



Estimated carbon footprint of Firma Capsules sold in 2024

January 2024

Contact information: Luigi Lavazza S.p.A
Headquarter: Torino, Via Bologna 32 - 10152
www.lavazza.it

1. Introduction

The challenges posed by the climate crisis to the coffee sector are many and urgent: this is why Lavazza is committed to the study of all-round solutions to meet the needs of reducing its environmental impact. In fact, starting from 2020, the Group has promoted a path that aims at achieving complete Carbon Neutrality, called “Roadmap to Zero”. This path consists in three main working steps, which are the quantification, reduction and offsetting of its carbon emissions.

In 2020, Lavazza Group achieved the first result of its Carbon Neutrality path by offsetting Scope 1 and 2 emissions, i.e., direct and indirect greenhouse gas emissions from, for example, the combustion of methane for roasting green coffee and the generation of electricity consumed. Knowing that that not all emissions can be reduced, Lavazza Group embarked on an offsetting strategy by supporting projects that contribute to sustainable development and to the containment of greenhouse gas emissions. In 2021, this process continued by introducing the offsetting of emissions from the main single serve products sold (capsules, soft pods, fresh packs), whose main contribution in emissions can be categorized in the organization's Scope 3. These include Lavazza FRIMA capsules whose CO_{2e} emissions from all stages of their life cycle (cradle to grave) are neutralized starting in 2021.

To ensure the accuracy of the estimated calculation, the carbon footprint for all capsules sold in 2024 will be recalculated when final sales data are available. If there is a mismatch (either over or under) between the estimated emission value for 2024 and the actual value after 12 months of sales, it will be adjusted (e.g., by committing a larger volume of carbon credits).

The purpose of this report is to report the process of analysis of the carbon footprint of FIRMA capsules according to the adopted reporting standard and present the results.

2. Carbon Footprint assessment

The structure of this report follows the main steps of Life Cycle Assessment (LCA):

- A. **Goal and scope definition:** defines the aim of the study, the reference unit, the processes included in the study and other important characteristics of the assessment;
- B. **Inventory analysis:** describes which data are used;
- C. **Impact assessment:** presents impact results obtained through the use of LCA;
- D. **Interpretation:** discussion of the results in order to formulate conclusions.

A. Goal and scope

Type of LCA Analysis

This Carbon Footprint (CFP) study is cradle to grave, since all the relevant life cycle stages are included in the LCA (i.e., raw material acquisition, production, distribution, use and end-of-life as better detailed in the “System Boundaries” chapter). The LCA follows an attributional approach.

Functional unit

The studied functional unit is the expected 2024 sales of Firma capsules.

System boundaries

The Carbon footprint of 2024 Firma capsules considers the following life cycle processes:

- **Green Coffee Cultivation & processing:** In this phase, all climate-altering emissions related to the CO2 indicator are calculated, starting from the sowing of the coffee plant, its cultivation and harvesting, the processing to obtain green coffee from the cherry (variable in stages and consumption depending on country of origin), through to the transport to the roasting/packing plant.
- **Packaging Processing:** This phase includes all emissions related to the extraction of raw materials and the production of the various primary, secondary and tertiary packaging components of the finished product, which are produced by various suppliers and sent to Lavazza plants for packing.
- **Final product Processing in Lavazza Plants:** this phase includes emissions from activities within Lavazza plants, where the roasting of green coffee and the packaging of the finished product takes place. In particular, energy consumption (both electrical and thermal), water consumption, refrigerant emissions and the disposal of plant waste are assessed.
- **Distribution:** in this phase the transport of the finished product from the Lavazza plants to its customers is evaluated. Starting from 2023, transport of coffee distribution not directly controlled by Lavazza was included. The transportation of coffee from the point of sale to the consumer remains excluded.
- **Use Phase:** In this phase, the emissions from energy consumption for the finished beverage are assessed, based on average values of the brewing coffee machine and country-specific emission factors.
- **End of life Packaging:** emissions from packaging disposal are then assessed, considering the actual quantities and types of end-of-life treatment for different categories of packaging in countries of sale, available from official external sources.
- **End of life Coffee:** emissions from the disposal of post-use spent coffee waste are assessed, considering the types of treatment for the management of this particular organic waste in the countries of sale, available from official external sources.

Norms of reference

The reported carbon footprint is based on the CFP study of Firma capsules sold in 2023 [1] which is validated ISO 14067 compliant [1] and in line with the existing PCR on espresso coffee [3].

CFP limitations

The most important limitations of this Carbon Footprint study are:

- Focus on a single environmental indicator.
- The CFP presented for FIRMA capsules in 2024 is based on the CFP study analyzed and verified for those sold in 2023 and projected sales for 2024. Therefore, the CFP estimate will be revised when the final data for 2024 is available.

