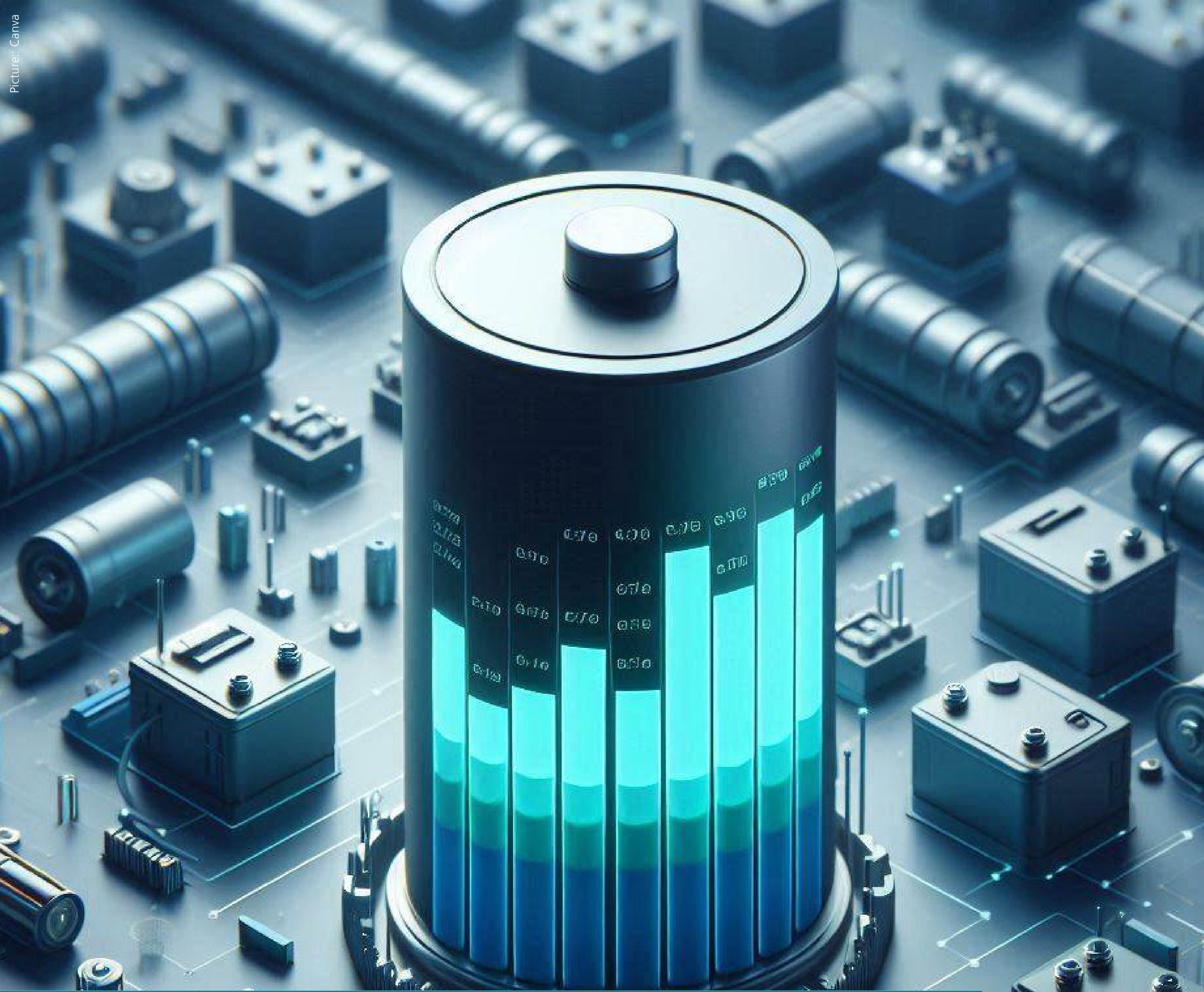

Picture: Canva

Whitepaper
Challenges in Defining and Assessing **Greenwashing**

Focusing on the role of LCA in the battery sector

HiQ·LCA

Recognizing Risks – Building Trust
Greenwashing in the Battery Sector

Why this Whitepaper?

The energy transition depends on credible sustainability. But where it says "green," it's not always backed by facts. In the battery industry especially, environmental claims are increasingly vague, exaggerated, or misleading. This white paper, developed by the HiQ-LCA research consortium, shows: greenwashing isn't just a marketing issue. It undermines trust, progress, and regulatory compliance.

EXECUTIVE SUMMARY

Environmental claims in the battery sector are becoming increasingly important as sustainability becomes a central requirement in both regulatory and market contexts. However, inconsistencies in how these claims are substantiated – particularly in the absence of standardized methods and verifiable data – pose growing challenges. Misleading or incomplete environmental messaging, referred to as greenwashing, may undermine transparency, comparability, and trust in sustainability assessments.

