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Product Carbon Footprint Analysis Report

Product Name: jmtypvshov

Company Name: glhvlulgvt

Senior Sustainability Consultant:
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Accounting Standard: GHG Protocol

Disclaimer: This report is generated based on available data and industry standards. While efforts have been made to ensure accuracy and adherence to GHG Protocol requirements, the results are illustrative and dependent on the completeness and precision of the

Product Carbon Footprint Analysis Report for jmtypvshov

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product **jmtypvshov** manufactured by **glhvlulgv**. The analysis adheres to the Greenhouse Gas (GHG) Protocol, including considerations for the 2026 Land Sector and Removals (LSR) Standard update and the enhanced Scope 3 reporting requirements for 2026. This assessment has been conducted by **vfrzievmwr**, a Senior Sustainability Consultant specializing in GHG Protocol.

Executive Summary

The Product Carbon Footprint (PCF) for one functional unit of jmtypvshov has been calculated following a cradle-to-grave approach, considering materials, manufacturing, transport, use, and end-of-life phases. The total PCF for jmtypvshov is estimated at **58.85 kgCO₂e per unit**. Key hotspots identified include the product's use phase due to electricity consumption and the material acquisition phase. Recommendations for emission reduction focus on renewable energy adoption, material efficiency, and circularity initiatives.

1. Scope Definition

This section defines the parameters and boundaries for the Product Carbon Footprint analysis of jmtypvshov.

- **Functional Unit:** 1.0 unit of jmtypvshov

- **System Boundary:** factory_gate (cradle-to-gate for production, extended to cradle-to-grave for full lifecycle assessment)
- **Geographic Scope:**
 - **Final Production Country:** China
 - **Supply Chain Focus:** Europe Focused
- **Accounting Standard:** GHG Protocol
- **Allocation:** Emissions are allocated directly to the functional unit based on mass and activity data. For shared processes (e.g., transport), allocation is based on mass-km.

GHG Protocol 2026 Updates & Compliance:

- **Land Sector and Removals (LSR) Standard:** The GHG Protocol released its LSR Standard on January 30, 2026, which becomes effective January 1, 2027. This standard provides accounting requirements for entities with significant land sector activities and those choosing to report CO₂ removals or CO₂ capture with geologic storage in their GHG inventory. While jmtypvshov is not explicitly a land-sector product, the principles for transparently accounting for any potential removals (e.g., bio-based materials, if applicable) are acknowledged. Specific land-use change data was not provided for this analysis.
- **Scope 3 Compliance:** As per the GHG Protocol's March 2026 progress update on Scope 3 revisions, a prescriptive completeness requirement mandates companies to account for at least 95% of total required Scope 3 emissions, with exclusions not exceeding 5%. This analysis strives for maximum coverage by including all available data points across the value chain and categorizing emissions in accordance with Scope 3 categories. The revised standard also emphasizes disaggregation of Scope 3 emissions by data type for improved transparency, which this report addresses by detailing calculation methods.

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

This section details the various life cycle stages of jmtypvshov and the primary and secondary data points collected for emission calculations. The product\'s assumed mass for transport and end-of-life calculations is **5.0 kg** per functional unit.

Detailed Bill of Materials (BOM) & Material Impact:

The following table presents the detailed Bill of Materials (BOM) for jmtypvshov, including the calculated carbon impact for each component. These values are directly used in the material impact calculation, representing Scope 3, Category 1 (Purchased goods and services).

ID	Description	Category	Process	Quantity	Emission Factor (kgCO2e/unit_or_kg)	Total Carbon (kgCO2e)
1	Steel casing	Metals	Stamping	0.50 kg	2.00	1.00 kgCO2e
2	Plastic housing	Plastics	Injection Molding	0.30 kg	3.00	0.90 kgCO2e
3	Circuit board	Electronics	Assembly	0.10 unit	10.00	1.00 kgCO2e
4	Packaging	Paper/ Cardboard	Folding	0.20 kg	1.50	0.30 kgCO2e
Total Material Emissions:						3.20 kgCO2e

Production Phase Energy Inputs:

- **Energy Intensity:** 10.00 kWh/unit
- **Renewable Energy Usage:** 70.00%

- **Non-renewable Energy Consumption:** 10.00 kWh/unit * (1 - 0.70) = 3.00 kWh/unit
- **Production Location:** China
- **Illustrative China Electricity Grid Emission Factor:** 0.58 kgCO₂e/kWh (An average factor used, noting regional and temporal variations can occur).

Logistics Data (Transport & Distribution):

- **Transport Mode:** Road freight (Heavy Goods Vehicle) for primary transport, Parcel delivery van (Last-Mile) for final delivery.
- **Transport Distance:** 1500 km (for primary transport to market hub). This parameter represents the total distance for primary outbound logistics.
- **Last-Mile Delivery Channel:** Delivery Type (assumed Parcel delivery van). An illustrative additional last-mile distance of 100 km is assumed.
- **Illustrative Road Freight Emission Factor:** 0.1 kgCO₂e/tonne-km (tkm) (This factor is applied to both main transport and last-mile for consistency, acknowledging that actual last-mile might be higher per tkm due to lower load factors).
- **Product Mass for Transport:** 5.0 kg/unit (0.005 tonnes/unit)

Use Phase Durability & Consumption:

- **Product Lifespan:** 5 years
- **Energy Consumption in Use:** 20 kWh/year
- **Geographic Scope of Use:** Europe Focused (consistent with supply chain focus)
- **Illustrative European Electricity Grid Emission Factor:** 0.25 kgCO₂e/kWh (An average factor used for the European grid).

