

McKinsey Center for Future Mobility

Electric mobility after the crisis: Why an auto slowdown won't hurt EV demand

Global auto sales plunged during the COVID-19 crisis, but electric mobility has remained remarkably resilient in some countries. Here's what's ahead for the electric-vehicle market.

by Thomas Gersdorf, Russell Hensley, Patrick Hertzke, and Patrick Schaufuss



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In 2019, electric mobility seemed poised to reach a tipping point. With more than two million electric vehicles (EVs) sold around the world, electric cars accounted for a record 2.5 percent of the global light-vehicle (LV) market.¹ Then the COVID-19 pandemic hit, endangering lives, shaking up supply chains and workforces, and shutting down factories. The economic slowdown has significantly disrupted the auto industry, causing rapid declines in LV sales.

Given the disruptions, previous predictions about EV growth are now obsolete. To create more accurate forward-looking perspectives, we examined the emerging developments that will shape the market over the coming years. We then conducted separate analyses of the EV markets in China, the European Union, and the United States, since trends might vary significantly by region. One of the most striking findings: the EV market is much more likely to see a quick recovery and strong growth in China and Europe than in the United States. Over the long term, EV market share is also more likely to increase in China and Europe.

COVID-19 crisis has significantly influenced major demand drivers

The COVID-19 crisis presents the greatest challenge to the global economy since World War II and has already exacted a heavy toll on the auto sector. Within the LV market, global sales for 2020 are currently expected to decline 20 to 25 percent from prepandemic forecasts in a virus-contained scenario (A3).² In the hardest-hit countries, the crisis could force staggering drops of up to 45 percent in LV sales for the year.

When considering the impact of the COVID-19 crisis on EV sales, including battery-powered EVs and plug-in hybrid EVs, we focused on developments in the following areas:

- **Macroeconomic environment.** The COVID-19 pandemic has not only decreased consumer purchasing power, but has also contributed to a significant drop in oil prices and, consequently, lower gasoline prices. For traditional vehicles with internal combustion engines (ICEs), the

drop in gasoline prices will decrease the total cost of ownership. Although EVs will still have lower total costs of ownership than traditional ICE vehicles do in most segments, the advantage will not be as great, and that shift could influence sales. The impact of lower oil prices will vary by country, however, because of differences in tax policies. For instance, if the price of a barrel of crude oil decreased from \$60 to \$30, gasoline would become about 35 percent cheaper in the United States. In Europe, by contrast, the same drop would only reduce gasoline prices by 15 percent because of higher taxes on fuel sales and consumption.

- **Government policies and regulations.**

Market dynamics are strongly driven by CO₂-emission limits, since they encourage OEMs to manufacture more fuel-efficient vehicles. Likewise, government incentives, such as purchase-price subsidies and tax exemptions, have a major effect on consumer demand. The COVID-19 crisis has already prompted some changes in both emission regulations and incentives. For instance, many local and federal governments have increased consumer incentives for EV purchases, often as part of stimulus programs designed to soften the economic impact of the pandemic. In Germany, for example, purchase-price subsidies for new EVs can amount to more than \$10,000 per vehicle. In China, the purchase-price subsidy currently ranges from 16,200 to 22,500 renminbi (approximately \$2,350 to \$3,265) by car, depending on its range.³

- **Technology and infrastructure.** In addition to instituting monetary subsidies for EV purchases, several governments are investing in charging infrastructure as part of their economic-stimulus programs. They range from direct investments for public charging stations to subsidies for the installation of private charging stations at homes and workplaces. For example, China committed more than \$1.4 billion in April 2020 to subsidize the construction of charging stations, on top of existing programs that promote the sale of EVs.

¹ Sales figures are from EV-volumes.com, IHS Markit, and MarkLines.

² For more on potential virus recovery and economic scenarios, see "Crushing coronavirus uncertainty: The big 'unlock' for our economies," May 13, 2020, McKinsey.com.

³ Up to a vehicle base price of 300,000 renminbi.

The EV market is much more likely to see a quick recovery and strong growth in China and Europe than in the United States.