This white paper examines greenwashing in the context of battery production and discusses how Life Cycle Assessment (LCA) can contribute to reducing associated risks. Greenwashing may occur at the product or corporate level, and is often linked to vague, selective, or unverifiable environmental claims. In the battery sector, this issue is amplified by methodological gaps in LCA studies, limited data quality, and the complexity of global supply chains.

The paper highlights the role of high-quality and transparent LCA as a key instrument to support compliance and comparability. However, it also outlines current limitations, such as data gaps, inconsistent system boundaries, and variation in functional units. Without methodological clarity and verifiable data, even well-intentioned assessments can lead to misinterpretation or misuse.

The analysis includes

- A review of existing definitions and typologies of greenwashing,
- An overview of regulatory frameworks, including the EU Battery Regulation (2023/1542),
- Case-based evidence on environmental claims in battery production and recycling,
- A discussion of the methodological requirements for credible LCA, including ISO standards and the need for third-party verification.

The HiQ-LCA project contributes to addressing these challenges by enabling validated, high-resolution LCA datasets and promoting harmonized methodological approaches. The project focuses on improving the scientific basis for sustainability claims in the battery sector, particularly in view of evolving EU regulatory requirements.

This white paper aims to support policymakers, researchers, and industry actors by providing a structured overview of greenwashing risks and outlining how transparent, standardized LCA can contribute to more credible and effective environmental communication.

More information on the project website https://www.hiq-lca.eu

The Key Insights

- Greenwashing is increasing in the battery sector and remains difficult to define.
- Lack of standards and inconsistent data quality hinder reliable environmental claims.
- LCAs are essential – but only effective when transparent and methodologically sound.
- The EU Battery Regulation raises expectations for traceability and verification.
- Without third-party checks, selective or misleading claims remain a risk.

Recommended Actions

- Mandate the use of standards (ISO 14040/44/67, PEF).
- Implement digital battery passports with complete LCA data.
- Ensure independent verification of environmental performance claims.

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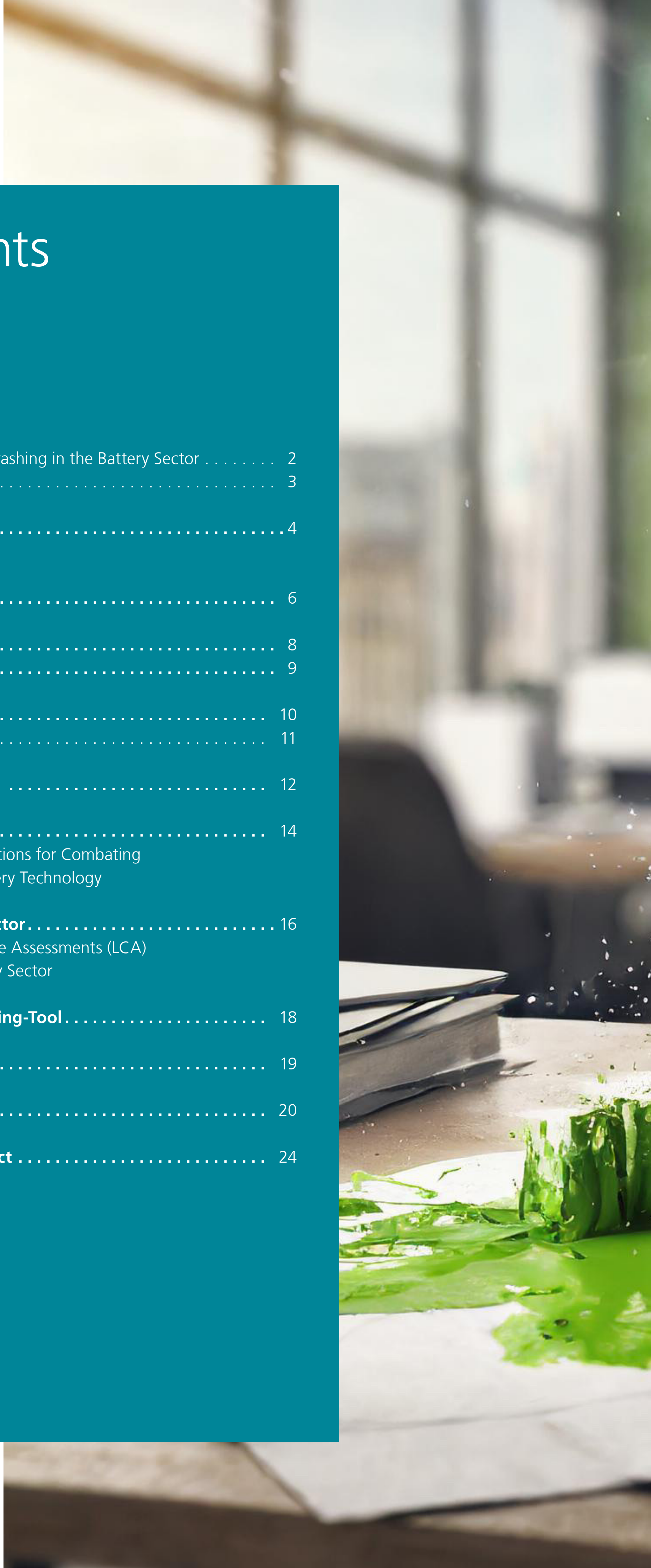