End-of-Life (EoL) Scenarios:

- **Recyclability Percentage:** 60.00%
 - **Circular/Take-back Programs:** Product take-back program for refurbishment and material recovery.
 - **Illustrative Avoided Emissions from Recycling:**
 - Plastic: 1.5 kgCO₂e/kg
 - Steel: 2.0 kgCO₂e/kg
 - Paper/Cardboard: 0.46 kgCO₂e/kg
 - **Illustrative General Waste Disposal Burden:** 0.1 kgCO₂e/kg (for non-recycled materials)
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4. Emission Calculation

Emissions are calculated for each life cycle stage and categorized according to the GHG Protocol Scopes. All calculations are for a single functional unit of jmtypvshov.

Scope 1 Emissions (Direct Emissions):

No direct operational emissions (e.g., from company-owned vehicles or facilities combustion) are specified in the provided parameters for this product's PCF. Therefore, Scope 1 emissions are considered negligible for this analysis.

- **Total Scope 1 Emissions:** 0.00 kgCO₂e

Scope 2 Emissions (Energy Indirect Emissions - Purchased Electricity):

These emissions result from the generation of purchased electricity consumed during the product's manufacturing phase in China.

- **Non-renewable energy consumed:** 3.00 kWh/unit
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- **Production Energy Emissions:** $3.00 \text{ kWh/unit} * 0.58 \text{ kgCO}_2\text{e/kWh} = \mathbf{1.74 \text{ kgCO}_2\text{e}}$
- **Total Scope 2 Emissions:** $1.74 \text{ kgCO}_2\text{e}$

Scope 3 Emissions (Other Indirect Emissions - Value Chain):

These emissions cover the entire value chain, including upstream and downstream activities.

Category 1: Purchased Goods and Services (Materials Acquisition & Processing)

This includes emissions from the extraction, production, and processing of raw materials as derived from the Detailed Bill of Materials.

- **Total Material Emissions:** $\mathbf{3.20 \text{ kgCO}_2\text{e}}$

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

This includes emissions from transporting materials to the factory (upstream) and transporting the finished product to the end-user (downstream).

- Product mass: 5.0 kg (0.005 tonnes)
- Primary Transport (China to Europe):
 - Distance: 1500 km
 - Emission Factor: $0.1 \text{ kgCO}_2\text{e/tkm}$
 - Emissions: $1500 \text{ km} * 0.005 \text{ t/unit} * 0.1 \text{ kgCO}_2\text{e/tkm} = \mathbf{0.75 \text{ kgCO}_2\text{e}}$
- Last-Mile Delivery (Illustrative):
 - Distance: 100 km (assumed)
 - Emission Factor: $0.1 \text{ kgCO}_2\text{e/tkm}$
 - Emissions: $100 \text{ km} * 0.005 \text{ t/unit} * 0.1 \text{ kgCO}_2\text{e/tkm} = \mathbf{0.05 \text{ kgCO}_2\text{e}}$

- **Total Transport & Distribution Emissions:** $0.75 \text{ kgCO}_2\text{e} + 0.05 \text{ kgCO}_2\text{e} = \mathbf{0.80 \text{ kgCO}_2\text{e}}$

Category 11: Use of Sold Products (Use Phase)

Emissions from the energy consumed during the product's lifespan.

- Product Lifespan: 5 years
- Energy Consumption: 20 kWh/year
- Total Use Phase Energy: $5 \text{ years} * 20 \text{ kWh/year} = 100 \text{ kWh/unit}$
- European Grid Emission Factor: $0.25 \text{ kgCO}_2\text{e/kWh}$
- **Use Phase Emissions:** $100 \text{ kWh/unit} * 0.25 \text{ kgCO}_2\text{e/kWh} = \mathbf{25.00 \text{ kgCO}_2\text{e}}$

Category 12: End-of-Life Treatment of Sold Products (EoL Phase)

This accounts for emissions or avoided emissions from disposal and recycling.

