【欧州】【自動車】

Road/Railway - Environmentally friendly vehicles: Market trends of electric vehicles in the EU, manufacturer's market shares, price trends and subsidies for EV

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【概要：Summary】

The transport sector is among the largest contributors to EU GHG emissions and road transport is responsible for 77% of the transport sector's total GHG emissions. Therefore, reducing the road transport sub-sector's GHG emissions is key to meeting the EU's climate neutrality objectives. Consequently, also the European automotive industry, which accounts for 7.5 million jobs and more than 6% of EU's employment overall, is in a phase of transformation due to the changes required by the EU's climate policy and the transition towards zero-emission vehicles.

Regulation (EU) 2023/851 amended Regulation (EU) 2019/631 and introduces the target to reduce fleet-wide CO_2 emissions targets, for passenger cars by 55% by 2030, and for vans by 50% by 2030, relative to a 2021 baseline. It also sets a 100% CO_2 emissions reduction target for newly registered passenger cars and vans by 2035, based on 2021 levels. Accordingly, a significant increase in the uptake of fully electric vehicles will be necessary to achieve these goals. Moreover, based on recital 11 of Regulation (EU) 2023/851 and the introduction of a European Commission's delegated act it will also be allowed to register vehicles running exclusively on CO_2 neutral fuels, such as e-fuels, derived from the combination of hydrogen, electricity, and CO_2 captured from industrial processes also beyond 2035. However, while e-fuels must still be developed, the increasingly stringent CO_2 emission limits based on Regulation (EU) 2023/851 can only be reached by increasing the share of electric vehicles in the overall number of registered vehicles. While the EU's automobile market is still dominated by petrol and diesel vehicles, the share of electric car registrations, BEVs and PHEVs, has reached 23% of new passenger car registrations in 2022. This increase has been supported by national subsidy programmes for the purchase of EVs. Regarding the development for EVs in the European car market, Norway had the overall highest number of EVs registered in 2021, but Germany has become the largest market for BEVs and PHEVs in absolute numbers of new registrations in Europe. The European market for BEVs and PHEVs is currently dominated by Tesla, but also several European car manufacturers are in top ranks of EV sales. However, although not visible yet in the 2022 sales figures, Chinese EV manufacturers could soon become a real game changer in the European EV automobile market. Chinese EVs manufacturer BYD is aiming at reaching a share of 5 to 10% in the German EVs market alone.

【記事：Article】

1. New European policy for GHG emission reduction limits for passenger cars/vans

The European Green Deal of 2019 set a climate neutrality target and a 90% GHG emissions reduction target for the EU's transport sector to be reached by 2050 (COM/2019/640 final). To reducing GHG emissions from the transport sector the European Commission expects the electric vehicles and electrification of road transport in general to play a major role. The transport sector is responsible for about 25% of the EU's total GHG emissions, and especially the road transport sub-sector is responsible for about 77% of the transport sector's total GHG emissions. Passenger cars and light commercial vehicles (vans) alone are responsible for around 12% and 2.5% respectively of the EU's total CO_2 emissions (European Commission n.d.a).

Based on the European Climate Law (Regulation (EU) 2021/1119), the "Fit for 55" package of 14 July 2021 also included a proposal to strengthening the CO_2 emission performance standards for newly registered passenger cars and light-duty vehicles (vans). It envisaged a GHG emissions reduction target of at least 55% for the fleet-wide CO_2 emissions of passenger cars by 2030, and 50% for vans by 2030, relative to a 2021 baseline (COM (2021) 556 final). It also set a 100% CO_2 emissions reduction target for newly registered passenger cars and vans by 2035, based on 2021 levels (COM(2021) 556 final). which would allow only zero-emission vehicles, with 0g CO_2/km CO_2 emissions as newly registered passenger cars and vans (European Commission n.d.a).