Spaniol identified key attributes of greenwashing:

- An environmental performance claim by a private sector organization,
- Lack of substantiation,
- Deceptive intent, and aim for competitive advantage.

Spaniol et al. (2024)

Picture: Adobestock

The Authors

The HiQ-LCA consortium brings together twelve European partners from academia, industry, and applied research. Its aim is to contribute to a sustainable battery value chain in Europe. In response to rising concerns over greenwashing in sustainability communication, the consortium develops innovative tools, services and trainings to enable reliable LCAs and to support transparent, evidence-based decisions.

About the HiQ-LCA Consortium

The HiQ-LCA project brings together leading organizations from research, industry, and data science to address a central challenge in the battery sector: the lack of verified and high-quality life cycle data for assessing the environmental impact of lithium-ion batteries. The goal of the consortium is to develop innovative tools for LCA data collection, modelling, and verification as well as related services, and trainings. This shall enable consistent and industry-accepted environmental assessments across the battery value chain, including upstream and downstream stages such as raw material sourcing, materials, cell and pack production, and recycling.

The project uses a combination of primary data collection, industrial modelling, external data integration, and simulation-based approaches. Data sources include project partners, advisory board members (e.g., OEMs and associations), as well as external contributors. With the implementation of the EU Battery Regulation (2023/1542) and growing demand for carbon footprint disclosures, OEMs are increasingly reliant on LCA tools and services to meet both compliance and strategic design requirements. However, the limited quality and coverage of current LCA datasets presents significant usability constraints.

To address this, HiQ-LCA not only delivers new data, but also supports the adaptation of LCA tools and methodologies to enhance usability, responsiveness, and integration into product development workflows. In parallel, the project responds to the emerging market need for expanded LCA services – including technology-specific modelling, mitigation assessments, and third-party validation. The rising demand for transparent supply chain data from end users and stakeholders reinforces this trend.

Facts and Figures

High-Quality Life Cycle Assessment for Battery Industry (HiQ-LCA)
Duration: Jan 2023 – Dec 31, 2025
Total budget: 3.5 Mio €
Funding organization: EIT RawMaterials
EIT Topic: Design of products and services for the circular economy

» Only those who avoid greenwashing can credibly achieve true sustainability.«

Picture: Adobestock

Introduction

The number of consumers who value environmental friendliness and climate-friendly consumption is steadily increasing. Therefore, sustainability is becoming a pitch.

The growing relevance of environmental- and climate-conscious consumption is reshaping markets and stakeholder expectations. As sustainability becomes a decisive factor for both competitiveness and regulatory compliance, companies across sectors are integrating environmental claims into their communications and product strategies. However, this trend is accompanied by a rise in misleading or unverifiable sustainability claims – a phenomenon widely known as greenwashing (Lyon & Montgomery, 2015).

Research on corporate social responsibility (CSR) and market value shows generally positive effects, although results vary by sector. In a German survey, 72% of companies expected social responsibility to positively influence their valuation; 57% anticipated similar effects specifically from environmental performance (Langer, 2011). These expectations reflect a strategic shift: Sustainability is no longer a reputational add-on, but a business imperative.

The term greenwashing was coined in 1986 by environmental activist Jay Westerveld, in response to hotel towel reuse campaigns that promoted water conservation without broader sustainability actions. Since then, greenwashing has evolved into a complex communication practice, often difficult to detect. It refers to the act of presenting products or companies as environmentally responsible without providing adequate, verifiable evidence (Somany, 2023; Krafft & Saito, 2015). The consequences range from loss of public trust to regulatory backlash and environmental harm.

Objective of this White Paper

This white paper examines greenwashing practices in the context of battery supply chains. It seeks to:

- Outline common forms of environmental misrepresentation,
- Identify methodological and regulatory weaknesses in current sustainability assessments,
- and demonstrate how life cycle assessment (LCA) and independent verification can serve as effective countermeasures.

Particular attention is given to the role of LCAs in evaluating the environmental performance of batteries – from raw material sourcing to recycling – and how data limitations or inconsistent standards can lead to misleading claims.

The paper highlights how more transparent, traceable sustainability assessments can not only improve regulatory compliance (e.g., with the EU Battery Regulation), but also strengthen long-term market credibility.