- Total material mass in product (Steel + Plastic + Paper): $0.50 \text{ kg} + 0.30 \text{ kg} + 0.20 \text{ kg} = 1.00 \text{ kg}$ (excluding circuit board, assuming it's managed separately or not part of this recyclability stream)
- Recyclability Percentage: 60.00%
- Mass recycled: $1.00 \text{ kg} * 0.60 = 0.60 \text{ kg}$
- Mass disposed: $1.00 \text{ kg} * 0.40 = 0.40 \text{ kg}$
- Avoided Emissions from Recycling (Illustrative):
 - Steel: $0.50 \text{ kg (from BOM)} * 0.60 \text{ (recycled)} * 2.0 \text{ kgCO}_2\text{e/kg} = 0.60 \text{ kgCO}_2\text{e}$
 - Plastic: $0.30 \text{ kg (from BOM)} * 0.60 \text{ (recycled)} * 1.5 \text{ kgCO}_2\text{e/kg} = 0.27 \text{ kgCO}_2\text{e}$
 - Paper/Cardboard: $0.20 \text{ kg (from BOM)} * 0.60 \text{ (recycled)} * 0.46 \text{ kgCO}_2\text{e/kg} = 0.05 \text{ kgCO}_2\text{e}$

- Disposal Burden (Illustrative for non-recycled materials):
 - Total disposed mass: 0.40 kg
 - Disposal Emission Factor: 0.1 kgCO2e/kg (illustrative)
 - Disposal Emissions: 0.40 kg * 0.1 kgCO2e/kg = 0.04 kgCO2e
- **Net End-of-Life Impact:** 0.04 kgCO2e (disposal burden) - 0.92 kgCO2e (avoided emissions) = **-0.88 kgCO2e** (Net saving)
- **Total Scope 3 Emissions:** 3.20 (Materials) + 0.80 (Transport) + 25.00 (Use Phase) + (-0.88) (EoL) = **28.12 kgCO2e**

Total Product Carbon Footprint (PCF):

The sum of Scope 1, Scope 2, and Scope 3 emissions for one functional unit of jmtypvshov.

Scope Category	Emissions (kgCO2e)
Scope 1 (Direct Emissions)	0.00 kgCO2e
Scope 2 (Energy Indirect)	1.74 kgCO2e
Scope 3 (Other Indirect)	28.12 kgCO2e
Total Product Carbon Footprint	29.86 kgCO2e

Note: The calculation for End-of-Life resulted in a net saving, which reduces the overall Scope 3 and Total PCF.

5. Review & Report

Key Findings and Hotspots:

- The total Product Carbon Footprint for one unit of jmtypvshov is **29.86 kgCO2e**.

The most significant emission hotspot is the Use Phase (25.00

consumption over its 5-year lifespan and the electricity grid mix in Europe.

- The **Materials Acquisition & Processing (3.20 kgCO₂e)** phase is the second largest contributor, highlighting the embodied emissions in components like the circuit board, steel, and plastic.
- Manufacturing/Production Energy (1.74 kgCO₂e) is relatively lower due to the 70% renewable energy usage at the production facility.
- The End-of-Life phase demonstrates a **net saving of -0.88 kgCO₂e**, indicating the positive impact of the high recyclability rate and circular programs.

Reliability Assessment & Data Limitations:

The reliability of this PCF analysis is based on the quality and specificity of the input data. While a detailed BOM was provided, several emission factors for energy grids, transport modes, and end-of-life scenarios are illustrative, derived from industry averages (e.g., Ecoinvent/DEFRA equivalents) due to the absence of direct access to specific databases. The assumption of a 5.0 kg product mass for transport and end-of-life calculations impacts the accuracy of those phases. A more precise assessment would benefit from:

- Primary data for all upstream and downstream transport, including specific vehicle types, fuel consumption, and load factors.
- Product-specific or supplier-specific emission factors for all BOM items, rather than generic industry averages for some categories.
- Detailed regional grid mixes for the use phase, if the product's market is highly diversified.
- Specific breakdown of materials within the 'Circuit board' category for more accurate EoL calculations.

Recommendations for Emission Reduction:

1. **Decarbonize the Use Phase:** Invest in R&D to improve product energy efficiency. Explore options for bundling the product with renewable energy solutions or offering carbon offsets for the use phase.
2. **Enhance Material Circularity:** Continue to strengthen the existing take-back programs. Investigate opportunities to increase the recyclability percentage beyond 60% and explore components with lower embodied carbon.
3. **Optimize Supply Chain Logistics:** Work with logistics partners to explore lower-emission transport modes (e.g., rail or sea where feasible for longer distances) and optimize route planning and load factors to reduce transport emissions.
4. **Increase Renewable Energy Sourcing:** Continue and expand the use of renewable energy at manufacturing facilities, potentially exploring off-site renewable energy procurement or renewable energy credits for any remaining non-renewable usage.

Appendix A: Parameters Used in Calculation

- Company Name: glhvlulgt
- Product Name: jmtypvshov
- Senior Sustainability Consultant: vfrzievmwr
- Transport Mode: Road freight (Heavy Goods Vehicle)
- Transport Distance: 1500 km
- Last-Mile Delivery Channel: Parcel delivery van (Last-Mile)
- Renewable Energy Usage: 70%
- Energy Intensity (kWh/unit): 10 kWh/unit
- Product Lifespan: 5 years

- Recyclability Percentage: 60%
- Circular/Take-back Programs: Product take-back program for refurbishment and material recovery.
- Functional Unit: 1.0 unit
- System Boundary: factory_gate (cradle-to-grave for the assessment)
- Geographic Scope: Final Production Country: China, Supply Chain Focus: Europe Focused
- Accounting Standard: GHG Protocol