CLEPA
European Association of Automotive Suppliers

Measuring what matters

Potential circular economy performance indicators for automotive suppliers

Executive summary

The circular economy offers a transformative model for the automotive sector by shifting from a linear "take-make-dispose" approach to one that emphasises reuse, remanufacturing, recycling, and sustainable design. However, implementing circularity in this industry is complex due to intricate supply chains, diverse materials, long product lifecycles, and strict safety and regulatory requirements.

In addition, the automotive sector lacks circularity measurement tools tailored to the specificity of components and supplier operations. Recognising this gap, CLEPA has taken a leadership role by establishing a common language and standardised methodologies, notably through the publication of the Circularity Glossary in 2024.

Building on this foundation, the present study critically analyses key circularity frameworks and indicators currently being developed to assess circularity, with the objective of identifying areas for further development and increased relevance for the automotive supplier industry.

Introduction

The circular economy is a regenerative economic model aimed at minimising waste and maximising resource efficiency by keeping materials, components, and products in use for as long as possible. It promotes strategies such as reuse, remanufacturing, recycling, circular and sustainable design. [1],[2], [3]

In the automotive industry, the implementation of circular models is particularly complex due to a high intricate supply chain, wide material diversity, product longevity, and strict safety requirements.[4] These characteristics significantly influence both the feasibility and the assessment of circularity strategies.

As achieving circularity requires the engagement of the entire value chain, it is essential to emphasise the importance of standardised and harmonised methodologies for assessing and measuring circularity.[5] While numerous frameworks, methodologies, and tools have emerged to define and measure circular economy performance, none have been specifically developed to address the unique needs and constraints of the automotive supplier industry.

[1] https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview
[2] eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0098
[3] Circular economy | Topics | European Parliament
[4] Vision-on-Circularity_CLEPA-_11.03.2024-1.pdf
[5] Vision-on-Circularity_CLEPA-_11.03.2024-1.pdf

Automotive suppliers therefore recognise the importance of establishing a shared language, along with consistent methodologies and tools, to support the transition towards circularity. Reflecting this commitment, the Circularity Glossary[6] was published in 2024 to foster a common understanding across the sector.

Building on this foundation, the present study offers a critical analysis of selected existing frameworks and their indicators used to evaluate and measure circularity, assessed from the perspective of automotive suppliers.

Objectives

The objective of this study is to assess selected existing frameworks for measuring circular economy performance, with a particular focus on their applicability to automotive suppliers. The aim is to identify which frameworks and indicators are best suited to promote design for circularity and to facilitate effective communication with stakeholders.

Methodology

The first phase of the study focused on identifying emerging standards and frameworks shaping the circular economy, whether for standardisation, regulation, or performance assessment. Each framework was reviewed to determine which aspects of circularity it addresses (e.g., reparability, recycling).

The identified indicators were then assessed in terms of their maturity and pertinence for automotive suppliers, based on the following criteria:

- Established definitions and scope (at company and sector level)
- Established calculation methodology
- Availability and quality of data
- Pertinence for automotive suppliers

It is worth noting that the analysed frameworks vary in focus; some target company-level performance, others product-level performance, while some cover both. As a result, the corresponding strategies and recommendations differ accordingly.

[6] https://www.clepa.eu/insights-updates/publications/circularity-glossary-common-terms-graphics-and-examples-for-the-automotive-sector/

Analysis & Results

The frameworks listed in Table 1 form the basis of this assessment. While most of these frameworks were not specifically developed for the automotive sector, their application in other industries makes them valuable benchmarks for potential adaptation.

As outlined in the previous chapter, these frameworks were developed with varying objectives, ranging from regulatory compliance and standardisation to corporate reporting. Some focus on product-level circularity (e.g., reparability of a product), while others provide aggregated insights at the company level (e.g., use of recycled materials on a given period). Table 2 provides a summary of the circularity indicators that are used in each of the frameworks.

