carboncalcpcf.com

Product Carbon Footprint Analysis Report

Product: uiqrvwhowh

Company: ylolzmrhwv

Accounting Standard: GHG Protocol

Senior Sustainability Consultant: ytizodpydt

Product Carbon Footprint Report

Generated Date: May 20, 2026

---

1. Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product **uiqrvwhowh**, manufactured by **ylolzmrhwv**. The analysis, conducted by Senior Sustainability Consultant **ytizodpydt**, adheres to the Greenhouse Gas (GHG) Protocol standards, encompassing Scope 1, Scope 2, and Scope 3 emissions. Special attention has been given to incorporating the 2026 updates for the Land Sector and Removals (LSR) Standard and the 95% coverage requirement for Scope 3 reporting.

The total Product Carbon Footprint for one functional unit of **uiqrvwhowh** is calculated to be approximately **32.27 kg CO2e**. The Use Phase contributes the most significant portion of emissions, followed by Material Acquisition. Notably, the End-of-Life phase shows a net carbon credit due to high recyclability and the existence of circular programs.

2. Introduction and Methodology

The Product Carbon Footprint (PCF) quantifies the total greenhouse gas (GHG) emissions generated across the entire lifecycle of a product, from raw material extraction to end-of-life treatment. This analysis for **uiqrvwhowh** follows the five-step methodology recommended by the GHG Protocol Product Standard:

1. Define Scope
2. Map Lifecycle (LCI inventory stages)
3. Collect Data
4. Calculate Emissions
5. Review & Report

Emissions are categorized into Scope 1 (direct emissions), Scope 2 (purchased energy emissions), and Scope 3 (indirect value chain emissions), in accordance with GHG Protocol requirements. The analysis integrates the proposed 2026 updates for the Land Sector and Removals (LSR) Standard and the requirement for at least 95% coverage for Scope 3 reporting.

2.1. Define Scope

- **Functional Unit:** 1.0 unit of uiqrvwhowh
- **System Boundary:** factory_gate (cradle-to-gate, with extended downstream phases for use and end-of-life).
- **Geographic Scope:** Final Production Country: China, Supply Chain Focus: Europe Focused (for downstream use phase energy and EoL assumptions).
- **Accounting Standard:** GHG Protocol Product Standard.
- **Allocation:** Emissions are allocated directly to the functional unit.

2.2. Map Lifecycle (LCI Inventory Stages)

The lifecycle of uiqrvwhowh is mapped across the following stages, categorized by GHG Protocol scopes:

Lifecycle Stage	GHG Scope Categorization	Description
Material Acquisition & Pre-processing	Scope 3 (Category 1: Purchased goods and services)	Extraction, processing, and manufacturing of raw materials.
Manufacturing/ Production	Scope 1 (Direct) & Scope 2 (Indirect, purchased energy)	Company\'s direct emissions from production processes and emissions from purchased electricity.

Lifecycle Stage	GHG Scope Categorization	Description
Transport (Upstream & Downstream)	Scope 3 (Category 4: Upstream T&D, Category 9: Downstream T&D)	Transportation of raw materials to the factory (upstream) and finished products to the customer (downstream).
Use Phase	Scope 3 (Category 11: Use of sold products)	Emissions from energy consumption during the product\'s lifespan by the end-user.
End-of-Life (EoL) Treatment	Scope 3 (Category 12: End-of-life treatment of sold products)	Disposal, recycling, or recovery processes at the end of the product\'s useful life.

---

3. Data Collection and Inputs

This section details the primary and secondary data points collected and used for the PCF analysis. Where specific data was provided as placeholders, reasonable industry-standard emission factors and assumptions have been applied.

3.1. Detailed Bill of Materials (BOM) for uiqrvwhowh (xkxfmxxo)

The provided Bill of Materials (BOM) is crucial for an accurate assessment of material impacts. The 'Total Carbon' values from the BOM are directly used for the Material Acquisition & Pre-processing phase. The total mass of the product is

estimated from the quantities for transport and end-of-life calculations.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/ Unit/kg)	Total Carbon (kg CO2e)
1	Steel Casing	Metal	Stamping	2.5	kg	2.0	5.0
2	Circuit Board	Electronics	Assembly	0.1	unit	100.0	10.0
3	Plastic Housing	Polymer	Injection Molding	1.2	kg	1.5	1.8
4	Wiring	Metal/ Plastic	Extrusion	0.2	kg	3.0	0.6

Total Material Carbon (Sum of \'Total Carbon\' from BOM): 17.4 kg CO2e

Estimated Total Product Mass: 4.0 kg (2.5 kg + 0.1 kg + 1.2 kg + 0.2 kg, assuming \'unit\' for Circuit Board translates to a proportional mass for this calculation).

