

Reframe
your strategy:
The great
automotive
value shift



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The great automotive value shift

As value migrates toward new disruptive arenas, auto industry players must quickly adapt, or risk becoming irrelevant. They must assess where the greatest revenue opportunities will lie, how quickly they will grow and what specific expertise, capabilities or strategies will be required to unlock their potential. To answer these questions, EY teams have conducted a detailed market analysis of the emerging opportunities across the evolving automotive value chain.

This analysis reveals how the great value shift is shaking long-held assumptions about the sources of value, as the revenue potential of once-lucrative income streams rooted in the manufacture of internal combustion engine (ICE) vehicles and related components wanes. Value is shifting from traditional revenue streams to adjacent new opportunities, which we have categorized as transitional and growth.

Transitional opportunities

such as hybrid vehicle manufacturing and alternate car ownership models are those most adjacent to traditional revenue streams and represent the first wave of the shift. They provide good revenue potential for industry incumbents and new entrants alike.

Growth opportunities

are those that represent the next wave of adjacencies shaping the new economics of mobility. They include battery electric/ software-defined vehicle technologies and circular business models, and they offer the most significant revenue potential.

Out of the 40 value pools identified by our analysis, we have categorized six as traditional, 14 as transitional, and 20 as growth.



The findings reveal three value megapools that will collectively represent a revenue opportunity of more than

US\$660 billion

by 2030, not just for OEMs, suppliers, battery manufacturers and energy players but also emerging startups and investors participating in the mobility transformation.



Supercharge the future – batteries and charging



Redefine the vehicle architecture – the software-defined vehicle



Close the loop – battery and vehicle circularity

To assess the attractiveness of the 40 value pools, the EY teams developed a proprietary framework across four broad parameters (and 16 sub-parameters) – scalability, technological maturity, investor attractiveness and customer

expectations.¹ The result was a shortlist of 10 value pools (top right in the chart below), which we clustered into three megapools mentioned above.

Identifying high-potential value pools

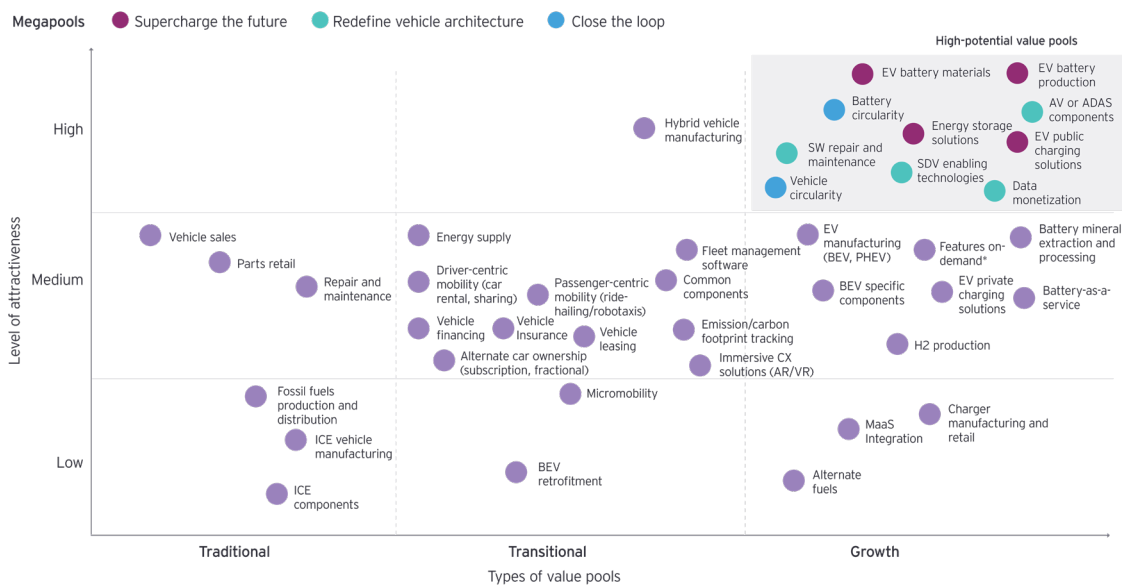


Image description: The graphic shows the level of attractiveness of the 40 value pools and maps them in traditional, transitional and growth categories.

