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FUTURE OF



**The Future of Aftersales  
in a BEV World**  
Under repair





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# Introduction

## 1.1 An inevitable shift to BEVs by 2040

The automotive industry is in the midst of a monumental transition, as OEMs shift to alternative drivetrains in general and battery-electric technology in particular.

In 2022, the industry produced more than 67 million vehicles around the globe, 10% of which were already battery-electric vehicles<sup>1</sup>. This figure is expected to quickly rise to 30% by 2030 and to nearly 70% by 2040.

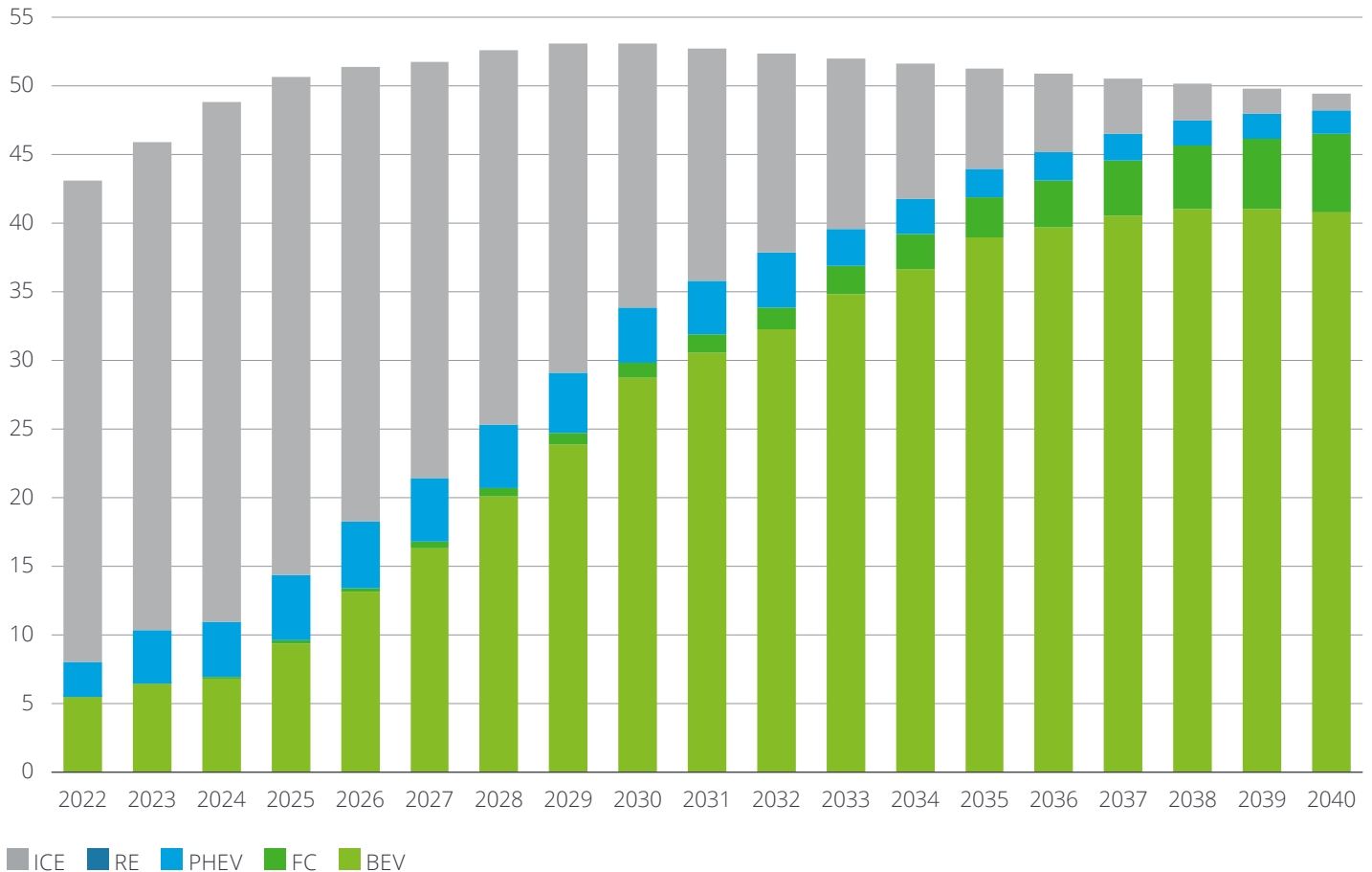
The pace of change varies drastically from market to market based on customer preference, BEV pricing, charging infrastructure and environmental regulations – as well as how quickly new players enter the market over the next few years. Using Deloitte’s E-Mobility Forecast Model, we believe that the EU5, the northern European markets and China will be the frontrunners in terms of BEV market share. North America is close behind thanks to stricter regulations

and better infrastructure than Eastern Europe, Southeast Asia, Latin America or other regions.

Even though hydrogen cells, synthetic fuels and other drivetrain developments are on the rise, we believe that battery-electric vehicles will dominate personal mobility between now and 2040.

**Fig. 1 – Absolute sales by drivetrain**

**Total car sales in major markets (in millions)<sup>1</sup>**

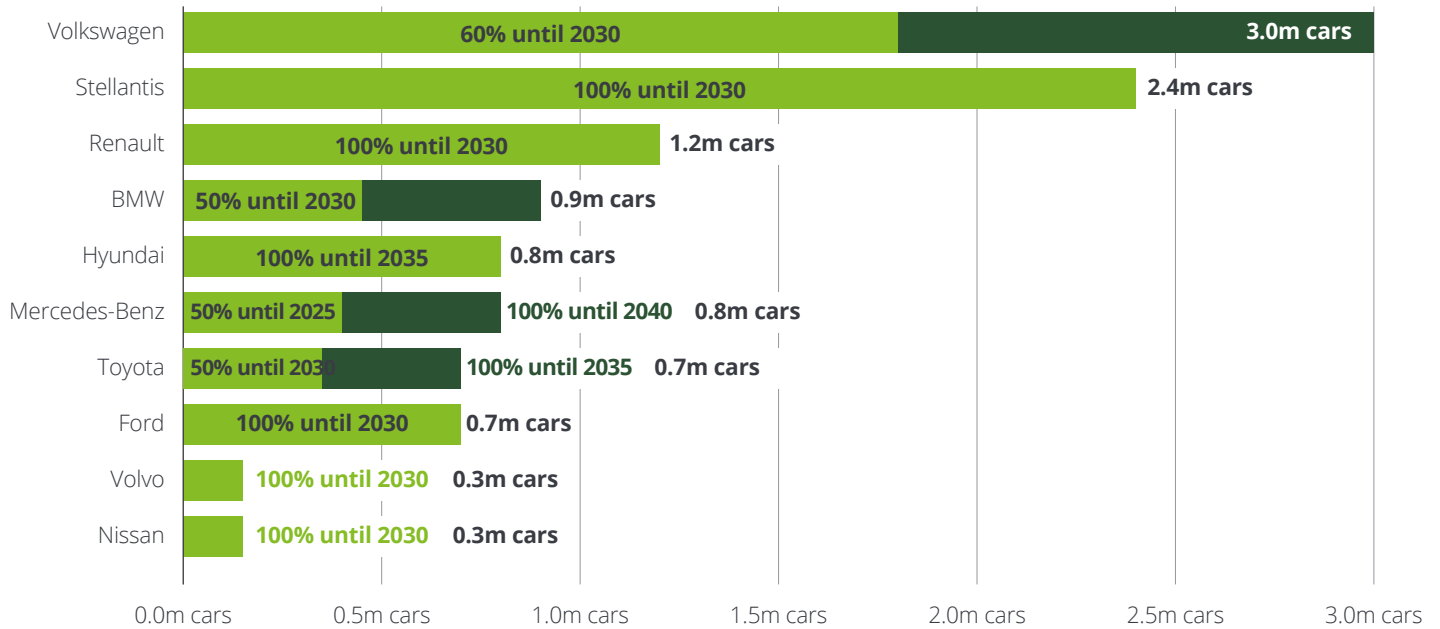


<sup>1</sup> United States, China and EU5 (Germany, France, UK, Spain, Italy)

Source: [E-Mobility Sales Forecasting Model](#)

**Fig. 2 – Electrification targets in Europe for the largest European-based OEMs**

**Total car sales in millions; BEV share as a percentage of total sales**



Source: e-mobil BW GmbH, Deloitte, 2022<sup>3</sup>

The pace of change not only varies by market but also by OEM. Most major OEMs have set very ambitious BEV targets for new car sales by 2030 and 2035 in an effort to sustain profitability. This will also cause a significant shift in the overall car parc, i.e., the total number of vehicles in operation, up to 2040. For details, please refer to Deloitte’s Pathway to Net-Zero study<sup>2</sup>.

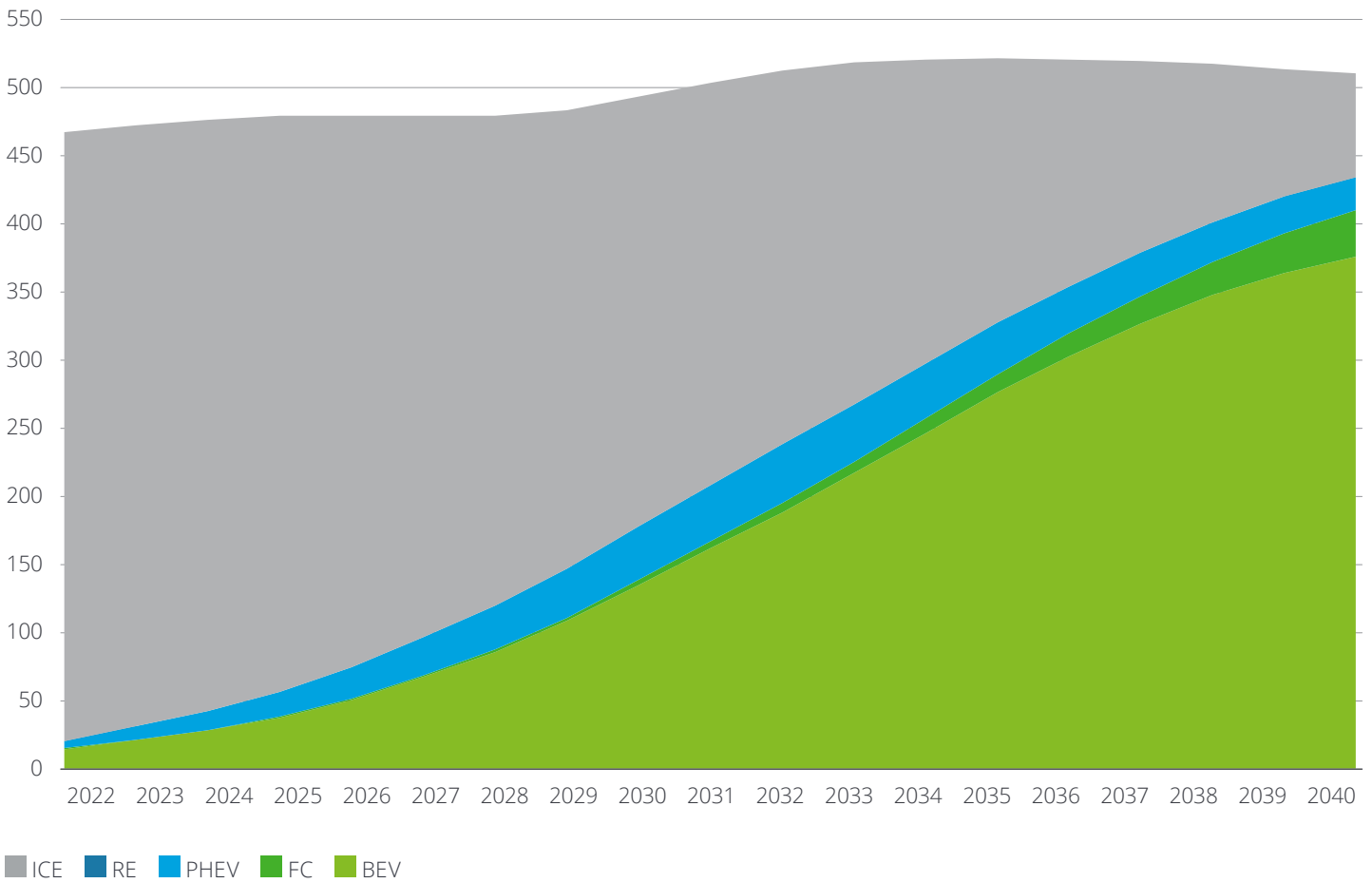
While we expect the global vehicle car parc to continue to grow for the foreseeable future, new players are seizing the opportunity to enter the market, following Tesla’s lead and gaining significant market share not only in the important Chinese market, but also in Europe. BYC, SAIC and NIO are just a few of the key players building on battery and software expertise rather than the mechanical engineering prowess that has given established OEMs a vast competitive advantage for so many years.

