# Technical Report

**Technical Report ID**: NP_2023_112

**Client**: Ønsk Aps

**Product**: Corcasan, Mørk ristet

**Product detail**: Coffee from Corcasan cooperative in Nicaragua, roasted in Denmark

The following material constitutes a technical report in the format requested by the ISO 14040/14044 and Greenhouse Gas Protocol Product Life Cycle Accounting and Reporting Standard.

## Product description

- *Corcasan coffee* (Arabica (Caturra, Pacamara, Maragohype)) was produced on 198 small-scale coffee farms in Nicaragua's northern highlands surrounding the town of San Juan del Río Coco.
- Harvested coffee was depulped, washed, and transported to *Peralta Coffee* to be dried, sorted, screened, and packaged in 69 kg bags.
- The coffee product was transported to Denmark via sea transport, stored and roasted weekly, followed by packaging into 5 kg barrel. The bulk package was then transported to *Ønsk,* and some portions were further packaged into 1 kg and 0.25 kg bags and stored at the *Ønsk warehouse*.

## Introduction

Estimating the environmental impact of a product requires a careful assessment of the supply chains linked to the product. A supply chain is a system of interlinked activities that contribute to one or more specified and intrinsically linked products. A better understanding of supply chains is increasingly being used in relation to transparency, as customers wish to know the exact origin of a product.

Life cycle assessment (LCA) is an internationally standardized tool that can be used to perform a holistic product specific environmental assessment. LCA is used to assess the environmental impact associated with all activities and product flows in a supply chain. Therefore, LCA is not merely used to estimate and report the environmental impact of a product but to identify hotspots (i.e., activities that have a high contribution to the total environmental impact) along the supply chain. Identification of these hotspots allows manufacturers to address these activities and identify strategies to improve the environmental performance of the product. LCA is widely used in all agricultural and industrial sectors to assess, report, and improve the environmental performance of the products. An important step in LCA modelling is mapping the supply chain and collecting the data associated with the product flows from each activity linked in the supply chain.

## Goal of the study

### Environmental footprint of agriculture

The study was performed to assess the environmental footprint of **Coffee, Corcasan** produced in **Nicaragua** and processed in **Denmark** by **Ønsk ApS** from the **Farm** to the **Warehouse**.

Anthropogenic climate change such as agriculture has significant impact on the physical environment and the ecosystems both directly and indirectly. However, climate change is only a part of the environmental impacts associated with agriculture; Agriculture is also the main driver for antibiotic resistance, water scarcity, eutrophication, biodiversity loss from pesticide usage and habitat destruction. This also means that the environmental footprint may fluctuate depending on what farming practices have been performed. Therefore, the focus of the study is to assess the environmental footprint, especially carbon footprint (climate change or GWP (Global Warming Potential)). This focus is chosen without any ranking of the importance of climate change relative to any other of the negative externalities associated with agriculture.

### Attributional life cycle assessment

The study is based on the attributional life cycle analysis (a-LCA). This means that all significant activities and their emissions in the production are considered, and their combined impact is attributed to the product. The attributional approach only accounts for emissions and removals of greenhouse gases (GHGs) generated during a product's life cycle and not avoided emissions or actions taken to mitigate released emissions such as agroforestry. This contrasts to the consequential approach (c-LCA), which is used to assess the climate impact from changing the level of output of a product and focuses on marginal effects linked to the production of a product.

### Stakeholders

The study has been carried out by **Nature Preserve**. Target audience is the users of the **Nature Preserve** online web application tool and their customers and clients.

## Scope of the study

### Unit of analysis

The unit of the analysis in this study is **one kilogram (kg)** of **Coffee, Corcasan**.

## System boundaries

The environmental footprint of **Coffee, Corcasan**, is assessed from the farm to the warehouse. This study includes all steps of the life cycle from the production of agricultural inputs, through agricultural processes, machine use, post-harvest activities, any subsequent processing, packaging, and transportation up until the warehouse. Hence, the calculated environmental footprint does not consider extra miles from the warehouse to clients or end consumers.

## Mechanisms included

All mechanisms that are generally considered within the system boundary are listed in this section. However, only mechanisms relevant to **Coffee, Corcasan** are applicable in this study.

