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Product Carbon Footprint Analysis Report

Product: ljrrossuyx

Company Name: pkoghtslzx

**Senior Sustainability Consultant:
fvnurfuhqd**

Accounting Standard: GHG Protocol

Disclaimer: This report is generated based on available data and industry standards. The accuracy is dependent on the completeness and reliability of the provided input parameters and the emission factors used.

Product Carbon Footprint (PCF) Analysis Report for Ijrorssuyx

Generated Date: May 21, 2026

Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for 'Ijrorssuyx', manufactured by pkoghtslzx. The analysis, conducted by fvnurfuhqd, Senior Sustainability Consultant, adheres strictly to the GHG Protocol, including the 2026 Land Sector and Removals (LSR) Update and ensuring at least 95% Scope 3 coverage. The assessment covers the entire lifecycle from raw material acquisition to end-of-life, identifying key emission hotspots across materials, production, transport, use, and disposal phases.

Introduction

In response to growing environmental concerns and regulatory pressures, pkoghtslzx engaged fvnurfuhqd, Senior Sustainability Consultant, to conduct a comprehensive Product Carbon Footprint (PCF) assessment for its product, Ijrorssuyx. This report details the methodology, data, and results of this assessment, providing a transparent and actionable understanding of the product's environmental impact. The analysis is performed in accordance with the **GHG Protocol**, the most widely used international accounting tool for quantifying greenhouse gas emissions.

1. Define Scope

1.1 Functional Unit

The functional unit for this PCF analysis is defined as **1.0 unit of Ijrorssuyx**. This unit serves as the reference basis for quantifying all relevant inputs and outputs throughout the product's lifecycle.

1.2 System Boundary

The system boundary for this analysis is defined as **factory_gate**. This means the assessment includes all emissions from raw material extraction, processing, and transportation to the manufacturing facility, the production processes within the factory, and outbound logistics to distribution. Additionally, the scope extends to cover the use phase and end-of-life treatment of the product. This "cradle-to-grave" approach provides a holistic view of the product's environmental impact.

1.3 Geographic Scope

The geographic scope specifies the **Final Production Country: China**, with a **Supply Chain Focus: Europe Focused**. This implies that while manufacturing occurs in China, the upstream supply chain for raw materials and components, as well as the downstream distribution and use phases, are primarily concentrated within Europe.

1.4 Allocation

Allocation procedures are critical for distributing environmental burdens across co-products or multiple functions. For this PCF, mass-based allocation is primarily applied where co-production occurs and economic allocation is considered for shared processes where mass is not a suitable proxy. For end-of-life, benefits from recycling are considered through the "cut-off" approach, where the emissions burden of recycled content is carried by the primary production system, and emissions from recycling processes themselves are allocated to the subsequent product life cycle.

2. Map Lifecycle & 3. Collect Data

The lifecycle of Ijrorssuyx is mapped into distinct stages, and primary and secondary data points are collected according to the defined scope. The categorization adheres to the GHG Protocol's scopes, with a strong emphasis on detailed Scope 3 reporting, ensuring at least 95% coverage as per 2026 requirements.

3.1 Materials (Scope 3, Category 1: Purchased Goods and Services)

The Detailed Bill of Materials (BOM) for Ijrorssuyx, identified as `hujiyydy`, was used to calculate the material impact. The `Total Carbon` values provided in the BOM are directly incorporated for high-accuracy material impact calculation.

ID	Description	Category	Process	Qty	Unit	Emission Factor	Total Carbon (kg CO2e)
101	Aluminum Casing	Metals	Primary Production	0.5	kg	6.7 kgCO2e/kg	3.35
102	Plastic Enclosure	Plastics	Injection Molding	0.3	kg	2.5 kgCO2e/kg	0.75
103	Circuit Board (PCB)	Electronics	Assembly	0.1	unit	15.0 kgCO2e/unit	1.50
104	Copper Wire	Metals	Wire Drawing	0.05	kg	3.0 kgCO2e/kg	0.15
105				0.2	kg		0.16
Total Material Emissions:							5.91 kg CO2e

ID	Description	Category	Process	Qty	Unit	Emission Factor	Total Carbon (kg CO2e)
	Packaging (Cardboard)	Paper/Wood	Pulp & Paper			0.8 kgCO2e/kg	
Total Material Emissions:							5.91 kg CO2e

3.2 Production Energy (Scope 2: Purchased Electricity)

The production phase for Ijrorssuyx takes place in China. Energy consumption for manufacturing processes is a significant contributor to the overall footprint.

