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# **Product Carbon Footprint Analysis Report**

**Product Name:** EcoGrip Ergonomic  
Mouse (wnyqnohyys)

**Company:** ouwxhkqjdp

**Accounting Standard:** GHG Protocol

**Senior Sustainability Consultant:**  
nskxoumwzy

**Disclaimer:** This report is generated based on available data, industry standards, and specified parameters. Assumptions have been made where

# Product Carbon Footprint Analysis for EcoGrip Ergonomic Mouse (wnyqnohyys)

Generated Date:

Company: ouwxhkqjdp

Senior Sustainability Consultant: nskxoumwzy

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## 1. Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the EcoGrip Ergonomic Mouse (wnyqnohyys), produced by ouwxhkqjdp. Conducted by nskxoumwzy, Senior Sustainability Consultant, this assessment adheres to the Greenhouse Gas (GHG) Protocol, including the latest 2026 updates for Scope 3 and the Land Sector and Removals (LSR) Standard. The analysis covers the product's lifecycle from raw material extraction (cradle) to the factory gate, and extends through the use phase and end-of-life (EoL) scenarios, with a primary focus on upstream Scope 3 emissions. Key findings identify emission hotspots and provide recommendations for potential reductions.

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## 2. Introduction and Scope Definition

This Product Carbon Footprint (PCF) analysis evaluates the greenhouse gas (GHG) emissions associated with the EcoGrip Ergonomic Mouse (wnyqnohyys). The assessment is performed in accordance with the GHG Protocol, aiming to provide

ouwxhkqjdp with comprehensive insights into its product's environmental impact.

## 2.1. Functional Unit

The functional unit for this analysis is defined as: **1.0 unit of EcoGrip Ergonomic Mouse (wnyqnohyys)**, providing ergonomic computer input functionality over its lifespan.

## 2.2. System Boundary

The system boundary for this PCF analysis is defined as "**factory\_gate**", encompassing all processes from raw material acquisition (cradle) up to the point where the finished product leaves the manufacturing facility. Additionally, as per the detailed request, the analysis is expanded to include emissions from product transport to the customer, the product's use phase, and its end-of-life treatment, thereby covering a full cradle-to-grave perspective for completeness in reporting relevant Scope 3 categories.

## 2.3. Geographic Scope

- **Final Production Country:** China
- **Supply Chain Focus:** Europe Focused (for raw materials and potentially outbound distribution routes)

## 2.4. Accounting Standard

This Product Carbon Footprint is calculated in strict adherence to the **GHG Protocol** (Corporate Value Chain (Scope 3) Accounting and Reporting Standard), ensuring categorization into Scope 1 (direct emissions), Scope 2 (purchased energy emissions), and Scope 3 (value chain emissions). This report also incorporates considerations from the 2026 updates, including the Land Sector and Removals (LSR) Standard and the enhanced Scope 3 reporting requirements.

## 2.5. Allocation

Emissions are allocated directly to the functional unit based on mass and energy consumption where applicable. For shared processes (e.g., transportation), emissions are allocated proportionally to the product's weight or volume relative to the total load.

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## 3. Methodology: Mapping Lifecycle and Data Collection

The PCF analysis follows the five-step methodology: Define Scope, Map Lifecycle, Collect Data, Calculate Emissions, and Review & Report. This section details the lifecycle mapping and data collection for the EcoGrip Ergonomic Mouse.

### 3.1. Lifecycle Stages (LCI Inventory)

The product lifecycle is broken down into the following stages for inventory collection:

- 1. Raw Material Acquisition & Pre-processing (Cradle-to-Gate of components):** Extraction, processing, and manufacturing of all input materials and components.
- 2. Manufacturing (At ouwxhkqjdp's factory in China):** Production energy, on-site operations, and waste generated during assembly.
- 3. Transportation (Outbound):** Transport of the finished product from the factory gate to the customer, including both main transport and last-mile delivery.
- 4. Use Phase:** Energy consumption during the product's operational life by the end-user.
- 5. End-of-Life (EoL):** Collection, sorting, recycling, and disposal of the product at the end of its useful life.

## 3.2. Data Collection (Primary & Secondary Data Points)

Primary data points for material composition and energy usage are incorporated as provided. Secondary data, including industry-standard emission factors (e.g., from Ecoinvent/DEFRA), are utilized for processes where specific primary data is unavailable or for general industry averages.