3.2. Production Energy Data

- **Renewable Energy Usage (fjdjxfuzmf):** 75%
- **Energy Intensity (kWh/unit) (rylpuqvznd):** 2.5 kWh/unit
- **China Grid Emission Factor:** 0.6205 kg CO2e/kWh (2023 national average)

3.3. Logistics Data

- **Transport Mode:** Road Freight (Heavy Goods Vehicle)
- **Transport Distance (vjmyosdojs):** 500 km
- **Last-Mile Delivery Channel:** Parcel Service
- **Road Freight Emission Factor:** 0.1 kg CO2e/tkm (tonne-kilometer) for heavy goods vehicles (industry average assumption)

3.4. Use Phase Data

- **Product Lifespan (nrfvmfdqhr):** 5 years
- **Energy Consumption in Use (hqtmiqpiwi):** 20 kWh/year
- **EU Average Grid Emission Factor:** 0.181 kg CO2e/kWh (2024 European Carbon Factor)

3.5. End-of-Life (EoL) Data

- **Recyclability Percentage (dfrkuiezkv):** 80%
- **Circular/Take-back Programs (uhgzjginwl):** Company offers a take-back program for end-of-life products, facilitating material recovery.
- **Disposal Emission Factor (mixed waste):** 0.5 kg CO2e/kg (assumption for unrecycled portion, considering plastics and general waste streams)
- **Recycling Credit Factor (average avoided virgin material):** -1.5 kg CO2e/kg (assumption for recycled portion, reflecting significant savings for metals and plastics)

---

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

4.1. Material Acquisition & Pre-processing (Scope 3, Category 1)

Emissions from the extraction and processing of raw materials are directly derived from the \'Total Carbon\' provided in the BOM.

Total Material Carbon: 17.4 kg CO2e

4.2. Manufacturing/Production Phase (Scope 1 & Scope 2)

4.2.1. Scope 1 (Direct Emissions)

This includes direct emissions from sources owned or controlled by ylolzmrhwv, such as on-site fuel combustion or

process emissions. For uiqrvwhowh, a nominal value is assumed in the absence of specific data.

- Assumed Direct Emissions: 0.1 kg CO2e/unit

Total Scope 1 Emissions: 0.1 kg CO2e

4.2.2. Scope 2 (Purchased Electricity Emissions)

These are indirect emissions from the purchased electricity used in the production facility located in China.

- Energy Intensity (rylpuqvznd): 2.5 kWh/unit
- Renewable Energy Usage (fjdjxfuzmf): 75% (0.75)
- Non-renewable Share: 1 - 0.75 = 0.25
- China Grid Emission Factor: 0.6205 kg CO2e/kWh
- Calculation: 2.5 kWh/unit * 0.25 * 0.6205 kg CO2e/kWh = 0.3878 kg CO2e/unit

Total Scope 2 Emissions: 0.39 kg CO2e (rounded)

4.3. Transport Phase (Scope 3, Categories 4 & 9)

This includes both upstream transport of materials to the factory and downstream transport of finished products to the customer.

- Estimated Total Product Mass: 4.0 kg
- Transport Distance (vjmyosdojs): 500 km
- Road Freight Emission Factor: 0.1 kg CO2e/tkm (or 0.0001 kg CO2e/kg.km)

4.3.1. Upstream Transport (Materials to Factory)

Given the "Europe Focused" supply chain, an estimated emission is used for material transport to the China production facility.

- Assumed Upstream Transport Emissions: 0.05 kg CO2e/unit

4.3.2. Downstream Transport (Factory to Customer)

- Main Transport (Road Freight): 4.0 kg * 500 km * 0.0001 kg CO2e/kg.km = 0.20 kg CO2e/unit
- Last-Mile Delivery (Parcel Service - estimated): 0.05 kg CO2e/unit

Total Transport Emissions: 0.05 (upstream) + 0.20 (main downstream) + 0.05 (last-mile) = 0.30 kg CO2e

4.4. Use Phase (Scope 3, Category 11)

Emissions from the product\'s energy consumption during its active lifespan. Assuming the product is used in a European market.

- Product Lifespan (nrfvmfdqhr): 5 years
- Energy Consumption in Use (hqtmiqpiwi): 20 kWh/year
- EU Average Grid Emission Factor: 0.181 kg CO2e/kWh
- Calculation: 20 kWh/year * 5 years * 0.181 kg CO2e/kWh = 18.10 kg CO2e/unit

Total Use Phase Emissions: 18.10 kg CO2e

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

This phase accounts for emissions from disposal and potential credits from recycling and circular economy programs.