### Transportation and distribution mechanisms

- $CH_4$ emissions from rice cultivation
- $CO_2$ emissions from deforestation
- $CO_2$ emissions from drying of cereals, pulses and other crops typically dried at the farm
- $CO_2$ emissions from energy production for irrigation
- $CO_2$ emissions from liming
- $CO_2$ emissions from organic soils
- $CO_2$ emissions from pesticide production
- $CO_2$ emissions from production of fertilizers
- $CO_2$ emissions from urea fertilization
- $CO_2$ emissions from use of farm equipment
- $N_2O$ emissions from managed soils (direct and indirect)
- $N_2O$ emissions from organic soils
- $N_2O$ emissions from production of fertilizers

### Transportation and distribution mechanisms

- Emissions from extraction, production, transportation, and combustion of fuels
- Fuel consumption for all transportation stages within the system boundary of the study, such as transportation and distribution:
    - from farms to food processing factories
    - between factories
    - to warehouses
- The following aspects of transport are considered:
    - distance
    - temperature controlled transportation
    - leakage of refrigerant for temperature-controlled transportation
    - fuel consumption as a function of capacity utilization of the vehicles
    - empty returns of vehicles during distribution

- The high-altitude climate effects of aviation

**Food processing mechanisms**

- Direct emissions of fossil carbon or other greenhouse gases from ingredient reactions
- Energy consumption for food processing
- Food waste during production
- Leakage of refrigerants
- Waste treatment

**Packaging mechanisms**

- Extraction of raw materials
- Production of raw materials
- Production of packaging from raw materials
- Recycling of packaging
- Transportation of packaging

**Mechanisms excluded**

Mechanisms explicitly excluded as out-of-scope:

- Maintenance of farm equipment
- Commute of personnel to and from the farms
- Housing of personnel working at the farms
- Albedo changes due to the production of crops
- Corporate activities and services (e.g., research and development, administrative functions, company sales and marketing)

Mechanisms excluded unless it is expected to have significant impact on the result of the study:

- Manufacture of capital goods (e.g., machinery, trucks, infrastructure)

**Time period**

The assessment reflects the production of **Coffee, Corcasan** in year **2023**. Agricultural production data averages the most recent 5-year period. For other agricultural input data, the latest available is used. Process data for the production of **Coffee, Corcasan,** is from the most recent full year, but older data can be used when deemed reasonably representative and newer data cannot be obtained.

**Carbon storage in products**

Biogenic uptake of carbon stored in agricultural products is not considered since the carbon is released again upon digestion, decomposition, or incineration. Delay of emissions has not been taken into consideration due to the short time scales involved.

**Environmental footprint indicators**

| Impact category / Indicator | Unit | Description |
|---|---|---|
| Climate change – total, fossil, biogenic and land use | kg $CO_2$-eq | Indicator of potential global warming due to emissions of greenhouse gases to the air. Divided into 3 subcategories based on the emission source: (1) fossil resources, (2) bio-based resources and (3) land use change. |
| Ozone depletion | kg CFC-11-eq | Indicator of emissions to air that causes the destruction of the stratospheric ozone layer |
| Acidification | kg mol H+ | Indicator of the potential acidification of soils and water due to the release of gases such as nitrogen oxides and sulfur oxides |
| Eutrophication – freshwater | kg $PO_4$-eq | indicator of the enrichment of the freshwater ecosystem with nutritional elements, due to the emission of nitrogen or phosphor-containing compounds |
| Eutrophication – marine | Kg N-eq | Indicator of the enrichment of the marine ecosystem with nutritional elements, due to the emission of nitrogen-containing compounds. |
| Eutrophication – terrestrial | mol N-eq | Indicator of the enrichment of the terrestrial ecosystem with nutritional elements, due to the emission of nitrogen-containing compounds. |
| Photochemical ozone formation | kg NMVOC-eq | Indicators of emissions of gases that affect the creation of photochemical ozone in the lower atmosphere (smog) catalyzed by sunlight. |
| Depletion of abiotic resources – minerals and metals | kg Sb-eq | Indicator of the depletion of natural non-fossil resources. |
| Depletion of abiotic resources – fossil fuels | MJ, net calorific value | Indicator of the depletion of natural fossil fuel resources. |
| Human toxicity – cancer, non-cancer | CTUh | Impact on humans of toxic substances emitted to the environment. Divided into non-cancer and cancer-related toxic substances. |
| Eco-toxicity (freshwater) | CTUe | Impact on freshwater organisms of toxic substances emitted to the environment. |
| Water use | m3 world eq. deprived | Indicator of the relative amount of water used, based on regionalized water scarcity factors. |