This 100% CO_2 emissions reduction target for newly registered passenger cars and vans by 2035 was debated controversially and the Council of the European Union insisted to introduce a recital clause 11 for introducing a Delegation Act, allowing new vehicles with combustion engines running on CO_2 neutral fuels, such as e-fuels, also beyond 2035. The Regulation (EU) 2023/851 amending Regulation (EU) 2019/631 came into force on 14 June 2023. The amendments are expected to help to further reducing CO_2 emissions by the introduction of zero emission vehicles such as full battery electric vehicles (BEVs) and vehicles running on other zero-emission power-train solutions like hydrogen fuel cell or e-fuels (Council of the EU 2023, Regulation (EU) 2023/851, European Commission n.d.b). This further strengthening of the GHG emission reduction targets of Regulation (EU) 2023/851 amending Regulation (EU) 2019/631 will require a transition of the European automotive industry, which accounts for 7.5 million jobs and more than 6% of European employment overall, towards a production of only zero emission vehicles (COR 2023). Based on the trends in recent years, EVs can be expected to play a major role in the further reduction of CO_2 emissions from newly registered passenger cars and vans (EEA n.d.).

2. Trends in reducing CO_2 emissions from passenger cars in Europe

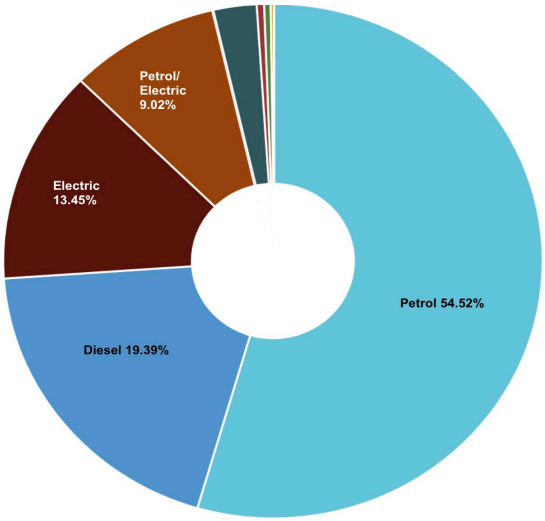
The transport sector is the second largest source of GHG emissions in the EU-27 and the distance to the envisaged 2050 transport target of reducing the GHG by 90% compared to 1990 is still huge, as the EEA projections show (EEA 2022c).

The Regulation (EU) 2019/631 set EU fleet-wide CO_2 emission targets and incentivised the uptake of zero- and low-emission vehicles. Since Regulation (EU) 2019/631 was applied as of 2020, the average CO_2 emissions from new passenger cars registered in Europe decreased significantly (European Commission n.d.b).

According to the European Environment Agency (EEA)'s provisional data, the average CO_2 emission was 108.2g CO_2/km in 2022, which represents a slight increase compared to the results in 2020 (107.5g CO_2/km), but the 2022 result represents a decrease of around 6g CO_2/km

(-5.2%) compared to the average emissions of 114.1g CO_2/km in 2021 and is even 27% below 2019 levels (EEA 2022a, EEA 2023a). According to the EEA, the main driver of this significant reduction of CO_2 emissions of newly registered passenger cars was a continued growth in the share of electric car registrations of various car types, including PHEV and BEV. (EEA n.d., European Commission 2023).

Fig. 1: Passenger car registrations by fuel type from new passenger cars registered in EU27, Iceland (from 2018) and Norway (from 2019) in 2022



Source: EEA (n.d.)

According to the EEA's provisional data of 2022 on the number of new passenger car registrations, out of the total of 9,442,384 new passenger cars registered across EU-27, Iceland, and Norway in 2022, the share of electric car registrations reached 23% (EEA 2023b). This includes BEVs (Battery Electric Vehicles), which are powered solely by an electric motor, using electricity stored in an on-board battery and PHEVs (Plug-in Hybrid Electric Vehicles), which are powered by an electric motor and an internal combustion engine designed to work either together or separately (EEA 2022b). It means that in 2022, almost one out of four new passenger cars registered in Europe was electric (EEA 2023a). According to EEA's provisional results for 2022, 13.45% of the newly registered passenger cars in 2022 were fully electric BEVs (EEA 2023a).