Exclusions

- Capital goods (e.g., equipment and buildings) already available in LCA databases (i.e., ecoinvent v3.9.1 [4]) were included in the LCA. Other capital goods have been excluded from the LCA, since it was assumed that they do not contribute significantly to the overall LCA results.
- Production and disposal of coffee machines; only specific consumption for product dispensing was included.
- Coffee distribution transportation from the point of sale to the consumer, not directly controlled by Lavazza.

Biogenic CO2 emissions and trapping

- For CO2 emissions originating from biogenic materials (green coffee), the carbon neutrality approach was adopted. With this approach, we assumed that all the CO2 emissions absorbed by plants and derivative materials will be released back into the atmosphere during the end-of life stage. Essentially, neither emissions nor trapping of CO2 related to biogenic materials were evaluated, assuming a carbon net exchange equal to zero. It is important to highlight that biogenic methane release is evaluated under the global warming indicator.
- In accordance with the ISO norm, atmospheric CO2 stored in bio-based materials was reported separately in the LCA report. The Global Warming Potential (GWP) results do not consider biogenic carbon emissions.

Land Use Change

Land use change (LUC) impacts were considered as reported in the World Food LCA Database (WFLDB) datasets for green coffee, aligned with the relevant ISO standards. LUC emissions are reported separately in the LCA report.

Time and geographical boundaries

Temporal data regarding average piece of Firma caps are reported in Table 1, according to the relative categories. Secondary data were found in the ecoinvent v3.9.1 database [4] and from WFLDB [5]. The plant responsible for producing Firma Capsules products is in Europe. The extraction/cultivation of raw materials (of food products and packaging) and the destination of the final product is global.

B. Inventory

This report uses data and results from the 2023 CFP study [1]. The only additional data used in this study is the estimation of the whole amount of capsules sold in 2024. The full Life Cycle Inventory (LCI) is available in the 2023 CFP study.

Table 1- Inventory table for 1 Firma average coffee capsule

Data for categories	
Quantity sold	2024 estimated data
Green coffee	Specific blend for system, data 2023 purchases
Transport green coffee	Sustainability Report 2022 [6], for inbound logistics from the port of embarkation to the port of disembarkation to the production plant. Hired to transport green coffee within the country of origin.
Packaging (production)	Main supplier data, 2023 purchases
Pack supply	
Processing in Lavazza plants (roasting and packaging)	Sustainability Report 2022 data
Finished product distribution	Sustainability Report 2022
Use phase	Sustainability Report 2022 for machine sales data with related consumption
End of life coffee and packaging	Sustainability Report 2022

The total amount of CO₂eq emissions calculated for this system is the result of the certified carbon footprint for 1 average capsule sold in 2023, multiplied for the estimated total amount of capsules sold in 2024.

C. Impact Assessment: Carbon footprint for 2024 estimated sales

The method used to assess the environmental impact of the Firma caps is the global warming potential of atmospheric emissions, evaluated through Intergovernmental Panel on Climate Change (IPCC) method [7]. The 2024 Carbon footprint was evaluated by multiplying the impact of 1 average piece of Firma coffee Capsule sold in 2023 by the expected sales for 2024, in order to obtain the 2024 CFP prevision for Firma Family (Table 2).

Results are presented for the main stages of the life cycle, i.e., for green coffee (cultivation and processing of green coffee in the country of origin, transportation to Lavazza plants, packaging (extraction of raw material, production of packaging), processing in Lavazza plants (roasting and packaging), distribution of the finished product, consumer use, and finally end of life of the product (both coffee and packaging).

Table 2 -GWP results for Firma family pack sold in 2024

Impact category	Unit	Total	LC coffee	%	LC packaging	%	Distribution	%	Use	%	EoL	%	Lavazza processing	%
GWP100 - total (neutral approach)	t CO ₂ eq	26.112	19.047	73%	4.516	17%	227	1%	1.015	4%	827	3%	480	2%
GWP100 - fossil	t CO ₂ eq	19.722	12.884	65%	4.481	23%	227	1%	1.005	5%	652	3%	477	2%
GWP100 - land transformation	t CO ₂ eq	4.636	4.620	100%	13	0%	0	0%	0	0%	0	0%	0	0%
GWP100 - CH₄ biogenic	t CO ₂ eq	1.754	1.543	88%	23	1%	0	0%	10	1%	178	10%	0	0%
CO₂ biogenic	t CO ₂ eq	-3.044	-3.994	131%	-872	29%	0	0%	68	-2%	1.751	-58%	0	0%

D. Interpretation and conclusion

According to the results obtained with the IPCC method, calculated with the described assumptions and limitations, the expected 2023 sales of Firma caps is potentially responsible for approximately 26.112 tons of CO₂ eq.

