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Circular Economy

OEMs' Path to Resilient Supply Chains and New Business Opportunities

Circularity offers new business models for the automotive industry – manufacturers should act now

The automotive industry is facing increasing geopolitical uncertainties, including trade embargoes, tariffs, and resource shortages. These factors impact material availability and costs, jeopardizing the resilience of supply chains and, in the long term, also the competitiveness of OEMs. Competitiveness is at further risk due to the growing awareness of society and stakeholders and increasing regulatory and environmental requirements, such as from the EU End-of-Life (ELV) Vehicles Directive and the Battery Regulation. The revised ELV Directive, expected to enter into force in 2026, will demand that OEMs incorporate 6.25% closed loop recycled plastics in new vehicle production from 2032 onwards. We thus expect a corresponding impact on Tier 1 suppliers as well. Regardless of regulation, new, innovative ways to secure feedstock need to be explored as there is a limit to the availability of raw materials. For instance, in Germany, around 300,000 ELVs were dismantled in 2022, 48% fewer than in 2018[1], due to increasing exports of used vehicles to EU and non-EU countries. This highlights the growing gap between available ELVs as a raw material source and increasing regulation.

Circular economy business models will not only counteract the impending shortage of materials but also lead to new business opportunities via newly created ecosystems. These are defined by circular, rather than linear, value chains, as well as long-term partnerships, such as with vehicle dismantlers, recyclers and chemical companies.

Strategic realization of circular business models offers stakeholders a strong basis for establishing innovative leadership and resilient supply chains. This may include setting up closed-loop systems or strategic partnerships. Therefore, the early integration of circular value creation opens up considerable potential for OEMS to position themselves as early movers in the market, combined with long-term financial benefits. Deloitte's expert calculations show that a margin of 5–15% can be expected from vehicle recycling and 15–20% from remanufacturing and reusing parts. Market growth of 6–8% (CAGR) is expected in the vehicle recycling field – primarily driven by increasing regulation.[2] Recycling high-voltage batteries (HVBs) is more challenging due to the difficulty of separating raw materials and thus the reduced purity of the recycled material. Therefore, the EU has determined recycling efficiency targets of 65% of the weight of lithium batteries by 2025 and 70% by 2030. Second-life applications for HVBs seem to be a more economically and environmentally viable solution. For instance, after first-life application in a vehicle, battery modules may then be used in industry applications.[3, 4]

[1] BMUV, Jahresbericht über die Altfahrzeug-Verwertungsquoten in Deutschland im Jahr 2018/2022 (Annual report on end-of-life vehicle reuse/recycling/recovery rates in Germany)
[2] Deloitte Analysis
[3] Regulation (EU) 2023/1542 of the European Parliament and of the Council
[4] Deloitte 2024, "Weshalb Batterien zu wertvoll für Recycling sind – Ein Multi-Life-Ansatz zur Batterienutzung"

Decision time: shape the market or play a minor role?

A complex new stakeholder ecosystem will shape the market landscape in the coming five to ten years. Importantly, the players outside the automotive industry, such as recyclers and chemical players, will take a leading role in forming this ecosystem, while OEMs will be mandated to participate due to regulatory-driven demand to take back vehicles at the end of life. In this context, OEMs are now faced with two options:

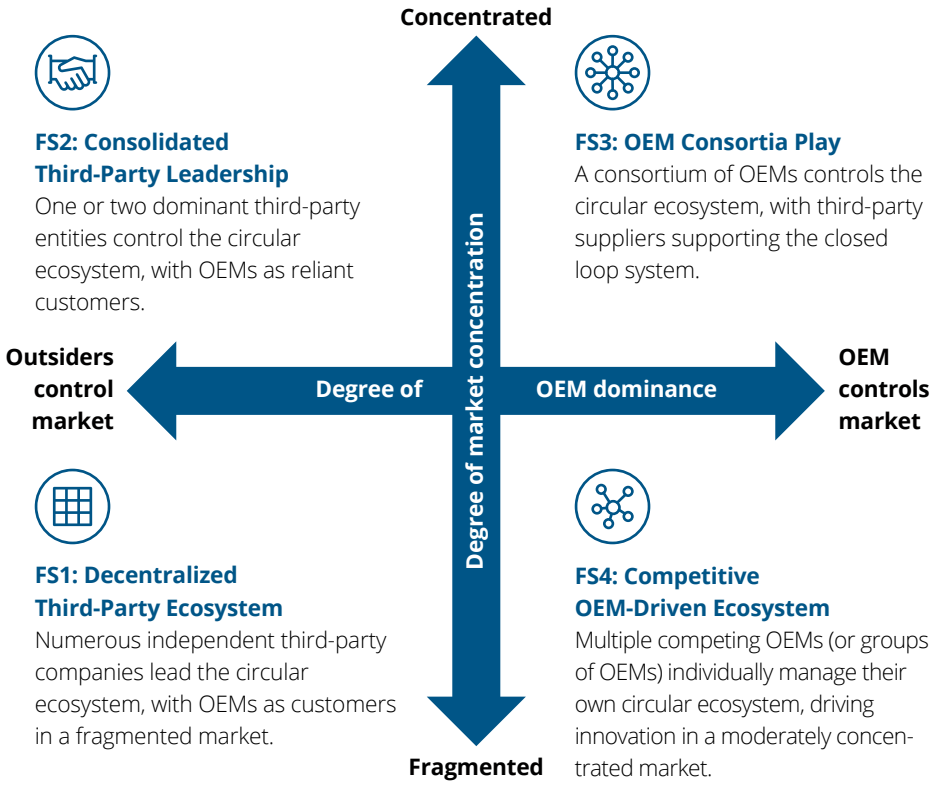
1. Either take an active role in driving the formation of such ecosystems or;