¹ Each parameter was assigned a specific weightage in direct correlation to relative significance.

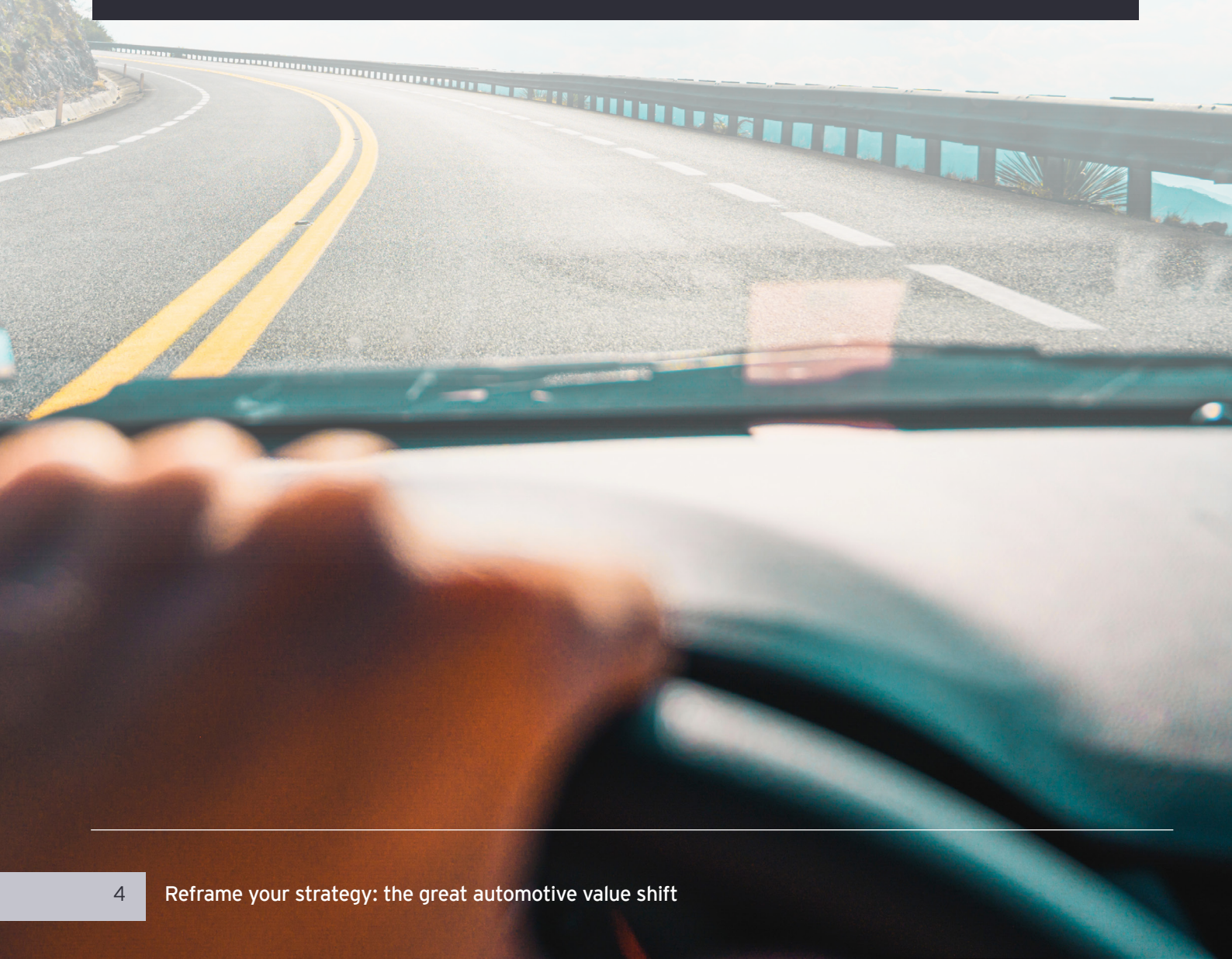
Case study

Developing an integrated mobility strategy for an OEM

To participate in the changing mobility landscape, the automaker aimed to increase its market share in mobility services in Europe by adopting a stronger customer focus, identifying new revenue streams and developing differentiating capabilities.