Reduction plan

The challenges posed by the climate crisis to the coffee sector are many and urgent. Climate change is in fact favouring devastating events that not only jeopardise the availability of quality coffee, but also have very serious social effects on the producing communities. The land suitable for coffee cultivation is decreasing due to rising temperatures, while the demand for coffee is constantly growing. This trend increases the risk of deforestation for the production of coffee in new areas, resulting in loss of biodiversity.

Lavazza is committed to the study of all-round solutions to meet the needs of reducing its environmental impacts: for this reason, the Group has promoted a path that consists of a technical process to quantify and reduce its greenhouse gas emissions, compensating for residual and "non-reducible" emissions up to the Carbon Neutrality of the entire organization.

A decorative graphic in the top left corner consisting of a yellow circle, a grey coffee capsule, and a yellow line.

It is therefore necessary to promote a systemic approach to sustainability, which primarily requires the company to set targets for reducing its emissions by defining a concrete plan, solid and transparent activities aimed at the total neutralisation of emissions along the entire value chain. This reality does not only concern the purchase of credits but is putting in action a parallel plan of reduction of emissions, which translates into:

- detailed analysis and reporting of direct and indirect emissions;
- emission reduction projects through the use of energy efficiency activities and the use of 100% renewable energy sources;
- development of a sustainable packaging roadmap, with the aim of improving recyclability and reducing the impact of all packaging used by the Lavazza Group;
- Lavazza Foundation environmental projects in 17 countries on sustainable agriculture and reforestation practices.

In recent years we have defined the strategy of the "Roadmap of Sustainable Packaging", which has as its main objectives to reduce the environmental footprint and make the entire packaging portfolio reusable, recyclable, compostable. The pillars of the Roadmap provide:

- Reduction of the amount of materials used, through eco-design and reduction of waste and waste;
- Use of resources with low environmental impact: materials recycled or obtained from renewable sources;
- Enhancement of the end of life of packaging, through reuse, recycling or composting.

In fact, with a view to continuous improvement, over the years Lavazza have undertaken a series of energy efficiency activities and increased the supply of electricity from renewable sources for both industrial and civil use: currently in Italy the supply of electricity is 100% from renewable sources.

For the Firma product family, a series of activities were developed to reduce CO₂eq as described in dedicated documents available upon request [8]. The areas of action involved are as follows:

- Packaging, with the reduction of materials used and consequent decrease in the environmental impact of the capsule;
- Green coffee, with the choice of a blend composed of origins with lower environmental impact;
- Optimization and energy efficiencies in Lavazza production facilities.

Offsetting activity

Lavazza has embarked on a path to offset residual carbon emissions. To purchase carbon credits, Lavazza selects specific projects that are verified and certified according to internationally recognized methodologies and standards. In addition to reducing or sequestering carbon, the projects can also provide other environmental, social and economic benefits. Supporting these projects is a way to improve the livelihoods of local communities in a sustainable way by tackling climate change and achieving the United Nations Sustainable Development Goals.

All purchase transactions and related certificates are accurately tracked through internal records within the organization.

For offsetting new Firma capsules, starting in 2021, Lavazza has supported several reforestation, community protection and renewable energy implementation projects. All

A decorative graphic in the top left corner consisting of a yellow circle, a textured coffee bean, and a yellow line.

projects are certified by internationally recognized standards (VCS, CCB and CDM) to ensure the high quality and robustness of the projects.

The Projects are the following:

- Teles Pires Hydropower Plant Project Activity, Brazil
- Envira Amazonia Tropical Forest Conservation, Brazil
- Yedeni Forest Conservation Project, Ethiopia
- Chile Run of River, Chile
- Windfarms Santa Clara, Brazil
- Cerro de Hula Wind Project, Honduras
- Oaxaca Wind Project, Mexico

A decorative graphic in the top left corner consisting of a yellow circle, a yellow line, and several coffee capsules.

References

1. Document “Carbon footprint of Firma capsule System sold in 2023” - November 13th, 2022 – Lavazza, 2B srl. Available upon request.
2. ISO/ TS 14067, 2018: Greenhouse gases- Carbon footprint of product- Requirements and guidelines for quantification and communication. ISO, ISO/ TS 14067, 2018 (www.iso.org).
3. PCR 2018:03, v 1.01: Espresso coffee Product Category Rules UN CPC 23912 v 1.01, The International EPD® System, 2018 (www.environdec.com)
4. ecoinvent, 2023: Database ecoinvent version 3.9.1 Swiss Centre for Life Cycle Inventories (www.ecoinvent.ch)
5. Quantis, 2020, WORLD FOOD LCA DATABASE version 3.5 (quantis-intl.com).
6. Luigi Lavazza (2022), Lavazza Sustainability Report 2022, Available on: <https://www.lavazzagroup.com/it/come-lavoriamo/il-bilancio-di-sostenibilita.html>
7. IPCC 100a 2013: Climate Change 2013, IPCC Fifth Assessment Report (www.ipcc.ch)
8. Document “Reduction Plans FIRMA 2024”, available upon request.