2. Play a subordinate role as clients seeking recycled feedstock to comply with the regulations.

Choosing the active role would require closing the loop on raw materials and overcoming a high degree of system complexity. On the other hand, it would also create new business opportunities, particularly when entering partnerships early with companies that already have expertise in areas such as take-back, recycling or digital platforms. Currently, less than 20% of plastics from ELVs in Europe are recycled[5]. The aforementioned quota requirements will inevitably lead to an increase in this share. Utilizing partnerships with existing players in the respective industries will allow OEMs to access know-how and proven value chain infrastructures. We defined four different scenarios for the resulting ecosystems for the next 10 years – a timeframe that is based on the expected entry into force of the new ELV Directive in 2026 and the implementation of its plastics recycling quota in 2032.

[5] World Economic Forum, April 10, 2025 "Circular Economy – Millions of tons of plastics from end-of-life vehicles are wasted each year. Here are 4 ways to fix the problem"

Fig. 1 – Different future scenarios reveal certain opportunities and challenges for OEMs



Especially in scenarios with high market concentration (Future Scenario 1 and Future Scenario 2), OEMs will be under mounting competitive pressure to access end-of-life vehicles and recyclates, and consequently run the risk of becoming "price takers". The German ATF (authorized treatment facility) market is currently highly fragmented, with 68% of ATFs (approx. 700) treating fewer than 250 ELVs per year, cumulatively accounting for around 62,000 ELVs (16% of all ELVs treated in 2021). Only 2% of ATFs (around 20) treat more than 2,500 ELVs.[6] The market therefore has very limited scale synergies at present and OEMs need to ensure process efficiency and scale advantages. To secure a leading position in the potentially emerging market scenarios, OEMs must therefore choose to actively invest in their own infrastructure and pursue innovative partnerships as described in Future Scenarios 3 and 4.

OEMs profit from reconditioning and remarketing parts

Therefore, targeted investments and the right choice of future service portfolios will be decisive factors in gaining a strong market position. To maximize business value, two key aspects need to be considered:

1. Recycling materials may serve to maintain access to recycled materials, as these tend to cover increasing internal demand due to increasing regulation

2. Further economically viable business models for OEMs arise from the remanufacturing of components and their sale as spare parts in aftersales. A margin of 15–20% is achievable due to almost new part quality after remanufacturing of complex components, such as transmissions or motors. By contrast, the reuse of less technically complex components, such as side mirrors, seems to be less economically attractive.

Deriving the most effective R-strategies (such as remanufacturing, reusing, refurbishing, recycling or repurposing batteries for second-life application) requires a thorough parts value assessment and remarketing price estimate to distinguish and identify parts worth reconditioning.

[6] Federal Statistical Office of Germany (Statistisches Bundesamt) 2023 "Größenklassen der Altfahrzeugverwerter in Deutschland, 2021"

The higher the automation and optimization of core services, such as condition assessment and dismantling, the lower the economic risk for the OEM. However, developing and implementing these solutions will take time.

In addition, certain recycled secondary materials, such as single-origin plastics or metals, may also offer additional revenue opportunities for OEMs. For instance, over 200 kg of plastics can be generated from an ELV. Shredded plastic has a premium of at least 50% more due to the reduction in sorting time and volume, the improvement in logistics costs and the quality of plastic scrap.[7] This is particularly important in case of increasing regulatory requirements and growing demand for recycled materials. As both the infrastructure and the specific expertise for this task often lie beyond the traditional competencies of OEMs, developing strategic partnerships with specialized players offers many benefits. For instance, collaborations allow the necessary investments to be shared and economies of scale to be exploited, while securing preferential access to high-quality recyclates.