Some researchers are forecasting that 50% of all BEVs sold globally in 2026 will be made by Chinese manufacturers.<sup>4</sup> So, despite growth in the global vehicle car parc, tougher competition means a loss in market share and overall sales volume for established players, particularly in China but increasingly also in other parts in the world.

**1.2 Impact of BEV shift on OEMs**

As we already reported in our Future of Sales and Aftersales study,<sup>5</sup> the impact of the BEV shift will vary significantly among the various service segments of today's OEMs.

**Fig. 3 – Total 10-year car parc development**  
 Total car parc per year in major markets (in millions)<sup>1</sup>



<sup>1</sup> United States, China and EU5 (Germany, France, UK, Spain, Italy)

Source: [E-Mobility Sales Forecasting Model](#)

A negative effect on Sales during the BEV transition is unlikely, because we don't expect much to change in terms of the kind of asset and the way it is sold. During the ramp-up phase, higher prices, staff up/reskilling and other factors associated with a new product launch may dampen demand and profitability. This effect will gradually subside over time as BEVs become simply "another asset" sold through the customers' preferred sales channel.

We expect Financial Services to grow further over the next few years, as the

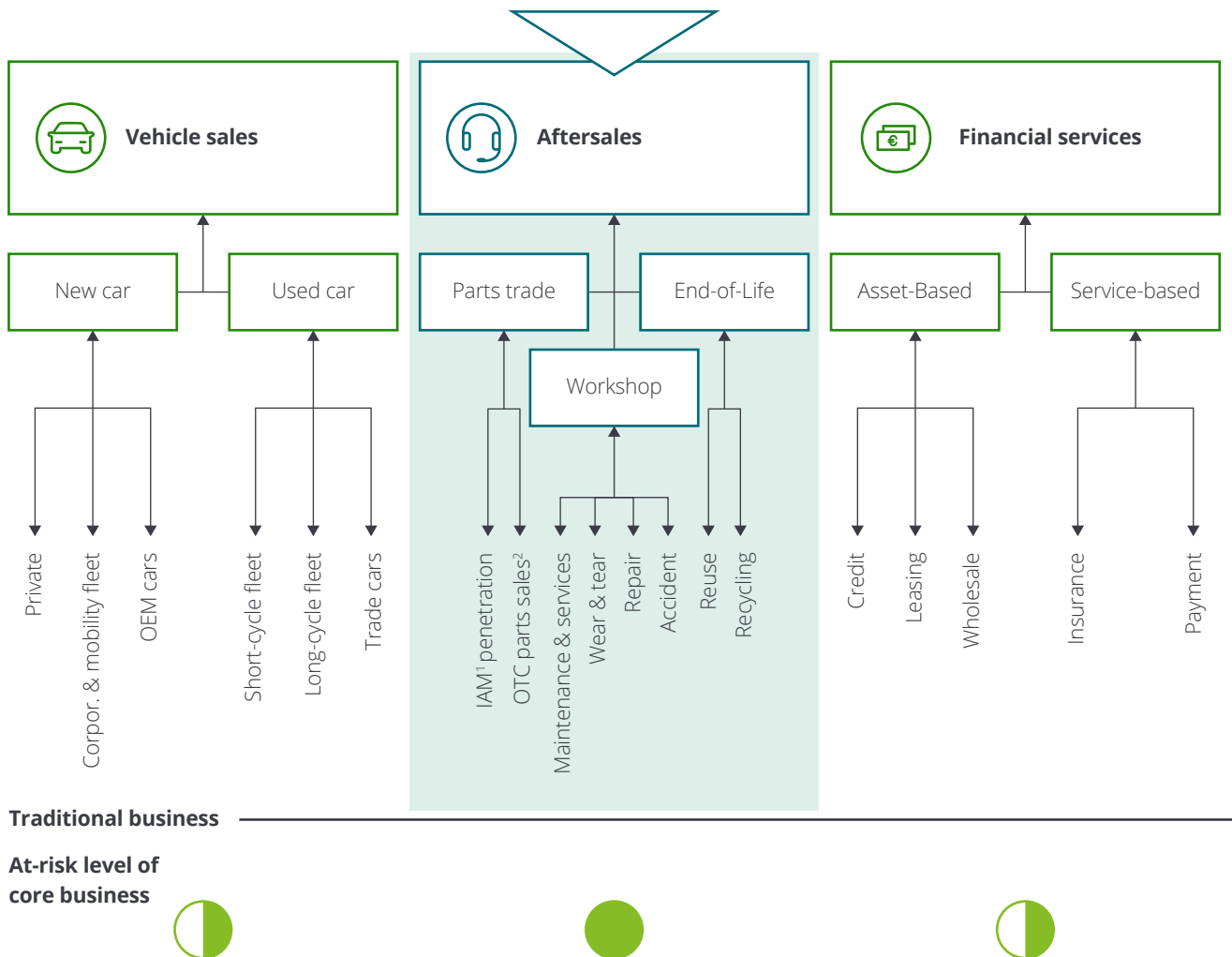
trends toward leasing and subscription fuel demand. The transition to BEVs will sustain these trends as more and more customers look for peace of mind with issues such as battery life and residual value. Despite the inevitable teething troubles when it comes to calculating BEV residual value, financial services players will gain more and more insight and therefore confidence in this area over time.

The Mobility-as-a-Service and Car-as-a-Platform segments stand to benefit from the transition to BEVs. Charging infrastructure and connected car features will be essen-

tial for the BEV ecosystem to thrive and for the overall ease of use of the vehicle.

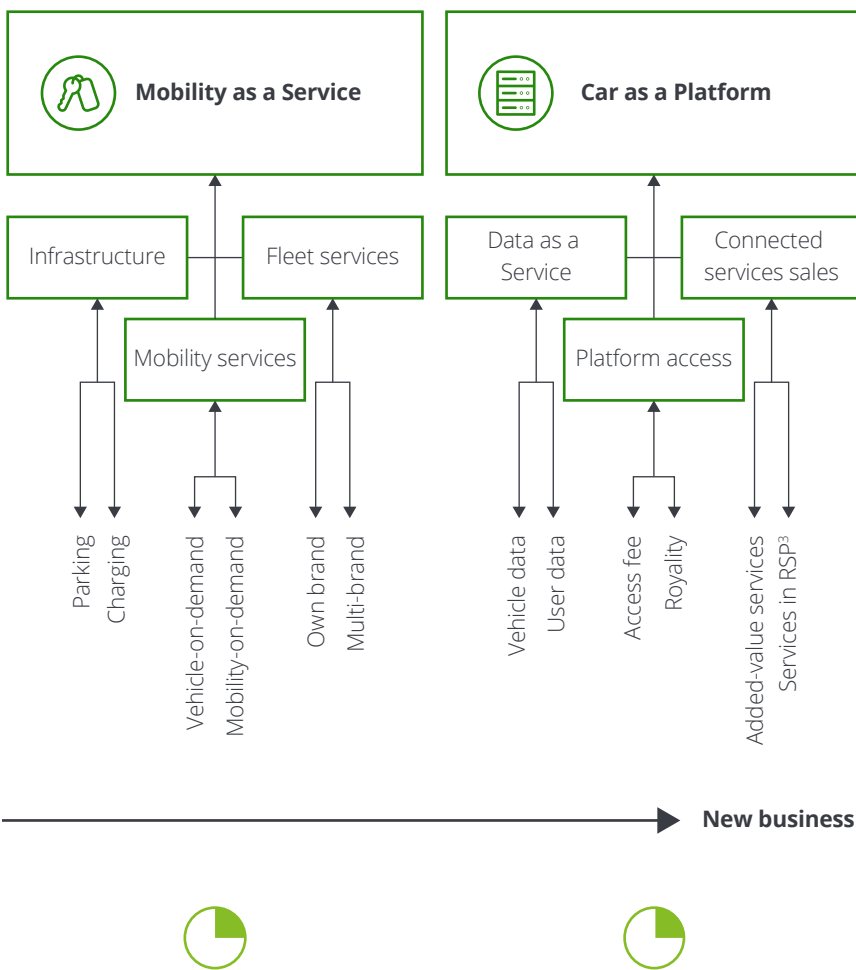
As one of the key profit drivers of OEMs, we expect the impact on the Aftersales business to be stronger as BEVs gradually take over. Not only will BEVs no longer require the same level of service or offer the same revenue potential (e.g., oil changes, filters, etc.), but they are less vulnerable to wear and tear and need far fewer repairs than ICE vehicles, resulting in huge profit losses for both OEMs and their authorized workshop partners.

**Fig. 4 - Core OEM Revenue Streams including BEV-impact**





The aim of this study is to create a quantitative basis to discuss the impact of the BEV shift on the aftersales business of a proxy OEM between now and 2040. We also propose various solutions that address the most important issues caused by the transition. In our model, we estimate the effects on an exemplary OEM in the main aftersales service segments (service and maintenance, wear and tear, repairs and accidents) and in different regions in order to outline the key action areas and concrete solutions available to OEMs looking to mitigate these negative effects.



# BEV impact on aftersales

## 2.1 Study Design and Key Results

First, we defined a representative proxy OEM to examine the effects on the aftersales business. This is an OEM with a global reach but no specific origin, approximating the fictional average of the EU5, American and Chinese markets. The development of its sales and car parc corresponds to an OEM with a 5% market share. This proxy