By offering a practical and evidence-based framework, this white paper aims to support industry actors, policymakers, and researchers in navigating the complex interface between sustainability, regulation, and communication – and in doing so, contribute to a more trustworthy and measurable energy transition.

Definition of Greenwashing

Greenwashing is a widely discussed yet inconsistently defined concept in both academic and practical discourse. Its multidimensional nature presents significant challenges for achieving a unified definition (Bernini et al., 2023; Huang et al., 2024; Spaniol et al., 2024). Across disciplines – including business studies, environmental science, law, engineering, marketing, and social sciences – numerous overlapping but distinct definitions have emerged (Nemes et al., 2022).

One major point of contention lies in the role of intentionality. Seele and Gatti (2017) argue that many definitions overemphasize the strategic intent to mislead, while in practice, greenwashing is often identified retrospectively through external critique – essentially, "in the eye of the beholder." Other scholars focus on the selective disclosure of positive environmental performance while omitting negative aspects, thus creating an unjustifiably favorable image (Bowen & Aragón-Correa, 2014).

Recent contributions have further advanced the conceptual landscape. Bladt et al. (2023) propose a two-dimensional typology that differentiates between types of environmental claims (e.g., factual vs. symbolic) and levels of initiation (e.g., organizational vs. product-level). Their findings suggest that consumers react differently to distinct forms of greenwashing, highlighting the need for more granular analytical tools.

Zervoudi et al. (2025) underscore this complexity and call for more sophisticated frameworks to distinguish between greenwashing, green marketing, and legitimate sustainability communication.

Despite this definitional diversity, a common thread runs through most interpretations: Greenwashing is generally understood as a misleading communication practice in which companies present their products, services, or brand as more environmentally friendly than they actually are (Aggarwal & Kadyan, 2011; Spaniol et al., 2024).

Greenwashing according to this definition may include:

- Making unfounded or exaggerated environmental claims,
- Marketing products as "green" without meaningful environmental benefits (Feinstein, 2012; Simion, 2024),
- And allocating more effort to promoting a sustainable image than to reducing actual environmental impacts (Aggarwal & Kadyan, 2011).

As such, greenwashing undermines transparency and can erode stakeholder trust – particularly when environmental information is presented without verifiable evidence or in a way that obscures trade-offs and limitations.

Picture: Canva

Different Levels: From Product to Corporate Level

Greenwashing occurs at multiple organizational levels and can take both intentional and unintentional forms. Scholars distinguish between product level and corporate level greenwashing, each involving different strategies, claims, and risks (Vieira de Freitas Netto et al., 2020; Nemes et al., 2022).

At the product level, greenwashing typically involves presenting products or services as more environmentally friendly than they are in reality. This may include vague or unverifiable claimws, misleading visuals, or omissions of relevant environmental impacts (UNEP, 2017). These practices are often aimed at influencing consumer perceptions or regulatory evaluations (Free et al., 2024).

At the corporate level, greenwashing encompasses broader strategies such as selectively reporting positive outcomes, decoupling sustainability communication from actual performance, or overstating commitments in ESG reports (Hu, P., Li, X., Li, N., Wang, Y., & Wang, D. D., 2024; ESMA, 2024). While some instances are deliberate, others may stem from a lack of transparency in complex supply chains or insufficient methodological guidance (Zioło et al., 2024).

Across both levels, one common factor is the prioritization of image over impact – spending more resources on appearing sustainable than on improving actual environmental performance (Aggarwal & Kadyan, 2011). This disconnect can erode trust, mislead stakeholders, and ultimately weaken the credibility of sustainability standards.

Proposed countermeasures to greenwashing include:

- Stronger regulatory oversight of environmental claims,
- Harmonized ESG reporting frameworks,
- Third-party verification of sustainability information (Ajay, S., Lakshmi, H., & Keerthi, H.K., 2024).

In sectors with complex value chains, such as battery manufacturing, clear and comparable sustainability data becomes especially critical. Without it, greenwashing can dilute meaningful environmental standards and compromise public and investor trust (ESMA, 2024; Kathan et al., 2025).

Graphic & picture: Canva

Companies that align sustainability claims with verifiable data will be best prepared for future regulation and increase credibility.«

Regulatory Bodies and the Battery Sector

Regulatory bodies face challenges in defining and assessing greenwashing in corporate environmental claims, but are increasingly addressing the issue. The battery sector, in particular, has come into focus (Peng et al., 2024).