[7] Deloitte Analysis

However, the global recycling landscape is increasingly dominated by Chinese enterprises that control significant portions of the value chain – from collection networks to processing facilities – especially in critical materials like battery components, rare earth metals, and high-grade recyclates.[8] This market concentration creates potential supply vulnerabilities for automotive OEMs that depend on steady access to these materials for production. Western manufacturers now face the dual challenge of meeting sustainability requirements while navigating a supply chain where key recycled inputs are controlled by overseas entities with different strategic priorities.

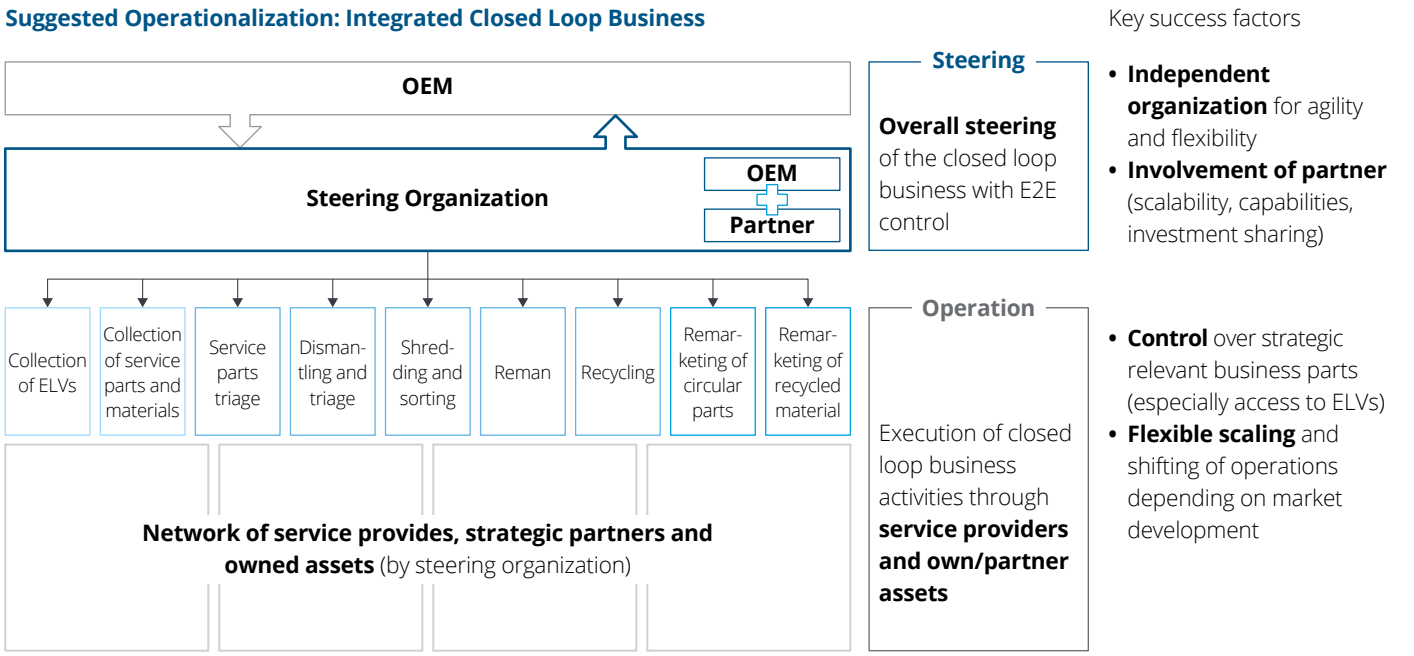
Circularity: Success depends on finding the right partner

To strategically position themselves and establish a successful circular business model, OEMs may therefore consider:

- Establishing strategic partnerships, which often require internal restructuring processes
- Setting up a coherent digital infrastructure to record and digitally map the flow of materials within these partnerships to ensure transparency
- Establishing a steering committee at the nexus between the OEM and partner organizations to enable joint planning and management of individual business areas, and coordinating a network of service providers, strategic partners and own assets

Overall, engaging early in the development of circular economy business models presents significant potential for OEMs to gain first-mover advantage in strategic positioning. However, as this is often not the core business, choosing the right alliances will ultimately make the difference in terms of the success of the business model. It is therefore crucial to act now. OEMs should proactively invest in shaping these emerging circular economy ecosystems today and actively choose which role to take, considering both internal adaptation and external partnerships.

Fig. 2 – Operationalization and steering of network of service providers, partners, and owned assets



[8] semafor.com, May 2024 "How China is building the next big green industry"; lemonde.fr, April 2025 "How China dominates the car industry, leading Western manufacturers to imitate it"

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