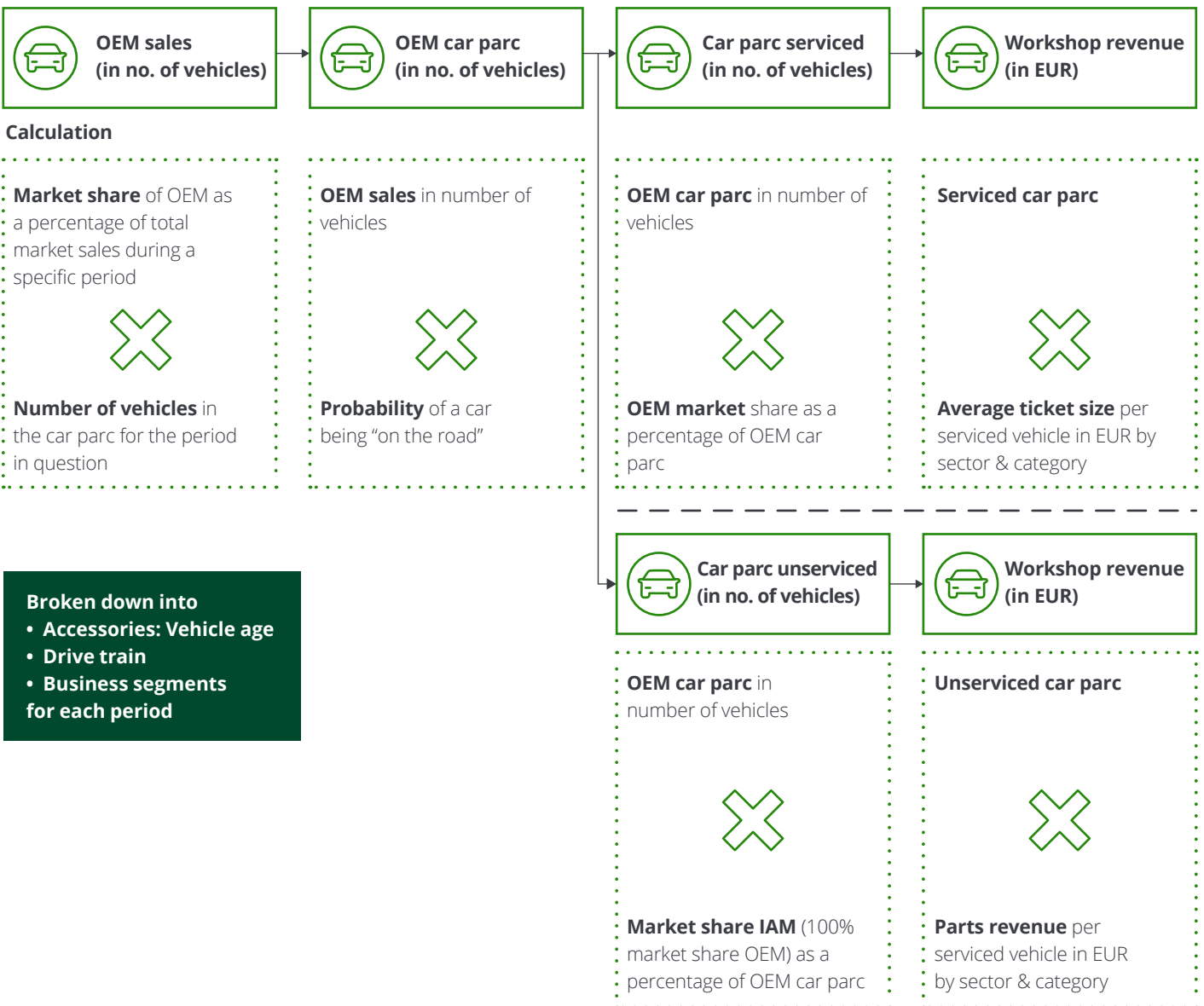
OEM provides aftersales services in authorized workshops and sells spare parts to the independent aftermarket (IAM).

We identified country-specific factors impacting each segment's share in the business (see below) and calculated the effect on revenue for each segment.



Fig. 5 – Calculation Model

Key outputs of model



Today's customers go to authorized workshops or buy spare parts for different reasons that can be broken down into five different service segments:

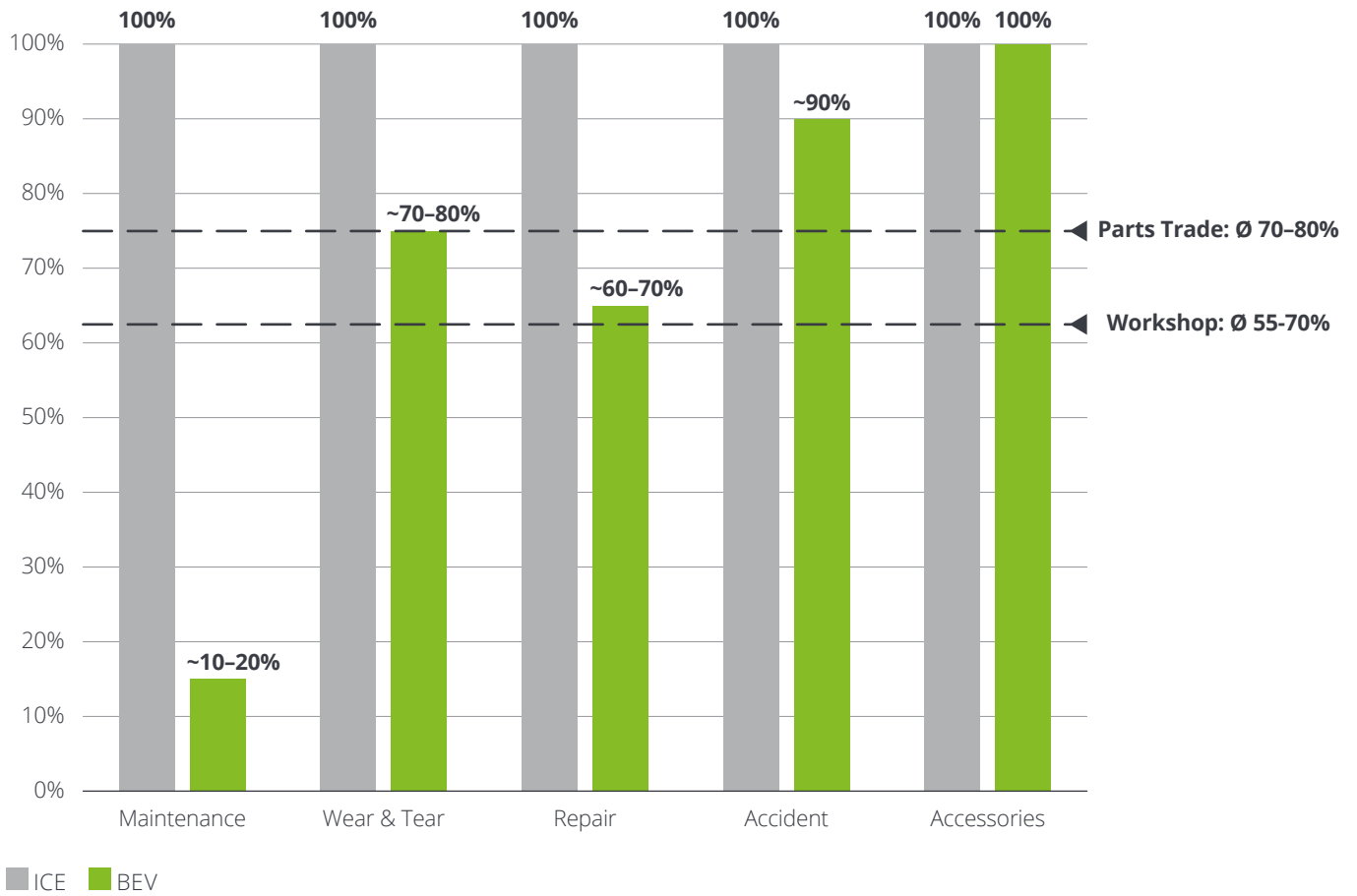
- **Maintenance**  
e.g., oil and filter changes, engine and transmission checks
- **Wear & Tear**  
e.g., replacement of brakes, brake pads, wipers or tires
- **Repairs**  
e.g., breakdowns, technical faults, cracked windshields
- **Accidents**  
e.g., repair or replacement of body panels and bumpers after a collision
- **Accessories**  
e.g., floor mats, DIY wiper blades, car seats, etc.

Overall, our EV aftersales model forecasts that revenues and profits will fall by 30 to 45% in the workshop business and by 20 to 30% in parts trade (to IAMs and other third-party workshops) to service BEVs rather than ICE vehicles, provided OEMs adopt no countermeasures. These figures do not include the decline in service via warranty and goodwill that we also expect over the long run. Based on the individual aftersales service segments, we see a huge dip in the maintenance segment, while the accessories segment is essentially unchanged (see graph). The effect will vary slightly by car type, with a far bigger drop in maintenance revenues for high-end cars versus city cars.



**Fig. 6 – Impact of BEV shift on different service segments**

Aftersales revenue in service segments for BEVs compared to ICE vehicles; indexed at 100% ICE revenue



Source: Deloitte, 2023

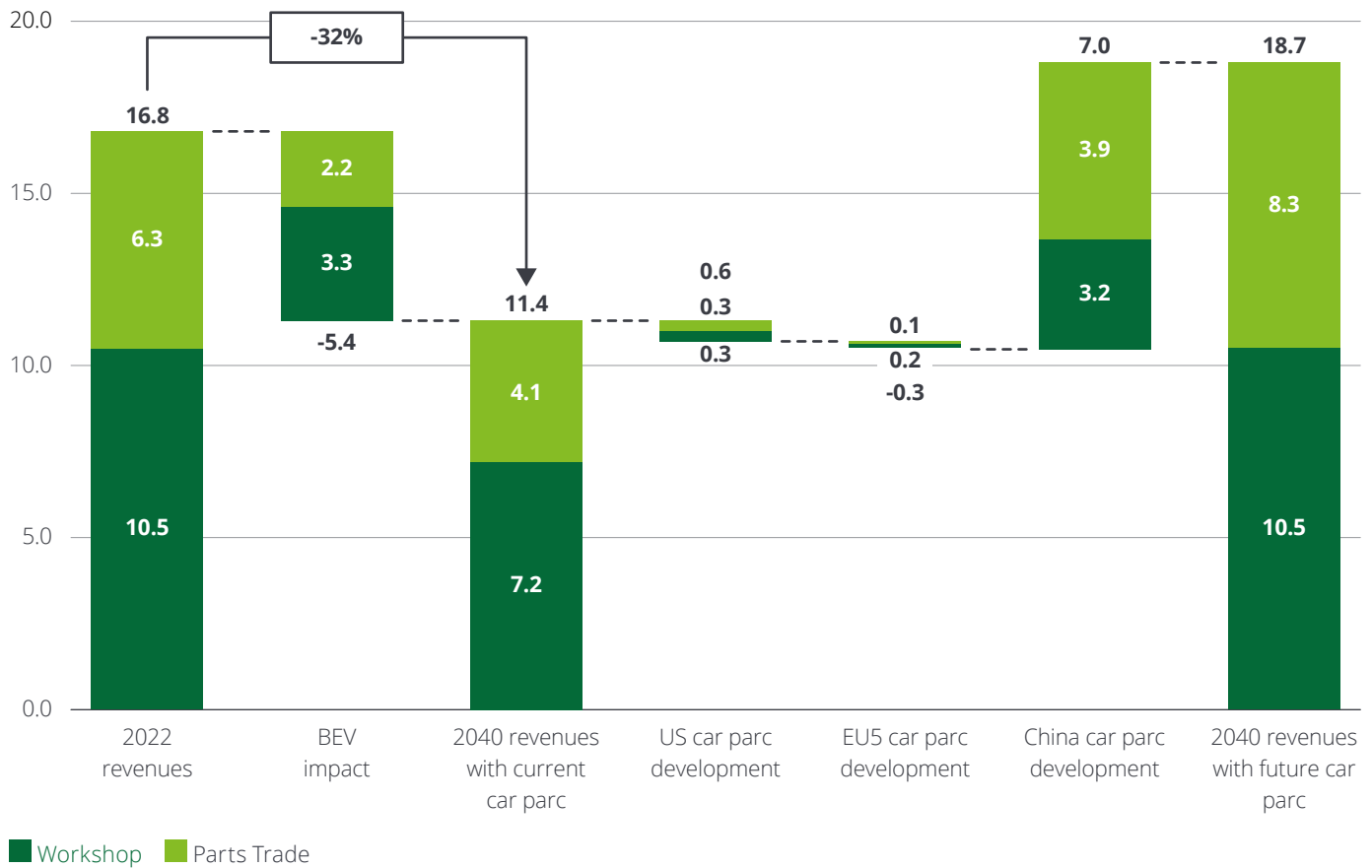


Additionally, the drop in revenue will vary based on the revenue split between the service segments. So, we need to take into account the differences between the workshop business and the parts trade, the different sales and car parc trends in the respective countries (e.g., age of the car parc) and the different segment focus of the respective OEMs.

For example, US-based workshops will face a strong impact from the BEV shift, because there is less accident business to offset the loss in other segments. In China, on the other hand, there will be a smaller impact, because there will still be a comparatively large number of accidents, with or without the transition to BEVs.

