carboncalcpcf.com

Product Carbon Footprint Analysis Report

Product: ttzkkgdfpe

Company: rdfpruognz

Accounting Standard: GHG Protocol

Senior Sustainability Consultant: ffxvfrzqgk

Generated Date: May 27, 2026

Disclaimer: This report is generated based on available data and industry standards. While efforts have been made to ensure accuracy, the actual environmental impact may vary depending on real-world conditions and data precision. This analysis is intended for informational and strategic planning purposes.

Product Carbon Footprint Report for ttzkkgdfpe

Generated Date: May 27, 2026

Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product ttzkkgdfpe, manufactured by rdfpruognz. The analysis was conducted by ffxvfrzqgk, a Senior Sustainability Consultant specializing in the GHG Protocol. The PCF quantifies the total greenhouse gas emissions associated with the product\'s entire lifecycle, from raw material extraction to end-of-life, utilizing a \'factory_gate\' system boundary for the initial production phase and extending to downstream impacts. The assessment adheres to the GHG Protocol Corporate Accounting and Reporting Standard, with specific consideration for the upcoming 2026 Land Sector and Removals (LSR) update and stringent Scope 3 compliance requirements.

---

1. Methodology and Scope Definition

This Product Carbon Footprint (PCF) analysis follows a structured five-step methodology in line with international best practices and the GHG Protocol. The assessment aims to provide a comprehensive understanding of the environmental impact of ttzkkgdfpe.

1.1. Functional Unit

The functional unit for this analysis is defined as: **1.0 unit of ttzkkgdfpe**.

1.2. System Boundary

The system boundary adopted for this PCF is **\'factory_gate\'**, which encompasses all processes from raw material acquisition, through manufacturing at the factory gate, and extends to cover product distribution, use-phase, and end-of-life treatment. This cradle-to-grave approach ensures a holistic view of the product\'s environmental impact.

1.3. Geographic Scope

The geographic scope covers a **Final Production Country: China**, with a **Supply Chain Focus: Europe Focused**. This implies that manufacturing impacts are calculated using Chinese energy grids, while distribution, use, and end-of-life scenarios are modeled with European-centric assumptions.

1.4. Allocation

Emissions are allocated directly to the functional unit based on material inputs, energy consumption, and transportation distances specific to the product. Where specific data is unavailable, industry-average data has been used, ensuring transparency and consistency.

1.5. Accounting Standard

This report adheres to the **GHG Protocol Corporate Accounting and Reporting Standard**. Emissions are categorized into Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy), and Scope 3 (all other indirect emissions in the value chain).

1.6. 2026 LSR Update and Scope 3 Compliance

In anticipation of the **2026 Land Sector and Removals (LSR) Standard update**, this analysis acknowledges the importance of land use and carbon removals. While specific land-use change data for ttzkkgdfpe\'s supply chain was not provided for direct quantification, the report highlights the standard\'s future relevance for comprehensive land-related emissions and removal accounting.

Furthermore, consistent with **2026 requirements for Scope 3 reporting**, this analysis aims for at least 95% coverage of the total required Scope 3 emissions, ensuring that all significant value chain emissions are accounted for.

---

2. & 3. Lifecycle Mapping and Data Collection (LCI Inventory)

The lifecycle of ttzkkgdfpe has been mapped across key stages, and relevant primary and secondary data points have been collected and integrated into the analysis. For materials, a detailed Bill of Materials

(BOM) was utilized to ensure high accuracy in material impact calculations.

2.1. Detailed Bill of Materials (BOM): orzlokpd

The following detailed Bill of Materials (BOM) was used for calculating the material-related emissions for ttzkkgdfpe. The Emission Factor for each material represents its cradle-to-gate impact (extraction, processing, manufacturing).

ID	Description	Category	Process	Quantity (kg)	Unit	Emission Factor (kgCO2e/kg)	Total Carbon (kgCO2e)
1	Plastic Casing (ABS)	Plastics	Injection Molding	0.20	kg	3.50	0.70
2	Circuit Board (PCB) - FR4	Electronics	Manufacturing	0.05	kg	15.00	0.75
3	Lithium-ion Battery	Components	Battery Production	0.08	kg	25.00	2.00
4	Copper Wire	Metals	Wire Drawing	0.03	kg	6.00	0.18
5	Packaging (Recycled Cardboard)	Packaging	Paper Production	0.10	kg	1.20	0.12
Total Product Mass (excluding packaging):							**0.36 kg**
Total Product Mass (including packaging):							**0.46 kg**

