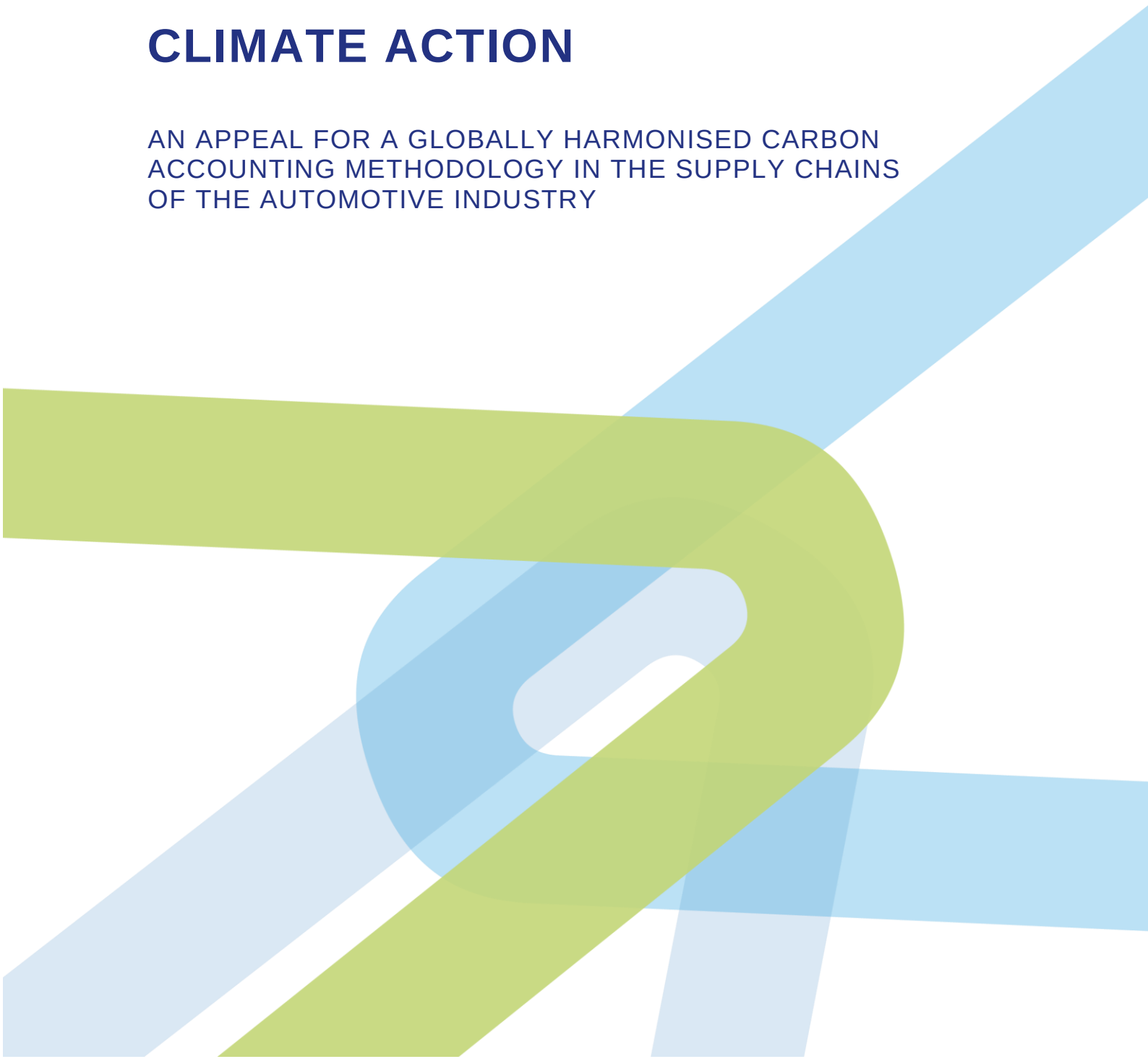
ETA
EXPERTENKREIS
TRANSFORMATION DER
AUTOMOBILWIRTSCHAFT

17 April 2024

A CURRENCY FOR CLIMATE ACTION

AN APPEAL FOR A GLOBALLY HARMONISED CARBON ACCOUNTING METHODOLOGY IN THE SUPPLY CHAINS OF THE AUTOMOTIVE INDUSTRY



EXECUTIVE SUMMARY

Electromobility and the energy transition are reducing greenhouse gas emissions (GHG emissions) increasingly in road transport. With the change in drive technologies, companies are now focusing on emissions along the entire value chain. This is because the majority of emissions from petrol and diesel-driven cars are generated when they are driven, while the majority of emissions from electric cars are generated during production, and during battery production in particular. These emissions will have to be reduced if climate neutrality is to be achieved in order to meet the goals of the Paris Agreement.

New legal requirements such as the CSRD[1] and the EU Batteries Regulation are intended to contribute to achieving this goal. They require companies to report the GHG emissions along the production and supply chain in a transparent and comprehensible manner, in addition to reducing them. This enables financial market players to take the corporate carbon footprint (CCF) and product carbon footprint (PCF) into account when determining a company's valuation. This means that GHG emissions and the corresponding calculation methodology are becoming increasingly relevant as a locational factor in corporate decisions.

It is precisely this methodology, however, that is currently a major challenge: there are uncertainties due to a lack of definitions, there is an increasing risk that different rules will apply depending on the EU directive and, ultimately, there is a need for international harmonisation.

Following in-depth analysis of the subject, the ETA has drawn up the following **recommendations for action**:

I. **Standardising the methodology**: There is an urgent need to standardise the methodology for the life cycle-based measurement, calculation and reporting of greenhouse gas emissions. The Federal Government should support the automotive industry in this endeavour as part of a project organised by the Federal Ministry for Economic Affairs and Climate Action (BMWK).

