

carboncalcpcf.com

Product Carbon Footprint Analysis Report

For Product: runjepiviq

Company Name: szfntjhnru

Senior Sustainability Consultant:
pnwvishrim

Accounting Standard: GHG Protocol

This report is generated based on available data and industry standards for Product Carbon Footprint (PCF) analysis. While efforts have been made to ensure accuracy based on the provided parameters, specific details may rely on recognized industry average emission factors where primary data was unavailable.

Product Carbon Footprint Analysis Report for runjepiviq

Generated Date: June 2, 2026

Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product **runjepiviq** manufactured by **szfntjhnru**. The analysis, conducted by Senior Sustainability Consultant **pnwvishrim**, adheres strictly to the GHG Protocol and incorporates the latest 2026 Land Sector and Removals (LSR) Standard updates where applicable. The total cradle-to-gate-plus-use-and-end-of-life PCF for one functional unit of runjepiviq is calculated to be **218.18 kg CO2e**. Key hotspots include the use phase due to energy consumption, and raw material acquisition. Significant efforts in renewable energy adoption in production and high recyclability at End-of-Life contribute to mitigating the overall footprint.

1. Defining the Scope

Functional Unit

The functional unit for this Product Carbon Footprint analysis is defined as **1.0 unit of runjepiviq**.

System Boundary

The system boundary for this PCF analysis is set as "**cradle-to-grave**", specifically encompassing raw material acquisition, manufacturing at the **factory_gate**, distribution, the use phase, and End-of-Life (EoL) treatment. This comprehensive approach ensures all significant emissions across the product's lifecycle are captured.

Geographic Scope

The geographic scope focuses on the **Final Production Country: China**, with a **Supply Chain Focus: Europe Focused** for upstream materials and downstream distribution. Use phase emissions are modeled based on the country of final production's electricity mix, where the product is assumed to be primarily sold and used.

Accounting Standard

This PCF analysis strictly follows the **GHG Protocol** standards. Emissions are categorized into Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy), and Scope 3 (all other indirect emissions across the value chain).

Allocation

For co-products or by-products, allocation is performed using a mass-based approach where appropriate. For recycled content at End-of-Life, a substitution approach is applied, crediting the product system for avoided virgin material production.

2. Mapping the Lifecycle & 3. Collecting Data

The lifecycle of **runjepiviq** is mapped through several stages, from raw material extraction to End-of-Life. Data collection prioritizes primary data provided by szfntjhnru and supplements with high-quality secondary data from industry-standard databases like Ecoinvent and DEFRA for generic emission factors.

Detailed Bill of Materials (BOM) & Material Inputs (Scope 3 Upstream)

The following detailed Bill of Materials (BOM) was provided for **pnqlxjpp**, and the "Total Carbon" values are directly used for material impact calculation, representing the embodied emissions from raw material extraction, processing, and upstream transport.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/unit)	Total Carbon (kg CO2e)
M001	Plastic Casing	Plastics	Injection Molding	0.5	kg	2.5	1.25
M002	Circuit Board	Electronics	Assembly	0.1	unit	15.0	1.50
M003	Metal Components	Metals	Stamping	0.2	kg	3.0	0.60
M004	Packaging (Cardboard)	Paper/ Cardboard	Forming	0.05	kg	1.0	0.05
Total Material Emissions:							3.40 kg CO2e

Production Phase Energy Inputs (Scope 2 & potentially Scope 1)

The production of **runjepiviq** occurs in China. The energy consumption and renewable energy usage data are customized as follows:

- **Energy Intensity:** 25 kWh/unit [jejfnhrkjo]
- **Renewable Energy Usage:** 60% [qukkwvedgx]
- **Assumed China Grid Emission Factor:** 0.6 kg CO2e/kWh
- **Assumed Renewable Energy Emission Factor (upstream):** 0.02 kg CO2e/kWh

Transport Logistics Data (Scope 3 Upstream & Downstream)

Logistics data for the supply chain analysis is incorporated using the provided parameters:

- **Primary Transport Mode:** Road Freight (Heavy Goods Vehicle) [Select Mode]
- **Transport Distance:** 1500 km [qzqrdugqrk]
- **Last-Mile Delivery Channel:** Parcel Delivery Van [Delivery Type]
- **Assumed Road Freight Emission Factor:** 0.15 kg CO₂e/tkm (for primary transport)
- **Assumed Parcel Delivery Van Emission Factor:** 0.5 kg CO₂e/tkm (for last-mile, reflecting lower efficiency with smaller loads)
- **Calculated Product Total Mass for Transport:** 0.85 kg (0.00085 tonnes)

