

The irresistible momentum behind clean, electric, connected mobility: Four key trends

Mobility's future is visible in the increasing support of capital markets, the demands of Chinese consumers, the effort to slow climate change, and the new skills automakers will need to deal with these shifts.

General Motors' January announcement that it would join other automakers by selling only zero-emission vehicles (in its case, by 2035) was one of the most well-publicized examples of something that has become crystal clear over the past few years: the momentum behind cleaner, software-enabled forms of mobility is powerful and seemingly unstoppable.

What does this mean for companies and consumers? In this article, we'll look at four trends that illustrate the way this new form of transformation will develop: the increasing support of capital markets; the kinds of features these vehicles will have, as seen by the demands of Chinese consumers; the speed needed for this transition to contribute meaningfully to the slowing of climate change; and the impact this shift will have on labor markets.

Why capital markets love mobility

by Kersten Heineke, Timo Möller, Asutosh Padhi, Dennis Schwedhelm, and Andreas Tschiesner

Over the past year and a half, the mobility industry has significantly outperformed top-performing industries, such as semiconductors and big tech, in capital markets. We think this reflects that new mobility start-ups are doing six key things right.

1. Accessing new value pools

While public attention has focused on autonomous electric vehicles (EVs) that might replace today's internal-combustion cars, the mobility industry has headed in several promising new directions. Shared mobility, for example, is an industry that could double in size by 2030. Advanced connectivity solutions for EVs, such as personalized contextual advertising based on driving routes, could create a considerable new subscription business, potentially generating up to \$310 in revenue and \$180 in cost savings per year per car by the end of this decade.

2. Getting software right

We estimate that the automotive software market will have grown by approximately 250 percent by the end of the decade. This will put software at the very center of new automobile designs.

3. Winning the talent war

New mobility requires new kinds of talent. New mobility players in the field are perceived as software- or electronics-first companies and have focused on hiring talent with digital skills from the outset. To catch up, traditional players will have to reskill up to a quarter of their current workforce.

4. Focusing on green

New mobility players have always seen the value of zero-emission vehicles and aim to cut both tailpipe emissions (which account for two-thirds of the total) and emissions from production (the remaining third). The €1.5 billion European Green Vehicles Initiative supports the effort. Consumers factoring sustainability into buying decisions helped drive EV sales up 43 percent in 2020.

5. Focusing on customers

Car buying and maintenance have entered the rapidly growing realm of experience shopping. New mobility players lead with a set of customer-centric solutions that ease the customer journey. It's not just dedicated apps; there are also social networks, flagship showrooms, and lounges for vehicle owners, creating a pleasing environment that envelops consumers from sales to service upgrades.

