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Product Carbon Footprint Analysis Report

for ewrqneeqmo

Company Name: drvutwepzs

Accounting Standard: GHG Protocol

Senior Sustainability Consultant: lefhixutyx

This report is generated based on available data and industry standards. While efforts have been made to ensure accuracy, the results are indicative and subject to the quality and completeness of the input data and chosen assumptions.

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1. Executive Summary

This report provides a high-detail Product Carbon Footprint (PCF) analysis for the product "ewrqneeqmo" manufactured by drvutwepzs. The analysis adheres to the GHG Protocol standards, incorporating recent updates such as the Land Sector and Removals (LSR) Standard and aiming for 95% Scope 3 coverage. The primary goal is to quantify the greenhouse gas emissions associated with the product's entire lifecycle, identify emission hotspots, and provide actionable insights for drvutwepzs to enhance its sustainability performance.

The PCF calculation covers material acquisition, manufacturing, transportation (upstream, primary, and last-mile), the product's use phase, and its end-of-life treatment. Key findings highlight the significant contributions from raw materials and the use phase, offering clear targets for reduction strategies.

2. Methodology

The Product Carbon Footprint (PCF) analysis for ewrqneeqmo follows a robust, five-step methodology in accordance with the GHG Protocol Product Life Cycle Accounting and Reporting Standard:

2.1. Define Scope

- **Functional Unit:** 1.0 unit of ewrqneeqmo.
- **System Boundary:** Cradle-to-Grave. While the primary production boundary for data collection is factory_gate, the analysis extends to cover the entire lifecycle, including upstream (material acquisition, pre-processing, inbound logistics), core production (manufacturing), downstream (outbound logistics, last-mile delivery), product use, and end-of-life treatment to provide a comprehensive PCF.
- **Geographic Scope:** Final production occurs in China, with a supply chain focus on Europe for upstream activities and product use, where relevant.
- **Allocation:** Emissions are allocated directly to the functional unit. For shared processes (e.g., factory utilities), economic allocation or mass allocation is applied as appropriate to attribute emissions proportionally.

2.2. Map Lifecycle (LCI Inventory Stages)

The lifecycle of ewrqneeqmo is mapped into the following stages:

- **Raw Material Acquisition & Pre-processing (Upstream - Scope 3, Category 1):** Extraction, processing, and refining of all components listed in the Bill of Materials (BOM).
- **Manufacturing (Core Production - Scope 1 & 2):** Energy consumption, direct emissions from processes, and waste generation at the drvutwepzs production facility in China.
- **Transportation & Distribution (Upstream & Downstream - Scope 3, Categories 4 & 9):**
 - Upstream Logistics: Transport of raw materials and components to the production facility.

- Primary Distribution: Transport of finished products from the factory to regional distribution centers or major markets.
- Last-Mile Delivery: Transport from regional hubs to the end-customer.
- **Product Use Phase (Downstream - Scope 3, Category 11):** Energy consumption during the product's operational lifespan.
- **End-of-Life Treatment (Downstream - Scope 3, Category 12):** Collection, recycling, disposal, and potential recovery of materials.

2.3. Collect Data (Primary/Secondary Data Points)

Data collection prioritizes primary data for drvutwepzs's operations and uses high-quality secondary data (industry-average emission factors) where primary data is unavailable or not feasible to collect. This approach ensures at least 95% coverage for Scope 3 emissions, aligning with 2026 GHG Protocol requirements.

2.3.1. Detailed Bill of Materials (BOM) - ovykeugh (Scope 3, Category 1)

The provided Detailed Bill of Materials (BOM) for ewrqneeqmo is used for a high-accuracy material impact calculation. The emissions factors and total carbon for each item are directly incorporated as per the format: ID, Description, Category, Process, Qty, Unit, Emission Factor (kgCO2e/unit), Total Carbon (kgCO2e).

Note: The BOM data below is illustrative, assuming the format for 'ovykeugh' as a string of semi-colon separated items, each with comma-separated fields.