| | | |
|---|---|---|
| Land use | Dimensionless | Measure of the changes in soil quality (Biotic production, Erosion resistance, Mechanical filtration). |
| Ionizing radiation, human health | kBq U-235 | Damage to human health and ecosystems linked to the emissions of radionuclides. |
| Particulate matter emissions | Disease incidence | Indicator of the potential incidence of disease due to particulate matter emissions |

### Allocation

When an agricultural activity generates more than one product, the climate impact from the activity needs to be allocated between the products. Allocation (instead of system expansion) is part of the traditional attributional approach to life cycle assessment. Allocation can be based on physical characteristics of the co-products such as mass or energy content or based on their relative market values (economic allocation). As a general principle in this study, economic allocation is applied. This means that the environmental footprint from agriculture is allocated between the products in proportion to their economic value.

If the economic value of by-products is unknown, it is conservatively assumed that they have no economic value, so that the whole climate impact is allocated to the main product.

## Models and data

The climate footprint of **Coffee, Corcasan** produced in **Nicaragua** is calculated with the Nature Preserve calculation model. This is a model of farm level emissions based on the IPCC guidelines for national greenhouse gas inventories (IPCC, 2019), complemented with estimates of emissions due to production of inputs.

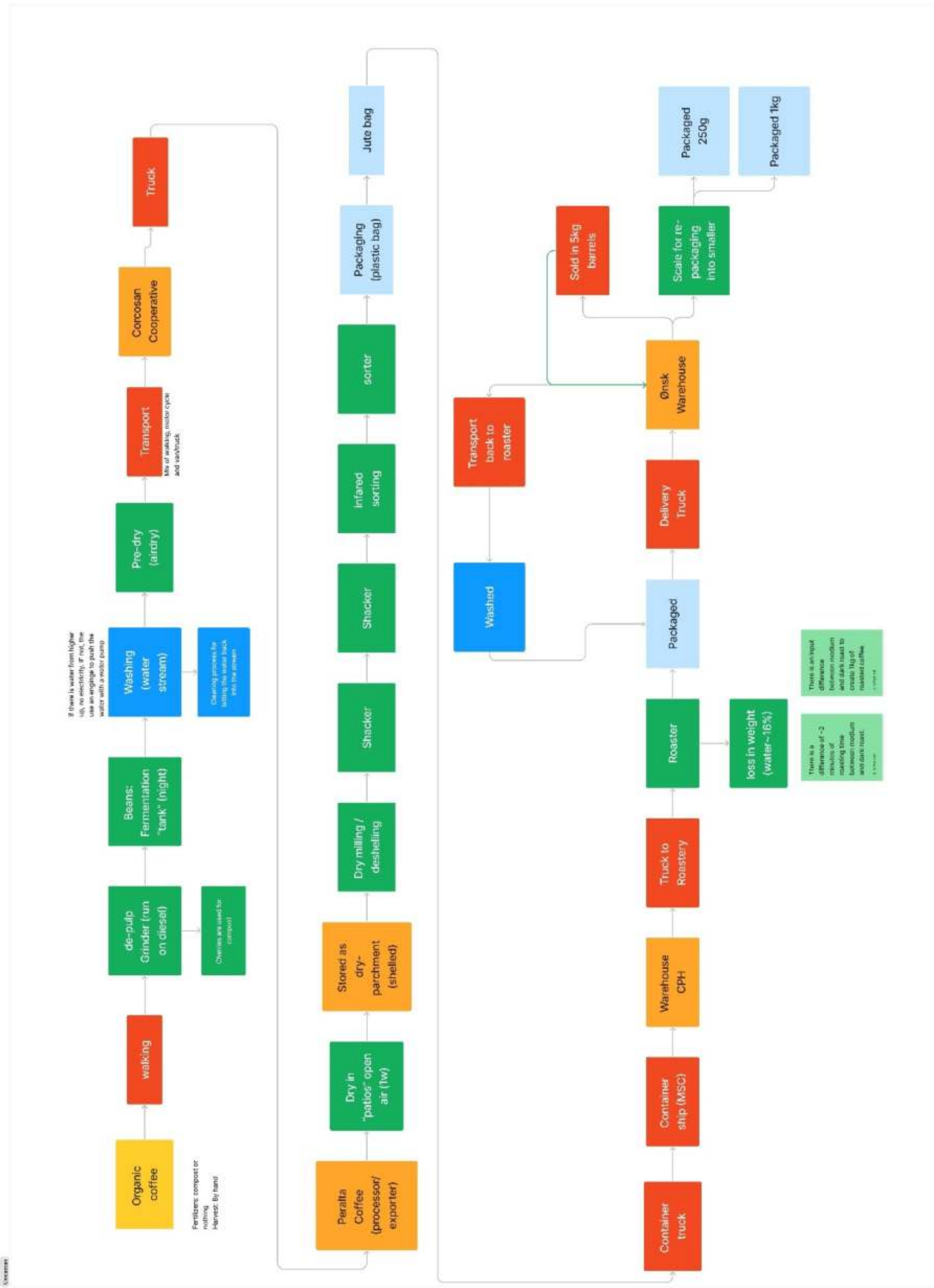
### Land use change

The land use change (LUC) calculation is based on the PAS2050 framework, on the most recent FAO country-level data on cropland, forest, and grassland expansion and contraction. The basic methodology of this framework is now widely referenced and applied. allocate it among products through a land-balance model based mainly on FAOSTAT data for expansion of cropland, pastures and forest plantations.

