RAWMATERIALS.net

TRADIUM

MARKET INSIGHT

The Mobility Transformation: Suspended or Postponed?

July 8, 2024

The Mobility Transformation: Suspended or Postponed?

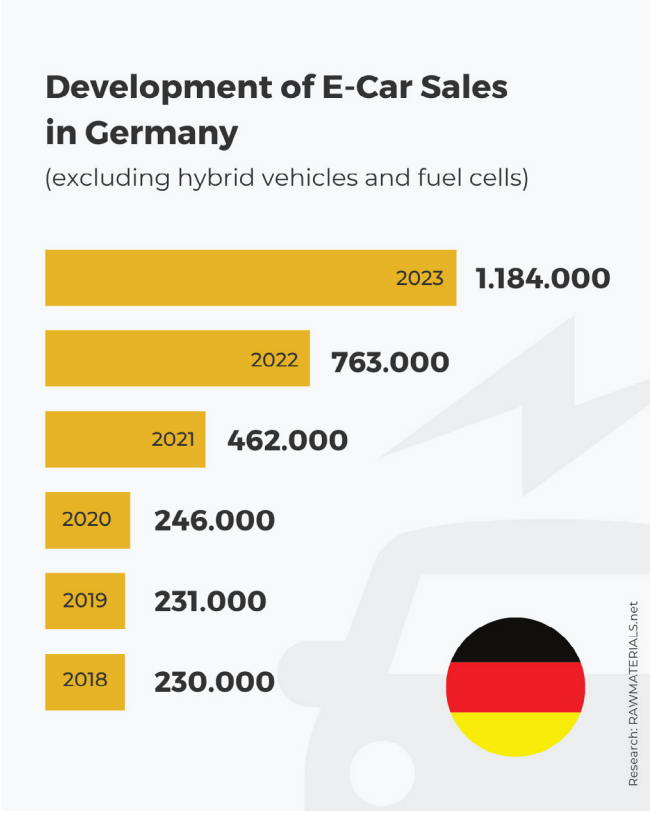
The German government has set a target of having 15 million electric cars on the road in Germany by 2030, but this goal is a long way off. Just 1.4 million EVs are currently registered in Germany, just under three percent of the total number of cars in the country. New EV registrations also fell in April compared to the previous month. The German press regularly talks about the EV sales crisis and buyers' reluctance to embrace emission-free mobility. But what is the truth behind this narrative? What is the situation in the much larger car markets in the U. S. and China?

Germany: Development Falls Short of Expectations

Around 30,000 purely battery-powered cars were newly registered in Germany in April 2024; this level was maintained in May, ending the sales recovery underway since the start of the year. Sales slumped in the summer of 2023, partly because purchase premiums for commercially used e-cars were discontinued. The market's subsequent revival was abruptly halted at the end of the year by the premature expiry of the premium for privately used e-vehicles, which was announced on short notice. According to transportation expert Constantin Gall from the consulting firm EY, the German government sent the wrong signal. „Customers doubt the prospects of electric cars if politicians are no longer willing to promote this technology," the German newspaper Handelsblatt quotes him as saying.

The recurring discussion about a possible reversal of the ban on the sale of new internal combustion engines (ICE) cars in the EU after 2035 might be contributing to the uncertainty of potential buyers about supposedly new EV technology, which is also stoked by reports of burning e-cars and the fear of empty batteries. Yet electrically powered and battery-powered vehicles have been around for over 100 years and are constantly being improved. According to the General German Automobile Club (ADAC), EVs pose the same fire risk as petrol cars, but the way fire departments extinguish electric fires is different. In this context, the automobile club says the scenario of an e-car fire is still unfamiliar and, therefore, appears more spectacular.

Public fears of electromagnetic radiation in battery-powered vehicles are also likely to be at least partially unfounded. According to the German Federal Office for Radiation Safety (BfS), theradiation fields of hybrid or electric vehicle drive trains are comparable to those emitted by air conditioning systems, seat heaters, or wireless systems — in other words, radiation sources that also exist in conventional ICE vehicles. According to the BfS, field strengths that affect vehicle occupants can be significantly reduced by optimizing the positioning of the batteries and cabling.



