

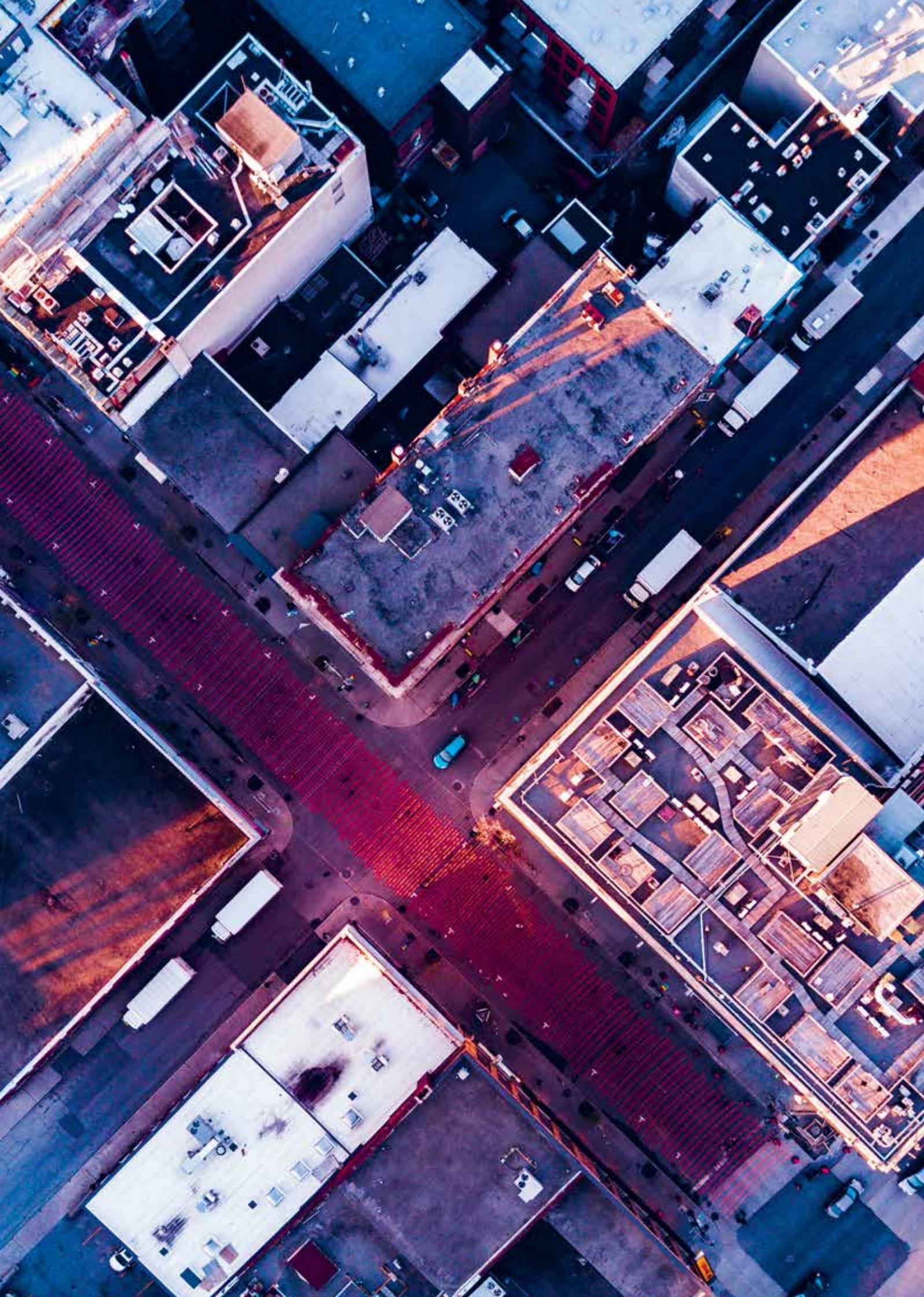
PLUGGED IN

Collaborating to win with electric vehicles

Are electric vehicles the future of the automotive industry? Certainly, there are many in the industry who would argue that is so, even though uncertainties surrounding electric-drive systems remain – and have increased significantly.

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Challenges to electric vehicles include the current low cost of fossil fuels, the recent protectionist and nationalistic leanings of some governments and interest groups, and the limited willingness of automobile manufacturers and suppliers to partner with competitors. At the same time, interest in electric vehicles (EVs) has spiked, fueled by the diesel emissions scandal, the continued regulator focus on reducing fine particulate and nitrogen oxide (NOx) emissions, and government strategies concerning fossil fuel dependencies and global warming.

