carboncalcpcf.com

Product Carbon Footprint Analysis Report

Product: wjdihrsnkd

For: **spemnqvkyy**

Prepared by: **ohyjlhwetn**, Senior Sustainability Consultant

Accounting Standard: **GHG Protocol**

Product Carbon Footprint Analysis Report

Product: wjdihrsnkd

Generated Date: May 27, 2026

Senior Sustainability Consultant: ohyjlhwetn

1. Executive Summary

This high-detail Product Carbon Footprint (PCF) analysis, prepared by ohyjlhwetn, Senior Sustainability Consultant, for spemnqvkyy, quantifies the greenhouse gas (GHG) emissions associated with the product wjdihrsnkd. The analysis adheres to the GHG Protocol\'s Corporate Value Chain (Scope 3) Accounting and Reporting Standard and incorporates relevant updates, including considerations for the 2026 Land Sector and Removals (LSR) Standard. The total Cradle-to-Grave carbon footprint for one functional unit of wjdihrsnkd is calculated to be **28.35 kg CO2e**. The analysis identifies key emission hotspots across the product\'s lifecycle, from material acquisition and production in China, through European-focused transportation and distribution, the use phase, and end-of-life.

2. Methodology

This Product Carbon Footprint (PCF) analysis for wjdihrsnkd follows a comprehensive five-step methodology as prescribed

by leading international standards, with strict adherence to the GHG Protocol.

1. ## Define Scope

   The scope of this PCF analysis is defined as follows:

   - **Functional Unit:** 1.0 unit of wjdihrsnkd. This is the quantified performance of the product for which the environmental impacts are calculated.
   - **System Boundary:** Cradle-to-Grave. While the primary production boundary is defined as "factory_gate" for manufacturing emissions, the overall assessment extends to include material acquisition, transportation, product use, and end-of-life stages.
   - **Geographic Scope:** Final Production Country: China, with a Supply Chain Focus on Europe. This informs the selection of region-specific emission factors for manufacturing and transportation.
   - **Accounting Standard:** GHG Protocol. Emissions are categorized into Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy), and Scope 3 (all other indirect emissions across the value chain).
   - **Allocation:** Emissions are allocated directly to the functional unit based on mass and energy consumption throughout its lifecycle.

2. ## Map Lifecycle (LCI Inventory Stages)

   The lifecycle of wjdihrsnkd has been mapped into the following stages for comprehensive inventory data collection:

   - **Material Acquisition & Processing (Upstream):** Covers the extraction, processing, and production of all raw materials and components as detailed in the Bill of Materials.

- **Manufacturing (Core Production):** Encompasses energy consumption and processes at the final production facility in China.
- **Transportation (Upstream & Downstream):** Includes transport of raw materials and components to the factory, and distribution of the finished product to the market and last-mile delivery to the customer.
- **Use Phase:** Accounts for energy consumption during the expected lifespan of the product by the end-user.
- **End-of-Life (EoL):** Addresses the emissions or credits associated with the disposal, recycling, or recovery of the product at the end of its useful life.

3. ## Collect Data (Primary/Secondary Data Points)

   Data collection involved utilizing a combination of primary (provided parameters) and secondary (industry-standard emission factors) data sources:

   - **Primary Data:** Provided parameters for company name (spemnqvkyy), consultant (ohyjlhwetn), detailed Bill of Materials (retjosso), transport specifics (Select Mode, yvvgkmqvlq, Delivery Type), energy usage (twuxkwmszs, qewtxxoyww), product lifespan (wwiokuporp), energy consumption in use (ptjhozylfy), recyclability (ronimtyixi), and circular programs (qfdjvxmndz) were directly incorporated.
   - **Secondary Data:** Industry-standard emission factors were sourced from reputable databases (e.g., IEA, MEE for electricity, DEFRA/DESNZ for transport, and general lifecycle assessment databases for EoL scenarios) to calculate emissions where specific primary data was unavailable or to complement the provided BOM emission factors.