II. **Developing a GHG emissions data quality assessment**: The development of a data quality assessment from primary and secondary data sources should be carried out as part of a project organised by the BMWK, while taking into account the international discussion on data quality and the most important parameters.

III. **Ensuring coordination with other sectors**: By organising an industry dialogue process, the Federal Government should support the coordination of the standardisation project mentioned above with other important branches of industry, such as steel, non-ferrous metals/aluminium and chemicals.

IV. **Standardising the external auditing of GHG data:** External auditing of GHG data should be standardised in accordance with the legal requirements. A concept to be developed for a GHG calculation tool is to support companies at the beginning of the supply chain and small and medium-sized enterprises (SMEs) in particular.

V. **Supporting a structural increase in GHG data availability**: The Federal Government should support the structural increase in GHG data availability for components with high production emissions in the automotive supply chain, initiating political initiatives and supporting processes in order to increase international data availability, primarily for materials and GHG emissions.

[1] Corporate Sustainability Reporting Directive - 2022/2464/EU

VI. **Supporting the development of a carbon accounting system**: the Federal Government should support the further development of the current approach into a comprehensive carbon accounting concept as part of a project organised by the BMWK.

VII. **Supporting international harmonisation**: the Federal Government should initiate processes for international harmonisation, standardisation and verification of the relevant methods, particularly at EU level. In much the same way, this process is to be initiated primarily with China, Japan and Korea, and with the USA.

This paper also presents initial **methodological guidelines as core results**, which are also supported by several reports on the accompanying research:

1. **Data transmission**: Emissions data should be transmitted peer-to-peer via standardised digital platforms such as Catena-X and TfS in order to ensure reliable data transmission along the supply chain. SMEs should be effectively supported in their efforts to collect and transmit data.
2. **Data quality – primary versus secondary data**: Primary data should be prioritised in the context of data collection. In supply chains, when there is no alternative to secondary data, data quality and representativeness will have to be reported transparently.
3. **Allocation rules**: For each coupling process, particularly in the case of cross-sector production processes, standardised allocation rules are needed for primary and secondary products. By the same token, there is also a need for decision-making tools in order to select the most appropriate method to be used in each case. Using the mass balance approach for labelling green premium products can be an incentive for transformative market developments and should be discussed across all branches of industry.
4. **Recycling**: Recyclates are only introduced into the process chain with recycling emissions.
5. **Energy accounting**: Purchased energy in the EU should generally be accounted for using a market-based approach. This requires easy-to-understand criteria that will prevent the double counting of green attributes.

TABLE OF CONTENTS

1 Initial situation

With the global trends towards electromobility and the energy transition, emissions during the use phase of road vehicles can be significantly reduced. As a result, the focus is now on emissions along the automotive value chain.

In this case, greenhouse gas emissions[2] from upstream process chains are significantly higher than those from production and assembly at the vehicle manufacturer's facilities (see Figure 1).

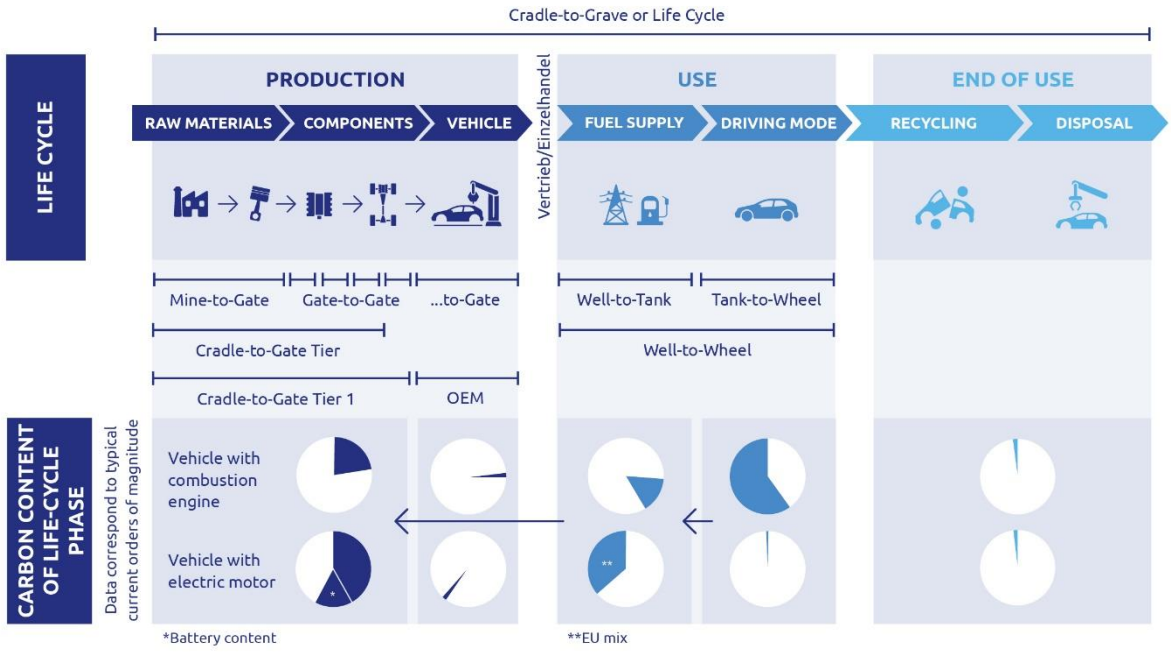


Figure 1: GHG hotspot along the life cycle of a vehicle (combustion engine vs. electric motor)[3].