To help achieve that, the EY teams conducted a readiness assessment to prioritize about 20 mobility services business models across the automotive spectrum by adopting a three-step filter prioritization approach using our proprietary attractiveness rating framework as well as evaluations of capability and strategic fit.

We helped the client to identify the most attractive mobility areas or value pools and created a three-year strategy roadmap period to develop and deploy the services in 12 key European markets. The EY teams also evaluated M&A opportunities for the client to identify target companies and helped develop the OEM's organizational structure for mobility services.



01

Unlocking value within the megapools

Look to EV batteries and charging, SDVs, and circular models

Supercharge the future – EV batteries and charging

Batteries and charging are foundational to steering a successful electric vehicle (EV) transition. This megapool comprises EV battery production, active materials and components, EV public charging solutions, and energy storage systems.

The combined value of this group of adjacent opportunities is expected to reach about

US\$405 billion

by 2030 at a compound annual growth rate (CAGR) of 14.8% between 2023 and 2030.

After a strong start, driven by EV enthusiasts, EV growth has moderated due to the impact of high ownership costs, reduced subsidies, range anxiety, slower-than-expected rollout of charging infrastructure and the increased interest in hybrids. To get growth back in the fast lane calls for EVs with greater range, reliability, safety and lower costs in a fiercely competitive market, and that's where **batteries** offer a pivotal differentiating potential.

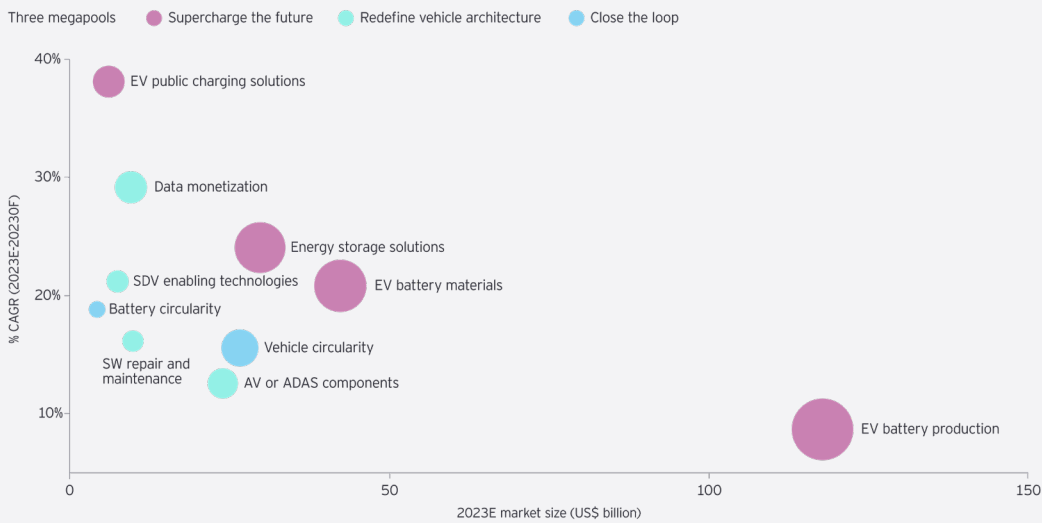
As China owns over half² of the global battery raw material refining for lithium and cobalt, rising trade tensions between China and the West, and consequent localization regulations (such as the US Inflation Reduction Act), securing direct access to battery materials and technologies will enable the most reliable and diversified battery supply chain. In addition, most automakers have begun integrating vertically to optimize the energy density, cycle life and thermal stability of their EV batteries.