However, also in 2022, the main fuel of the newly registered passenger cars remained petrol with 54.52%, followed by diesel (19.39%) and fully electric vehicles (13.45%) (EEA n.d.). These were followed by petrol/electric type cars (9.02%), lpg (2.53%), diesel/electric (0.44%), E85 (0.39%), ng and others 0.26% (EEA n.d.).

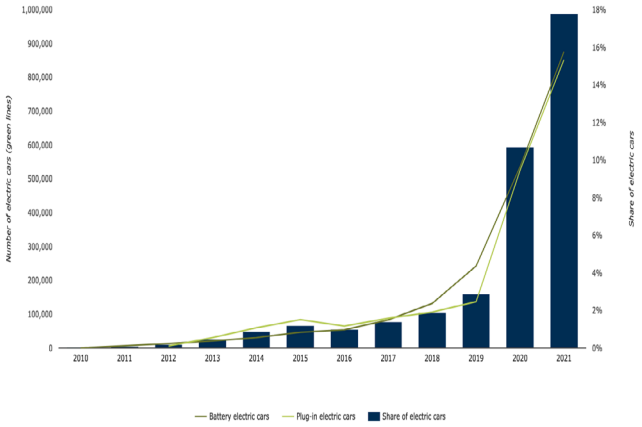
In 2022, vans too have seen a similar downward trend in their average CO_2 emissions, with emissions on average ranging 9% below 2019 levels (EEA 2023a). In 2022, about 1 million new vans were registered in the EU-27, plus Iceland and Norway, with average CO_2 emissions of 185.3g CO_2/km. This represents a decrease of about 8g CO_2/km compared to 2021. In 2021, almost 38,000 electric vans were sold in the EU-27, representing 3.1% of the market share and an increase of around 1.0 percentage point from 2020. In 2022, also the share of electric vans increased to 6.1%, up from 3.5% in 2021 (EEA 2023a). The majority of electric vans sold were BEVs (EEA 2022b).

3. Recent trends in the EV's market in the EU Member States and Norway 2019-2023

For years, Germany's powerful automobile lobby promoted diesel as clean technology, until the Diesel gate scandal unfolded. However, in the past years, the automobile manufacturers seem to have finally realised the importance of producing EVs and they need to further increase their efforts to rise the share of the electric vehicles in their fleets, ahead of the introduction of even tighter standards towards the target of 0g CO_2/km target in 2035 for passenger cars and vans. The share of electric vehicles, including BEVs and PHEVs, in new registrations increased significantly between 2019 and 2022, from about 3.5% in 2019 to 10.7% in 2020, 17.8% in 2021 and finally it reached

23% in 2022, which can be seen as a milestone on the way to switch to zero-emissions cars by 2035 (EEA 2022b).

Fig.2: New registrations of electric vehicles in Europe, 2010-2021



Source: EEA 2022b (https://www.eea.europa.eu/ims/new-registrations-of-electric-vehicles)

However, the CO_2 emissions reduction targets set by Regulation (EU) 2023/851 amending Regulation (EU) 2019/631 can basically only be achieved by accelerating the market penetration of BEVs (EEA 2023a). Therefore, a further improvement will be needed from 2025 onwards, to achieve the new CO_2 emission targets.

Considering the country specific share of electric vehicles in the newly registered fleet of vehicles, in 2021, the share of electric vehicles (BEVs and PHEVs) in national new car registrations increased in all countries (EU-27, Iceland, Norway) compared with 2020. The highest shares were reached in Norway (86%), Iceland (64%), Sweden (46%) and Denmark (35%) (EEA 2022b). In 2021, electric car registrations reached around 1,729,000, up from 1,061,000 in 2020, and BEVs accounted for 9.0% of total new passenger car registrations, while PHEVs represented 8.8% share in total new passenger car registrations (EEA 2022b, EEA 2023b). The share of newly registered electric vans also increased, from 2.1% out of total new registrations in 2020 to 3.1% in 2021 (EEA 2022b).

