Rum Blanc

Environmental Impact Assessment

Key Environmental Impact Results

CARBON FOOTPRINT	WATER FOOTPRINT
2.691 kg CO_2e	0.0 L
per unit	per unit

ANNUAL PRODUCTION	TOTAL ANNUAL IMPACT
150,000	403.6 tonnes
units	CO_2e

Methodology: This assessment follows ISO 14040 and ISO 14044 LCA standards, using the latest environmental impact databases including ecoinvent 3.5 and verified supplier data. All calculations are performed using the Avallen Sustainability Platform with OpenLCA integration.

Executive Summary

> **Study Overview:** This Life Cycle Assessment (LCA) of Rum Blanc produced by Demo Company was conducted to quantify environmental impacts using internationally recognized methodologies. The assessment focused on climate change impacts represented by the Global Warming Potential in the next 100 years (GWP100).

The study shows a carbon footprint of **2.691 kg CO_2-eq per product unit**. Raw material production and packaging contribute the highest environmental impacts, followed by processing and facility operations. The water footprint analysis reveals **0.0 litres of water consumption per product unit**.

Key Findings

- Primary environmental impacts stem from raw material production ({{INGREDIENTS_IMPACT}}%)
- Packaging materials contribute {{PACKAGING_IMPACT}}% to total climate impacts
- Facility operations account for {{FACILITIES_IMPACT}}% of carbon footprint
- Transportation and other logistics represent {{TRANSPORT_IMPACT}}% of total impacts

Methodology & Standards Compliance

This assessment adheres to the four phases of LCA methodology as defined by ISO standards:

LCA Phase Methodology Applied Data Sources **Goal & Scope Definition** Cradle-to-gate assessment Company production data **Inventory Analysis** Material & energy flow quantification Ecoinvent 3.5, DEFRA 2024 **Impact Assessment** IPCC 2013 GWP100 factors OpenLCA calculations **Interpretation** Hotspot analysis & recommendations Platform analytics

Functional Unit: The functional unit is defined as 1 750mlL bottle of Rum Blanc, representing the typical consumer product format.

Inventory Analysis

Process Description

The production process of Rum Blanc includes ingredient sourcing, processing, packaging, and distribution to retail points. Raw materials are sourced from verified suppliers and processed according to industry standards and company quality protocols.

Ingredient Composition

- Molasses, cane: 1.5 kg

Packaging Specifications

Component Material Weight (g) Environmental Impact Bottle Glass bottle, clear 530 Low recycled content impact Label Paper label, uncoated 2.5 Recyclable material

Production Facilities

> **Primary Production Location:** 123 Demo Street
> **Annual Production Capacity:** 150,000 units
> **Energy Sources:** Grid electricity, Natural gas
> **Water Sources:** Municipal supply, Treated groundwater

Dataset References

All impact calculations are based on the following environmental databases and methodological sources:

- **Ecoinvent 3.5 database** - Swiss Centre for Life Cycle Inventories
- **DEFRA 2024 emission factors** - UK Government GHG Conversion Factors
- **OpenLCA methodology** - Ingredient impact calculations
- **Verified supplier data** - Environmental product declarations where available

Environmental Impact Assessment

Impact Categories

Results of the life cycle impact assessment across all evaluated environmental categories:

Climate Change (GWP100)

2.691 kg CO_2e per unit

Global Warming Potential over 100 years, based on IPCC 2013 methodology

Water Consumption

0.0 L per unit

Freshwater consumption across ingredient production and processing

Waste Generation

0.0000 kg per unit

Production waste and end-of-life packaging impacts

Impact Breakdown by Life Cycle Stage

Life Cycle Stage Carbon Impact (kg CO_2e) Water Impact (L) % of Total **Ingredients & Raw Materials** 1.335 39.0 50% **Packaging Production** 0.272 5.4 10% **Facility Operations** 1.084 2.8 40%

Greenhouse Gas Analysis

> **ISO 14064-1 Compliant GHG Breakdown:** The following analysis provides a detailed breakdown of greenhouse gas emissions by individual gas species, using IPCC AR5 Global Warming Potential factors for scientifically accurate climate impact assessment.

Carbon Dioxide (CO_2) 2.206

Methane (CH_4) 0.323

0.011532 kg × GWP 28 | Anaerobic processes, agricultural production kg CO_2eq

Nitrous Oxide (N_2O)

0.000609 kg × GWP 265 | Fertilizer application, soil emissions

0.161 kg CO_2eq

Total GHG Impact: 2.691 kg CO_2eq per unit

Phase 2 estimate • Upgrade to Phase 3 for advanced gas-by-gas analysis

GWP Methodology: Global Warming Potential factors based on IPCC Fifth Assessment Report (AR5) with 100-year time horizon. All calculations comply with ISO 14040/14044 LCA standards and ISO 14064-1 greenhouse gas quantification requirements.

Interpretation & Hotspot Analysis

Primary Impact Drivers: The assessment reveals that raw material production constitutes the largest environmental impact, accounting for approximately 50% of total carbon footprint. Packaging materials contribute 10% to climate impacts, while facility operations account for 40%.

The comprehensive analysis demonstrates that ingredient sourcing represents the greatest opportunity for impact reduction. Supply chain optimization and sustainable sourcing adoption could significantly reduce the total environmental footprint.

Data Quality & Transparency: Impact calculations integrate primary facility data, verified supplier declarations where available, and representative secondary data from peer-reviewed databases including ecoinvent 3.5. Carbon footprint calculations demonstrate accuracy within ±15%, with water footprint uncertainty estimated at ±20%.

Phase 3 data verification available with advanced analytics upgrade
Advanced uncertainty analysis available with Phase 3 upgrade

References & Standards

1. ISO 14040:2006 - Environmental management — Life cycle assessment — Principles and framework
2. ISO 14044:2006 - Environmental management — Life cycle assessment — Requirements and guidelines
3. IPCC 2013 - Climate Change 2013: The Physical Science Basis. Working Group I Contribution to the Fifth Assessment Report
4. Ecoinvent 3.5 database - Swiss Centre for Life Cycle Inventories, Zurich, Switzerland
5. DEFRA 2024 - UK Government GHG Conversion Factors for Company Reporting. Department for Environment, Food & Rural Affairs
6. OpenLCA 1.11 - GreenDelta GmbH. Open-source software for Life Cycle Assessment and Sustainability Assessment
7. GHG Protocol - A Corporate Accounting and Reporting Standard. World Resources Institute and World Business Council for Sustainable Development
8. PEF Guide - Product Environmental Footprint Category Rules. European Commission, Joint Research Centre

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