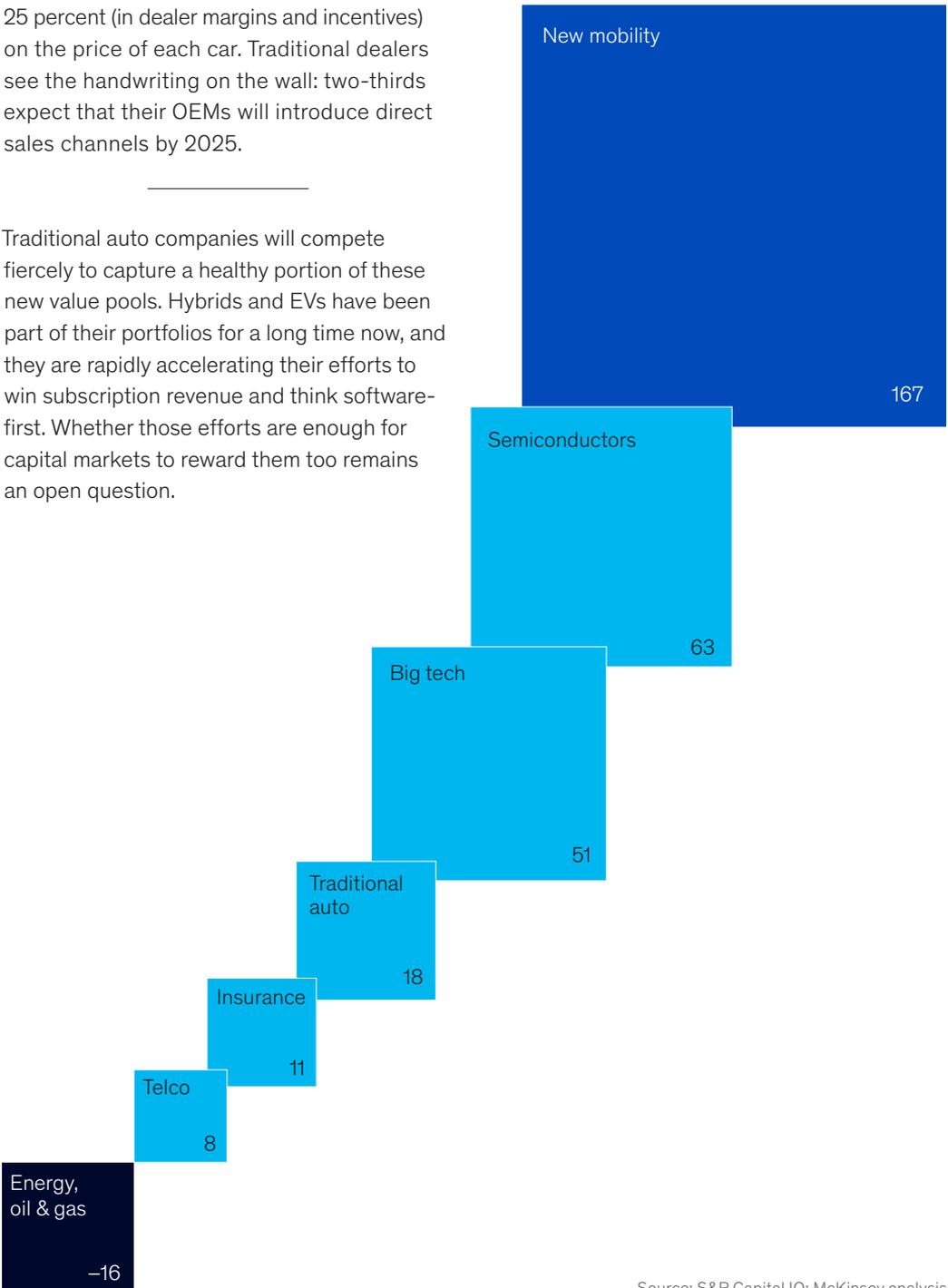
6. Offering new purchasing options

Mobility start-ups are giving consumers what they want with the direct purchase of vehicles: 50 percent of consumers across the world's key markets say they are interested in online car purchases, although less than 5 percent of purchases are made that way now. The absence of a traditional dealer structure allows new mobility players to save up to 25 percent (in dealer margins and incentives) on the price of each car. Traditional dealers see the handwriting on the wall: two-thirds expect that their OEMs will introduce direct sales channels by 2025.

Traditional auto companies will compete fiercely to capture a healthy portion of these new value pools. Hybrids and EVs have been part of their portfolios for a long time now, and they are rapidly accelerating their efforts to win subscription revenue and think software-first. Whether those efforts are enough for capital markets to reward them too remains an open question.

Capital market performance by industry cluster

Total returns to shareholders, H2 2019–20, weighted average by market cap as of June 1, 2019, %



Source: S&P Capital IQ; McKinsey analysis

China's connected consumer is the future

*by Paul Gao, Florian Garms, Asad Husain,
and Philipp Kampshoff*

If you're a Chinese owner of an electric car, your experience is significantly different from that of most Western electric-car owners. In fact, your experience inside the car is in many ways just an extension of your experience outside the car.

New Chinese automakers have tapped into advanced technologies to deliver a customer journey that is friendly and convenient, starting with online sales, which are the norm in China. But the experience is truly differentiated when you climb into the driver's seat. Advanced facial-recognition systems using in-vehicle cameras kick in immediately, adjusting the seat, steering wheel, and interior lighting to your preferred settings. A customized avatar on the central dashboard screen greets you and even offers up restaurant recommendations if you say that you're looking for someplace to eat. If you want to change the music during your drive, just say so. Chinese automakers have also improved on charging and parking: valet charging services will drive the car to a charging station during your work hours and return it to your parking spot before your commute home. And if you do have to charge the car yourself, you can pay for it from the infotainment screen, which has many of the features and apps that you get on your smartphone.

Connectivity has significantly higher relevance for consumers in China.