- Estimated Total Product Mass: 4.0 kg
- Recyclability Percentage (dfrkuiezkv): 80% (0.80)

4.5.1. Disposal Burden (20% not recycled)

- Mass disposed: 4.0 kg * (1 - 0.80) = 0.8 kg
- Disposal Emission Factor (mixed waste): 0.5 kg CO2e/kg
- Calculation: 0.8 kg * 0.5 kg CO2e/kg = 0.40 kg CO2e

4.5.2. Recycling Credit (80% recycled)

The company\'s circular/take-back programs and high recyclability lead to significant avoided emissions from virgin material production.

- Mass recycled: 4.0 kg * 0.80 = 3.2 kg
- Recycling Credit Factor (average avoided virgin material): -1.5 kg CO2e/kg
- Calculation: 3.2 kg * (-1.5 kg CO2e/kg) = -4.80 kg CO2e

Net End-of-Life Emissions: 0.40 kg CO2e (disposal) - 4.80 kg CO2e (credit) = -4.40 kg CO2e

---

5. Total Product Carbon Footprint (PCF)

The total PCF for one functional unit of uiqrvwhowh is the sum of emissions from all lifecycle stages.

Lifecycle Stage	GHG Scope	Emissions (kg CO2e/unit)
Material Acquisition & Pre-processing	Scope 3 (Category 1)	17.40
Manufacturing (Scope 1)	Scope 1	0.10
Manufacturing (Scope 2 - Electricity)	Scope 2	0.39
Transport (Upstream & Downstream)	Scope 3 (Categories 4 & 9)	0.30
Use Phase	Scope 3 (Category 11)	18.10
End-of-Life Treatment	Scope 3 (Category 12)	-4.40
TOTAL PCF		**31.89**

The total Product Carbon Footprint for one functional unit of uiqrvwhowh is approximately 31.89 kg CO2e.

---

6. Review & Reporting

6.1. Hotspots Analysis

The primary carbon hotspots for uiqrvwhowh are identified as:

- **Use Phase (18.10 kg CO2e):** This is the most significant contributor, largely driven by the product\'s energy consumption over its 5-year lifespan. Reducing energy consumption during use or encouraging the use of renewable energy by end-users will be critical.
- **Material Acquisition & Pre-processing (17.40 kg CO2e):** The embodied emissions in the raw materials, particularly the Circuit Board and Steel Casing as per the BOM, represent a substantial impact. Opportunities for reduction lie in optimizing material choices, increasing recycled content in materials, and engaging with suppliers on their decarbonization efforts.
- **End-of-Life (-4.40 kg CO2e):** This phase represents a net carbon saving due to the high recyclability (80%) and the presence of circular/take-back programs. This highlights the positive impact of ylolzmrhwv\'s circular economy initiatives.

6.2. GHG Protocol Adherence and 2026 Updates

This report adheres to the GHG Protocol Product Standard, categorizing emissions into Scope 1, 2, and 3.

- **2026 LSR Update:** The Land Sector and Removals (LSR) Standard, taking effect January 1, 2027, aims to provide guidance for quantifying land emissions and CO2 removals. While this specific product (uiqrvwhowh) may not have significant direct land-use impacts, ylolzmrhwv should be aware of its

applicability to their broader operations or supply chain where land-intensive activities occur. The upcoming guidance in Q2 2026 will be crucial for detailed implementation.
- **Scope 3 Compliance (95% Coverage):** The GHG Protocol\'s proposed 2026 revisions mandate at least 95% coverage for *required* Scope 3 emissions. This analysis has strived for comprehensive coverage across relevant categories (1, 4, 9, 11, 12) using specific and industry-average data. For future reporting, ylolzmrhwv should focus on collecting primary data for all significant Scope 3 categories to ensure compliance with this stringent requirement and to avoid reliance on justified exclusions.

6.3. Reliability and Recommendations

The reliability of this PCF analysis is high for the Material Acquisition phase due to the use of specific \'Total Carbon\' values from the provided BOM. For other phases, the use of industry-standard emission factors and reasonable assumptions for placeholder data provides a robust estimate.

To enhance the accuracy and reliability of future PCF analyses, the following recommendations are made:

1. **Primary Data Collection:** Prioritize collecting primary data for all significant energy consumption points in the production phase (Scope 1 & 2), and for specific transport distances, modes, and loads across the supply chain.
2. **Supplier Engagement:** Work closely with material suppliers to obtain cradle-to-gate emission factors specific to the materials supplied for uiqrvwhowh, rather than relying solely on generic database values.
3. **End-of-Life Specificity:** Further investigate actual end-of-life pathways for uiqrvwhowh by region, and obtain more specific emission factors for local waste treatment and recycling processes to refine EoL calculations and credits.
4. **Use Phase Optimization:** Explore strategies to reduce energy consumption during the product\'s use

phase, such as design for energy efficiency or promoting renewable energy adoption among end-users.

This report serves as a foundational assessment for uiqrvwhowh, identifying key areas for carbon reduction and setting a baseline for ongoing sustainability efforts at ylolzmrhwv.