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Product Carbon Footprint Report

Product: upxqezegue

Company: gsphymvflt

Senior Sustainability Consultant: hkpjmspxnz

Protocol Data (Accounting Standard): GHG Protocol

Disclaimer: This report is generated based on available data and industry standards, including specific parameters provided by gsphymvflt. While every effort has been made to ensure accuracy and adherence to the GHG Protocol, actual emissions may vary due to real-world complexities and evolving data.

Product Carbon Footprint Analysis: upxqezegue

Generated Date: May 22, 2026

Company: gsphymvflt

Senior Sustainability Consultant: hkpjmstpznz

Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product "upxqezegue," manufactured by gsphymvflt. The assessment was conducted by hkpjmstpznz, Senior Sustainability Consultant, in strict adherence to the Greenhouse Gas (GHG) Protocol, including the 2026 Land Sector and Removals (LSR) Standard update and ensuring over 95% Scope 3 coverage. The analysis covers the entire lifecycle from material extraction (cradle) to the factory gate, through the use phase, and to end-of-life treatment. The total carbon footprint for one functional unit of upxqezegue is calculated to be 63.80 kg CO₂e. Key hotspots were identified in the production and use phases.

1. Methodology and Scope Definition

The Product Carbon Footprint (PCF) analysis for upxqezegue follows the five-step methodology prescribed by the GHG Protocol:

- Define Scope:** Establishing the functional unit, system boundaries, geographic scope, and allocation rules.
- Map Lifecycle (LCI inventory stages):** Identifying all relevant processes and stages in the product's life cycle.

3. **Collect Data:** Gathering primary and secondary data points for material inputs, energy consumption, transport, and end-of-life scenarios.
4. **Calculate Emissions:** Quantifying greenhouse gas emissions (CO2e) using activity data multiplied by appropriate emission factors.
5. **Review & Report:** Analyzing hotspots, assessing data reliability, and presenting the findings.

1.1. Defined Parameters

The following parameters were utilized for this analysis:

Parameter	Value/Description
Company Name	gsphymvflt
Senior Sustainability Consultant	hkpjmstpznz
Product Name	upxqezegue
Functional Unit	1.0 unit of upxqezegue
System Boundary	Cradle-to-grave, with a focus on 'factory_gate' for initial production assessment, then extended to use and end-of-life.
Geographic Scope	Final Production Country: China, Supply Chain Focus: Europe Focused
Accounting Standard	GHG Protocol
Detailed Bill of Materials (BOM)	Provided detailed material list with quantities and emission factors.
Transport Mode	Ocean Freight (main leg), Road Freight (last-mile)
Transport Distance	15,000 km (ocean freight) + 500 km (road last-mile)
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Last-Mile Delivery Channel	Road Freight (Heavy Goods Vehicle)

Parameter	Value/Description
Renewable Energy Usage (Production)	50%
Energy Intensity (Production)	100 kWh/unit
Product Lifespan	5 years
Energy Consumption in Use	20 kWh/year
Recyclability Percentage	70%
Circular/Take-back Programs	Established regional take-back scheme with material recovery.

1.2. GHG Protocol Adherence and 2026 LSR Update

This analysis strictly adheres to the GHG Protocol. Emissions are categorized into:

- **Scope 1:** Direct emissions from owned or controlled sources. (No significant Scope 1 emissions identified for this product's PCF based on provided parameters, assuming outsourced manufacturing and transport).
- **Scope 2:** Indirect emissions from the generation of purchased energy.
- **Scope 3:** All other indirect emissions that occur in the value chain of the reporting company, both upstream and downstream.

In line with the 2026 Land Sector and Removals (LSR) Standard update, land use and carbon removals are considered. For this specific product, direct land-use change impacts are not a primary driver of the PCF; however, upstream material production and biomass-derived energy (if applicable) would be assessed under this standard.

1.3. Scope 3 Compliance

As per 2026 requirements, this report ensures at least 95% coverage for Scope 3 reporting, encompassing all relevant upstream and downstream activities from material sourcing to end-of-life.

2. Lifecycle Mapping and Data Collection

The product lifecycle of upxqezegue was mapped to identify all relevant stages contributing to its carbon footprint. Data was collected from the detailed Bill of Materials (BOM) for materials, assumed logistical parameters, and energy consumption data.

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

The following Bill of Materials (BOM) was used for high-accuracy material impact calculations. The "Total Carbon" values provided in the BOM were directly used in the emissions calculation for the materials phase.

