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Verification Opinion

VO-4211387

Add value.
Inspire trust.

For the CFP study report **V5** dated **22/10/2025**, prepared by

AutoX (Pty) Ltd
1 Cnr Stanford & Lindsay Roads
6000 Korsten, Gqeberha (Formerly Port Elizabeth)
South Africa

for the 2024 data

was verified according to DIN EN ISO 14064-3:2020 regarding compliance with the requirements from DIN EN ISO 14067: 2019.

Result:

Carbon Footprint of 1 average lead acid battery[1] for different transportation and use-phase scenarios

Scenario 1	Scenario 2	Scenario 3
Charging through the vehicle's onboard system. In this scenario, the battery is mainly charged through the vehicle's alternator during operation and does not require external energy input.	**Charging from the electrical grid.** This scenario includes use cases where the battery is typically charged via stationary power.	**Charging through the vehicle's onboard system or from the electrical grid.** This scenario is a mix of scenario 1 and 2.
63 kg CO_2e	**109 kg CO_2e**	**86 kg CO_2e**

[1] The average lead acid battery has the following characteristics:
Weight: 18.17 kg; Capacity: 68 Ah; Voltage: 12.8 V; Energy capacity: 870 Wh; Expected service life: 4 years with 1900 cycles

Level of assurance: reasonable

Materiality threshold(s): 15 % for the total sum of all reported Greenhouse Gas emissions

This verification statement is only valid for the specified scope and in combination with the objectives, explanations and criteria for evaluation as documented in the attached verification report.

TÜV SÜD Industrie Service GmbH
Westendstrasse 199, 80686 Munich, Germany
Validation and Verification Body for Greenhouse Gases
accredited by DAkkS according to DIN EN ISO 17029 with DIN EN ISO 14065

Munich, 31 October 2025

Explanations to the verification opinion

Brief description of the verification process

AutoX (Pty) Ltd (hereinafter referred to as “AutoX”) has voluntarily entrusted TÜV SÜD Industrie Service GmbH (verification body) to carry out an independent (third party) verification of the CFP study report Project Report: AutoX’s Product Carbon Footprint (22/10/2025) on the average lead acid battery, manufactured at AutoX, 1 Cnr Stanford & Lindsay Roads 6000 Korsten, Gqeberha (formerly Port Elizabeth), South Africa for the reporting period 2024.
This opinion is based on the intended area of application, the goals and criteria as agreed upon with the commissioning on 21/07/2025.

The personnel appointed by the validation and verification body conducted an audit on 23/07/2025 with representatives of the client, a review of documents, as well as site visits at 1 Cnr Stanford & Lindsay Roads 6000 Korsten, Gqeberha (formerly Port Elizabeth), South Africa. The following facilities were inspected:

- Production processes from material input to finished lead acid batteries
- Measurement points for energy consumption (fuels)
- ERP system and respective production materials and quantities

Additionally, online audits were conducted on 18/07/2025 with representatives of AutoX and the practitioners of the study from the consulting firm Manergy Iroko (Pty) Ltd for auditing the LCA model implementation.

Roles and responsibilities

The quantification and reporting of greenhouse gas (GHG) emissions are the sole responsibility of our client. Our role and responsibility as an accredited verification body was to independently verify the adequacy of the GHG emissions reported by our client, as well as the underlying systems and processes for data collection, analysis, and control, in accordance with the requirements of DIN EN ISO 14064-3:2020.

Standard for quantification and reporting of the carbon footprint of the product

DIN EN ISO 14067:2019 (“Greenhouse gases – Carbon Footprint of products – Requirements and guidelines for quantification”)

System boundaries

The system boundary only includes the batteries manufactured within AutoX’s own facilities. The temporal boundary for the assessment is the calendar year 2024, reflecting current operations and product performance. The geographical boundary centers on AutoX’s manufacturing facility located in Port Elizabeth, South Africa, and extends to the main export destinations of the batteries, which include South Africa, Angola, the Democratic Republic of the Congo (DRC), Zambia, Botswana, Zimbabwe, Mozambique, Malawi, Namibia, Tanzania, Mauritius, Seychelles, the United Kingdom (UK), and Ireland.

Included are the following life cycle stages:

- The extraction, processing, and transportation of raw materials;
- The manufacturing phase;
- The transport phase, transportation to customers;
- The use phase, covering the energy consumed over the product’s entire lifetime;

- The end-of-life stage, including recycling or disposal and associated transportation.

The CFP is presented with an average lead acid battery for different transportation and use-phase scenarios, that are representative for the whole AutoX product portfolio with more than 350 battery models.

