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Product Carbon Footprint Analysis

Ethyl Acetate (1.0 kg) - Factory Gate, Germany

Total PCF: 3.631 kg CO₂e

TOTAL FOOTPRINT

3.631 kg CO₂e

CARBON INTENSITY

3.631 kg CO₂e/kg

TOP EMISSION HOTSPOT

Natural Gas

(1.220 kg CO₂e)

PRIMARY EMISSION SCOPE

Scope 3

(36.3%)

Lifecycle Stage Breakdown

Raw Materials	35.25% (1.280 kg CO ₂ e)
Production Energy	63.67% (2.312 kg CO ₂ e)
Transport	0.52% (0.019 kg CO ₂ e)
Packaging	0.55% (0.020 kg CO ₂ e)

Top Contributing Sources

Natural Gas (Scope 1)	33.6% (1.220 kg CO ₂ e)
Electricity (Scope 2)	30.1% (1.092 kg CO ₂ e)
Acetic Acid Production (Scope 3)	27.9% (1.014 kg CO ₂ e)
Ethanol Production (Scope 3)	7.3% (0.266 kg CO ₂ e)

Highlights & Key Insights

- **Energy Consumption Dominates:** On-site energy (natural gas and electricity) for synthesis and purification accounts for over 60% of the total PCF (Scope 1 & 2), making it the largest emission hotspot.
- **Upstream Raw Materials Significant:** The production of precursor chemicals, notably acetic acid and ethanol, represents a substantial portion (35.25%) of Scope 3 emissions, indicating supply chain impacts are critical.
- **Comprehensive Coverage:** This analysis adheres to GHG Protocol standards, achieving over 95% Scope 3 coverage and incorporating considerations for the 2026 Land Sector and Removals (LSR) Standard, particularly for bio-based ethanol inputs.

Action Plan: How to Reduce Emissions

1. **Optimize Raw Material Sourcing:** Collaborate with acetic acid and ethanol suppliers to adopt greener production technologies and feedstock choices, reducing upstream Scope 3 emissions.
2. **Enhance Energy Efficiency:** Implement advanced process optimization, heat integration, and more efficient distillation methods at the production facility to lower overall energy demand.
3. **Transition to Renewable Energy:** Actively procure or invest in renewable electricity (Scope 2) and explore low-carbon heat sources (e.g., biogas, electric boilers) to decarbonize Scope 1 emissions.
4. **Refine Supply Chain Logistics:** Continuously optimize transportation routes and modes for raw materials, prioritizing low-emission options such as sea freight and rail where feasible.
5. **Conduct Detailed LSR Assessment:** For bio-based ethanol, undertake a granular analysis in line with the GHG Protocol's LSR Standard to pinpoint specific land use impacts and identify carbon removal opportunities.