As environmental concerns gain traction, regulatory institutions are stepping up efforts to prevent greenwashing in corporate sustainability communication. In the battery sector, increasing scrutiny has been directed toward misleading claims, particularly those that overlook upstream emissions or rely on inconsistent data (Peng et al., 2024; Kumar & Suresh, 2024). Governments around the world have introduced legal instruments and guidelines to improve transparency and accountability. While these efforts are growing, some research suggests that regulation alone may not be sufficient to improve environmental outcomes or prevent misleading claims (Mukherjee, A., & Ghosh, S., 2025, Wang, Z., Ni, D., & Zheng, K., 2022). Still, initiatives such as the U.S. Federal Trade Commission's Green Guides and the United Nations Environment Programme's principles for product sustainability claims emphasize the importance of clarity, transparency, and relevance in environmental marketing (Feinstein, 2013; UNEP, 2017).

The EU Battery Regulation (2023/1542)

A central regulatory development is the European Union's Battery Regulation, which entered into force in August 2023. Article 7 mandates carbon footprint declarations for rechargeable industrial and electric vehicle batteries as a condition for market access. The regulation sets out:

- Lifecycle-based calculation rules for carbon footprint,
- Requirements for digital product passports,
- Obligations for end-of-life documentation and recyclability performance.

These provisions aim to promote credible sustainability communication and limit the risk of greenwashing through standardized and verifiable environmental disclosures (ESMA, 2024). However, challenges remain.

Many companies struggle with data collection, supply chain transparency, and end-of-life tracking (Rizos & Urban, 2024). While some adopt best practices, others face difficulties navigating inconsistent global reporting obligations or may be incentivized to present overly optimistic environmental data (Xia et al., 2023).

Risks and Future Directions

Research shows that carbon footprint data may still be manipulated or selectively disclosed, especially in complex global value chains (Jannesar Niri et al., 2024). Game-theoretic models suggest that a combination of regulatory pressure and supportive policies is necessary to incentivize truthful disclosure practices (Xia et al., 2023).

To reduce greenwashing risks and strengthen institutional trust, researchers and regulators emphasize the need for:

- Harmonized ESG rating standards and methods (Kathan et al., 2025),
- Clear sustainability assurance processes, including independent auditing (Free et al., 2024),
- Transparency in environmental communication throughout a product's life cycle.

In summary, the regulatory environment around green claims is evolving – particularly in the battery sector. However, the effectiveness of these frameworks depends not only on legal provisions, but also on the quality of implementation, third-party verification, and the willingness of stakeholders to engage in transparent environmental disclosure.

»Scoring methods need to be revised and standardized.«

Dr. Andreas Bittner
HiQ-LCA project team,
CEO, CellCircle

Picture: Canva

Picture: AI-generated, Fraunhofer ISC

Driving Green or Simply Talking Green

Recent research highlights growing concerns about greenwashing in the energy and battery sectors. Companies in the electric vehicle (EV) industry have been found to exaggerate their environmental credentials, overlooking the full lifecycle impact of EVs. Companies often emphasize zero-emission aspect of EVs but neglect the environmental toll of production and disposal (Kumar & Suresh, 2024).

Electric vehicles (EVs) are widely promoted as a cornerstone of sustainable mobility; however, recent life cycle assessments highlight that the environmental benefits of EVs can vary significantly depending on battery production, raw material extraction, and regional electricity mix. Studies show that the environmental footprint of EV batteries can be substantial, and the overall life cycle emissions may reduce or even offset claimed zero-emission advantages in certain contexts (Chen, Li, Zhang, & Wang, 2025; Kumar, Singh, & Zhao, 2025). These findings emphasize the need for transparency and full life cycle consideration when making environmental marketing claims.

This imbalance between public perception and actual performance has led scholars to identify what they call symbolic sustainability-communication that promotes ecological virtue without proportional environmental impact (Bowen & Aragón-Correa, 2014). In the context of EVs, such symbolic claims often highlight the use-phase benefits while omitting emissions associated with battery manufacturing or electricity generation (Liao & Wu, 2024). Empirical studies, e.g., Kanberger & Ziegler (2024, show that consumers may consider life cycle emissions when making purchasing decisions. However, there is little evidence of how advertising with zero tailpipe emissions influences the actual perception of the overall environmental impact. This selective framing can distort purchasing behavior and undermine trust in environmental communication within the mobility transition.

Addressing these gaps requires transparent, standardized life-cycle data and harmonized environmental disclosure practices. Life Cycle Assessment (LCA) provides a comprehensive approach to capturing the full environmental footprint of EVs, from mining to recycling. By integrating high-resolution, verifiable LCA data, initiatives such as HiQ-LCA contribute to aligning sustainability communication with measurable performance and reducing the space for greenwashing in the battery value chain.

THE ELECTRIC VEHICLE AND THE REALITY GAP

Despite the potential of EVs, the possible gap between corporate claims and actual environmental performance remains a concern.

Picture: Canva

Greenwashing and LCA in the Battery Sector

The battery sector is among the first to face direct regulatory requirements for environmental transparency. The EU Battery Regulation (2023/1542) mandates carbon footprint disclosures for EV, industrial, and light transport batteries. This increases the need for standardized Life Cycle Assessments (LCA) and independent verification to prevent greenwashing.