SEEKING THE KEY TO EV MARKET SUCCESS

Without binding legislation that is consistent across borders or the willingness of players to work with each other beyond standard-setting activities, the rapid adoption of electric vehicles technology remains unlikely. That places the automotive industry in the nebulous position of preparing for a potential disruption without any evidence of when it will happen or how it will play out.

Customer feedback on past sales suggests that electric vehicles will not achieve significant market shares simply as alternatives to conventional drive systems or due to high fuel costs. The higher costs of the vehicles and their limited range, coupled with uncertainties regarding infrastructure development and vehicle residual values, have reinforced a persistent reluctance among customers to buying electric vehicles in the numbers needed to make it profitable for automakers.

Consequently, market success will depend heavily on legislation to drive electric vehicles sales, which in turn may trigger the need to establish the necessary infrastructure and lead to the scale effects that will bring prices down to a level where they can compete with conventional automobiles. The likelihood of short-term legislative changes varies by country, and the outcome is unclear. Nations with strong automotive industries and traditional infrastructure tend to be less aggressive than others; they typically rely on a haphazard network of incentives instead of setting hard quotas. In contrast, smaller markets without substantial automotive industry footprints, such as Norway or the Netherlands, or resource-limited island nations and cities like London, often exhibit significantly more agility. Likewise, emerging markets that lack a strong internal combustion engine (ICE) technology heritage or leadership and are establishing modern energy infrastructure, such as China, are aggressively attempting to leapfrog others to become leaders in the electric vehicles field.

Global vehicle powertrain electrification will probably gain momentum when lead markets change their electric vehicles penetration strategies and when electric vehicles technology costs reach competitive parity with the internal combustion engine. When this will happen remains unclear.

Our research has identified four theoretical electric vehicles penetration archetypes, based on legislation and incentives, with very different ramp-up scenarios through 2035. These are

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not actual predictions of future electric vehicles penetration, rather they are “what if” estimates of the theoretical rate of new electric vehicles penetration by 2035 given certain legislation or incentives. For example, the first archetype models strong legislation, such as that proposed for Norway in 2025, and indicates the penetration rate would exceed 95 percent. For the archetype that focuses on urban and metropolitan areas in markets with low internal combustion engine heritage, such as China, the rate is about 70 percent. The archetype for markets focused on incentives, such as Germany, is 35 percent, and for those with no additional legislation or incentives, the rate drops to about 10 percent.

UNDERSTANDING THE VEHICLE TECHNOLOGY CHALLENGES

Electrification will have an increasingly dramatic impact on the automotive value chain, depending on the degree of e-mobility chosen such as mild hybrid, plug-in hybrid, or battery electric. Research suggests that one-third of the overall value creation of an average vehicle will fundamentally change when comparing a battery electric vehicle with a conventional one. These changes focus on specific areas, thus affecting specific business models and value chains in significantly different ways.

Consequently, conventional engine and transmission components will face an ongoing decline, while the electronics landscape will likely experience comprehensive change, as power and control systems migrate to higher voltages and vehicle system electrification predominates. (See Exhibit 1.)

CREATING NEW INFRASTRUCTURE

If successful, electric vehicles could make established energy delivery infrastructure and value chains obsolete. Vehicles will move away from centralized fueling points, such as gas stations, to a new, distributed and ideally smart electric-grid-based delivery system. This shift will inevitably open a service

industry to handle customer recharging needs – with a new set of players and rules.

This of course puts into question the future of fuel cell vehicles that is, cars requiring hydrogen-based fueling stations, as they will have to adhere to traditional centralized fueling models and value chains, especially with battery technologies rapidly moving forward and the technical complexity and associated costs of fuel cell vehicles countering its benefits.

WHAT TO DO: COLLABORATE TO COMPETE

Automotive players need to develop a comprehensive strategy that addresses today’s industry needs and anticipates a potentially rapid shift towards electrification. Attempts at “parallel positioning”, meaning pursuing multiple strategies side-by-side, as some players are currently doing, come at a high cost and can carry extreme risks. For instance, due to the rapid changes in electric drive technology and the uncertainties regarding which systems will mature in the market, investing in particular areas is far from a sure thing. Parallel investment in fuel cells and battery electric powertrains, as well as spending on

traditional internal combustion engines – even when combined with limited partnerships – will stretch the limited research and development budgets of even the largest automakers. Adding to this burden, the extensive investments required for autonomous-vehicle technologies and advanced safety systems could push spending requirements beyond the breaking point.

