carboncalcpcf.com

Product Carbon Footprint Analysis Report

Product Name: nwnxxhhvke

Company Name: wwtqijgspz

Accounting Standard: GHG Protocol

Senior Sustainability Consultant: kddnpvurzk

Product Carbon Footprint Analysis for nwnxxhhvke

Generated Date: May 18, 2026

Senior Sustainability Consultant: kddnpvurzk

---

1. Executive Summary

This report presents a high-detail Product Carbon Footprint (PCF) analysis for the product **nwnxxhhvke**, manufactured by **wwtqijgspz**. The analysis quantifies the greenhouse gas (GHG) emissions across the product\'s lifecycle, from raw material extraction to end-of-life, adhering to the principles of the GHG Protocol. The total Product Carbon Footprint for one functional unit of nwnxxhhvke is calculated to be approximately **38.35 kg CO2e**. The primary hotspots identified are the material acquisition and production energy phases, followed by the product\'s use phase. Significant efforts in circularity, such as high recyclability and take-back programs, contribute to a net credit at the end-of-life stage, effectively reducing the overall footprint.

---

2. Methodology and Scope Definition

The Product Carbon Footprint (PCF) for nwnxxhhvke has been calculated following the Greenhouse Gas (GHG) Protocol Product Standard, a recognized methodology for quantifying GHG emissions across a product\'s lifecycle.

2.1. Functional Unit

- **Functional Unit:** 1.0 unit of nwnxxhhvke

- This unit serves as the reference basis for all emission calculations, allowing for consistent comparison and analysis.

2.2. System Boundary

- **System Boundary:** factory_gate. This "cradle-to-gate" approach encompasses all GHG emissions from raw material extraction and processing, through manufacturing, up to the point the product leaves the factory. However, for a comprehensive understanding and as per reporting requirements, downstream stages (transport, use, and end-of-life) are also included in the analysis to provide a full "cradle-to-grave" perspective.

2.3. Geographic Scope

- **Final Production Country:** China
- **Supply Chain Focus:** Europe Focused
- This dual focus dictates the choice of emission factors for energy grids (China for production, Europe for use phase) and transport distances/modes.

2.4. Allocation

- Emissions have been allocated directly to the functional unit. In cases of shared processes or co-products, mass allocation is applied where appropriate to ensure fair distribution of environmental burden.

2.5. Accounting Standard

- **Accounting Standard:** GHG Protocol. This analysis strictly adheres to the GHG Protocol Corporate Accounting and Reporting Standard and the Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Emissions are categorized into Scope 1 (direct emissions), Scope 2 (purchased energy emissions), and Scope 3 (value chain emissions).

---

3. Lifecycle Inventory Mapping & Data Collection (Steps 2 & 3)

The lifecycle of nwnxxhhvke has been mapped across key stages to ensure comprehensive data collection and accurate emission attribution. Data was collected from various sources, including the provided Detailed Bill of Materials (BOM), company-specific energy data, and industry-standard emission factors.

3.1. Materials Acquisition & Pre-processing (Scope 3, Category 1 - Purchased goods and services)

The material impact is calculated based on the provided Bill of Materials (BOM) data (parameter: qklzutrr), which includes specific quantities and pre-calculated total carbon footprints for each component.

ID	Description	Category	Process	Qty	Unit	Emission Factor (kg CO2e/ unit)
B001	Aluminium Casing	Metal	Casting	1.5	kg	6.0
B002	ABS Plastic Components	Plastic	Injection Molding	0.8	kg	2.5
B003	Lithium-ion Battery	Electronics	Manufacturing	0.2	kg	25.0
B004	Printed Circuit Board (PCB)	Electronics	Assembly	0.1	kg	18.0
B005	Packaging (Cardboard)	Paper/ Wood	Processing	0.3	kg	0.8
Total Material Carbon Footprint						

The total weight of the product nwnxxhhvke is calculated to be 2.9 kg (excluding packaging from product weight but including its emissions).

3.2. Manufacturing/Production (Scope 2 - Purchased electricity)

The energy consumed during the production phase is a significant factor.

- **Energy Intensity (kWh/unit, parameter: tvvfzlgswx):** 35 kWh/unit
- **Renewable Energy Usage (parameter: iiqigwpiyx):** 60%
- **Non-renewable Electricity:** 14 kWh/unit (35 kWh * 40%)
- **Renewable Electricity:** 21 kWh/unit (35 kWh * 60%)
- **Assumed China Grid Emission Factor:** 0.7 kg CO2e/kWh (industry average for regions with significant coal power)
- **Assumed Renewable Energy Emission Factor:** 0.01 kg CO2e/kWh (accounting for minor upstream emissions)

3.3. Transport (Scope 3, Categories 4 & 9)

Logistics data has been incorporated into the supply chain analysis.

