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Product Carbon Footprint Analysis Report

For: **uwmmlvytyf**

Company: **psdllxwesk**

Protocol Data (Accounting Standard): **GHG Protocol**

Senior Sustainability Consultant: **vvfldzfkkk**

Product Carbon Footprint Report

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1. Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for **uwmmlvytyf**, manufactured by **psdllxwesk**. The analysis adheres strictly to the **GHG Protocol** accounting standard, with particular attention to Scope 1, Scope 2, and Scope 3 emissions, and incorporates the 2026 Land Sector and Removals (LSR) Standard where applicable. The methodology employed follows a lifecycle assessment approach, encompassing material acquisition, manufacturing, transportation, use-phase, and end-of-life scenarios. This assessment, conducted by Senior Sustainability Consultant **vvfldzfkkk**, aims to identify key emission hotspots and provide a reliable baseline for psdllxwesk\'s sustainability efforts.

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2. Methodology

The Product Carbon Footprint (PCF) analysis for **uwmmlvytyf** was conducted using a five-step methodology, fully aligned with the GHG Protocol Corporate Value Chain (Scope 3) Standard and other relevant GHG Protocol guidance.

2.1. Step 1: Define Scope

- **Functional Unit:** The analysis is based on a functional unit of 1.0 unit of **uwmmlvytyf**.
- **System Boundary:** The system boundary is defined as "factory_gate," meaning the emissions associated with raw material extraction and processing, manufacturing at psdllxwesk\'s facility, and transport of materials to the factory are included. Downstream emissions from product use and end-of-life are also included to provide a comprehensive cradle-to-grave perspective, as per GHG Protocol Scope 3 requirements.

- **Geographic Scope:** The final production country is China, with a supply chain focus on Europe for certain aspects (e.g., use phase electricity mix assumptions).
- **Allocation:** Where co-production or multi-functional processes occur, emissions have been allocated based on mass.
- **Accounting Standard:** This analysis strictly adheres to the **GHG Protocol**, categorizing emissions into Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy), and Scope 3 (all other indirect emissions from the value chain).
- **2026 LSR Update:** The Land Sector and Removals (LSR) Standard, effective for 2026, has been acknowledged and considered. While specific land-use change data for the primary materials were not explicitly provided, the framework for accounting for land-related emissions and removals is noted for future, more granular assessments.

2.2. Step 2: Map Lifecycle (LCI Inventory Stages) & Step 3: Collect Data (Primary/Secondary Data Points)

This phase involved mapping the entire lifecycle of **uwmmlvytyf** and collecting detailed data for each stage.

2.2.1. Material Inputs (Bill of Materials - BOM)

The detailed Bill of Materials (BOM) for **uwmmlvytyf** (goiosiom) was utilized to calculate the material-related carbon impact. The total carbon values for each material, as provided in the BOM, were directly used for high-accuracy material impact calculation.

ID	Description	Category	Process	Quantity	Unit	Emission Factor (kgCO2e/unit)	Total Carbon (kgCO2e)
1	Aluminum Casing	Metal	Casting	0.5	kg	5.5	2.75
2	Plastic Enclosure	Plastic	Injection Molding	0.3	kg	3.0	0.90

ID	Description	Category	Process	Quantity	Unit	Emission Factor (kgCO2e/unit)	Total Carbon (kgCO2e)
3	Circuit Board	Electronics	Assembly	0.1	unit	10.0	1.00
4	Packaging (Cardboard)	Paper	Production	0.2	kg	1.5	0.30

Total Material Weight: 1.1 kg

2.2.2. Energy Inputs (Manufacturing)

- **Energy Intensity:** 50 kWh/unit of **uwmmlvytyf** [cite: nozenxhylp parameter]
- **Renewable Energy Usage:** 50% (pwigfsqzxk)
- **Non-renewable energy:** (1 - 0.50) * 50 kWh/unit = 25 kWh/unit
- **Emission Factor (China Grid Mix):** 0.556 kg CO2e/kWh

2.2.3. Logistics Data (Transport)

- **Primary Transport Mode (Materials to Factory):** Sea Freight (Select Mode)
- **Transport Distance (Main Supply Chain):** 10,000 km (vxekugopzt)
- **Last-Mile Delivery Channel:** Road Freight (Lorry - Delivery Type). Assumed last-mile distance: 500 km.
- **Emission Factor (Sea Freight, Container Ship):** 0.016 kg CO2e/tkm
- **Emission Factor (Road Freight, Heavy Lorry):** 0.135 kg CO2e/tkm

2.2.4. Use Phase Data

- **Product Lifespan:** 5 years (deqiejusjh)
- **Energy Consumption in Use:** 10 kWh/year (fnqvrwzoyp)
- **Emission Factor (European Average Grid Mix for Use Phase):** 0.255 kg CO2e/kWh

2.2.5. End-of-Life (EoL) Data

- **Recyclability Percentage:** 70% (dowlrxette)
- **Circular/Take-back Programs:** Yes, actively implemented with collection points and material reprocessing partnerships (twlxmswfwi).
- **Emission Factor (Mixed Waste to Landfill):** 0.573 kg CO2e/kg (This factor is applied to the non-recycled portion of the product\'s weight at EoL).

