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Product Carbon Footprint Analysis Report

Product: hqm1lezdkg

Company: ulpzlnwize

**Accounting Standard: GHG
Protocol**

**Senior Sustainability Consultant:
rxyzwxoukn**

This report is generated based on available data,
industry standards, and specified parameters.
Assumptions have been made where specific
data was not provided for illustrative calculation
purposes.

Generated Date: June 4, 2026

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Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product hqmllezdkg, manufactured by ulpzlnwize. The analysis was performed by rxyzwxoukn, Senior Sustainability Consultant, adhering strictly to the GHG Protocol accounting standards. The total Product Carbon Footprint for hqmllezdkg is calculated to be approximately **44.24 kgCO₂e per functional unit**, encompassing emissions across material acquisition, manufacturing, transportation, use phase, and end-of-life. The use phase and material impacts represent the most significant hotspots, indicating key areas for reduction efforts.

1. Scope Definition

The scope of this Product Carbon Footprint (PCF) analysis for hqmllezdkg is defined as follows:

- **Functional Unit:** 1.0 unit of hqmllezdkg.
- **System Boundary:** Cradle-to-grave, with a '\factory_gate\' focus for immediate operational control, extending to cover the full lifecycle.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kgCO ₂ e/unit)	Total Carbon Footprint (kgCO ₂ e)
			Injection Molding				
Material3	Silicon Wafer	Electronics	Semiconductor Mfg	0.01	unit	100.0	1.0
Material4	Copper Wire	Metals	Drawing	0.1	kg	5.0	0.5
Material5	Packaging Cardboard	Packaging	Pulping & Forming	0.3	kg	0.8	0.2
Subtotal Material Emissions (Scope 3 - Upstream):							12 kgCO ₂ e

2.2. Manufacturing/Production (ulpzlnwize Operations)

Energy consumption data for the production phase of hqmllezdkg at ulpzlnwize\'s facilities:

- **Renewable Energy Usage:** wmnioyquxo = 75% (Assumed for calculation)
- **Energy Intensity (kWh/unit):** quewixmjfq = 1.5 kWh/unit (Assumed for calculation)
- **Final Production Country:** China

2.3. Transport and Distribution

Logistics data incorporated into the supply chain analysis:

- **Primary Transport Mode (Raw materials to factory):** Select Mode = Ocean Freight (Assumed for calculation)
- **Primary Transport Distance (Raw materials to factory):** gdezurhpr = 10,000 km (Assumed for calculation)

- **Last-Mile Delivery Channel (Finished product to consumer):** Delivery Type = Road Freight (Assumed for calculation)
- **Last-Mile Delivery Distance:** 500 km (Assumed for calculation)

2.4. Use Phase

Durability and consumption data for the product's use phase:

- **Product Lifespan:** rpmkoowtqn = 5 years (Assumed for calculation)
- **Energy Consumption in Use:** mysfxhwpvg = 10 kWh/year (Assumed for calculation)

2.5. End-of-Life (EoL)

EoL scenarios reflecting circular economy impacts:

- **Recyclability Percentage:** vwkhviwtqx = 80% (Assumed for calculation)
- **Circular/Take-back Programs:** ypmkzwnxsv = Yes, through authorized collection points (Assumed for calculation)
- **Assumed Product Weight at EoL:** 1.5 kg (including packaging, based on BOM)

3. Emission Calculation

Emissions are calculated by multiplying activity data by relevant emission factors. Categorization follows the GHG Protocol standards for Scope 1, Scope 2, and Scope 3 emissions. Industry-standard emission factors from sources like Ecoinvent/DEFRA (or similar authoritative databases) are used, as detailed below.

3.1. Assumptions for Emission Factors

- **Electricity (China Grid Average):** 0.6205 kgCO₂e/kWh (Based on China's national average for 2023).
- **Ocean Freight (Container Ship):** 0.016 kgCO₂e/tkm (tonne-kilometer).
- **Road Freight (Heavy Goods Vehicle, HGV):** 0.105 kgCO₂e/tkm.
- **End-of-Life (Landfill for mixed waste):** 0.75 kgCO₂e/kg.
- **Renewable energy emissions:** 0.0 kgCO₂e/kWh (assuming certified renewable energy with zero upstream emissions).

