

carboncalcpcf.com

Product Carbon Footprint Analysis Report

Product: ueoyhlzpfw

Company: msszlpqozu

Senior Sustainability Consultant: uqwljtvier

Accounting Standard: GHG Protocol

Disclaimer: This report is generated based on available data and industry standards. While efforts have been made to ensure accuracy, the actual environmental impacts may vary depending on real-world conditions and specific supplier data.

Generated Date: May 23, 2026

Confidential - Internal Use Only | Page

Product Carbon Footprint Analysis for ueoyhlzpfw

Generated Date: May 23, 2026

Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for **ueoyhlzpfw**, produced by **msszlpqozu**. Conducted by Senior Sustainability Consultant **uqwljtvier**, this assessment adheres to the Greenhouse Gas (GHG) Protocol standards, including the 2026 Land Sector and Removals (LSR) Standard update, and aims for at least 95% Scope 3 coverage. The analysis covers the entire lifecycle, from raw material extraction to end-of-life, quantifying greenhouse gas emissions in carbon dioxide equivalents (CO₂e) per functional unit of the product. The total cradle-to-grave carbon footprint for one unit of ueoyhlzpfw is calculated to be approximately **14.90 kg CO₂e**.

1. Introduction

The imperative for businesses to understand and reduce their environmental impact has never been greater. A Product Carbon Footprint (PCF) analysis provides critical insights into the greenhouse gas (GHG) emissions associated with a product's entire lifecycle, enabling informed decision-making for sustainable development. This report details the PCF for the product **ueoyhlzpfw**, manufactured by **msszlpqozu**, performed by **uqwljtvier**, a Senior Sustainability Consultant specializing in GHG Protocol. The analysis strictly follows the GHG Protocol standards, ensuring a comprehensive and credible assessment.

2. Scope Definition (GHG Protocol Step 1)

2.1. Functional Unit

The functional unit for this PCF analysis is defined as **1.0 unit of ueoyhlzpfw**. All emissions are calculated and attributed to this single functional unit.

2.2. System Boundary

The primary system boundary for this analysis is defined as '\factory_gate'. However, as per the detailed requirements, this report extends beyond a typical cradle-to-gate assessment to include critical downstream Scope 3 categories, effectively performing a cradle-to-grave analysis. This includes:

- **Upstream (Cradle-to-Gate):** Raw material extraction and processing, manufacturing of components (based on Detailed Bill of Materials), and inbound transportation to the final production facility.
- **Core Operations (Gate):** Direct emissions from the production facility (Scope 1) and indirect emissions from purchased electricity (Scope 2).
- **Downstream (Gate-to-Grave):** Outbound transportation from the factory, last-mile delivery, product use phase, and end-of-life treatment.

2.3. Geographic Scope

The **Final Production Country is China**, with a **Supply Chain Focus on Europe** for sourcing components and potential distribution. Use phase and end-of-life scenarios are modeled for a typical European market.

2.4. Allocation

Emissions are allocated directly to the functional unit. In cases of shared processes or facilities, allocation is typically done on a mass or economic basis. For this product, no complex co-product allocation was required based on available data.

2.5. Accounting Standard

This Product Carbon Footprint analysis strictly adheres to the **GHG Protocol**, encompassing:

- **Scope 1 Emissions:** Direct GHG emissions from sources owned or controlled by msszlpqozu (e.g., on-site combustion). For this PCF, direct

Scope 1 emissions at the factory are assumed minimal or integrated into broader manufacturing processes captured in material emission factors, due to the 'factory_gate' boundary focus on product, and lack of explicit direct combustion data.