The EU has issued guidelines on how the GHG emissions of imported goods should be determined. Car manufacturers and suppliers are required to report emissions along the value chain and reduce them as much as possible in order to comply with the requirements of the Paris Agreement. At the same time, however, there are currently methodological uncertainties and internationally harmonised standards are lacking.

The demand for steel with reduced GHG emissions is increasing, as is the case for aluminium manufactured using renewable energy sources. Secondary materials are also increasingly in demand, as is the integration of GHG emission requirements into battery cell production. All this shows that companies are already moving in a new direction.

[2] These are greenhouse gases within the meaning of the Kyoto Protocol.
[3] Source: https://www.vda.de/dam/jcr:fa58be7c-f240-49f2-adc0-43e0270f4d1f/VDA_5937_Position_Dekarbonisierung%20des%20Lebenszyklus%20eines%20PKWs.pdf?mode=view

Innovations by companies and research projects funded by the Federal Government and *Länder* are supporting this transformation. Low-emission production and primary products are becoming a location and competitive factor. As a result, the industrial policy significance of the methodology and standards for measuring, quantifying, validating and reporting emissions and their standardisation that are required to achieve this goal is growing.

1.1 Background: LCAs and the relevance of verifiable assessments of GHG emissions

Life cycle assessments (LCAs) are prepared for different areas of application. They are used to identify alternative product solutions with a lower overall environmental impact. This is done by analysing various environmental categories and comparing the environmental impacts of the different categories. Life cycle assessments are therefore key instruments in decarbonisation strategies – at both company and product level.

The carbon footprint is the key impact category. In the assessment process, optimisation options can be identified along the entire value chain and provide an incentive for research and development activities. The importance of the carbon footprint and the requirements for accuracy has increased significantly.

At the same time, there is a growing need to determine a company's GHG emissions as completely as possible and to document their reduction (corporate carbon footprint). Data relating to the supply chain is being used increasingly to manage corporate goals and as evidence for external stakeholders such as investors or financiers. The emissions of suppliers are also compared, resulting in the data requirements increasing from a number of perspectives in terms of scope, accuracy and comparability.

The verifiable measurement, calculation and validation of GHG emissions in the supply chain are important for two reasons: firstly, they make it possible to provide a comprehensive picture of the emissions and their reduction along the entire life cycle of a vehicle at product level, for both battery-powered and conventional vehicles; secondly, they are absolutely essential for the calculation of a total carbon footprint at company level.

At the same time, the regulatory requirements for car manufacturers and their component suppliers to measure GHG emissions are growing:

- As a result of the revision of the EU **Corporate Sustainability Reporting Directive (CSRD)** and its implementation through ESRS E1, companies are required to report details of their climate targets and GHG emissions, including upstream process chains, by 2028 at the latest. Verification of the reports must be carried out initially with a limited depth of inspection and from 2028 with an appropriate depth of inspection.
- Similar quality requirements also apply to the measurement and documentation of GHG emissions for individual vehicle components, such as the battery (**EU Batteries Regulation**). Comparable requirements are also being developed by authorities in other countries and regions such as China.
- In future, incorrect and improperly used information on the carbon footprint of companies and products may have significant legal consequences. This applies in particular to communications with consumers, which may have potentially serious consequences for the credibility and reputation of companies (**EU Green Claims Directive**).

- In the future, information on emissions may also play a role for **government funding programmes.** This is illustrated, for example, by the current amendment to the French eco-bonus, with supply chain emissions becoming relevant for funding eligibility in future[4]. This information will also have an influence on consumers' purchasing decisions.
- The EU's Carbon Border Adjustment Mechanism (**CBAM**) will result in further requirements with regard to the automotive industry's internationally networked supply chain, with imports of emission-intensive goods taxed on the basis of the CBAM.

In addition to state institutions, more and more **financial market players** are demanding transparency based on validated and verified information on quantitative climate targets and GHG emissions.

This will make the measurement and communication of climate targets, GHG emissions and their reduction at product and company level more binding and more compulsory. Failure to comply with the requirements in this area will in future have significantly more legal and financial consequences for companies.

Conversely, suppliers and vehicle manufacturers have a strategic interest in ensuring that emission-reducing innovations can be reliably demonstrated. Fair competition for the best solutions requires comparable and transparent standards, uniform calculation rules and assessment criteria.

Political support for the use of GHG-reducing technologies and products is all the more effective, the more plausibly it is reflected in reported impacts. Political pressure and customer demand will result in comparable requirements in terms of transparency and data quality.

1.2 Current calculation standards for GHG emissions

To date, assessment approaches from life-cycle analysis have been used to determine climate targets, to measure GHG emissions and to verify emission reductions. These include carbon footprints and the Greenhouse Gas Protocol (GHG Protocol). However, the underlying standards are aimed at all branches of industry and for this reason cannot accurately describe the specific challenges in the automotive sector.

For this purpose, sector or product-specific definitions are required, such as those included in the Catena-X rulebook or in the PCF guideline for the chemical industry. At company level, the concept of scopes as defined in the GHG Protocol has become established as a way of categorising emissions according to their origin. Reference is made in the CSRD to this categorisation.