Regarding full electric cars (BEVs), Norway showed the highest percentage in all new passenger car sales with 65% in 2021 (EEA 2022b). Instead, the PHEV sales were highest in Iceland (36%), Sweden (25%) and Norway (22%) in 2021 (EEA 2022b).

About 9.7 million new cars were registered in the EU in 2021, and the three largest EU Member States Germany, France, and Italy accounted for 59% of the total of newly registered cars (ICCT 2023). Germany remains the largest vehicle market, with a current share of 26% of the total EU market in 2021 (ICCT n.d.).

According to statistics of Eurostat, in 2021, Germany was the biggest market for EVs with 355,961 new BEVs registered out of a total of 2,622,132 new passenger cars registered in Germany (13.57%) (Eurostat 2021). Germany, France, and Norway together accounted for about 63% of all BEV registrations (in the EU-27, Norway, and Iceland)(EEA 2022b).

4. Trends in the automobile manufacturers' EV passenger car sales, purchase prices and state subsidies

4.1. Limiting factors to further increase of EVs' market shares

Considering the limiting aspects of further increasing the market share of EVs, consumers tend to be concerned about some EV characteristics, including the high purchase prices, the limited driving range of EVs compared to conventional ICE passenger cars, and the availability of public recharging infrastructure, among others (Lorentzen et.al. 2017). Norway is a positive example how to overcome those limiting factors when consumers make their purchase decision against or in favour of BEVs. Norway has introduced a comprehensive package of incentives for promoting the purchase and utilization of BEVs, including tax breaks at time

of purchasing an EV, in combination with a comparably higher purchase tax for diesel and petrol cars (Lorentzen et.al. 2017).

In contrast to Norway, in the EU, according to the European Commission's science and knowledge service Joint Research Centre (JRC)'s study, the sales price of EVs is generally higher than that of its comparable models of passenger cars with ICE (JRC 2017).

Regarding recharging, the EU has taken measures to incentivise Member States to increase the number of recharging points and make them more standardised and interoperable (Directive 2014/94/EU) and it is planned to introduce a new Regulation for the deployment of alternative fuels infrastructure (AFIR) (COM (2021) 559).

The new AFIR Regulation sets mandatory deployment targets for electric recharging and hydrogen refuelling infrastructure for the road sector, among others (COM (2021) 559). It requires Member States to expand charging capacity in line with zero-emission car sales, and to install charging and fuelling points at regular intervals on major highways. In fact, policies, and initiatives to support the purchase of EVs remain crucial to overcome market barriers at national and European level.

4.2. Best-selling EV models in Europe

In the EU, total registrations of new passenger cars fell by 4.6% in 2022, mainly due to the impact of component shortages during the first half of the year in the wake of the COVID-19 pandemic (ICCT n.d.). However, although the overall automotive market continued to shrink in 2022, the PHEV market had a historic month in December, with 413,500 new registrations, showing an improvement of 46% over the previous month of November, which had already beaten the December 2020 record of 282,000 units (European Alternative Fuels Observatory 2023, Pontes 2023a). In 2022, the total numbers for BEVs and PHEVs rose above 2.6 million (23%), with the BEVs alone reaching 13.45% of newly registered vehicles (European Alternative Fuels Observatory 2023, Pontes 2023a).

Looking more closely at the European electric car market in December 2022, the BEV market had a record month (275,277 registrations, +51% YoY), beating the previous record by a wide margin of 51% and also PHEVs had a positive month with +40% on a YoY basis, beating their own record from March 2021 (European Alternative Fuels Observatory 2023, Pontes 2023a).

However, incentives to support the purchase of PHEVs in a number of markets will end in 2023, which could create a drop of PHEV and also BEV purchase plans.