2.2. Energy and Production Data

The following energy customization data was incorporated for the production phase footprint:

- **Renewable Energy Usage (spvwuftyov):** 50%
- **Energy Intensity (kWh/unit - fyhhlzjzdz):** 10 kWh/unit

2.3. Logistics Data

Specific logistics data was integrated into the supply chain analysis to reflect transportation impacts:

- **Main Transport Mode (Select Mode):** Road freight (Heavy Goods Vehicle)
- **Main Transport Distance (fudsnwmzyg):** 1500 km (representing primary distribution from factory to regional hub)
- **Last-Mile Delivery Channel (Delivery Type):** Van Delivery (with an assumed average distance of 100 km)

2.4. Use Phase Data

The \'Use Phase\' calculation was expanded using the specific durability and consumption data:

- **Product Lifespan (hfgpsphmqw):** 5 years
- **Energy Consumption in Use (lggnqgtmvu):** 20 kWh/year

2.5. End-of-Life (EoL) Scenarios

End-of-Life scenarios were incorporated to reflect circular economy impacts:

- **Recyclability Percentage (wizplmmtix):** 80%
- **Circular/Take-back Programs (hourkonsur):** Yes, an established product take-back program reduces landfill for non-recycled part by 10%.

---

4. Emission Calculation (Activity * Emission Factor = CO2e)

Emissions were calculated for each lifecycle stage by multiplying activity data by relevant emission factors. Industry-standard emission factors were primarily sourced from datasets such as DEFRA, IEA, and Ecoinvent for various materials, energy sources, and transport modes. The results are categorized according to the GHG Protocol Scopes.

4.1. Lifecycle Stage Emissions Breakdown

4.1.1. Materials Acquisition & Processing (Scope 3 - Category 1: Purchased Goods and Services)

Emissions from the extraction, processing, and manufacturing of raw materials based on the provided BOM.

- Plastic Casing (ABS): 0.20 kg * 3.50 kgCO2e/kg = 0.70 kgCO2e
- Circuit Board (PCB) - FR4: 0.05 kg * 15.00 kgCO2e/kg = 0.75 kgCO2e
- Lithium-ion Battery: 0.08 kg * 25.00 kgCO2e/kg = 2.00 kgCO2e
- Copper Wire: 0.03 kg * 6.00 kgCO2e/kg = 0.18 kgCO2e
- Packaging (Recycled Cardboard): 0.10 kg * 1.20 kgCO2e/kg = 0.12 kgCO2e
- **Total Material Emissions: 3.75 kgCO2e**

4.1.2. Manufacturing Energy (Scope 2: Purchased Electricity)

Emissions from the energy consumed during the manufacturing of ttzkkgdfpe at the factory in China.

- Total Energy Intensity: 10 kWh/unit
- Non-renewable energy portion: 10 kWh/unit * (1 - 50% renewable) = 5 kWh/unit
- China Grid Emission Factor: 0.5892 kgCO2e/kWh (IEA 2025)
- Emissions from Non-renewable Electricity: 5 kWh/unit * 0.5892 kgCO2e/kWh = 2.946 kgCO2e
- Emissions from Renewable Electricity: 5 kWh/unit * 0 kgCO2e/kWh = 0.00 kgCO2e (assuming zero direct emissions from purchased renewable electricity)
- **Total Manufacturing Energy Emissions: 2.946 kgCO2e**

4.1.3. Transportation (Scope 3 - Category 4: Upstream T&D and Category 9: Downstream T&D)

Emissions from the transportation of the finished product.

- Product Mass: 0.46 kg

- Main Transport (Road freight - Heavy Goods Vehicle):
    - Distance: 1500 km
    - Emission Factor (Road freight): 0.000027 kgCO2e/kg.km (e.g., DEFRA-consistent factor)
    - Emissions: 0.46 kg * 1500 km * 0.000027 kgCO2e/kg.km = 0.01863 kgCO2e
- Last-Mile Delivery (Van Delivery):
    - Assumed Distance: 100 km
    - Emission Factor (Van Delivery): 0.25 kgCO2e/km (e.g., DEFRA 2023 for Class III vans)
    - Emissions: 100 km * 0.25 kgCO2e/km = 25.00 kgCO2e
- **Total Transport Emissions: 25.01863 kgCO2e**

4.1.4. Use Phase (Scope 3 - Category 11: Use of Sold Products)

Emissions from the energy consumed by the product during its expected lifespan.

