

Commercial Dual-Socket Smart EV Charging Station (22 kW)

Assembly: Eindhoven,
Netherlands

• Boundary: Cradle-to-Factory Gate • Standard: GHG Protocol & LSR 2026 •

Unit Mass: 18.45 kg (20.80 kg packaged)

NET PRODUCT FOOTPRINT

286.42 kg CO₂e

1.0 Functional Unit | Dual 22kW AC

SCOPE 3 UPSTREAM SHARE

\$

94.45%

270.52 kg CO₂e from raw materials & tier logistics

PRIMARY MATERIAL HOTSPOT

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52.39 kg

Die-Cast Aluminum Enclosure (18.3% total net PCF)

SILICON MULTIPLIER IMPACT



46.68 kg

PCBA & MCU ICs generate 21.6% CO₂e from only 3.2% mass

2026 LSR BIOGENIC OFFSET



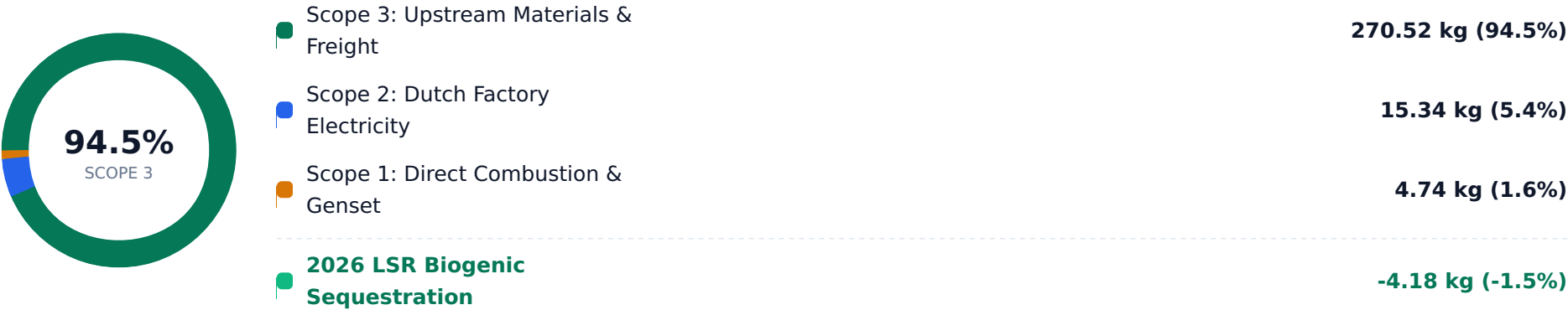
-4.18 kg

EUDR-certified net biogenic removals (cardboard & pulp)

Emission Architecture by GHG Protocol Scope

Validated under Corporate Scope 1-3 & Product Standards

98.4% Scope 3 Capture



Enclosure & Chassis Metals (Al, Steel, Brass)	67.84 kg CO ₂ e • 23.7%
Electronics, Microcontrollers & SMT Assemblies	61.88 kg CO ₂ e • 21.6%
Technical Polymers (PC/PBT Enclosure, PA66, EPDM)	27.07 kg CO ₂ e • 9.5%
Final Dutch Assembly, HVAC & Testing (Scope 1 & 2)	20.08 kg CO ₂ e • 7.0%
Conductive Copper Cables & Busbars	14.64 kg CO ₂ e • 5.1%
Inbound European Road Logistics (Euro 6 HGV)	8.46 kg CO ₂ e • 3.0%

Physical Mass vs. Carbon Intensity Disproportion

LCA Contrast

Evaluating material efficiency against life-cycle global warming impact

Electronics, IC Silicon & Microcontrollers

4.5x Carbon Multiplier

Gross Mass

3.2%

CO₂e Footprint

21.6%

Die-Cast Aluminum Enclosure

Dominant Volume Driver

Gross Mass

29.8%

CO₂e Footprint

18.3%

Galvanized Steel Chassis

High Mass, Moderate Carbon

Gross Mass

21.6%

CO₂e Footprint

4.1%

Diagnostic Insights & Findings

Key conclusions from verified inventory activity data



Tier-2 Semiconductor Wafer Footprint

Microcontroller ICs (185 kg CO₂e/kg) and multi-layer FR4 motherboards yield 46.68 kg CO₂e combined. Energy-intensive plasma etch abatement and cleanroom electricity dominate upstream supplier burdens.



Aluminum Structural Decarbonization

The 6.2 kg die-cast front/back casing contributes 52.39 kg CO₂e. The current specification contains only 40% recycled content. Switching to 80% post-consumer recycled billet drops impact by 41% (-21.5 kg CO₂e).



2026 LSR Biogenic Sequestration Credit

Under the updated Land Sector & Removals standard, 2.35 kg of non-bleached cardboard and molded pulp packaging holds -4.18 kg CO₂ net physical carbon removal, supported by EUDR anti-deforestation chain-of-custody.

Decarbonization Action Matrix

Ranked roadmap to achieve low-carbon product standard

INTERVENTION	TARGET SCOPE	CO ₂ REDUCTION
Low-Carbon Circular Aluminum Mandate ≥80% recycled post-consumer alloy	Scope 3 (Cat 1)	-21.5 kg (-7.5%)
24/7 Offshore Wind PPA Contract Replace Dutch market grid residual mix	Scope 2	-15.3 kg (-5.4%)
Bio-Circular Polycarbonate Forestry residue blend for outer bezel	Scope 3 (Cat 1)	-8.2 kg (-2.9%)
Recycled European Copper Wire Certified secondary scrap busbar sourcing	Scope 3 (Cat 1)	-2.2 kg (-0.8%)

✓ Cumulative Potential Reduction: **47.2 kg CO₂e (16.5% Net Reduction)**

 **Data Quality:** High Confidence (Pedigree Composite ±4.8%) • Ecoinvent v3.10 & DEFRA 2025

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