[4] Source: https://www.reuters.com/business/autos-transportation/sixty-five-percent-electric-cars-sold-france-can-quality-state-bonus-scheme-2023-12-14/

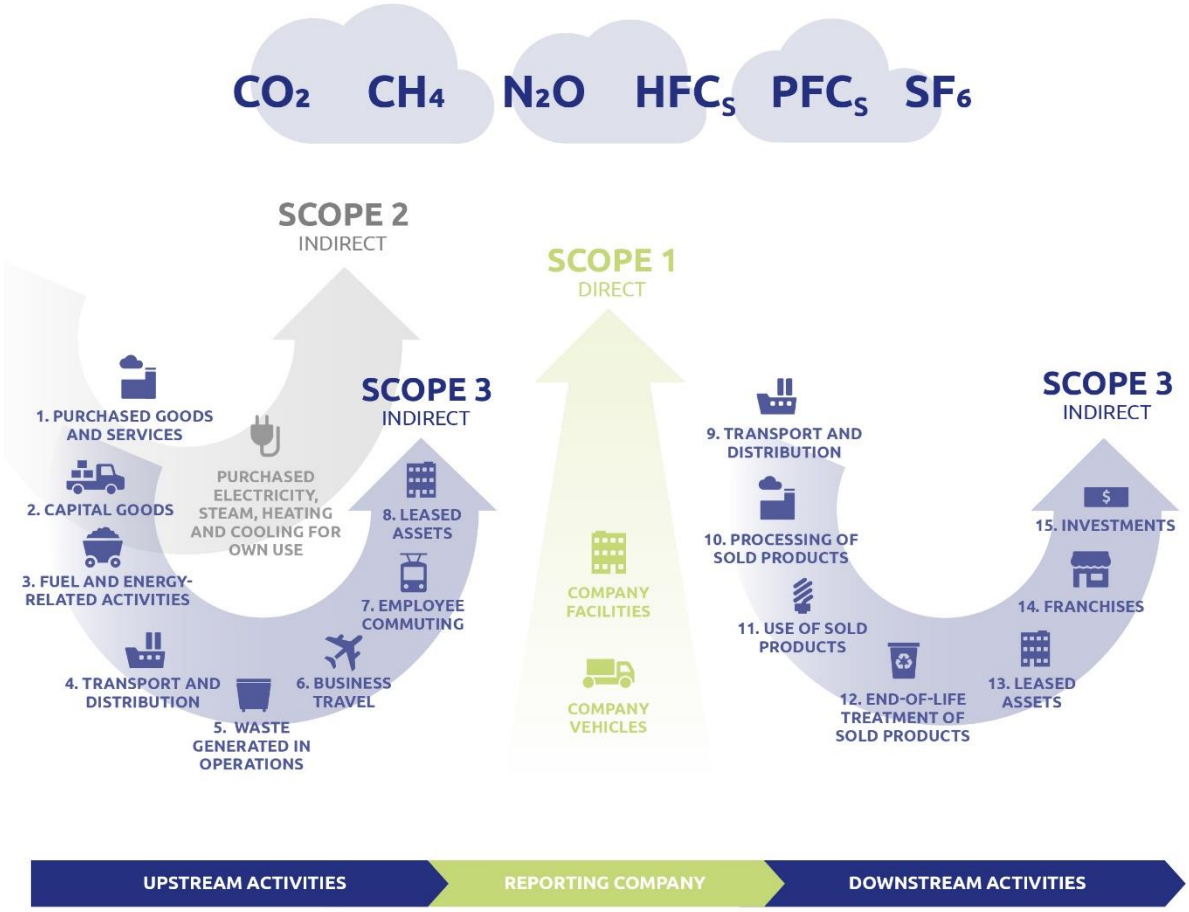


Figure 2: Scope analysis in accordance with GHG Protocol[5]

- **Scope 1** includes the GHG emissions generated directly by the company.
- **Scope 2** includes GHG emissions from externally purchased energy for the company's own processes.
- **Scope 3** downstream includes emissions in the use phase of products sold by the company, such as emissions from cars from the combustion of petrol or the generation of electricity for driving electric vehicles. Waste disposal processes, for example, are also reported.
- **Scope 3** upstream includes the GHG emission equivalents of the production of all intermediate services purchased from other companies, such as the supply chain.

The respective point of view is decisive in each case: GHG emissions that arise from the combustion of natural gas in a power plant fall under Scope 1 of the power plant operator. They appear as Scope 2 in the footprint of a utility company and are finally reflected in Scope 3 downstream of a car manufacturer when an electric car is driven. Similarly, during aluminium production, emissions from the generation of electric power can be found in Scope 1 of the power plant, in Scope 2 of the aluminium smelter and in Scope 3 upstream of the manufacturer of a car body part.

[5] Source: https://ghgprotocol.org/blog/you-too-can-master-value-chain-emissions

This means that Scope 3 upstream describes the sum of all upstream emissions. In view of the thousands of suppliers affected, the level of complexity increases with each stage of the supply chain. Companies can measure Scope 1 emissions precisely based on consumption. There are also accepted allocation rules for this and also for accounting for green electricity (Scope 2) in the GHG Protocol. In contrast, so-called secondary data frequently have to be used to measure Scope 3 upstream emissions due to a lack of data availability and calculation rules that are not clearly defined. These are statistical average values for materials that can be broken down by country of origin and manufacturing process. In order to achieve comparable results, therefore, standardised data collection is necessary. Additional information on data quality should also be provided.

1.3 Data quality and data sources

Data quality is a key issue in the future development of standardised methods for reporting emission values and is based on the following general quality criteria[6] :

1. Representativeness
2. Validity
3. Reliability
4. Completeness
5. Timeliness
6. Measurability

Data quality is crucial to the direction and effectiveness of business decisions and, above all, innovative manufacturing processes. The focus in this case is on the representativeness of the data. This means that the calculated GHG emission value should reflect the real-time GHG emissions as closely as possible. A distinction is made between primary data, which originates from direct measurements taken at the source of an emission, and secondary data.