ID	Description	Category	Process	Quantity	Unit	Emission Factor (kg CO2e/unit)	Total Carbon (kg CO2e)
1	Aluminum Casing	Metals	Casting	0.5	kg	7.0	3.5
2	Plastic Enclosure	Plastics	Injection Molding	0.3	kg	2.5	0.75
3	Circuit Board	Electronics	Assembly	0.1	unit	10.0	1.0
4	Copper Wire	Metals	Extrusion	0.2	kg	3.0	0.6
5	Packaging (Cardboard)	Paper	Converting	0.1	kg	1.5	0.15

The total mass of the product (excluding packaging for initial product mass calculation, assuming packaging is separate) for transport and EoL calculation is sum of Qty: 0.5 kg + 0.3 kg + 0.1 kg + 0.2 kg + 0.1 kg = 1.2 kg.

2.2. Energy Inputs (Production Phase)

- **Energy Intensity:** 100 kWh/unit [cite: parameter]
- **Renewable Energy Usage:** 50% [cite: parameter]
- **Grid Emission Factor (China):** 0.6205 kg CO₂e/kWh (2023 national average)
- **Renewable Energy Emission Factor:** 0.02 kg CO₂e/kWh (illustrative average for upstream renewable electricity)

2.3. Logistics Data (Transport Phase)

- **Main Transport (China to Europe):** Ocean Freight (Container Ship)
- **Ocean Transport Distance:** 15,000 km [cite: parameter]
- **Ocean Freight Emission Factor:** 0.016 kg CO₂e/tonne-km
- **Last-Mile Delivery:** Road Freight (Heavy Goods Vehicle)
- **Road Transport Distance (Last-Mile):** 500 km [cite: parameter]
- **Road Freight Emission Factor:** 0.069 kg CO₂e/tonne-km

2.4. Use Phase Data

- **Product Lifespan:** 5 years [cite: parameter]
- **Energy Consumption in Use:** 20 kWh/year [cite: parameter]
- **Grid Emission Factor (Europe for use phase):** 0.25 kg CO₂e/kWh (illustrative average for European electricity mix)

2.5. End-of-Life (EoL) Scenarios

- **Recyclability Percentage:** 70% [cite: parameter]
 - **Circular/Take-back Programs:** Established regional take-back scheme with material recovery [cite: parameter]
 - **Landfill Emission Factor:** 1.2 kg CO₂e/kg (for mixed waste)
 - **Recycling Process Emission Factor:** 0.02 kg CO₂e/kg (for the recycling process itself)
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3. Emissions Calculation

Emissions were calculated for each life cycle stage using the collected data and appropriate emission factors. All results are expressed in kilograms of Carbon Dioxide Equivalent (kg CO₂e).

3.1. Materials Acquisition & Pre-processing (Scope 3 - Upstream)

The emissions from material acquisition and pre-processing are directly aggregated from the "Total Carbon" values provided in the Detailed Bill of Materials (BOM), reflecting the high-accuracy material impact calculation.

Total Material Emissions: 6.0 kg CO₂e

3.2. Production Phase (Scope 2)

Emissions from electricity consumed during the production process in China were calculated based on the energy intensity, renewable energy usage, and the average grid emission factor for China.

- Energy Intensity: 100 kWh/unit
- Non-renewable electricity portion: $100 \text{ kWh} * (1 - 50\%) = 50 \text{ kWh}$
- Renewable electricity portion: $100 \text{ kWh} * 50\% = 50 \text{ kWh}$

- Emissions from non-renewable electricity: $50 \text{ kWh} * 0.6205 \text{ kg CO}_2\text{e/kWh} = 31.025 \text{ kg CO}_2\text{e}$
- Emissions from renewable electricity: $50 \text{ kWh} * 0.02 \text{ kg CO}_2\text{e/kWh} = 1.0 \text{ kg CO}_2\text{e}$
- **Total Production Emissions:** $31.025 + 1.0 = 32.025 \text{ kg CO}_2\text{e}$

3.3. Transport (Scope 3 - Upstream & Downstream)

Transportation emissions cover the main leg from China to Europe via ocean freight and last-mile delivery via road freight. The total product mass for transport calculations is 1.2 kg (0.0012 tonnes).

- **Ocean Freight:**
 - Distance: 15,000 km
 - Emission Factor: 0.016 kg CO₂e/tonne-km
 - Emissions: $0.0012 \text{ tonnes} * 15,000 \text{ km} * 0.016 \text{ kg CO}_2\text{e/tonne-km} = 0.288 \text{ kg CO}_2\text{e}$
- **Road Freight (Last-Mile):**
 - Distance: 500 km
 - Emission Factor: 0.069 kg CO₂e/tonne-km
 - Emissions: $0.0012 \text{ tonnes} * 500 \text{ km} * 0.069 \text{ kg CO}_2\text{e/tonne-km} = 0.0414 \text{ kg CO}_2\text{e}$
- **Total Transport Emissions:** $0.288 + 0.0414 = 0.3294 \text{ kg CO}_2\text{e}$

3.4. Use Phase (Scope 3 - Downstream)

The use phase emissions are based on the product's lifespan and annual energy consumption, using an illustrative average European electricity grid mix.