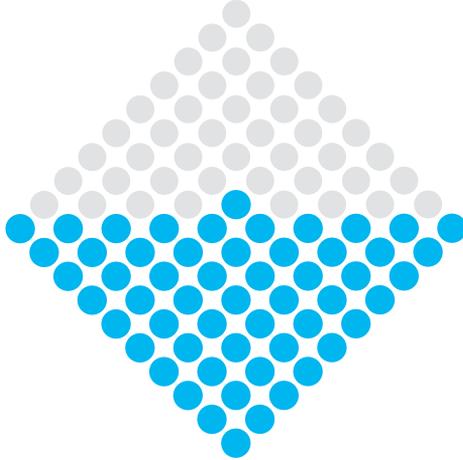
These developments may not seem as significant as, say, electrification itself. But they have the potential to be hugely significant. Chinese consumers are willing to pay twice as much as their Western peers for such features. Electrification may eventually become the expected norm, just as gasoline-powered engines did. But connected, consumer-friendly features have the potential to woo customers—in China, 56 percent of consumers say they'd be willing to change brands for better connectivity. OEMs around the world would be wise to pay attention to that statistic. It may well be that the differentiating feature in the car of the future will be its ability to mimic the conveniences we've come to expect from our smartphones.

**Willingness to switch auto brand
for better connectivity**

% of respondents

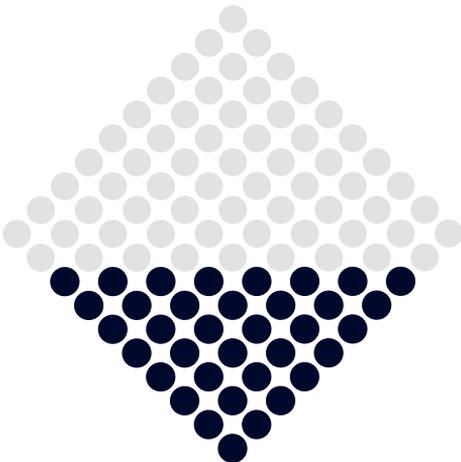
China

56



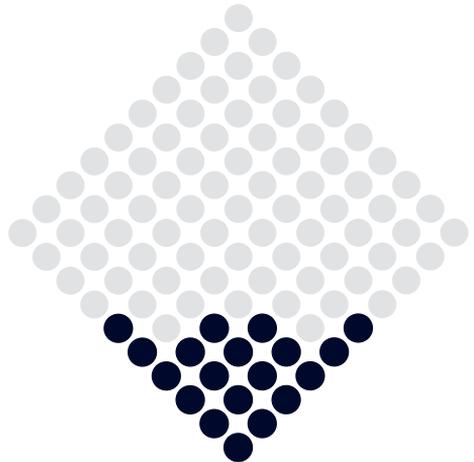
United States

36



Germany

19

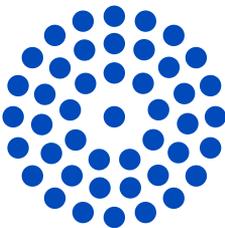


Can electric vehicles put the brakes on climate change?

by Julian Canzade, Russell Hensley,
and Patrick Schaufuss

Despite 2020 being a tipping-point year for EV sales, automakers and consumers will need to accelerate their adoption if we hope to meaningfully limit climate change. Reducing carbon emissions from vehicles is critical—currently, road transport accounts for 13 percent of global carbon emissions.

Carbon budget for 1.5°C target



45
gigatons

To understand the depth of the challenge, consider that the pace of technology development of mobility is already quite fast. The cost of EV batteries, for example, is now just \$100 per kilowatt-hour, down from \$1,200 in 2010. Investment in EV-related technologies and assets almost doubled in 2020. And yet these advancements still aren't enough to ensure that we'll hit the 1.5°C climate targets.

The decade between 2025 and 2035 will determine whether the industry can keep cumulative CO₂ emissions for passenger cars (through 2050) to under 45 gigatons, a “carbon budget” that would help hold global temperature increases to under 1.5°C, according to McKinsey analysis. Mobility players, consumers, and governments face five challenges:

1. Speed the shift to zero-emission vehicles

This is the most efficient lever to reduce carbon emissions. By 2035, more than 95 percent of all cars and trucks on the road would need to be zero-emission vehicles to limit warming to 1.5°C.

2. Leverage the abatement potential of transition technologies

Hybrid vehicles and more efficient gas-powered cars can play an important role in the transition to a zero-emission global vehicle fleet.

