

The challenge of electro-mobility for the European area and the position of the Czech Republic.

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State of Issue

At present, attention in the Czech Republic (CR) is focused on further development of the automobile sector. Although the automobile sector is currently performing well, the situation may change due to growing foreign competition supplying technologically new vehicles. The increase in sales in the country has been on an upward trend (221,422 automobiles in 2023, 231,600 units in 2024). Nevertheless, in 2024, electric vehicles (EVs) accounted only for less than 5% of the total number of cars sold in the CR. Measures to cope with growing competition, especially from the US and China, will have to be the subject of the development strategy at the national and corporate levels. Compared to the position of CR that has become one of the global leaders in development of internal combustion engines (ICEs), the current emerging model of new vehicles “batteries, wheels, software” is a fundamental change and challenge. Moreover, many of the raw materials needed to produce electric vehicles (EVs) are imported. A long-run objective of the European Union (EU) is to strengthen its sustainability. In December 2019, the European Commission (EC) unveiled the EU strategy on climate neutral Europe, or the European Green Deal. The strategy promises to ensure that there are no net greenhouse gas (GHG) emissions by 2050, including increasing the EU’s 2030 GHG reduction target to at least 50%, and towards 55%. This shift towards sustainable and zero emissions technologies and economy-wide change is needed if the EU is to meet the ambition of the Paris Agreement. Electro-mobility seems to represent a vehicle how to improve Europeans’ living standards, as it is important to clean cities, affordable mobility of all citizens and European competitiveness.

There are various platforms promoting electro-mobility in Europe. One of them is Platform for Electro-mobility, which unites organizations from across civil society, industries, cities and transport modes. Its members are committed to promote electro-mobility, to develop solutions to electrify European transport and to promote those solutions to the EU institutions and member states. The Platform is working to create a sustainable, multimodal transport system in Europe.

Battery-powered electric vehicles (BEVs) can help to reduce CO₂ emissions in the transport sector during a complex mobility transition. This contribution to climate protection can be advanced through the expansion of renewable energies and specifications for energy-efficient and resource-saving vehicles and batteries. However, to prevent the expansion of electro-mobility from shifting environmental problems to other areas, the switch to battery drives must be highly resource-efficient. This requires a reduction in individual vehicle traffic as part of a mobility transition and a trend reversal towards small and light vehicles. The production, use and disposal of EVs and batteries should also be subject to legal requirements (durability, the promotion of reuse, reparability and recycling of batteries/vehicles) to minimize the use of resources and environmental impacts. Under a legal framework that meets these requirements, electro-mobility will be able to make a valuable contribution to environmental protection and

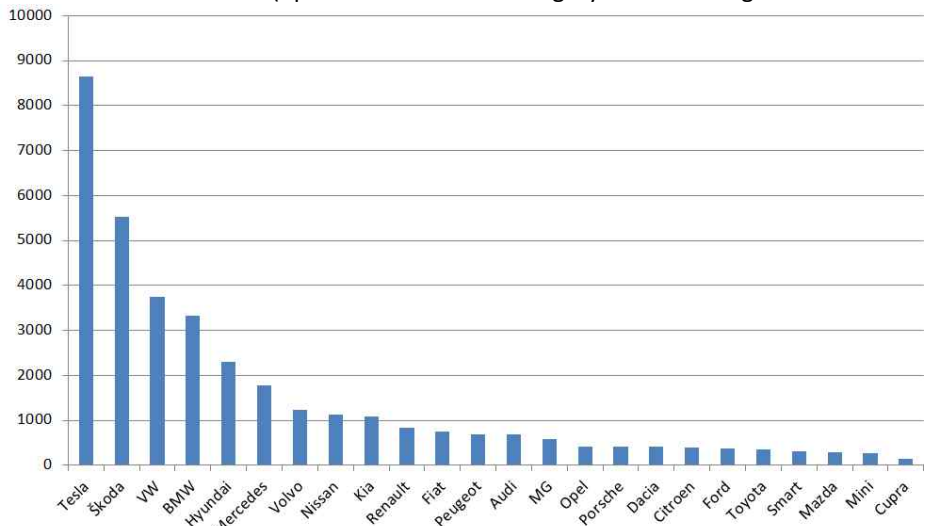
resource conservation in the long term. The CR continues to increase the share of clean vehicles on Czech roads through the updated *National Action Plan for Clean Mobility*.

Causes and Analysis

The achievement of climate neutrality in the EU by 2050 entails, among other things, a transformation of transport system. In recent years, emissions of GHG, dust, and other harmful substances in this sector have grown significantly. To reverse this trend, the necessary investment in zero-emission public transport is not enough. An opportunity is the widespread electrification of transport combined with de-carbonization of the energy sector. A potential is seen in developing and massive production of BEVs. The automotive sector is a major economic sector of some of the Central European countries (the CR, Hungary, Poland, and Slovakia). It is crucial that national strategies of those countries take account of the upcoming changes. For them this represents a great challenge, but also a major opportunity.

