

Volkswagen Group Position

Life-cycle-assessments (LCA) in the automotive industry

Introduction

The standardization of LCA methods for the European automotive industry and their regulatory application is gaining increasing awareness. On an international level the Informal Working Group on Automotive Life Cycle Assessment (IWG on A-LCA) at the UNECE aims at harmonizing the calculation methods for LCA.¹ At the same time, the discussions to develop an LCA methodology for vehicles under the CO₂ Fleet regulation will create a precedent on EU level.²

The Volkswagen Group (hereinafter referred to as “Group”) recognizes the general needs and efforts to standardize and regulate LCA. The Group considers it necessary to include the current transformation process of the automotive industry to shift production from internal combustion engine vehicles (ICE) to battery electric vehicles (BEV) into any consideration for rule-making. The legislator should especially avoid comprehensive regulatory requirements which could cause additional financial and administrative burden and have the potential to harm this transformation process which would be counterproductive to the currently discussed measures to support the European automotive industry. The Group’s concerns are as follows:

I. Ensure global harmonization

Various international regulatory efforts have the potential to create a regulatory patchwork. To avoid this and to secure a worldwide international participation to create harmonized uniform standards we are of the view that the groundwork should be laid first and foremost on UN level. As soon as the UNECE will have finished its work, the adopted resolution should serve as a harmonized standard for regional (EU) and national (countries) legislators.

Request: LCAs for passenger cars and light duty vehicles should follow a worldwide harmonized standard.

II. Focus on sector-specific regulation

Currently, the CO₂ Fleet Regulation addresses the efficiency of vehicles, focusing on emissions produced during operation (“tank-to-wheel” tailpipe emissions). This approach ensures that the responsibility for the efficiency is being assigned to its originator. As a fundamental principle, this proper assignment of responsibility on a sector-specific basis is embedded in the entire EU legislation on the reduction of CO₂ emissions:

¹ IWG on A-LCA, United Nations Economic Commission for Europe (UNECE): [\(A-LCA\) Latest version of draft Terms of References \(ToRs\) | UNECE](#)

² see EUR-Lex: [CO2FleetRegulation](#)

- **Emissions Trading System (ETS):** ETS 1 covers manufacturing phase as well as first part of use phase (“well-to-tank”). ETS 2 will be aimed at second part of use phase (“tank-to-wheel”). Responsible industries: suppliers of automotive materials/components, manufacturers (ETS 1), oil industry and energy suppliers (ETS 1 and 2).
- **CO₂ Fleet Regulation:** Affects supply of CO₂-efficient vehicles to the customers. Responsible industry: manufacturers.
- **Renewable Energy Directive (RED):** Covers first part of use phase (“well-to-tank”). Responsible industry: oil industry and energy suppliers need to enhance share of RE in EU.
- **Circular Economy Regulations:** Battery Regulation and the End-of-Life Vehicles Directive (ELV) include detailed provisions for so called “end-of-life” phase (EOL-phase) the major reason of which is to enhance recycling measures and as such the circular economy.

An LCA standardization must and can only ensure that the described regulations transparently demonstrate their impact on CO₂ and adhere to unified reporting standards, where reduction targets are defined based on the principle of responsibility. Only after rules for a unified recording of all life-cycle-phases (including the global supply chain) have been adopted and subsequently ramped-up, LCA can be reviewed as a regulatory control instrument.

Even if desired, a regulatory LCA-framework cannot replace this approach yet. The state of the art in LCA is continuously evolving, with methodologies and standards frequently being updated. Additionally, the necessary data availability and reliability are not yet developed. This will take time, making it impossible to implement LCA as a robust basis for any new regulation yet. Also, to create a comparable basis for evaluating individual vehicles, it would first be essential to establish initial standards. These standards could ensure that assessments are conducted on a consistent basis across all vehicles. Furthermore, to implement effective measures, suppliers must establish robust data pathways. Compatible standards would have to be introduced and adopted by all companies to ensure seamless data integration and reliability.