Why Standards Matter

Credible sustainability claims in the battery sector require adherence to harmonized life cycle assessment (LCA) methodologies. Multiple studies emphasize that rigorous LCA practices are essential for reliable environmental data and several studies conclude that there are relevant benefits in the case that reliable data can be applied. For example:

- Kurz et al. (2022) found that optimized recycling processes can reduce global warming potential (GWP) by up to 12.3%.
- Piepenbrink et al. (2025) reported that battery-electric trucks reduce emissions by 34–69% compared to diesel models.
- Gonzales-Calienes et al. (2023) demonstrated a 48% – 54% reduction in cost and emissions when using recycled rather than virgin materials.

However, limited methodological transparency, selective data disclosure, and promotional language in some LCA reports risk overstating sustainability benefits (Eltohamy et al., 2024b). Reliable environmental assessments require a complete picture of both benefits and trade-offs.

Identifying Impact Hotspots

LCA helps to identify critical emission sources ("hotspots") in battery production, such as energy-intensive processes and materials like cathodes and anodes (Erakca, M. (2023). Despite methodological advances, challenges remain, e.g.:

- Lack of primary (measured) data
- Inconsistent system boundaries and functional units
- Difficulties in comparing results across technologies and scales

To address these issues, researchers recommend using multiple production scales, adopting consistent functional units (e.g., per kWh of storage capacity), and ensuring full disclosure of assumptions and data sources (Porzio & Scown, 2021).

From LCA to Digital Battery Passports

The integration of LCA into digital battery passports is a key measure to improve supply chain transparency and meet the requirements of the EU Battery Regulation (Haupt et al., 2024). This approach allows environmental data to be traceable, standardized, and independently verified. Even partial LCAs – such as cradle-to-gate or gate-to-gate – can be valid if their scope and limitations are clearly reported. However, using partial LCAs for product comparison without disclosing system boundaries may result in greenwashing, even if the methodology follows ISO 14040, 14044, or 14067 standards.

LCA as a Tool Against Greenwashing

LCA has the potential to expose or prevent misleading environmental claims. Studies such as Brandao et al. (2024) and Dieterle et al. (2022) emphasize that robust LCA frameworks, transparent inventory data, and third-party validation are essential to avoid manipulation and ensure credibility. In this context, the European Securities and Markets Authority (ESMA, 2024) has highlighted the role of supervisory technology (SupTech) and natural language processing in monitoring and auditing green claims. Further research recommends integrating LCA data early in battery design processes, including for advanced battery chemistries like vanadium flow or solid-state systems (Blume et al., 2023; Degen et al., 2024). The need for harmonized datasets and functional units remains a barrier to comparability and standardization (Backes et al., 2023).

Outlook

Despite increasing policy attention and methodological progress, the risk of greenwashing in LCA-based sustainability communication remains. Legal frameworks alone are not sufficient to prevent misleading claims unless accompanied by third-party assurance, transparent declaration of assumptions, reliable data, and consistent application of standards (Zych et al., 2021; Finkbeiner, 2014).With rising demand for lifecycle transparency in the battery sector, advancing LCA quality and credibility is critical for aligning industry practice with regulatory goals and consumer expectations.

Context REMARKS

The integrity of sustainability claims, particularly those derived from complex battery Life Cycle Assessments, hinges entirely on the rigour of data verification. As detailed in this Whitepaper, preventing greenwashing requires a dedicated commitment to methodological excellence, encompassing strict alignment with standards like ISO 14040/44 and specific regulatory mandates such as the EU Battery Regulation.

The requirements, from justifying the system boundary and prioritising verifiable primary supply chain data over generic datasets, to ensuring full transparency and the omission of high-impact categories, are extensive. These critical steps, summarised in our essential self-checklist, demand specialised knowledge and, crucially, independent third-party verification for credibility.

Limitations of LCA as an Anti-Greenwashing Tool

While Life Cycle Assessment (LCA) is a widely accepted method for evaluating environmental impacts, its use as a defense against greenwashing is limited by systemic, methodological, and practical constraints.

Uncertainty from System Boundaries and Data Gaps

Life Cycle Assessment (LCA) is a key tool for evaluating the environmental performance of products, including lithium-ion batteries for electric vehicles. However, its effectiveness in counteracting greenwashing is limited by uncertainties related to system boundaries, data quality, and methodological choices. Many LCA studies rely on secondary data or incomplete inventories, and only a minority incorporate formal sensitivity or uncertainty analyses, which reduces the robustness and comparability of results (Scrucca, Presciutti, Baldinelli, Barberio & Postrioti, 2024; Li, Wang & Zhang, 2025; Marin, Hossain & Patel, 2022). Differences in system boundaries, functional units, and assumptions about energy mix, recycling rates, and battery lifespan further contribute to variability across studies, making cross-study comparisons challenging (Li et al., 2025; Marin et al., 2022).