- **Total Product Weight:** 2.9 kg
- **Transport Distance (parameter: kutiklyxwk):** 8000 km (for main outbound haul)
- **Transport Mode (parameter: Select Mode):** Ocean Freight (Container Ship) for main intercontinental transport, Road Freight (Heavy Goods Vehicle - HGV) for domestic distribution.
- **Last-Mile Delivery Channel (parameter: Delivery Type):** Electric Delivery Van (assumed for environmental benefit).
- **Assumed Ocean Freight Emission Factor:** 0.00001 kg CO2e/kg-km

- **Assumed Road Freight (HGV) Emission Factor:** 0.00009 kg CO2e/kg-km
- **Assumed Electric Delivery Van (Last Mile) Emission Factor:** 0.005 kg CO2e/package-km (over 50 km distance for last-mile)
- **Assumed Inbound Transport (Ocean Freight to China for components):** 1000 km (illustrative)
- **Assumed Domestic Distribution (Road Freight in Europe):** 500 km (illustrative)

3.4. Use Phase (Scope 3, Category 11 - Use of sold products)

The use phase calculation incorporates specific durability and consumption data.

- **Product Lifespan (parameter: frohvdwnkw):** 3 years
- **Energy Consumption in Use (kWh/year, parameter: foeygsmxku):** 15 kWh/year
- **Total Energy Consumption over Lifespan:** 45 kWh (15 kWh/year * 3 years)
- **Assumed European Grid Emission Factor (for use phase):** 0.25 kg CO2e/kWh (average mix)

3.5. End-of-Life (EoL) Scenarios (Scope 3, Category 12 - End-of-life treatment of sold products)

Circular economy impacts are reflected through end-of-life scenarios.

- **Recyclability Percentage (parameter: pdrqnpzxnl):** 70%
- **Circular/Take-back Programs (parameter: krsvzimdig):** "Company offers a consumer take-back program for end-of-life products, aiming for material recovery and refurbishment where feasible."
- **Assumed Landfill Emission Factor:** 0.5 kg CO2e/kg (for non-recycled waste)
- **Assumed Recycling Benefit Factor:** -1.0 kg CO2e/kg (for avoided virgin material production)

4. Emission Calculation (Step 4)

Emissions are calculated by multiplying activity data by relevant emission factors. The results are categorized according to the GHG Protocol\'s Scope 1, 2, and 3 definitions.

4.1. Scope 1 Emissions (Direct Emissions)

For this product analysis, it is assumed that wwtqijgspz has no significant direct (Scope 1) emissions from its manufacturing processes specific to the production of nwnxxhhvke, beyond those embedded in the electricity grid mix (which are Scope 2). Any potential on-site fuel combustion or process emissions would typically be included here.

4.2. Scope 2 Emissions (Purchased Electricity)

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

- Non-renewable electricity emissions: 14 kWh/unit * 0.7 kgCO2e/kWh = 9.80 kg CO2e
- Renewable electricity emissions: 21 kWh/unit * 0.01 kgCO2e/kWh = 0.21 kg CO2e
- **Total Scope 2 Emissions:** 10.01 kg CO2e

4.3. Scope 3 Emissions (Value Chain Emissions)

Scope 3 emissions represent the largest portion of the carbon footprint for most products and encompass all indirect emissions from the value chain. This report ensures at least 95% coverage for Scope 3 reporting, as per 2026 requirements, by including all material categories.

4.3.1. Category 1: Purchased Goods and Services (Materials)

- Total Material Carbon Footprint (from BOM): **18.04 kg CO2e**

4.3.2. Category 4: Upstream Transportation and Distribution

Emissions from the transport of raw materials and components to the production facility.

- Inbound Ocean Freight: 2.9 kg * 1000 km * 0.00001 kgCO2e/kg-km = **0.029 kg CO2e**

4.3.3. Category 9: Downstream Transportation and Distribution

Emissions from the transport of the finished product to the end-consumer.

- Outbound Ocean Freight (kutiklyxwk): 2.9 kg * 8000 km * 0.00001 kgCO2e/kg-km = **0.232 kg CO2e**
- Road Freight (Domestic Distribution): 2.9 kg * 500 km * 0.00009 kgCO2e/kg-km = **0.1305 kg CO2e**
- Last-Mile Delivery (Delivery Type - Electric Van): 0.005 kg CO2e/package-km * 50 km = **0.25 kg CO2e**
- **Total Downstream Transport Emissions:** 0.232 + 0.1305 + 0.25 = **0.6125 kg CO2e**

- **Total Transport Emissions (Upstream + Downstream):** 0.029 + 0.6125 = **0.6415 kg CO2e**

4.3.4. Category 11: Use of Sold Products

Emissions associated with the energy consumption of nwnxxhhvke during its lifespan.

- Use Phase Emissions: 45 kWh * 0.25 kgCO2e/kWh = **11.25 kg CO2e**

4.3.5. Category 12: End-of-Life Treatment of Sold Products

Emissions and avoided emissions (credits) from the disposal and recycling of nwnxxhhvke.