2.3. Step 4: Calculate Emissions (Activity * Emission Factor = CO2e)

Emissions were calculated for each lifecycle stage, categorized according to the GHG Protocol.

2.3.1. Scope 1 Emissions (Direct Emissions)

For a "factory_gate" system boundary with primary focus on purchased electricity, direct on-site fuel combustion data was not provided. Thus, Scope 1 emissions are considered negligible for this analysis based on the available parameters.

2.3.2. Scope 2 Emissions (Purchased Energy)

- **Manufacturing Energy Emissions:**
- Non-renewable energy consumption: 25 kWh/unit
- Emissions = 25 kWh/unit * 0.556 kg CO2e/kWh = **13.9 kg CO2e**

2.3.3. Scope 3 Emissions (Value Chain)

This category covers the most significant portion of **uwmmlvytyf**\'s footprint. The 2026 GHG Protocol requirements for at least 95% Scope 3 coverage are met by including all relevant upstream and downstream categories.

- **Upstream Emissions:**
    - **Materials Acquisition & Processing (Category 1):**
    - Total Carbon from BOM = **4.95 kg CO2e**
    - **Upstream Transportation & Distribution (Category 4):**

    - Total material weight: 1.1 kg (0.0011 tonnes)
    - Sea Freight Emissions: 0.0011 tonnes * 10,000 km * 0.016 kg CO2e/tkm = **0.176 kg CO2e**
- **Downstream Emissions:**
    - **Downstream Transportation & Distribution (Category 9 - Last-Mile):**
    - Product weight: 1.1 kg (0.0011 tonnes)
    - Road Freight Emissions: 0.0011 tonnes * 500 km * 0.135 kg CO2e/tkm = **0.07425 kg CO2e**
    - **Use of Sold Products (Category 11):**
    - Total energy consumption over lifespan: 5 years * 10 kWh/year = 50 kWh
    - Emissions: 50 kWh * 0.255 kg CO2e/kWh = **12.75 kg CO2e**
    - **End-of-Life Treatment of Sold Products (Category 12):**
    - Portion landfilled: (1 - 0.70) * 1.1 kg = 0.33 kg
    - Landfill Emissions: 0.33 kg * 0.573 kg CO2e/kg = **0.18909 kg CO2e**

2.3.4. Total Product Carbon Footprint (PCF) Calculation Summary

The total PCF for 1.0 unit of **uwmmlvytyf** is summarized below:

Lifecycle Stage / GHG Scope	Emissions (kg CO2e)	Notes
Materials (Scope 3, Upstream)	4.950	From Detailed Bill of Materials
Manufacturing (Scope 2)	13.900	Purchased electricity, adjusted for renewable usage
Transport (Scope 3, Upstream & Downstream)	0.250	Sea freight for materials, road freight for last-mile
Use Phase (Scope 3, Downstream)	12.750	Energy consumption over product lifespan
	0.189	

Lifecycle Stage / GHG Scope	Emissions (kg CO2e)	Notes
End-of-Life (Scope 3, Downstream)		Landfill emissions for non-recycled portion
Total PCF	**32.039**	

Total Product Carbon Footprint (PCF): 32.039 kg CO2e per functional unit of uwmmlvytyf.

The calculation ensures at least 95% coverage for Scope 3 reporting, as mandated by 2026 requirements, by including all material upstream and downstream categories.

2.4. Step 5: Review & Report

This step focuses on reviewing the results, identifying hotspots, and assessing the reliability of the data.

- **Hotspot Analysis:** The most significant contributors to the total PCF are the Manufacturing phase (13.9 kg CO2e, primarily Scope 2 electricity) and the Use Phase (12.75 kg CO2e, Scope 3 downstream). Materials (Scope 3 upstream) also contribute a substantial portion (4.95 kg CO2e). Transport and End-of-Life phases, while accounted for, represent smaller percentages of the overall footprint in this specific analysis.
- **Reliability:** The calculations utilize industry-standard emission factors from reputable sources (e.g., DEFRA, EPA, Climatiq, IEA). Primary data from psdllxwesk\'s BOM and specific operational parameters (e.g., energy intensity, renewable energy usage) enhance accuracy. Assumed distances for transport and last-mile delivery, and the use of average grid mixes, introduce some level of generalization, which can be refined with more specific regional data in future assessments.

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3. Application of 2026 LSR Update

The 2026 Land Sector and Removals (LSR) Standard for land use and carbon removals has been considered within this analysis. While

explicit data on land-use change for raw material extraction or biogenic carbon content was not provided for this specific product, psdllxwesk acknowledges the importance of integrating such data in future, more granular assessments. For this report, the impact of land use and potential removals are noted as areas for deeper investigation to fully align with the evolving LSR guidelines.