- **Scope 2 Emissions:** Indirect GHG emissions from the generation of purchased electricity, heat, or steam consumed by msszlpqozu's production facilities.
- **Scope 3 Emissions:** All other indirect emissions occurring in the value chain, both upstream and downstream. This analysis aims for at least **95% coverage for Scope 3 reporting**, aligning with 2026 requirements, by including materials, transportation, use phase, and end-of-life.
- **2026 LSR Update:** The Land Sector and Removals (LSR) Standard, effective January 1, 2027, has been considered. While the provided Bill of Materials for ueoyhlzpfw does not explicitly detail land-intensive raw materials (e.g., agricultural or forestry products) or direct land-use change, the principles of the LSR Standard for identifying and quantifying land-related emissions and removals are acknowledged in the methodology. Should specific land-use data become available for raw material extraction or product components (e.g., bio-based plastics from specific crops), the LSR Standard would be applied for detailed accounting.

3. Lifecycle Mapping & Data Collection (GHG Protocol Step 2 & 3)

The lifecycle of ueoyhlzpfw has been mapped across key stages, and data collected from specified parameters and industry-standard sources.

3.1. Materials (Detailed Bill of Materials - BOM: wevwzwet)

The material impact is calculated using the provided Detailed Bill of Materials (BOM). Each item's specific quantity, unit, and "Total Carbon" value are directly incorporated, providing a high-accuracy material impact calculation.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/Unit)	Total Carbon (kg CO2e)
1	Aluminum Frame	Metal	Extrusion	0.2	kg	8.0	1.600
2	Plastic Housing	Plastic	Injection Molding	0.15	kg	3.5	0.525
3	Lithium-ion Battery	Electronics	Manufacturing	0.05	kg	15.0	0.750
4	Printed Circuit Board (PCB)	Electronics	Assembly	0.03	kg	12.0	0.360
5	Packaging (Cardboard)	Paper	Production	0.08	kg	1.5	0.120
6	Adhesives	Chemicals	Production	0.01	kg	7.0	0.070
Total Material Carbon:							3.425 kg CO2e

Total Product Weight: Approximately 0.52 kg (sum of items in 'kg' units).

3.2. Production Energy (Scope 2)

- **Energy Intensity (kWh/unit):** rridilhquv (e.g., 2.5 kWh/unit)
- **Renewable Energy Usage:** heklyyrieo (e.g., 40%)
- **Non-Renewable Energy Usage:** (100% - 40%) = 60% of total energy.
- **Electricity Emission Factor (China Grid Mix):** 0.60 kg CO2e/kWh (Average factor, 2023, Ministry of Ecology and Environment, National Bureau of Statistics, National Energy Administration). Other sources indicate ranges from 0.556 to 0.6093 kg CO2e/kWh.

3.3. Transport Logistics (Scope 3 - Upstream & Downstream)

- **Primary Transport Mode (Upstream/Outbound):** Select Mode (Assumed: Road Freight - Heavy Duty Truck)
- **Transport Distance (Upstream/Outbound):** ujluhsymyp (Assumed: 1500 km for European-focused supply chain)
- **Road Freight Emission Factor:** 0.095 kg CO₂e/tkm (Average factor for heavy-duty road freight).
- **Last-Mile Delivery Channel:** Delivery Type (Assumed: Light Commercial Vehicle - LCV for parcel delivery)
- **Last-Mile Distance:** Assumed 50 km per unit.
- **Last-Mile Delivery Emission Factor (LCV):** 0.15 kg CO₂e/km per unit.

3.4. Use Phase (Scope 3 - Downstream)

- **Product Lifespan:** ijfymuqtgt (e.g., 3 years)
- **Energy Consumption in Use:** fjnkyywrgg (e.g., 5 kWh/year)
- **Total Energy Consumption over Lifespan:** 5 kWh/year * 3 years = 15 kWh
- **Electricity Emission Factor (European Grid Mix):** 0.28 kg CO₂e/kWh (Representative average for EU-27, 2021).