In the CR, Slovakia and Hungary, the employment in the automobile sector accounts for more than ten percent of total employment, while in Poland over three hundred thousand people work in the sector. This is why it is necessary to devise a proper strategy for electro-mobility development and design methods for its effective management. In this context, it will be critical to use the fiscal impetus provided by national recovery plans. It will also be vital to advance properly the competencies of employees who will be the pillars of a rapidly developing market. The Central European countries would be the setting up of an electric route, which would consist of a network of recharging points (PChP) that would enable mobility of BEVs between Prague and other regional capitals. To illustrate the position of the CR in terms of new passenger BEVs registration, from January to October 2024, 1.2mn new passenger BEVs were registered in the EU, down 4.9% y-o-y, of which about 8.7 thousand in the CR, up 61.3% y-o-y, according to the European Alternative Fuels Observatory and the European Automobile Manufacturers' Association. Graph 1 shows BEVs currently operated in the CR (category M1).

Graph 1: Personnel BEVs in the CR (operated vehicles of category M1 according to the vehicle brand)



Source: author, data Ministry of Transport, CR, 2024

The global automobile sector has been one of the earliest adopters of automation technologies, from assembly lines to industrial robots. In terms of robot density, it is one of the most

automated sectors. It now stands as a sector that could leverage AI innovation to deliver a transformation of the way in which vehicles are manufactured, operated and serviced.

Critical raw materials are essential to accelerate the transformation required for the EU's economy. Rapid demand growth is putting at risk the global supply-demand balance, with additional challenges posed by the limited diversification of supplies and a high level of dependency in EU supply chains. The demand for these minerals has significantly increased in recent years driven by the demand for EVs and other clean technology applications. Demand may continue to grow at a high rate. The market size of critical minerals for the energy transition has already doubled during the past five years, reaching EUR 300bn in 2022, according to *the International Energy Agency (IEA)*. Record deployment of clean energy technologies (e.g., batteries and solar panels) is driving growth in demand. The global market has seen a significant increase in demand for lithium, cobalt and nickel. Unlike fossil fuels, the EU has deposits of some critical raw materials. Materials found in retired EVs, windmills and other goods represent a further supply that could be tapped through recycling. Currently, however, the EU remains heavily reliant on raw material imports.

The push towards rapid market penetration by EVs has not been followed in the EU by a coordinated effort towards the conversion of the supply chain. In the mid-2010s, several EU members started to provide tax incentives and purchase subsidies for the adoption of EVs as well as infrastructure development. However, the EC only launched in 2017 *the European Battery Alliance (EBA)* to build a sustainable battery value chain in Europe covering the whole process from access to raw materials to battery recycling. The EBA strives to reduce the dependency on imports and to strengthen the EU's competitiveness in the growing battery market. By contrast, at the same time as the EU introduced new legislation, China has pursued a strategy aiming to dominate the global automobile sector. The Chinese 14th Five-Year Plan (2021-2025) and *the Made in China 2025* strategy declared new energy vehicles a strategic sector. China has focused on the development and deployment of BEVs since 2012 with large investments spending 230.8bn USD in more than a decade to build its EV sector.

There are currently over 36 thousand M1 category passenger BEVs in operation in the CR, with more than 5.6 thousand public charging points (PChPs) available. From January to November 2024, 9.9 thousand new passenger BEVs were registered in the CR, up 60.8% year-on-year (y-o-y), and the share of all registrations reached 4.7%. In the same period 2024, 1.3mn new passenger BEVs were registered in EU countries, down 5.4% y-o-y, and the share of all registrations reached 13.4%. From January to November 2024, 9.7mn new passenger vehicles were registered in the EU (up 0.4% y-o-y), of which 1.3mn were EVs (down 5.4% y-o-y). Battery-powered electric vehicles were the third most popular choice with a share of 13.4%, with petrol engines accounting for the most registrations (33.7% share; -4.9% y-o-y), ahead of hybrids without external charging (30.7% share; 19.7% y-o-y), diesel engines reaching a share of 12.1% (-11.2% y-o-y), plug-in hybrid 7.0% (-8.0% y-o-y).