**Fig. 7 – Revenue Development Proxy OEM**

**Total revenues in EUR billions per year in major markets<sup>1</sup>**



<sup>1</sup> United States, China and EU5 (Germany, France, UK, Spain, Italy)

Now let's look at the overall effect on our proxy OEM: Because car sales and the size of the car parc continue to grow across all markets combined, we expect aftersales for our proxy OEM to increase by more than 10% by 2040. That shouldn't give us a false sense of security, however, because the total revenue of our proxy OEM is expected to fall by more than 30% due to the lower revenue per car for BEVs, though each region faces different countereffects.

- The growth in the US and the EU5 car parc cannot offset the overall drop in sales, which we expect to be substantial. It is vital for these markets to make an effort to adjust the business to the new reality.
- If they succeed in defending their market share from fierce competition, China-based OEMs may be able to keep revenues stable, driven by both an increase in sales in China and a significantly older car parc in 2040. The BEV transition should still be a high priority, because the vast majority of 2040 sales in China will be BEVs.

Now we will take a deep dive into the root causes of the trends in each service segment.



## 2.2 Impact on core service segments

### 2.2.1 Maintenance

BEVs have components that are easier to maintain than their ICE counterparts, reducing maintenance and parts sales by roughly 80 to 90%. BEVs no longer need oil, fluids and fuel filters changed, exhaust and transmission systems inspected or most of the regular maintenance services provided in service plans for ICE vehicles (see graph). The few remaining parts that do require maintenance (e.g., cabin air filters, dust filters) generally only need checking at intervals of 2 or more years rather than annually.

All other check-ups only require visual inspection, which has less perceptible value for the end customer. Labor costs are of little direct relevance for the OEM's business, but they are the main profit driver for workshops. And since visual inspections don't usually result in parts sales, OEMs will have a smaller share in the revenue. Some pure EV competitors do not recommend regular services at any interval – customers only come into the workshop when they have an issue. Tesla, for example, will honor the warranty even without regular service.<sup>6</sup> This makes sense when you consider that Tesla has an 80% resolution rate with its digital over-the-air (OTA) updates.



#### Maintenance Key BEV impact

- Drivetrain components are easier to maintain
- Longer intervals for maintenance (every 2+ years instead of annually)
- More focus on visual inspection than replacing parts

Fig. 8 – Difference in maintenance check-ups between ICE vehicles and BEVs



#### ICE Maintenance Checks

**Engine:** check for leaks and/or replace gaskets, check motor oil and coolant levels, inspect exhaust system, fan belt tension and camshaft chain wear, etc.

**Gearbox:** check gearbox oil levels, inspect clutch for wear, check joint protection covers, etc.

**Brakes:** check brake pads and discs, brake pipes, brake fluid, etc.

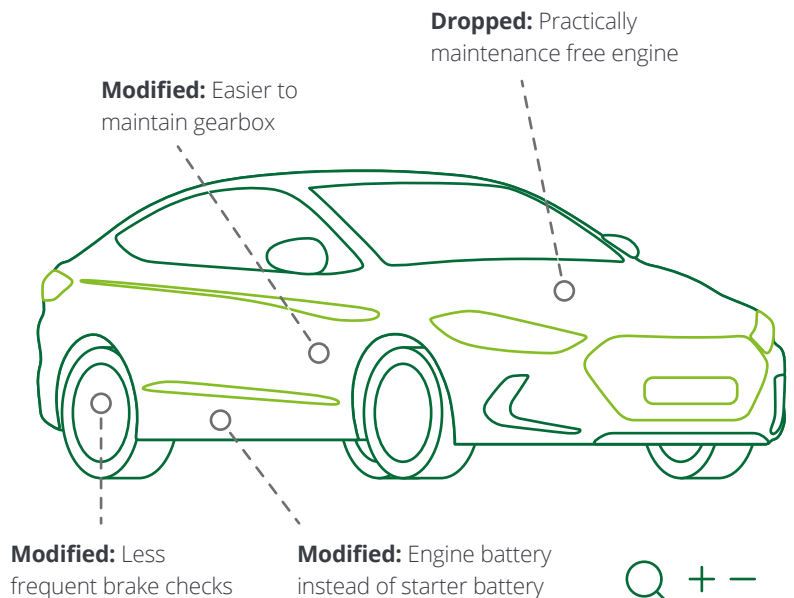
**Electronics:** check alternator, light and lamps, airbags, seatbelts, warning lights, key batteries, starter battery.

**Steering:** check hydraulic oil, hydraulic pumps, steering gearbox, tie rods, suspension, etc.

**Chassis:** check hinges and locks, wheels and tires, air conditioner, air filters, windshield, wipers, antifreeze mixture, paint job, etc.



#### BEV Maintenance Checks



Visual Inspections



### 2.2.2 Wear and tear

According to our forecasts, the wear and tear business will decrease by between 20 and 30% in BEVs compared to ICE cars. Many of the main parts that generated most of the wear and tear revenue in the past are no longer in use or need replacing less often. There are 3 main reasons for this: First, the engine and drivetrain have fewer parts, which means less wear and tear overall (e.g., no spark plugs, no fan belts or cam chains, no alternators). Second, the remaining parts tend to last longer in electric vehicles and do not need to be replaced as often (e.g., brakes due to regenerative braking and a much less complicated gearbox, if needed at all). Third, parts are often replaced after a (visual) inspection. So, if customers only go in for a service every other year, that will delay the replacement of some parts that they didn't know were worn.

Some players see tires as a kind of savior of BEV aftersales, but we do not expect the shift to electric vehicles to hugely impact the tire business, with revenues potentially rising by less than 3%. This is mainly driven by the higher weight of BEVs rather than by higher torque. There are also plans in the pipeline to optimize the rubber compound used in tires, which may further reduce wear.



#### Wear and tear Key BEV impact

- Fewer parts susceptible to wear and tear (e.g., engine oil, brake fluid, brake pads)
- Longer intervals between service eliminate or delay replacement of worn parts
- Tires provide only a minor increase in revenue

### 2.2.3 Repairs

Our model expects a substantial 30 to 40% reduction in repair sales for BEV vehicles. With only around 200 parts compared to 1,600 parts in an ICE vehicle, there are significantly fewer parts that can fail in a BEV. The drivetrain itself is considerably less complex, which further lowers failure rates. This effect is expected to increase over time as newer BEV parts gradually mature and become even less likely to fail. The remaining mechanical parts are less vulnerable to the friction and heat caused by rotational movement and less exposed to fluids that can cause rust or leakage.



#### Repairs Key BEV impact

- Lower revenue due to EV parts that are less vulnerable to failure and fewer parts overall that can fail
- Slightly higher repair costs thanks to more complex platforms and the proliferation of modules

### 2.2.4 Accidents

We expect revenues in the accident segment to drop by roughly 10% for BEV vehicles. Although most of the accident damage for BEVs and ICE vehicles is the same, damaged battery packs are often not repaired after an accident, leaving revenue "on the street". On the one hand, paint and body work (e.g., chassis or glass repairs) are the main repairs after a crash, and they cost roughly the same for BEVs and ICE vehicles. Workshops may even charge a slight premium for BEV repairs because of the additional steps required to decouple and recouple high voltage systems around the battery during repairs. On the other hand, BEVs are still likely to have a negative impact on OEM revenues due to write-offs. The more valuable batteries become in terms of the residual value calculation, the more we can expect to see total losses from collisions. After all, a workshop is much more likely to repair a car with a combustion engine than a BEV in a similar accident that involves battery damage. Even though this is relatively rare, it still accounts for a 5 to 10% drop in accident revenue. Other factors that impact the accident business have nothing to do with the shift to BEVs. The proliferation of sensors in advanced driver-assistance systems (ADAS), for example, reduces accident frequency, but may cost more to repair. In other words, the higher repair costs for these increasingly complex systems are likely to offset any savings from lower accident frequency.



#### Accidents Key BEV impact

- Lower rate of accidents due to higher ADAS levels
- Higher accident costs due to more modules than parts, greater vehicle complexity and sensor density (unrelated to the BEV shift)
- Battery packs (rather than engines) are now the decisive factor in the decision to repair or write off a vehicle.

## 2.3 Impact on over-the-counter (OTC) business

### 2.3.1 Impact on parts trade

In line with the trends in other aftersales service segments, revenues from the parts trade are expected to fall as well by around 20 to 30%. The effects outlined above will also reduce demand for spare parts in the independent aftermarket (IAM) over the long-term. However, we do not expect sales to decrease as much in authorized workshops. Vehicle owners rarely buy high-margin parts such as engine oil directly from the OEM anyway, and the sourcing focus has been more on captive parts for the repair and accident business, a segment less affected by the BEV shift than maintenance. In the medium-term, the aging ICE car parc will keep the parts trade running, as the owners of older cars tend to go to IAMs rather than an OEM's authorized workshop.



#### Parts trade Key BEV impact

- Trends similar to core service segments
- Impact is less severe than on core segments, because ICE vehicles remain the key revenue driver for IAMs in the medium term
- However, car owners only rarely go to OEMs to buy those parts heavily impacted by the BEV shift

### 2.3.2 Impact on accessories business

The impact of the BEV transition on the accessories business will be negligible. Both the demand for accessories and the type of accessories on offer are expected to remain basically the same (e.g., car cleaning liquids, car seats, floor mats, bike racks, etc.), keeping risk low in this segment. There may be a potential upside in the secondary market thanks to wall boxes and charging cables; however, we expect OEMs to sell these accessories upfront with the car.



#### Accessories Key BEV Impact

- Similar accessories to be sold for BEVs and ICE vehicles
- Commercial fleet operators represent largest customer group and lifestyle-relevant features come as standard
- Potential uptake for charging equipment (e.g., wallbox, charging cables) and upgrading connectivity features

## 2.4 Impact on labor business

OEMs tend to generate the most profit with parts, while workshop profits stem mainly from labor. With the shift to BEVs, there will also be a huge change in the demand for labor, but not necessarily on par with the drop in demand for parts.

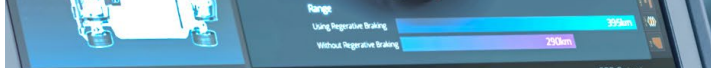
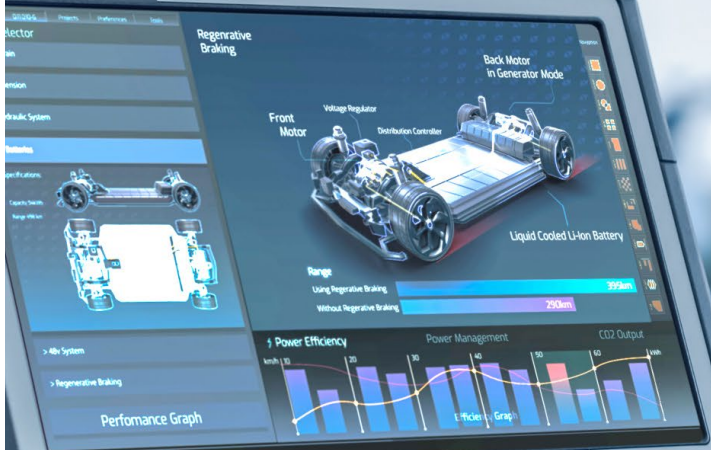
Authorized workshops may continue to carry out visual inspections as part of their car maintenance services, but this will rarely require parts to be replaced. These visual inspections will also take place less frequently as the interval between maintenance checks goes from one to two or more years.

On the other hand, we expect the impact on revenue from repair and accident labor to be stronger than in the respective parts business. This mainly has to do with the fact that a lot of EV components will simply be replaced outright without a huge amount of manual labor required.