### Activity data

The input to the agricultural model is taken from a combination of **User's input** and **database of activity estimates** established with representativeness as main goal. Estimates of fertilizer inputs are made from FAO and IFA database on total fertilizer use within a country and/or crop group and attributing that to different crops in proportion to their nitrogen needs (modeled by using a mix of allometric data and specific factors such as nitrogen fixating mechanisms combined with production data).

**Figure 1.** Supply chain diagram



## Table 1: The inventory for the Coffee, Corcasan production

| **Country of Origin** | Nicaragua | | | **Reference/comments** |
|---|---|---|---|---|
| **Cultivation** | Coffee_modi | | | |
| **Farming practice** | Organic | | | Primary data from Ønsk |
| **Yield** | Database yield | 1,340.00 | kg/ha | Process from Ecoinvent v3.9 |
| | Total harvest | 557.94 | ton | Primary data from Ønsk |
| | Cultivated area | 617.92 | ha | |
| | Yield | 902.9324 | kg/ha | |
| **Land Use Change (LUC)** | LUC within the last 20 years | None | | Primary data from Ønsk |
| **Inputs** | Trellis system | Not in use | | Primary data from Ønsk |
| | market for compost | 3,023.00 | kg/ha | |
| | Coffee Mucilage Foliar | 42.00 | L/ha | |

| **Activity (Product)** | | | | **Reference/comments** |
|---|---|---|---|---|
| De-pulp Grinder | Manufacturer | Eterna Industries, Colombia | | Primary data from Ønsk |
| | Processing time | N/A | | |
| | Capacity (wet Parchment Coffee) | 295 | kg/hr | |
| | Input (Cherry Coffee) | 885 | kg/hr | |
| | Output (wet Parchment Coffee) | 295 | kg/hr | |
| Manual Washing | Water consumption | 11,250.00 | L/ha | Primary data from Ønsk |
| Questions to calculate the impact of their diesel consumption (Parchment Coffee) | Processed amount of coffee (parchment) | 2,070.00 | kg/ha | Primary data from Ønsk |
| | Diesel consumption | 17.54 | L/ha | Primary data from Ønsk |

