0.5-litre glass bottle

PARAMETERS Use of resources	Unit	UPSTREAM			CORE	DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
Non-hazardous waste disposed	Kg	0	0	0	0	0	0	**0**
Hazardous waste disposed	Kg	0	0	0	0	0	0	**0**
Radioactive waste disposed	Kg	0.000162	0.000021	0.000003	0.000014	0.000087	0.000001	**0.000288**
Components for reuse	Kg	0	0	0	0	0	0	**0**
Materials for recycling	Kg	0	0	0	0	0	0.2562	**0.2562**
Materials for energy recovery	Kg	0	0	0	0	0	0	**0**
Exported energy, electricity	MJ	0	0	0	0	0	0	**0**
Exported energy, thermal	MJ	0	0	0	0	0	0	**0**
Land use	m^2a	114.27	0.0545	0.0057	0.0011	0.0009	0.0002	**114.33**
By-products	Kg	0	0	6.70	0	0	0	**6.70**

Environmental impact in reference to the functional unit of the 0.5-litre bottle of Extra Virgin Nettare Olive Oil and its packaging

NOTE: Hazardous and non-hazardous wastes are only reported if treatment takes place outside the system boundaries. The amount of radioactive waste comes from the use of nuclear energy in the national electricity generation mix of different countries along the life cycle.

05 *Additional Information*

Monini S.p.A. CERTIFICATIONS

Site	Typology		Certifying body	Year of issue
Production unit	**ORTHODOX UNION**	Kosher Certification		1992
Production unit	**DOP**	Production and packaging DOP Umbria		1998
Production unit	**ISO 9001:2015**	Standard for the management of Quality Systems		1999
Production unit	**BIO**	production and packaging of organic products		2001
Production unit	**British Retail Consortium**	hygienic and sanitary safety of private label food products		2004
Production unit	**International Food Standard**	hygienic and sanitary safety of private label food products		2006
Production unit	**ISO 22000:2018**	Food Safety Management Systems		2010
Production unit	**EPD: Monini Extra Virgin Oil "Granfruttato"; "Classico" "Delicato"**	Environmental Product		2012
Monini "Bios" chain	**Organic Products Certificate of Conformity IBD-Brazil**	Production of raw materials and packaging of organic products		2012

05 *Additional Information*

Monini S.p.A. CERTIFICATIONS

Site	Typology		Certifying body	Year of issue
Production unit	**HALAL**	Standard: HIA-01, HAS 23201 AND MS 1500 HALAL GUIDELINES & STANDARDS		2013
Monini products	**EPD: Monini Extra Virgin Oil "BIOS" "DOP Umbria"**	Environmental Declaration of Product (EPD®)		2014
Production unit	**JAS Organic Products Certificate of Conformity - Japan**	Organic manufacturing and packaging		2016
Monini Chain	**Certificate of Conformity of organic products OFDC-China**	Organic manufacturing and packaging		2016
Production unit	**HALAL**	Standard: GSO 2055-1 – MUIS-HC-S001 Thailand		2018
Production unit	**ISO 45001:2018**	Occupational health and safety management systems		2018
Production unit	**ISO 22005:2008**	Traceability system in agri-food chains		2020
Production unit	**Extra virgin Consortium Of Quality "CEQ"**	Traceability system in agri-food chains Technical Product Specification "Extra Virgin Olive Oil Quality CEQ".		2020
Production unit	**BRCGS Global Standard Food Safety Issue 8**	Module 13 - FSMA Preventive Controls Preparedness		2021

05 *Additional Information*

ENVIRONMENTAL INFORMATION ADDITIONAL

The packaging used by Monini for Nettare d'Oliva Extra Virgin Olive Oil is recyclable. In addition, the 1 litre and 0.75 litre bottles contain an average of 45% recycled glass, while the 0.50 litre bottle contains an average of 55% recycled glass.

05 *Additional Information*

INFORMATION

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Bureau Veritas Italia S.p.A.

For further information

Monini S.p.A.

www.monini.com

International EPD® system

www.environdec.com

05 *Additional Information*

VERIFICATION

Product Category Rules (PCR): PCR 2010:07, CPC Division 21537: Virgin olive oil and its fractions; version 3.0
PCR review conducted by: The Technical Committee of the International EPD® System Chair: Adriana del Borghi, info@environdec.com
Independent third-party verification of declaration and data, in accordance with ISO 14025:2006 ☐EPD® process certification ☑EPD® verification
Third-party verifier: Ugo Pretato - Individual Verifier Approved by: The Technical Committee of the International EPD® System
The procedure of data follow-up during the validity of the EPD includes the third-party verifier: ☑ Yes ☐No

EPDs within the same product category but from different programmes may not be comparable, nor are EPDs within the same product category and programme but differing in packaging format. The holder of the EPD® has exclusive ownership, obligations and responsibilities regarding the EPD® itself

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05 *Additional Information*

REFERENCES

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2. ISO 14044:2018 Environmental management - Life cycle assessment - Requirements and guidance
3. General Programme Instructions for Environmental Product Declarations, version 3.01 of 2013-09-19
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6. Life cycle assessment of Monini Extra Virgin Olive Oil - LCA report; Ambiente Italia S.r.l. updated in February 2022
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8. CONAI, General programme for the prevention and management of packaging and packaging waste - Final general report 2017
9. Association of Issuing Bodies, European residual mixes 2020

More information: website: International Olive Oil Council.
Eurostat (2018 data on packaging end-of-life)
www.environdec.com