ID	Description	Category	Process	Quantity	Unit	Emission Factor (kgCO2e/unit)	Total Carbon (kgCO2e)
1	Plastic Casing	Plastics	Injection Molding	0.1	kg	2.5	0.25
2		Electronics	Assembly	0.05	unit	15.0	0.75

ID	Description	Category	Process	Quantity	Unit	Emission Factor (kgCO2e/unit)	Total Carbon (kgCO2e)
	Circuit Board						
3	Metal Screws	Metals	Machining	0.01	kg	3.0	0.03
4	Packaging Box	Paper/Cardboard	Forming	0.02	kg	1.2	0.024

Total Material Emissions: $0.25 + 0.75 + 0.03 + 0.024 = 1.054$ kgCO2e

2.3.2. Production Energy Inputs (Scope 2)

- **Energy Intensity (kWh/unit):** kfuwofxdgn kWh/unit
- **Renewable Energy Usage:** vnwklspouv %
- **Grid Electricity Emission Factor (China):** Assumed 0.556 kgCO2e/kWh for China's grid mix.

2.3.3. Logistics Data (Scope 3, Categories 4 & 9)

- **Transport Mode:** Select Mode (e.g., "Ocean Freight", "Truck", "Air Freight")
- **Transport Distance:** qtmzdklzze km (Total distance for primary inbound/outbound logistics)
- **Last-Mile Delivery Channel:** Delivery Type (e.g., "Road Freight Small Parcel")
- **Assumed Product Weight for Transport:** 0.5 kg (illustrative for calculation if not provided by BOM).
Based on BOM, total material weight for the main components is 0.1 kg (Plastic Casing) + 0.01 kg (Metal Screws) + 0.02 kg (Packaging Box) = 0.13 kg. Let's use 0.2 kg as a reasonable packaged weight for transport estimations if a specific product weight is not implied by the functional unit.

- **Emission Factors for Transport (illustrative, industry-standard):**
 - Ocean Freight: 0.016142 kgCO₂e/tonne-km
 - Road Freight (Truck): 0.1 kgCO₂e/tonne-km (average for medium/heavy duty trucks)
 - Air Freight: 0.6 kgCO₂e/tonne-km
 - Last-Mile Delivery: Assume similar to road freight, adjusted for parcel size if necessary. For "Delivery Type" if it refers to standard parcel delivery, a factor for small packages could be applied, e.g., 0.21 kg CO₂e per 2kg package per 1000km, which translates to 0.000105 kgCO₂e/g.km or 0.105 kgCO₂e/tonne.km. Let's use 0.105 kgCO₂e/tonne-km for last-mile.

2.3.4. Use Phase Data (Scope 3, Category 11)

- **Product Lifespan:** tqkfmhxke years
- **Energy Consumption in Use:** zsgxxmqeer kWh/year
- **Grid Electricity Emission Factor (Europe Focused Use):**
Assumed 0.25 kgCO₂e/kWh for average EU grid mix.

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

- **Recyclability Percentage:** wjqozkyuft %
- **Circular/Take-back Programs:** Invyniifwz (qualitative impact on emissions/credits)

3. Calculation of Emissions (Activity * Emission Factor = CO₂e)

Emissions are categorized according to the GHG Protocol's Scope 1, Scope 2, and Scope 3 definitions. Illustrative calculations are provided below based on the placeholder parameters and assumed emission factors.

3.1. Scope 1 Emissions (Direct Emissions from Owned or Controlled Sources)

For a product PCF at the "factory_gate" boundary, direct emissions typically include on-site fuel combustion for manufacturing processes and company-owned vehicles for internal transport. Given the provided parameters, specific Scope 1 data is not detailed but would typically involve:

- Fuel consumption for on-site machinery or heating.
- Process emissions (e.g., from chemical reactions) if applicable to ewrqneeqmo's production.

For this report, assuming direct process emissions are negligible or already factored into upstream material emissions. If on-site fuel combustion occurs, it would be calculated here.

Illustrative Scope 1 Emissions: 0.0 kgCO₂e (assuming no specific direct process emissions or on-site fuel consumption data provided beyond general production energy intensity)

3.2. Scope 2 Emissions (Indirect Emissions from Purchased Energy)

These emissions arise from the generation of purchased electricity consumed during the manufacturing of ewrqneeqmo in China.

- Total electricity consumed = Energy Intensity (kfuwofxdgn kWh/unit)
- Non-renewable electricity % = (100 - vnwklspouv) / 100
- Emissions from purchased electricity = kfuwofxdgn kWh/unit * (1 - vnwklspouv/100) * 0.556 kgCO₂e/kWh

Illustrative Calculation: Let's assume `kfuwofxdgn` = 10 kWh/unit and `vnwklspouv` = 20%.

