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Product Carbon Footprint (PCF)  
Analysis Report

**Product:** iqmkqmodgp

**Company Name:** ddfwounoxz

**Accounting Standard:** GHG  
Protocol

**Senior Sustainability  
Consultant:** sgdufynouk

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# Product Carbon Footprint Analysis Report

**Product:** iqmkqmodgp

**Generated Date:** May 25, 2026

**Company:** ddfwounoxz

**Senior Sustainability Consultant:** sgdufynouk

## Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product iqmkqmodgp, manufactured by ddfwounoxz. The analysis adheres strictly to the GHG Protocol standards, incorporating the latest 2026 Land Sector and Removals (LSR) update and ensuring robust Scope 3 compliance. The objective is to quantify the greenhouse gas (GHG) emissions associated with the product across its entire lifecycle, from material acquisition to end-of-life, to identify hotspots and inform strategic decarbonization efforts. This assessment serves as a critical tool for ddfwounoxz to understand its environmental impact and drive sustainability improvements.

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## Methodology

The Product Carbon Footprint (PCF) analysis for iqmkqmodgp follows the five-step methodology as

prescribed by industry best practices and aligned with the GHG Protocol standards:

1. Define Scope (Functional unit, System boundaries, Geographic scope, Allocation).
2. Map Lifecycle (Life Cycle Inventory (LCI) inventory stages).
3. Collect Data (Primary/Secondary data points).
4. Calculate Emissions (Activity \* Emission Factor = CO<sub>2</sub>e).
5. Review & Report (Hotspots and reliability).

A key aspect of this analysis is strict adherence to the GHG Protocol, categorizing emissions into Scope 1 (direct emissions), Scope 2 (purchased energy emissions), and Scope 3 (value chain emissions). Furthermore, the analysis applies the principles of the 2026 Land Sector and Removals (LSR) Standard for land use and carbon removals, and ensures at least 95% coverage for Scope 3 reporting, as mandated by the 2026 requirements.

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## 1. Define Scope

The initial phase of the PCF analysis establishes the boundaries and parameters for the assessment of iqmkgmodgp.

- **Functional Unit:** The defined functional unit for this study is **1.0 unit of iqmkgmodgp**. This serves as the reference basis to which all inputs and outputs are normalized, ensuring comparability and clarity of the results.
- **System Boundary:** The system boundary for this PCF is set at **factory\_gate**. This means the analysis includes all processes from raw material extraction and processing, through manufacturing, up to the point where the finished product leaves

the factory gate. Downstream stages (e.g., distribution to customer, use phase, end-of-life) are evaluated separately within the Scope 3 framework but are not part of the 'factory\_gate' boundary for the primary product footprint.

- **Geographic Scope:** The **Final Production Country is China**, with a **Supply Chain Focus on Europe**. This dictates the regional specificity for selecting emission factors and understanding supply chain logistics and energy grids.
- **Allocation:** For a product-level assessment, direct attribution of material and energy inputs to the functional unit is prioritized. Where shared processes or infrastructure are involved, allocation is performed on a scientifically justifiable basis, typically mass or economic allocation, to ensure emissions are fairly distributed to iqmkmqmodgp.
- **Accounting Standard:** This analysis strictly adheres to the **GHG Protocol**, which provides the foundational framework for corporate and product GHG accounting and reporting.

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## **2. Map Lifecycle (LCI Inventory Stages) & 3. Collect Data (Primary/Secondary Data Points)**

The lifecycle mapping identifies all stages contributing to the product's footprint, while data collection gathers the necessary inputs for quantification. For this report, specific placeholder values have been provided, and illustrative data consistent with these parameters will be used to demonstrate the calculation methodology. Industry-standard emission factors from databases such as Ecoinvent and DEFRA are employed.

## 2.1. Materials Acquisition & Pre-processing (Scope 3, Category 1: Purchased Goods and Services)

This stage covers the extraction of raw materials, their initial processing, and transport to manufacturing sites. The detailed Bill of Materials (BOM) for htzxtdkv is critical for high-accuracy material impact calculation.

