

# **Carbon** Footprint **Management** Plan 2023



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#### **1. EXECUTIVE SUMMARY**

The Carbon Footprint Management (CFM) Plan outlines NKG Fazendas Brasileiras Ltda's commitment to measuring, monitoring, and continuously reducing its carbon footprint. The company aims to mitigate the negative impacts of climate change by reducing greenhouse gas (GHG) emissions. This plan also safeguards and enhances future business growth and value creation.

NKG Fazendas Brasileiras Ltda., also known as Fazenda da Lagoa (FDL), is a Brazilian agricultural company specialized in sustainable production, processing, and sale of natural and semi-washed green coffee. It is a German NKG Neumann Kaffee Gruppe subsidiary with headquarter in Hamburg, Germany.

As an agricultural company, Fazenda da Lagoa is directly vulnerable to climate change due to its close relationship with the environment. Like many farms worldwide, it has experienced adverse effects of climate change, such as extreme temperatures, altered precipitation patterns, droughts, and frost. These factors have negatively impacted production and yields.

These effects pose a threat to food security by affecting crop productivity. Global coffee productivity is projected to decline by 50% by 2050 (Grüter et al., 2022).

Driven by NKG's Responsible Business Program and the farm's commitment to sustainable practices, Fazenda da Lagoa began efforts in 2020 to understand, measure, and reduce its carbon footprint, aiming to improve its overall environmental performance. The CFM Plan encompasses NKG Fazendas Brasileiras' approach to managing and monitoring its carbon footprint, setting GHG emissions reduction targets, and presenting an action plan for achieving gradual reductions over time.

Through this plan, NKG Fazendas Brasileiras Ltda. aims to demonstrate responsible business practices and add commercial value to its coffee products by measuring, reducing, and certifying its carbon footprint.

# 2. CORPORATE CLIMATE POLICY TEMPLATE

#### July 2023

NKG Fazendas Brasileiras Ltda is committed to taking responsibility for its business practices and addressing its operations' greenhouse gas (GHG) emissions. This commitment will be upheld through the following guidelines:

1. Demonstrating a solid commitment to climate change mitigation and adopting best practices.

2. Working towards reducing the company's annual GHG emissions levels.

3. Ensuring that all relevant business policies align with this policy statement.

4. Identifying and investing in reasonable opportunities to significantly reduce GHG emissions.

5. Establishing a robust method for accurate, comprehensive, consistent, relevant, and transparent annual monitoring and reporting of GHG emissions.

6. Consistently and transparently

communicating about the company's climate policy.

7. Ensuring that any carbon credits come from credible, sustainable, and additional projects.

8. Striving to maintain carbon neutrality.

9. Making concerted efforts to encourage partners and clients to adopt climate-friendly practices.

By adhering to these guidelines, NKG Fazendas Brasileiras Ltda. aims to demonstrate its commitment to environmental responsibility and mitigate climate change impacts.

**Joaquim Aguiar Paiva** General Director

#### **3. CFM OVERVIEW AND APPROACH**

The following provides an overview of the carbon footprint approach and the relevant processes and quality management measures related to the farm's operational plan.

**1. The subject of analysis:** The carbon footprint analysis focuses on the cradle-to-gate approach of green coffee.

**2. Base year justification:** The base year for the analysis is 2021, as it provides an accurate snapshot of the farm's reality with available and verifiable emissions data.

**3. Staff responsabilities:** All data and projects provided for this study were collected by the farm's Sustainability Team, with the support of the NKG Group Compliance and Responsible Business Program.

**4. Staff Training:** The staff actively participates in climate change mitigation and adaptation events and has gained expertise in calculating greenhouse gas (GHG) emissions balance through their involvement in the Imaflora carbon footprint project in 2020 and as a pilot farm for the NKG Corporate Carbon Footprint Analysis in 2021.

**5. Documentation:** All relevant documents of this study are registered on the NKG web server, and paper summaries are retained at NKG Fazenda da Lagoa for a minimum of 5 years.