Development of electric car sales in Germany (excluding hybrid vehicles and fuel cells)

Consumers also have legitimate concerns about the availability of EV charging stations and battery performance. That said, a study by the German Association of Energy and Water Industries (BDEW) concluded there is an oversupply of charging stations in Germany, albeit with substantial regional differences in the charging network. Rural areas have significantly fewer stations than urban areas, as figures from the German Federal Network Agency show. In cities, the argument that the EV range per charging cycle is too short is therefore unlikely to be valid, especially as city dwellers only travel an average of around 22 kilometers by car per day, according to the German Federal Ministry of Transport.

Brake for E-cars: High Prices Prevent Establishment

While the BDEW largely gives the all-clear to EVs in terms of energy supply, it sees long delivery times and comparatively high prices as obstacles to the roll-out of this technology. EVs for sale in Germany are dominated by expensive SUVs, and the number of models available in the

mini- and small-car classes has fallen in the past year, writes ADAC. Volkswagen recently announced its intention to close this gap with a 20,000-euro e-car expected to roll off the production line in 2027.

Demand for electric cars is also lower than expected in the higher-price segment. As a result, last February, Mercedes Benz board member Ola Källenius abandoned the goal of fully embracing e-mobility in Europe by 2030. Meanwhile, BMW is promoting its openness to EV technology but has announced it will continue to offer combustion engines as long as there's a market for them. The expansion of the automaker's electric division is unfolding in parallel.

Meanwhile, premium manufacturer Tesla speaks openly of a „weakening" sales market that has left many unsold Teslas gathering dust in „stockpiles." Due to the current demand slump, the company plans to cut hundreds of the 12,000 jobs at its Grünheide plant in Brandenburg, Germany. Still, Tesla believes in its long-term success, and its application to expand its Brandenburg plant to include a freight yard, factory building, and daycare center was recently approved. Ford is a relatively late entrant into e-car production in Germany. It has invested two billion euros in a new production line at its Cologne plant, where 250,000 SUVs will be produced annually. The starting price for the vehicles will be 45,000 euros.

Overall, the German market is a mix of an openness to embrace new technology and all-electric. At present, the government's targets for the expansion of electromobility appear to be optimistic, if not unrealistic. An almost five-fold increase in current sales per quarter would be necessary to hit the target by 2030 — in other words, from now on, almost every new car sold would have to be electric. This target scenario will require more support from the industry and politicians. Now let's look at the U. S., whose Inflation Reduction Act provides massive state subsidies for renewable energy and the transport sector.

United States: Subsidies Should Make the Difference

The Inflation Reduction Act (IRA), ratified by U.S. President Joe Biden in the summer of 2022, is part of the country's efforts to broaden the supply chains for critical raw materials and,

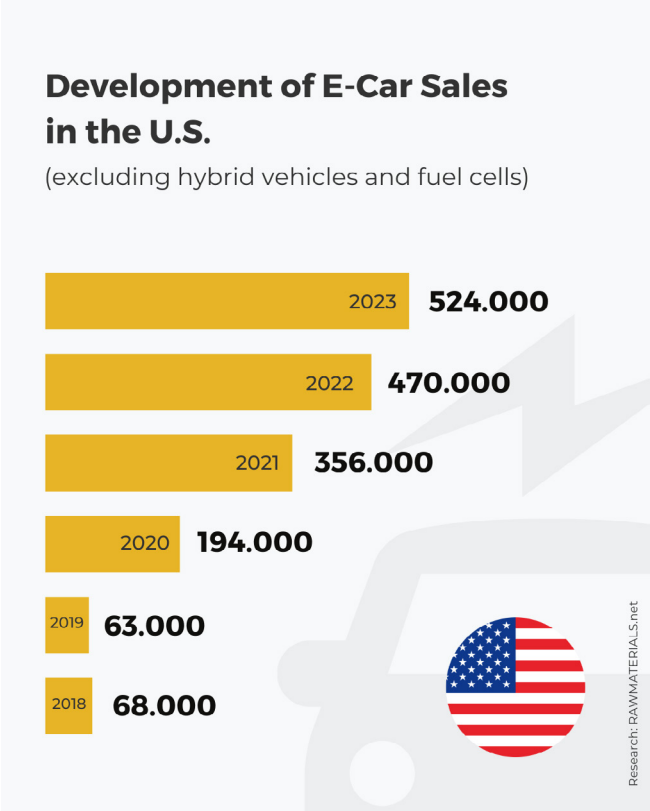
in particular, to relocate downstream processing steps to the U.S. In addition to the expansion of battery production, electric car production is also to be expanded. The legislation's stated aim is for half of all new cars in the U.S. to be electric by 2030.