### Detailed Bill of Materials (BOM) for htzxtdkv (Illustrative based on provided format):

Note: The following table uses illustrative data for ID, Description, Category, Process, Qty, Unit, Emission Factor, and Total Carbon, as 'htzxtdkv' was provided as a string placeholder for the BOM. In a real-world scenario, precise supplier-specific data would be used here.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kgCO2e/unit)	Total Carbon (kgCO2e)
M001	Aluminum Casing	Metal	Extrusion	0.5	kg	8.0	4.0
M002	ABS Plastic Housing	Plastic	Injection Molding	0.2	kg	3.5	0.7
M003	Copper Wiring	Metal	Drawing	0.1	kg	4.5	0.45
M004	Printed Circuit Board (PCB)	Electronics	Manufacturing	1.0	unit	2.0	2.0
M005	Lithium-ion Battery Pack	Battery	Assembly	1.0	unit	15.0	15.0
M006	Packaging (Cardboard)	Paper/Pulp	Conversion	0.05	kg	1.2	0.06

Based on this illustrative BOM, the total carbon from raw materials and their processing (up to the point they

are ready for production) is **22.21 kgCO<sub>2</sub>e** (4.0 + 0.7 + 0.45 + 2.0 + 15.0 + 0.06). This falls under Scope 3, Category 1.

## **2.2. Production Phase (Scope 1 & 2, and Scope 3 Category 3)**

This stage encompasses the energy consumed and direct emissions generated during the manufacturing and assembly of iqmkqmodgp in China.

- **Energy Intensity (kWh/unit):** The production process for iqmkqmodgp consumes **ekzrpjzmzp kWh/unit**. (Illustrative: Assuming 5 kWh/unit for calculations).
- **Renewable Energy Usage: zvplqvovgs** of the energy used is from renewable sources. (Illustrative: Assuming 60% renewable energy for calculations).
- **Grid Electricity Emission Factor (China):** An illustrative grid electricity emission factor for China is assumed to be 0.65 kgCO<sub>2</sub>e/kWh (source: Ecoinvent/IEA, approximate for recent years).
- **On-site Fuel Consumption (Scope 1):** Assuming minimal direct fuel combustion at the factory, e.g., for heating or backup, contributing a small portion to Scope 1. (Illustrative: 0.1 kgCO<sub>2</sub>e/unit).
- **Upstream fuel and energy related activities (Scope 3, Category 3):** These include emissions from the extraction, production, and transportation of fuels and energy purchased or acquired, not already in Scope 1 or 2.

### **Breakdown:**

- Non-renewable electricity:  $ekzrpjzmzp * (1 - zvplqvovgs) = 5 \text{ kWh/unit} * (1 - 0.60) = 2 \text{ kWh/unit}$ .
- Scope 2 Emissions:  $2 \text{ kWh/unit} * 0.65 \text{ kgCO}_2\text{e/kWh} = 1.3 \text{ kgCO}_2\text{e/unit}$ .
- Scope 1 Emissions: 0.1 kgCO<sub>2</sub>e/unit (illustrative direct combustion).

- Scope 3 (Category 3): Upstream emissions related to the non-renewable electricity and fuels.  
(Illustrative: Assuming 0.15 kgCO<sub>2</sub>e/kWh upstream factor for the 2 kWh/unit non-renewable electricity = 0.3 kgCO<sub>2</sub>e/unit).

### **2.3. Transport & Logistics (Scope 3, Categories 4 & 9)**

This stage covers the transportation of materials to the factory (upstream) and the product to distribution centers (downstream). The supply chain focus is Europe-oriented.

- **Transport Mode: Select Mode** (Illustrative: Assuming Road Freight HGV > 20t for primary transport).
- **Transport Distance: rwsvixdyfr** (Illustrative: Assuming an average of 1,500 km for inbound materials and 2,000 km for outbound product to Europe).
- **Last-Mile Delivery Channel: Delivery Type** (Illustrative: Assuming parcel delivery van for last mile).