Regarding the top selling EVs in Europe in 2022, Tesla is in the leading position with two Models Y and 3. Already in the 2021 ranking, the Tesla Model Y was the best-selling EV, and again, in 2022, Tesla Model Y and Model 3 won 1st and 2nd place in Europe (European Alternative Fuels Observatory 2023, Pontes 2023a). While it can be expected that Tesla's Model Y could be again the best-selling BEV in 2023, Model 3 could be replaced by a rising Volkswagen ID.4, which is looking for a 100,000+ result by the end of 2023 (European Alternative Fuels Observatory 2023, Pontes 2023a). In 2023, not only the VW ID.3 but also 4th ranking Fiat 500e could overcome the Tesla Model 3 in sales.

According to Pontes (2023a), the VW ID.4 profited from a particularly good end of the year to displace the Fiat 500e model, allowing the VW ID.4 crossover to reach the 3rd rank in 2022 sales (Pontes 2023a). The Renault-Nissan-Mitsubishi group also had Dacia Spring amongst the top 10 at ranking #8. In the PHEV category, the Ford Kuga PHEV took the best place, and in the overall ranking of EVs in Europe, it reached rank #5 (European Alternative Fuels Observatory 2023, Pontes 2023a). However, the shares of top selling EVs in the European Market show how heterogenous this market is, since even the top-selling Tesla

Model Y reached only 5.3% of the total EV sales in 2022 with 138,373 sold Model Y (Pontes 2023a).

Fig. 3: Top Selling Electric Vehicles in Europe in 2022

Sources: European Alternative Fuels Observatory 2023, Pontes 2023a

In fact, out of the total 2,602,431 sold EVs in Europe, the 20 top selling EVs models only have a share of 38% of the total EV market. All other EVs models cover the majority of EV sales with 1,612,795 units or 62% (Pontes 2023a).

Therefore, in the top brands ranking for EVs sales in Europe in 2022, Tesla's share is 9% and takes the lead position, followed by BMW (8.6%), Volkswagen (8.4%) and Mercedes-Benz (8.2%), and Audi (5.6%) (European Alternative Fuels Observatory 2023, Pontes 2023a). The small differences in the share of top brands' EV sales in 2022 indicate that the total sales in 2023 could see a close race between Tesla and Volkswagen and BMW (European Alternative Fuels Observatory 2023, Pontes 2023a).

However, considering the sales of top automobile manufacturers by groups and alliances in the EV segment, Volkswagen Group (including Volkswagen, Skoda, Audi) became first with a 20.6% share, followed by Stellantis (14.9%) including its subsidiaries Peugeot, Chrysler, Citroën, Groupe PSA, Opel and Dodge among others, BMW Group (10.5%), Hyundai-Kia (10.1%) and Mercedes Group 9.9% (European Alternative Fuels Observatory 2023, Pontes 2023a).

4.3. EV purchase prices and purchase subsidies

Regarding the purchase prices and the state subsidies for EVs, the leading countries in electric mobility offered financial incentives such as tax reductions and tax exemptions for electric vehicles, or purchase subsidies designed to increase the EVs' uptake (EEA 2022b).

Regarding the EV price trends in the EU in 2022, the EV models ranking high in sales in 2022 are not necessarily the less expensive ones. This also implies that the consumer group buying an EV is not considering the purchase price as the most important factor to choose an EV model.

The EV Renault Zoe with a good range of up to 400km and a decent battery life is the least expensive EV in the European market with prices starting at around €20,000 (Energy5, 2023). In 2022, it ranked only at #14 in the ranking of most sold EVs in Europe (Pontes 2023).

Regarding the price, but not in the sales' ranking, Renault Zoe is followed by Nissan Leaf with a range of up to 385km and a price starting at €27,000 (Energy5, 2023). In fact, although Nissan Leaf has a moderate purchase price, it is not ranking amongst the top 20 EVs in sales.

Instead, the #1 in sales ranking, Tesla Model Y, and the #2 ranking Tesla Model 3 as the most sold EVs in Europe in 2022 are all sold at considerably higher prices. The Tesla Model 3 is #2 in the ranking of sales not because of a low purchase price (which starts at €47,000), but the reason for its high rank in sales in 2022 is related to the excellent battery life and range of up to 560km and a top speed of 250km/h (Energy5, 2023).