### 3.2.1. Detailed Bill of Materials (BOM) - hjgyqsrw

The following Bill of Materials (BOM) provides a high-accuracy material impact calculation for the EcoGrip Ergonomic Mouse. The "Emission Factor" and "Total Carbon" values provided in the BOM are directly used for material impact calculation.

[Assumption: The provided 'Emission Factor' and 'Total Carbon' values within the BOM string represent the cradle-to-gate impact of each material.]

| ID | Description         | Category    | Process            | Qty (Unit) | Emission Factor (kg CO2e/ Unit Qty) | Total Carbon (kg CO2e) |
|----|---------------------|-------------|--------------------|------------|-------------------------------------|------------------------|
| 1  | Plastic Casing      | Plastics    | Injection Molding  | 0.05 kg    | 2.5                                 | 0.125                  |
| 2  | Circuit Board       | Electronics | Assembly           | 0.02 kg    | 15.0                                | 0.300                  |
| 3  | Rubber Grip         | Elastomers  | Molding            | 0.01 kg    | 1.8                                 | 0.018                  |
| 4  | Lithium-ion Battery | Chemicals   | Battery Production | 0.03 kg    | 20.0                                | 0.600                  |
| 5  | Copper Wire         | Metals      | Wire Drawing       | 0.005 kg   | 3.0                                 | 0.015                  |

Total raw material weight:  $0.05 + 0.02 + 0.01 + 0.03 + 0.005 = 0.115$  kg per unit.

### 3.2.2. Production Phase Energy Data

- **Renewable Energy Usage (twviuufprl):** 70% of total electricity consumed.
- **Energy Intensity (wekffrukyyo):** 0.8 kWh per unit of product.
- **Non-Renewable Energy Usage:** 30% of total electricity consumed.
- **Electricity Grid Emission Factor (China):** 0.65 kg CO<sub>2</sub>e/kWh. [Assumption: Based on a conservative estimate from 2022-2025 China grid mix data.]

### 3.2.3. Transport Logistics Data

- **Main Transport Mode (Select Mode):** Road Transport (Heavy Goods Vehicle)
- **Main Transport Distance (jxhmjsmttl):** 2500 km
- **HGV Emission Factor:** 0.112 kg CO<sub>2</sub>e/tonne-km. [Assumption: Based on EPA data for medium/heavy-duty trucks.]
- **Last-Mile Delivery Channel (Delivery Type):** Parcel Delivery (Small Van)
- **Last-Mile Delivery Emission Factor:** 0.23 kg CO<sub>2</sub>e per package. [Assumption: Based on average pickup and delivery emissions for last-mile as cited by Consumer Ecology.]

### 3.2.4. Use Phase Data

- **Product Lifespan (xsinwrovod):** 3 years (1095 days)
- **Energy Consumption in Use (dxqggdutfd):** 0.01 kWh/day
- **Electricity Grid Emission Factor (Europe Average):** 0.3 kg CO<sub>2</sub>e/kWh. [Assumption: A generalized average for

electricity consumption in the European context where the product is likely used.]

### 3.2.5. End-of-Life (EoL) Data

- **Recyclability Percentage (djvxqrjwis):** 80%
  - **Circular/Take-back Programs (ykmgpkggj):** Yes, Product Take-back and Refurbishment Program.
  - **Avoided Emissions for Recycled Plastic:** -2.0 kg CO<sub>2</sub>e/kg. [Assumption: Based on general estimates for avoided virgin plastic production through recycling.]
  - **Landfill Emissions for Plastic:** 0.5 kg CO<sub>2</sub>e/kg. [Assumption: A simplified factor for plastic waste going to landfill.]
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## 4. Emission Calculation

Emissions are calculated for each lifecycle stage using the formula: Activity Data × Emission Factor = CO<sub>2</sub>e. All results are presented in kilograms of CO<sub>2</sub> equivalent (kg CO<sub>2</sub>e) per functional unit.

### 4.1. GHG Protocol Adherence and 2026 LSR Update

This analysis categorizes emissions according to the GHG Protocol's Scope 1, 2, and 3. Special attention is paid to the 2026 updates:

- **Scope 1:** Direct emissions from sources owned or controlled by ouwxhkqjdp (e.g., on-site fuel combustion). For this PCF, assuming no significant direct fuel combustion on-site beyond electricity usage, Scope 1 is considered negligible within the factory gate boundary for production, as the energy intensity primarily refers to electricity.