- **EV offerings.** The pandemic has shuttered plants and halted auto-assembly lines around the world. As OEMs prepare for reopening, some are prioritizing EV production either to meet the expected strong demand or to fulfill regulatory requirements, such as the European Union's strict target for CO₂ emissions. In contrast, some US-based OEMs are delaying production of upcoming EV models.
- **Consumer demand.** For many countries, consumer demand for EVs has remained relatively stable during the crisis when compared with demand for other vehicles. While the overall number of EV sales has declined in China and Europe, the market share for EVs has risen. In the United States, however, consumer demand for EVs has dropped. Globally, EV manufacturers that offer online sales have seen particularly high demand, since lockdown measures meant to control the spread of COVID-19 have kept people at home. For instance, Tesla has been shifting to an online-only sales model and was the only OEM to increase sales in March 2020.

Positive momentum in China and Europe; slowdown in the United States

Given the regional differences in the spread of COVID-19 and varying government responses, we conducted separate analyses for the three key markets that represent 94 percent of global EV sales⁴: China, Europe, and the United States. Exhibit 1 describes the major developments that we expect in each market for macroeconomic trends,

government regulations and policies, technology and infrastructure, EV models, and EV supply.

Of course, we cannot be certain that the predicted developments will materialize as expected. Therefore, we created different scenarios for each region. In one, the overall LV market recovers quickly from the impact of the COVID-19 crisis, and growth in EV market share accelerates. In the second scenario, the overall LV market is slow to recover, and growth in EV market share slows. Based on our analyses, we expect that the positive-growth scenario is most likely in China and Europe. In the United States, by contrast, we expect that the slowdown scenario is the most likely (Exhibit 2).

China: Quick recovery, with sales accelerating by late 2020

China is by far the largest EV market in the world, with 1.2 million EVs sold in 2019. The country's quick containment of the COVID-19 pandemic and its economic rebound have contributed to a robust, developing EV ecosystem. Many EV start-ups are pushing new, mostly locally designed EV models into the market.

China also benefits from government policies designed to support EV growth. Some of them were in place before the pandemic, partly because officials were concerned that EV market-share growth decelerated from 2018 to 2019. For instance, China had established strong federal-fleet-emission targets and created a system in which OEMs received emission credits for

⁴ The percentage is for global sales of battery-powered electric vehicles and plug-in hybrid electric vehicles in the second quarter of 2020.

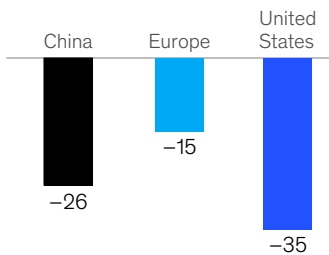
Exhibit 1

Multiple drivers will shape the future electric-vehicle market, but their impact will vary by region.

Key drivers by selected focus areas

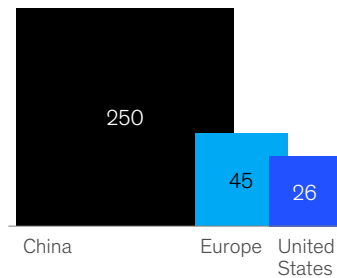
MACROECONOMICS

Change in gas price as a result of per-barrel oil-price decrease from \$60 to \$30, %

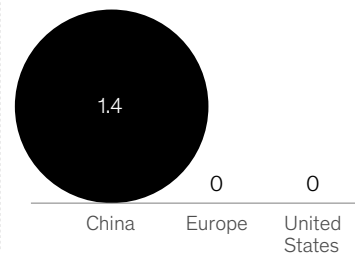


TECHNOLOGY AND INFRASTRUCTURE

Additional public charging poles installed in 2019, thousands

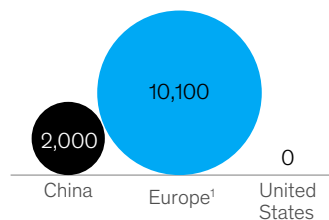


Committed additional spending on charging stations in 2020, \$ billion

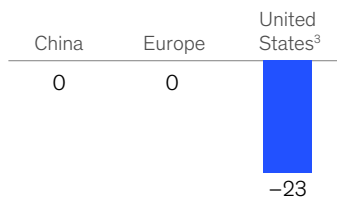


REGULATIONS AND POLICIES

Purchasing incentives, as of June 2020, \$ per vehicle

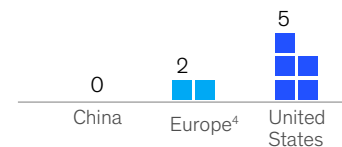


Change in regulatory target² from pre-COVID-19 to April 2020, %



SUPPLY

Electric-vehicle models with delayed production since pandemic began, as of June 2020



¹Total purchasing incentives in Germany; similar incentives have been enacted or are under consideration in other European countries.