3.2. Detailed Emissions Breakdown

3.2.1. Materials Acquisition and Production (Scope 3 - Upstream)

The total carbon impact from the raw materials and their respective production processes, as provided in the Detailed Bill of Materials (xxpngsxy), is directly used.

Emissions: 12.44 kgCO₂e

3.2.2. Manufacturing/Production (Scope 2)

Emissions from purchased electricity at ulpzlnwize's manufacturing facilities.

- Total Energy Intensity: 1.5 kWh/unit
- Renewable Energy Usage: 75%
- Non-renewable energy portion: $1.5 \text{ kWh/unit} * (1 - 0.75) = 0.375 \text{ kWh/unit}$
- Emission Factor (China Grid): 0.6205 kgCO₂e/kWh

Emissions: $0.375 \text{ kWh/unit} * 0.6205 \text{ kgCO}_2\text{e/kWh} =$
0.233 kgCO₂e (rounded)

3.2.3. Transport and Distribution (Scope 3 - Upstream & Downstream)

Emissions from the transportation of raw materials to the factory (upstream) and finished products to the consumer (downstream). Assumed product weight for transport is 1.5 kg.

- **Primary Transport (Upstream - Raw materials to factory):**

- Mode: Ocean Freight
- Distance: 10,000 km
- Emission Factor: 0.016 kgCO₂e/tkm
- Calculation: $(1.5 \text{ kg} / 1000 \text{ kg/tonne}) * 10,000 \text{ km} * 0.016 \text{ kgCO}_2\text{e/tkm} = 0.24 \text{ kgCO}_2\text{e}$

- **Last-Mile Delivery (Downstream - Finished product to consumer):**

- Mode: Road Freight
- Distance: 500 km
- Emission Factor: 0.105 kgCO₂e/tkm
- Calculation: $(1.5 \text{ kg} / 1000 \text{ kg/tonne}) * 500 \text{ km} * 0.105 \text{ kgCO}_2\text{e/tkm} = 0.079 \text{ kgCO}_2\text{e}$ (rounded)

Total Transport Emissions: $0.24 \text{ kgCO}_2\text{e} + 0.079 \text{ kgCO}_2\text{e} =$
0.319 kgCO₂e

3.2.4. Use Phase (Scope 3 - Downstream)

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

- Product Lifespan: 5 years
- Energy Consumption in Use: 10 kWh/year

- Total Energy Consumption: 5 years * 10 kWh/year = 50 kWh
- Emission Factor (China Grid, assuming consumer electricity): 0.6205 kgCO₂e/kWh

Emissions: 50 kWh * 0.6205 kgCO₂e/kWh = **31.025 kgCO₂e**

3.2.5. End-of-Life (EoL) Treatment (Scope 3 - Downstream)

Emissions from the disposal of the product at the end of its life, considering recyclability and take-back programs.

- Total Product Weight at EoL: 1.5 kg
- Recyclability Percentage: 80%
- Waste to Landfill: 1.5 kg * (1 - 0.80) = 0.3 kg
- Landfill Emission Factor: 0.75 kgCO₂e/kg

Emissions: 0.3 kg * 0.75 kgCO₂e/kg = **0.225 kgCO₂e**

3.3. Application of 2026 LSR Update (Land Sector and Removals Standard)

The GHG Protocol Land Sector and Removals (LSR) Standard was released on January 30, 2026, and officially takes effect on January 1, 2027. This standard provides critical requirements for quantifying, reporting, and tracking land sector emissions (such as those from land use change, land management, and biogenic products) and CO₂ removals. For this analysis, while specific land-use change data for product components or operations was not provided, the commitment to applying the LSR Standard for future, more granular assessments is noted. Its implementation will be crucial for companies like ulpzlnwize, particularly those involved in agriculture or utilizing biomass, to set

science-based targets and comply with evolving regulations.

3.4. Scope 3 Compliance

As per 2026 requirements, a minimum of 95% coverage for Scope 3 reporting is targeted.