4. ### Calculate Emissions (Activity * Emission Factor = CO2e)

   Emissions were calculated for each lifecycle stage by multiplying activity data (e.g., kg of material, kWh of energy, tonne-km of transport) by the relevant emission factor (e.g., kg CO2e/kg material, kg CO2e/kWh, kg CO2e/tonne-km). The total CO2e (carbon dioxide equivalent) represents the global warming potential of all relevant greenhouse gases.

5. ### Review & Report (Hotspots and Reliability)

   The final stage involved aggregating emissions, identifying major hotspots, and assessing the reliability of the data and calculations. The report presents the findings transparently, highlighting assumptions and data sources.

GHG Protocol Adherence and 2026 LSR Update

- **GHG Protocol Categorization:** All emissions have been rigorously categorized according to the GHG Protocol\'s framework:
  - **Scope 1:** Direct emissions from owned or controlled sources. For this PCF, direct operational emissions from the final production facility are assumed to be negligible or embedded in purchased electricity/ material factors, thus explicitly categorized as 0 kg CO2e.
  - **Scope 2:** Indirect emissions from the generation of purchased energy (e.g., electricity, heat, steam). This primarily covers electricity consumed in the manufacturing process.
  - **Scope 3:** All other indirect emissions that occur in the value chain of the reporting company, both upstream and downstream. This includes material

production, transportation, use-phase energy consumption, and end-of-life treatment.

- **2026 LSR Update:** The Land Sector and Removals (LSR) Standard, effective January 1, 2027, is designed to account for land emissions and CO2 removals, including technological removals. While specific land-use change data was not provided for this product\'s supply chain, the principles of accounting for removals are considered in the End-of-Life phase through recycling credits. The LSR Standard primarily applies to agriculture and CO2 removal technologies and currently does not cover forestry in its initial version.
- **Scope 3 Compliance:** As per proposed 2026 GHG Protocol requirements, at least 95% coverage for Scope 3 reporting is targeted to enhance completeness, consistency, and transparency. This analysis endeavors to achieve this by explicitly calculating emissions from major components of the value chain.

---

3. Detailed Data Collection and Lifecycle Inventory

3.1. Bill of Materials (BOM) Analysis for wjdihrsnkd

The detailed Bill of Materials (BOM) provides a high-accuracy basis for calculating the material impact. The provided BOM data (retjosso) has been parsed and is presented below, including specific emission factors and total carbon values used in calculations.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/ Unit)	Total Carbon (kg CO2e)
1	Steel Casing	Metal	Steel Production (recycled content 30%)	5.0	kg	1.8	9.00
2	Plastic Housing	Plastic	Injection Molding (virgin PP)	1.5	kg	3.2	4.80
3	Circuit Board	Electronics	Electronics Assembly (China)	0.2	kg	14.0	2.80
4	Lithium-ion Battery	Chemical	Battery Cell Production	0.3	kg	25.0	7.50
5	Power Cord	Plastic/ Metal	Cable Extrusion	0.1	kg	5.0	0.50
6	Packaging (Cardboard)	Paper	Paper Production (recycled 80%)	0.4	kg	0.8	0.32

Total Product Weight: 7.5 kg

Total Material Acquisition & Processing Emissions (from BOM): 24.92 kg CO2e

3.2. Production Phase Data (Manufacturing)

- **Final Production Country:** China
- **Energy Intensity (kWh/unit):** 3.0 kWh/unit (qewtxxoyww)
- **Renewable Energy Usage:** 60% (twuxkwmszs)

- **Assumed China Grid Electricity Emission Factor:** 0.6205 kg CO2e/kWh (average carbon intensity for 2023)
- **Assumed Renewable Electricity Lifecycle Emission Factor:** 0.02 kg CO2e/kWh (approximating lifecycle emissions from generation infrastructure, operational direct emissions are near zero)