**6. Data Collection:** Data on all internal farm operations and processes related to Scope 1 and 2 emissions are consistently recorded in the company's Enterprise Resource Planning (ERP) System, which undergoes third-party auditing by BDO Audit. Inputs for Scope 1 emissions are recorded at purchase, consumption is recorded during field application, and all products are weighed and documented before application.

The distances associated with Scope 3 emissions related to input transportation are calculated using Google Maps, measuring the distance from the farm gate to the plant.

The carbon stocks estimation was made based on the Intergovernmental Panel on Climate Change (IPCC) default values and information of areas and species provided by the NKG team.

**7. Performance Monitoring:** Continuous monitoring of GHG emissions across all farm processes is mandatory to assess the environmental footprint.

The farm is committed to developing reduction plans based on energy efficiency and renewable energy. In case any internal non-conformities are identified, efforts will

be made to correct them and action plans with specific timelines for corrective measures will be developed.

**8. Offsetting Procedures:** NKG Fazendas Brasileiras Ltda. has not obtained and does not plan to acquire carbon credits from third parties. The potential issuance of carbon credits will be evaluated to determine their relevance and how they can be accounted for in the voluntary carbon market. The farm's team will oversee the monitoring of processes and any carbon-neutral declarations that may arise.

#### **4. CARBON FOOTPRINT RESULTS**

#### 4.1 BASE YEAR CARBON FOOTPRINT AND BOUNDARIES

#### 4.1.1 Corporate Carbon Footprint

The organizational boundaries of farm operations include the following:

- 1. Upstream transportation and inputs;
- 2. Coffee nursery;
- 3. Mill;
- 4. Mechanical workshop;

5. Farm operations: input application, crop pruning and renovation, coffee harvesting, processing, and transportation;

6. Downstream coffee transportation until the port.

NKG Fazendas Brasileiras Ltda. employs over 500 workers yearly and is a highly mechanized farm. The processing site has 25 dryers heated by a boiler that uses Eucalyptus wood planted on the farm as fuel. Although water contributes to the farm's carbon footprint in a minor degree, Fazenda da Lagoa is committed to managing and using water responsibly. The farm has 66 water springs, and all streams and rivers have riparian buffers that are fully forested according to Brazilian law. The preserved area has turned the farm into a significant water producer.

FDL produces an average of 1,600 tons of coffee pulp and 3,000 tons of coffee husk annually. These organic fertilizers are returned to the coffee fields in two different ways: in nature and composted. FDL annually applies 12 tons of compost per hectare in the new coffee plantings. Using organic fertilizers reduces the demand for chemical fertilizers and improves physical and biological soil conditions.

The types of energy used on the farm are:

**Electricity**: for all facilities and houses; **Diesel**: for all machinery, trucks, cars, buses, tractors and processing;

**Wood**: as fuel for the boiler at the processing facility;

**Natural gas**: for kitchen and forklifts; **Gasoline**: fuel for small vehicles and manual harvesting and weed control machines.

The farm's GHG emissions for this study were calculated based on IPCC default values and the GHG Protocol for Brazil. However, recent local studies conducted at Fazenda da Lagoa by the Prof. Dr. Douglas Guelfi, from Federal University of Lavras, showed that the emissions factors of CO2 stated by IPCC for inorganic fertilizer do only reflect the Brazilian coffee plantations reality to a certain degree. According to their assumption, the emission factors for urea and ammonium nitrate should be 75% lower than the IPCC values, considering tropical soils dynamics and FDL's management practices in order to reduce nutrient loss.

The base year for the Carbon Footprint Management (CFM) plan, calculated in 2021, shows the following GHG emissions:

# **Total (Absolute) GHG emissions:** 10,491.40 tCO2e in 2021.



**EMISSIONS BY SCOPE IN 2021 (%)** 

(GBE: Green Bean Equivalent)

#### Scope 1

Responsible for 29% of total emissions, primarily due to fuel and eucalyptus firewood used for processes, staff, and coffee transport within the farm. Fugitive emissions from fertilizer application, including organic compost, soil, and foliar fertilizers, contribute to the remaining Scope 1 emission.