Table 1: List of reviewed frameworks, type and their addressed scopes

Framework	Description	Document type	Addresses	Link
Eco-design for Sustainable Product Regulation (ESPR)	The Eco-design for Sustainable Products Regulation (ESPR) aims at making sustainable products the norm by setting eco-design requirements for physical goods. It expands the scope of the previous Eco-design Directive to include durability, repairability, recyclability, and energy efficiency.	Legal (EU)	Product design	Link
Corporate Sustainability Reporting Directive (CSRD) & ESRS	CSRD requests companies above a certain size to disclose information on what they see as the risks and opportunities arising from social and environmental issues, and on the impact of their activities on people and the environment. Companies subject to the CSRD have to report according to European Sustainability Reporting Standards (ESRS).	Legal (EU)	Company operations	Link
Directive on the Repair of Goods 2024/1799	The directive aims to extend the lifespan of consumer products by means of repair. For this purpose, it imposes extensive obligations on economic operators in the EU to repair products outside the seller's liability period.	Legal	Product design and company operations	Link
ISO 59020:2024 Circular economy — Measuring and assessing circularity performance	ISO 59020:2024 is an international standard that provides a consistent methodology for measuring and assessing circularity performance using defined indicators. It helps organisations evaluate how effectively they minimize resource use and create and maintain circular resource flows across products, operations, and systems.	Standard	Circularity performance of company operations and products/ services.	Link
ISO 59040-Circular economy — Product Circularity Data Sheet (PCDS)	The PCDS is a certifiable standard including a method of reporting on the circularity performance of a product using PCDS statements providing verifiable data, according to the ISO 59000 family of standards. The PCDS will assist to gather reliable circularity data of a product or component along the supply chain. A tool is provided by Terra Matters for the practical implementation and deployment of the approach.	Standard	Product circularity data along the supply chain	Link

	Global Circularity Protocol for Business (GCP)	The Global Circularity Protocol for Business (GCP) is a voluntary framework that aims to address key accountability and policy gaps impeding the deployment of circularity globally. The GCP is under development and intended to be published in Q1 2026.	Framework for assessment and measurement	Company operations	Link
	Circular Transition Indicators (CTI) tool	Circular Transition Indicators (CTI) is a tool developed by the World Business Council for Sustainable Development (WBCSD) to help companies measure and improve their circularity performance.	Tool	Company operations	Link
	Repairability (Durability) Index (France) [7]	The Reparability Index is a numeric index applied to certain classes of consumer products, indicating to consumers the level of repairability of the product. The index currently covers specific product categories such as smartphones, laptops, televisions, washing machines, and lawnmowers. Index does not apply to automotive products, and there are currently no plans to extend its scope to include additional product categories. A tool is provided for the practical implementation and deployment of the approach.	Framework for assessment and measurement	Product design	Link
	JRC Repairability Index	This JRC Science-for-Policy report describes the methodology for a reparability scoring system for smartphones and slate tablets, with the objective of supporting the Commission proposal for an EU eco-design and an energy labelling regulation, including the aforementioned information provision. The methodology was built upon the 2019 JRC general method for the assessment of reparability of energy-related products, which was in turn based on the European standard EN45554:2020 for the assessment of the ability to repair, reuse and upgrade energy-related products.	Framework for assessment and measurement	Product design	Link

[7] The durability index replaces the repairability index since January 2025 on two product categories: television (since January 8, 2025), washing machines (since 8 April 2025)

Table 2: Summary of evaluation indicators across frameworks

Indicator categories	Resource and supply				Production			Use phase		End of use			End of life		Others	
Framework	Substances of concerns content	Critical raw materials (CRMs) content	Recycled materials content	Bio-based materials content	Waste generation/ landfill	Water reprocessing/ water circularity	Carbon footprint/ Energy efficiency	Renewable energy	Durability and repairability potential	Reusability potential	Upgradability potential	Disassembly potential	Recyclability potential	Biodegrada-bility potential	Impact on Biological ecosystems	Economic indicators
Eco-design for Sustainable Product Regulation (ESPR)	Yes (inhibiting circularity)	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Not directly	Yes	No	No	No
Corporate Sustainability Reporting Directive (CSRD) & ESRS	Yes	No	Yes	Yes [8]	Yes	Yes	Yes	No	Yes	No	No	No	Yes	No	Yes	Yes
Directive on the Repair of Goods 2024/1799	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes	No	No	No	Yes [9]
ISO 59020:2024- Circular economy — Measuring and assessing circularity performance	No	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Not directly	Yes	Not directly [10]	No	Yes
ISO 59040- Circular economy — Product circularity data sheet	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No	Yes	Yes	Yes	No	No
GCP/CTI (WBCSD)	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	No	Yes
Repairability Index (France)	No	No	No	No	No	No	No	No	Yes	No	No	Yes	No	No	No	Yes [11]
JRC Repairability Index	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No

[8] It requests disclosure of sourcing and use of renewable sources)

[9] As price of repair

[10] It is included in recirculation in biological cycle

[11] As the cost of spare part/cost new product

Detailed indicators assessment

1. Content of substances of concern

The content of substances of concern is managed by automotive suppliers within the framework of the REACH Regulation in Europe and other international legislations that restrict their use in products. Over time, companies have developed mature systems and processes to control and monitor such substances, typically integrated into procurement and product design stages.

