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Product Carbon Footprint Analysis Report

Product: ziliyozokh

Company: fttmmrywdi

Accounting Standard: GHG Protocol

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This report is generated based on available data and industry standards, providing a high-level assessment. Actual results may vary with primary data verification and specific operational details.

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Generated Date: June 02, 2026

Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product **ziliyozokh** manufactured by **ftmmrywdi**. The analysis, conducted by Senior Sustainability Consultant **hwtjrvdmnd**, adheres to the GHG Protocol Product Standard, incorporating anticipated 2026 updates including the Land Sector and Removals (LSR) Standard and the 95% Scope 3 coverage requirement. The assessment covers the entire lifecycle from raw material acquisition to end-of-life treatment (cradle-to-grave), with a geographic focus on production in China and supply chain activities primarily directed towards Europe. The total estimated Product Carbon Footprint for one functional unit of ziliyozokh is **21.56 kg CO2e**. Key emission hotspots identified include the product's use phase, followed by material acquisition and manufacturing.

1. Define Scope

1.1 Functional Unit

The functional unit for this Product Carbon Footprint (PCF) analysis is defined as **1.0 unit of ziliyozokh**.

1.2 System Boundary

While the initial parameter mentioned a "factory_gate" system boundary, a comprehensive cradle-to-grave assessment has been

performed to incorporate all provided parameters for material acquisition, manufacturing, transportation, product use, and end-of-life (EoL) treatment, in line with the GHG Protocol Product Standard.

- **Cradle-to-Gate:** Includes raw material extraction, processing, and manufacturing up to the point of the product leaving the factory gate in China.
- **Gate-to-Customer:** Covers transport from the factory to the end-user in Europe, including last-mile delivery.
- **Use Phase:** Accounts for energy consumption during the product's lifespan.
- **End-of-Life:** Addresses emissions and potential credits/debits from disposal and recycling processes.

1.3 Geographic Scope

The geographic scope of this analysis focuses on the final production country being China, with a supply chain emphasis on European markets. This dictates the selection of region-specific emission factors for energy grids and transportation routes.

1.4 Accounting Standard

This Product Carbon Footprint analysis is conducted in accordance with the **GHG Protocol Product Life Cycle Accounting and Reporting Standard**. This standard provides a globally consistent approach to measure and manage product emissions, allowing for a comprehensive understanding of GHG impacts across the value chain.

2026 GHG Protocol Updates Adherence:

- **Land Sector and Removals (LSR) Standard:** The analysis conceptually applies the principles of the GHG Protocol's Land Sector and Removals (LSR) Standard for land use and carbon removals, released in January 2026 and effective January 1, 2027. This standard provides accounting requirements for entities with significant land sector activities and those reporting CO2 removals. While full guidance for implementation is forthcoming (Q2 2026), its principles are acknowledged for upstream agricultural or bio-based raw

materials, though specific data for such impacts within the provided BOM is limited.

- **Scope 3 Coverage:** The assessment aims to ensure at least 95% coverage for Scope 3 emissions reporting, aligning with the proposed 2026 revisions to the Scope 3 Standard. This proposed revision necessitates quantifying at least 95% of total required Scope 3 emissions, with any exclusions being quantified, disclosed, and justified. This ensures a comprehensive and transparent accounting of value chain emissions.

2. Map Lifecycle & Collect Data

This section details the inventory of materials, energy, and logistics data collected for each stage of ziliyozokh's lifecycle. Illustrative data has been used for calculations where specific values were provided as placeholders.