3.5. End-of-Life (EoL) Scenarios (Scope 3 - Downstream)

- **Recyclability Percentage:** wsmitftswq (e.g., 70%)
- **Circular/Take-back Programs:** iennpefzjl (e.g., Yes, active programs). The presence of active programs supports the assumed recyclability rate.
- **EoL Methodology:** A recycling credit approach is applied, estimating avoided virgin material production emissions due to recycling. A 50% avoided burden factor is assumed for the recyclable portion of materials.

4. Calculation of Emissions (GHG Protocol Step 4)

Emissions are calculated using the activity data collected and applied emission factors, categorized according to the GHG Protocol Scopes.

Industry-standard emission factors (e.g., from Ecoinvent/DEFRA equivalents) are used, with specific citations where applicable.

4.1. Scope 1: Direct Emissions

For a product-level PCF with a 'factory_gate' boundary, explicit direct (Scope 1) emissions from manufacturing are often integrated into upstream material production data or captured if specific on-site fuel combustion data is available. Given the provided parameters, no direct Scope 1 emissions at the factory are quantified separately beyond what might be embedded in the BOM's "Total Carbon" values for processes. Any on-site fuel combustion for energy generation would typically be captured under Scope 2 or specific Scope 1 reporting for the company, which is outside the direct product boundary for this PCF.

4.2. Scope 2: Purchased Energy Emissions

These emissions arise from purchased electricity used during the manufacturing phase in China.

- Total Energy Intensity: 2.5 kWh/unit
- Non-Renewable Energy Portion: $2.5 \text{ kWh} * (1 - 0.40) = 1.5 \text{ kWh/unit}$
- China Electricity Emission Factor: 0.60 kg CO₂e/kWh
- **Scope 2 Emissions:** $1.5 \text{ kWh/unit} * 0.60 \text{ kg CO}_2\text{e/kWh} = \mathbf{0.90 \text{ kg CO}_2\text{e/unit}}$

4.3. Scope 3: Value Chain Emissions

4.3.1. Upstream Emissions

These include emissions from the production of raw materials and inbound transportation.

- **Materials (BOM):** The sum of "Total Carbon" from the Detailed BOM: **3.425 kg CO₂e/unit**
- **Upstream/Outbound Transportation:**
 - Product Weight: 0.52 tonnes (0.52 kg converted to tonnes)
 - Transport Distance: 1500 km
 - Transport Mode: Road Freight (Heavy Duty Truck)
 - Emission Factor: 0.095 kg CO₂e/tkm

- **Emissions:** $0.00052 \text{ t} * 1500 \text{ km} * 0.095 \text{ kg CO}_2\text{e/tkm} = \mathbf{0.0741 \text{ kg CO}_2\text{e/unit}}$

4.3.2. Downstream Emissions

These include emissions from distribution, product use, and end-of-life.

- **Last-Mile Delivery:**
 - Assumed Distance: 50 km
 - Delivery Type: Light Commercial Vehicle (LCV)
 - Emission Factor: 0.15 kg CO₂e/km (per unit)
 - **Emissions:** $50 \text{ km} * 0.15 \text{ kg CO}_2\text{e/km} = \mathbf{7.50 \text{ kg CO}_2\text{e/unit}}$
- **Use Phase:**
 - Total Energy Consumption over Lifespan: 15 kWh/unit
 - European Electricity Emission Factor: 0.28 kg CO₂e/kWh
 - **Emissions:** $15 \text{ kWh/unit} * 0.28 \text{ kg CO}_2\text{e/kWh} = \mathbf{4.20 \text{ kg CO}_2\text{e/unit}}$
- **End-of-Life (EoL) - Recycling Credit:**
 - Total Material Carbon (potential for recycling): 3.425 kg CO₂e
 - Recyclability Percentage: 70%
 - Avoided Burden Factor: 50%
 - **Credit:** $-(3.425 \text{ kg CO}_2\text{e} * 0.70 * 0.50) = \mathbf{-1.19875 \text{ kg CO}_2\text{e/unit}}$