Year-on-year, there were 73,802 fewer passenger BEVs registered in EU countries, while in the largest market, Germany, there was a drop in registrations of these vehicles by 122,517 (-28.8%). The year-on-year decrease was also caused by the termination of subsidy incentives during 2023. In the sum of other countries, except Germany, the number of BEV registrations increased year-

on-year. Of the larger markets, a y-o-y decrease in BEV registrations was recorded, e.g., in Finland (-28.8%, 19,539 BEVs), Ireland (-24.2%), Sweden (-16.9%,). Nevertheless, growth was recorded e.g. in Belgium 38.5% (120,264 BEVs), the Netherlands 11.8% and Denmark 48.4%. The CR is one of the fourteen EU countries where a year-on-year increase in BEV registrations has been recorded in the eleven months of 2024, with 9,943 vehicles representing a 60.8% growth. In this respect, the CR was ranked second just behind Malta in 2024. The effect of *the National Development Bank's Electro Mobility Guarantee Program*, which took place in the CR during 2024, has been noted, but not everyone has taken advantage of this incentive when buying a new electric vehicle. In terms of the number of all newly registered passenger vehicles, the CR was the tenth country in the EU, but only fifteenth with BEVs, which was reflected in the still relatively low share of BEVs (4.7%), while only five countries achieved lower shares in 2024: Italy, Bulgaria, Poland, Croatia and Slovakia. There are currently over 36 thousand M1 category BEVs in operation in the CR, with more than 5.6 thousand PChPs available.

In 2024, Tesla held about a third of the market for new passenger BEVs in the CR. In terms of brands, Tesla (3,394), Škoda (1,538), Volvo (864), VW (611), BMW (501) and Hyundai (480) have recorded the most registrations of new passenger BEVs in the CR over the past eleven months. The registrations of other BEV categories in the January-November 2024 period were as follows: light commercial vehicles (530 units, 66.7% y-o-y, market share/ms/ 2.7%); trucks (ms 0.3%) and electric buses (ms 3.3%).

Approximately 6.2mn BEVs of the M1/N1 categories operate in EU countries and there are almost 822 thousand PChPs. However, almost 470 thousand (57%) of them are available in three countries: the Netherlands (21.2%), France (18.4%) and Germany (17.5%). More than 5.6 thousand PChPs are registered in the CR, which ranks it on the 14th place among the EU countries and 21st place in terms of per capita. In EU countries, there are an average of 7.5 BEVs (category M1/N1) per public charging point, in the CR this share is 5.2. Of all PChPs in operation in the CR, 3,964 were regular, 1,238 fast charging and 444 very fast charging high-performance units (7.9%). In this latter indicator, the country does not differ from the European average (8.0%). Compared to EU countries, the CR has a higher share of points in the power spectrums of 50-150 kW. While in the CR this is 20.5%, in the EU countries it is about five percent. The trend in the field of public charging of EVs is the expansion of infrastructure. The country is thus only 17th in the number of M1/N1 BEVs, which is why the country achieves lower values in the share of vehicles per charging point than most EU countries. In EU countries, there are an average of 7.5 BEVs (category M1/N1) per public charging point, in the CR this share is 5.2 (14.6 in Hungary, 6.5 in Poland and 3.3 in Slovakia).

The EU has also increased tariffs on EV imports from China recently. In July 2024, the EC has imposed provisional countervailing duties ranging from 17.4% to 37.6% on imports of BEVs from China, on top of the existing 10% overall import duty for vehicles, based on the conclusion that BEV production in China benefitted from unfair subsidization. Consultations continue with a view to reaching a solution that addresses the concerns raised by the EU. The provisional duties will apply for a maximum duration of four months, within which a final decision must be taken on definitive duties (for a five-year period), through a vote by EU members (with the EC proposal being adopted unless there is qualified majority against it). The EU decision is based on

Regulation (EU) 2016/1037 on the protection against subsidized imports from the non-EU members.

Operational expenses also affect the cost competitiveness of EU vehicle manufacturing in addition to higher investment costs. Higher energy and labor costs contribute to the competitive disadvantage for the EU on the cost side. Higher energy costs are especially relevant for the energy-intensive battery production. Labor is becoming a challenge for the automotive transition in terms of labor costs and relevant skills. The automotive sector is therefore focusing on use of robots and especially China is massively investing in use of robots, despite having lower labor costs than the EU. Automation tends to substitute lower-skilled workers, such as assemblers, machine operators or metalworkers. Projections for 2020-2030 expect engineering and ICT occupations to account for 90% of job growth in the EU's automotive sector (90 thousand jobs). In the labor market, the automotive sector will then compete increasingly with all other sectors employing ICT skills at an increasing scale.

The EV markets, comprising BEVs and plug-in hybrid vehicles (PHEVs), have been dynamically growing in recent years. Globally, the market share of EVs in new passenger vehicle sales has increased from 14% in 2022 to 18% in 2023, and it is expected to further expand to 30% in 2026. In 2023, EVs accounted for more than a one fifth of new vehicle registrations in Europe (14.6% BEVs, 7.7% PHEVs). The transition of automotive manufacturing towards EVs means a far-reaching change in the technology, production processes, skills demand and inputs needed by vehicle producers and supplier networks. Major sector reorientation is needed, including the reskilling of workers, leaner supplier networks and the development of charging infrastructure. Electro-mobility eliminates CO² emissions, which improves air quality in cities, but also reduces noise. Particle emissions from brake wear is reduced in BEVs due to regenerative braking, whereas the emission performance in terms of tire depends on the weight of the vehicle. The Euro-7 regulation on vehicle emissions (adopted in Spring 2024, to be in force from 2026-2027 for cars/vans and 2028-2029 for trucks/buses) includes non-exhaust emissions from tires/brakes and includes minimum requirements for battery durability in EVs and hybrid vehicles.