#### Labor Business Key BEV Impact

- Profit in authorized workshops is mainly driven by labor
- The impact on labor of the BEV shift is not the same as the drop in the parts trade, as each segment behaves differently
- The impact on maintenance parts will be stronger than on maintenance labor, with the opposite result in the repair segment



AUTOMOTIVE DESIGN AND SIMULATORS

# Implications for OEMs and potential solutions

## 3.1 Identified business implications

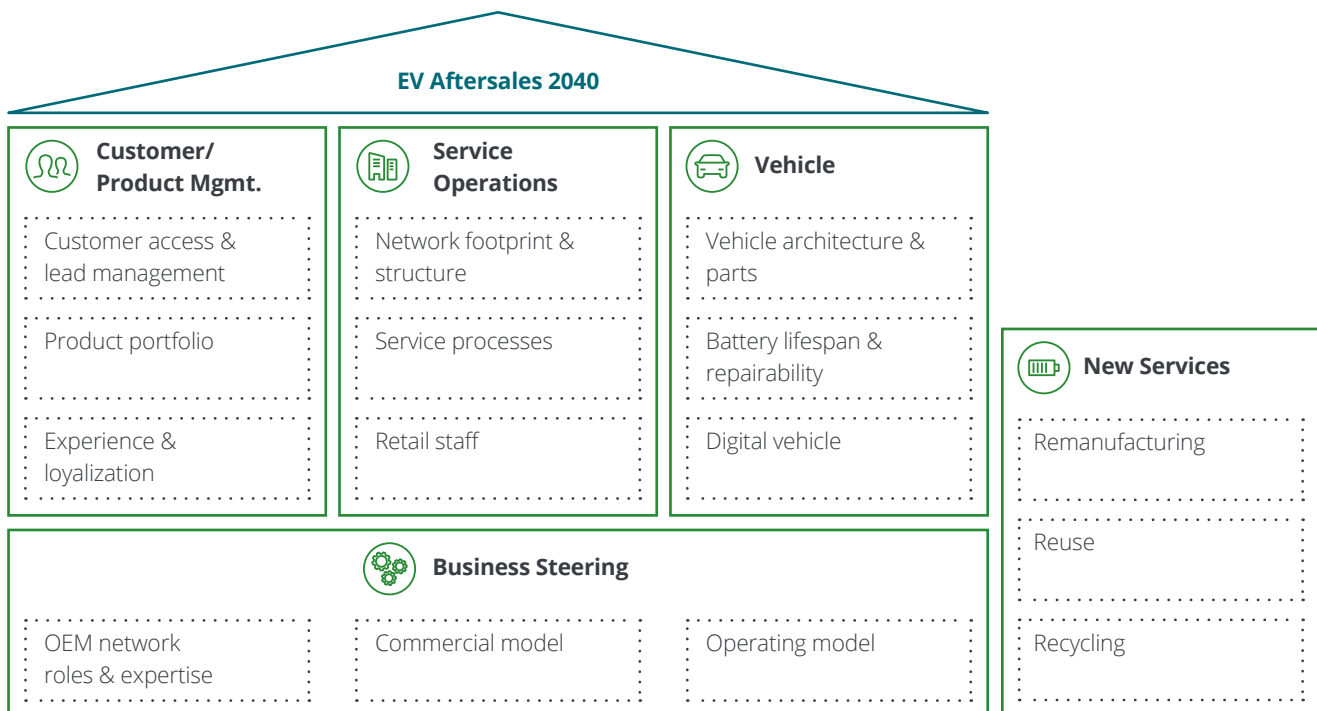
Based on the various trends described in the previous chapters, we can summarize the impacts on the traditional OEM business as follows:

Despite the growth in the overall car parc, the BEV shift is giving new OEMs, especially Chinese OEMs with competitive pricing, a strong opportunity to increase their market share in all global regions. An established OEM's car parc might decrease in line with its market share, even as the overall after-sales car parc is increasing.

These new OEMs are not only making an aggressive play for the market share of traditional OEMs, they also have a different take on the aftersales business. We don't typically see these OEMs relying on authorized workshops and, as is often the case with pure BEV players, they don't see a need to set up a workshop network at all.

Ultimately, the BEV transition will lead to a shift in 5 key aftersales segments (see Aftersales House), which we will explain in further detail below.

**Fig. 9 – EV Aftersales House 2040**





First, the shift to BEVs is changing the way OEMs approach customer and product management. Tesla, for instance, has announced that its warranty will still be valid even if the vehicles never go in for a regular service check.<sup>6</sup> Genesis is promoting a 5-year, all-inclusive service plan in Europe, and Polestar is including 2 years of service with the purchase of selected vehicles.<sup>7,8</sup> All of these offerings are designed to appeal to the general customer trend toward “peace of mind”, which is also evident in the rise of subscription-based models. Customers see “no service” as the best kind of service, and therefore traditional OEMs need to massively adapt their offerings to not only meet the service demands of future customers but also to remain competitive.

As indicated above, we expect the aftersales revenue per vehicle to drop significantly over time. Not only because of the shift towards BEVs, but also because the ICE car parc is quickly aging, and older vehicles, despite generating more revenue per car, typically don’t contribute as much revenue to the OEM bottom line as before.

Second, because of this trend, traditional OEMs will have to fundamentally change the service operations in their authorized workshops. Not only will the current cost structure make many workshops unprofitable, but the remaining workshops will have to invest significant funds in their facilities to accommodate BEV service and repair. OEMs need to find ways to actively address the lower workshop density associated with the closure of unprofitable sites.

This means making adjustments to their processes and systems as well as acquiring digital maintenance service expertise.

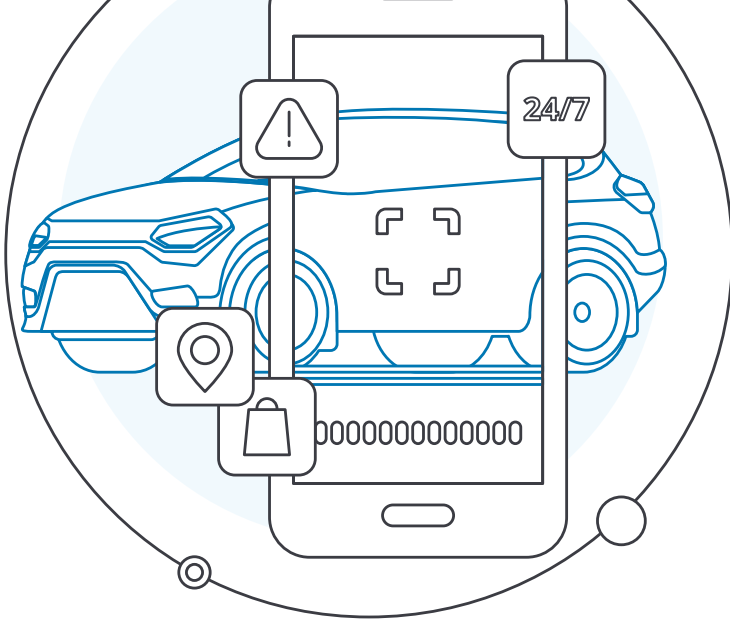
Third, it will ultimately be changes to the vehicle that make these advances possible. It is vital to integrate these changes seamlessly into workshop workflows and champion the kind of changes that support rather than oppose new customer engagement and service trends. This includes the digital integration of the vehicles as well as the ability to repair batteries and other parts at both authorized workshops and independent service providers.

Fourth, as the revenue per service ticket is lower for BEVs, the authorized workshops will have to increase the overall capacity in each workshop. Handling a higher number of service tickets will enable the OEMs to bring workshop revenues more in line with past levels. This will require better allocation and planning among different service facilities, a massive restructuring in the management of processes and support services, and digitalized workflows to create a more integrated environment. As a result, the roles and responsibilities of the OEMs will change relative to their authorized workshops and require amendments to the underlying contractual agreements. This goes hand in hand with changes to the business model and the financial relationships between OEMs and workshops as well as third-party providers.

Fifth, repairable batteries will also open up opportunities for new services with additional revenue potential. With the

high-value resources contained in batteries and the goal of a circular economy in the context of ESG initiatives, we can expect innovations in second life battery usage.

Based on these implications for the business, OEMs have a lot of options not only to incrementally adapt the current aftersales business but also to identify new solutions that will offset the potential losses in this area. We will add these solutions to our BEV Aftersales House in the following chapter.



### 3.2 Customer and product management

Customers with BEVs no longer recognize the value of regular maintenance checks. After all, there are few to no parts that need maintenance, and competitors like Tesla are calling their cars “maintenance-free”. This threatens to eliminate all aftersales customer touchpoints. The classic lock-in approach for replacement parts within the OEM ecosystem is becoming less relevant, resulting in an increased push for loyalisation and a quest for more novel customer retention initiatives. OEMs also need to focus on retaining customers in the transition from the first owner (mostly corporate/leasing) to the second owner (mostly private). This is particularly relevant for the remaining potential with ICE vehicles, as they are getting older on average, but still have higher revenue potential than their BEV counterparts.

To lock-in customers, one option for OEMs is to create an ecosystem focused on three core missions: attracting customers to the ecosystem with an appealing business model, retaining customers by providing excellent service and products, and preventing customers from leaving the company by making it difficult to switch.

Subscriptions models can also be a compelling way to draw customers into an ecosystem. Vehicle subscriptions can offer lock-in effects for flexible users who want to drive more than one type of car (e.g., a convertible in the summer and an SUV in the winter). OEMs could offer a battery subscription that reduces the purchase

price of the car, akin to NIO’s power-swap stations that replace batteries in just 5 minutes and lock customers into regular OEM touchpoints.<sup>9</sup> There is an opportunity to expand on this concept and use the swap time for other up-selling or cross-selling opportunities, ranging from vehicle cleaning to maintenance check-ups.

In order to retain customers, OEMs need to offer services and products that differ distinctly from those of its competitors and focus on customer satisfaction. Widely available, easy-to-use charging infrastructure can create a lock-in effect, as in Tesla’s global supercharger network that is limited to Tesla owners (but recently expanded to Ford vehicles).<sup>10</sup> Ionity is offering a similar approach in Europe as well. Customers have limited charging options and a less seamless experience when they switch to a competitor, because these days finding an available, properly functioning charging port is almost like playing Russian roulette.

OEMs need to make it difficult to switch in order to prevent customers from leaving the ecosystem. In addition to the high revenue upside, there is a lock-in effect with in-car payment features, for example. In this seamless experience, customers can pay for charging, parking or infotainment services without creating an extra account – a benefit that is lost when customers switch to a competitor. Customer profile settings within the car (e.g., seat and window settings, favorite destinations, etc.) are linked to the customer’s exclusive account with the OEM, which can also make switching more onerous. There may also be

additional lock-in effects from services that extend beyond a single vehicle or lease. Linking services to a specific account rather than to the car on offer increases the cost of switching to a competitor and the potential for customer loyalty. For example, giving customers access to lower rates for charging or parking even after they return a particular vehicle might persuade them to stay in the ecosystem.

There are different approaches to generate customer loyalty with authorized workshops for newer, mostly BEV cars and older ICE vehicles, in line with different customer expectations. This differentiation may also vary by market, as not all loyalisation initiatives are equally effective in different cultural/competitive settings. Statistics show that customers are more likely to go to the same workshop they visit for maintenance when they need repairs or accident service. So, customer loyalty in the maintenance business not only offers up-selling and cross-selling potential during a maintenance event but also uplift for other service segments.

**Customers with newer BEV vehicles:**

As the revenue per maintenance ticket is comparatively low for BEV vehicles, it is not the frequency of service visits that has the biggest impact on customer loyalty. Instead, what customers tend to prioritize in their decision to stay is the greater peace of mind offered by a particular brand.

One solution might be to offer a customer loyalty program shared by both the workshop and the OEM. Ford, for example, offers the Fordpass Rewards program in the US. Customers receive points for accessories or planned vehicle purchases when they frequently visit one of Ford's authorized workshops. They can then later redeem those points for maintenance, parts or a new vehicle purchase. This does not necessarily capture the full loyalisation experience, as customers not planning to purchase any other items have no incentive to join the program. What is more, the program does not necessarily cover the gap between first (mostly corporate) and second ownership.