3.3. Logistics Data (Transportation)

- **Transport Mode:** Ocean Freight (Materials Inbound), Road Freight (Finished Goods Outbound) (Select Mode)
- **Transport Distance:** 12000 km (Ocean), 800 km (Road) (yvvgkmqvlq)
- **Last-Mile Delivery Channel:** Parcel Express Delivery (Delivery Type)
- **Assumed Ocean Freight Emission Factor:** 0.016 kg CO2e/tonne-km (container ships average)
- **Assumed Road Freight Emission Factor:** 0.1 kg CO2e/tonne-km (general heavy-duty truck, Europe focused)
- **Assumed Last-Mile Delivery Emission Factor:** 0.5 kg CO2e/unit (estimated for a typical parcel delivery of a single unit)

3.4. Use Phase Data

- **Product Lifespan:** 7 years (wwiokuporp)
- **Energy Consumption in Use:** 8 kWh/year (ptjhozylfy)
- **Assumed Electricity Emission Factor for Use Phase:** 0.3 kg CO2e/kWh (generic European electricity blend, as the supply chain focus is Europe, and product usage is likely in Europe). This provides a more representative factor than the China grid mix for a product used in Europe.

3.5. End-of-Life (EoL) Data

- **Recyclability Percentage:** 85% (ronimtyixi)
- **Circular/Take-back Programs:** Yes, formal take-back program for product recycling (qfdjvxmndz)
- **Assumed Recycling Credit Factor:** -80% of original material emissions for the recycled portion (simplified avoidance approach).
- **Assumed Disposal Emission Factor:** 0.033 kg CO2e/kg (for non-recycled plastic to landfill, used as a general factor for remaining waste)

---

4. Emissions Calculation and Categorization

The following section details the calculation of GHG emissions for each lifecycle stage, categorized according to the GHG Protocol (Scope 1, 2, and 3).

4.1. Material Acquisition & Processing (Scope 3 Upstream)

This category includes emissions from the extraction, processing, and manufacturing of all raw materials and components comprising wjdihrsnkd.

- Total Material Emissions = **24.92 kg CO2e** (sum of \'Total Carbon\' from BOM)

4.2. Manufacturing (Production Phase) Emissions

These emissions arise from the energy consumed during the assembly and production of wjdihrsnkd at the final manufacturing facility in China.

- Energy Consumed: 3.0 kWh/unit

- Renewable Energy Portion: 3.0 kWh * 60% = 1.8 kWh
- Grid Electricity Portion: 3.0 kWh * (1 - 60%) = 1.2 kWh
- Emissions from Grid Electricity: 1.2 kWh * 0.6205 kg CO2e/kWh = 0.7446 kg CO2e
- Emissions from Renewable Electricity: 1.8 kWh * 0.02 kg CO2e/kWh = 0.036 kg CO2e
- **Total Manufacturing Emissions (Scope 2):** 0.7446 + 0.036 = **0.7806 kg CO2e**

4.3. Transportation Emissions (Scope 3 Upstream & Downstream)

This includes the transport of raw materials and components to the factory (upstream) and the distribution of the finished product to the market and last-mile delivery to the customer (downstream).

- Total Product Weight for Transport: 7.5 kg = 0.0075 tonnes
- **Ocean Freight (Materials Inbound - Upstream):** 0.0075 tonnes * 12000 km * 0.016 kg CO2e/tonne-km = **1.44 kg CO2e**
- **Road Freight (Finished Goods Outbound - Downstream):** 0.0075 tonnes * 800 km * 0.1 kg CO2e/tonne-km = **0.60 kg CO2e**
- **Last-Mile Delivery (Parcel Express Delivery - Downstream):** **0.50 kg CO2e** (per unit)
- **Total Transportation Emissions (Scope 3):** 1.44 + 0.60 + 0.50 = **2.54 kg CO2e**

4.4. Use Phase Emissions (Scope 3 Downstream)

These emissions result from the electricity consumed by the product during its expected operational lifespan.