Total Calculated PCF: 44.24 kgCO₂e

Total Scope 3 Emissions: 12.44 (Materials) + 0.319 (Transport) + 31.025 (Use Phase) + 0.225 (EoL) = 44.009 kgCO₂e

Scope 3 Coverage: (44.009 kgCO₂e / 44.242 kgCO₂e) * 100% = 99.47%

The Scope 3 coverage of 99.47% exceeds the 95% requirement, demonstrating robust reporting for hqmllezdkg's value chain emissions.

3.5. Summary of Product Carbon Footprint (PCF) for hqmllezdkg

Lifecycle Stage	Emissions (kgCO ₂ e/unit)	GHG Scope	Percentage of Total
Materials Acquisition & Production	12.440	Scope 3 (Upstream)	28.12%
Manufacturing/ Production	0.233	Scope 2	0.53%
Transport & Distribution	0.319	Scope 3 (Upstream & Downstream)	0.72%
Total Product Carbon Footprint (PCF)	44.242		100.00%

Lifecycle Stage	Emissions (kgCO ₂ e/unit)	GHG Scope	Percentage of Total
Use Phase	31.025	Scope 3 (Downstream)	70.13%
End-of-Life Treatment	0.225	Scope 3 (Downstream)	0.51%
Total Product Carbon Footprint (PCF)	44.242		100.00%

4. Review & Report

4.1. Hotspot Identification

The PCF analysis reveals the following key hotspots in the lifecycle of hqmllezkdg:

- **Use Phase (70.13%):** The most significant contributor to the overall footprint is the energy consumed during the product\'s 5-year lifespan. This highlights a critical area for design intervention, focusing on energy efficiency and exploring renewable energy sources for end-users.
- **Materials Acquisition & Production (28.12%):** Raw material extraction and processing contribute substantially. Optimizing material selection towards lower-impact alternatives, increasing recycled content, and working with suppliers on their decarbonization efforts are key strategies.

4.2. Reliability and Limitations

The calculations are based on the provided parameters and a combination of primary (BOM) and secondary (industry-average emission factors) data. The reliability

of the results is dependent on the accuracy and completeness of the input data.

- **Assumptions:** Several parameters (e.g., specific transport modes and distances, exact renewable energy usage, use phase energy consumption, and end-of-life pathways) were based on reasonable assumptions for illustrative purposes. For a truly definitive PCF, primary data for all these aspects would be required.
- **Emission Factors:** While industry-standard emission factors were used, these represent averages and may not perfectly reflect the specific nuances of every supplier or process involved in ulpzlnwize's supply chain.
- **LSR Standard:** While acknowledged, specific land-use change and biogenic carbon data were not available for a quantitative assessment in this report, as the standard itself is new and guidance is still evolving.

4.3. Recommendations

Based on this PCF analysis, ulpzlnwize should consider the following recommendations for reducing the environmental impact of hqmllezdkg:

1. **Enhance Use Phase Efficiency:** Invest in R&D to drastically reduce the product's energy consumption during its operational life. Explore opportunities for energy-efficient design, smart energy management features, and promoting renewable energy adoption by end-users.
2. **Optimize Material Sourcing:** Prioritize sourcing materials with lower inherent carbon footprints. Engage with suppliers to understand and improve their production processes, increase the use of recycled content, and explore innovative, low-carbon materials.

3. **Strengthen Circularity Programs:** Leverage the high recyclability percentage (vwkhviwtqx = 80%) by actively promoting and expanding take-back schemes (ypmkzwnxsv). Invest in infrastructure or partnerships for effective recycling and recovery of materials at end-of-life.
 4. **Supplier Engagement for Scope 3 Data:** Continue to gather more granular, primary data from upstream suppliers (Scope 3, Category 1-8) to refine the accuracy of the PCF and identify further reduction opportunities.
 5. **Monitor LSR Standard Integration:** Prepare for the full implementation of the GHG Protocol Land Sector and Removals Standard, assessing any potential land-related emissions or removals across the value chain, especially if raw materials involve agricultural or forestry products.
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