The price of best ranking Tesla Model Y in sales in Europe in 2022 starts at a price of €44,890 and the Model Y with the widest range before recharging has a purchase price of €54,990 in Germany (Tesla 2023).

However, in spring 2023, Tesla announced to have lowered its prices in European markets, like in Germany. Tesla lowered the prices of its Model 3 and Model Y vehicles by between 4.5% and 9.8% (Automotive Europe 2023). The #4 VW ID.4 in the ranking of most sold EVs in Europe in 2022 costs in its basic version €40,850 (Volkswagen 2023), while Volkswagen ID.3, ranking #6, starts at €32,990 (Energy5, 2023).

Considering the price reductions for Tesla EV models, also other automobile manufacturers could follow, and prices can be expected to further decrease over time, with the electric car market becoming more accessible to a wider range of consumers (Energy5, 2023). However, the current prices of EVs in Europe not only vary depending on the manufacturers' sales policy but they also vary depending on the individual country's government incentives and subsidy programmes for the purchase of an EV. To promote the adoption of electric vehicles, many European governments offer a variety of incentives, tax breaks or other advantages, including grants or rebates for purchasing an EV, tax credits or exemptions, free parking or charging and access to low-emission zones (Engery5, 2023).

Considering the impact of government incentives on the uptake of low- or zero-emission vehicles, it can be significant, and appropriate taxes and incentives can have some positive impact to encourage the purchase of an EV (EEA 2023d).

As a result, those countries, which actively promote the purchase of BEVs and PHEVs, could also significantly reduce their transport sector's CO_2 emissions, whereas the effects of tax incentives promoting low-emitting conventional cars on CO_2 emissions are less clear (EEA 2023d).

The availability and amount of grants vary across European countries, and some countries have more favourable policies than others. In this respect, Norway is one of the best examples for initiatives and policy to encourage customers to purchase EVs. As a result, the share of electric vehicles (BEVs and PHEVs) in Norway's total car fleet is the highest in the world, at 88% in 2022 (Energy5, 2023, Statista 2023).

However, also other countries like Sweden, the Netherlands and France offer generous incentives for the purchase of EVs. In Sweden, EV buyers are exempt from road tax and get a 60% reduction in company car tax, whereas in the Netherlands, the government offers a purchase subsidy of up to €4,000 for EVs (Energy5, 2023). In France, electric car buyers can get a €7,000 discount on the purchase price, and benefit from a 50% reduction in company car tax.

In Germany, to speed up the uptake of EVs, the Federal Government introduced market incentive package in 2016, focusing on three measures including temporary purchase grant (environmental bonus) for the purchase of BEVs and PHEVs available for a limited period of time, the expansion of the charging infrastructure, and the purchase of electric vehicles by public authorities (BMWK 2023a).

The German government's purchase grant with a total funding limited to €1.2 billion, known as the "environmental bonus", offered a purchase grant of €4,000 for BEVs, and €3,000 for PHEVs (BMWK 2023a). The grant is paid towards purchases of EVs with a list price of up to €60,000 and private, commercial and free-lance applicants were eligible for funding. This means that company cars and other commercial vehicles were also eligible (BMWK 2023a). The funding from the Federal Government was disbursed if the manufacturer also provided a grant (BMWK 2023a). However, in 2022, the Federal Ministry for Economic Affairs and Climate Action revised the environmental bonus

funding guidelines (BMVK 2022a). Accordingly, from 2023, the funding is granted exclusively for the purchase of BEVs and fuel cell cars, whereas PHEV are no longer eligible for subsidies (BMVK 2022b). The subsidy for PHEV ended on 31.12.2022 (BMVK 2022b). Also, the grant for the purchase of BEVs or fuel cell cars dropped to €3,000-4,500, and accordingly also the registrations of new EVs in Germany decreased significantly. According to VDA (2023a), in January 2023, 27,000 new EVs were registered, which was 32% less than in January 2022 (VDA 2023a). Out of these, 18,140 units BEVs and 8,850 units were plug-in hybrids (PHEV) (VDA 2023a). This translated into a 15.1% share of EVs of all newly registered passenger cars in January 2023, whereas in December 2022, the share of EVs was still 55.4% of new registrations (VDA 2023a).