Moreover, many matrix-based LCA applications omit quantitative uncertainty evaluation, even though methods such as Monte Carlo simulations or sensitivity analyses are well-established, potentially leading to misleading conclusions in comparative assessments (Heinrich, 2022). To improve reliability and transparency, researchers recommend full disclosure of all assumptions, consistent definition of functional units, and rigorous treatment of uncertainty. Such practices are helpful to prevent both accidental misinterpretation and intentional misuse of LCA results in sustainability communication (Scrucca et al., 2024; Li et al., 2025).

Methodological Inconsistencies and Attributional Bias

Attributional Life Cycle Assessment (ALCA) estimates average environmental burdens but does not capture marginal or system-level effects, which can lead to oversimplified or misleading conclusions in sustainability claims (Schaubroeck, 2023). Empirical studies on electric vehicle batteries show that LCA results vary considerably depending on assumptions about electricity mix, efficiency, lifetime, material composition, and recycling strategies (Li, Wang, & Zhang, 2024; Zhang, Chen, & Wu, 2024). Secondary datasets are not representative in every case. Northvolt has identified in 2023 that PEF secondary datasets on battery raw materials significantly differ from primary data that has been provided by suppliers. This can result in significantly underestimated or overestimated environmental impacts.

These findings highlight the need for disaggregated LCA datasets that represent the correct processes as well as the importance of transparent reporting of assumptions and, where possible, complementary analyses to support robust decision-making and prevent greenwashing.

Variability in Practice and Interpretability

The diversity in LCA application practices also limits comparability and reliability. Curran et al. (2014) demonstrate that even assessments of the same product can yield different results due to inconsistent application of functional units and system boundaries. Bicalho et al. (2012) and Dacić et al. (2022) highlight broader problems related to missing data, lack of standards, and divergent assumptions in modeling practices. Furthermore, Pattara et al. (2012) point out that LCA's common single-impact focus (e.g., climate only) can obscure negative trade-offs in other environmental domains – a phenomenon known as burden shifting.

Self-Checklist for reliable Life Cycle Assessment

	Yes	No
Is your LCA aligned with ISO 14040/44, and where applicable, ISO 14067 for carbon footprinting?	◯	◯
Have you explicitly stated the regulatory or compliance framework your study aligns with (e.g., EU Battery Regulation, PEF, other)?	◯	◯
Are you applying recognized reporting schemes, such as the Product Environmental Footprint (PEF) or Environmental Product Declarations?	◯	◯
Have you clearly justified the system boundary used (e.g., cradle-to-gate, cradle-to-grave) and ensured it's appropriate for your claim?	◯	◯
Have you prioritized primary data from your supply chain, especially where required, over default or generic datasets?	◯	◯
Has the study undergone independent third-party verification to ensure credibility and compliance?	◯	◯
Are the methodology, data sources, and assumptions transparent, reproducible, and accessible for scrutiny?	◯	◯
Have you ensured your results are comprehensive, avoiding cherry-picking or omission of high-impact stages or categories?	◯	◯

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The HiQ-LCA Project Consortium

BRGM - The French Geological Survey, France
BRGM, the French Geological Survey, is France's leading public institution for Earth Science applications and work towards advancing the Earth Sciences in strategic areas such as geology and environmental knowledge, mineral resources and the circular economy, digital data and infrastructure. In collaboration with HiQ-LCA partners, BRGM is mainly contributing to develop datasets and methods for battery specific LCA. In addition, BRGM is highly involved in supporting the startup creation that will commercialize the battery-specific LCA services and project result expertise.

Contact: Antoine Beylot

CellCircle
CellCircle's mission is to create a sustainable circular economy for battery cells. The German start-up develops innovative battery recycling processes to recover the functional materials of Li-ion batteries in high purity for direct reuse. Benefits are closed material loops, low energy demands and significantly reduced carbon foot-prints. This work is complemented by CellCircle's engagement for an improved life cycle assessment to better distinguish green solutions from standard processes.

Contact: Dr. Andreas Bittner

ecoinvent
ecoinvent is an internationally active, mission-driven organization devoted to supporting high-quality, science-based environmental assessments. Its activities include publishing and maintaining the ecoinvent database, a comprehensive life cycle inventory database that provides reliable and transparent information on the environmental impacts of various products and services. It is used by companies, researchers, and policymakers to analyze the environmental impact of their operations, make informed decisions, and develop sustainable practices. As part of the HiQ-LCA project, ecoinvent will lead the work package on data management.

Contact: Dr. Antonio Valente

Eramet
Eramet is a global mining and metallurgical group, a leading player in the production of metals and minerals essential for economic development and the energy transition. The Group operates across the entire value chain, from exploration to production and the processing of resources. The Group employs around 10,000 people in 20 countries. Eramet's minerals are: Manganese in Gabon, Nickel in Indonesia and New Caledonia, Mineral sands in Senegal, Lithium in Argentina.