However, the best-performing EV battery is only as good as the infrastructure available to charge it – a reliable, convenient and affordable, fast charging network is the other key to wider EV adoption (EY professionals predict that by 2030, there will be about 76 million public and private charging stations across the US and Europe, at a 30% CAGR from 2024 to 2030³). Industry players are integrating and even standardizing charging into their brand offerings, along with seamless payment and navigation services. Moreover, to manage the load on energy grids, EV charging data will spur new opportunities in real-time monitoring and managed EV charging services – smart and vehicle-to-grid (V2G) charging. Investing in stationary energy storage systems will further bolster grid resilience by providing backup power during emergencies and balancing load during peak demand.

² Batteries and Secure Energy Transitions, International Energy Agency, April 2024, accessed 30 April 2024

³ EY EV charging infrastructure forecasts

High-potential value pools



EV represents electric vehicles; SDV: software defined vehicles; SW: software; AV or ADAS: autonomous vehicles or advanced driver-assistance systems
 EV battery materials represent a subset of the EV battery production. Revenue potential of vehicle circularity is indicative and extrapolated from regional estimates.
 Note: the chart plots the high potential value pools basis the 2023 revenue opportunity and CAGR for the period 2023-2030, and the size of the bubble represents the revenue opportunity in 2030.

Redefine the vehicle architecture – the software-defined vehicle

The shift from hardware to software-defined vehicle (SDV) architectures will not only unlock new revenues in technology and data-based services but also drive cost efficiencies, enhance faster software delivery and improve the quality of fleets. This megapool comprises SDV enabling technologies, advanced driver-assistance system/autonomous vehicle (ADAS/AV) components, data monetization, and software-based repair and maintenance.

The combined value of this group of adjacent opportunities is expected to reach about

US\$169 billion

by 2030 at a CAGR of 18.8% between 2023 and 2030.

Vehicles are becoming increasingly software-defined⁴ – the average number of lines of code per car is anticipated to grow from 200 million in 2020 to as much as 650 million lines by 2025.⁵ Centralized architectures and standardized platforms are becoming more common, and significant opportunities are arising across the vehicle tech stack, from ADAS/autonomous driving components and chips to new operating systems (OS) and user interface controls. Levels of vehicle autonomy are already rising beyond lane departure warning and blind spot detection, requiring sophisticated radars, light detection and ranging systems (LiDARs) and cameras. Legacy infrastructure must also evolve to seamlessly integrate hardware and software (via OS), facilitate data exchange between OS and applications (via middleware) and accelerate agile development (via standard processes or toolchains).

Connected cars are also generating a wealth of data on driver behavior, vehicle use, location and customer preferences, providing various data monetization opportunities. Moreover, advances in artificial intelligence (AI), machine learning (ML) and vehicle-to-everything (V2X) technologies are transforming the collection and analysis of connected car data, providing customer insights to enable value-added services and enhance operational efficiencies.

⁴ This article introduces the automotive value pools that will shape the future of mobility. The SDV value pools study marked the inaugural piece in the series; watch this space for further value pool deep dives.

⁵ "Software Is Taking Over the Auto Industry," Goldman Sachs, 8 November 2022, <https://www.goldmansachs.com/intelligence/pages/software-is-taking-over-the-auto-industry.html>, accessed March 2024.

A software-defined car will also need to be updated frequently (via over-the-air updates) to ensure optimal functionality. With increased sensors, ADAS recalibration will become critical as minor malfunctions or misalignment can lead to inaccurate readings, causing safety and vehicle performance issues. Connected cars will also enable predictive maintenance using advanced analytics to reduce downtime and improve vehicle performance.

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Close the loop – battery and vehicle circularity

Moving toward fully circular models aimed at reusing and recycling materials promises a greener automotive industry and solves an increasingly geopolitical war for rare minerals.

The combined value of adjacencies in battery and vehicle circularity is expected to reach

US\$88 billion

by 2030 at a CAGR of 16.2% between 2023 and 2030.