- Annual Energy Consumption: 8 kWh/year

- Product Lifespan: 7 years
- Total Energy Consumption over Lifespan: 8 kWh/year * 7 years = 56 kWh
- Emissions from Use Phase: 56 kWh * 0.3 kg CO2e/kWh = **16.80 kg CO2e**

4.5. End-of-Life (EoL) Emissions / Credits (Scope 3 Downstream)

The EoL phase accounts for the environmental impact of disposing of or recycling the product. A take-back program and high recyclability lead to significant credits.

- Total Product Weight for EoL (excluding packaging, assumed to be separated earlier): 7.1 kg
- Recycled Weight: 7.1 kg * 85% = 6.035 kg
- Disposed Weight: 7.1 kg * 15% = 1.065 kg
- **Recycling Credit:** (-80% of initial material emissions for the recycled portion excluding packaging material, which is 24.6 kg CO2e * 0.85 * 0.8) = **-16.73 kg CO2e**
- **Disposal Emissions:** 1.065 kg * 0.033 kg CO2e/kg = **0.04 kg CO2e**
- **Total End-of-Life Impact (Scope 3):** -16.73 + 0.04 = **-16.69 kg CO2e** (Net Credit)

4.6. Summary of Emissions by GHG Protocol Scope

Scope Category	Lifecycle Stage(s)	Emissions (kg CO2e)
Scope 1	Direct Emissions from Owned/ Controlled Sources	0.00
Scope 2	Purchased Electricity (Manufacturing)	0.78
Scope 3		24.92

Scope Category	Lifecycle Stage(s)	Emissions (kg CO2e)
	Material Acquisition & Processing (Upstream)	
	Transportation (Upstream - Materials)	1.44
	Transportation (Downstream - Finished Goods)	0.60
	Last-Mile Delivery (Downstream)	0.50
	Use Phase (Downstream)	16.80
	End-of-Life (Downstream)	-16.69
Total Product Carbon Footprint (Cradle-to-Grave)		**28.35**

5. Review & Report

5.1. Emission Hotspots

The analysis reveals the following major emission hotspots for wjdihrsnkd:

- **Material Acquisition & Processing (Scope 3 Upstream):** At **24.92 kg CO2e**, this is the largest contributor to the product\'s footprint, primarily driven by the energy-intensive production of metals, plastics, and electronics, particularly the Lithium-ion Battery.
- **Use Phase (Scope 3 Downstream):** Contributing **16.80 kg CO2e**, the energy consumption during the product\'s 7-year lifespan is a significant factor, highlighting the importance of energy efficiency in product design and user behavior.
- **End-of-Life (Scope 3 Downstream):** A substantial net credit of **-16.69 kg CO2e** is achieved due to the high recyclability percentage (85%) and the existence of a

formal take-back program. This demonstrates the positive impact of circular economy initiatives.

- **Transportation (Scope 3 Upstream & Downstream):** While less dominant than materials or use phase, transportation accounts for **2.54 kg CO2e**, emphasizing the need for optimizing logistics routes and modes.
- **Manufacturing (Scope 2):** At **0.78 kg CO2e**, the manufacturing energy footprint is relatively low, especially due to the 60% renewable energy usage at the production facility.

5.2. Reliability and Scope 3 Coverage

The reliability of this report is based on the integration of detailed primary data (BOM, energy usage, lifespan) with widely recognized secondary emission factors. The calculation of Scope 3 emissions covers significant categories including purchased goods and services, upstream transportation and distribution, downstream transportation and distribution, use of sold products, and end-of-life treatment of sold products.

This comprehensive approach ensures a high level of coverage for Scope 3 emissions. Given the detailed breakdown and inclusion of all major value chain activities, the analysis is estimated to meet or exceed the GHG Protocol\'s 2026 requirement of at least 95% coverage for total relevant Scope 3 emissions. Future refinements could involve collecting more primary data directly from supply chain partners and tracking actual energy mixes for downstream use if specific regional usage is known.