Scope 2 Emissions = 10 kWh/unit * (1 - 20/100) * 0.556 kgCO₂e/kWh
= 10 * 0.8 * 0.556 = 4.448 kgCO₂e

Actual Scope 2 Emissions (Placeholder): (kfuwofxdgn * (1 - vnwklspouv/100) * 0.556) kgCO₂e

3.3. Scope 3 Emissions (All Other Indirect Emissions in the Value Chain)

This includes upstream and downstream emissions not covered in Scope 1 or 2, covering a minimum of 95% of total required Scope 3 emissions as per 2026 guidelines. The Land Sector and Removals (LSR) Standard is applied for land use and carbon removals where relevant to the supply chain.

3.3.1. Category 1: Purchased Goods and Services (Raw Materials)

Based on the Detailed Bill of Materials (BOM):

Total Material Emissions: 1.054 kgCO₂e (from example BOM calculation)

3.3.2. Category 4 & 9: Transportation and Distribution (Upstream & Downstream)

Assuming "Select Mode" is Ocean Freight for primary transport and "Delivery Type" implies road freight for last-mile. Assume a packaged product weight of 0.2 kg (0.0002 tonnes).

- **Primary Transport (e.g., Ocean Freight):**

- Distance: qtmzdklzze km
- Emission Factor: 0.016142 kgCO₂e/tonne-km (Ocean Freight)
- Emissions = 0.0002 tonnes * qtmzdklzze km * 0.016142 kgCO₂e/tonne-km

- **Last-Mile Delivery (e.g., Road Freight Small Parcel):**

- Assume an average last-mile distance of 50 km (illustrative).
- Emission Factor: 0.105 kgCO₂e/tonne-km (Road Freight Small Parcel)
- Emissions = 0.0002 tonnes * 50 km * 0.105 kgCO₂e/tonne-km = 0.00105 kgCO₂e

Illustrative Calculation (assuming qtmzdklzze = 10,000 km, Select Mode = Ocean Freight):

- Primary Transport: $0.0002 \text{ tonnes} * 10,000 \text{ km} * 0.016142 \text{ kgCO}_2\text{e/tonne-km} = 0.032284 \text{ kgCO}_2\text{e}$
- Last-Mile Delivery: $0.00105 \text{ kgCO}_2\text{e}$
- **Total Transport Emissions:** $0.032284 + 0.00105 = 0.033334 \text{ kgCO}_2\text{e}$

Actual Transport Emissions (Placeholder): $(0.0002 * \text{qtmzdklzze} * \text{Emission_Factor_for_Select_Mode}) + (0.0002 * 50\text{km} * 0.105 \text{ kgCO}_2\text{e/tonne-km}) \text{ kgCO}_2\text{e}$

3.3.3. Category 11: Use of Sold Products

- Total energy consumption during use = Product Lifespan (tqkfmhxke years) * Energy Consumption in Use (zsgxxmqeer kWh/year)
- Emissions = (tqkfmhxke years * zsgxxmqeer kWh/year) * 0.25 kgCO₂e/kWh (Europe focused grid mix)

Illustrative Calculation: Let's assume `tqkfmhxke` = 5 years and `zsgxxmqeer` = 20 kWh/year.

Use Phase Emissions = $(5 \text{ years} * 20 \text{ kWh/year}) * 0.25 \text{ kgCO}_2\text{e/kWh} = 100 \text{ kWh} * 0.25 \text{ kgCO}_2\text{e/kWh} = 25.0 \text{ kgCO}_2\text{e}$

Actual Use Phase Emissions (Placeholder): $(\text{tqkfmhxke} * \text{zsgxxmqeer} * 0.25) \text{ kgCO}_2\text{e}$

3.3.4. Category 12: End-of-Life Treatment of Sold Products

Emissions and potential credits from end-of-life depend on recyclability and circular programs. We assume a credit for recycled material and emissions for disposal of non-recycled waste.

- Recycled portion = wjqozkyuft %
- Disposed portion = $(100 - \text{wjqozkyuft}) \%$
- Assume a material-specific emission factor for waste to landfill (e.g., 1.0 kgCO₂e/kg for mixed waste) and a credit for recycled material (e.g., 80% avoided virgin material emissions).

- Circular/Take-back Programs (Invyniifwz) will further reduce emissions or increase credits.

Illustrative Calculation: Assume product total material weight = 0.13 kg (from BOM components excluding circuit board) and `wjqozkyuft` = 70%. Assume disposal emission factor = 1.0 kgCO₂e/kg, and recycling credit = 80% of virgin material impact (from BOM total for recyclable parts, e.g., plastic casing, metal screws, packaging). For simplicity, let's use 0.5 kg CO₂e/kg for non-recyclable parts' disposal and a credit of 0.8 * initial impact for recyclable parts.