Federal authorities are setting a good example: all government vehicles weighing up to 3.8 tons must be fully electric by 2027, with heavier models to follow by 2035. Twelve states, including the most populous and economically strongest, California, will exceed these targets. After 2035, combustion vehicles will no longer be allowed to be sold in the state, and there will be penalties for violations.

The IRA provides the main incentive for EV purchases with tax credits of up to 7,500 USD. However, the subsidy is linked to certain conditions — for example, the final assembly of the vehicle must take place in North America. In addition, both the critical raw materials used in the battery, such as lithium, and battery components, such as the cathode and anode, must come from the U.S. or a country that has signed a free-trade agreement with the U.S., such as Canada or Mexico. Otherwise, funding for the non-compliant vehicle will be reduced. So far, just under one billion dollars has been called up.
Despite the extensive subsidies, the expansion of e-mobility in the U. S. is stuttering: as in Germany, EV sales growth slowed in the first three months of 2024. However, this was the first decline since summer 2020.

Nevertheless, almost 2.6 percent more vehicles were sold year-over-year than in the firstquarter of 2023, meaning EVs accounted for 7.3 percent of all new registrations in the first quarter of 2024. The U.S. is, therefore, far from experiencing a sales crisis. In addition to the record number of e-cars sold, nine car manufacturers in the U S. — BMW, Cadillac, Ford, Hyundai, Kia, Lexus, Mercedes, Rivian, and Vinfast – reported record sales of zero-emission cars. The analysis firm Cox Automotive even says 2024 will be the most successful year ever for EVs and expects them to account for almost a tenth of all U.S. car sales by the end of the year. However, Tesla suffered a significant decline in its home country: the U.S. company sold around 13 percent fewer cars in the first quarter of this year than in the same period in 2023.

In an interview with Reuters, Elizabeth Krear, Vice President of Electric Vehicle Practice at J.D. Power, says the general EV sales setback in the first quarter of 2024 is due to the sluggish expansion of U.S. charging infrastructure. In addition, the price of new EVs is higher compared to ICE vehicles, and consumers think the EV range per charging cycle is too low. In its calculations, the analysis firm The Conference Board doesn't not see electric and combustion vehicles reaching parity until 2038, eight years later than the target year set by Biden. Too little investment in charging facilities, too few incentives to buy, and shortfalls in demand stand in the way of achieving the target. McKinsey notes that the charging infrastructure in the U. S. would have to increase more than eightfold by 2022 for enough households to have sufficient access and for e-mobility to become more attractive. To close the gap, the U.S. recently announced a massive investment of 1.3 billion USD to expand and modernize EV charging facilities, especially along highways and other main traffic arteries. According to AlixPartners, consumers want charging infrastructure to improve before they buy an electric car. In a survey, the analyst found that perceived limited range and lack of charging options deter Americans from buying EVs. To achieve the government's targets, sales would have to increase significantly. Currently, the share of EVs in the total U.S. fleet is just under one percent.



Development of electric car sales in the U. S. (excluding hybrid vehicles and fuel cells)

China: Boom According to Plan

Across the Pacific, the picture is very different. China has become the largest manufacturer of electric cars and the world's most important market. Globally, more than half of electric vehicles are on

China's roads. According to the International Energy Agency (IEA), 60 percent of all new EV registrations in 2023 were attributable to the People's Republic, with one in three newly registered cars in the country itself being electric. China has achieved its target to increase the sales share of pure electric cars, plug-in hybrids, and fuel cell cars to 20 percent by 2025 ahead of schedule. Although the share of e-vehicles in the total vehicle population is only just over three percent, as in Germany, the IEA still predicts strong growth; it expects Chinese EV sales in 2024 to climb by almost 25 percent compared to the previous year to around ten million. E-cars could then account for 45 percent of total car sales in China.