Another solution to create peace of mind is an up-front service bundle (USB) of mainly maintenance services that customers purchase at the same time they buy the car. As mentioned before, European-based OEMs such as Genesis or Polestar are already offering packages like these to their BEV customers.<sup>7,8</sup> Tesla is going in a similar direction, announcing that the vehicle warranty will still be valid even without any service visits.<sup>6</sup> This gives customers the perception that they do not need to worry about their vehicle having a breakdown

or about any unexpected downtime. With a USB, customers will rely on the OEM's service offering if there is an issue with the vehicle rather than third-party providers, as the service is already paid, and they don't need to worry about comparing maintenance prices. Customers will also implicitly have more loyalty when they feel cared for by a particular brand. That is why more and more traditional OEMs, such as Mercedes-Benz in Switzerland, are revamping their service offering and factoring the full scope of maintenance services into the vehicle price for a specific timeframe.<sup>12</sup> This approach allows customers to retain the vehicles even throughout the second ownership phase. It also represents a total restructuring of the customer service approach of a traditional OEM by putting the focus more on reducing costs rather than generating revenue.

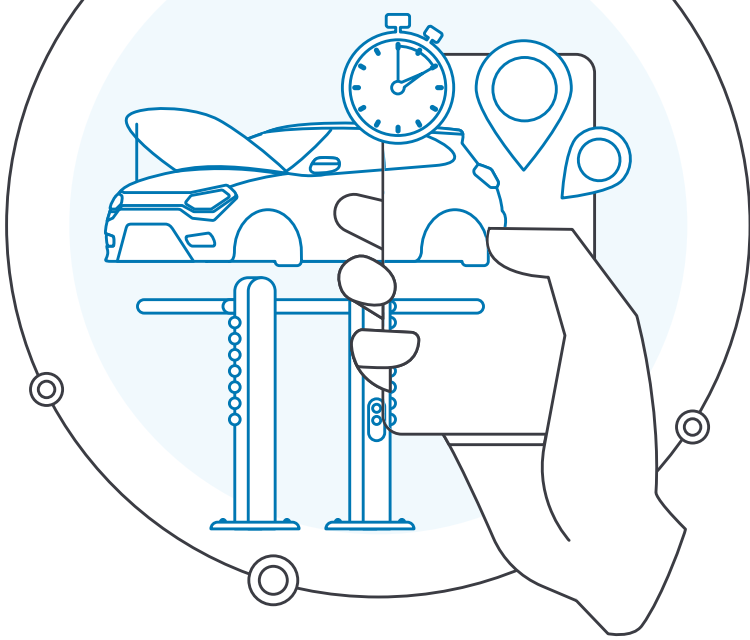
**Customers with older ICE vehicles:**

Workshop revenue is currently generated mostly by newer captive vehicles that are typically covered under service contracts. This is the most profitable and least problematic model in terms of billing. However, to further exploit the potential of the existing ICE car parc, the shift towards older vehicle segments is inevitable, as we see BEVs gradually take over. There are several options on the market designed to increase customer loyalty for ICE customers.

One primary reason customers stop servicing their vehicles at an authorized OEM workshop is pricing – so this is a good place to start. Volkswagen, Mercedes-Benz and other OEMs offer additional cost-focused

service packages (e.g., no car cleaning, pre-payment, no reimbursement for travel) or parts packages (e.g., time-value-adjusted quality and prices for parts subject to wear and tear). Despite cutting into the OEM's margin, this could still be a profitable business solution for the aging ICE car parc, as it captures otherwise lost customers and draws them into the ecosystem, which may have more available capacity as service intervals become longer in a BEV-dominated car parc.

In addition, OEMs must continue to boost sales of extended warranties or service contracts for older vehicles, such as the programs promoted by Audi and Mini that offer a certain level of service for maintenance and wear and tear in exchange for a monthly fee to provide greater financial security.<sup>13,14</sup> This creates a lock-in effect over a longer period of time and creates upselling potential in the event of repairs. Other approaches, such as the Fordpass Rewards program, work well for older vehicles as well.



### 3.3 Service operations

We expect the demand for aftersales service and the revenue per vehicle in authorized workshops to decrease over time. With lower revenues and profits, the OEMs will be unable to maintain operations at the current level if no countermeasures are taken. This puts OEMs under pressure to transform their workshop networks and puts the workshops under pressure to cut costs, which may reduce the number of workshops and the services they provide as well as substantial changes to the workflows.

Given the push to transform and cut costs, lower regional coverage and workshop closures may seem inevitable. However, as discussed earlier, it is important to consider regional variations in the car parc and other factors that impact capacity. For example, the growing car parc in China might make it less urgent to transform the network. And aside from the generic benefits of cost savings, closures will upset customers who want to bring their cars to a nearby workshop. It might also be a difficult task for workshops with a lot of overheads.

To solve this problem and try to maintain as many of the current services as possible, OEMs have to increase either the revenue per car or the number of cars serviced per day. As outlined above, customers are not willing to pay the same price for a reduced level of service for their BEVs, which will inevitably lead to a drop in the revenue per vehicle. That means workshops will have to find ways to cut costs and improve capacity utilization in the workshop network to

accommodate more service tickets. They will also have to restructure and digitalize their workflows and support services. There are several options available to improve the status quo:

#### 1. Reduce costs through specialization and lower standards

In order to reduce costs, one potential solution is to centralize repair and maintenance services in factory-like facilities. These specialized workshops offer only selected aftersales services, e.g., only vehicle preparation, complex repairs or paint jobs. Centralizing the services creates economies of scale and improves efficiency by providing specialized processes and repetitive tasks much like an assembly line. OEMs would only have to buy specialist tools for a single “service factory” rather than for every workshop in the network. Battery repair equipment for BEVs, for example, is particularly expensive, and buying it only for the service factory means lower investments and overheads. These factories would not have to be customer-facing; in other words, these “back-office” repairs are cost-optimized and don’t require expensive customer-facing features. This would free up capacity at other sites that can be used for different services or allow for closures to reduce overheads.

OEMs will still have to provide any services that are not covered in this facility at a different site and maintain customer contact. So, they need other forms of customer-facing touchpoints at smaller facilities with lower equipment overheads, e.g., service vans, park-and-service and pick-up ser-

vices, as we will outline in the next chapter. Beresa, a group of Mercedes-Benz dealers in Germany, uses this “service-factory” and “sales satellite” approach to service cars in their 19 facilities.<sup>15</sup> This also opens the door to scaling this approach across several brands without jeopardizing the image of the original brand.

Another solution could be to reduce costs by lowering the standard requirements for authorized workshops. This may extend to reducing, simplifying or removing customer-facing features and contract requirements, e.g., opening hours, qualifications and the kind of tools available. Since customer-facing features are particularly expensive, this would give workshops more flexibility to adjust costs and provide customer-facing services only where needed. This would also work well in combination with the centralization approach to reduce costs at service factories that don’t offer customer-facing features.

#### 2. Maintain coverage with flexible network solutions

In order to deal with the lack of coverage associated with specialized service facilities, OEMs need to find flexible network solutions that cover a larger area. This would help mitigate the long distance to the service factory for specialized repairs, though it will require some interchange between specialized factories and customer-facing facilities that may not offer the full range of services. If managed efficiently and effectively, the savings generated by a centralized approach will offset the transportation costs. Flexible network solutions



can also help overcome the varying car parc trends, e.g., some regions experience a temporary growth spurt, while other regions take longer to transition to BEVs. We have identified three network solutions to improve coverage:

**a) Service vans:**

Mobile service vans provide the most common aftersales services that a van can accommodate and that do not require a lot of equipment. This may include inspections and replacement of brakes, tires, oil or brake fluid and air or cabin filters. The benefits to the customer are obvious, as vans can cover a larger area and access locations that are far away from the nearest authorized workshop. It can also give customers more “peace of mind”, allow for easier scheduling and service the vehicle where it is most convenient for the customer. Customers do not need a replacement vehicle during the service, and it can usually be done quite quickly. There is also an opportunity for economies of scale with commercial customers when vans provide service for several cars at the same time.

Today’s workshops are also focused on ICE vehicles and have to maintain specialized equipment. The service vans would be able to free up workshop capacity by doing the less complex BEV services, to enable authorized workshops to remain with focus on the ageing ICE vehicle car parc. This would lower the pressure on workshops to restructure their workflows and allow them to use their overheads more effectively.

To set up a van service, workshops need more efficient appointment scheduling systems to avoid as much downtime as possible (i.e., driving from the workshop to customers or between customers). The service van technicians also need to know exactly what kind of work and what parts are required to enable one-touch service without a second appointment (that might annoy customers and cost more). It is vital to have an efficient parts management system as well to ensure parts are available when and where the service van needs them. Before loading the service van with the necessary tools and parts, the technician needs to have the digital diagnosis from the car and the background processes and software on deck ready to better plan the scope of the work.

This service is already available as standard for individual customers at Tesla or Rivian and for fleet customers at Ford.<sup>16, 17, 18</sup> Even if an OEM does not offer service vans, other independent service providers will. RepairSmith, for example, operates a fleet of service vans as an independent service provider and as a partner to various OEMs.<sup>19</sup>

**b) “Park-and-service” points:**

Customers may be dissatisfied if they have to travel a long distance to the nearest authorized workshop. To shorten the distance, OEMs can increase coverage with simple, customer-facing park-and-service points. They are generally in convenient locations where customers can leave the car while a technician takes care of the service and any transportation needs.

It does not take much effort or investment to set up a park-and-service point and you don’t need much equipment or infrastructure. Most OEMs provide some type of key disposal box or personal reception at the site, though this would not be needed for connected cars with remote unlocking and starting features. Customers can park their cars for service in a suitable location either close to their home, both in rural areas and in big cities, or close to a convenient location, such as an airport as is currently the practice at Audi and Mercedes-Benz.<sup>20, 21</sup> This allows the OEM to leverage synergies if they can fill up the parking spots and transfer several vehicles at a time on a car carrier trailer. When combined with a mobile service van, technicians can service cars in bulk at the service point with little to no transfer needed. The benefits of this approach, provided it is managed correctly, would outweigh the costs for transportation, construction and operation of a park-and-service point.

**c) “Pick-up and delivery” service:**

To take the park-and-service point concept to the next level, instead of picking up cars at a pre-defined lot, technicians could also pick up the car at the customer’s preferred location. There are a lot of car companies and workshops offering this service, which may even be complimentary for select workshops and short distances, as is the case with Ford’s network in the US.<sup>22</sup> This is obviously the most convenient solution for the customer, but also the most expensive solution for the OEM, as it is particularly labor-intensive and must meet the standards of a customer-facing facility.

### **3. Centralize and digitalize processes**

To accommodate novel network solutions (e.g., service vans or factories) as well as USBs and other service solutions with a stronger OEM focus, providers need to digitalize all current and future processes. A robust digitalization strategy will allow OEMs to improve operational efficiency, enhance the customer experience and gain a competitive edge in the aftersales market. There are three key processes that OEMs need to improve, centralize and digitalize:

#### **a) Customer communications**

We see today's dealerships as the main anchor point for customers following a car purchase. They often lead the conversation and may even create their own communication solutions and apps, except when it comes to recalls and general information about new products. This may include complaints management, service communications and sales pitches with concrete offers. From the OEMs' perspective, they would like to be more involved with or directly responsible for more sales and services transactions. It is therefore critical to collect more customer insights across different channels if they want to improve product and service customization and meet customer expectations. Vehicle status and car diagnosis data is also key to create customized offerings that can now be initiated and managed directly by the OEM. Operational efficiency, economies of scale and utilization of flexible network solutions will improve as a result. A robust, centralized customer relationship management system (CRM) is a crucial element of the dealership management system (DMS). Establishing digital channels like chatbots and AI-powered customer support can also decrease administrative costs and improve services.

#### **b) Appointment booking**

Workshop staff is currently responsible for almost all appointment bookings and, though there are apps that send alerts to customers, end-to-end appointment management systems are rare. OEMs should provide a centralized automated appointment management system to leverage scale and efficiency, and to eliminate the huge amount of unproductive administrative labor currently being provided by workshop staff. What is more, when customers book appointments online, they can also share the direct diagnosis of the car with the workshop to better schedule and prepare the necessary parts or tools. To take the seamless customer experience one step further, customers might be able to book appointments at the most appropriate workshop directly in the car's online infotainment system.