European Lithium Institute eLi (project coordination)
The European Lithium Institute eLi is an international non-profit organization with headquarter in Brussels. The virtual institute links up the competences and infrastructure of its member organizations along the whole lithium value chain to generate focused international cooperation. All eLi activities are organized in six platforms. Four platforms cover the whole lithium value chain – from exploration and mining up to recycling. Two additional platforms have a cross-value chain character and use the holistic expertise of eLi to improve life cycle assessment for lithium-ion batteries and to develop new business models.

Contact: Dr. Andreas Bittner, Dr. Jean Paul Gueneau de Mussy

Fraunhofer Institute for Silicate Research ISC
The Fraunhofer ISC is one of the leading R&D centers for material-based research and development in the fields of resource efficiency, energy, environment and health. The Institute works to develop innovative functional materials and technologies for more sustainable products with less resource input and a clear focus on sustainability. Fraunhofer ISC combines first–rate expertise in materials science with long-standing experience in materials processing, industrial application and the upscaling of production and process technologies to pilot scale as well as in materials analysis and characterization. In the field of battery cell materials and concepts, the Fraunhofer R&D Center Electromobility is one of Europe's leading research institutions. Fraunhofer ISC is contributing its expertise in the digitization of materials development and coordinating dissemination, communication and marketing activities.

Contact: Marie-Luise Righi

Fraunhofer Institute for Surface Engineering and Thin Films IST
Fraunhofer Institute for Surface Engineering and Thin Films is located in Braunschweig, Germany. Our research focuses on surfaces and coatings for sustainable products and related production systems to tap the synergies of process technology and production engineering. Fraunhofer IST is responsible for data generation for graphite materials and development of simulation models of processes for procurement of relevant battery materials in the HiQ-LCA Project.

Contact: Moritz Günther, Prof. Dr. Stephan Krinke

Ghent University, STEN
Ghent University has a strong record in raw materials research and education. The Sustainable Systems Engineering (STEN) Research Group focuses on the study of sustainability, using life cycle thinking and sustainability analysis. In the HiQ-LCA project, STEN will support data generation for representative life cycle assessment. This will be done by investigating the processes in the battery and electric vehicles life cycles, mainly with project partners, and complemented with literature review.

Contact: Dr. Erasmo Cadena Martinez

Leiden University
Leiden University is one of Europe's leading international research-intensive universities. The Institute of Environmental Sciences (CML) at Leiden University focuses on the strategic and quantitative research and education on sustainable use and governance of natural resources and biodiversity. For over 30 years, CML plays a leading role in the development of tools for decision making on sustainable production and consumption, including life cycle assessment (LCA), material flow analysis (MFA), environmentally extended input-output analysis (EE-IOA) and their integration.

Contact: Dr. Bernhard Steubing, Dr. Robert Istrate

MINVIRO
Minviro is a science-based consultancy and software provider offering a deeper level to sustainability. They bring the knowledge and tools necessary for impact reduction to people and businesses globally. From guiding material and technology companies in the low-carbon transition to making essential intelligence accessible. Through a recognised framework for analysing impacts, they build transparent roadmaps with actionable insights. Shaping a future where all ingredients of modern technology are produced with consideration and minimal effect on the environment.

Contact: Adriana Merino Zamora, Costanza Tinari

Northvolt
Northvolt is a European supplier of sustainable, high – quality battery cells and systems. Founded in 2016 to enable the European transition to a decarbonized future, the company has made swift progress on its mission to deliver the world's greenest lithium – ion battery with a minimal CO_2 footprint and has grown to over 4 , 500 people from over 110 different nationalities. Northvolt has to date secured more than $ 55 billion worth of contracts from key customers, including BMW, Fluence, Scania, Volkswagen, Volvo Cars and Polestar, to support its plans, which include establishing recycling capabilities to enable 50 percent of all its raw material requirements to be sourced from recycled batteries by 2030. Northvolt filed for insolvency in Sweden in March 2025.

CyVi group – Université de Bordeaux
Based at the University of Bordeaux in the Institute of Molecular Sciences (ISM), the CyVi Group is an interdisciplinary group of scientists working on research methods of and applications to sustainable chemistry and life cycle assessment. ISM is a Joint Research Unit between University of Bordeaux, Bordeaux INP and CNRS. The objectives of the research carried out in the CyVi Group is to apply and develop methodologies for assessing the environmental impacts and use of natural resource, in particular life cycle assessment (LCA).
The CyVi Group research aims to enhance sustainable engineering & chemistry, and promote the link between academic methodological developments and its application in key sectors.

Contact: Prof. Dr. Guido Sonnemann

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