The latter are calculated using by means of statistical surveys, aggregation and processing as average values for a material, a region or a sector.

Secondary data from recognised databases have been used primarily to date, as the availability of data on different materials and countries of origin at the moment varies considerably. Secondary data are suitable for comparing different technology options. However – even if they are collected with great care – they are limited in terms of their accuracy and specificity, i.e. they do not allow any company-specific distinctions to be made. In particular, they are useful for innovations in the underlying manufacturing processes to a limited extent only, because these are not seen in the data until they are reflected in the weighted average of all intermediate products. Secondary data, therefore, offer no direct incentives for companies and thus do not support competition to reduce emissions.

---

[6] Definitions of the quality criteria:
1. Representativeness: the representativeness of the data determines whether the totality of GHG emissions from all emission sources is reflected. This means that the sample of GHG data collected is expected to be representative of the totality.
2. Validity: the measurement methods must be precise to ensure that the acquired values actually reflect the GHG emissions.
3. Reliability: data collection should be consistent to enable reliable comparisons to be made across different time periods or locations.
4. Completeness: all GHG emissions listed in the Kyoto Protocol should be measured.
5. Timeliness: in order to reflect effective GHG-reducing measures, the data should be up-to-date and provide timely insights into current GHG emissions.
6. Measurability: the methods used to measure and record GHG emissions should be clearly defined and verifiable to enable comparisons and analyses to be made.

Nevertheless, secondary data disaggregated by regions, as is the case for regionally purchased energy, can be of high quality, which means less effort required for collecting data. An assessment of quality is difficult at the moment. Assessment and confirmation approaches are not yet sufficiently established. The current product-related generic standards, such as ISO, have many degrees of freedom in this respect. It is imperative at the moment, therefore, that the data is assessed and interpreted by experts.

All things considered, it can be said that an increasing percentage of primary data is essential for the quality of the overall assessment. For this reason, structural funding in increasing the use of primary data should be provided. This applies specifically to those elements of the supply chain that make a major contribution to the overall impact:

- Primary data are currently collected at selected points in the supply chain, but they make up only a small part of the overall analyses.
- Although the problem of data availability affects the entire automotive industry, the lack of transparency regarding GHG emissions applies in particular to the mining, refining and trading of raw materials in an international context. This is the case, for example, in Australia, Indonesia, Canada and China, and affects metals such as lithium, aluminium and iron.
- This problem is severely exacerbated by two fundamental issues: firstly, emissions for the same primary raw material often vary greatly, and secondly, the supply chains mentioned earlier account for most of the overall GHG emissions balance of a road vehicle in the production phase.
- In addition to its impact on primary producers, this problem also affects recycling companies who, due to a lack of material certificates, often make the assessment of GHG emissions and thus the availability of data considerably more difficult.
- The consistency and traceability of data is often inadequate, which significantly impairs data availability.

The development of standards for measuring product carbon footprints is therefore particularly important in material supply chains. Since these supply chains are characterised by a high degree of internationality, the international harmonisation of the relevant standards is of particular importance.

1.4 International relevance

International harmonisation of the relevant methodology and standards for measuring, quantifying and reporting is becoming increasingly important for foreign trade, which means that primary data should increasingly be used for this purpose.

GHG emissions can become a locational factor with a wide range of implications. If only secondary data are used, in future a country's electricity mix may determine the production location of energy-intensive companies. Primary data, on the other hand, will be used to support global competition in terms of the efforts being made to decarbonise the automotive supply chain. Even policy instruments for the purpose of reducing GHG emissions in supply chains, such as CBAM, can only be effective with precise, product and manufacturer-specific data. With such data, suppliers in third countries have an incentive to implement GHG reduction measures.

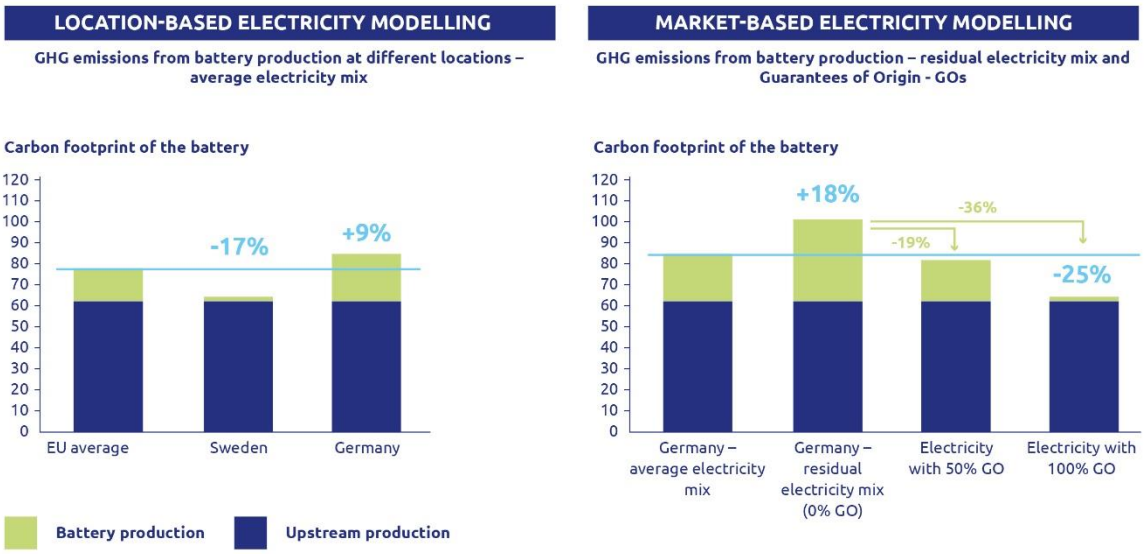


Figure 3: Carbon emissions from battery production: location-based[7] and market-based electricity modelling[8]

Figure 3 illustrates the difference between the location-based and market-based approach to calculating emissions from production. If companies use the location-based approach, they are tied to the emission factor at the production site, such as the electricity mix for example. With the market-based approach, companies have the option of reducing their specific emission factor by investing in renewable energies, for example, or through procurement decisions, by deciding in favour of renewable electricity contracts, for instance.

