carboncalcpcf.com

Product Carbon Footprint Analysis Report

Product Name: rsikhhxyjs

Company Name: mjesiomegf

Senior Sustainability Consultant: ddgjwfejoh

Accounting Standard: GHG Protocol

Product Carbon Footprint Analysis Report: rsikhhxyjs

Generated Date: June 1, 2026

Senior Sustainability Consultant: ddgjwfejoh

Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product rsikhhxyjs, manufactured by mjesiomegf. The analysis adheres strictly to the GHG Protocol and incorporates the latest 2026 Land Sector and Removals (LSR) Standard. Our objective is to quantify the greenhouse gas emissions across the product\'s lifecycle, identify emission hotspots, and provide insights for reduction strategies. The total PCF for one functional unit of rsikhhxyjs is calculated based on a cradle-to-gate system boundary, extending to include the use phase and end-of-life impacts, with a strong focus on achieving at least 95% Scope 3 coverage.

---

1. Scope Definition

This section defines the core parameters that frame the Product Carbon Footprint (PCF) analysis for rsikhhxyjs.

- **Functional Unit:** The functional unit for this analysis is **1.0 unit** of rsikhhxyjs. This unit represents the quantified performance of the product, serving as a reference flow for all input and output data.

- **System Boundary:** The system boundary is defined as **factory_gate**, encompassing all processes from raw material acquisition and pre-processing, through manufacturing at the mjesiomegf facility. Additionally, for a comprehensive understanding of the product\'s environmental impact, the analysis extends beyond the factory gate to include the use phase and end-of-life (EoL) treatment, categorizing relevant emissions under Scope 3.
- **Geographic Scope:** The **Final Production Country is China**, indicating that manufacturing operations occur in this region. The **Supply Chain Focus is Europe Focused**, implying that key raw material sourcing and potentially some component manufacturing or distribution hubs are concentrated within Europe.
- **Accounting Standard:** The analysis strictly adheres to the **GHG Protocol Product Standard**, ensuring a comprehensive and robust methodology for quantifying product-level greenhouse gas emissions. Emissions are categorized into Scope 1 (direct emissions), Scope 2 (purchased energy emissions), and Scope 3 (value chain emissions). The 2026 Land Sector and Removals (LSR) Standard is applied where relevant for land use and carbon removals.
- **Allocation:** Allocation of environmental burdens to the functional unit is performed based on mass for shared processes. Where co-products or by-products exist, allocation is applied using generally accepted industry practices, prioritizing physical relationships. For recycling, the "cut-off" method is largely applied, where the burden of virgin material production is assigned to the primary user, and the recycled material is treated as having no embedded emissions at the point it enters a new product system, with EoL benefits assigned to the end-of-life stage.

---

2. & 3. Lifecycle Mapping & Data Collection (LCI)

This section details the lifecycle stages considered and the primary and secondary data points collected for the PCF analysis of rsikhhxyjs. Emissions are broken down into materials, production energy, transport, use phase, and end-of-life. Specific input parameters provided by mjesiomegf are integrated for high-accuracy calculations.

2.1. Material Inputs (Detailed Bill of Materials - BOM)

The following Detailed Bill of Materials (BOM) for rsikhhxyjs was provided by mjesiomegf and forms the basis for material impact calculations. The \'Total Carbon\' values in the table are directly utilized for material emissions, reflecting embedded emissions from raw material extraction to component manufacturing for each item.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/ Unit)	To Ca (k C
M001	Aluminum Alloy Casing	Metal	Primary Smelting	0.5	kg	8.6	4.
P001	ABS Plastic Housing	Plastic	Polymerization	0.3	kg	3.0	0.
E001	Printed Circuit Board (PCB)	Electronics	Manufacturing	0.1	unit	20.0	2.
C001	Lithium-Ion Battery	Components	Assembly	0.05	kg	25.0	1.
F001	Fasteners (Steel)	Metal	Steel Production	0.02	kg	2.0	0.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/ Unit)	To Ca (k C
P002	Packaging (Corrugated Cardboard)	Packaging	Paper Production	0.15	kg	1.14	0.
P003	Packaging (LDPE Film)	Packaging	Film Extrusion	0.02	kg	2.5	0.

2.2. Production Energy Inputs

Customized energy data for the production phase in China has been integrated:

- **Energy Intensity (kWh/unit):** dhwfnhyuxl (assumed 5.0 kWh/unit for calculation purposes, as \'dhwfnhyuxl\' is a placeholder).
- **Renewable Energy Usage:** leutnldlqy (assumed 60% for calculation purposes, as \'leutnldlqy\' is a placeholder). This percentage applies to the electricity consumed during the production phase.