The massive adoption of EVs in China was not a sure-fire success but the result of a long-standing political agenda, as the MIT Technology Review explains. China planned to invest in its domestic e-car industry in the early 2000s to build up a clear lead in an emerging area of vehicle manufacturing that it felt could be important. The nascent EV industry was also seen as a way to address domestic problems such as severe air pollution, dependence on oil imports, and a weakened economy after the 2008 financial crisis.

In 2009, the government launched numerous support measures that have boosted the supply, quality, and demand for e-cars. The Kiel Institute for the World Economy (IfW) cites, among other things, purchase premiums in the billions for domestic e-car manufacturers such as BYD and subsidies for foreign companies producing cars in China (such as Tesla) or those involved in joint ventures (such as VW). Manufacturers could also benefit from tax breaks, discounted loans, preferential treatment in government procurement, or subsidized inputs such as steel and batteries.

The „License Plate Lottery" Promotes the Spread of E-cars

On the buyer side, in addition to subsidies, scrappage schemes, tax benefits, and the quota system for vehicles introduced in 2011 in populous cities such as Beijing also likely contributed to the spread of e-cars in China. The latter system, commonly known as the license plate lottery, limits the number of new license plates issued each month and distributes registrations randomly; there are more spaces and much shorter waiting times for electric vehicles. EV owners also have access to a charging infrastructure that is considered to be the best in the world, including fast chargers.

Development of electric car sales in China (excluding hybrid vehicles and fuel cells)

In addition, prices for e-cars in China are comparatively low, in some cases less than ICE vehicles. In addition to many years of subsidies, EV popularity in China is also due to the general spread of smaller and, therefore, more affordable vehicles and constant technical optimizations by manufacturers, especially in batteries, which can account for up to 40 percent of production costs. China's easier access to inexpensive raw materials such as lithium and rare earths has undoubtedly paid off, as the People's Republic has the world's largest refinery capacities. BYD, which now sells more e-cars than Tesla and was founded in 1995 as a battery manufacturer, controls entire value chains, including its own cargo ships.

The extent to which electric cars have become mainstream in China is shown by recent surveys such as the one by AlixPartners cited above. According to that survey, 97 percent of respondents in China are very or moderately likely to buy a battery-electric vehicle. By comparison, the figure is 35 percent in the U.S. and 43 percent in Europe.

However, the potential of the Chinese car market has not yet been exhausted. The car density is comparatively low at just under 220 per 1,000 inhabitants. However, analysts see a certain saturation among the urban middle class and a slowdown in sales, partly due to the Chinese economy, which is recovering slowly after the coronavirus pandemic. However, China's climate targets for its transport sector mean a further increase in e-cars is to be expected, although the country is also focusing on plug-in hybrids and fuel cell cars, and possibly on combustion engines using alternative, non-fossil fuels.

Meanwhile, China's EV success has not been limited to the domestic market. Due to increasing internal competition, Chinese EV manufacturers are also expanding into other countries, where sales are growing thanks to the comparatively low prices of Chinese-made vehicles. According to forecasts, one in four e-cars sold in Europe in 2024 will come from China. On the other hand, the proportion of exports to the U.S. has been negligible. Nevertheless, the U.S. government recently announced increased tariffs on Chinese e-vehicles to protect its domestic auto industry. So has the EU, which has set rates of 17.4 percent to 38.1 percent, depending on the manufacturer. The punitive duties already came into force in the EU on July 4, initially for a provisional period of four months. Until then, a final decision must have been reached. Criticism of the levies has come both from the People's Republic and large parts of the German automotive industry. Due to China's geopolitical tensions with many Western countries, many analysts see the greatest growth potential for Chinese EVs in the emerging markets of Southeast Asia and possibly Latin America.

Outlook: Evolution Instead of Revolution?