²Target of grams of CO₂/kilometer.

³2025 US federal-fleet-consumption target.

⁴Both model launches by US-based OEMs.

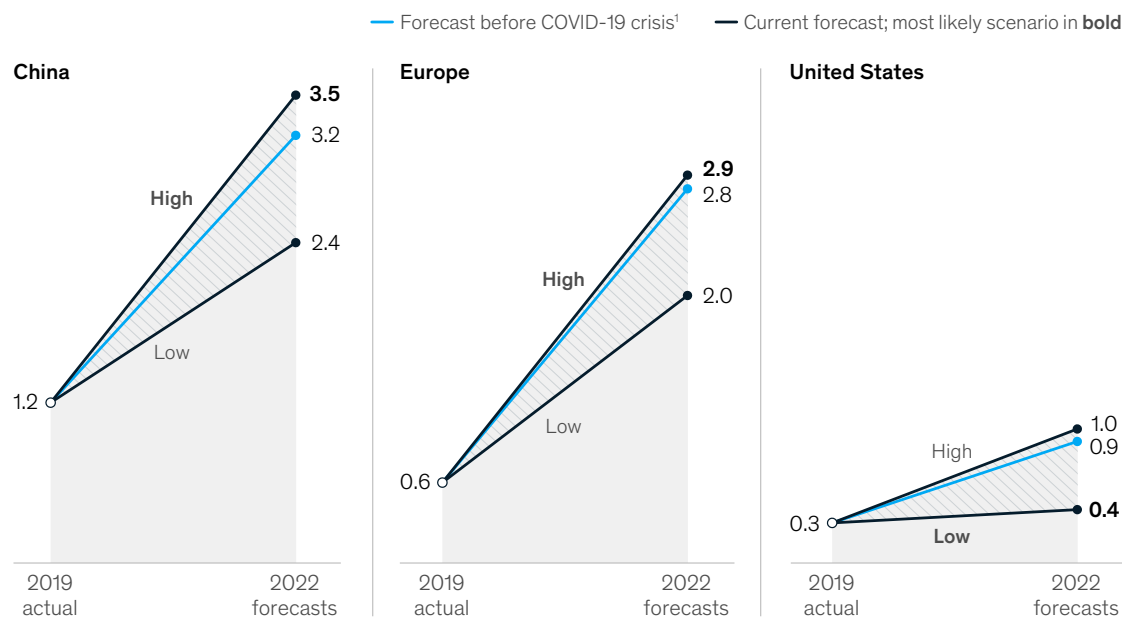
Source: *Autozeitung*; Electrek; electrive.com; European Alternative Fuels Observatory; *Handelsblatt*; NBC Universal; Renewable Energy World; Statista; Vox Media; McKinsey analysis

EV sales in the United States had been slowing before the COVID-19 crisis, with annual growth decreasing from 80 percent in 2018 to 12 percent in 2019.

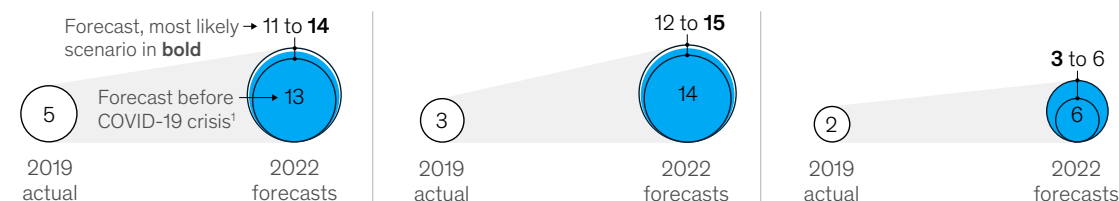
Exhibit 2

The 2022 electric-vehicle market shares in China and Europe—but not in the United States—might be slightly higher than the precrisis projections.

Electric-vehicle sales, millions of units



Market share, %



Note: Preliminary projections, as of June 5, 2020; includes battery-powered electric vehicles and plug-in hybrid electric vehicles (light-vehicle market).

¹Per January 2020 IHS Markit Alternative Propulsion Forecast.