#### **c) Workshop workflows (logistics, output and return processes)**

Besides advances in AI and potential automation, OEMs need a single-source-of-truth as the central data repository in order to digitalize the workflows within their workshops. This will enable the workshop to generate digital work plans, provide relevant repair information and instructions (even with interactive video content), and create individual checklists for maintenance check-ups. It is also vital to upgrade to new, flexible network solutions and have systems in place that plan and monitor services at more than one facility (e.g., service factory and satellite) in order to improve uptime and minimize customer waiting time. Another key improvement area is logistic, where IT systems could enable workshops to order parts online in advance (perhaps even by the customer themselves when they book their appointments in the car's infotainment system) and to manage

inventories digitally – a robust parts management system is particularly critical for service vans. When it comes to staff for the service vans, park-and-service points or pick-up-and-delivery services, scheduling needs to be as cost-efficient as possible. At the same time, it is important to improve operational efficiency for BEV service in the workshop; for example, using car lifts only when needed and optimizing the use of specialized tools. If properly managed, workshops have the potential to cut up to 50% of non-billable administrative tasks in both appointment booking as well as workshop workflows.



# LOGISTICS ROUTE

NETWORK · REAL-TIME



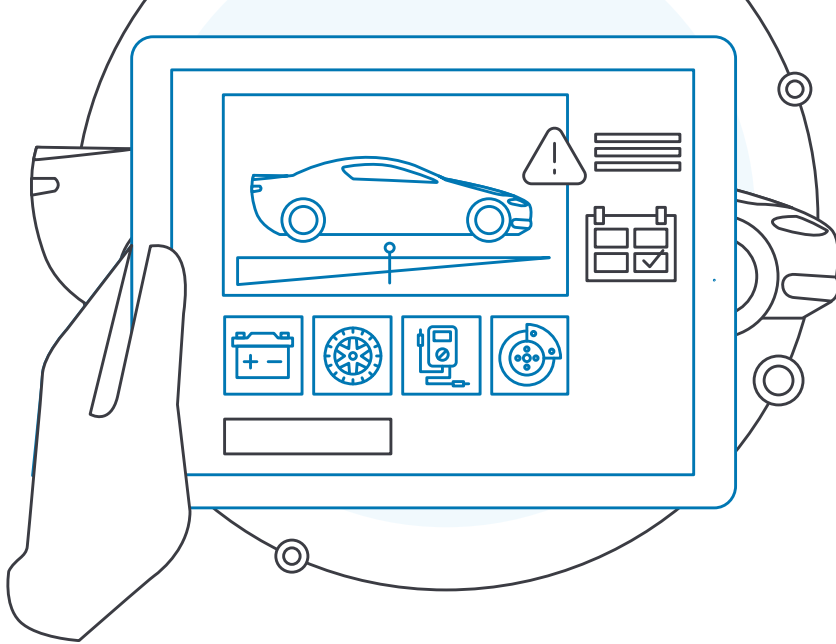
Multi-modal  
Multi-user



Network

D





### 3.4 Vehicle technology and requirements

Our current aftersales business model is revenue-driven, as high-maintenance ICE vehicles need annual service check-ups that can generate relevant up-selling and cross-selling potential for wear and tear, repair, accessories and other service segments. This model will not work as well for BEVs, as the service cycles get longer, and customers start to develop a no-service-is-the-best-service attitude. The aftersales market needs to move towards a cost-based approach for even lower-maintenance vehicles. In addition, up-front service bundles and other pre-paid maintenance packages can attract customers to the workshop with easy maintenance and create touchpoints for up-selling and cross-selling opportunities. What customers expect, however, is some type of all-inclusive package that increases goodwill and warranty costs. As a result, making aftersales as cost-efficient as possible is even more vital.

We are proposing four different solutions related to vehicle development that will maximize the potential of aftersales business:

#### 1. Reduce operational costs for repair service packages by extending service intervals

The trend is shifting increasingly towards all-inclusive service (e.g., warranty, service packages, USB), which means that damage to a particular part no longer results in additional revenue. Since the customer has already paid for the parts upfront, they are now considered an expense. And the longer maintenance cycles of BEVs make it quite expensive to visit the workshop just to replace one part. OEMs therefore

need to adjust the replacement intervals to these longer maintenance cycles. At the same time, manufacturers need to reduce the potential for wear and tear on all parts and make new cars as maintenance-free as possible (e.g., no key battery replacement, fewer electronics failures).

#### 2. Create future aftersales revenue by making it easier to repair more parts (esp. batteries)

As we mentioned early, today's batteries are expensive but very difficult to repair. We need to make repairable batteries technically feasible, cheaper and decentralized (with low shipping costs) and maintain backwards compatibility to avoid losses in the accident and repair business. As batteries are expensive to store, backwards compatibility will reduce both the cost and duration of battery storage. They need to be connected to a charging unit to maintain the necessary charge, which can increase storage costs or even require an extra warehouse. Reducing the variety of batteries can also reduce battery replacement costs. There are four types of battery repair. First, replacing the entire battery, which is common practice for large, connected battery packs that may even be built into the structure of the car. The second option is to replace only the modules that are faulty, which would be cheaper than replacing the entire battery pack and would potentially allow the workshop to remanufacture the faulty module. In the third option, the workshop only replaces individual cells – something that might be possible in the future using high-precision tools that can extract them without damaging the neighboring cells. This would be especially useful for integrated batteries to avoid the high cost of completely disassembling the battery. Finally, technicians

could bypass faulty cells and simply stop using them, a comparably easy repair that would likely only reduce the range slightly. This is, however, an expensive solution to implement and develop, as technicians would have to mechanically bypass the cell in question, unless each cell was designed to allow for bypasses from the start. The high production cost of this type of battery might be difficult to sell in a revenue-based aftersales model, because the actual change does not require many spare parts or intense manual labor. But as a relatively low-cost alternative to battery replacement, it might be more appealing to customers in the medium term.

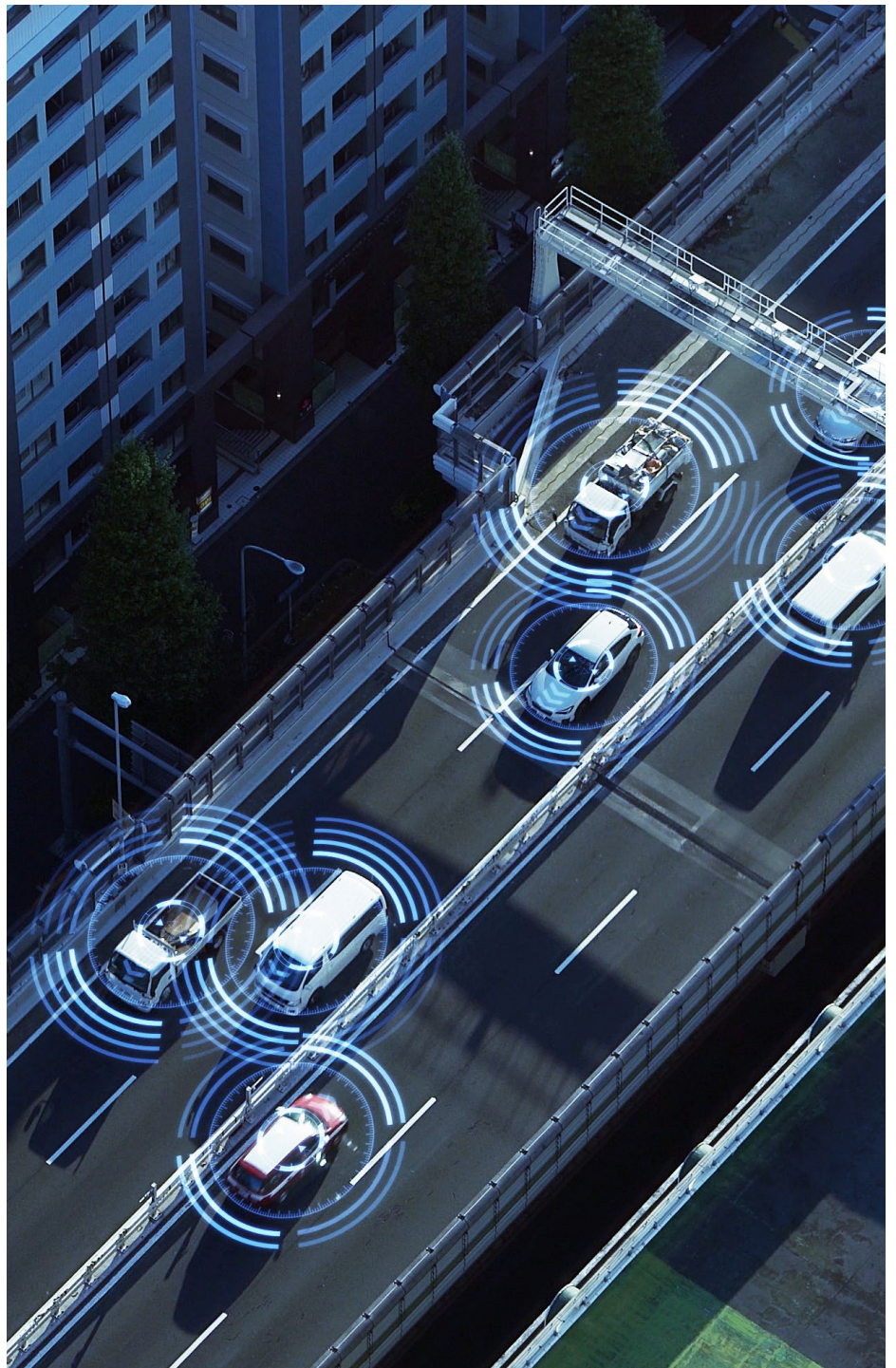
#### 3. Utilize predictive maintenance and virtual inspections to prevent unnecessary repair costs

Making two trips to the workshop for maintenance and wear and tear parts is expensive. That is why it is so important for OEMs to digitalize their services and use car sensors to minimize in-person service visits. Digital twins can help OEMs understand which breakdowns are possible and/or likely. To improve appointment scheduling and predict faults, the cars need additional sensors to track the status of the vehicle, including wear and tear. Skoda, for example, uses microphones to record sound within the car and automatically detect any deviations from the target state. This is currently done in an app, but it may be possible in the future to include this feature in the car. To avoid the high cost of extra appointments, OEMs should ideally include parts replacement in the regularly scheduled inspections. This is especially relevant if brands increase the yearly service interval from one to two or more years. It could also be an option to define convenient customer touchpoints as a trig-

ger to bring customers into the workshop. For example, if a part needs replacing, car owners can book an appointment and order the replacement parts directly in the infotainment system. This helps OEM better forecast parts supply and plan capacity for both the physical workshop and mobile solutions like the service van.

#### 4. Use Over-the-air (OTA) updates to avoid physical repair costs

OEMs traditionally purchase parts from suppliers that also work with their own software, which makes repairs costly and complicated. Tesla is taking a different approach with separate hardware and software. Customers purchase parts from third-party suppliers, while the software is centrally stored in Tesla's own operating system.<sup>23</sup> In the end, this centralizes the computing capacity needed to control all or most of the parts in a single module. The OEM would then be able to simply maintain and update the system using "over-the-air" (OTA) updates, guaranteeing more data sovereignty, faster innovations cycles and lower repair costs on the software side. Tesla is a leader in this area, reporting that 80% of its service requests are resolved through software updates. Some OEMs, like Volkswagen or Mercedes-Benz, are also taking this route, which requires high investments initially but can lead to a reduction in service costs over the long term.