The average lead acid battery has the following characteristics:

- Capacity: 68 Ah
- Voltage: 12.8 V
- Energy capacity: 870 Wh
- Cycles: 1900
- Battery Energy Efficiency: 80 %
- Depth of Discharge (DoD): 17.5 %
- Expected service life: four years
- Total usable energy over lifetime = Voltage × Current × Number of cycles × DoD: 12.8×68×1900×0.175 = 289275 Wh = 289.3 kWh
- Weight: 18.17 kg

Further information ca be found in the *Particularities / Limitations* section of this verification opinion.

Emissions per life cycle stage

kg CO_2e per average lead-acid battery:

Scenario	Raw material	Manufacturing	Transport	Use	EoL
Scenario 1	27	18	6	0	12
Scenario 2	27	18	6	46	12
Scenario 3	27	18	6	23	12

Relevant GHG emissions in the inventory

☒ Carbon dioxide (CO_2),
☒ Methane (CH_4),
☒ Nitrous oxide (N_2O),
☒ Hydrofluorocarbons,
☒ Perfluorocarbons,
☒ Sulphur hexafluoride (SF_6),
☒ Nitrogen trifluoride (NF_3)
☐ other

The greenhouse gas inventory was calculated as CO_2 equivalents using the relative global warming potential (GWP-100) according to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

Intended user of the CFP study report and this verification opinion

AutoX: to identify the main emission sources, quantify the carbon footprint of its product range, and highlight priority areas for targeted improvements.

The CFP study also represents an preparatory step towards future compliance with the Regulation (EU) 2023/1542 on Batteries and Waste Batteries; a verification against the upcoming requirements of this regulation was **not** part of the verification and is not part of this verification opinion.

Standard for the verification

DIN EN ISO 14064-3:2020 ("Specification with guidance for verification and validation of GHG statements")

Objectives of the verification

The verification was performed with due regard to our impartiality in a risk-based approach. Rational procedures were applied to reach reliable and reproducible conclusions. Within the scope of our audit, a sufficient amount of suitable evidence needed to be collected and explained in the audit by representatives of AutoX. This was to ensure sufficient traceability of the information presented with the CFP study.

Criteria

The data review was conducted according to the following criteria:
Relevance, completeness, accuracy, transparency of information and consistency.
The assessment of alternatives according to the quantification model applied was carried out according to the principle of conservatism.

Agreed level of assurance: reasonable

Note:
At a reasonable - but not absolute - level of assurance, we verify that the CFP study is substantially correct. This includes a review of the processes, data and evidence on their correctness and accuracy with an appropriately adequate sample size.

Materiality threshold(s): 15%

for the total of the reported greenhouse gas emissions according to the reporting boundaries established by AutoX

Note:
The materiality threshold represents the degree of accuracy for our assessment of data gaps, misstatements and non-conformities remaining at the end of our verification process.
Gaps, omissions, inaccuracies identified during the verification process that result in quantities greater than the established thresholds constitute a "material deviation", i.e. non-conformities, that must be addressed before a verification opinion can be issued.

Methods of verification

- Strategic analysis and risk assessment based on the submitted CFP study report
- Detailed audit planning and scheduling
- Interviews of personnel of AutoX within the scope of audit
- Site inspection at plant Stanford & Lindsay Roads 6000 Korsten, Gqeberha (formerly Port Elizabeth), South Africa
- Review of the data and methodology for collecting, aggregating and analyzing the information used to determine the life cycle inventory and its associated emission factor(s)
- Sampling of data and evidence for consumption of fuel, electricity and relevant materials
- Plausibility check by recalculating significant values of the life cycle impact assessment

- Independent review (quality assurance by an auditor who is not involved in the verification process)

Particularities / Limitations

The carbon footprint was calculated for an average lead acid battery of AutoX´s product portfolio. There are more than 350 battery models produced, which are very similar in their design, having all the same lead acid battery chemistry. An assessment of the most representative battery models showed that the 55 Ah battery, which is produced most, has a 6 % lower carbon footprint than the average battery in the representative scenario 1 (automotive application). The range of CFP is from -10 % for small batteries to 31 % for big batteries.

Conclusions

This verification opinion according to ISO 14064-3:2020 for the CFP study of AutoX confirms that the greenhouse gas emissions determined for the defined time boundary comply with all applicable requirements and standards in every material respect. The presentation of the results is factually accurate and meets the requirements of the DIN EN ISO 14067:2019.

Based on the findings of our audit process, we confirm the reported emissions and the achievement of the agreed level of assurance, as well as compliance with the agreed materiality thresholds for the considered emission categories and defined system boundaries.

Our verification opinion is to be interpreted solely in conjunction with the CFP study of AutoX (in its final version dated 22/10/2025).

This opinion is issued in accordance with the agreement made with the client and within the framework of our verification and validation programs. The results presented herein are based on our internal documentation dated 22/10/2025 for this verification with project no. 4211387.