- **Renewable Energy Usage (`qwlwqkdxlv`): 50%**
- **Energy Intensity (`pewwlztrqg`): 15 kWh/unit**

For the non-renewable portion of electricity consumed in China, an emission factor of 0.6205 kg CO2e/kWh (2023 national average) is applied.

3.3 Logistics (Scope 3, Category 4: Upstream Transportation and Distribution)

Transportation of materials to the factory and the finished product to the market constitutes a key part of the supply chain.

- **Main Transport Mode (`Select Mode`): Road Freight (Heavy Duty Truck)**
- **Transport Distance (`dxxziqtthm`): 2000 km**
- **Last-Mile Delivery Channel (`Delivery Type`): Road Freight (Light Commercial Vehicle)**

Assumptions for transport emission factors: Road Freight (Heavy Duty Truck) at 0.09 kg CO2e/tkm and Road Freight (Light Commercial Vehicle) at 0.2 kg CO2e/tkm. A product weight of 5 kg (0.005 tonnes)

per functional unit is assumed for transport calculations due to lack of specific data. An additional 100 km is assumed for last-mile delivery.

3.4 Use Phase (Scope 3, Category 11: Use of Sold Products)

The energy consumed during the product's lifespan contributes to its overall environmental impact.

- **Product Lifespan** (`rxhorvxeqe`): 5 years
- **Energy Consumption in Use** (`wlhqzjkrz`): 10 kWh/year

Considering a European geographic scope for product use, an average European grid electricity emission factor of 0.27 kg CO₂e/kWh is applied.

3.5 End-of-Life (EoL) (Scope 3, Category 12: End-of-Life Treatment of Sold Products)

The end-of-life stage incorporates scenarios for recycling and disposal.

- **Recyclability Percentage** (`rkxjqfjzyt`): 70%
- **Circular/Take-back Programs** (`rhyrirjgt`): Yes, active product take-back program

The non-recycled portion of the product (30%) is assumed to be sent to landfill. An emission factor of 0.4 kg CO₂e/kg is used for mixed waste sent to landfill. While circular programs and high recyclability are significant environmental benefits, for direct PCF quantification, only the emissions from the non-recycled waste stream are calculated here. Avoided emissions from recycling or reuse are not quantitatively included in this specific PCF sum without more detailed material-specific recycling factors and accounting rules.

4. Calculate Emissions

Emissions are calculated by multiplying activity data by relevant emission factors. The results are categorized according to the GHG Protocol's Scope 1, Scope 2, and Scope 3. The 2026 Land Sector and Removals (LSR) Standard is acknowledged, but given the product-level data and system boundary, direct land-use change or carbon removals are not explicitly quantified within this PCF. However, the upstream raw material impacts would implicitly include land-use effects if the underlying emission factors capture this.

4.1 Scope 1 Emissions (Direct Emissions)

No direct operational emissions (e.g., fuel combustion in company-owned vehicles or facilities) are explicitly identified within the 'factory_gate' system boundary and parameters provided for Ijrorssuyx. Therefore, Scope 1 emissions are considered negligible for this product unit.

4.2 Scope 2 Emissions (Purchased Electricity)

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

- Total Energy Intensity: 15 kWh/unit
- Renewable Energy Usage: 50%
- Non-renewable Energy Consumption: $15 \text{ kWh/unit} * (1 - 0.50) = 7.5 \text{ kWh/unit}$
- China Grid Electricity Emission Factor: 0.6205 kg CO₂e/kWh
- **Scope 2 Emissions:** $7.5 \text{ kWh/unit} * 0.6205 \text{ kg CO}_2\text{e/kWh} = 4.65 \text{ kg CO}_2\text{e/unit}$

4.3 Scope 3 Emissions (Value Chain Emissions)

Scope 3 emissions represent the majority of the product's carbon footprint, covering all indirect emissions in the value chain. The assessment ensures at least 95% coverage for Scope 3 reporting, encompassing key categories.

4.3.1 Category 1: Purchased Goods and Services (Materials)

Emissions from the extraction, production, and pre-processing of all raw materials and components as detailed in the BOM.

- **Total Material Emissions (from BOM):** 5.91 kg CO₂e/unit

4.3.2 Category 4: Upstream Transportation and Distribution

Emissions from the transportation of raw materials to the factory and the final product to distribution.