The Federal ministry BMVK decided to limit the eligible group to private individuals as well as non-profit organisations as of 1 September 2023 (BMVK 2022b). Accordingly, companies are not eligible anymore to apply for grants for the purchase of EVs (BMVK 2022a). This restriction of the groups eligible for receiving the grants is criticised, as company cars are seen as an enormous booster for the rapid spread of EVs in the German market (VDA 2023b). The abolition of subsidies for EVs as company cars can be expected to lead to a significant delay in the increase of electric mobility in Germany (VDA 2023b).

As of 1 January 2024, the eligibility will change again and only will include BEVs and FCEVs up to a net list price of €45,000 (BMVK 2022b). It can be expected that this will again have a negative impact on the sales of EVs in the German market.

5. A game changer: Chinese EVs enter the European market

Looking at the 2023 ranking in Europe from January to April 2023, the Tesla Model Y has three times as many deliveries as the #2 Volvo XC40, and Volkswagen's ID EVs arrived #3 in the first half year of 2023, surpassing the Tesla Model 3 as #4 (Pontes 2023c). However, a significant change in the European EVs market could take place soon, which was not yet visible in the 2022 sales figures. This is the increase in imports and sales of a wide variety of Chinese EVs in the European market. The EU levies a duty of 10% on cars imported from China, which is rather low compared with the duty of 27.5% in the United States (Frater/Thompson 2023). In the first half of 2023, Chinese companies exported nearly 350,000 EVs to nine European countries (Frater/Thompson 2023).

The EVs sales at global level could give a taste of what could happen in the European EVs market in the near future. At global level, the most selling EVs in July 2023 have been Tesla Model Y at #1 ranking, followed by the Chinese automotive manufacturer BYD on #2 and #3 with its models Song and Qin Plus as BEV and PHEV, followed by Tesla Model 3 at #4 ranking (Pontes 2023b). At global level, the best-selling EVs are Tesla and BYD with 6 ranks amongst the Top 10 (Pontes 2023b). Accordingly, the top 10 ranking of best-selling EVs at global level are dominated by Chinese manufacturers, namely BYD, GAC and Wuling (Pontes 2023b).

While BYD EVs are also in the higher priced EVs segment, there is also a very low-priced Mini EV microcar available, which GM offers in China through its partner Wuling. This Mini EV has also entered the European market in 2021 as FreZe Nikrob EV via the Latvian company Dartz Motorz at a starting price of €9,999 and is the cheapest EV available in the Europe (Hommen 2021).

Considering the situation at global level, it is only a matter of time that Chinese EV manufacturers will enter the European market with a great variety of EV models. The Chinese vehicle manufacturer BYD has ambitious goals for sales on the German market. According to the Federal Motor Transport Authority (Kraftfahrzeugbundesamt, KBA), 165 BYD cars were

registered by the end of May 2023. However, latest statistics of the Kraftfahrzeugbundesamt (KBA) show that a total of 2,666 BYD models have been registered in Germany from January to August 2023, which translates into a market share of 0.3% (KBA 2023). In comparison, in 2022, BYD sold 550,000 electric cars worldwide, out of which 440,000 were sold in China (Ecomento 2023). BYD plans to achieve around 5% to 10% of the electric segment in the German automobile market "already in the medium term" (Ecomento 2023). BYD is currently busy setting up sales structures in Germany and BYD also wants to produce its EVs in Europe in the future. Germany is discussed as one of the possible locations (Ecomento 2023).

Furthermore, 3,038 units of GWM FUNKY CAT, an electric model of Great Wall Motor Co., Ltd., a Chinese privately owned automobile manufacturer headquartered in Baoding, Hebei, has been registered (KBA 2023a).