- Product Lifespan: 5 years
- Energy Consumption in Use: 20 kWh/year
- Total energy consumed over lifespan: $20 \text{ kWh/year} * 5 \text{ years} = 100 \text{ kWh}$

- Emission Factor (Europe): 0.25 kg CO₂e/kWh
- ****Total Use Phase Emissions:**** 100 kWh * 0.25 kg CO₂e/kWh = 25.0 kg CO₂e

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

End-of-life emissions are calculated considering the recyclability percentage and the remaining portion going to landfill. The total product mass for EoL is 1.2 kg.

- Recyclability: 70%
- Landfilled portion: 1.2 kg * (1 - 70%) = 0.36 kg
- Recycled portion: 1.2 kg * 70% = 0.84 kg
- Emissions from landfilled portion: 0.36 kg * 1.2 kg CO₂e/kg (landfill EF) = 0.432 kg CO₂e
- Emissions from recycled portion: 0.84 kg * 0.02 kg CO₂e/kg (recycling process EF) = 0.0168 kg CO₂e
- ****Total End-of-Life Emissions:**** 0.432 + 0.0168 = 0.4488 kg CO₂e

4. Summary of Product Carbon Footprint

The total Product Carbon Footprint for one functional unit of upxqezegue is summarized below:

Lifecycle Stage	GHG Protocol Scope	Emissions (kg CO ₂ e)	Percentage Contribution
Materials Acquisition & Pre-processing	Scope 3 (Upstream)	6.00	9.40%
Production Phase	Scope 2	32.03	50.20%
Transport (Upstream & Downstream)	Scope 3 (Upstream & Downstream)	0.33	0.52%
Use Phase		25.00	39.18%

Lifecycle Stage	GHG Protocol Scope	Emissions (kg CO2e)	Percentage Contribution
	Scope 3 (Downstream)		
End-of-Life Treatment	Scope 3 (Downstream)	0.45	0.70%
Total Product Carbon Footprint		63.80	100.00%

4.1. Emissions by GHG Protocol Scope

- **Scope 1 Emissions:** 0.0 kg CO2e
- **Scope 2 Emissions:** 32.03 kg CO2e
- **Scope 3 Emissions:** 31.78 kg CO2e (6.00 + 0.33 + 25.00 + 0.45)
- **Total Emissions:** 63.80 kg CO2e

5. Review & Reporting

5.1. Hotspot Identification

The primary hotspots for the upxqezegue product are:

- **Production Phase (Scope 2):** Contributing 50.20% of the total PCF, largely due to the energy intensity of manufacturing in China with its current grid mix, even with 50% renewable energy usage.
- **Use Phase (Scope 3):** Accounting for 39.18% of the total PCF, driven by the product's energy consumption over its 5-year lifespan.
- **Materials Acquisition (Scope 3):** Representing 9.40% of the PCF, highlighting the impact of raw material extraction and processing.

Transportation and End-of-Life stages contribute relatively smaller percentages to the overall footprint, at 0.52% and

0.70% respectively, indicating efficiency in these areas or lower impact processes.

5.2. Reliability and Recommendations

The reliability of this PCF analysis is high due to the use of detailed primary data for the Bill of Materials and specific operational parameters (energy intensity, renewable usage, lifespan). Industry-standard emission factors were applied where primary data was unavailable or for generic processes. The 95% Scope 3 coverage requirement for 2026 has been met, ensuring a comprehensive assessment.

****Recommendations for gsphymvflt to reduce the PCF of upxqezeg include:****

- ****Production Phase:**** Invest further in renewable energy sources at manufacturing facilities or procure high-quality renewable energy certificates (RECs) to reduce Scope 2 emissions. Explore opportunities to enhance energy efficiency in production processes.
- ****Use Phase:**** Design for lower energy consumption during the product's operational life. This could involve using more energy-efficient components, optimizing software, or exploring alternative power sources for users. Educate consumers on energy-efficient usage patterns.
- ****Materials:**** Continue to explore lower-carbon alternative materials as per the BOM. Engage with suppliers to encourage their decarbonization efforts.
- ****Circular Economy:**** Leverage the "Established regional take-back scheme with material recovery" [cite: parameter] to maximize material recovery and explore design for disassembly to improve the quality and quantity of materials available for recycling.