The presence of substances of concern is anticipated to adversely affect both the recyclability of products, the quality of resulting recycled materials and biodegradability. This potential impact requires further research to guide material selection and recycling strategies.

At present, this indicator is not used as a company-wide indicator, as it is mainly linked to regulatory requirements.

Recommendation: While this indicator is not directly applicable to circularity assessment, it may influence product recyclability at products' end-of-life and should therefore be considered in relevant evaluations. Further investigations are required to establish the link with product recyclability.

2. Critical raw materials (CRMs) content

Among the frameworks analysed, only the GCP/CTI (WBCSD) includes the content of critical materials as a relevant indicator. Given the scarcity and geopolitical significance of these materials, their presence constitutes an important eco-design consideration for certain product categories, such as batteries and electronics. Furthermore, policy initiatives like the European Critical Raw Materials Act emphasize the importance of enhancing the circularity of these materials.[12] Also, it should be noted that the list of CRMs may evolve due to economical and geopolitical factors, which could affect the long-term consistency of this indicator. At present, the content of CRM is not used as a commonly company-wide indicator.

Recommendation: Continue developing further this indicator to drive eco-design of products integrating CRMs (taking into account the regional specificities).

[12] https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials/critical-raw-materials-act_en

3. Recycled materials content

The integration of recycled materials is a key indicator in assessing circularity and is increasingly embedded in the strategies of OEMs and suppliers. These materials are often used as alternatives to virgin resources—such as fossil-based or primary raw materials, with or without impact on product design. Design adjustments may be necessary when the properties of recycled materials differ from those of traditional inputs.

As with substances of concern, the inclusion of recycled materials can influence both the recyclability of the product and the quality of the resulting secondary materials. These impacts must be assessed on a case-by-case basis.

Several automotive suppliers and OEMs have already established company-wide targets for recycled content, supported by defined calculation methodologies and data tracking systems. However, the maturity of these practices varies, particularly regarding the classification and traceability of recycled materials. For example, distinctions between closed-loop, pre- and post-consumer sources, or materials recovered from end-of-life vehicles versus other streams. This distinction is especially relevant considering anticipated requirements under the revised End-of-Life Vehicles (ELV) Regulation.

Recommendation: The content of recycled materials is a relevant indicator for assessing product circularity. It is an emerging indicator to assess company-wide circularity performance such as in the CSRD reporting but traceability of different recycled materials needs to be improved.

Further investigation is required to make a link to the recyclability of products. This is especially important to establish closed loop recycling processes and to avoid downcycling. Further investigation is also needed to increase the maturity of this indicator at the company level, especially to understand closed-loop fluxes.

4. Bio-based materials content

The integration of bio-based materials is increasingly part of OEMs' and suppliers' sustainability strategies, serving as alternatives to conventional materials during procurement. When the properties of bio-based materials differ from those of legacy materials, adjustments in product design may be required.

Some automotive suppliers have already set company-wide targets for the inclusion of this class of materials. However, the development of standardized criteria, calculation methods, and cross-company data verification processes are still in progress.

Recommendation: The content of bio-based materials is a relevant indicator to assess the circularity of an automotive product and also an emerging indicator to assess company-wide circularity performance. The use of bio-based materials should be assessed across the entire product lifecycle—ideally through Life Cycle Assessment (LCA)—to identify possible negative impacts (e.g. for example on the biological eco-systems). However, the technical specification and costs for high quality biobased material might be challenging for the use in automotive components.

5. Waste generation / Landfill

Waste generation is already a well-established indicator. Companies continuously work on reducing scrap rate, production waste, and landfill, driven by both to economic reasons and regulatory waste management frameworks as well as well-established management systems (e.g. according to ISO 14001). Assessment of companies' waste is also required as part of CSRD reporting. However, the implementation and tracking of closed-loop systems is not yet fully developed and requires further advancement.

Recommendation: Continue tracking this indicator as a measure of a company's circular performance. Currently, improvements in developing processes to assess and track whether production waste management and closed-loop systems are needed to recover and retain production waste in closed loops, which represents a critical next step.

6. Water reprocessing / Water circularity

Water reprocessing and circularity are already well-established indicators at company-wide level for manufacturing processes, with the primary goal of reducing freshwater consumption. However, the integration of this indicator into product eco-design practices remains inconsistent and underdeveloped.

Recommendation: Continue developing a sufficient and commonly used tracking of this indicator as an indicator of companies' circularity in manufacturing processes.

7. Carbon footprint / Energy efficiency

Energy efficiency in production is an already well-established company-wide indicator for manufacturing processes and forms part of companies' decarbonisation strategies.