According to another KBA statistics, in 2022, out of the newly registered 2,651,357 passenger cars in Germany, 22,832 were cars of Chinese manufacturers (0.86%) (KBA n.d.). The Chinese manufacturers offer a large variety of Chinese EVs at sometimes but not always lower prices also in the European market.

As the president of the European Commission, Ursula von der Leyen, has pointed out in her State of the Union Address on 13 September 2023, the electric vehicles sector is a crucial industry for the clean economy, with a huge potential for Europe. She also pointed out that global markets are now flooded with cheaper Chinese electric cars and that their price is kept artificially low by huge state subsidies, which also endangers the European market (von der Leyen 2023). Accordingly, von der Leyen announced that the European Commission would launch an anti-subsidy investigation into electric vehicles coming from China (von der Leyen 2023). Europe would be open for competition, but not for a race to the bottom. Therefore, Europe would defend itself against unfair practices (von der Leyen 2023).

However, in any case, the European manufacturers will have to consider their future market strategies carefully to be able to compete with the Chinese EV manufacturers entering the European and German automobile market.

6. Conclusion

The European Green Deal aims to achieve net-zero GHG emissions by 2050 and to reduce GHG emissions in the transport sector by 90%. Since road transport is responsible for 77% of the transport sector's CO_2 emissions, the electrification of road transport and the deployment of zero-emission BEVs are considered being fundamental factors to achieve the 2050 targets. Based on Regulation (EU) 2023/851, all new passenger cars registered in the EU will have to be zero-emission vehicles as of 2035. This would mainly imply to opt for BEVs or require the introduction of other zero-emission vehicles based on synthetic fuels.

While some automobile manufacturers like Volkswagen, Audi and Volvo have decided to phase out their production of ICE-powered vehicles at least for the European market, towards achieving the zero-emission vehicles by 2035, the question will be which automobile manufacturers and what zero-emission vehicles will dominate European roads in future.

Besides the top seller Tesla, the Volkswagen group and Renault are among the leading brands in the European EVs market. Although currently, in the EU, EVs are mostly more expensive than gasoline cars, the incentives of offering grants and tax breaks for the purchase of EVs could reduce the purchase cost for EVs. With prices for EVs decreasing as competition is becoming more intense amongst EV producers, it can be expected that in future, an ever-increasing number of automobile manufacturers will offer an even greater variety of BEVs, each with its own

set of features and prices. However, the current situation in the European market does not yet reflect the situation of the global market in which Chinese EV manufacturers are pushing to take the lead from Tesla.

In the past, in particular German automobile manufacturers have been lobbying the German government and EU institutions for slowing down the transition towards e-mobility, only for learning later that they must compete in the ever-growing global market for EVs, which is flooded and partially dominated by Chinese EV manufacturers. If it wasn't for Tesla's top selling Model Y there are hardly any non-Chinese EV manufacturers amongst the top 10 best-selling EVs at global level. Due to the delay in the transition towards e-mobility in Europe, the EU's automobile manufacturers are only a sideshow in the present global EVs market.

Although the European Commission's president points out that the EU will insist on fair competition regarding the Chinese EV manufacturers, it has also to be considered that those Chinese EV manufacturers that are now starting to enter the EU market have already survived a domestic ousting process in the Chinese EV market, which saw many small Chinese EV manufacturers exiting the domestic market. Therefore, while the European automobile market can be expected to be dominated by BEVs in future, it will highly depend on the European automobile industry's resilience and better market strategies to keep their market shares in the European EV market once the Chinese EV manufacturers will enter the European market with a wide variety of EV models.

However, regarding the general target of making the transport sector more sustainable, the increase of the market share of EVs will not be enough, as also the production of EVs requires substantial resources and causes pollution. Therefore, to become sustainable, the transport sector must change significantly and will need new approaches for point-to-point mobility and for social interaction and access to goods and services. This will include the expansion of public transport and a shift to alternative modes of transport including rail, walking, and cycling, as well as an improvement of working conditions to reduce the need for mobility, such as working from home.

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