Requests:

- Rules should only be set in those regulations where specific emissions actually occur in the lifecycle.
- The legislator needs to ensure that these regulations measure CO₂ emissions on a uniform and comprehensive basis.

III. Refrain from mandatory targets and reporting requirements

The Group is committed to contribute to the objectives of the Paris climate agreement and aims at becoming carbon neutral until 2050. In order to achieve our goals we demand strict targets for CO₂ emissions from our suppliers. Should regulatory targets not be measured by tailpipe emissions anymore, but by LCAs this could have sensitive impacts on our supply chain. Depending on the level of an LCA target the number of eligible suppliers could shrink. A smaller number of suppliers leads to higher prices, though. Rising costs would impact the urgently needed financial resources for investments in future technologies and on customer prices and as such lead to a reduced demand, including for BEV’s and plug-in and hybrid vehicles.

The Group's fleet consists of more than 300 models worldwide. In 2024 the Group sold more than 3m vehicles in Europe alone. Different products mean different LCAs, though. Due to the complexity of different vehicle models, it is impossible to represent them individually across the many millions of vehicles sold. The solution approach that most accurately reflects reality, while still being methodologically feasible, would be to only calculate a limited number of LCAs and extrapolate them with regional volumes for the entire company. At the same time the brands of the Group operate in different regions. For separate EU reporting or regulation, the EU share would have to be calculated and controlled separately. Finally, certain data cannot be collected within the Group or from the brands since they are simply not available.

As a result, the application purposes of any LCA cannot be extended for the time being, especially not for replacing the current method of the CO₂ Fleet Regulation to measure emission targets by tailpipe emissions and instead use an LCA of a single vehicle or even an OEMs fleet.

Requests:

- **Any LCA methodology should only be applied on a voluntary basis.**
- **The legislator should refrain from setting mandatory targets or reporting requirements to the automotive industry based on LCA.**

IV. Develop an appropriate LCA methodology

The EU-Commission has started its work on the required methodology subject to article 7a of the CO₂ Fleet Regulation and aims to provide a report as well as delegated acts in the given time. The Group considers it important to find a solution that delivers appropriate results while at the same time reflects the current realities. The key topics for the Group are:

1. Goal and scope

Goal and scope of the future methodology should appropriately consider the practical feasibility for the automotive industry and not cause unnecessary burdens. The ongoing discussions in the UNECE I-WG on A-LCA deliver first results of how to approach OEMs challenges by introducing a so called level concept.³ The Group supports the developed concept as it offers a high degree of flexibility and considers Level 3 as appropriate for external reporting. In addition, the following aspects need to be taken into account:

- **Set the right purpose:** It is essential to steer demand into the right direction to achieve the climate targets of the EU. This can be supported if LCAs deliver information to end customers who finally decide in their own responsibility which low-carbon product to buy.
- **Consider data availability:** Exchange of primary data with suppliers and data quality pose challenges. Secondary databases' inconsistencies prevent a level-playing field.
- **Avoid administrative burden:** Requiring an LCA for each ICE or BEV variant would generate massive administrative and bureaucratic efforts. It would be impossible to generate LCAs on a single vehicle based approach in a reasonable amount of time. A so called "representative

³ The current status can be found on the website of the UNECE I-WG under the following link: [SG7 - Drafting document - Transport - Vehicle Regulations - UNECE Wiki](#)

vehicle" needs to be determined from which scaling by weight will be applied to the entire model range.

Request: Depending on the goal and scope of the LCA, a methodological balance must be struck between accuracy and administrative effort.

2. Electricity modelling

The question of how to model the electricity grid-mix has an important impact on the carbon footprint. For the following reasons we are of the view that the location-based approach should not be applied for calculating a carbon footprint for vehicles:

- **Discrimination of regions:** The approach disadvantages production facilities in regions with carbon-intensive energy mix, though the industry itself has no influence on such mixes.
- **Removal of incentives:** Incentives for economic entities to effectively decarbonise global supply chains and contribute to the expansion of renewable energies will no longer be available.
- **Current EU legislation and norms:** The approach contradicts existing EU legislation and norms that follow the market-based approach (e.g., CSRD, RED II, CBAM, Electricity Market Design, ISO 14067).