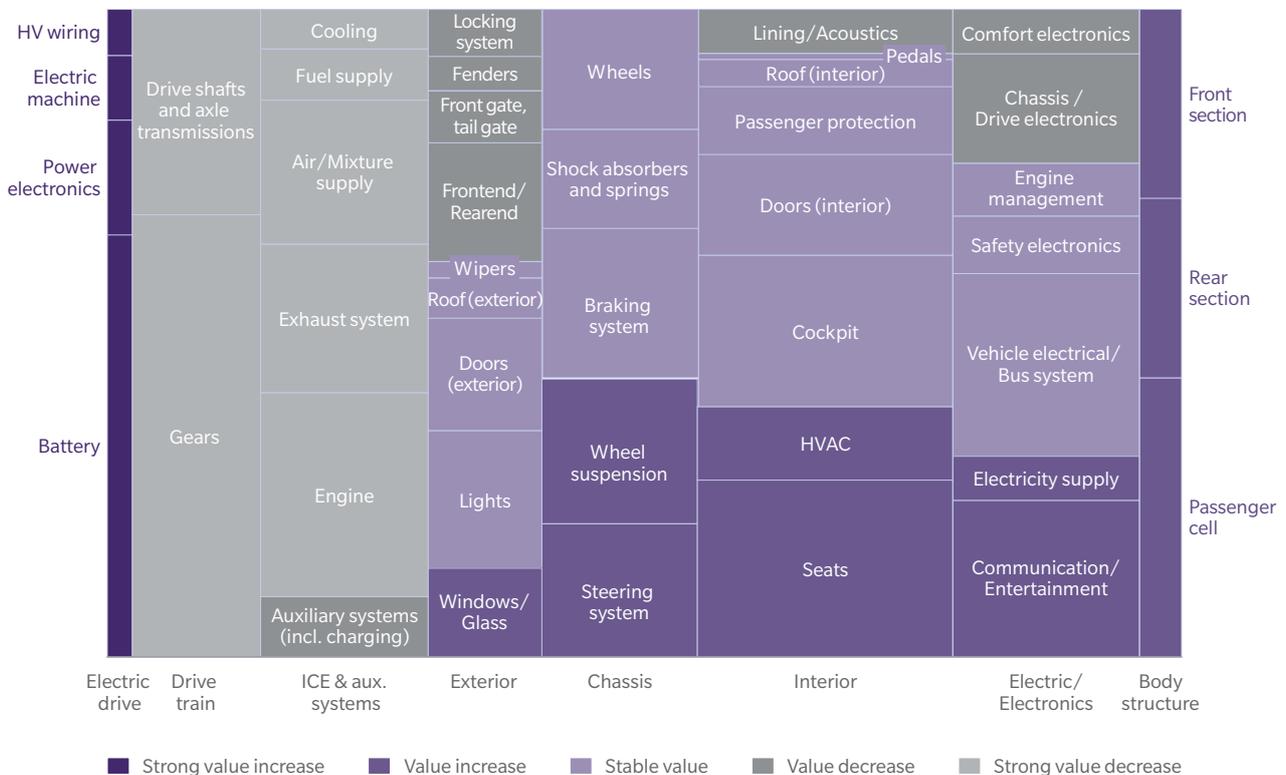
To address these uncertainties and spend research and development money wisely, we believe automakers and suppliers need to accelerate their participation in bold, cross-competitor initiatives to develop battery-electric vehicles, which could include full vehicle platform sharing beyond batteries, as well as joint work on internal combustion engines and hybrid powertrains as short- and mid-term solutions.

To accelerate the overall electrification trend once it gains critical mass, markets need legislative decisions that align across all forms of transportation, and ideally across borders in ways that reinforce each other. Strong lead markets could form the tipping point of a true electric vehicles disruption. At the same time, the willingness of carmakers and suppliers to work with competitors will limit their risk exposure while driving technology forward and costs down for the benefit of all participants. ●

EXHIBIT 1: IMPACT OF E-MOBILITY ON VALUE SPLIT OF VEHICLE MODULES

Due to the increasing market penetration of alternative power trains, the future value split of electric vehicles modules in a car will strongly increase

2016 TOTAL MARKET VALUE SPLIT OF VEHICLE MODULES AND FUTURE DEVELOPMENT



Source: Oliver Wyman automotive cost and value migration model