#### **Illustrative Calculations:**

- **Inbound Transport (Scope 3, Category 4: Upstream Transportation and Distribution):**
  - Material weight (approx. from BOM): 0.5 + 0.2 + 0.1 + 1 (unit weight for PCB/battery) + 0.05 = ~1.85 kg.
  - Illustrative Emission Factor (Road Freight HGV > 20t, Europe): 0.08 kgCO<sub>2</sub>e/tonne-km.
  - Illustrative Emissions: 1.85 kg \* (1,500 km / 1000 kg/tonne) \* 0.08 kgCO<sub>2</sub>e/tonne-km = 0.222 kgCO<sub>2</sub>e/unit.
- **Outbound Transport (Scope 3, Category 9: Downstream Transportation and Distribution):**
  - Product weight: Assume 2 kg/unit.

- Illustrative Emission Factor (Road Freight HGV > 20t, Europe): 0.08 kgCO<sub>2</sub>e/tonne-km.
- Illustrative Emissions (main transport): 2 kg \* (2,000 km / 1000 kg/tonne) \* 0.08 kgCO<sub>2</sub>e/tonne-km = 0.32 kgCO<sub>2</sub>e/unit.
- Illustrative Last-Mile (Delivery Type, e.g., small van): Assume 50 km, 0.2 kgCO<sub>2</sub>e/km for small parcel van.
- Illustrative Last-Mile Emissions: 0.2 kgCO<sub>2</sub>e/km \* 50 km (per delivery, amortized across multiple units) = 1.0 kgCO<sub>2</sub>e/unit (assuming 10 units per trip, 0.1 kgCO<sub>2</sub>e/unit).

Total illustrative transport emissions (Scope 3, Categories 4 & 9) = 0.222 + 0.32 + 0.1 = 0.642 kgCO<sub>2</sub>e/unit.

## 2.4. Use Phase (Scope 3, Category 11: Use of Sold Products)

This stage accounts for the energy consumption during the product's lifespan, which is increasingly under scrutiny with the 2026 GHG Protocol Scope 3 revisions moving towards an annualized approach for Category 11.

- **Product Lifespan: lvgethjggw** (Illustrative: 5 years).
- **Energy Consumption in Use: ytmyfqrmig** (Illustrative: 10 kWh/year).

### Illustrative Calculations:

- Total energy consumption over lifespan: 10 kWh/year \* 5 years = 50 kWh/unit.
- Assuming an average end-user electricity grid mix for Europe (e.g., 0.25 kgCO<sub>2</sub>e/kWh).
- Use Phase Emissions: 50 kWh/unit \* 0.25 kgCO<sub>2</sub>e/kWh = 12.5 kgCO<sub>2</sub>e/unit.

## 2.5. End-of-Life (EoL) Scenarios (Scope 3, Category 12: End-of-Life Treatment of Sold Products)

This stage considers the emissions or avoided emissions associated with the disposal, recycling, or recovery of the product after its useful life.

- **Recyclability Percentage: gtevljnulv**  
(Illustrative: 70%).
- **Circular/Take-back Programs: jnxzehtymq**  
(Illustrative: Existing, providing 50% collection rate for recycling).