When the **location-based approach** is used, the average emissions intensity of the electricity grid at the production site is the basis for the calculation. According to the Greenhouse Gas Protocol, the size of the balanced grid, whether local, regional or national, is to be selected in such a way that the generation capacities within the balance limit ensure grid stability. In Germany, the emission factor of the German electricity mix is normally used as a reference value. If the use of renewable energies were to increase at a below-average rate, this approach could result in a significant disadvantage for Germany as a production location, it being a country characterised by a comparatively high level of coal-fired power generation.

The **market-based approach,** on the other hand, is influenced by a company's procurement and investment decisions and by the choice of emission factor to be used for the PCF calculation with regard to energy procurement. Average factors from LCA databases are not used. Contractual commitments to electricity suppliers, contracts for differentiated electricity products, the purchase of green electricity certificates or the purchase of electricity from a selected power generation plant can be used as the basis for determining the emission factor.

---

[7] Source: T&E (2023): How to guarantee green batteries in Europe and (2022) UPDATE - T&E's analysis of electric car lifecycle CO_2 emission. Notes: Modelling for the NMC-622 battery is based on IVL (2019) and Minviro (2022). Electricity mix from ENTSO-E TYNDP (2022 Draft Scenario Report), and electricity emission factors from UNECE (2021). The carbon footprint of the battery is the GHG emissions of battery production and the upstream phase, measured in kg CO_2 eq per kWh for each battery produced.

[8] Source: T&E (2023 & 2022). Systemiq has included the emissions from the residual electricity mix, where the GOs are taken into account. Residual electricity mixes from AIB (2022): European residual electricity mixes. Notes: Guarantees of origin (GOs) from hydropower for the electricity used in the production of battery cells and the assembly of battery packs. The carbon footprint of the battery is the GHG emissions of battery production and the upstream phase, measured in kg CO_2 eq per kWh for each battery produced.

The different approaches have consequences for a product's carbon footprint, as Figure 3 shows. This underscores the relevance of decisions on the methodology to be applied for both politicians and companies. In future, the resulting emissions intensity metric of a product will become a criterion for investment and locational decisions by companies and is therefore highly relevant for the attractiveness and competitiveness of locations and countries.

Further information on the calculation of energy emissions can be found in the Short Paper Product Carbon Footprint: 2 Energy from accompanying scientific research, published by Hamburg Institut & Horváth (see Further attachments).

The lack of internationally accepted GHG measurement methods and primary data increases the risks of trade policy conflicts, which could have a negative impact for Germany in particular. There is also the risk that methodological issues could be interpreted in a protectionist sense to the advantage of the respective country. This includes a definition of green electricity, for example, in addition to allocation and compensation rules. German climate policy, with its claim to be an international driver of green electricity, should actively shape this process together with the automotive industry.

1.5 Further categorisation of the need for action

With regard to global value chains and markets, the aim should be to apply standardised methods worldwide wherever possible. Assessment approaches that meet all the above requirements are generally available in the form of generic ISO standards and the GHG protocol. They need to be harmonised, however, and, if necessary, specified in more detail, as is the case with the Catena-X rulebook or Product Category Rules (PCR) that go even further as part of the Environmental Product Declarations (EPD).

Regardless of this, companies today have to come to terms with different methodological requirements, some of which contradict each other. The decisive factor is to ensure that the methods used in the automotive industry are coordinated with the relevant supplier industries, such as steel, non-ferrous metals/aluminium and chemicals.

In addition to the methodological requirements, the data quality and availability of GHG emissions are a structural problem in the automotive industry. This affects international raw material producers, refineries and traders of primary materials, in particular, in addition to recycling companies, which account for a large proportion of the overall balance.

The long-term goal of having a seamless and complete emissions data collection integrated into the entire value chain is also discussed under the term carbon accounting. This involves measuring and adding up the GHG emissions of each step in the process along the entire value chain. In this way, GHG emissions will be shown as yet another cost factor similar to the production costs for the whole process from start to final product. Life cycle assessment accounting will thus be replaced by a consistent addition of all the cost factors applying bottom-up logic. A climate accounting system of this kind would thus amount to practicing financial logic.

2 Recommendations

Against this background, the following measures and options for action are recommended for the Federal Government:

2.1 Standardisation of the methodology

There is an urgent need to standardise the methodology for life cycle-based measurement, calculation and transmission of GHGs. The Federal Government should support the automotive industry in this process as part of a project organised by BMWK. At the same time, key methodological issues with regard to the calculation, allocation and verification of GHG-reducing measures, among other things, should also be considered (see 3 Appendix). Key factors, among other things, include the crediting of green electricity and the use of secondary raw materials. The Federal Government should also promote the stringent transmission of GHG data along the supply chain through digital services such as Catena-X.

2.2 Development of a data quality assessment for GHG emissions

The development of a data quality assessment from primary and secondary data sources should be carried out as part of a project organised by BMWK. The international discussion on data quality and the most important parameters should be taken into account. In addition, incentives should be provided to use high-quality data and increase accuracy by having the highest possible proportion of primary data.

