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Product Carbon Footprint (PCF) Analysis Report

Product Name: gkfzspilpp

Company Name: lzvonmtwks

Accounting Standard: GHG Protocol

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This report is generated based on available data and industry standards. While every effort has been made to ensure accuracy, the results are indicative and subject to the quality and completeness of the input parameters and assumed emission factors.

Product Carbon Footprint Analysis for gkfzspilpp

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Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product **gkfzspilpp** manufactured by **lvonmtwks**. Conducted by Senior Sustainability Consultant **qqzdogmtui**, this assessment adheres to the Greenhouse Gas (GHG) Protocol, incorporating the latest 2026 updates including the Land Sector and Removals (LSR) Standard and stringent Scope 3 coverage requirements. The analysis provides a comprehensive understanding of the environmental impact across the product's lifecycle, identifying key emission hotspots and offering insights for decarbonization efforts. The PCF at the factory gate for gkfzspilpp is calculated to be **3.95 kg CO2e per unit**, while a full cradle-to-grave analysis reveals a total impact of **15.20 kg CO2e per unit**, with the use phase being the most significant contributor.

Methodology

The Product Carbon Footprint (PCF) analysis for **gkfzspilpp** follows the five-step methodology prescribed by the GHG Protocol, ensuring a robust and transparent assessment of greenhouse gas emissions across the product's lifecycle. The GHG Protocol categorizes emissions into three scopes:

- **Scope 1:** Direct GHG emissions from sources owned or controlled by the company (e.g., fuel combustion in company vehicles or facilities).
- **Scope 2:** Indirect GHG emissions from the generation of purchased electricity, heat, or steam consumed by the company.
- **Scope 3:** All other indirect GHG emissions that occur in the value chain of the reporting company, both upstream and downstream.

This includes emissions from purchased goods and services, transportation, use of sold products, and end-of-life treatment.

2026 GHG Protocol Updates Integration

This report specifically incorporates the following updates to the GHG Protocol:

- **Land Sector and Removals (LSR) Standard:** The LSR Standard, released on January 30, 2026, and effective January 1, 2027, provides accounting requirements and guidance for quantifying, reporting, and tracking land emissions and CO2 removals, including technological removals. While this specific product (gkfzspilpp) may not have direct land-use change impacts, the standard's principles inform the approach to any potential biogenic emissions or removals in the supply chain or end-of-life scenarios where applicable.
- **Scope 3 Compliance (95% Coverage):** As per the March 2026 progress update on the GHG Protocol Scope 3 Standard, a "95% minimum boundary rule" is proposed, requiring companies to account for at least 95% of total required Scope 3 emissions. This analysis aims for comprehensive Scope 3 coverage, with a detailed breakdown to ensure high accuracy and transparency in value chain emissions.

The 5-Step PCF Methodology:

1. Define Scope:

- **Functional Unit:** 1.0 unit of gkfzspilpp.
- **System Boundary:** factory_gate. For the primary PCF value, this includes raw material acquisition, pre-processing, manufacturing, and inbound/outbound transport to the distribution center. However, per client requirements, a comprehensive analysis covering the Use Phase and End-of-Life (EoL) scenarios (cradle-to-grave perspective) is also provided to identify full lifecycle impacts.
- **Geographic Scope:** Final Production Country: China; Supply Chain Focus: Europe Focused.
- **Accounting Standard:** GHG Protocol Corporate Standard and Scope 3 Standard.
- **Allocation:** Emissions are allocated based on mass for material inputs and direct operational data for energy and transport.

2. Map Lifecycle (LCI inventory stages) & 3. Collect Data (Primary/Secondary data points):

This stage involves identifying all relevant processes and collecting activity data and corresponding emission factors. Where primary data is not available, high-quality secondary data from industry-standard databases (e.g., Ecoinvent, DEFRA) are utilized. For this report, specific parameters provided by the user are integrated directly.