Source: IHS Markit; McKinsey Center for Future Mobility analysis

passenger cars, based on various features, such as energy efficiency and vehicle range. In addition to those policies, the government is attempting to stimulate EV sales by extending purchase subsidies of up to 22,500 renminbi,⁵ which were about to expire, through 2022. The government has also recently exempted EVs from the purchase tax.

Even with those incentives, the COVID-19 crisis has significantly affected EV sales in China. Only 100,000 units were sold in June 2020, compared

with 196,000 in June 2019. That said, the EV market share in China has slightly increased to 4.4 percent in June 2020. Government incentives may contribute to even stronger market-share growth in the second half of 2020. For instance, China has long had license-plate quotas to limit the number of new vehicles on the road to reduce pollution. In several large Chinese cities where EVs are already popular, local governments are limiting new license-plate registrations to EVs and lifting restrictions on the purchase of new EVs.

⁵ Depending on the range of the electric vehicle, up to a vehicle base price of 300,000 renminbi (approximately \$43,540); not for imported EVs.

Overall, we expect that the number of EVs sold in China to potentially increase from 1.2 million in 2019 to between 2.4 million and 3.5 million in 2022—about 300,000 more in the most likely scenario than predicted before the COVID-19 crisis. With that shift, the EV market share in China would rise to 11–14 percent, from 5 percent.

Beijing's policies toward stimulating electric mobility in recent years have also helped create a crowded market, with numerous domestic EV makers and start-ups. The pandemic is likely to hasten consolidation of Chinese brands in 2022 and 2023. For instance, a Chinese EV maker planning its entry into the US market recently announced the suspension of its operations because of funding and operational problems brought on by the COVID-19 crisis. Several other players could follow, leading to consolidation and a smaller number of strong EV players in the Chinese market.

Europe: Positive momentum, with emission regulations potentially pushing market share higher by 2022

Despite the COVID-19 pandemic, European leaders have maintained a strict fleetwide CO₂-emission target of 95 grams of CO₂ per kilometer by 2021. Many major European-based OEMs have publicly committed to reaching that target and have rolled out an unprecedented number of battery-powered-EV and plug-in hybrid-EV models. By our count, they introduced 42 models in the first quarter of 2020 alone.

European governments have introduced new purchase subsidies, tax breaks, or a combination of incentives to encourage EV adoption and promote green mobility. While they implemented those policies to improve emissions, they are also responding to increased consumer concerns about sustainability and environmental issues. The incentives (such as Germany's subsidies toward the purchase of an EV), combined with the increase in EV models, has led to soaring consumer demand—despite the continued COVID-19 pandemic. For example, vehicle registrations for plug-in hybrid EVs and battery-powered EVs in Germany in the first half

of 2020 increased by 200 percent and 43 percent, respectively, over the first half of 2019.

While the rebound from the COVID-19 crisis will differ by country, we expect that Europe is likely to make a quick recovery. Overall, European EV sales will potentially increase from 600,000 in 2019 to between 2.0 million and 2.9 million in 2022. Europe's EV market share is also increasing, in line with trends that were occurring before the COVID-19 crisis. The market share rose from 3 percent in 2019 to 7 percent by June 2020. By 2022, we expect that EVs may have a 12–15 percent market share in Europe—slightly higher than the precrisis projection in the most likely scenario.

United States: Stagnating sales, potentially pushing 2022 market share below precrisis demand scenarios

The US EV market looks vastly different from that in China or Europe. As in China, EV sales in the United States had been slowing before the COVID-19 crisis, with annual growth decreasing from 80 percent in 2018 to 12 percent in 2019. The country's slowing economy during the pandemic and the subsequent decrease in consumer spending are contributing to a lackluster EV market. Moreover, low demand for oil—and bottomed-out oil prices—make ICE vehicles cheaper than EVs to operate in the United States, since gasoline taxes are relatively low compared with those of most other countries.

Recent regulatory changes are also stymieing the large-scale adoption of EVs in the United States. The US federal government plans to decrease the fuel-economy standard to 40.4 miles per gallon by 2026 and is relaxing CO₂-emission targets. Although some states have adopted a stricter low-emission standard, such as the one in California, the current regulatory environment will provide fewer incentives for purchasing or manufacturing EVs.

