



Estimated carbon footprint of Firma Capsules sold in 2023

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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 of a technical process involving 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 greenhouse gas emissions (due, for example, to the burning of methane for heating in the industrial plants) and those deriving from the generation of electricity that was then consumed. Aware 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 Scope 3 emissions, including the neutralization of the whole amount of greenhouse gases emissions of Firma capsules.

To assure to its customers that all the capsules, once bought, have already been compensated, an estimated Carbon Footprint (CFP) study is carried out. The calculation is based on the estimated sales for 2023 and on the CFP of 1 average Firma coffee capsule piece sold in 2022, verified by third part.

To ensure the accuracy of the estimated calculation, the 2023 carbon footprint will be recalculated when all 2023 final sales data will be available. In case the estimated and the final calculation are not aligned, the difference will be compensated.

The purpose of this report is to explain the carbon footprint quantification for Firma capsules.

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 scientific models;

D. **Interpretation:** discussion of the results in order to formulate conclusions.

A. Goal and scope

Type of Carbon Footprint

This Carbon Footprint 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 2023 sales of Firma capsules.

System boundaries

The Carbon footprint of 2023 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 (the type of which varies depending on the 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. As detailed further below, coffee distribution transports not directly controlled by Lavazza were excluded (this includes transport coffee from the selling point to the consumer).
- 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 waste treatment conditions in the countries of sale
- End of life Coffee dregs: emissions from coffee dregs disposal are then assessed, considering the waste treatment conditions in the countries of sale.

Norms of reference

The reported carbon footprint is based on the CFP study of Firma capsules sold in 2022 [1] which is validated ISO 14067 compliant [2] and therefore in line with the existing PCR on espresso coffee [3].

Disclaimer CFP limitations

The most important limitations of this Carbon Footprint study are:

- Focus on a single environmental indicator.
- Limitations related to the methodology: because of limitations related to the underlying LCA report [1], the results of the CFP are often not a sound basis for comparison.
- The 2023 CFP of Firma Capsules is based on the 2022 CFP study and on 2023 expected sales. For this reason, this estimated CFP will be revised when 2023 final data is available

Exclusions

- Capital goods (e.g., equipment and buildings) already available in LCA databases (i.e., ecoinvent v3.7.1 [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.
- The coffee machine life cycle was not assessed.
- Coffee distribution transport not directly controlled by Lavazza were excluded (this includes transport coffee from the selling point to the consumer).



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 biological 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. Datasets are aligned with the ISO norm request on land use change. 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 v3.7.1 database [4] and from WFLDB [5], both published in 2020. The plant responsible for producing Firma Capsules products is in Europe. Raw materials are extracted from all over the world, as well as the destination of the final product.

B. Inventory

This report uses data and results from the 2022 CFP study [1]. The only additional data used in this study is the estimation of the whole amount of capsules sold in 2023. The full LCI is available in the 2022 CFP study.

Table 1- Inventory table for 1 Firma average coffee capsule

Data for categories	
Quantity sold	Data 2023 provisional
Green coffee	Specific blend for system, data 2022 purchases
Transport green coffee	Except logistics country producer from BDS 2021
Packaging	Main supplier data, 2022 (8+4)
Pack supply	
Lavazza Processing	BDS 2021 data
Distribution	BDS 2021
Use of energy and H2O	BDS 2021 distribution mix and consumption from 2021+2022 machine sales
End of life coffee	BDS 2021

The total amount of CO₂e emissions calculated for this system is the result of the certified carbon footprint for 1 average capsule sold in 2022, multiplied for the estimated total amount of capsules sold in 2023.

C. Impact Assessment: Carbon footprint for 2023 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 2023 Carbon footprint was evaluated by multiplying the impact of 1 average piece of Firma coffee Capsule sold in 2022 by the expected sales for 2023, in order to obtain the 2023 CFP prevision for Firma Family (Table 2).

Results are presented divided into coffee life cycle (coffee cultivation and processing in the Country of origin, transportation, transformation into ground coffee, packing, coffee dregs disposal), packaging life cycle (raw material extraction, processing, packaging end of life), distribution and use.

Table 2 -GWP results for Firma family pack sold in 2023


Impact category	Unit	Total	Green Coffee cultivation & processing		Packaging raw material & processing		Lavazza Processing		Distribution		Use Phase		End-of-Life packaging		End-of-Life coffee	
GWP100 fossil	t CO ₂ eq	21.864,2	14.157,8	64,75 %	5.319,6	24,33 %	502,8	2,30%	101,6	0,46%	1.086,2	4,97%	582,0	2,66%	113,9	0,52%
GWP100 - land transformation	t CO ₂ eq	5.422,6	5.408,1	99,74 %	14,1	0,26%	0,0	0,00%	0,0	0,00%	0,3	0,00%	0,0	0,00%	0,0	0,00%
CH₄ - biogenic	t CO ₂ eq	1.849,4	1.651,7	89,31 %	22,0	1,18%	0,7	0,03%	0,0	0,00%	11,3	0,61%	73,8	3,99%	90,3	4,87%
GWP100 - total (neutral approach)	t CO ₂ eq	29.136,1	21.217,7	72,82 %	5.355,3	18,38 %	503,4	1,73%	101,6	0,35%	1.097,8	3,77%	656,2	2,25%	204,2	0,70%
Impact category	Unit	Total	Green Coffee cultivation & processing		Packaging raw material & processing		Lavazza Processing		Distribution		Use Phase		End-of-Life packaging		End-of-Life coffee	
*GHG biogenic (CO₂)	t CO ₂ eq	-3.265,0	4.325,8	132,48 %	-913,2	27,97 %	1,0	0,04%	0,0	0,00%	72,8	-2,23%	75,5	2,32%	1.824,3	55,87 %

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 29.136 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

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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. 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 are developed for the reduction of CO₂e impacts. From 2023 onwards, the achievable savings will be monitored through 10-year plans covering three areas of work, packaging, green coffee, and plant energy savings.

Offsetting activity

Lavazza's approach to carbon neutrality begins by reducing emissions along the company's entire value chain. Since not all emissions can be completely reduced, 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.

In 2020 Lavazza achieved complete emissions neutrality for the Group's offices and production facilities. At the product level, carbon credits are purchased at the beginning of the year to offset emissions based on an estimate of sales volumes for the year. The process involves the purchase

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of credits in excess of projected volumes, which will be verified at the end of the year based on actual sales volume. Any excess credits will then be used for the following year. 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 reforestations, community protection and renewable energy implementation projects. All projects are certified by internationally recognized standards (VCS, CCB and CDM) to ensure the high quality and robustness of the projects. Our climate partners take care of all carbon offsetting operations, ensuring compliance with best practices in offsetting from project selection to the withdrawal of credits on behalf of Lavazza.

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

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References

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