3. Reduce vehicle miles traveled

While trends like increased hours of remote work may help reduce vehicular travel, governments may need to explore the traffic optimization potential of multimodal mobility.

4. Increase share of renewables

Clean electricity and low-carbon fuels (eg, renewable natural gas) are needed to reduce the life cycle emission of road transport.

5. Zero-carbon supply chains

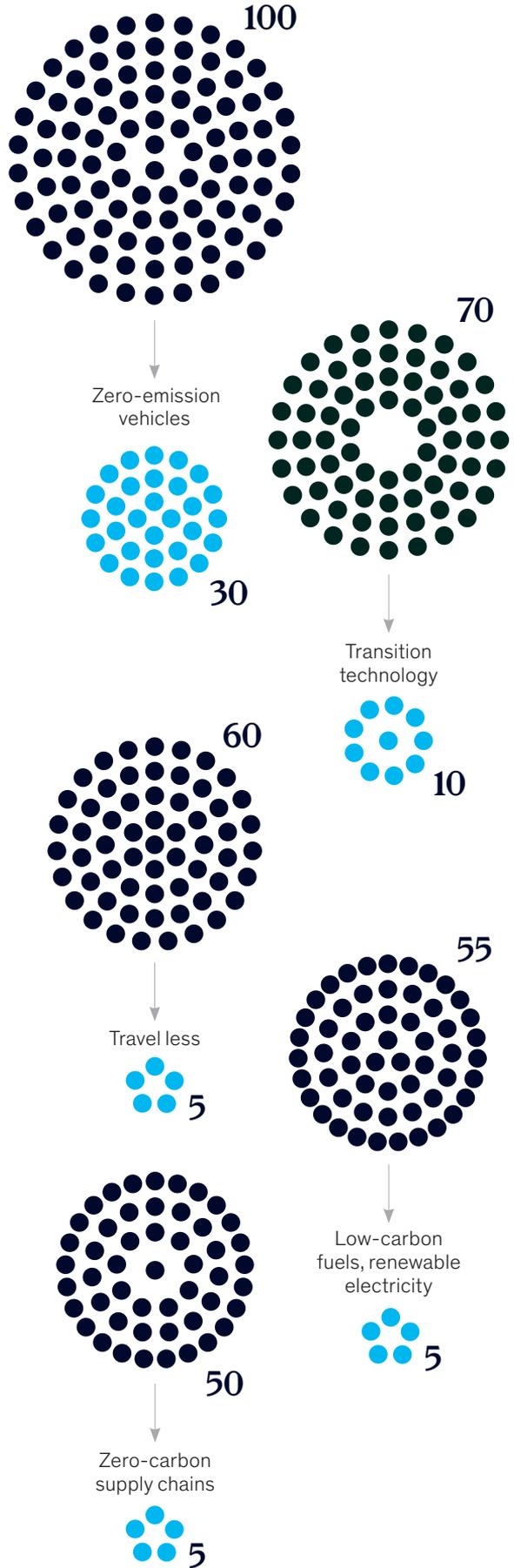
OEMs will also turn their attention to supply chains. How can materials, their transport, and in-plant processes become carbon free? There are a number of promising efforts, like the development of “green” steel, and the location of battery plants close to OEMs to lower carbon transport costs. Some such plants are even powered with carbon-free, water-generated electricity.

Cumulative CO₂ emissions from road transport, 2021–50

Gigatons

- Status quo
- Improved emissions
- Carbon budget

None of this will be easy. Holding emissions under the 45 gigaton target will require a cross-industry effort among companies, industries, and government. For instance, the energy and transport sectors can work together to drive smart-charging technologies that would in turn accelerate the shift to EVs. Coalitions can be formed to develop clean supply chains for the creation of low-carbon battery solutions that reflect the full potential of a circular economy. Ultimately, regulators and policy makers may have to intercede, adopting an ecosystem perspective with cross-border goals and meaningful timelines for everything from number of charge points needed to the trajectory of carbon reduction. Without this kind of cooperation, it's unlikely that the shift to EVs will realize its full potential for creating a sustainable battery value chain and for mitigating the impact of climate change.



New mobility, new skills

by Björn Hagemann, Ruth Heuss, and Kirsten Weerda

Over the next five to ten years, the skill sets of traditional automakers and suppliers will need to shift dramatically. Several factors will drive this change.