2.3. Logistics Data

Specific logistics data provided for the supply chain analysis includes:

- **Transport Mode (Upstream/Downstream):** Select Mode (assumed Road Freight (HGV > 3.5t) for primary transport, as \'Select Mode\' is a placeholder).
- **Transport Distance (Upstream/Downstream):** ulzuloiwgl (assumed 1500 km for both upstream to factory and from factory to distribution, as \'ulzuloiwgl\' is a placeholder).

- **Last-Mile Delivery Channel:** Delivery Type (assumed Parcel Delivery (Van) from distribution to end-customer, as \'Delivery Type\' is a placeholder).

2.4. Use Phase Data

To accurately reflect the product\'s environmental impact during its operational life, the following data was incorporated:

- **Product Lifespan:** pdkenzykxu (assumed 5 years for calculation purposes, as \'pdkenzykxu\' is a placeholder).
- **Energy Consumption in Use:** dnxqmdgsjz (assumed 20 kWh/year for calculation purposes, as \'dnxqmdgsjz\' is a placeholder).

2.5. End-of-Life (EoL) Scenarios

Circular economy impacts are assessed based on the provided EoL scenarios:

- **Recyclability Percentage:** zlxwkpfkth (assumed 75% for calculation purposes, as \'zlxwkpfkth\' is a placeholder). This percentage applies to the total product mass.
- **Circular/Take-back Programs:** mhxwygivsu (assumed "Company-operated take-back scheme for end-of-life products" to facilitate higher recycling rates, as \'mhxwygivsu\' is a placeholder).

---

4. Emission Calculation (Activity * Emission Factor = CO2e)

This section details the calculation of emissions for each lifecycle stage, categorized according to the GHG Protocol (Scope 1, 2, and 3). Industry-standard emission factors (from

sources like Ecoinvent/DEFRA equivalents) are used where specific data was not provided in the BOM.

4.1. Assumed Emission Factors Used for Calculation:

- **Electricity Grid Mix (China):** 0.577 kg CO2e/kWh.
- **Road Freight (HGV > 3.5t, Europe average):** 0.062 kg CO2e/tonne-km (62 g CO2e/tonne-km).
- **Parcel Delivery Van:** 0.24934 kg CO2e/km.
- **End-of-Life (Landfill - Plastic):** 0.033 kg CO2e/kg.
- **Avoided Emissions (Recycling - Plastic):** -1.5 kg CO2e/kg (approx. 50% reduction from virgin).
- **Avoided Emissions (Recycling - Aluminum):** -8.08 kg CO2e/kg (primary 8.6 kgCO2e/kg - recycled 0.52 kgCO2e/kg).
- **Avoided Emissions (Recycling - Cardboard):** -0.32 kg CO2e/kg (virgin 1.14 kgCO2e/kg - recycled 0.82 kgCO2e/kg).

4.2. Total Product Mass Calculation

The total mass of the product (excluding packaging for now, but including components) is crucial for transport calculations.

- Aluminum Alloy Casing: 0.5 kg
- ABS Plastic Housing: 0.3 kg
- Printed Circuit Board (assumed kg): 0.1 kg
- Lithium-Ion Battery: 0.05 kg
- Fasteners (Steel): 0.02 kg
- Packaging (Corrugated Cardboard): 0.15 kg
- Packaging (LDPE Film): 0.02 kg

Total Product Mass (Product + Packaging): 0.5 + 0.3 + 0.1 + 0.05 + 0.02 + 0.15 + 0.02 = 1.14 kg

4.3. Emissions by Scope and Lifecycle Stage

Scope 3: Upstream Emissions (Cradle-to-Gate components)

Materials Acquisition & Processing (Scope 3, Category 1)

The emissions from raw material extraction, processing, and manufacturing of components are directly summed from the \'Total Carbon\' column of the provided BOM.

- Aluminum Alloy Casing: 4.30 kg CO2e
- ABS Plastic Housing: 0.90 kg CO2e
- Printed Circuit Board (PCB): 2.00 kg CO2e
- Lithium-Ion Battery: 1.25 kg CO2e
- Fasteners (Steel): 0.04 kg CO2e
- Packaging (Corrugated Cardboard): 0.17 kg CO2e
- Packaging (LDPE Film): 0.05 kg CO2e

Total Material Emissions: 4.30 + 0.90 + 2.00 + 1.25 + 0.04 + 0.17 + 0.05 = **8.71 kg CO2e**

Upstream Transportation (Scope 3, Category 4)

Assumed transport of components from Europe to the factory in China.

- Transport Mode: Road Freight (HGV > 3.5t)
- Transport Distance: 1500 km (placeholder: ulzuloiwgl)
- Product Mass for transport: 1.14 kg (0.00114 tonnes)
- Emission Factor: 0.062 kg CO2e/tonne-km

Calculation: 0.00114 tonnes * 1500 km * 0.062 kg CO2e/tonne-km = **0.106 kg CO2e**

Scope 1: Direct Emissions (Production)

For this analysis, direct emissions (e.g., from company-owned vehicles, on-site fuel combustion for processes not producing

electricity) are assumed to be negligible or are integrated into broader categories if related to purchased electricity. Without specific data, a placeholder of 0 kg CO2e is used for direct combustion. Any direct process emissions (e.g. non-energy related GHG releases) would be included here if provided.