- **Scope 2:** Indirect emissions from the generation of purchased electricity consumed by ouwxhkqjdp (e.g., electricity for manufacturing).
- **Scope 3:** All other indirect emissions that occur in the value chain of ouwxhkqjdp, both upstream and downstream. This includes purchased goods and services (materials), transportation and distribution, use of sold products, and end-of-life treatment of sold products.
- **2026 LSR Update:** The GHG Protocol's Land Sector and Removals (LSR) Standard, released on January 30, 2026, and effective January 1, 2027, is considered. While the EcoGrip Ergonomic Mouse itself does not directly involve land-use change, ouwxhkqjdp acknowledges the importance of this standard for broader corporate reporting and for any future expansion of PCF to include agricultural feedstocks or bio-based materials where land-use emissions or removals would be significant. The accompanying LSR Guidance is expected in Q2 2026.
- **Scope 3 Compliance:** As per 2026 requirements, this report aims for at least 95% coverage for Scope 3 reporting. By detailing material, transport, use-phase, and EoL, significant portions of Scope 3 are addressed. Mandatory data disaggregation by source type is a key aspect of the 2026 revisions.

## 4.2. Calculated Emissions by Lifecycle Stage

### 4.2.1. Materials Acquisition & Pre-processing (Scope 3 - Upstream)

Calculated directly from the "Total Carbon" values provided in the BOM, which represent cradle-to-gate emissions for each component.

- Plastic Casing: 0.125 kg CO<sub>2</sub>e
- Circuit Board: 0.300 kg CO<sub>2</sub>e
- Rubber Grip: 0.018 kg CO<sub>2</sub>e
- Lithium-ion Battery: 0.600 kg CO<sub>2</sub>e

- Copper Wire: 0.015 kg CO<sub>2</sub>e

**Total Material Emissions = 0.125 + 0.300 + 0.018 + 0.600 + 0.015 = 1.058 kg CO<sub>2</sub>e**

#### **4.2.2. Manufacturing (Scope 2)**

- Energy Consumption: 0.8 kWh/unit
- Renewable Energy Portion: 70% (0.56 kWh/unit) → 0 kg CO<sub>2</sub>e
- Non-Renewable Energy Portion: 30% (0.24 kWh/unit)
- Emissions from Non-Renewable Energy: 0.24 kWh/unit \* 0.65 kg CO<sub>2</sub>e/kWh = 0.156 kg CO<sub>2</sub>e

**Total Manufacturing Emissions = 0.156 kg CO<sub>2</sub>e**

#### **4.2.3. Transportation (Scope 3 - Downstream)**

- **Main Transport (Factory to Distribution/Customer - HGV):**
  - Product Weight: 0.115 kg
  - Transport Distance: 2500 km
  - Emission Factor: 0.112 kg CO<sub>2</sub>e/tonne-km
  - Calculations: 0.112 kg CO<sub>2</sub>e/tonne-km \* (0.115 kg / 1000 kg/tonne) \* 2500 km = 0.0322 kg CO<sub>2</sub>e
- **Last-Mile Delivery (Parcel Delivery Van):**
  - Emission Factor: 0.23 kg CO<sub>2</sub>e/package
  - Calculations: 0.23 kg CO<sub>2</sub>e

**Total Transportation Emissions = 0.0322 + 0.23 = 0.2622 kg CO<sub>2</sub>e**

#### **4.2.4. Use Phase (Scope 3 - Downstream)**

- Product Lifespan: 3 years = 1095 days
- Energy Consumption: 0.01 kWh/day
- Total Energy Consumption over lifespan: 1095 days \* 0.01 kWh/day = 10.95 kWh

- Electricity Grid Emission Factor (Europe Average): 0.3 kg CO<sub>2</sub>e/kWh
- Calculations: 10.95 kWh \* 0.3 kg CO<sub>2</sub>e/kWh = 3.285 kg CO<sub>2</sub>e

**Total Use Phase Emissions = 3.285 kg CO<sub>2</sub>e**

#### 4.2.5. End-of-Life (EoL) (Scope 3 - Downstream)

- Recyclability Percentage: 80%
- Portion Recycled: 0.115 kg \* 0.80 = 0.092 kg
- Portion Landfilled: 0.115 kg \* 0.20 = 0.023 kg
- Recycling Credit (Avoided Emissions): 0.092 kg \* -2.0 kg CO<sub>2</sub>e/kg = -0.184 kg CO<sub>2</sub>e
- Landfill Emissions: 0.023 kg \* 0.5 kg CO<sub>2</sub>e/kg = 0.0115 kg CO<sub>2</sub>e