The rising importance of in-vehicle software and connected and autonomous cars increases the need for digital talent, putting OEMs worldwide in direct competition with Silicon Valley and the Chinese digital giants. But the shift isn't merely an issue of seeking out new kinds of engineers. Drawing from thousands of existing databases, we created a taxonomy of the future skills the industry will need. Based on that work, we believe that demand for workers with today's standard skill sets will drop by up to 30 percent in the coming decade.

A reduction of employees could occur across the entire automotive value chain. As consumers become increasingly comfortable buying everything online, existing dealer networks could shrink dramatically and shift their focus to maintenance. Manufacturing could take a similar hit, driven mostly by OEMs shifting to EVs with simpler assembly processes and very different parts. Both factory workers and current powertrain suppliers will

Employment changes through losses and reskilling in next decade

- 1 x 100
- Cumulative loss
- Loss per employment category
- Gain per employment category

20–30% lost

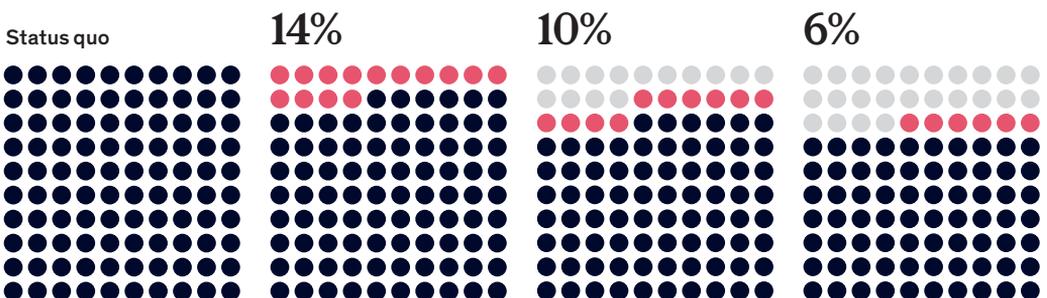
to demand reduction for current skills through electrification, autonomous driving, connected cars, and digitization

Losses

Marketing, sales, and distribution
E-commerce results in fewer dealer networks

Manufacturing
Shift to electric vehicles and autonomous driving reduces demand

Support functions
Digitization and automation reduce demand for in-person support



be affected. Existing large-scale combustion-engineering departments will no longer be needed after 2030—EVs require engineers with more electrical skills and an understanding of battery chemistry. As with many other industries, up to 50 percent of some support-function tasks, such as accounting or order processing, are likely to be fully automated. And for those tasks that can't be automated, we may see the creation of shared service centers in low-cost locations, now that companies are more skilled at using digital tools and more comfortable with remote work because of the pandemic.

New skills will be needed, especially in software and data analytics, which will be critical for online sales and marketing channels. We believe automakers can close up to half of the skills gap organically, by way of reskilling, continuous education, and hiring. M&A and strategic partnerships, already a core aspect of the mobility ecosystem, will also play a big role. Every automaker needs a strategic workforce

plan that identifies critical roles and skills *at every level* in the organization, and matches the right talent to the most value-creating roles. This would be a big shift from the traditional succession and talent management processes of OEMs, which have focused on the top tiers of the company.

This skills transformation will demand a culture transformation as well. Automakers will have to provide the kind of employee experience that top talent has come to expect at tech companies, which means approachable managers, speedy hiring and onboarding, agile-work and fast-decision processes using QBRs [quarterly business reviews] and OKRs [objectives and key results] methodologies, compensation and incentives tied to talent rather than hierarchy, and an acceptance of flexible and remote work. All in all, the changes to the automotive workforce are likely to be as extensive as the changes coming to the vehicles they manufacture.

5–20% gained

by reskilling workforce in line with future technologies

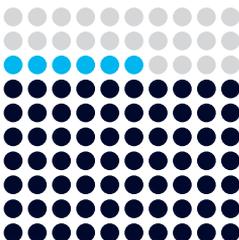
**Net impact:
10–25% loss**

Gains

Software and IT

Software and analytics drive a higher percentage of vehicle value

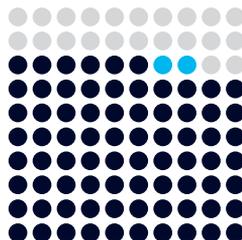
6%



Digital marketing and sales

Improved digital and analytical skills shift points of sale to advanced online channels

2%



Data analytics

Offers are personalized by analyzing customer data (eg, from in-car entertainment system)

2%