### Illustrative Calculations:

- Assume product weight at EoL: 2 kg/unit.
- **Disposal Emissions:**
  - Portion going to landfill/incineration:  $(1 - (\text{gtevljnulv} * \text{jnxzehtymq})) = (1 - (0.70 * 0.50)) = 1 - 0.35 = 0.65$ .
  - Illustrative Emission Factor for disposal (e.g., landfill/incineration of mixed waste): 1.0 kgCO<sub>2</sub>e/kg.
  - Disposal Emissions:  $2 \text{ kg} * 0.65 * 1.0 \text{ kgCO}_2\text{e/kg} = 1.3 \text{ kgCO}_2\text{e/unit}$ .
- **Recycling Avoided Emissions:**
  - Portion recycled:  $\text{gtevljnulv} * \text{jnxzehtymq} = 0.70 * 0.50 = 0.35$ .
  - Illustrative Avoided Emission Factor for recycling (e.g., for metals/plastics): -2.0 kgCO<sub>2</sub>e/kg (i.e., avoids 2.0 kgCO<sub>2</sub>e compared to virgin material production).
  - Recycling Avoided Emissions:  $2 \text{ kg} * 0.35 * (-2.0 \text{ kgCO}_2\text{e/kg}) = -1.4 \text{ kgCO}_2\text{e/unit}$ .

Total illustrative EoL emissions (Scope 3, Category 12) =  $1.3 - 1.4 = -0.1 \text{ kgCO}_2\text{e/unit}$  (net removal/avoidance due to recycling).

## **2.6. Land Sector and Removals (LSR) Standard Application**

The 2026 Land Sector and Removals (LSR) Standard, effective January 1, 2027, provides crucial guidance for accounting for land emissions, CO<sub>2</sub> removals, and technological CO<sub>2</sub> removals. While iqmkmmodgp itself might not have direct land-use implications, its upstream supply chain (e.g., agricultural inputs for some materials if applicable, or bio-based materials) could be subject to this standard. For ddfwounoxz, if any raw materials in the htzxtkv BOM are derived from agricultural land or involve significant land-use change, the LSR Standard would require detailed accounting of associated GHG emissions and removals. For example, if the packaging involves virgin paper from unsustainable forestry, the associated land-use change emissions would be captured. Conversely, if certified sustainable bio-based materials are used, potential carbon removals from responsible land management could be reported. Given the current product details, a detailed LSR calculation is not explicitly provided, but its principles are noted for future, more granular assessments of agricultural or bio-based supply chain elements.

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## **4. Calculate Emissions (Activity \* Emission Factor = CO<sub>2</sub>e)**

Based on the data collected and the illustrative calculations, the emissions for iqmkmmodgp are aggregated and categorized by GHG Protocol scopes.

## Summary of Illustrative Emissions by Lifecycle Stage and Scope (per 1.0 unit of iqmkqmodgp)

Lifecycle Stage	GHG Scope	Illustrative Emissions (kgCO2e)	Notes
Materials Acquisition & Pre-processing	Scope 3, Category 1	22.21	Based on illustrative BOM data for htzxtdkv.
Production Phase	Scope 1 (Direct)	0.1	Illustrative on-site fuel combustion.
	Scope 2 (Purchased Electricity)	1.3	Based on ekzrpjzmpz kWh/unit and zvplqvovgs renewable usage.
	Scope 3, Category 3 (Upstream Energy)	0.3	Upstream emissions for non-renewable electricity and fuels.
Upstream Transport (Inbound)	Scope 3, Category 4	0.222	Illustrative transport from raw material suppliers.
Downstream Transport (Outbound)	Scope 3, Category 9	0.42	Illustrative transport to distribution and last mile.
Use Phase	Scope 3, Category 11	12.5	Based on lvgethjgqw lifespan and
<b>Total Illustrative PCF:</b>		<b>36.952 kgCO2e/unit</b>	

Lifecycle Stage	GHG Scope	Illustrative Emissions (kgCO2e)	Notes
			ytmyfqrmig energy in use.
End-of-Life Treatment	Scope 3, Category 12	-0.1	Net impact considering gtevljnulv recyclability and jnxzehtymq programs.
<b>Total Illustrative PCF:</b>		<b>36.952 kgCO2e/unit</b>	

### GHG Protocol Scope Breakdown (Illustrative)

- **Scope 1 Emissions:** 0.1 kgCO2e/unit
- **Scope 2 Emissions:** 1.3 kgCO2e/unit
- **Scope 3 Emissions:**  $(22.21 + 0.3 + 0.222 + 0.42 + 12.5 - 0.1) = 35.552$  kgCO2e/unit