Use Phase Data (Scope 3 Downstream)

The use phase calculation integrates specific durability and consumption data:

- **Product Lifespan:** 7 years [eixmohgike]
- **Energy Consumption in Use:** 50 kWh/year [pknidtshpm]
- **Total Energy Consumption over Lifespan:** 350 kWh (50 kWh/year * 7 years)
- **Assumed Electricity Grid Emission Factor (China):** 0.6 kg CO₂e/kWh (assuming use occurs in the same region as production for grid mix consistency)

End-of-Life (EoL) Scenarios (Scope 3 Downstream)

Circular economy impacts are reflected by incorporating EoL scenarios:

- **Recyclability Percentage:** 80% [fijutrns soy]
 - **Circular/Take-back Programs:** Yes, comprehensive material recovery and reuse initiatives are in place. [fhyxmdidwp]
 - **Assumed Average Recycling Emission Reduction:** 65% reduction in virgin material emissions for the recycled portion, based on industry averages for materials like plastics and metals.
 - **Assumed Disposal Emission Factor (non-recycled portion):** 0.1 kg CO₂e/kg (for landfill/incineration of the remaining 20% waste).
-

4. Calculating Emissions (Activity * Emission Factor = CO₂e)

Emissions are calculated for each life cycle stage and categorized according to the GHG Protocol. This report aims for at least 95% coverage for Scope 3 reporting as per 2026 requirements.

Scope 1: Direct Emissions

For this Product Carbon Footprint (PCF) with a "factory_gate" boundary for direct operational control, Scope 1 emissions (e.g., direct fuel combustion in owned vehicles or stationary sources) are considered negligible or not directly attributable to the product unit in isolation, as they would typically fall under the corporate inventory or be indirect within the value chain for a product assessment. Thus, for runjepiviq, direct Scope 1 emissions are considered N/A.

Scope 2: Purchased Energy Emissions

These emissions arise from the generation of purchased electricity for the production process.

- Total Energy Consumption: 25 kWh/unit
- Non-renewable energy portion (40%): $25 \text{ kWh} * 0.40 = 10 \text{ kWh}$
- Non-renewable emissions: $10 \text{ kWh} * 0.6 \text{ kg CO}_2\text{e/kWh (China Grid EF)} = 6.00 \text{ kg CO}_2\text{e}$
- Renewable energy portion (60%): $25 \text{ kWh} * 0.60 = 15 \text{ kWh}$
- Renewable emissions (upstream): $15 \text{ kWh} * 0.02 \text{ kg CO}_2\text{e/kWh} = 0.30 \text{ kg CO}_2\text{e}$
- **Total Scope 2 Emissions: $6.00 + 0.30 = 6.30 \text{ kg CO}_2\text{e}$**

Scope 3: Value Chain Emissions

Scope 3 encompasses all other indirect emissions from the value chain, both upstream and downstream.

Materials Acquisition & Pre-processing (Upstream)

Emissions from the extraction, production, and pre-processing of raw materials are directly taken from the "Total Carbon" values in the provided BOM, representing embodied emissions.

- Plastic Casing: 1.25 kg CO₂e
- Circuit Board: 1.50 kg CO₂e
- Metal Components: 0.60 kg CO₂e
- Packaging (Cardboard): 0.05 kg CO₂e
- **Total Material Emissions (Scope 3): 3.40 kg CO₂e**

Transportation and Distribution (Upstream & Downstream)

This includes emissions from transporting materials to the factory and distributing the finished product.

- Product Mass: 0.00085 tonnes/unit

- **Primary Transport (Road Freight):**

- Distance: 1500 km

- Emissions: $0.00085 \text{ t} * 1500 \text{ km} * 0.15 \text{ kg CO}_2\text{e/tkm} = 0.19 \text{ kg CO}_2\text{e}$

- **Last-Mile Delivery (Parcel Delivery Van):**

- Assumed Distance: 100 km

- Emissions: $0.00085 \text{ t} * 100 \text{ km} * 0.5 \text{ kg CO}_2\text{e/tkm} = 0.04 \text{ kg CO}_2\text{e}$

- **Total Transport Emissions (Scope 3): $0.19 + 0.04 = 0.23 \text{ kg CO}_2\text{e}$**

Use Phase (Downstream)

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

- Total Energy in Use: 350 kWh

- Emissions: $350 \text{ kWh} * 0.6 \text{ kg CO}_2\text{e/kWh (China Grid EF)} = 210.00 \text{ kg CO}_2\text{e}$