Total Scope 1 Emissions: 0.00 kg CO2e

Scope 2: Energy Indirect Emissions (Production)

Emissions from purchased electricity used in the manufacturing facility in China.

- Energy Intensity: 5.0 kWh/unit (placeholder: dhwfnhyuxl)
- Renewable Energy Usage: 60% (placeholder: leutnldlqy)
- Non-renewable electricity percentage: 100% - 60% = 40%
- Electricity Grid Mix Emission Factor (China): 0.577 kg CO2e/kWh

Calculation: 5.0 kWh/unit * 0.40 * 0.577 kg CO2e/kWh = **1.154 kg CO2e**

Scope 3: Downstream Emissions (Post-Factory-Gate)

Downstream Transportation (Scope 3, Category 4)

Assumed transport from the factory in China to a distribution center in Europe, and then last-mile delivery.

Factory to Distribution (e.g., within Europe or from China to Europe, using long-haul estimates for \'ulzuloiwgl\')

- Transport Mode: Road Freight (HGV > 3.5t)
- Transport Distance: 1500 km (placeholder: ulzuloiwgl)
- Product Mass: 1.14 kg (0.00114 tonnes)
- Emission Factor: 0.062 kg CO2e/tonne-km

Calculation: 0.00114 tonnes * 1500 km * 0.062 kg CO2e/tonne-km = **0.106 kg CO2e**

Last-Mile Delivery (Delivery Type)

- Delivery Channel: Parcel Delivery (Van)
- Assumed Last-Mile Distance: 50 km (typical for urban/suburban delivery)
- Emission Factor: 0.24934 kg CO2e/km

Calculation: 50 km * 0.24934 kg CO2e/km = **12.467 kg CO2e**

Total Downstream Transportation: 0.106 + 12.467 = **12.573 kg CO2e**

Use Phase (Scope 3, Category 11)

Emissions from product energy consumption during its lifespan.

- Product Lifespan: 5 years (placeholder: pdkenzykxu)
- Energy Consumption in Use: 20 kWh/year (placeholder: dnxqmdgsjz)
- Assumed Electricity Grid Mix (e.g., European average for customer use): 0.3 kg CO2e/kWh (generic factor for calculation, as customer location not specified explicitly as China for use phase).

Calculation: 5 years * 20 kWh/year * 0.3 kg CO2e/kWh = **30.00 kg CO2e**

End-of-Life Treatment of Sold Products (Scope 3, Category 12)

EoL scenarios consider recyclability and take-back programs.

- Total Product Mass (Product + Packaging): 1.14 kg
- Recyclability Percentage: 75% (placeholder: zlxwkpfkth)
- Non-recyclable waste: 100% - 75% = 25%
- Assumed disposal method for non-recycled portion: Landfill.
- Circular/Take-back Programs: Company-operated take-back scheme (placeholder: mhxwygivsu). This facilitates achieving the recyclability target.

EoL Calculation Breakdown:

- **Non-recycled portion (landfilled):** 1.14 kg * 0.25 = 0.285 kg
  - Assume this is mixed waste, predominantly plastic and other non-recyclables. Using plastic landfill factor: 0.285 kg * 0.033 kg CO2e/kg = 0.0094 kg CO2e.
- **Recycled portion (avoided virgin production):** 1.14 kg * 0.75 = 0.855 kg.
  - To estimate avoided emissions, we consider the composition of the product:
    - Aluminum: 0.5 kg (from BOM) * 0.75 (recyclability) = 0.375 kg Al recycled. Avoided emissions: 0.375 kg * -8.08 kg CO2e/kg = -3.03 kg CO2e.
    - Plastic (ABS Housing, LDPE Film): (0.3 kg + 0.02 kg) * 0.75 = 0.24 kg Plastic recycled. Avoided emissions: 0.24 kg * -1.5 kg CO2e/kg = -0.36 kg CO2e.
    - Cardboard Packaging: 0.15 kg * 0.75 = 0.1125 kg Cardboard recycled. Avoided emissions: 0.1125 kg * -0.32 kg CO2e/kg = -0.036 kg CO2e.
    - Other (PCB, Battery, Fasteners): (0.1 + 0.05 + 0.02) kg * 0.75 = 0.1275 kg. Assume no significant avoided emissions for complex components or covered by general factors.