A number of US-based OEMs have recently delayed the start of production on new EV models (as of May 2020, they had postponed the introduction of at least five). Consequently, we expect that EV sales may only increase slightly, going from 300,000

units sold in 2019 to between 400,000 (in the most likely scenario) up to 1.0 million in 2022. Growth in EV market share is also slowing significantly in the United States. It fell from 2 percent in the fourth quarter of 2019 to 1.3 percent in April 2020 before reaching 2.4 percent in June 2020. The projected 2022 market share of 3 to 6 percent is below precrisis expectations.

Long-term market dynamics

In addition to evaluating short-term changes, we also wanted to understand long-term trends for EVs. Would they see continued worldwide growth? And would regional differences continue to persist?

If the current tailwinds for EVs in China and Europe persist, electric mobility could emerge from the COVID-19 crisis in an even stronger position than precrisis estimates had predicted. In fact,

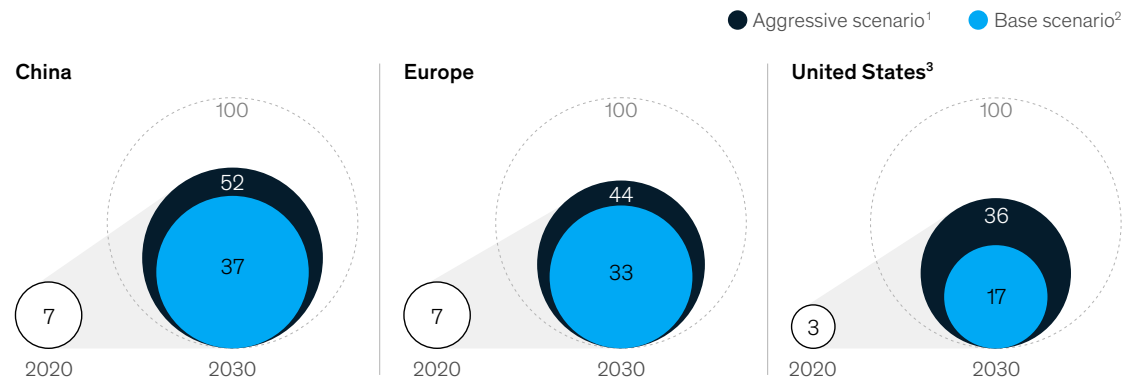
regulations and incentives will likely propel EV market share⁶ in China to roughly 35 to 50 percent and in Europe to 35 to 45 percent by 2030, with the post-COVID market environment making the aggressive scenario more likely (Exhibit 3).

There is more uncertainty about long-term trends in the US market because of regulatory headwinds and macroeconomic challenges; these could also change in the next 12 to 18 months, since the economic and regulatory outlook is also highly uncertain. While the EV market share in the United States will likely increase, the pace of its growth will likely be slower than seen in China or Europe, only reaching around 15 to 35 percent by 2030. The exact developments will largely depend on oil prices and monetary incentives for EV purchases, since the market is highly responsive to changes in those areas.

Exhibit 3

Growth in electric-vehicle market share will vary by region through 2030.

Projected electric-vehicle share of light-vehicle market, %



Note: Preliminary projections, as of June 5, 2020; includes battery-powered electric vehicles and plug-in hybrid electric vehicles (light-vehicle market).

¹Assumptions include China meeting State Council emission targets, Europe missing 2020 emission-reduction targets and accelerating regulatory targets after 2025, and United States increasing adoption of California Air Resources Board (CARB) mandates, with consumer demand slowing adoption after 2025.

²Assumptions include China meeting State Council emissions targets, Europe missing 2020 emission-reduction targets and extending CO₂ limits proposed in November 2017 beyond 2025, and United States increasing adoption of CARB mandates.

³Decreased oil prices likely to diminish electric-vehicle market share by another 5% (to 12% in base scenario and 31% in aggressive scenario).

Source: McKinsey Center for Future Mobility analysis

⁶Including battery-powered electric vehicles and plug-in hybrid electric vehicles.

Beyond taking short-term actions to get businesses back on track, automakers and their suppliers will need to understand market dynamics, including regulatory and competitive trends, as we move towards the next normal. In addition to increasing EV adoption in some markets, the COVID-19 pandemic could have large-scale implications on

how cars are sold and how profitable they can be. For example, with the pandemic preventing or discouraging consumers from going to showrooms, online sales of EVs could soar. While much uncertainty still persists, one thing seems clear: the future of global electric mobility is likely to emerge even brighter than before.

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