### 3.5 Business steering

Using USBs to drive customer loyalization requires more flexible networks and vehicles that transfer service from the authorized workshops to the OEM as well as a more integrated operational and organizational structure. There are several key aspects to consider:

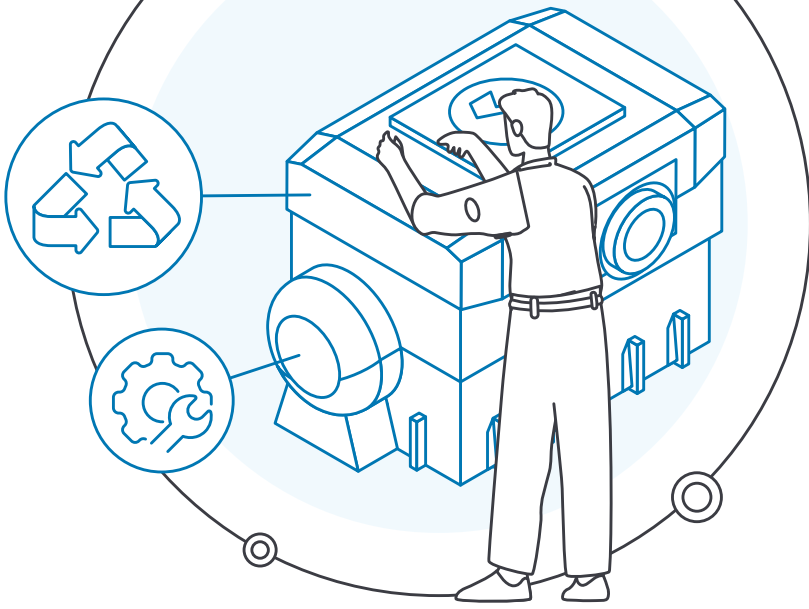
First, the division of roles between OEMs and their authorized workshops needs to change. OEMs need to be in more direct control, given the flexible network solutions, a customer preference for USBs and ease of mind, and the trend towards a more centralized vehicle architecture. We need to accelerate the shift to a cost-driven aftersales approach and incentivize dealers to operate more cost-effectively for those USBs where the OEM is the customers' main contact for aftersales services, particularly direct-sales models. OEMs are actually in a stronger position here, because – unlike when services are provided under warranty – they can refer customers to workshops with competitive prices. Such a high proportion of centrally paid aftersales services may also pave the way for other aftersales services to be more centralized, e.g., high voltage parts. OTA updates allow OEMs to fully control service updates without involving authorized workshops, making software-related aftersales services the mandate of the OEM. The effect will be magnified for OEMs that develop their own vehicle operating systems. As the USB segment eventually becomes less attractive for workshops, they may shift their focus to older ICE models to keep utilization rates high.

We also expect consolidation on the workshop market with bigger dealer chains dominating certain market areas to ensure the flexible network solutions are as efficient as possible. In the end, this may even increase the workshops' bargaining power over time.

Second, OEMs or regional dealership chains need a more centralized management of their flexible service networks. They decide which cars are transported to service factories and which work is carried out in a smaller satellite workshop or by a service van. They are also responsible for keeping the distance manageable both in terms of touchpoints and service facilities. This also influences the degree of control in terms of capacity planning, pricing and logistics to ensure scalability. OEMs therefore need to prepare for a higher operative throughput of closely managed services and supply the tools the workshops need to run flexible networks, e.g., systems for route planning, adapted capacity and logistics planning.

Third, we need to change the way profits are allocated between OEMs and workshops. You need more labor but fewer parts to provide most maintenance services under today's USBs – but parts traditionally generated most of OEM profits in the past. So, OEMs need to identify new monetization strategies and ensure more equal distribution of profits between the OEMs and the authorized workshops. Because labor rates have increased over recent years, OEMs need to get a handle on warranty, goodwill and USB prices.

The OEM receives the money for the USB upfront, putting the workshops more and more in the role of service agents. Much like the warranty approach, OEMs could negotiate fixed prices and margins with the workshops. OEMs can use their leverage to funnel customers to specific workshops if alternatives are still accessible and convenient for customers. This will allow them to negotiate labor prices and volume discounts more effectively – they might even consider negotiating fixed rates for certain service bundles.



### 3.6 New services

The increasing awareness of climate change, the depletion of resources and the proliferation of waste have led to a paradigm shift in the way today's OEMs operate. To address these challenges, it is imperative for OEMs to rethink their traditional linear business models and explore new approaches that allow them to extract value from their products throughout their lifecycle. For a more in-depth look at this, check out our Deloitte Pathway to Net Zero Study.<sup>2</sup> When it comes to BEVs, the battery system is the key differentiator, though for many years the focus has not been on recycling batteries, even though many battery components are becoming more important for the following reasons. First, batteries contain valuable raw materials (in particular, lithium, manganese, nickel, and cobalt), and we could potentially mitigate resource shortages and supply bottlenecks by recycling them. Second, recyclable batteries could significantly reduce a company's carbon footprint; after all, battery production accounts for up to a third of the total production emissions of a BEV depending on the region and energy mix.<sup>24</sup> Third, manufacturers could avoid the high cost of disposal and R&D on new battery systems. The intrinsic value of a battery pack is often higher than the cost of recycling. In other words, even if a battery has less than 80% capacity, it is still a valuable form of energy storage.

We are seeing new business models emerge in the three areas of remanufacturing, reuse and recycling, though they will vary depending on the capacity and the wear and tear of the battery pack over its lifetime.

#### Remanufacturing

The first and most obvious option is to reuse the battery system or its components in another vehicle. The lifespan of a battery is very dependent on driving style, charging frequency, temperature and age. Most of today's OEMs guarantee roughly 70% capacity after 8 to 10 years or an equivalent of 160,000 km.<sup>25</sup> However, we can expect the actual average capacity to be higher for modern cars at between 60 and 70% capacity after a lifespan of 15 to 20 years – and that lifespan will likely continue to improve over time. When a partially faulty battery is replaced, it is vital to have specialists on-site to complete inspection and remanufacturing. Opel has a Battery Refurbishment Center where all high-voltage batteries are opened, repaired and put back in the warehouse to become a replacement battery in the next warranty case.<sup>26</sup> Reusing older batteries can also partially offset the losses in the accident and repair business if a new battery is more costly than the residual value of the car. Lifetime-adjusted spare batteries with a lower capacity but also a lower cost might be an attractive option for used car customers.

#### Reuse

After being used one or more times post-remanufacturing, a battery pack can also be disassembled into its components and get a "new life" in either the primary or secondary energy market. On the primary market, these used batteries can store energy from renewable resources, help manage peak electricity demand, further stabilize the grid or serve as an emergency power backup. In the secondary market, they can be used as a flexible charging station (comparable to portable chargers for cell phones) and as energy storage for homes or factories.

#### Recycling

At the end of life, a battery can be recycled in a process of shredding, drying and screening the battery components to extract the most coveted resources lithium, nickel and cobalt. Since many OEMs have binding sustainability targets, it is absolutely essential to recycle all battery components. Recycling helps mitigate environmental impact, consume fewer resources and support the circular economy. By the end of the decade, OEMs will face more pressure from a legislator standpoint; the European Union's Green Deal, for example, calls for 80% of all lithium to be recycled by 2031.<sup>27</sup> Today's technology is already outperforming those targets: Volkswagen in Salzgitter, for instance, can already recover around 90% of the raw materials in a battery.<sup>28</sup> In collaboration with US-based Redwood and other specialized recycling firms, recovery rates can go as high as 95%.<sup>29</sup> Tesla is also recycling more than 90% of the raw materials in their batteries in its Gigafactories.<sup>30</sup> This is difficult to scale, however, due to the OEMs' different battery designs, non-recyclable battery materials and the high cost of recycling. So, it makes sense to focus more on reusing batteries before attempting to recycle them. OEMs also need to factor future recycling into the design and production of the vehicles themselves, using standardized connectors, avoiding adhesives and minimizing the number of hard-to-recycle materials.

# Outlook



The shift toward battery electric vehicles (BEVs) also presents an opportune moment for OEMs to reassess business opportunities in their existing strategic orientation and explore unique roads to growth. Working collaboratively, we can turn these challenges into opportunities, enabling OEMs to innovate, ensure sustainability, and boost long-term competitiveness. These opposing potentials could substantially leverage a BEV-induced decline. Deloitte has already supported several OEMs, importers and dealer groups in evaluating countermeasures and new business opportunities for exemplary software-defined platforms, battery services and their future service networks.

- As stated in Chapter 3.4, software-defined vehicles on electric platforms are a key cornerstone for future transformations in a BEV world. Connected and intelligent vehicles allow for digital problem-solving and customer service satisfaction. Software-defined vehicle platforms facilitate faster and more efficient integration of new services and features, which will further enhance the customer experience with significant business potential. Especially in an after-sales environment, vehicle digitalization opens up a strong business field that warrants further exploration.
- With the rise of BEVs, the importance of closing the loop through battery services, repair, reuse, and recycling increases notably and provides a substantial revenue opportunity. As mentioned in Chapter 3.6, increased focus on these products related to battery usage could generate additional revenue for OEMs. However, the potential extends far beyond a sole focus on batteries and is therefore not fully covered in this study. Through its sustainability practice, Deloitte has developed a perspective on sustainability in aftersales which can be opened up for discussion.





- The service network will remain crucial for OEMs in the future, in order to maintain customer satisfaction. As stated in Chapter 3.3, its shift to modularization presents a major opportunity for all parties along the value chain. In emerging markets with expected car parc growth, the focus would be on developing scalable processes and setting up new network elements quickly. By contrast, in mature markets where car parc is expected to decline, efforts may concentrate on service consolidation, operational efficiency, and digital solution integration. A thorough market-specific analysis

will guide OEMs in shaping their future service networks. For dealers, it provides a unique opportunity to position themselves with fewer standards. We have helped dealer groups to identify and exploit opportunities.

Collectively, the shift towards BEVs requires a significant adaptation of the current business but also presents unique opportunities for innovation and growth. By proactively embracing these changes and partnering for solutions, we can create a successful and sustainable roadmap into this new era of electric mobility.

# How we can support you

## 4.1 What to do now

### 1. Review the status quo and evaluate future impact

As a first step, we encourage OEMs to use the example of our proxy OEM, adapt it to their own business and identify any relevant regional differences. This will help them better understand the status quo and to make a quantitative assessment of the future impact of the BEV transition on their business, on their service networks and other “dependents”.

### 2. Develop a target model for the aftersales business

OEMs need to develop a clear strategic vision and approach that is in line with their ambitions and current strengths, i.e., what types of service will they be offering, how will it be delivered, and what kind of operating model and expertise are required.

### 3. Define a transformational path to future business

Last but not least, OEMs need to define a path forward and set concrete initiatives and action plans that will mitigate the negative effects of the BEV transition on the aftersales business as well as make the business as future-proof as possible for the changes to come.



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# Contacts



**Harald Proff**  
Partner  
Global Automotive Sector Lead  
Tel: +49 211 8772 3184  
hproff@deloitte.de



**Jan Bakker**  
Partner  
Automotive Lead Strategy, Analytics, M&A  
Tel: +49 89 29036 7640  
janbakker@deloitte.de



**Holger Weuste**  
Partner  
Global Lead Client Service  
Tel: +49 89 29036 7827  
hweuste@deloitte.de



**Jochen Funk**  
Partner  
Automotive Strategy  
Tel: +49 30 25468 3020  
jochfunk@deloitte.de



**Melina Weidenbach**  
Director  
Automotive Sales & Aftersales Expert  
Tel: +49 211 8772 3741  
mweidenbach@deloitte.de



**Toni Meyer**  
Senior Manager  
Automotive Strategy  
Tel: +49 69 97137 244  
tomeyer@deloitte.de



**Julian Zaßenhaus**  
Manager  
Automotive Strategy  
Tel: +49 211 8772 3862  
jzassenhaus@deloitte.de



**Christian Schlipf**  
Senior Consultant  
Automotive Strategy  
Tel: +49 89 29036 5961  
cschlipf@deloitte.de



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