Decarbonization and waste management directives are forcing industry players to upgrade from traditional take-make-waste to closed-loop circular models. The EU remains at the forefront of this change, mandating OEMs since 2015 to ensure 95% of vehicle weight be reusable or recoverable and further proposing recycling 25% of plastics used in the sector by 2030 (of which 25% must come from end-of-life vehicles).⁶ It has also put mineral-specific recovery targets to increase recycling efficiency (e.g., lithium recovery rate of 50% by 2027 and

80% by 2031). Moreover, there are mineral-specific mandates for the use of recycled materials in new batteries (e.g., 6% recycled lithium and nickel and 16% recycled cobalt by 2031, increasing to 12% recycled lithium, 15% of recycled nickel and 26% of recycled cobalt by 2036).

The increased demand for electric mobility and the resulting need for batteries has created significant opportunities in battery circularity. Spent EV batteries can be repurposed and reused – for stationary power storage applications or in vehicles with lower capacity requirements – or they can be recycled to recover scarce minerals. However, the increasing lifespan of EV batteries may result in limited recycling feedstock, creating potential headwinds to meet regulatory targets.

The focus must also go [beyond decarbonization](#) if the industry is to lead on a broader environmental, social and governance (ESG) frontier. The use of sustainable materials in cars is already on the rise, from recycled steel and battery minerals to bio-based thermoplastics and recovered carbon black. However, the cost to innovate with these materials remains quite high. The fragmented nature of the market and downcycling practices create further challenges to retain the recycling value within the automotive ecosystem. To maximize value creation across the vehicle lifecycle, design, processes and business models must all be synced.

⁶ EU End-of-life vehicle directive, EUR Lex 30 March 2023, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legisum%3A121225>, accessed 11 March 2024; "Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on circularity requirements for vehicle design and on management of end-of-life vehicles," EUR Lex 12 July 2023, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2023%3A451%3AFIN&qid=1689318552193>, accessed 11 March 2024.

Case study

Defining an OEM's 6R circularity vision, strategy and future roadmap

As the automotive industry is witnessing a regulatory shift, the OEM wanted to evaluate its requirements to comply with EU regulation on vehicle and battery recycling while also balancing commercialization of its end-of-life assets, ensuring security of supply, and playing an industry feedstock aggregator role.

To achieve this, the EY teams developed a robust business case mapping more than 10 major vehicle components and commodities, outlined the economics of recovering, dismantling, pre-processing and recycling or repurposing for vehicle components from a financial standpoint and defined the target business model.

The EY teams helped create an actionable roadmap across pilot development, teams activation and infrastructure development and shaped client's vision around the "6Rs" (redesign, recover, retain, recirculate, repurpose, recycle). We also conducted a network improvement study to evaluate footprint options for the transport of hazardous materials.

02

Winning the great value shift race

Focus on four pivotal actions to win

Understanding the great value shift is only the start – translating it into lasting competitive advantage calls for a complete strategic rethink. Players must focus on four pivotal actions to win the value shift race:

Building a culture of innovation

Redefining strategy and customer service

Unlocking the value/potential of data

Nurturing future workforce skills

Become "innovation obsessives"

From additive manufacturing technologies and ADAS systems to advanced materials for improved vehicle performance and to enable the "gigacasting" of ever-larger one-piece structural sections, innovation is non-negotiable. Obsessing on innovation holds the power to separate the leaders from the laggards, by leveraging strategic partnerships, ramping up R&D investments and building an ecosystem play.



Berkana's two-loop innovation transformation model

Illustrative: An automotive OEM aims to become a market leader in SDVs and increase its share in software revenues.