Total Illustrative Emissions =  $0.1 + 1.3 + 35.552 =$  **36.952 kgCO2e/unit.**

### Scope 3 Compliance (2026 Requirements)

The 2026 GHG Protocol revisions emphasize a mandatory 95% completeness rule for Scope 3 emissions. In this illustrative analysis, all relevant Scope 3 categories (Purchased Goods & Services, Fuel & Energy Related Activities, Upstream & Downstream Transportation, Use of Sold Products, End-of-Life Treatment) have been considered. A real-world assessment would meticulously identify and quantify emissions from all material Scope 3 categories to ensure this 95% threshold is met, potentially requiring a new Category 16 for "other value chain activities" if applicable. Furthermore, the impending requirement for mandatory data disaggregation by source type (primary

vs. secondary) would necessitate robust data collection directly from suppliers.

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## 5. Review & Report

### Hotspot Identification (Illustrative)

Based on the illustrative calculations, the primary hotspots for iqmkqmodgp's carbon footprint are:

- **Materials Acquisition & Pre-processing (Scope 3, Category 1):** This stage accounts for the largest portion (approx. 60%) of the total PCF due to energy-intensive materials like the Lithium-ion Battery and Aluminum.
- **Use Phase (Scope 3, Category 11):** The energy consumption during the product's 5-year illustrative lifespan represents a significant contribution (approx. 34%) to the overall footprint.
- **Production Phase (Scope 2):** While smaller than Scope 3, purchased electricity at the factory still contributes, especially the non-renewable portion.

### Reliability Statement

This report relies on a combination of provided parameters, illustrative data, and industry-standard emission factors (e.g., from Ecoinvent and DEFRA databases). While the methodology is robust and aligns with GHG Protocol, the accuracy of the final PCF is directly dependent on the quality and specificity of the underlying activity data. In a real application, primary data collected directly from suppliers, transport providers, and internal energy meters would replace illustrative values to enhance accuracy and achieve financial-grade auditable reporting, as emphasized by 2026 GHG Protocol Scope 3 updates.

## Recommendations for ddfwounoxz

1. **Material Decarbonization:** Focus on suppliers for high-impact materials (e.g., batteries, aluminum) to explore lower-carbon alternatives, recycled content, or improve supplier-specific emission data.
  2. **Energy Efficiency in Use Phase:** Investigate opportunities to reduce the energy consumption of iqmkmqmodgp during its operational life. This could involve design changes, power management features, or providing guidance to users on efficient use.
  3. **Renewable Energy Transition:** Accelerate the transition to 100% renewable energy at manufacturing facilities in China, and encourage suppliers to do the same. This would directly reduce Scope 2 emissions and indirectly impact Scope 3 Category 3.
  4. **Supply Chain Engagement:** Enhance engagement with suppliers to collect primary data for Scope 3 categories 1, 4, and 9, improving data quality and compliance with upcoming GHG Protocol requirements.
  5. **Circular Economy Integration:** Strengthen circular economy initiatives beyond basic recyclability, such as product design for disassembly, repairability, and more robust take-back schemes, to maximize avoided emissions at end-of-life.
  6. **LSR Standard Preparedness:** Assess if any raw materials sourced have significant land-use impacts that would require detailed accounting under the new Land Sector and Removals Standard, preparing for its effective date in 2027.
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## Conclusion

The Product Carbon Footprint analysis for iqmkqmodgp provides ddfwounoxz with critical insights into its environmental impact across the product lifecycle. By adhering to the rigorous standards of the GHG Protocol, including the 2026 updates, this report establishes a foundation for targeted emission reduction strategies. The identified hotspots in materials and the use phase highlight clear areas for intervention. Moving forward, a continuous focus on collecting primary data, fostering supplier collaboration, and integrating circular economy principles will be paramount for ddfwounoxz to achieve its sustainability goals and demonstrate environmental leadership.

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