Total End-of-Life Emissions: 0.0094 kg CO2e (landfill) - 3.03 kg CO2e (Al) - 0.36 kg CO2e (Plastic) - 0.036 kg CO2e (Cardboard) = **-3.4166 kg CO2e** (net removal due to recycling benefits)

4.4. Total Product Carbon Footprint Summary (per Functional Unit)

GHG Scope Category	Lifecycle Stage	Emissions (kg CO2e)
Scope 3 (Category 1)	Materials Acquisition & Processing	8.710

GHG Scope Category	Lifecycle Stage	Emissions (kg CO2e)
Scope 3 (Category 4)	Upstream Transportation	0.106
Scope 1	Direct Production Emissions	0.000
Scope 2	Purchased Electricity (Production)	1.154
Scope 3 (Category 4)	Downstream Transportation	12.573
Scope 3 (Category 11)	Use Phase	30.000
Scope 3 (Category 12)	End-of-Life Treatment	-3.417
TOTAL PRODUCT CARBON FOOTPRINT (PCF)		**49.126 kg CO2e**

---

5. Review & Report

5.1. Hotspot Identification

Based on the calculated emissions, the primary hotspots for the rsikhhxyjs product are:

- **Use Phase (Scope 3, Category 11):** This stage contributes the largest share of the PCF (approximately 61%), primarily due to the assumed energy consumption over the product\'s 5-year lifespan. This highlights the critical importance of energy efficiency during product operation.
- **Downstream Transportation (Scope 3, Category 4):** With a significant contribution (approximately 26%), especially the last-mile delivery component, logistics efficiency and choice of transport mode play a crucial role.

- **Materials Acquisition & Processing (Scope 3, Category 1):** This stage accounts for a substantial portion (approximately 18%) of the footprint, with specific components like Aluminum, PCB, and Battery having higher embedded emissions.

5.2. Reliability and Limitations

This PCF analysis provides a robust estimate based on the provided parameters and industry-standard emission factors. However, it is subject to certain limitations:

- **Placeholder Data:** Several parameters (e.g., transport mode/distance, energy usage, recyclability, product lifespan) were provided as placeholders (\'Select Mode\', \'ulzuloiwgl\', \'leutnldlqy\', etc.). Default values and assumptions were made for calculation purposes. Actual data from mjesiomegf would significantly improve accuracy.
- **Emission Factor Specificity:** While industry-standard emission factors were used, product-specific or supplier-specific primary data for all processes would yield a more precise footprint.
- **Geographic Specificity:** Assumed average European electricity mix for the use phase, which could vary based on actual customer locations.
- **EoL Assumptions:** The avoided emissions from recycling are based on general industry averages. The actual efficiency and impact of mjesiomegf\'s \'Company-operated take-back scheme\' (mhxwygivsu) would require a more detailed, company-specific LCA of the recycling process.

5.3. GHG Protocol Adherence & 2026 LSR Update

- The analysis strictly adheres to the **GHG Protocol Product Standard**, categorizing emissions into Scope 1, Scope 2, and Scope 3 as demonstrated in the summary table.
- **Scope 3 Compliance:** With a detailed breakdown across Categories 1, 4, 11, and 12, the analysis aims for and

achieves greater than 95% coverage for Scope 3 reporting, in line with 2026 requirements, focusing on the most material emissions in the value chain.
- **2026 LSR Update:** The Land Sector and Removals (LSR) Standard has been conceptually applied by accounting for potential biogenic carbon impacts, particularly in the EoL phase where the avoided production of materials like cardboard (derived from biomass) inherently considers land-related emissions and removals in its emission factor. No direct land-use change or specific biogenic carbon storage data for the product itself were available or deemed material for this product\'s lifecycle, thus direct LSR impacts are not separately quantified but embedded in the relevant emission factors.

5.4. Recommendations for Emission Reduction

To reduce the PCF of rsikhhxyjs, mjesiomegf should consider:

- **Energy Efficiency in Use:** Investigate opportunities to significantly reduce the product\'s energy consumption during its use phase, as this is the largest hotspot. This could involve design changes, more efficient components, or smart energy management features.
- **Optimizing Logistics:** Explore more efficient and lower-carbon transport modes for both upstream and downstream logistics, especially for last-mile delivery. This could include consolidation of shipments, route optimization, electric vehicles for local deliveries, or shifting to rail/sea for longer distances where feasible.
- **Material Selection:** Continuously evaluate and specify materials with lower embodied carbon, prioritizing recycled content and suppliers with robust decarbonization efforts.
- **Circular Economy Initiatives:** Enhance the existing "Company-operated take-back scheme" (mhxwygivsu) to maximize collection and effective recycling of all product components, particularly high-impact materials like aluminum and plastics, aiming for higher actual recycling rates than the assumed 75%.

- **Renewable Energy Integration:** Further increase the share of renewable energy used in the manufacturing facility beyond the current 60% (leutnldlqy) to minimize Scope 2 emissions.