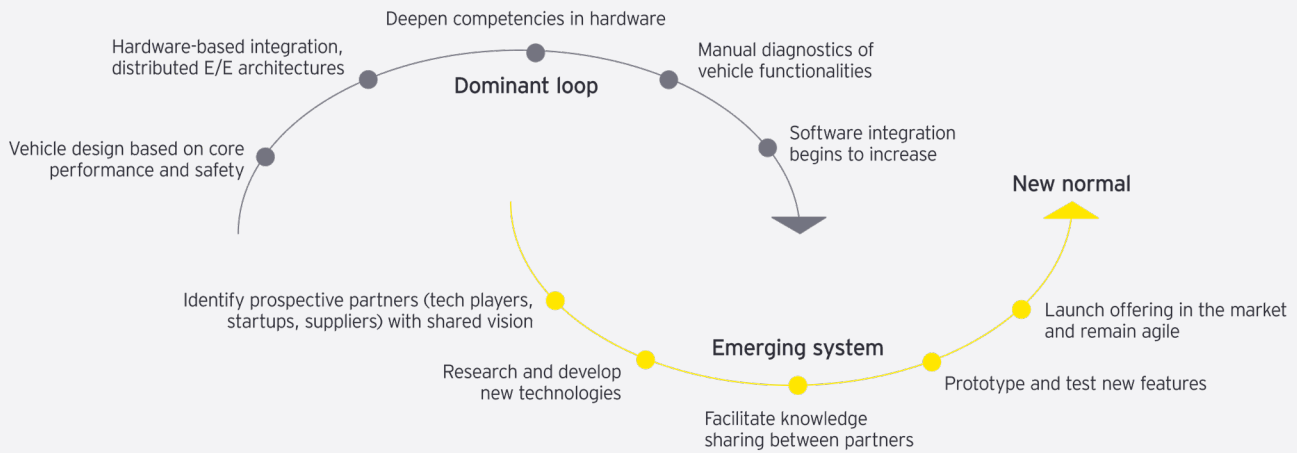


Image description: The graphic shows an illustration of an automotive OEM, which aims to become a market leader in SDVs and increase its share in software revenues.

The Berkana two-loop model explains how change is inevitable. As the industry shifts from the traditional automotive systems to advanced technologies, players must identify [strategic partners](#) with a shared vision. The partners must demonstrate competencies in new technologies (e.g., advanced battery tech), complementary capabilities (software synergies) and robust governance.

Alongside the right partners, skilled R&D teams and progressive scaling of R&D will be critical to successfully integrate the latest innovation into vehicle production processes. As pioneers, players

will encourage the industry to follow suit.

New growth avenues should be explored using new models and methods – such as closed material loops – to limit environmental footprints, build supply chain security and manage high manufacturing costs. Players must begin designing vehicles for easy disassembly and maintenance, while the use of standardized parts and more renewable materials will help accelerate commitments around sustainability and reduce overall costs.

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Case study

Commercializing innovation through EY design-driven approach

The automaker wanted to move from a product sales company to a mobility services organization to generate additional revenue streams by focusing on new services and establishing new ways of commercializing and scaling innovation.

The EY teams curated a design-driven innovation program to identify 10 opportunity areas; three were shortlisted for the prototype phase that included identification of business models for commercialization and potential partnerships scenarios. The team also helped the client select diverse groups of internal pioneers that can help drive innovation within the firm.

- ▶ From the prototyping phase, two proof-of-concepts were piloted with ecosystem partners that helped the client gain strategic insights into its business future. The EY teams also helped set up an innovation services unit focused on upskilling key personnel and training their leadership team on how to lead innovation.



Reimagine strategies, redefine portfolios, revolutionize customer experience

To make the most of the value shift, players must go beyond traditional vehicle sales strategies, redefining their portfolios while building a laser-focused understanding of [customer needs](#).