4.4. Summary of Emissions by Scope

GHG Scope Category	Lifecycle Stage	CO ₂ e (kg/unit)
Scope 1	Direct Emissions from Operations	0.00
Scope 2	Purchased Electricity (Production)	0.90
Scope 3	Upstream Materials (BOM)	3.425
	Upstream/Outbound Transportation	0.0741
	Downstream Last-Mile Delivery	7.50
	Downstream Use Phase	4.20
	Downstream End-of-Life (Recycling Credit)	-1.19875

GHG Scope Category	Lifecycle Stage	CO2e (kg/unit)
Total Product Carbon Footprint (PCF)		14.90 kg CO2e/unit

5. Review & Report (GHG Protocol Step 5)

5.1. Key Findings & Hotspots

The total Product Carbon Footprint for one unit of ueoyhlzpfw is approximately **14.90 kg CO2e**. Key hotspots identified are:

- **Last-Mile Delivery (Scope 3):** This stage contributes significantly, accounting for approximately 7.50 kg CO2e/unit. This is primarily due to the nature of last-mile logistics, which can be energy-intensive per package.
- **Use Phase (Scope 3):** The energy consumed during the product's lifespan contributes 4.20 kg CO2e/unit, highlighting the importance of energy efficiency in product design and user behavior.
- **Material Production (Scope 3):** The raw materials, as detailed in the BOM, represent a substantial upstream impact of 3.425 kg CO2e/unit.
- **Production Energy (Scope 2):** Manufacturing energy, despite 40% renewable usage, still accounts for 0.90 kg CO2e/unit, indicating opportunities for further decarbonization of the production facility's energy mix.

5.2. Data Reliability and Limitations

The reliability of this PCF analysis is high for material impacts due to the provision of detailed BOM data, including explicit "Total Carbon" values for each item. However, certain aspects rely on industry average emission factors and reasonable assumptions:

- **Placeholder Data:** "Select Mode" and "Delivery Type" were substituted with common road freight and light commercial vehicle assumptions. Distances (`ujluhsymp`) were assumed at 1500 km for transport and 50 km for last-mile.
- **Emission Factors:** While industry-standard (e.g., from MEE, EU averages, LCV data), these are generic and not specific to exact suppliers or routes.

- **System Boundary Interpretation:** While the primary boundary is 'factory_gate', the analysis extends to 'cradle-to-grave' as per parameters. This comprehensive approach ensures significant Scope 3 categories are addressed.
- **LSR Standard:** Based on the provided BOM, no direct agricultural or forestry products requiring specific LSR calculation were identified. Future analyses with more granular material origin data could integrate these aspects more deeply.
- **Scope 3 Coverage:** By including all major categories requested (materials, transport, use, EoL), the report aims to meet the 95% Scope 3 coverage requirement, though exact verification would require deeper supplier-specific data.

5.3. Recommendations

Based on this analysis, msszlpqozu can pursue several strategies to reduce the carbon footprint of ueoyhlzpfw:

- **Optimize Last-Mile Delivery:** Investigate more efficient last-mile logistics options, such as electric delivery vehicles or optimized routing, to reduce the significant impact from this stage.
- **Enhance Use Phase Efficiency:** Explore ways to reduce the product's energy consumption during its lifespan or extend its durability ('ijfymuqtgt') to minimize replacement frequency.
- **Sustainable Material Sourcing:** Continuously review and optimize the Bill of Materials (wewvzwet) by sourcing lower-carbon alternatives or materials with higher recycled content.
- **Increase Renewable Energy in Production:** Further increase the percentage of renewable energy usage ('heklyyrieo') at the production facility in China to reduce Scope 2 emissions.
- **Strengthen Circularity:** Leverage and expand circular/take-back programs ('iennpefzjl') to maximize the recycling rate ('wsmittswq') and ensure effective end-of-life management, potentially increasing recycling credits.
- **Supplier Engagement:** Engage with suppliers to obtain primary, product-specific emission data for materials and transportation to further enhance the accuracy of Scope 3 reporting.