2.3 Ensuring coordination with other sectors

By organising an industry dialogue process, the Federal Government should support the coordination of the standardisation project mentioned earlier with other key branches of industry, such as steel, non-ferrous metals/aluminium or chemicals. In particular, this means supporting an assessment and categorisation of industry-specific and cross-industry methodological rules.

2.4 Standardisation of the external auditing of GHG data

The external auditing of GHG data should be standardised in accordance with legal requirements such as CSRD/ESRS, the EU Battery Passport or the EU Battery Regulation. The aim is primarily to support companies at the beginning of the supply chain and small and medium-sized enterprises. For this purpose, a concept is to be developed for a GHG calculation tool for SMEs, taking into account the external auditing required. In doing so, care must be taken to ensure that coordination with digital platforms such as Catena-X is provided and the cost and effort involved in carrying out such an external audit is kept to a minimum, in addition to avoiding multiple audits of the same situations.

2.5 Support for a structural increase in GHG data availability

The Federal Government should support the structural increase in GHG data availability in the automotive supply chain. This applies in particular to those parts that account for a high percentage of emissions in the overall GHG balance. These include the extraction, refining, trading and recycling of raw materials. The Federal Government is initiating political initiatives and supporting processes to increase the international availability of data, primarily for materials and GHG emissions data, as is the case with the raw material declaration. This is to be implemented in particular with the countries involved in raw material extraction, refining, trade and recycling.

2.6 Support for the development of a carbon accounting system

As part of a project organised by BMWK, the Federal Government should support the further development of the current approach into a comprehensive carbon accounting concept (see Chapter 1.5 Further classification of the need for action). This concept depicts GHG emissions as an elementary component similar to financial variables at product level and aggregates them along the value chain, while current scientific concepts[9] for methodological development are also to be considered. In this overall assessment, the possible nature of a transition period should also be taken into account and described.

2.7 Supporting international harmonisation

The Federal Government should initiate processes for international harmonisation, standardisation and verification of the relevant methods, particularly at EU level. In a similar way, this process is to be initiated primarily with China, Japan, Korea and the USA. With regard to China, the existing memorandum of understanding[10] of 20 June 2023 can be seen as a basis for cooperation. Another model could be the MARV or NDC partnership as part of the International Climate Initiative (ICI), with special consideration given to the work of the UNECE GRPE IWG on A-LCA. In addition, the recognition of the relevance of the GHG emissions footprint and its calculation should be aimed at ensuring a fair development of global competition and at the same time should act as an effective incentive to actually reduce GHG emissions.

[9] Further information: https://hbr.org/2023/04/getting-a-clearer-view-of-your-companys-carbon-footprint cf.: https://www.uni-mannheim.de/media/Einrichtungen/mises/Dokumente/CarbonEmissionStatements.pdf

[10] In which it states: "Exchange of experiences and good practices in monitoring, reporting and accounting and technological solutions for mitigation of non-CO2 GHG emissions", in addition to "Research on policies and measures for non-CO2 GHG emission control and mitigation, including market-based measures to incentivise GHG emission reduction" (Section 2, Point 6)

3 Appendix: Methodological needs for action as a basis for discussion of the next steps

The list of key methodological results and the remaining outstanding questions is in all likelihood not complete. It needs to be completed and reflected upon in the further work process.

3.1 Assessment methodology for GHG emissions including transmission of data

With the Catena-X initiative, the Federal Government is already supporting the goal of establishing a digital infrastructure to ensure reliable data transmission along the supply chain. At the same time, this should provide effective support for SMEs, who could potentially be overwhelmed by future requirements. Catena-X has developed a rulebook to provide a generally agreed, standardised method for calculating emission values and thus contribute to the debate mentioned earlier. This set of rules is based on the internationally recognised standards ISO 14040, 14044 and 14067, but also specifies design options within these standards in order to achieve greater comparability of the calculation results. The Catena-X rulebook is publicly available on the Catena-X website and is available for comment. The approach is also being pursued in other industries relevant to the automotive industry, such as the chemicals and plastics industry, with the *Together for Sustainability* initiative, which is already going through the process of harmonisation with Catena-X.

3.2 Outstanding questions to be considered

The ever-increasing demand for validity and the representativeness of GHG emissions data as a result of legislation at product and company level underscores the need for a carbon accounting system that is subject to similar quality standards as those used for financial reporting. At the same time, auditing costs and effort must remain as reasonable as possible. In addition, the following questions need to be answered:

- How will the transition from today's system to a possible carbon accounting system for automotive value chains be structured?
- How is the transition from non-uniform to harmonised accounting standards progressing?
- How can the efficiency of the processes in a company and the quality of the data generated be safeguarded?
- What will an effective and efficient auditing system look like without duplicating audits of the same situations and without gaps in the system?
- How can dialogue with competent national and international organisations in the field of accounting and financial reporting be strengthened?
- How are emissions to be dealt with that are not directly attributable to the value chains of the products, such as emissions from a company's headquarters, for example?
- What additional adjustments need to be considered beyond the harmonised calculation standards?

3.3 Key methodological issues

From the discussions and expert hearings held to date in the ad hoc working group, initial methodological guidelines have emerged as core results that can be used in the further development of the assessment and in international dialogues on harmonisation and standardisation:

General

- Climate impact is measured in equivalents of GHG emissions in accordance with the Kyoto Protocol. The use of a standard impact model, such as Global Warming Potential 100, is compulsory.

Data transmission

- Emissions data should be shared peer-to-peer via standardised, digital channels and platforms, such as Catena-X and TfS. With the explicit consent of the participating company, these platforms can also be used to perform benchmarks and calculate industry averages to drive the decarbonisation of the supply chain. For this purpose, interacting sector-specific standards such as the TfS PCF Guideline are to be created. Process-related data are to be measured and processed digitally in Catena-X, for example, or TfS.