Defining the constructs of a value shift

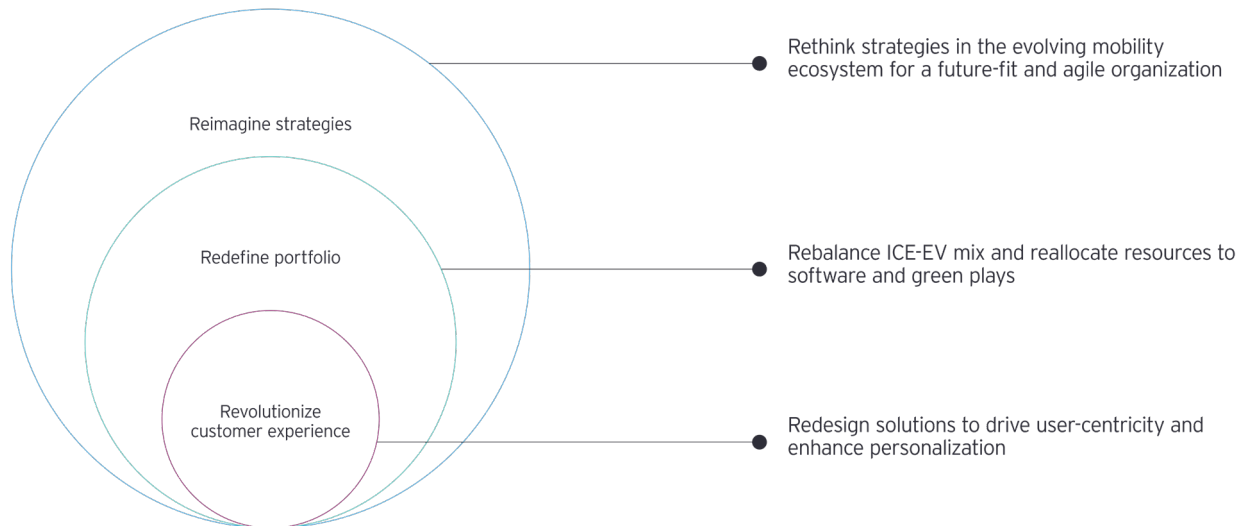


Image description: The graphic depicts the three elements of value-shift focused on strategy, portfolio and customer experience.

As EVs gain popularity, industry players must continue to streamline their ICE portfolio, reducing complexities and freeing up capital for new businesses such as ADAS and AV components, SDVs, and recycling technologies. They must remain agile in the face of growing regulatory uncertainties and nonlinear pathways into the EV age.

With the increased convergence of mobility and energy industries, auto players can collaborate with utility players for energy storage systems, vehicle-to-home and vehicle-to-grid charging to provide smart energy solutions for customers.

Industry players should also look to develop user- and data-centric digital services, integrated payments, and better EV charging infrastructure to boost consumer confidence. Personalizing the driving experience and enhancing convenience features will also help improve customer satisfaction.

As vehicles become increasingly software-defined, players must ensure seamless integration between hardware and software by investing in car OS and middleware. They should also focus on ADAS recalibration centers and integrate ADAS services

into their aftersales mix to broaden their customer base.

Amid this change, players must urgently rethink their operating models as agile, fit-for-purpose frameworks to support their new mobility strategy.

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Case study

Prioritizing future focus areas to meet strategic vision

Amid the changing mobility landscape, the European OEM launched an initiative to revise its Focus Area Strategy to bridge the gap between its service roadmap and 2030 vision of meeting its service revenue target.

The EY teams conducted a deep dive on the five focus areas, comprising over 20 value pools, and prioritized them based on several dimensions including market size, expected growth and ability to capture the strategic fit to build a shortlist of nine distinct value pools.

From our analysis, we recommended select value pools to the client based on its capabilities and future growth prospects and estimated a market share range for each value pool that it should aim to capture to meet its revenue target by 2030.

Double down on data

Customer-centricity can be enhanced exponentially with data. To fully harness data's potential, clear data management, streamlined processes, and user-centric and modular architectures are necessary.

Data is becoming increasingly dynamic as AI, ML and quantum computing technologies continually learn and evolve, driving next-gen analytics and reducing costs while also generating new monetization opportunities. Auto players must create modern architectures, leverage advanced analytics and generative AI (GenAI) to transform R&D operations (e.g., faster design cycles, simulations to enhance vehicle safety) and customer experience (e.g., anticipating customers' preferred features, voice assistants for infotainment). They must provide access to anonymized vehicle data for optimized offerings (e.g., partnering with technology players or insurance companies to personalize offerings or enhance safety features, leveraging geospatial data to enable governments to deploy intelligent traffic management solutions).