Scope 1.				
Emission Source	tCO2 per ton GBE	Contribution		
Fuel Use	1,539.82	0.73	51%	
Fugitive Emissions	1,497.34	0.71	49%	
Total	3,038	1.45	100%	

#### **SCOPE 1 EMISSIONS**



#### Scope 2

Emissions represent 1% of total emissions and are mainly due to electricity consumption provided by a public supplier.

Scope 2.				
Emission Source tCO2e tCO2 per ton GBE Contribution				
Electricity	74.12	0.04	100%	
Total	74	0.04	100%	

#### Scope 3

Amounting to 70% of total emissions are generated by activities along the farm's value chain, including transport (upstream and downstream), input materials, water, waste, and the value chain.

Scope 3.				
Emission Source	tCO2e	tCO2e tCO2 per ton GBE		
Transport (UpStream and DownStream)	975.74	0.46	13%	
Input Material	5,263.99	2.51	71%	
Water	3.85	0.002	0,1%	
Waste	111.42	0.05	2%	
Value Chain	1,024.73	0.49	14%	
Total	7,380	3.52	100%	

#### **SCOPE 3 EMISSIONS**



#### 4.1.2. Product Carbon Footprint

NKG Fazendas Brasileiras Ltda. produces and sells green coffee beans in natural and semi-washed varieties, pulped but not fermented, to the roasting industry in domestic and foreign coffee markets.

The coffee is transported in bulk or in big bags by truck to NKG Stockler's warehouse in Varginha. It is stored and reprocessed according to customer demand for export purposes and shipped via the Santos port to Europe, America, or Asia.



Process map with system inputs and outputs.

The production number of the base year is 2,099 tons of green bean equivalent (GBE) in 2021.

The intensity term for the base year is 4.99 tCO2e per ton of GBE in 2021. Emissions by the life cycle stage include raw material acquisition, cultivation, processing, and transport.

**Intensity (Ratio) terms:** 4.99 tCO2e per ton of GBE in 2021.

#### **Emissions by life cycle stage:**



Note: Cradle-to-gate emissions of GBE grown at Fazendas Brasileiras.

# 4.1.3. Carbon Sequestration and Carbon Stocks

Over the past 20 years, Fazenda da Lagoa has significantly progressed in protecting, maintaining, and expanding its natural cover areas. These areas play a vital role in safeguarding biodiversity, ensuring ecological balance, and enhancing carbon removal from the atmosphere.

More than 37% of NKG Fazendas Brasileiras's total area comprises protected natural reserves, including the Atlantic rainforest, Brazilian savannah, and bushland.

Following a rather conservative approach, a 25% buffer was decreased from resulting stocks - and sequestration values for coffee - and forest areas. The 1.369 ha of secondary forest contribute to a carbon stock of **296,707.11 tCO2e** including above and below ground biomass.

Since 2003, when Fazenda da Lagoa joined Neumann Kaffee Gruppe, 1,205 ha of

grassland were converted in coffee fields. (gross area).

Given the perennial nature of coffee plants with an average life cycle ranging from 20 to 25 years, the crops similarly contribute to a carbon stock of **38,334.84 tCO2e**, from which **23,960.21 tCO2e** are considered carbon sequestration from land use change.

Land Use	Current Carbon Stocks (AGB+BGB in tCO2e)	%
<b>Reforested Lands</b>	9,908.21	3%
Coffee Lands	38,334.84	11%
Secondary Forest	296,707.11	86%
TOTAL	344,950.16	100%

AGB: Above Ground Biomass | BGB: Below Ground Biomass

Additionally, potential areas are identified yearly for reforestation projects. FDL exclusively purchases native tree seedlings, provides the necessary workforce and materials for planting, and takes measures to minimize seedling mortality.