The decision to increase the GHG emission reduction target by 2030 requires reduction of emissions in the road transport sector. Apart from regulations that set the standards for ICEs, the primary measures to reduce emissions will be the development of electro-mobility and de-carbonization of the energy mix. The Central European countries may largely contribute to the achievement of these goals as they have a significant potential in the automotive sector.

Future Expectations and Implication

Battery-powered electric vehicles are the dominant de-carbonization technology and considered the future of road transport under the net-zero emissions target. Nevertheless, other alternatives to gasoline/diesel fuels are available for specific automobile segments (heavy-duty vehicles, critical services/infrastructure, regions with underdeveloped EV charging infrastructure), or to reduce carbon emissions in road transport for the existing segment of automobiles with ICE. The limited affordability of EVs due to price differences is a barrier to greater fleet modernization. The cheapest available new BEVs on the European market in 2023 was nearly twice more expensive than the cheapest ICE automobile. In China, the situation is different. The cheapest available BEV is less expensive than the cheapest ICE automobile. Factors

behind the EU-China differential in EV are Chinese industrial policy, including the early-mover advantage and economies of scale in EV production and lower battery manufacturing costs in China. In the European market, Chinese EVs sell at higher prices than the same model at its own market.

The strategic framework for transport in the CR is regulated by the *Programming document of the Transport Program in the Period 2021–2027* and the *Approved Programming Document OPT3*. Incentivize (e.g., through the compensation mechanism for consumers) the large-scale rollout of bidirectional charging for EVs. This will help to ensure that the EU's growing BEVs fleet becomes a flexibility asset for the grid, lowering overall system costs. The expanded production of clean technologies will trigger job creation. By 2030, around five million new jobs may be created for the assembly of EVs and the production of their batteries. The Ministry of Transport of the CR has announced several calls under *the Transport Program 2021–2027 (OPT3)*, which should support infrastructure for alternative fuels, specifically for the construction of charging stations. The current calls of the Ministry of Transport for the support of charging infrastructure under *the Transport Program 2021–2027 (OPT3)* are as follows:

- *Call No. 30* to support the development of fast-charging infrastructure for passenger vehicles - the whole CR with allocated funds of CZK 1bn (EU contribution from the Cohesion Fund, like calls No. 31 and 32). Applicants can receive support of up to 55% of the eligible costs of the project. The call is in rounds and will be open to applicants until 27 January 2025 (like call No. 31, for call No. 32 the deadline is 28 February 2025).
- *Call No. 31* to support the development of fast-charging infrastructure for passenger vehicles – priority areas with allocated funds of CZK 385mn. Applicants can receive support of up to 70% of the eligible project costs.
- *Call No. 32* to support the development of the infrastructure of common charging stations in cities and municipalities has allocated funds of CZK 370mn. Applicants can receive support of up to 80% of the eligible costs of the project.

As far as the supporting infrastructure for BEVs is concerned, the situation is not the worst in some parameters. A bigger challenge for tourism is to address the issue of domestic production and especially the sale of BEVs. Recently, the first effects of the changing market situation have become apparent. Although Škoda cars are selling well so far, changes are expected in the market overall. Some companies are trying to limit production of vehicles. Hyundai Motor manufacturing Czech carmaker in Nošovice (the CR) has already briefly stopped production in 2024 due to low demand for EVs. Employees received 70% of the average wage. The company originally expected purely EVs to account for about a sixth of production in 2024. In the end, it was only a tenth. In 2025, the Nošovice's Hyundai will reduce production. Due to uncertain demand, it is going to produce fewer cars this year (less than 300,000) than the 330,000 cars produced in 2024. Currently Hyundai's reduced daily production in Nošovice plant declined from 66 vehicles per hour (in 2024) to 60 units per hour this year. At the same time, it is starting to reduce production days and the company has also announced layoffs of a relatively small number of workers. In neighboring Slovakia, the changes also affect some companies supplying components or components to car manufacturers in Europe. Structurally, Europe must address the fundamental challenge of modifying its production profiles in view of

innovation, market, energy and environmental potential. Also, in the EU car and van manufacturers urged action on CO₂ rules before end of year 2024 to avoid damage to competitiveness and jobs. The Czech Republic must be one of the most proactive in this respect, as it is one of the most industrialized countries in the EU.

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