| **Activity (Product)** | | | | **Reference/comments** |
|---|---|---|---|---|
| From Grower to Corcasan | Transport type | light commercial vehicle | | Primary data from Ønsk |
| | Proportion % | 25% | | |
| | Fuel for transport | Gasoline | | |
| | Travelled distance | 8.00 | km | |
| From Grower to Corcasan | Transport type | Van | | Primary data from Ønsk |
| | Proportion % | 75% | | |
| | Fuel for transport | Gasoline and Diesel | | |
| | Travelled distance | 10.00 | km | |
| To Peralta Coffee | Transport type | 16-32 metric ton, EURO6 | | Primary data from Ønsk |
| | Adress From | San Juan del Rio Coco | | |
| | Adress To | Km 233, Carretera Ocotal - Jalapa, Mozonte, PERALTACOFFEES, S.A. | | |
| | Fuel for transport | Diesel | | |
| | Travelled distance | 81.50 | km | |

| Activity (Product) | | Amount | Unit | Reference/comments |
|---|---|---|---|---|
| Fosa Pergamino | Capacity | 2,898.00 | kg/hr | Primary data from Ønsk |
| | Input | 35,358.00 | kg | |
| | Output | 35,358.00 | kg | |
| 98 QQ | Processing time | 7.84 | hr | Primary data from Ønsk |
| | Capacity | 4,508.00 | kg/hr | |
| | Input | 35,358.00 | kg | |
| | Output | 35,358.00 | kg | |
| | Heat | 0.0011 | MJ per kg/hr | |
| | Energy consumption | 17.55 | kWh | |
| Prelimpiadora Pre-Cleaner | Processing time | 5.00 | 3.73 kW | Primary data from Ønsk |
| | Processing time | 7.84 | hr | |
| | Capacity | 4,508.00 | kg/hr | |
| | Input | 35,358.00 | kg | |
| | Output | 35,101.00 | kg | |
| | Yield | 99.27% | | |
| | Heat | 0.0018 | MJ per kg/hr | |
| | Energy consumption | 29.26 | kWh | |
| Elevator 2 | Processing time | 7.79 | hr | Primary data from Ønsk |
| | Capacity | 4,508.00 | kg/hr | |
| | Input | 35,101.00 | kg | |
| | Output | 35,101.00 | kg | |
| | Yield | 100% | | |
| | Heat | 0.0018 | MJ per kg/hr | |
| | Energy consumption | 29.04 | kWh | |
| Dry milling | Processing time | 7.79 | hr | Primary data from Ønsk |
| | Capacity | 4,508.00 | kg/hr | |
| | Input | 35,101.00 | kg | |
| | Output | 34,991.00 | kg | |
| | Yield | 99.69% | | |
| | Heat | 0.0018 | MJ per kg/hr | |
| | Energy consumption | 29.04 | kWh | |
| Elevator 3 | Processing time | 7.76 | hr | Primary data from Ønsk |
| | Capacity | 4,508.00 | kg/hr | |
| | Input | 34,991.00 | kg | |
| | Output | 34,991.00 | kg | |
| | Yield | 100% | | |
| | Heat | 0.0008 | MJ per kg/hr | |
| | Energy consumption | 12.74 | kWh | |
| Trilo | Processing time | 9.51 | hr | Primary data from Ønsk |

| Activity (Product) | | Amount | Unit | Reference/comments |
|---|---|---|---|---|
| | Capacity | 3,680.00 | kg/hr | |
| | Input | 34,991.00 | kg | |
| | Output | 34,049.00 | kg | |
| | Yield | 97.31% | | |
| | Heat | 0.0268 | MJ per kg/hr | |
| | Energy consumption | 354.66 | kWh | |
| Fosa Café Oro Bruto | Processing time | 82.24 | hr | *Primary data from Ønsk* |
| | Capacity | 414.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 34,049.00 | kg | |
| | Yield | 100% | | |
| | Heat | 0.0041 | MJ per kg/hr | |
| | Energy consumption | 6.14 | kWh | |
| Elevator 4 | Processing time | 9.25 | hr | *Primary data from Ønsk* |
| | Capacity | 3,680.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 34,049.00 | kg | |
| | Yield | 100% | | |
| | Heat | 0.0011 | MJ per kg/hr | |
| | Energy consumption | 15.19 | kWh | |
| Storage Hopper 1 | Processing time | 5.78 | hr | *Primary data from Ønsk* |
| | Capacity | 5,890.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 34,049.00 | kg | |
| | Yield | 100% | | |
| | Energy consumption | 0.43 | kWh | |
| Screener | Processing time | 4.93 | hr | *Primary data from Ønsk* |
| | Capacity | 6,900.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 34,049.00 | kg | |
| | Yield | 100% | | |
| | Heat | 0.0004 | MJ per kg/hr | |
| | Energy consumption | 11.04 | kWh | |
| Elevator 5 | Processing time | 1.00 | hr | *Primary data from Ønsk* |
| | Capacity | 34,049.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 29,440.00 | kg | |
| | Yield | 86.46% | | |
| | Energy consumption | 2.24 | kWh | |
| Densimètrica 1 | Processing time | 6.17 | hr | *Primary data from Ønsk* |