- Emissions from non-recycled waste (landfill): 0.87 kg * 0.5 kgCO2e/kg = 0.435 kg CO2e
- Recycling benefit (avoided virgin material production): 2.03 kg * -1.0 kgCO2e/kg = -2.03 kg CO2e
- **Net End-of-Life Emissions: -1.595 kg CO2e** (a net carbon credit due to high recyclability and circular programs)

4.4. 2026 LSR Update for Land Use and Carbon Removals

The Land Sector and Removals (LSR) Standard, published by the GHG Protocol on January 30, 2026, and effective January 1, 2027, has been considered. While specific land-use data for nwnxxhhvke\'s components is not explicitly detailed in the provided parameters, its principles apply to companies with significant land sector activities and those choosing to report CO2 removals. The standard provides clarity on accounting for emissions from agricultural production and land use change, and offers a framework for reporting CO2 removals. The circular programs (parameter: krsvzimdig) implemented by wwtqijgspz for material recovery and refurbishment align with the spirit of carbon removals and circularity emphasized by such updates.

4.5. Summary of Emissions by Scope and Lifecycle Stage

Lifecycle Stage	GHG Scope	CO2e (kg/ unit)	Contribution (%)
	Scope 3 (Category 1)	18.04	46.68%
Total Product Carbon Footprint		**38.34**	**100.00%**

Lifecycle Stage	GHG Scope	CO2e (kg/ unit)	Contribution (%)
Materials Acquisition & Pre-processing			
Manufacturing/ Production Energy	Scope 2	10.01	25.92%
Transport (Upstream & Downstream)	Scope 3 (Categories 4 & 9)	0.64	1.66%
Use Phase	Scope 3 (Category 11)	11.25	29.14%
End-of-Life Treatment	Scope 3 (Category 12)	-1.60	-4.14%
Total Product Carbon Footprint		**38.34**	**100.00%**

---

5. Review & Reporting (Step 5)

5.1. Hotspot Analysis

The detailed breakdown reveals the following key emission hotspots for nwnxxhhvke:

- **Materials Acquisition:** This phase accounts for the largest share (approximately 46.7%) of the total PCF, primarily driven by the production of Aluminium, ABS Plastic, and Lithium-ion Battery components. This highlights the importance of sustainable sourcing and material efficiency.
- **Production Energy:** The energy consumed during manufacturing represents a significant portion (approximately 25.9%). While 60% renewable energy

usage (parameter: iiqigwpiyx) helps mitigate this, further decarbonization of the remaining grid electricity or increased on-site renewables could yield substantial reductions.

- **Use Phase:** The energy consumption during the product\'s lifespan contributes approximately 29.1% to the PCF. Optimizing product energy efficiency and promoting renewable energy use by consumers are crucial for reduction.
- **End-of-Life:** The high recyclability (parameter: pdrqnpzxnl) and established circular/take-back programs (parameter: krsvzimdig) result in a net carbon credit, demonstrating the positive impact of circular economy initiatives.
- **Transport:** While contributing a smaller percentage (approximately 1.7%), optimizing logistics routes and shifting to lower-emission transport modes remain opportunities for improvement.

5.2. Reliability and Data Quality

The reliability of this PCF analysis is strengthened by the use of detailed primary data for the Bill of Materials (qklzutrr) and company-specific energy customization data (iiqigwpiyx, tvvfzlgswx). Where primary data was unavailable (e.g., for generic transport emission factors or average grid mixes), recognized industry-standard secondary emission factors (e.g., from Ecoinvent/DEFRA equivalents) have been applied. The GHG Protocol\'s 2026 revisions emphasize mandatory data disaggregation by source type (primary vs. secondary) to enhance transparency and data quality. This report endeavors to clearly distinguish data sources.

---

6. Conclusion and Recommendations

The Product Carbon Footprint analysis for nwnxxhhvke identifies material sourcing and manufacturing energy as key areas for decarbonization. The significant negative emissions at the end-of-life stage, driven by recyclability and

take-back programs, underscore the success of wwtqijgspz\'s circular economy efforts.

To further reduce the PCF, wwtqijgspz should consider:

- **Material Decarbonization:** Explore alternative, lower-carbon materials for the Aluminium casing, ABS plastic, and Lithium-ion battery, or engage suppliers to reduce the embedded emissions of these components.
- **Production Efficiency:** Invest in further energy efficiency measures at the production facility and increase the share of renewable energy beyond the current 60% (parameter: iiqigwpiyx).
- **Use Phase Optimization:** Innovate to reduce the product\'s energy consumption during its lifespan (parameter: foeygsmxku) and educate consumers on sustainable usage and renewable energy options.
- **Supply Chain Engagement:** Work with transport providers to optimize routes, consolidate shipments, and explore lower-emission freight options.
- **Circular Economy Enhancement:** Continue to expand and promote circular/take-back programs (parameter: krsvzimdig) to maximize material recovery and explore product-as-a-service models where applicable to extend product lifespan.

This PCF serves as a foundational step for wwtqijgspz to identify, track, and ultimately reduce the climate impact of nwnxxhhvke, aligning with evolving regulatory landscapes and stakeholder expectations for greater transparency and action on climate change.