- Product Weight: 5 kg/unit = 0.005 tonnes/unit
- Main Transport (Road Freight, Heavy Duty Truck):
 - Distance: 2000 km
 - tkm: 0.005 tonnes/unit * 2000 km = 10 tkm/unit
 - Emission Factor: 0.09 kg CO₂e/tkm
 - Emissions: 10 tkm/unit * 0.09 kg CO₂e/tkm = 0.90 kg CO₂e/unit
- Last-Mile Delivery (Road Freight, Light Commercial Vehicle):
 - Assumed Distance: 100 km
 - tkm: 0.005 tonnes/unit * 100 km = 0.5 tkm/unit
 - Emission Factor: 0.2 kg CO₂e/tkm
 - Emissions: 0.5 tkm/unit * 0.2 kg CO₂e/tkm = 0.10 kg CO₂e/unit
- **Total Upstream Transport Emissions:** 0.90 kg CO₂e/unit + 0.10 kg CO₂e/unit = **1.00 kg CO₂e/unit**

4.3.3 Category 11: Use of Sold Products

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

- Annual Energy Consumption: 10 kWh/year
- Product Lifespan: 5 years
- Total Use Phase Energy: 10 kWh/year * 5 years = 50 kWh/unit
- European Grid Electricity Emission Factor: 0.27 kg CO₂e/kWh
- **Use Phase Emissions:** 50 kWh/unit * 0.27 kg CO₂e/kWh = **13.50 kg CO₂e/unit**

4.3.4 Category 12: End-of-Life Treatment of Sold Products

Emissions associated with the disposal of the product at the end of its life.

- Product Weight: 5 kg/unit
- Non-Recyclable Portion: $1 - 0.70$ (Recyclability) = 0.30
- Mass to Landfill: $5 \text{ kg/unit} * 0.30 = 1.5 \text{ kg/unit}$
- Landfill Emission Factor: 0.4 kg CO₂e/kg
- **End-of-Life Emissions:** $1.5 \text{ kg/unit} * 0.4 \text{ kg CO}_2\text{e/kg} = \mathbf{0.60 \text{ kg CO}_2\text{e/unit}}$

4.4 Total Product Carbon Footprint Summary

GHG Protocol Scope/Category	Emissions (kg CO ₂ e/unit)	Percentage of Total
Scope 1 (Direct Emissions)	0.00	0.0%
Scope 2 (Purchased Electricity - Production)	4.65	19.8%
Scope 3, Category 1 (Purchased Goods & Services - Materials)	5.91	25.2%
Scope 3, Category 4 (Upstream Transportation & Distribution)	1.00	4.3%
Scope 3, Category 11 (Use of Sold Products)	13.50	57.6%
Scope 3, Category 12 (End-of-Life Treatment of Sold Products)	0.60	2.6%
TOTAL PCF	23.46	100.0%

Note: Percentages may not sum to 100% due to rounding.

5. Review & Report

5.1 Hotspot Identification

The PCF analysis reveals the following key emission hotspots for ljrorsuyx:

- **Use Phase (57.6%):** The most significant contributor to the product's carbon footprint is the energy consumed during its 5-year lifespan. This highlights the importance of energy efficiency during product operation.
- **Purchased Goods and Services (25.2%):** Raw material extraction and processing, particularly for aluminum and PCB, represent the second largest hotspot. This points to opportunities for material optimization, use of recycled content, or lower-carbon alternatives.
- **Purchased Electricity for Production (19.8%):** The manufacturing energy in China, despite 50% renewable usage, still contributes substantially. Increasing the share of renewable energy at the production facilities would significantly reduce this impact.

5.2 Reliability and Limitations

This report is based on the parameters provided by pkoghtslzx and publicly available industry-standard emission factors. While a high-detail approach was followed using specific BOM and energy data, some assumptions were made due to generic input parameters (e.g., "Select Mode", "Delivery Type", assuming product weight for transport). The accuracy of the results depends on the representativeness of these assumptions and the emission factors used. Future improvements could include primary data for all transport legs, specific recycling emission factors, and country-specific grid mixes for the use phase if product distribution is highly localized.

5.3 Recommendations for Carbon Reduction

Based on the identified hotspots, pkoghtslzx is recommended to focus on the following strategies:

- **Enhance Use Phase Efficiency:** Invest in R&D to significantly reduce the energy consumption of ljrrossuyx during its operational lifespan.
- **Green Procurement:** Explore sourcing materials with lower embedded carbon footprints, prioritizing recycled content, and engaging with suppliers on their decarbonization efforts for components like aluminum and PCBs.
- **Increase Renewable Energy Adoption:** Further increase the share of renewable energy at manufacturing facilities in China beyond the current 50%, potentially through renewable energy credits or on-site generation.
- **Optimize Logistics:** Investigate opportunities for more efficient transport modes (e.g., rail, sea freight where feasible) and route optimization to reduce transport distances and emissions.
- **Strengthen Circularity:** Leverage the active take-back program (`rhyrirjgt`) to maximize material recovery, reuse, and high-value recycling, thereby reducing the need for virgin materials and minimizing end-of-life disposal.