Since 2004, FDL has successfully reforested 90.34 hectares, with 30 hectares receiving infilling or replanting projects. These efforts have cumulatively resulted in a carbon sequestration of 9,908 tCO2e from land use change.



#### **CARBON REMOVALS IN tCO2e/YEAR**

Project conservative values with 25% buffer

#### **5. GHG EMISSIONS REDUCTIONS**

#### 5.1. Reduction targets

Aligned with climate science, NKG Fazendas Brasileiras has set a substantial annual reduction target of 4.2% for absolute Scope 1, 2, and 3 emissions bv 2023. Acknowledging the importance and audacity of this objective, NKG Fazendas Brasileiras is acutely aware that its successful accomplishment relies on close partnerships with pivotal clients and suppliers, a partnership that we highly value. These reduction targets will be implemented starting from 2023 operations, and their effectiveness will be assessed in early 2024.

Considering the most significant emission sources, the internal reduction targets are as follows: optimizing vehicle fleet usage and transitioning to biofuels to reduce Scope 1 emissions from fossil fuel use, implementing solar panels for renewable energy generation to decrease Scope 2 emissions, and modifying fertilizer purchases to reduce the carbon footprint associated with Scope 3 emissions.

Current strategies include using local organic fertilizers produced by composting and waste generation reduction. The increased production with approximately the same input use due to cyclical coffee biannually will likely result in a more efficient emissions intensity.

Description	Target	Year	Scope /LC Stage	Source
Absolute	5%	2023	Scopes 1 (fossil fuel)	Internal
Absolute	25%	2023	Scopes 2 (transition to renawable energy)	Internal
Absolute	5%	2023	Scope 3 (Input Material)	Internal
Absolute	5%	2023	Scope 3 (Employee Travel)	Internal
Absolute	5%	2023	Scope 3 (waste reduction and management)	Internal

#### **5.2. REDUCTION PLANS**

NKG Fazendas Brasileiras Ltda. is committed to undertaking practical and committed efforts to reduce GHG emissions in all its activities through the following actions:

#### 1. LED and energy-saving light fixtures at the processing site and other infrastructure

- Status: Complete;
- Timeframe: 2021-2022;
- Reduction amount: 2 tCO2e per year.

# 2. Solar power panels at the processing site for coffee drying

- Status: In progress;
- Timeframe: 2022-2023;
- Reduction amount: 116 tCO2e per year.

# 3. Renewal of the tractor fleet with more efficient equipment

• Status: In progress. Searching for more diesel-efficient options;

- Timeframe: 2023 onwards;
- Reduction amount: To be identified.

#### 4. Extension of precision farming to the 100% mechanized field area for precise input application based on field requirements

- Status: In progress;
- Timeframe: 2021-2025;
- Reduction amount: To be identified.

# 5. Increase the use of climate-friendly, carbon-neutral fertilizers

- Starting in 2023;
- Timeframe: 2023-2027;
- Reduction amount: To be identified.

6. Efficient and reduced usage of agrochemicals for pest and disease control, depending on viability, weather and field conditions

• Status: In progress. Annual field monitoring and analysis conducted;

• Timeframe: 2023 onwards;

• Reduction amount: To be identified.

# 7. Reforestation of non-coffee areas in reserve zones with native tree seedlings

• Continuous action. Annual reforestation projects from 2005 to 2025;

Average annual restored area: 2 hectares;
Total natural vegetation cover maintained: 1,409 hectares. Deforestation and cutting of native trees are prohibited.

#### 8. Further actions to enhance climate policy

• Training, internal audits, and prevention interventions, including carbon footprint calculation, fossil fuel optimization, energy efficiency, and waste reduction training;

- Status: In progress;
- Timeframe: 2021-2027;
- Reduction amount: 50 tCO2e per year.