Instead we propose to apply the market-based approach under the following conditions:

- **Renewable energy certificates (RECs):** Acceptance of RECs from EU and non-EU countries if they meet minimum criteria and comply with LCA international agreements such as the Greenhouse Gas (GHG) Protocol Scope 2 criteria.
- **Reporting schemes:** Existence of reporting schemes avoiding double-counting (renewable electricity + residual mix). Market participants should be legally required to report emissions from energy according to this system to ensure consistent and reliable accounting and reporting of energy-related emissions.

Request: For electricity modelling the market-based approach is the only way for economic operators to incentivize the decarbonization of the electricity generation

3. Data collection and carbon reduction measure accounting

Any LCA calculation depends on availability and quality of primary and secondary data. Primary data is a quantified value of a process or an activity obtained from a direct measurement or a calculation based on direct measurements. Secondary data can include data from databases and published literature, default emission factors from national inventories, calculated data, estimates or other representative data, validated by competent authorities.

For **primary data** we propose the following premises for Level 3 LCAs:

- In level 3, company specific (OEM / supplier specific) data shall be used for at least one material or component of choice. This means, for the selected component / material:
for at least one process at OEMs' and/or preceding suppliers' production sites (depending on availability and vertical integration) it is required to collect primary information on either activity data or material carbon footprint which is then utilized for the calculation of the cradle-to-gate carbon footprint.

- The selected component as well as the chosen process or material shall be named including type of primary information collected .

For **secondary data** an international harmonized high-quality database needs to be available to the automotive industry. To reduce complexity and to avoid complex allocation algorithms we prefer that a manageable LCA dataset will be provided by the EU which provides for simplified material clusters to focus on standardization/comparability, energy and fuel datasets and specifications for calculations in the use phase with alternative fuels or "green electricity".

Since an LCA is also a “measurement tool” to reflect carbon footprint optimizations, a practical and transparent rule set to directly integrate GWP relevant measures implemented at the OEMs and/or at preceding suppliers into the carbon footprint calculation of a vehicle is necessary.

Request: In the calculation, both the use of primary data and secondary data is necessary. Primary data should only be required in a restricted manner, while a consistent, standardized high-quality data basis must be available for secondary data on a global level.

4. End-of-life (EOL) modelling

We are of the view that it will be difficult to apply the Circular Footprint Formular (CFF) on EOL-Modelling for the following reasons:

- **Temporal mismatch** between environmental impacts that occur during the production and use of a vehicle and the benefits achieved through recycling at the end of its life cycle.
- **Changes in recycling technology and infrastructure** over the lifespan of a long-living product. The CFF cannot accurately predict these future changes, leading to uncertainties in the LCA.
- **Market conditions and material availability** can change over time. However, the CFF uses fixed parameters that may not reflect future market conditions.
- **Potential “double accounting”** if both, the input and the output of recycled materials are credited. The formula itself uses a factor to allocate impacts between the production and end-of-life phases. If not correctly applied, the use of this factor can lead to both the producer and the recycler claiming the same environmental benefits, thus double counting.

Eventually, it is simply not possible to calculate a CO₂ footprint for the EOL-phase according to the CFF as long as the necessary parameters (A-factor, emission factors, quality factors) are not properly defined. These data would first have to be provided by the legislator in order for the CFF to be applied.

Request: For end-of-life the “cut-off” approach should be preferred over the Circular Footprint Formula (CFF).

5. Conclusion

We consider the development of a calculation method as an iterative process in which the legislator as well as the automotive industry will gradually learn how to tailor the right parameters. We suppose that an adopted method will have to be adjusted over time since there remain several unsolved challenges, especially for external communication and comparisons. These challenges should be mutually identified, evaluated based on their impact on applicability of the once adopted method and eliminated over time.