However, as these vast collections of data are stored in the cloud, challenges around data privacy, cybersecurity and AI emerge. Despite their interest in connected car features, consumers can be reluctant to share their data. Players must respect privacy regulations during data collection and processing and implement responsible and ethical AI to establish safeguards and trust.

Increased vehicle connectivity has also generated higher data security risk. Cyber attacks aimed at vehicle systems are becoming more common, more sophisticated and larger in magnitude (in 2023, large-scale cyber incidents increased 2.5 times year-over-year).⁷ Companies must transition to an integrated vehicle security operations center to secure V2X operations for connected fleets. They must define cyber defenses across the supply chain, engage in simulated recovery processes and work with cyber test labs to lower vulnerabilities.

How EY can help

Data and Insight-driven Transformation solution

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Conduct a talent transformation

The great value shift can only be achieved by a commensurate transformation in talent, with players becoming more human-centered than ever and fostering a high-performance culture centered on wellbeing and continuous learning.

The center of gravity around skills is shifting from the mechanical engineering that automakers traditionally placed at the forefront toward software and chemical engineering, thereby increasing the emphasis on hiring the right talent.

As innovation becomes indispensable in software/chemical/electronics engineering, battery, robotics, AI, and data or material science, existing staff will need to master disruptive technologies if incumbents are to thrive. Players should upskill their workers, from the basics of EV powertrains to managing electrical procedures to become EV-ready. They must also reskill workers in advanced robotics, mechatronics, sensor technology, ML to build automated driving technologies and AUTOSAR (automotive open system architecture) as well as eco-design engineering and sustainable chemistry for a circular future. Employees will also need to be open to change and hone their skills in collaborative problem-solving and in understanding partner technologies, etc., to navigate the complexities of emerging ecosystems and drive successful partnerships.

⁷ Global Automotive Cybersecurity Report 2024, Upstream Securities, accessed April 2024.

However, auto players continue to face challenges in hiring the right talent due to fierce competition with other sectors such as banking and health care for top science, technology, engineering and mathematics (STEM) talent. While competitive pay would be table stakes, players must adequately communicate their vision to strengthen their employer brand. Partnering with universities on research, as well as offering apprenticeships, experiential learning opportunities and auto tech scholarships, will help build a future-proof workforce.

How EY can help

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Gearing up for the great value shift

The great automotive value shift is already underway. There is an urgent need for players within the mobility ecosystem to optimize today's business while simultaneously innovating for tomorrow's business. The decision is not whether to engage with the value shift, but how? Winning players will be those who prepare themselves for a new tomorrow by recognizing the full range of needs and ambitions that exist across the entire global ecosystem and aligning the organization's strategy and capabilities to create value within these emerging megapools. It's time to put yourself in the driving seat and gear up for the great value shift.



Authors



Martin Cardell

Partner/Principal

EY Global Mobility
Solutions Leader

+46 31 637733

martin.cardell@se.ey.com



Jan F Sieper

Partner

Strategy and Transactions,
EY Strategy & Transactions GmbH

+49 40 36132 27236

jan.f.sieper@de.ey.com



Claudio A Knizek

Partner/Principal

EY-Parthenon Global Advanced
Manufacturing & Mobility Leader

+15715658730

claudio.knizek@parthenon.ey.com



Gaurav Batra

Associate Director

EY Global Advanced Manufacturing &
Mobility Analyst Leader, EY Knowledge

+91 9899634444

gaurav.batra3@gds.ey.com



Anuj Chandna

Assistant Director

EY Global Advanced Manufacturing
& Mobility Analyst

+91 9717440005

anuj.chandna@gds.ey.com

Contributors

Manisha Samal, Ankit Khatri, Menaka Samant, Gautam S Rashingkar, Animesh Walia,
Hillary Gerlings and Davinderpreet S Gugnani

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