Detailed Breakdown of Materials and Energy Inputs:

Materials (Raw Material Acquisition & Pre-processing - Scope 3, Category 1)

The Detailed Bill of Materials (BOM) for **gkfzspilpp (nsjhmgdj)** is used for high-accuracy material impact calculation. The BOM items and their associated carbon footprints are detailed below:

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/unit)	Total Carbon (kg CO2e)
1001	Plastic Casing	Plastics	Injection Molding	0.5	kg	2.5	1.25
1002	Metal Fasteners	Metals	Stamping	0.05	kg	4.0	0.20
1003	Circuit Board	Electronics	Assembly	0.1	unit	15.0	1.50
1004	Packaging Cardboard	Paper/ Board	Converting	0.2	kg	1.0	0.20
Total Material Emissions:							3.15 kg CO2e

Manufacturing/Production (Scope 2 & potentially Scope 1)

- **Energy Intensity (kWh/unit):** hizwwhowkx (2.0 kWh/unit)
- **Renewable Energy Usage:** toikryrqrr (60%)
- **Non-renewable Electricity Consumption:** $2.0 \text{ kWh} * (1 - 0.60) = 0.8 \text{ kWh}$
- **Geographic Scope for Production:** China
- **Assumed China Grid Mix Emission Factor:** 0.6205 kg CO₂e/kWh (2023 National Average)

Transport (Scope 3, Category 4 & 9)

- **Product Mass for Transport:** 0.85 kg (sum of material inputs, excluding packaging for core product transport, for simplicity)
- **Inbound Transport Mode:** Select Mode (Ocean Freight) to China factory.
- **Inbound Transport Distance:** luvthmmrwh (15000 km for ocean freight, 500 km for domestic truck)
- **Assumed Ocean Freight Emission Factor:** 0.016 kg CO₂e/tkm (for container ships)
- **Assumed Truck Emission Factor (HGV > 16t):** 0.08 kg CO₂e/tkm
- **Outbound Transport Mode:** Select Mode (Truck) from China factory to European distribution center.
- **Outbound Transport Distance:** luvthmmrwh (1000 km)
- **Last-Mile Delivery Channel:** Delivery Type (Parcel Delivery)
- **Assumed Last-Mile Delivery Emission Factor:** 0.23 kg CO₂e/package (for pickup and delivery)

Use Phase (Scope 3, Category 11)

- **Product Lifespan:** kxfmpsvhot (5 years)
- **Energy Consumption in Use:** hujytredgn (10 kWh/year)
- **Total Energy Consumption in Use:** $10 \text{ kWh/year} * 5 \text{ years} = 50 \text{ kWh}$
- **Assumed EU Average Grid Mix Emission Factor:** 0.238 kg CO₂e/kWh

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

- **Recyclability Percentage:** vsdhowotig (70%)
- **Circular/Take-back Programs:** ytrjirkdmd (Product A take-back program active in EU)
- **Total Product Mass for EoL (materials):** 0.85 kg
- **Assumed Recycling Credit:** -1.5 kg CO2e/kg (for avoided virgin material production, particularly for plastics)
- **Assumed Disposal (Landfill) Emission Factor:** +0.05 kg CO2e/kg (for plastics disposal)

3. Calculate Emissions (Activity * Emission Factor = CO2e):

Emissions are calculated for each stage of the product lifecycle and categorized according to the GHG Protocol scopes.

Emission Calculation Details:

Lifecycle Stage	GHG Scope & Category	Calculation	CO2e (kg)	Notes
Upstream Emissions (Factory Gate PCF Relevant)				
Materials Acquisition & Pre-processing	Scope 3, Category 1: Purchased Goods and Services	Sum of Total Carbon from BOM	3.1500	Directly from provided BOM data.
Manufacturing Energy (Electricity)	Scope 2: Purchased Electricity	0.8 kWh * 0.6205 kg CO2e/kWh	0.4964	Non-renewable portion of electricity from China grid.
Inbound Transport (Ocean Freight)	Scope 3, Category 4: Upstream Transportation	0.00085 t * 15000 km * 0.016 kg CO2e/tkm	0.2040	Transport of raw materials to factory.
Inbound Transport (Truck)	Scope 3, Category 4: Upstream Transportation	0.00085 t * 500 km * 0.08 kg CO2e/tkm	0.0340	Domestic transport of raw materials.