#### 6. OFFSET PROJECTS AND CARBON CREDITS

# 6.1. CARBON NEUTRALITY AND OFFSET TARGETS

The primary objective behind pursuing carbon neutrality is to limit global warming following climate science, aiming to keep the increase in temperature below 1.5 degrees Celsius.

This endeavor also generates value for customers who have made climate commitments to reduce emissions throughout the value chain.

NKG Fazendas Brasileiras has set significant offset targets for its farms. The GHG balance study conducted by Imaflora in 2020 revealed a net carbon sequestration balance of 1.93 tCO2e per hectare per year.

NKG Fazendas Brasileiras presents significant carbon stocks from preserved forests and coffee fields, estimated at **344,950.16 tCO2e**.

Of this, **23,960.21 tCO2e** were sequestrated from land use change from grassland to coffee fields and **9,908.21 tCO2e** from reforested areas, which could be potentially entitled to emissions offsetting.

NKG Fazendas Brasileiras is dedicated to transparently offering pertinent information to the coffee industry to promote actions that aid in climate protection and furthering biodiversity while enhancing local communities' living conditions. According to the reduction plans, NKG Fazendas Brasileiras will further enhance climate performance by reducing emissions within feasible limits.

#### 7. DATA QUALITY

#### **7.1. DATA QUALITY ASSESSMENT**

NKG Fazendas Brasileiras Ltda is dedicated to collecting and applying accurate and factual data to the best of its abilities. This involves sourcing primary data for all activities under its control, primarily focusing on Scope 1 and Scope 2 emissions, such as diesel consumption, electricity usage, and applying fertilizers and agrochemicals. Whenever possible, NKG Fazendas Brasileiras Ltda also strives to gather primary data for Scope 3 emissions, utilizing actual data from suppliers for specific activities or processes. Credible secondary data from similar processes and emission factors are considered when primary data is unavailable.

The following table outlines potential data quality issues identified for the base year (2021):

Category or Process	Source	Quality Issue Results	
Scope 2 emissions	Direct emissions measurement	Potential faulty meter	+/- 10% difference in emissions
Scope 1 (onsite heat)	Direct emissions measurement	Potential faulty meter	+/- 15% difference in emissions
Scope 1 (diesel use)	Direct consumption measurement	Potentially (records not up to date or leakages)	+/- 5% difference in emissions
Scope 3 (material X)	LCA Database	Potentially (based on the global average)	Unknown but X is the primary material

#### **7.2. DATA QUALITY IMPROVEMENT PLAN**

NKG Fazendas Brasileiras Ltda is committed to enhancing its data collection methods and sources to ensure accurate and relevant measurement of emission totals and reductions. This will be achieved by incorporating industry best practices, utilizing up-to-date resources, and prioritizing primary data.

The following outlines the actions planned to reduce data uncertainty and enhance data quality in the future:

Area of improvement	Action Plan	Effects on Results	Status
Scope 2 emissions factors	Secure data from the utility provider	Eliminate variation in results	Underway
Scope 1 Diesel	Monthly review	+/- 1% difference	Scheduled
Scope 3 (Material X)	Talk to supplier	Unknown	Scheduled

#### 8. CLIMATE COMMUNICATIONS, CLAIMS, AND LABELS

#### **8.1. PUBLIC REPORTING**

NKG Fazendas Brasileiras Ltda is committed to communicating the results of its carbon footprint and its progress in reducing GHG emissions annually. This information will be made available in the following documents:

#### • Carbon Management Plan NKG Website: To showcase climate efforts

https://nkgtropical.com/fazenda-da-lagoa/

# $\boldsymbol{\cdot}$ Sustainability Report NKG Website: To demonstrate progress at the farm level

https://sustainabilityreport.nkg.coffee/

 Annual Report Fazenda da Lagoa
 Website: To provide ongoing emission accounting and progress towards reduction targets

https://nkgtropical.com/fazenda-da-lagoa/