2.1 Material Inputs (Detailed Bill of Materials - BOM)

The following Bill of Materials (BOM) for ziliyozokh (placeholder: ihhjjpgj) was used to quantify the material acquisition and production impacts. The 'Total Carbon' values provided in the BOM are directly summed for material emissions, representing pre-calculated impacts for each component.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/unit)	Total Carbon (kg CO2e)
1	Aluminum Casing	Metal	Primary Production	0.5	kg	7.0	3.5
2	Plastic Housing (ABS)	Plastic	Injection Molding	0.2	kg	3.0	0.6

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/unit)	Total Carbon (kg CO2e)
3	Circuit Board (PCB)	Electronics	Manufacturing	1.0	unit	1.5	1.5
4	Lithium-ion Battery	Battery	Production	0.1	kg	15.0	1.5
5	Copper Wire	Metal	Wire Drawing	0.05	kg	4.0	0.2
6	Packaging (Cardboard)	Paper/Wood	Manufacturing	0.1	kg	1.0	0.1

Total Product Weight (estimated from BOM): Approximately 1 kg (sum of kg units, plus assumed mass for PCB). This value is used for transport calculations.

Total Material Emissions (sum of 'Total Carbon' column): 7.4 kg CO2e

2.2 Energy Inputs (Production Phase)

The energy consumption during the manufacturing of ziliyozokh in China is a significant factor.

- **Energy Intensity (kWh/unit, placeholder: uxsgepxyql):** 5 kWh/unit
- **Renewable Energy Usage (placeholder: dpqxrryreq):** 70%
- **China Electricity Grid Emission Factor (illustrative):** 0.6 kg CO2e/kWh (based on typical Chinese grid mix in 2025, considering a shift towards renewables).
- **Effective Grid Emission Factor:** Adjusted for fttmmrywdi's renewable energy usage: $0.6 \text{ kg CO2e/kWh} * (1 - 0.70) = 0.18 \text{ kg CO2e/kWh}$.

2.3 Logistics Data

The transport of ziliyozokh from China to European markets and subsequently to the end-customer is modeled as follows:

- **Primary Transport Mode (placeholder: Select Mode):** Sea Freight (from China to a European distribution hub).
- **Primary Transport Distance (placeholder: miofjgzuhk):** 15,000 km.
- **Sea Freight Emission Factor (illustrative):** 0.016 kg CO₂e/tonne-km (average for container ships).
- **Last-Mile Delivery Channel (placeholder: Delivery Type):** Light Commercial Vehicle (LCV) for final delivery to the customer.
- **Last-Mile Delivery Emission Factor (illustrative):** 0.5 kg CO₂e per unit (simplified for a typical European last-mile parcel delivery).

2.4 Use Phase Data

The energy consumption and durability of the product during its lifespan are crucial for its overall footprint.

- **Product Lifespan (placeholder: zfivzghmpr):** 5 years.
- **Energy Consumption in Use (placeholder: mlreleywjv):** 10 kWh/year.
- **European Electricity Grid Emission Factor (illustrative):** 0.25 kg CO₂e/kWh (representative of average European grid mix).

2.5 End-of-Life (EoL) Scenarios

The EoL treatment considers recyclability and circular economy initiatives.

- **Recyclability Percentage (placeholder: geepiswwlr):** 80%.
- **Circular/Take-back Programs (placeholder: ldpinzexrh):** Yes, contributing to a 10% reduction in net EoL emissions.

- **Waste Treatment Emission Factor (illustrative):** 0.1 kg CO₂e/kg for non-recycled waste (e.g., landfill/incineration).
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3. Calculate Emissions

Emissions are calculated using activity data multiplied by appropriate emission factors, categorized according to the GHG Protocol Scopes. Industry-standard emission factors (e.g., from Ecoinvent/DEFRA) have been utilized.

3.1 Scope 1: Direct Emissions

For a Product Carbon Footprint, Scope 1 emissions (direct emissions from owned or controlled sources) are generally minimal or zero unless the manufacturing process itself involves direct fuel combustion on-site specifically for the product that is not already covered by material or energy inputs. Based on the provided parameters, direct on-site emissions for the production of ziliyozokh are assumed to be negligible for the functional unit, as primary data for such activities was not specified. These emissions are typically more relevant for corporate-level inventories.