Data quality: primary vs. secondary data

- As part of the data collection process, primary data from producers in the value networks should be used to the fullest extent possible in order to increase the data quality of GHG emissions. In supply chains where there is no alternative to secondary data, the quality or representativeness of the data (see Chapter 1.3 Data quality and data sources of GHG values) must be reported transparently.
- The use of secondary data should aim at achieving a high data quality of GHG emissions – possibly through a breakdown by region – or used in supply chains with a high percentage of the overall GHG emissions balance and for critical raw materials, albeit only in a clearly defined transition phase instead of primary data.
- For modelling the background systems, however, secondary data will be needed, which is why appropriate secondary data sets should be globally harmonised, optimally disaggregated by region, and stored in a public database. The data should be updated regularly and used as uniformly as possible.
- Primary data should be averaged over a period of at least one year in order to avoid seasonal fluctuations, for example, which will be challenging for product start-ups. Shorter periods of time can also be used for preliminary values.

Allocation rules

- For each coupling process, standardised allocation rules for main and by-products are required, in addition to decision-making tools for selecting the appropriate method to be used. Standardised allocation rules are necessary for cross-sector production processes in particular.
- The allocation hierarchy of ISO 14044 needs to be discussed by experts with both practical and scientific experience. Due to the specific focus of the PCF, system expansion makes no sense, while subdivision, on the other hand, cannot always be implemented. For individual materials or material groups, therefore, appropriate allocation rules should be identified.
- If product category rules (PCR) are applied, a standardised method for the development of the PCR is necessary and regular updating of the data base to enable primary data to be used.
- There needs to be a common understanding as to whether a PCF is an inventory or whether it should have a more encompassing impact. This focus is also relevant for recycling and energy.

- Uniform cut-off criteria or rules are needed for each process and sub-process in order to determine which inputs, sub-processes or outputs are not to be taken into account.
- Sub-processes within a company or production site can be aggregated gate-to-gate into a single process. In this case, companies declare the emissions per product.

The use of the mass balance method for labelling green premium products can be an incentive for transformative market developments and should be discussed across all industries. If the mass balance method is accepted, it should be implemented in accordance with established rules. Double counting should be avoided, the method should be verifiable and communicated transparently.

- Recyclates only enter the process chain as input with the emissions from recycling. This is predetermined by the cradle-to-gate system boundary of accounting within the supply chain. Any side effects resulting from this methodological incentive are to be discussed further by LCA specialists.

Energy accounting

In conformity with the Hamburg Institute & Horváth Short Paper on Energy, the following can be noted:

- As a matter of principle, purchased energy should be accounted for using a market-based approach.
- Due to the existing European legislation on verification systems for renewable energy, electricity in Europe in particular must be accounted for on a market basis.
- Easily understandable criteria should be defined for the use of contractual instruments as part of the market-based accounting approach in order to prevent double counting of green attributes. In addition, the usability of existing verification systems should be established and communicated on the basis of these criteria. If a country does not have an adequate verification system, clear instructions for accounting should be provided in this case.
- Restrictions on the offsetting of green electricity can be discussed. This relates to the setting of quality criteria for accounting versus the separate reporting of quality criteria for green electricity.
- Clear rules will have to be formulated for the accounting of company owned electricity generation plants with grid access.

4 Further attachments

Accompanying scientific research (only available in German): Hamburg Institut & Horváth (Only in German available)

- Short Papers Product Carbon Footprint: Allocation, Energy, Recycling

Accompanying scientific research (only available in German): Prognos & Fraunhofer IAO (Only in German available)

- Need for action in climate accounting.
  Findings and need for action resulting from surveys and discussions on product-related carbon accounting in the automotive value chain
- Measuring and reporting emissions by companies.
  Requirements for and importance of measuring and reporting corporate emissions
- Financial market perspectives on climate accounting.
  Assessments of financial market actors regarding the climate accounting requirements of companies in the automotive value chain

About the Expert Group

The Expert Group Transformation of the Automotive Industry (ETA) is an independent advisory body of the Federal Ministry of Economic Affairs and Climate Action (BMWK). The Expert Group develops target and recipient-based recommendations for action for politicians, business and society in general, which can be used to successfully shape long-term structural change in the industry. The overarching goal is to achieve climate neutrality, in addition to securing value creation, jobs and apprenticeships in Germany as an automotive location.

The ETA consists of 13 people from the scientific community, business and society who were appointed by Federal Minister Dr. Robert Habeck for the 20th legislative period. Other experts, in addition to relevant institutions and stakeholders, are involved in the work of the ETA via flexible and agile work formats. The members receive no remuneration or expense allowance for their involvement in the ETA. The group of experts is supported by a process and scientific monitoring team commissioned by the BMWK. The ETA has a sister body, the Expert Advisory Council on Climate Action in Mobility (EKM) at the Federal Ministry for Digital and Transport (BMDV). Both bodies are integrated into the Federal Government's Transformation of the Automotive and Mobility Industry Strategy Platform (STAM).

The ETA is responsible for the content. It develops statements, position papers and reports partly in its working groups, then deliberates and decides on them in plenary session, and subsequently publishes them under its own responsibility.

PUBLISHING DATA

AUTHOR: Expert Group Transformation of the Automotive Industry (ETA), Reinhardtstraße 58, 10117 Berlin / https://expertenkreis-automobilwirtschaft.de

PUBLISHER: Federal Ministry of Economic Affairs and Climate Action (BMWK)