**Total End-of-Life Emissions = -0.184 + 0.0115 = -0.1725 kg CO<sub>2</sub>e (Net Credit)**

### 4.3. Summary of Product Carbon Footprint (PCF)

| Lifecycle Stage                             | GHG Scope            | Emissions (kg CO <sub>2</sub> e per unit) |
|---|----------------------|---|
| Materials Acquisition & Pre-processing      | Scope 3 (Upstream)   | 1.058                                     |
| Manufacturing (Electricity)                 | Scope 2              | 0.156                                     |
| Transportation (Outbound)                   | Scope 3 (Downstream) | 0.2622                                    |
| Use Phase                                   | Scope 3 (Downstream) | 3.285                                     |
| End-of-Life (Net)                           | Scope 3 (Downstream) | -0.1725                                   |
| <b>Total Product Carbon Footprint (PCF)</b> |                      | <b>4.5887</b>                             |

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## 5. Review & Report

### 5.1. Emission Hotspots

The analysis for the EcoGrip Ergonomic Mouse (wnyqnohyys) reveals the following emission hotspots:

- **Use Phase (3.285 kg CO<sub>2</sub>e):** This is the most significant contributor to the total PCF, accounting for approximately 71.6% of the emissions. The energy consumption of the mouse over its 3-year lifespan, even at a low daily rate, accumulates to a substantial impact, especially when considering the carbon intensity of the electricity grid in the region of use.
- **Materials Acquisition & Pre-processing (1.058 kg CO<sub>2</sub>e):** Representing about 23.1% of the total PCF, the raw materials, particularly the Lithium-ion Battery and Circuit Board, contribute significantly to upstream emissions. This highlights the carbon intensity of electronics components manufacturing.
- **Manufacturing (0.156 kg CO<sub>2</sub>e):** While ouwxhkqjdp utilizes 70% renewable energy, the remaining 30% from the China grid still contributes to the footprint, accounting for approximately 3.4%. Increasing renewable energy penetration further could reduce this.
- **Transportation (0.2622 kg CO<sub>2</sub>e):** Both main transport and last-mile delivery contribute to the downstream footprint, making up about 5.7%.
- **End-of-Life (-0.1725 kg CO<sub>2</sub>e):** The robust recyclability and circular programs result in a net carbon credit, indicating avoided emissions due to materials re-entering the economy. This positive impact helps offset some of the lifecycle emissions.

## 5.2. Reliability and Recommendations

The reliability of this PCF analysis is high due to the use of a detailed BOM and adherence to the GHG Protocol. However, it relies on several assumptions for generic emission factors and average data where primary data was not available (e.g., specific electricity grid mix for Europe, detailed transport load factors). Future improvements could involve collecting more granular primary data for all lifecycle stages.

### Recommendations:

- 1. Optimize Use Phase Efficiency:** Invest in R&D to further reduce the energy consumption of the EcoGrip Ergonomic Mouse during its operational life. Explore features that promote ultra-low power modes or self-powering capabilities.
- 2. Sustainable Material Sourcing:** Work with suppliers to source lower-carbon intensity materials, especially for the battery and circuit board. Explore recycled content for plastics and metals where feasible without compromising performance.
- 3. Increase Renewable Energy in Manufacturing:** While already at 70%, further increasing renewable energy usage at the manufacturing facility in China (e.g., through Power Purchase Agreements or on-site generation) will directly reduce Scope 2 emissions.
- 4. Optimize Logistics:** Evaluate opportunities to optimize transportation routes and modes, particularly for long-distance freight, to reduce emissions per tonne-km. Explore consolidation strategies for last-mile delivery to reduce per-package emissions.
- 5. Enhance Circularity:** Continue to strengthen circular economy initiatives, including the Product Take-back and Refurbishment Program (ykmgpkggjl), to maximize material recovery and reuse, further increasing end-of-life credits. Explore options for product upgrades and modular designs to extend product lifespan.

6. **Data Granularity:** For future assessments, aim to collect more specific, primary data for transport (e.g., actual load factors, specific vehicle types) and a more precise regional electricity mix for the use phase.

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