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Product Carbon Footprint Report

For Product: nzxtmjfuzu

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

Name of the Company: ikgtpnoioh

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xnvknmfnvw**

This report is generated based on available data and industry standards. While every effort has been made to ensure accuracy, the actual carbon footprint may vary based on more precise, primary, and real-time data inputs from the supply chain.

Product Carbon Footprint Analysis for nzxtmjfuzu

Generated Date: May 27, 2026

Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product **nzxtmjfuzu**, manufactured for **ikgtpnoioh**. The analysis adheres strictly to the **GHG Protocol** standards, including the 2026 Land Sector and Removals (LSR) Update, and aims for at least 95% coverage for Scope 3 emissions. As **xnvknmfnvw**, a Senior Sustainability Consultant, this assessment quantifies greenhouse gas (GHG) emissions across the product's entire lifecycle, from material extraction (cradle) through manufacturing, distribution, use, and end-of-life (grave). The total calculated carbon footprint provides critical insights into emission hotspots, enabling informed strategies for decarbonization and enhancing product sustainability.

1. Scope Definition

This section defines the fundamental parameters guiding the Product Carbon Footprint analysis for **nzxtmjfuzu**.

- **Functional Unit:** 1.0 unit of nzxtmjfuzu. This serves as the reference unit to which all inputs and outputs are normalized, ensuring comparability and consistency.
- **System Boundary:** Cradle-to-Grave, with a primary focus on the 'factory_gate' for production emissions, extended to include the use phase and end-of-life scenarios as per explicit parameters. For **ikgtpnoioh**, a brand owner or distributor, most emissions upstream of the factory gate, as well as emissions from manufacturing, downstream transport, use, and end-of-life, fall under Scope 3.

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- **Geographic Scope:** Final Production Country: China. Supply Chain Focus: Europe Focused (for distribution and use phase).
 - **Accounting Standard:** The analysis strictly follows the requirements and guidelines of the **GHG Protocol**. Emissions are categorized into Scope 1, Scope 2, and Scope 3.
 - **Allocation:** Where co-production or recycling is involved, mass-based allocation or avoided burden approach (for recycling credits) is applied, consistent with GHG Protocol recommendations.
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2. Lifecycle Mapping and 3. Data Collection

The lifecycle of **nzxtmjfuzu** is mapped through several stages, from raw material acquisition to end-of-life. Data collection involved primary inputs provided and secondary (generic) emission factors from industry-standard databases, where specific data was not available.

2.1. Material Acquisition & Manufacturing (GHG Protocol Scope 3, Category 1 & 2)

This stage covers the extraction and processing of raw materials, as well as the manufacturing processes at the production facility in China.

Detailed Bill of Materials (BOM) for **nzxtmjfuzu**

The following table presents the detailed Bill of Materials (BOM) for **nzxtmjfuzu** (as per input: vqmrlfwx), including specific quantities and their associated carbon emissions. The 'Emission Factor' values are illustrative and represent typical industry averages that would be sourced from databases like Ecoinvent or DEFRA in a live assessment.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kgCO2e/unit or / kg)	Total Carbon Footprint (kgCO2e)
M001	Aluminium Casing	Metal	Casting	0.200	kg	8.00	1.600
M002	Plastic Components (ABS)	Plastic	Injection Molding	0.150	kg	2.50	0.375
M003	Circuit Board (PCBA)	Electronics	Manufacturing	0.050	unit	20.00	1.000
M004	Copper Wire	Metal	Drawing	0.020	kg	3.00	0.060
M005	Lithium-ion Battery	Electronics	Manufacturing	0.080	unit	15.00	1.200
M006	Packaging (Cardboard)	Paper	Production	0.050	kg	0.80	0.040
Total Material Carbon Footprint (kgCO2e):							4.275

Production Energy Data

The energy consumption during the production phase significantly contributes to the product's footprint.

- **Energy Intensity (kWh/unit):** 15 kWh/unit (Illustrative: 15 kWh/unit)
- **Renewable Energy Usage:** 50% (Illustrative: 50%)
- **Non-Renewable Energy Usage:** 50% (100% - 50%)
- **Electricity Grid Emission Factor (China):** 0.577 kgCO2e/kWh (Based on recent data for China's national average electricity carbon footprint, which has varied from 0.5568 to 0.6205 kgCO2/kWh in recent years.)

2.2. Transportation and Distribution (GHG Protocol Scope 3, Category 4 & 9)

Logistics play a crucial role in the overall carbon footprint, especially for a supply chain focused on Europe with production in China.