| Activity (Product) | | Amount | Unit | Reference/comments |
|---|---|---|---|---|
| Density sorter | Capacity | 5,520.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 33,987.00 | kg | |
| | Yield | 99.82% | | |
| | Energy consumption | 13.80 | kWh | |
| Elevator 6 | Manufacturer | 2.20 | 1,64 kW | *Primary data from Ønsk* |
| | Processing time | 6.17 | hr | |
| | Capacity | 5,520.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 34,049.00 | kg | |
| | Yield | 100% | | |
| | Energy consumption | 10.12 | kWh | |
| Densimètrica 2 Density sorter | Processing time | 7.40 | hr | *Primary data from Ønsk* |
| | Capacity | 4,600.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 33,987.00 | kg | |
| | Yield | 99.82% | | |
| | Heat | 0.0010 | MJ per kg/hr | |
| | Energy consumption | 16.57 | kWh | |
| Elevator 7 | Processing time | 7.40 | hr | *Primary data from Ønsk* |
| | Capacity | 4,600.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 34,049.00 | kg | |
| | Yield | 100% | | |
| | Heat | 0.0007 | MJ per kg/hr | |
| | Energy consumption | 12.15 | kWh | |
| Densimètrica 3 Density sorter | Processing time | 9.25 | hr | *Primary data from Ønsk* |
| | Capacity | 3,680.00 | kg/hr | |
| | Input | 34,049.00 | kg | |
| | Output | 33,987.00 | kg | |
| | Yield | 99.82% | | |
| | Heat | 0.0026 | MJ per kg/hr | |
| | Energy consumption | 34.51 | kWh | |
| Elevator 8 | Processing time | 9.24 | hr | *Primary data from Ønsk* |
| | Capacity | 3,680.00 | kg/hr | |
| | Input | 33,987.00 | kg | |
| | Output | 33,987.00 | kg | |
| | Yield | 100% | | |
| | Heat | 0.0011 | MJ per kg/hr | |
| | Energy consumption | 15.16 | kWh | |

| Activity (Product) | | Amount | Unit | Reference/comments |
|---|---|---|---|---|
| Storage Hopper 2 | Processing time | 6.16 | hr | *Primary data from Ønsk* |
| | Capacity | 5,520.00 | kg/hr | |
| | Input | 33,987.00 | kg | |
| | Output | 33,987.00 | kg | |
| | Yield | 100% | | |
| | Energy consumption | 0.46 | kWh | |
| Elevator 9 | Processing time | 6.16 | hr | *Primary data from Ønsk* |
| | Capacity | 5,520.00 | kg/hr | |
| | Input | 33,987.00 | kg | |
| | Output | 33,987.00 | kg | |
| | Yield | 100% | | |
| | Heat | 0.0007 | MJ per kg/hr | |
| | Energy consumption | 13.78 | kWh | |
| Delta (infared sorting) | Processing time | 7.39 | hr | *Primary data from Ønsk* |
| | Capacity | 4,600.00 | kg/hr | |
| | Input | 33,987.00 | kg | |
| | Output | 33,856.00 | kg | |
| | Yield | 99.61% | | |
| | Heat | 0.0004 | MJ per kg/hr | |
| | Energy consumption | 6.61 | kWh | |
| Vacuum packer | Manufacturer | 25.00 | 18,65 kW | *Primary data from Ønsk* |
| | Processing time | 10.22 | hr | |
| | Capacity | 3,312.00 | kg/hr | |
| | Input | 33,856.00 | kg | |
| | Output | 29,440.00 | kg | |
| | Yield | 87% | | |
| | Energy consumption | 190.60 | kWh | |
| Packaging material 1 | Packaging material | Jute | | *Primary data from Ønsk* |
| | Content weight | 69 | kg | |
| | Packaging weight | 0.429 | kg/pk | |
| Packaging material 2 | Packaging material | Packaging film | | |
| | Content weight | 69 | kg | |
| | Packaging weight | 0.161 | kg/pk | |