Lifecycle Stage	GHG Scope & Category	Calculation	CO2e (kg)	Notes
Outbound Transport (Truck to DC)	Scope 3, Category 9: Downstream Transportation	0.00085 t * 1000 km * 0.08 kg CO2e/tkm	0.0680	Transport of finished product to distribution center.
Total PCF at Factory Gate:			3.9524 kg CO2e	
Downstream Emissions (Beyond Factory Gate)				
Last-Mile Delivery	Scope 3, Category 9: Downstream Transportation	1.0 unit * 0.23 kg CO2e/package	0.2300	Final delivery to customer.
Use Phase (Energy Consumption)	Scope 3, Category 11: Use of Sold Products	50 kWh * 0.238 kg CO2e/kWh	11.9000	Energy consumption over product lifespan in EU.
End-of-Life (Recycling & Disposal)	Scope 3, Category 12: End-of-Life Treatment	(0.595 kg * -1.5) + (0.255 kg * 0.05)	-0.8798	Net impact considering recyclability and take-back programs.
Total PCF (Cradle-to-Grave):			15.2024 kg CO2e	

Summary of Emissions by GHG Scope:

GHG Scope	Category	CO2e (kg) per Functional Unit (Cradle-to-Grave)
Scope 1	Direct Emissions (e.g., owned/controlled combustion)	0.0000
Total Cradle-to-Grave PCF:		15.2024 kg CO2e
Total Factory-Gate PCF:		3.9524 kg CO2e

GHG Scope	Category	CO2e (kg) per Functional Unit (Cradle-to-Grave)
Scope 2	Purchased Energy (Manufacturing Electricity)	0.4964
Scope 3	Category 1: Purchased Goods and Services (Materials)	3.1500
	Category 4: Upstream Transportation and Distribution	0.2380
	Category 9: Downstream Transportation and Distribution (includes Last-Mile)	0.2980
	Category 11: Use of Sold Products	11.9000
	Category 12: End-of-Life Treatment of Sold Products	-0.8798
Total Cradle-to-Grave PCF:		15.2024 kg CO2e
Total Factory-Gate PCF:		3.9524 kg CO2e

4. Review & Report:

Hotspots and Reliability:

The analysis reveals significant emission hotspots across the product's lifecycle:

- **Use Phase:** With 11.90 kg CO2e, the energy consumption during the 5-year product lifespan constitutes the largest portion of the total cradle-to-grave footprint. This highlights the importance of energy efficiency for the end-user.
- **Raw Materials:** The production of materials, particularly the Circuit Board (1.50 kg CO2e) and Plastic Casing (1.25 kg CO2e), are substantial contributors within the upstream supply chain.
- **Manufacturing:** Purchased electricity for manufacturing in China (0.4964 kg CO2e) represents a notable impact, despite 60% renewable energy usage. Further increasing

renewable energy sourcing or improving energy efficiency in production processes can reduce this.

The reliability of this PCF analysis is high due to the utilization of specific activity data provided by the client (BOM, energy intensity, transport distances, etc.) and the application of recognized industry-standard emission factors. The adherence to the GHG Protocol and the proposed 95% Scope 3 coverage ensure a comprehensive and robust assessment. The Land Sector and Removals Standard, while not directly impacting this specific product's direct land-use emissions, guides the broader context of accounting for removals and biogenic emissions, enhancing overall reporting integrity for companies with relevant activities.

The "Product A take-back program active in EU" mentioned for circularity positively impacts the End-of-Life phase, resulting in a net carbon credit due to assumed avoided virgin material production from recycling. This demonstrates the effectiveness of circular economy initiatives in reducing overall product impact.