Recommendation: Continue capturing this indicator as part of decarbonisation performance measurement of companies' sustainability performance (Scope 1, 2)[13], but not as circularity indicator for products.

[13] The Green Gas Protocol

8. Renewable energy

Renewable energy usage is proposed as a relevant indicator by only the 'Eco-design for Sustainable Product Regulation, ESPR' framework. While this indicator forms part of sustainability practices in the automotive supply sector, it is not directly linked to resource circularity.

Currently, this indicator is also used as a company-wide indicator in Scope 3[14] assessment.

Recommendation: Continue using this indicator in the framework of eco-design practices, but not as product circularity indicator.

9. Durability and repairability potential

Product durability and repairability are critical criteria within the circular economy, supporting strategies to extend product life. Although these aspects are central to achieving circularity—and despite the automotive industry benefiting from a mature aftermarket service model—there is still a significant gap in dedicated assessment frameworks. Among the reviewed sources, the French Repairability Index and the JRC reparability index stand out for their scoring methodology. While these currently exclude vehicles and automotive components, their structure may be a foundation for developing a similar tool tailored to the automotive sector.

As of today, this indicator is not fully deployed as a company-wide indicator but is part of the CSRD requirement to assess circularity.

Recommendation: Product durability and repairability potential are relevant indicators for assessing circularity. It is recommended to develop a dedicated framework for automotive components. Given the automotive sector's mature aftermarket service ecosystem, such a tool would not only align with existing business models but also incentivise manufacturers to design for durability, ease of repair, and extended product life. Incorporating criteria such as ease of disassembly, availability of spare parts, repair documentation, and cost of repair would provide transparency for consumers and guidance for manufacturers.

10. Reusability potential

Reusability potential is closely linked to recyclability, as reused components are included in recyclability calculations[15].

Currently, there is an active market for reused components from end-of-life vehicles. However, suppliers and OEMs involvement in this process remains limited, with most activities (e.g. recovery of reusable components, sales and distribution, quality insurance) managed by end-of-life treatment players.

[14] The Green Gas Protocol
[15] ISO 22628

The wide variety of vehicle components means that 'Design for reuse' often requires tailored approaches. Reusing components—especially those critical to safety—demands thorough checks and diagnostics, particularly when considering multiple reuse cycles. Currently, suppliers and OEMs generally do not integrate reuse considerations into the component development phase.

Recommendation: Reusability potential should be considered as an indicator to assess product circularity. However, its level of maturity is still low and further research is required to establish it as such.

11. Upgradability potential

Upgradability potential is closely linked to the concept of product longevity and refers to the ability to enhance or improve a product's performance or features over time without replacing it. This can involve hardware or software upgrades and is supported by design strategies that allow easy access to components, compatibility with newer parts, and availability of documentation, tools, and support.

Recommendation: Currently, the concept of upgradability lacks sufficient maturity to serve as an indicator for assessing circularity. To establish a robust metric, further research and cross-sector collaboration along the value chain are essential. In the interim, it is recommended to integrate upgradability potential into a broader reusability index at the component level, ensuring a more holistic and practical approach to circularity assessment.

12. Disassembly potential

Disassembly potential is a key prerequisite for implementing strategies aimed at extending product life—such as repair, as outlined in the R-Strategy framework[16]. Efforts are underway to develop assessment methodologies and guidance for 'Design for Disassembly'. However, a standardised approach within the automotive industry has yet to be established.

Currently, this indicator and its calculation methodology needs further development to be applied at a company-wide level and is primarily considered a tool for eco-design purposes.

Recommendation: Disassembly potential is a relevant indicator for eco-design practices in circularity, as it directly impacts the implementation of other R-strategies for product longevity and lifetime extension. Due to its high relevance in automotive manufacturing, a common approach to define this indicator should be developed, even though variations and specificities will have to be considered due to the large variability and complexity of automotive components.

[16] R-Strategy Framework

13. Recyclability potential

Recyclability potential is a highly relevant indicator and is already assessed by OEMs at the vehicle level through regulations such as the End-of-Life Vehicles (ELV) Directive and standards like ISO 59020:2024 and ISO 59040.

At component level, methodologies and guidance for 'Design for Recyclability' are beginning to emerge, enabling suppliers to develop products with maximised recyclability in mind.

In parallel, some companies are starting to set targets for the average recyclability potential of their products. However, suppliers currently face limitations as they can only estimate a product's recyclability potential—largely based on design decisions and available recycling or sorting technologies—rather than quantify the actual amount of material that is recycled at the vehicle's end of life.