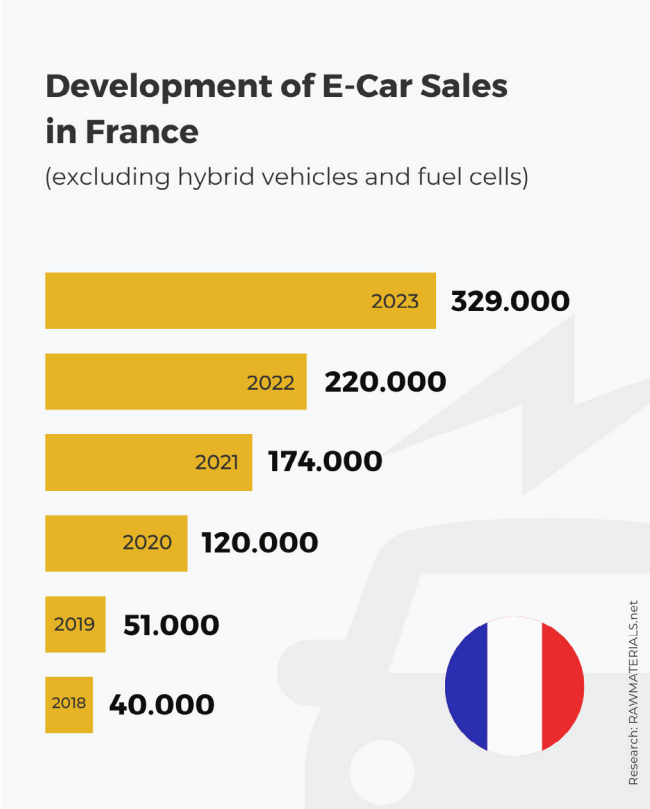
A comparison of market developments reveals a differentiated picture depending on the region. In general, electromobility is lagging behind targets and expectations, except in China. However, in Europe, for example, the registration figures in France, Europe's largest EV market after Germany, are far from crisis levels.

"The supposed electric slump in Europe is first and foremost a German slump," wrote the German newspaper Handelsblatt at the beginning of June. This is surprising, as Germany is not only the leader in Europe in terms of electric car production figures. It is also second only to China worldwide, according to the German Association of the Automotive Industry (VDA). This means Germany contributes significantly to climate-neutral mobility in Europe, as most German-made vehicles are exported.

Despite the positive developments in Europe, some arguments against electromobility remain to be addressed in the U.S. and China. For example, operating an electric car is only truly sustainable if the charging current comes from renewable sources. In Germany, the framework for this criterion is in

place, as the country's share of green electricity is almost 50 percent. The U.S. and China have so far relied predominantly on fossil fuels to produce electricity, despite a boom in the expansion of renewables.

However, even when the electricity is sustain-able, it takes EV owners significantly longer to recharge their vehicle batteries at public charging points than to refuel an ICE car. Although fast-charging stations can recharge a battery within half an hour, accelerated charging increases wear and tear on the battery, the vehicle's most expensive component.



Development of electric car sales in France (excluding hybrid vehicles and fuel cells)

CO_2 Balance: How Environmentally Friendly Are Electric Cars?

The carbon footprint of e-cars is a recurring topic of discussion, especially among critics. Electric cars leave the factory with a carbon footprint, mainly due to the energy-intensive production of the battery and the extraction of the raw materials needed to make them. But, during use, EVs have a clear climate advantage over ICE vehicles. Whether they close the gap after just 30,000 or 60,000 kilometers of mileage depends primarily on the models compared, and the electricity mix used for charging also has a major influence. In addition, battery production is becoming more environmentally friendly, thanks to the increased use of renewable energies or recycled raw materials, for example. In addition, statements on the environmental impact of electric cars are often based on earlier and sometimes incorrectly reproduced study results that are now considered outdated.