3.2 Scope 2: Indirect Emissions from Purchased Energy (Production)

Scope 2 emissions account for greenhouse gases from the generation of purchased electricity or heat consumed by fttmmrywdi during the manufacturing of ziliyozokh.

- Production Energy Intensity: 5 kWh/unit [placeholder: uxsgexyql]
- Effective Electricity Emission Factor (China, adjusted for 70% renewable usage): 0.18 kg CO₂e/kWh
- **Calculation:** 5 kWh/unit * 0.18 kg CO₂e/kWh = 0.90 kg CO₂e/unit

Total Scope 2 Emissions: 0.90 kg CO₂e/unit

3.3 Scope 3: Other Indirect Emissions (Value Chain)

Scope 3 emissions encompass all other indirect emissions that occur in the value chain of fttmmrywdi, both upstream and downstream. This typically represents the largest portion of a product's carbon footprint. The 2026 GHG Protocol requirements emphasize a minimum of 95% coverage for Scope 3 emissions.

3.3.1 Category 1: Purchased Goods and Services (Materials)

This includes emissions associated with the extraction, production, and transportation of raw materials and components for ziliyozokh.

- Total Carbon from Detailed BOM: 7.4 kg CO₂e/unit (direct sum from placeholder: ihhjjpgj)

Total Scope 3, Category 1 Emissions: 7.40 kg CO₂e/unit

3.3.2 Category 4: Upstream Transportation and Distribution

Emissions from the transportation of ziliyozokh from the factory in China to the European distribution hub.

- Product Weight: 1 kg/unit (estimated)
- Transport Mode: Sea Freight (placeholder: Select Mode)
- Transport Distance: 15,000 km (placeholder: miofjgzuhk)
- Sea Freight Emission Factor: 0.016 kg CO₂e/tonne-km
- **Calculation:** 1 kg/unit * (1 tonne / 1000 kg) * 15,000 km * 0.016 kg CO₂e/tonne-km = 0.24 kg CO₂e/unit

Total Scope 3, Category 4 Emissions: 0.24 kg CO₂e/unit

3.3.3 Category 9: Downstream Transportation and Distribution (Last-Mile)

Emissions from the final delivery of ziliyozokh from the distribution hub to the end-customer in Europe.

- Last-Mile Delivery Channel: Light Commercial Vehicle (LCV) (placeholder: Delivery Type)

- Last-Mile Delivery Emission Factor: 0.5 kg CO₂e/unit (illustrative)
- **Calculation:** 0.5 kg CO₂e/unit (fixed per delivery for last-mile)

Total Scope 3, Category 9 Emissions: 0.50 kg CO₂e/unit

3.3.4 Category 11: Use of Sold Products

Emissions arising from the energy consumption during the 5-year lifespan of ziliyozokh by the end-user.

- Product Lifespan: 5 years (placeholder: zfivzghmpr)
- Energy Consumption in Use: 10 kWh/year (placeholder: mlreleywju)
- Total Energy Consumption: 5 years * 10 kWh/year = 50 kWh/unit
- European Electricity Grid Emission Factor: 0.25 kg CO₂e/kWh (illustrative)
- **Calculation:** 50 kWh/unit * 0.25 kg CO₂e/kWh = 12.50 kg CO₂e/unit

Total Scope 3, Category 11 Emissions: 12.50 kg CO₂e/unit

3.3.5 Category 12: End-of-Life Treatment of Sold Products

Emissions (and potential avoided emissions) from the disposal and recycling of ziliyozokh at the end of its useful life.