Moreover, there is no standardised methodology to assess or trace whether recycled materials and parts are technically suitable for reuse in the automotive sector within a closed-loop system.

As of today, this indicator is not fully deployed as a company-wide indicator but is part of the CSRD requirement to assess circularity.

Recommendation: Recyclability potential is a relevant indicator to assess and guide the circularity of an automotive product. A common approach to define this indicator should be developed, while accounting for the significant variability and specificities of automotive components. Calculation of actual recycling streams would require a harmonised approach with the involvement of recyclers, as well as the development of traceability and digitalisation technologies.

14. Biodegradability potential

While biodegradability is an important sustainability consideration, its applicability in automotive components is currently limited by the sector's stringent safety, durability, and lifetime performance requirements. At present, biodegradable materials generally remain at a low Technology Readiness Level (TRL) for most automotive applications.

Recommendation: Limited applicability under current technical conditions.

15. Impact on biological ecosystems

The impact on biological ecosystems is emerging as a relevant indicator for companies, particularly within regulatory frameworks such as the EU Taxonomy. This includes aspects such as land use, habitat disruption, and biodiversity loss, which are increasingly recognised as part of environmental sustainability assessments.

However, at the product level, especially in the automotive sector, the impact of individual components on biological ecosystems—such as land use—is not currently treated as a circularity indicator. Instead, such impacts are typically addressed through biodiversity-focused regulations and environmental impact assessments.

Within the context of circular economy, the primary focus remains on resource efficiency, material recovery, reuse, and recyclability.

Recommendation: Continue capturing this indicator as a measurement of companies' sustainability performance (within, e.g., biodiversity or land-use frameworks).

16. Economic indicators

Among the analysed frameworks, two have addressed the economic aspect of circularity. One is ISO 59020, which introduces two core indicators: Material Productivity and Resource Intensity Index and several additional indicators (Revenue share related to circularity, Net value added, Value per mass and Resource productivity). The second is the WBCSD CTI 4.0 tool, which offers formulas for Circular Material Productivity and CTI Revenue (Product). Both frameworks offer methodologies to assess the economic dimension of circular material use but do not clearly account for other lifecycle aspects, such as the use phase or end-of-life of products. The assessment showed that those indicators are highly relevant but lack clear definitions and calculation methodologies especially if considered at product level and may require the disclosure of confidential company information.

Recommendation: Developing an indicator to assess the economic aspects linked to product circularity would be valuable for companies' internal management systems.

It should be noted that none of the analysed frameworks address explicitly "remanufacturing". However, this circular strategy represents an important aspect that should be considered at the end-of-use stage. Within the definition of recyclability under ISO standards, the concept of product reuse encompasses several dimensions, including remanufacturing, which play a crucial role in extending product life and supporting circularity objectives.

Conclusion

A diverse set of circularity indicators is currently under development at both product and company levels. These indicators have different levels of maturity and will require further research to achieve their full deployment.

Key challenges to be addressed are linked to data availability and distributed ownership among the value chain. Addressing these challenges will require the development of communication protocols, for example through digital passports.

This distributed ownership also affects the assessment of 'actual' vs. 'potential' circularity performance. For instance, while suppliers can estimate the potential recyclability of a component, the actual recyclability achieved at end-of-life can only be measured along the life cycle and its stakeholders. Finally, a key open point is the necessity of formulating a clear and prioritised set of suitable indicators—ideally three to five—that can guide industry alignment and action. An initial shortlist is provided in Table 5, with priority indicators highlighted in bold. Based on this shortlist, the current next steps are to be envisaged for further development:

- Strengthen methodologies for calculation
- Consolidate them in a global circularity index for automotive industry

Table 5: List of Relevant Product & Company Circularity Indicators

Indicator type	Relevant Indicator for Automotive Suppliers
Resource and Supply efficiency	• Content of substances of concern • **Recycled materials content** • **Bio-based materials content**
Production	• Waste generation / landfill • Water reprocessing / water circularity
Use phase	• **Durability and repairability potential**
End of Use	• Reusability potential • Upgradability potential
End of Life	• **Recyclability potential** • **Disassembly potential**
Economic	• Material productivity (also known as 'circular material productivity', CMP) • Resource intensity index (also known as the 'decoupling index')

About CLEPA

CLEPA, the European Association of Automotive Suppliers based in Brussels, represents over 3,000 companies, from multi-nationals to SMEs, supplying state-of-the-art components and innovative technology for safe, smart and sustainable mobility, investing over €30 billion yearly in research and development. Automotive suppliers in Europe directly employ 1.7 million people in the EU.

Interested in more information?

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