| **Activity (Product)** | **Amount** | **Unit** | **Reference/comments** |
|---|---|---|---|
| Kaffer from Nicaragua 275 sacks | | | |
| Peralta to Corinto (port) | 1,037 | kg | All transport with MSC https://www.msc.com/en/carbon-calculator |
| Sea freight Corinto - Cph | 1,433 | kg | |
| | | | |
| Questions Warehouse | | unit | |
| Address | Skagerrakvej 8, 2150 København | | 600 bags in 2023, 69kg pr bag + packaging |
| Time designated | 4,382 | hrs | |
| Storage temperature | 21 | °C | Summer |
| | 7 | °C | Winter |
| Energy consumption | 185 | kWh | |
| Warehouse dimension | 12,600 | m3 | |

| Activity (Product) | | Amount | Unit | Reference/comments |
|---|---|---|---|---|
| Truck to Roastery | Transport type | Road | | Primary data from Ønsk |
| | Truck size | EURO6, 16-32 MT | | |
| | Fuel for transport | Diesel | | |
| | Transport condition | ambient | ambient/chilled | |
| | Travelled distance | 20.3 | km | |
| Machine: Roaster | Manufacturer | Loring | | Primary data from Ønsk |
| | Processing time | S70 Perigrine | | |
| | Capacity | 276 | kg/hr | |
| | Input | 69 | kg | |
| | Output | 57.67 | kg | |
| | Yield | 83.58% | | |
| | Heat | 2.3 | MJ per kg/hr | |
| Packaging material | Packaging material | HDPE | | Primary data from Ønsk |
| | Content weight | 5 | kg | |
| | Packaging weight (drum, reused) | 1.005 | kg/pk | |
| Barrel washing | Water | 1.10 | L/barrel | Primary data from Ønsk |
| | Detergent type | liq. detergent | | |
| | Detergent consumption | N/A | L/barrel | |
| Truck back to Roastery (empty barrels) | Transport type | Road | | Primary data from Ønsk |
| | Truck size | EURO6, 16-32 MT | | |
| | Fuel for transport | Diesel | | |
| | Transport condition | ambient | | |
| | Travelled distance | 12.7 | km | |
| Truck to Ønsk Warehouse | Transport type | Road | | Primary data from Ønsk |
| | Truck size | EURO6, 16-32 MT | | |
| | Fuel for transport | Diesel | | |
| | Transport condition | ambient | | |
| | Travelled distance | 12.7 | km | |
| Packaging material (250 g bag) | Packaging material | PLA | | Primary data from Ønsk |
| | Content weight | 0.25 | kg | |
| | Packaging weight | 0.0135 | kg/pk | |
| Packaging material (1 kg bag) | Packaging material | PLA | | Primary data from Ønsk |
| | Content weight | 1 | kg | |
| | Packaging weight | 0.031 | kg/pk | |
| Packaging machine (250 g bag) | Manufacturer | Kina | | Primary data from Ønsk |
| | Processing time | HA-ACZ-C | | |
| | Capacity | 654.5 | pk/hr | |
| | Energy | 0.8 | kWh | |
| | Energy consumption | 0.001222222 | kWh/pk | |
| | Manufacturer | Kina | | Primary data from Ønsk |

| Activity (Product) | | Amount | Unit | Reference/comments |
|---|---|---|---|---|
| Packaging machine (for 1 kg bag) | Processing time | HA-ACZ-C | | |
| | Capacity | 411.4 | pk/hr | |
| | Energy consumption | 0.8 | kWh | |
| | Energy consumption | 0.001944444 | kWh/pk | |
| Packaging machine loader | Manufacturer | N/A | | Primary data from Ønsk |
| | Processing time | N/A | | |
| | Capacity | 514.2857143 | kg/hr | |
| | Energy consumption | 1.1 | kWh | |
| | Energy consumption | 0.00213889 | kWh/kg | |