- **Total Use Phase Emissions (Scope 3): $210.00 \text{ kg CO}_2\text{e}$**

End-of-Life Treatment of Sold Products (Downstream)

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

- Recyclability Percentage: 80%

- Non-recyclable portion: 20% of 0.85 kg product mass = 0.17 kg

- Disposal emissions for non-recyclable portion: $0.17 \text{ kg} * 0.1 \text{ kg CO}_2\text{e/kg} = 0.02 \text{ kg CO}_2\text{e}$

- Recycling credit for 80% of material emissions: $-(3.40 \text{ kg CO}_2\text{e} * 0.80 * 0.65) = -1.77 \text{ kg CO}_2\text{e}$

- **Total End-of-Life Emissions (Scope 3): $0.02 - 1.77 = -1.75 \text{ kg CO}_2\text{e (Net saving)}$**

Total Product Carbon Footprint (PCF)

Summing up the emissions from all stages:

- Scope 1 Emissions: 0.00 kg CO₂e (negligible/N/A for PCF)
- Scope 2 Emissions: 6.30 kg CO₂e
- Scope 3 Emissions (Materials): 3.40 kg CO₂e
- Scope 3 Emissions (Transport): 0.23 kg CO₂e
- Scope 3 Emissions (Use Phase): 210.00 kg CO₂e
- Scope 3 Emissions (End-of-Life): -1.75 kg CO₂e

Overall Product Carbon Footprint for runjepiviq: 218.18 kg CO₂e per functional unit

Application of 2026 LSR Update

The GHG Protocol's Land Sector and Removals (LSR) Standard, published on January 30, 2026, and effective January 1, 2027, provides comprehensive guidance for accounting for land emissions, CO₂ removals, and biogenic products. While specific biogenic material data was not provided in the BOM for direct quantification of removals, this analysis acknowledges the importance of the LSR Standard. For future assessments, particularly if bio-based materials (e.g., specific wood products beyond generic cardboard packaging) are introduced or land-intensive processes are identified in the upstream supply chain, the LSR Standard will be crucial for quantifying and reporting associated emissions and removals.

5. Review & Report

Emissions Hotspots

The PCF analysis reveals the following major emission hotspots for **runjepiviq**:

- **Use Phase (210.00 kg CO₂e):** This constitutes the vast majority of the product's footprint, primarily due to the energy

consumption over its 7-year lifespan. This highlights a critical area for product redesign aimed at energy efficiency or shifting to renewable energy sources during usage.

- **Production Phase (6.30 kg CO₂e):** While significant renewable energy (60%) is used, the remaining grid electricity still contributes notably. Further increasing renewable energy sourcing and improving energy efficiency at the factory will reduce this impact.
- **Materials Acquisition (3.40 kg CO₂e):** The embodied emissions in materials like the Circuit Board and Plastic Casing are substantial. Opportunities exist for sourcing lower-carbon materials, lightweighting, or increasing recycled content beyond what's handled at EoL.
- **End-of-Life (-1.75 kg CO₂e):** The robust recyclability and circular programs result in a net carbon saving at the end of the product's life, demonstrating a positive circular economy impact.

Recommendations for Improvement

1. **Energy Efficiency in Use:** Investigate opportunities to significantly reduce the energy consumption of runjepiviq during its operational lifespan. This could involve more efficient components or power management features.
2. **Renewable Energy Expansion:** Explore further investments in renewable energy at production facilities, potentially targeting 100% renewable energy usage to minimize Scope 2 emissions.
3. **Material Decarbonization:** Work with suppliers to identify and procure lower-carbon alternatives for key components, especially plastics and electronics. Explore options for materials with higher inherent recycled content or from bio-based sources, carefully considering their overall lifecycle impacts including potential LSR relevance.
4. **Optimized Logistics:** Review transportation modes and routes for both inbound materials and outbound products to identify

opportunities for reducing distances, optimizing load factors, and shifting to lower-emission transport options where feasible.

Reliability Statement

This report is based on the data provided by **szfntjhnru** and estimated using industry-standard emission factors from reputable databases (e.g., Ecoinvent, DEFRA). The methodology strictly adheres to the GHG Protocol. While primary data was prioritized, assumptions were made where specific data was not available (e.g., generic emission factors for transport modes, typical grid mixes). The accuracy of the results is contingent upon the completeness and accuracy of the input data. Continuous improvement in data collection for all lifecycle stages, particularly primary data from suppliers, will enhance the precision of future PCF assessments.

Confidential - Internal Use Only