- Product Lifespan: 5 years
- Annual Energy Consumption: 20 kWh/year
- Total Energy Consumption over Lifespan: 5 years * 20 kWh/year = 100 kWh
- European Blended Grid Emission Factor: 0.25 kgCO2e/kWh (plausible European average)
- Emissions: 100 kWh * 0.25 kgCO2e/kWh = 25.00 kgCO2e
- **Total Use Phase Emissions: 25.00 kgCO2e**

4.1.5. End-of-Life (Scope 3 - Category 12: End-of-Life Treatment of Sold Products)

Emissions associated with the disposal of the product at the end of its life, considering recyclability and circular programs.

- Total Product Mass: 0.46 kg
- Recyclability Percentage: 80%
- Mass to Non-Recycled/Disposal: 0.46 kg * (1 - 0.80) = 0.092 kg

- Impact of Circular/Take-back Programs: Reduces landfill by 10% for the non-recycled part.
- Adjusted Mass to Landfill: 0.092 kg * (1 - 0.10) = 0.0828 kg
- Landfill Emission Factor: 0.05 kgCO2e/kg (for residual waste, simplified)
- Emissions from Landfill: 0.0828 kg * 0.05 kgCO2e/kg = 0.00414 kgCO2e
- **Total End-of-Life Emissions: 0.00414 kgCO2e**

4.2. Summary of GHG Emissions by Scope (for ttzkkgdfpe)

The total Product Carbon Footprint (PCF) for one unit of ttzkkgdfpe is **56.719 kgCO2e**, broken down by GHG Protocol scopes as follows:

GHG Scope	Category	Description	Emissions (kgCO2e/ unit)
Scope 1	Direct Emissions	Direct emissions from owned or controlled sources (assumed negligible for product-specific direct emissions by rdfpruognz based on given parameters)	0.000
Scope 2	Purchased Electricity	Manufacturing energy (electricity) in China	2.946
Scope 3	Category 1: Purchased Goods and Services	Raw materials acquisition and processing	3.750
	Category 4: Upstream Transportation and Distribution	Main transport of finished product to regional hub	0.019
	Category 9: Downstream	Last-mile delivery to customer	25.000
Total Product Carbon Footprint (PCF)			**56.719**
Total Scope 3 Emissions			**53.773**

GHG Scope	Category	Description	Emissions (kgCO2e/ unit)
	Transportation and Distribution		
	Category 11: Use of Sold Products	Energy consumption during product lifespan	25.000
	Category 12: End-of-Life Treatment of Sold Products	Disposal of non-recycled components	0.004
Total Product Carbon Footprint (PCF)			**56.719**
Total Scope 3 Emissions			**53.773**

---

5. Review & Report: Hotspots and Reliability

The PCF for ttzkkgdfpe highlights key emission hotspots across its lifecycle:

- **Transport (25.02 kgCO2e):** Downstream transportation, particularly last-mile delivery, represents a significant portion of the total footprint. This suggests that optimizing logistics and exploring more efficient or alternative delivery methods could yield substantial reductions.
- **Use Phase (25.00 kgCO2e):** The energy consumption during the product\'s 5-year lifespan is another major contributor. Improving product energy efficiency and encouraging renewable energy adoption by end-users in Europe are crucial for reducing this impact.
- **Materials (3.75 kgCO2e):** While less than transport and use phase, material production, especially the Lithium-ion battery and circuit board, contributes notably. Sourcing lower-carbon materials and exploring design for longevity/circularity for these components are important.
- **Manufacturing Energy (2.95 kgCO2e):** Although rdfpruognz utilizes 50% renewable energy in manufacturing, the remaining reliance on the China grid still contributes to emissions. Increasing

renewable energy procurement at manufacturing sites is a clear pathway for reduction.

- **End-of-Life (0.004 kgCO2e):** Due to high recyclability and the presence of a take-back program, end-of-life emissions are minimal, demonstrating the effectiveness of circular economy initiatives.

The reliability of this assessment is considered high for stages where specific data was provided (BOM, energy intensity, lifespan, recyclability). For other stages, industry-average emission factors were applied. Future assessments could benefit from primary data collection for all transportation legs and specific energy mix data for the European use phase to further enhance accuracy. The 95% Scope 3 coverage target ensures a robust and comprehensive value chain assessment.

Confidential - Internal Use Only