## Results

Given below are the primary results derived from the LCA performed for 250 g, 1 kg, and 5 kg of packaged coffee produced at for global warming potential calculated using the EF 3.0 method (which uses the IPCC methodology).

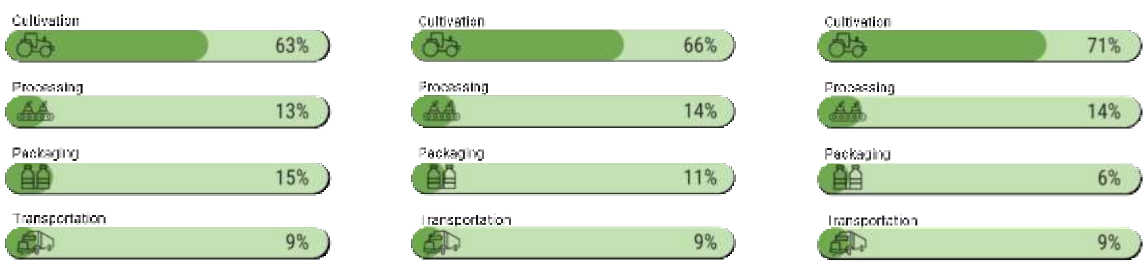
**Table 2**. Carbon footprint result of the products

| Product | Packaging size | kg$CO_2$eq/kg | kg$CO_2$eq/unit |
|---|---|---|---|
| Ønsk coffee, Corcasan | 0.25 kg | 1.860 | 0.465 |
| Ønsk coffee, Corcasan | 1 kg | 1.783 | 1.783 |
| Ønsk coffee, Corcasan | 5 kg | 1.679 | 8.397 |

Each 0.25 kg, 1 kg, and 5 kg package of Ønsk coffee contributes to approximately 0.465 kg, 1.783 kg, and 8.397 kg of $CO_2$eq, respectively, which is equivalent to 1.860 kg$CO_2$eq, 1.783 kg$CO_2$eq, and 1.679 kg$CO_2$eq per 1 kg of coffee.

When broken down into four groups, namely *Cultivation*, *Processing*, *Packaging*, and *Transportation*, the contribution from each group is shown in **Figure 2**. The step-by-step carbon footprint accumulation is shown in **Table 3**. The main difference among the products is from the packaging, since the smaller packaging unit requires more packaging materials.

**Figure 2.** Emission contribution% from the supply chain




Ønsk coffee, Corcasan, 0.25 kg

Ønsk coffee, Corcasan, 1 kg

Ønsk coffee, Corcasan, 5 kg

**Table 3. Carbon footprint aggregation along the supply chain**

| Supply chain steps | 0.25 kg | 1 kg | 5 kg |
|---|---:|---:|---:|
| Cultivation | 0.55896 | 0.55896 | 0.55896 |
| Cultivation processing | 0.11685 | 0.11685 | 0.11685 |
| Transport | 0.03388 | 0.03388 | 0.03388 |
| Peralta | 0.37250 | 0.37250 | 0.37250 |
| Transport Ship | 0.13000 | 0.13000 | 0.13000 |
| Transport truck | 0.00331 | 0.00331 | 0.00331 |
| Roaster | 0.39466 | 0.39466 | 0.39466 |
| Barrel Washing | 0.06647 | 0.06647 | 0.06647 |
| Transport Empty barrels | 0.00035 | 0.00035 | 0.00035 |
| Transport to Ønsk | 0.00248 | 0.00248 | 0.00248 |
| Ønsk re-packaging | 0.00200 | 0.00116 | - |
| packaging material | 0.17818 | 0.10229 | - |
| **Total** | **1.85964** | **1.78291** | **1.67947** |