- **Product Weight (assumed for transport):** 0.5 kg/unit
- **Transport Mode (main leg):** Select Mode (Illustrative: Ocean Freight - Container Ship) for China to Europe, followed by Road Freight for regional distribution.
- **Transport Distance (Illustrative breakdown):**
 - Upstream Materials to Factory (within China, avg): 500 km (Road)
 - Factory to Europe Port: 10,000 km (Ocean)
 - Europe Port to Distribution Center: 500 km (Road)
- **Last-Mile Delivery Channel (Delivery Type):** Illustrative: Small Van Parcel Delivery
- **Last-Mile Delivery Distance (Illustrative):** 100 km (Road)

Illustrative Emission Factors for Transport (per tonne-km, based on DEFRA and industry averages):

Transport Mode	Emission Factor (kgCO ₂ e/tonne-km)
Ocean Freight (Container Ship)	0.005
Road Freight (Heavy Duty Truck)	0.090
Small Van Parcel Delivery	0.150

2.3. Use Phase (GHG Protocol Scope 3, Category 11)

Emissions during the product's active use are calculated based on its lifespan and energy consumption.

- **Product Lifespan (Illustrative):** 3 years

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- **Energy Consumption in Use (xjwtnmxqfy):**
Illustrative: 5 kWh/year
- **Electricity Grid Emission Factor (Europe):** 0.181 kgCO₂e/kWh (Based on the average European Carbon Factor in 2024.)

2.4. End-of-Life (EoL) (GHG Protocol Scope 3, Category 12)

This stage accounts for the emissions (or avoided emissions) associated with the disposal and recycling of the product.

- **Recyclability Percentage (qrwquxuptl):** Illustrative: 70%
- **Circular/Take-back Programs (ylipidsloh):** A regional take-back program is available. For the non-recycled portion, a 15% material recovery credit is applied, reducing the EoL impact.
- **Waste to Landfill Emission Factor (illustrative):** 0.3 kgCO₂e/kg (for non-recycled portion)
- **Avoided Emissions from Recycling (illustrative):** -1.0 kgCO₂e/kg (credit for materials successfully recycled)

4. Emission Calculations (CO₂e)

This section details the calculation of GHG emissions (expressed in kgCO₂e) for each lifecycle stage, categorized according to the GHG Protocol.

4.1. Material Acquisition (Scope 3, Category 1)

The total carbon footprint from materials is directly summed from the provided BOM data.

Total Material Acquisition Emissions: 4.275 kgCO₂e

4.2. Production Energy (Scope 3, Category 1 for purchased electricity)

Emissions from energy consumed during manufacturing in China:

- Total energy consumed: 15 kWh/unit
- Non-renewable energy portion: $15 \text{ kWh} * (1 - 0.50) = 7.5 \text{ kWh}$
- Emissions from non-renewable energy: $7.5 \text{ kWh} * 0.577 \text{ kgCO}_2\text{e/kWh} = 4.3275 \text{ kgCO}_2\text{e}$
- Renewable energy portion: $15 \text{ kWh} * 0.50 = 7.5 \text{ kWh}$
- Emissions from renewable energy (assumed near zero for grid-connected renewable sources, though upstream emissions for renewable infrastructure exist, these are typically accounted for differently or are very low per kWh): $0 \text{ kgCO}_2\text{e}$

Total Production Energy Emissions: 4.328 kgCO₂e

4.3. Transportation and Distribution (Scope 3, Category 4 & 9)

Product weight for transport calculations: $0.5 \text{ kg} = 0.0005 \text{ tonnes}$.

- **Upstream Materials to Factory (Road):** $500 \text{ km} * 0.090 \text{ kgCO}_2\text{e/tonne-km} * 0.0005 \text{ tonnes} = 0.0225 \text{ kgCO}_2\text{e}$
- **Factory to Europe Port (Ocean):** $10,000 \text{ km} * 0.005 \text{ kgCO}_2\text{e/tonne-km} * 0.0005 \text{ tonnes} = 0.0250 \text{ kgCO}_2\text{e}$
- **Europe Port to Distribution Center (Road):** $500 \text{ km} * 0.090 \text{ kgCO}_2\text{e/tonne-km} * 0.0005 \text{ tonnes} = 0.0225 \text{ kgCO}_2\text{e}$
- **Last-Mile Delivery (Van):** $100 \text{ km} * 0.150 \text{ kgCO}_2\text{e/tonne-km} * 0.0005 \text{ tonnes} = 0.0075 \text{ kgCO}_2\text{e}$

Total Transportation Emissions: 0.0775 kgCO₂e

4.4. Use Phase (Scope 3, Category 11)

Emissions from product use over its lifespan in Europe:

- Annual energy consumption: 5 kWh/year
- Product lifespan: 3 years

- Total energy consumed during use: 5 kWh/year * 3 years = 15 kWh
- Emissions from use phase: 15 kWh * 0.181 kgCO₂e/kWh = 2.715 kgCO₂e

Total Use Phase Emissions: 2.715 kgCO₂e

4.5. End-of-Life (EoL) (Scope 3, Category 12)

Calculations for disposal and recycling:

- Product Weight: 0.5 kg
- Recycled portion: 0.5 kg * 0.70 = 0.35 kg
- Non-recycled portion: 0.5 kg * (1 - 0.70) = 0.15 kg
- Emissions from non-recycled to landfill: 0.15 kg * 0.3 kgCO₂e/kg = 0.045 kgCO₂e
- Avoided emissions from recycling credit: 0.35 kg * -1.0 kgCO₂e/kg = -0.35 kgCO₂e
- Circular program credit for non-recycled portion: 0.15 kg * -0.15 kgCO₂e/kg (15% of the -1.0 kgCO₂e/kg potential credit for the non-recycled portion if it were recovered) = -0.0225 kgCO₂e

Total End-of-Life Emissions: 0.045 - 0.35 - 0.0225 = -0.3275 kgCO₂e (Net Removal/Avoidance)

Summary of Total Product Carbon Footprint for nzxtmjfuzu

Lifecycle Stage	GHG Protocol Category	Emissions (kgCO ₂ e)
Material Acquisition & Manufacturing (Materials)	Scope 3, Category 1 (Purchased goods and services)	4.275
Material Acquisition & Manufacturing (Production Energy)	Scope 3, Category 1 (Purchased goods and services)	4.328
Transportation (Upstream)	Scope 3, Category 4 (Upstream)	0.0225
Total Product Carbon Footprint (kgCO₂e):		11.068

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Lifecycle Stage	GHG Protocol Category	Emissions (kgCO2e)
	transportation and distribution)	
Transportation (Midstream & Downstream)	Scope 3, Category 9 (Downstream transportation and distribution)	0.055
Use Phase	Scope 3, Category 11 (Use of sold products)	2.715
End-of-Life	Scope 3, Category 12 (End-of-life treatment of sold products)	-0.3275
Total Product Carbon Footprint (kgCO2e):		11.068

The total Product Carbon Footprint for nzxtmjfuzu is approximately 11.068 kgCO2e.

GHG Protocol Scope 3 Compliance and 2026 LSR Update

This analysis has categorized all relevant value chain emissions under Scope 3 categories, ensuring a comprehensive view. The calculated Scope 3 emissions cover all significant lifecycle stages of **nzxtmjfuzu**, achieving over 95% coverage as required by 2026 standards.

The **Land Sector and Removals (LSR) Standard (2026 Update)** provides accounting requirements for entities with significant land sector activities or those choosing to report CO2 removals. For **nzxtmjfuzu**, an electronic product, direct land-use emissions are not a primary driver of its footprint. However, the LSR Standard is acknowledged for its applicability to upstream agricultural products or bio-based materials, which might be present in a more granular BOM. For this analysis, no direct land-use change or biogenic carbon removal was identified as a significant impact area based on the provided parameters. If materials like wood or agricultural biomass were extensively used, a deeper

assessment under the LSR Standard would be required to quantify associated land management or land-use change emissions and removals.

5. Review & Report

5.1. Hotspot Identification

Based on the calculations, the primary emission hotspots for **nzxtmjfuzu** are:

- **Material Acquisition (approx. 38.6%):** Specifically, the Aluminium Casing, Circuit Board, and Lithium-ion Battery components contribute significantly due to their inherent production processes and raw material extraction.
- **Production Energy (approx. 39.1%):** Despite 50% renewable energy usage, the remaining reliance on the China grid mix for the illustrative 15 kWh/unit energy intensity is a substantial contributor.
- **Use Phase (approx. 24.5%):** The energy consumption during the 3-year lifespan, even with Europe's relatively lower grid emission factor, accumulates to a notable portion of the footprint.

Transportation, while spanning significant distances, has a comparatively smaller impact per unit, primarily due to the relatively low product weight and efficiency of ocean freight. The End-of-Life phase demonstrates a net avoidance of emissions due to high recyclability and circular economy initiatives.

5.2. Data Reliability and Recommendations

The reliability of this PCF analysis is contingent on the accuracy of the input parameters and the emission factors used. As this report utilizes illustrative data for several parameters (e.g., specific transport modes, distances, energy consumption, and generic emission factors from databases like Ecoinvent/DEFRA), the results should be considered indicative.

Recommendations for ikgtpnoioh:

- **Supplier Engagement:** Collaborate with material suppliers to obtain primary, product-specific emission data for BOM items, particularly for Aluminium, Circuit Boards, and Batteries, to refine the material acquisition footprint.
 - **Renewable Energy Adoption:** Explore opportunities to increase renewable energy penetration at the manufacturing facility in China, potentially through renewable energy certificates (RECs) or direct power purchase agreements (PPAs), to further reduce production emissions.
 - **Energy Efficiency in Use:** Invest in product design improvements that minimize energy consumption during the use phase, or provide users with guidance on energy-efficient operation.
 - **Circular Economy Enhancement:** Continue to strengthen circular economy initiatives and explore opportunities to increase recyclability rates beyond 70%, and consider material recovery strategies for challenging components.
 - **Lifecycle Assessment (LCA) Software:** Utilize specialized LCA software platforms that integrate up-to-date, geographically specific emission factor databases (e.g., Ecoinvent 3.9/3.10 or later versions) for more precise calculations and ongoing monitoring.
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