End-of-Life Emissions / Credits:

- Non-recyclable materials (e.g., circuit board part of total material weight, 0.05 units) disposal: 0.05 kg (assuming 1 unit = 1kg for circuit board part as rough estimate) * 1.0 kgCO₂e/kg = 0.05 kgCO₂e.
- Recycling credit for wjqozkyuft % of recyclable materials: Assume total initial material impact of recyclable parts (Plastic Casing, Metal Screws, Packaging Box) = 0.25 + 0.03 + 0.024 = 0.304 kgCO₂e.
Credit = 0.304 kgCO₂e * (wjqozkyuft/100) * 0.8 (avoided emission factor).
If `wjqozkyuft` = 70%, Credit = 0.304 * 0.7 * 0.8 = 0.17024 kgCO₂e (as a negative emission).
- Net EoL = 0.05 - 0.17024 = -0.12024 kgCO₂e (a net credit)

The existence of "Invyniifwz" (Circular/Take-back Programs) suggests a proactive approach to EoL, likely increasing actual recycling rates and ensuring higher quality material recovery, leading to greater credits or lower disposal emissions than default assumptions.

Actual End-of-Life Emissions/Credits (Placeholder): Calculated based on wjqozkyuft and the impact of Invyniifwz (potentially a net credit).

3.4. Total Product Carbon Footprint (PCF) - Illustrative Summary

Scope/Category	Description	Illustrative Emissions (kgCO2e)
Scope 1	Direct Emissions	0.000
Scope 2	Purchased Electricity (Production)	4.448
Scope 3, Category 1	Purchased Goods and Services (Materials)	1.054
Scope 3, Categories 4 & 9	Transportation and Distribution	0.033
Scope 3, Category 11	Use of Sold Products	25.000
Scope 3, Category 12	End-of-Life Treatment	-0.120
TOTAL PCF (Illustrative)		30.415

Note: These are illustrative values. Actual PCF will depend on the precise numeric values of kfuwofxdgn, vnwklspouv, qtmzdklzze, tqkfmdbhxke, zsgxxmqeer, and wjqozkyuft.

4. Review & Report

4.1. Hotspot Analysis

Based on the illustrative calculations, the primary emission hotspots for ewrqneeqmo are:

- **Use Phase (Scope 3, Category 11):** This is the dominant contributor, primarily due to the product's energy consumption over its lifespan. Reducing energy consumption during use or promoting renewable energy sources for users would have the most significant impact.

- **Purchased Electricity (Scope 2):** While secondary to the use phase, the electricity consumed during manufacturing is a notable contributor, especially considering China's grid mix. Increasing renewable energy usage (vnwklspouv) in production directly reduces this hotspot.
- **Purchased Goods and Services (Scope 3, Category 1):** Material selection plays a crucial role. Optimizing material choices towards lower-impact alternatives or working with suppliers committed to decarbonization can significantly reduce this impact.

4.2. Reliability and Data Quality

The reliability of this PCF analysis is contingent upon the accuracy of input data. The use of a detailed BOM and specific operational parameters (energy intensity, renewable usage) enhances accuracy. However, some aspects rely on industry-average emission factors (e.g., for transport modes, generic grid mixes, and EoL scenarios from Ecoinvent/DEFRA), which introduce inherent uncertainties. Future iterations could benefit from:

- Collecting primary data for all significant Scope 3 categories.
- Engaging key suppliers to obtain product-specific or process-specific emission factors.
- More detailed modeling of transport routes and vehicle types, especially for last-mile delivery.
- Refined EoL scenario modeling based on actual recovery rates and material-specific impacts.

The GHG Protocol's 2026 update emphasizes enhanced data quality and transparency, including disaggregation by data type. drvutwepzs should continue to strengthen its data collection and reporting mechanisms to meet these evolving standards.

4.3. Application of 2026 LSR Update

The Land Sector and Removals (LSR) Standard, effective January 1, 2027, provides a framework for accounting for land emissions and CO2 removals. While ewrqneeqmo itself may not have direct land-use emissions, its upstream supply chain (e.g., agricultural products,

wood-based materials) or any land-based carbon removal initiatives by drvutwepzs would be accounted for under this standard. As the guidance for the LSR Standard is expected in Q2 2026, drvutwepzs should prepare to integrate these considerations into future, more granular supply chain assessments, particularly if raw materials have significant land-use footprints.

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