Conventional ICE cars also perform better in terms of depreciation and potential resale price. The consultancy firm Berylls attributes this to the fact that most EVs are SUVs, which are less attractive to

second-hand buyers. In addition, new models with greater range are entering the market and thus become competition. Competition is also coming from an unexpected quarter: hybrid cars, or, more precisely, plug-in hybrids. Spurned by European manufacturers for some time, hybrids are making a comeback in Asia and the U.S. They combine the advantages of combustion engines with those of EVs and for many buyers, pave the way to completely emission-free driving. According to Alix Partners, consumers, especially in the U.S., are switching to plug-in hybrids due to their reservations about battery electric cars, which they see as a fully-fledged replacement. In other key markets, there is a strong overlap in these buyer groups, too. However, although hybrid technology can allay fears about the reliability and range of electric cars, they have serious drawbacks. For example, they're significantly heavier than ICE cars due to their two drive units, requiring more maintenance. Of course, they only contribute to achieving climate targets when they're driven in electric mode.

The mobility transition and raw materials demand

The shift from ICE to electric cars is also driving a change in raw material requirements. New supplies of materials, such as lithium, nickel, and graphite, are needed for batteries, and raw materials already in use are being used in much larger quantities. For example, copper is used in cables and motors, and it is estimated that the amount of the metal used in vehicles will double in the future. The use of rare earths will also increase. While they've been used in conventional vehicles for decades in catalytic converters, servomotors (window regulators, windscreen wipers), and as catalysts in fuel production, their main application in EVs is in the drive motor. Although some drive systems don't use neodymium-iron-boron magnets, these magnets currently offer the best ratio between weight and performance. They are found in 85 percent of zero-emission cars, in addition to the servo motors, loudspeakers, and other components mentioned above, which also often contain other rare earths. Then there are synthetic fuels. Also known as e-fuels, these fuels can replace petrol and diesel and be used in conventional vehicles. Unlike their fossil-derived counterparts, they can be produced from hydrogen in a climate-neutral way. The hydrogen is obtained from water by electrolysis, and the technologies needed for this process require platinum group metals to obtain the best possible efficiency. However, the touted benefits of e-fuels are controversial, as the fuels are not yet available in sufficient quantities and, as a study by Transport and Environment shows, their combustion produces environmentally harmful emissions, just like petrol and diesel. Carbon monoxide emissions from some synthetic fuels are three times higher than Super E10 petrol, according to the umbrella organization, which campaigns for a sustainable transport sector.

Forecast for Electromobility Remains Positive

Despite the hurdles, most forecasters predict steady growth in e-mobility in the coming years. According to the International Energy Agency, for example, one in three cars on Chinese roads will be electric by 2030, and almost one in five in the U.S. and the EU. The IEA expects that by 2035, every second car sold worldwide will be electric, based on today's political framework alone. Goldman Sachs comes to the same conclusion. A study by the Rocky Mountain Institute and the Bezos Earth Fund is even more optimistic and assumes that electric cars will account for two-thirds of global car sales by 2030.

In the EU, impetus for EV growth is also likely to come from heavy goods vehicles, as trucks will have to reduce their CO_2 emissions by 90 percent by 2040 compared to 2019. New city buses will no longer be allowed to be diesel-powered after 2035. It's not clear which energy sources will then be used. In addition to battery electric vehicles, great hopes are also being pinned on trucks that draw energy for their electric motors from hydrogen fuel cells.

Regardless of which technologies prevail, the potential for reducing greenhouse gas emissions in the transport sector is enormous. According to figures from the Federal Environment Agency, the sector's 22 percent share of total CO_2 and other emissions in Germany is roughly equivalent to that of industry. Any progress on the transport front would, therefore, contribute to achieving the goal of net zero emissions in Germany by 2045.

About TRADIUM

TRADIUM

TRADIUM is one of the most renowned suppliers of strategic metals in Europe and specializes in supplying a wide range of innovative industries that use technology metals, rare earths and precious metals. As an owner-managed company, TRADIUM in Frankfurt am Main has been operating successfully internationally for 25 years and supplies industrial companies from over 70 countries.

www.tradium.com/en

info@tradium.com

About Rawmaterials.net

RAWMATERIALS.net

Rawmaterials.net is a news portal specializing in strategic raw materials and rare earths. The site offers news, background reports, analyses, and interviews on raw materials bundled on one page, up-to-date, and widely accessible. The German-speaking sister portal Rohstoff.net offers similar coverage with a more in-depth scope on Germany and Europe.

www.rawmaterials.net

editors@rawmaterials.net