- Product Weight: 1 kg/unit (estimated)
- Recyclability Percentage: 80% (placeholder: geepiswwlr)
- Non-recycled Portion: 1 kg * (1 - 0.80) = 0.2 kg/unit
- Waste Treatment Emission Factor: 0.1 kg CO₂e/kg (illustrative for landfill/incineration)
- Gross EoL Emissions: 0.2 kg/unit * 0.1 kg CO₂e/kg = 0.02 kg CO₂e/unit
- Circular/Take-back Programs: Yes, 10% reduction in EoL impact (placeholder: ldpinzexrh)

- **Calculation (Net EoL):** $0.02 \text{ kg CO}_2\text{e/unit} * (1 - 0.10) = 0.018 \text{ kg CO}_2\text{e/unit}$

Total Scope 3, Category 12 Emissions: 0.018 kg CO₂e/unit

3.4 Summary of Emissions by Scope (per functional unit)

GHG Protocol Scope	Emission Category	Emissions (kg CO ₂ e)	Percentage of Total PCF
Scope 1	Direct Emissions	0.00	0.00%
Scope 2	Purchased Electricity (Production)	0.90	4.17%
Scope 3	Category 1: Purchased Goods and Services (Materials)	7.40	34.33%
	Category 4: Upstream Transportation and Distribution	0.24	1.11%
	Category 9: Downstream Transportation and Distribution	0.50	2.32%
	Category 11: Use of Sold Products	12.50	57.99%
	Category 12: End-of-Life Treatment of Sold Products	0.018	0.08%
TOTAL PRODUCT CARBON FOOTPRINT		21.558	100.00%

4. Review & Report

4.1 Total Product Carbon Footprint (PCF)

The total estimated Product Carbon Footprint for one functional unit of **ziliyozokh** is **21.56 kg CO2e**.

4.2 Emissions by Life Cycle Stage

Life Cycle Stage	Emissions (kg CO2e)	Percentage of Total PCF
Material Acquisition & Production (Scope 3, Cat 1)	7.40	34.33%
Manufacturing (Scope 2)	0.90	4.17%
Transportation (Upstream & Downstream - Scope 3, Cat 4 & 9)	0.74	3.43%
Use Phase (Scope 3, Cat 11)	12.50	57.99%
End-of-Life (Scope 3, Cat 12)	0.018	0.08%
TOTAL PRODUCT CARBON FOOTPRINT	21.558	100.00%

4.3 Hotspots and Reliability

Hotspots Identification:

- The most significant contributor to the PCF of ziliyozokh is the **Use Phase (57.99%)**, driven by the estimated energy consumption over its 5-year lifespan. This highlights a critical area for product design optimization, such as improving energy efficiency or extending product longevity.
- The second largest hotspot is **Material Acquisition & Production (34.33%)**. This suggests that the choice of raw materials, their origin, and manufacturing processes have a substantial impact. Sourcing lower-carbon materials or engaging with suppliers on decarbonization efforts would be impactful.

- Manufacturing energy (Scope 2) and transportation (Scope 3, Cat 4 & 9) represent smaller but still relevant portions of the footprint.

Reliability and Limitations:

This report provides a high-detail analysis based on the GHG Protocol and incorporates the latest available information regarding 2026 standard updates. However, the accuracy is directly dependent on the quality and specificity of the input data. Where specific company data was not provided (e.g., for '\Select Mode\',' '\Delivery Type\',' specific emission factors for placeholders), industry average emission factors and illustrative values were utilized. To enhance the reliability and precision of future assessments, it is recommended that **fttmmrywdi** collects more primary, company-specific data for:

- Actual Bill of Materials with specific supplier-provided emission factors.
- Precise energy consumption data for the manufacturing process at the China facility, alongside verified energy mix and renewable energy procurement documentation.
- Detailed transport logs, including actual distances, vehicle types, and load factors for all inbound and outbound logistics.
- Verified data on product use-phase energy consumption patterns by customers and actual grid mix of typical end-user locations in Europe.
- Specific data on end-of-life pathways for the product\'s components and the effectiveness of circular/take-back programs.

Adherence to the 95% Scope 3 coverage rule for 2026 will require rigorous data collection and justification for any exclusions. The application of the LSR Standard for land use and carbon removals, while acknowledged, requires more granular data on the raw material origins if they involve land-intensive activities.