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The Automotive Sector in EU-CEECs: challenges and opportunities

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The global automotive sector is undergoing major structural changes which in the next decades will pose significant challenges to the sector, but also offer opportunities. Highlighting three major disruptive trends, (i) shifts of global automotive production towards Asia, in particular China, (ii) trends in e-mobility, and (iii) problems in supply chains, this article shows how Austria and the Central and East European automotive sector have faced these shifts. Overall, the EU-CEE countries have benefited from the relocation of automotive companies to emerging countries and have been integrated into global, in particular German supply chains during the last thirty years. The e-revolution started off in 2020 and the EU-CEE had a rather good start. As the automotive industry is a key sector in the region, the electric transformation is vital for their future. While there are some positive trends, risks are manifold, and further efforts have to be undertaken so as not to be left behind.

1. Introduction

The automotive sector plays an important role in Austria and the Central and East European economies (CEECs) of the European Union. While Austria has a large car parts industry, the main original equipment manufacturers (OEMs) like Volkswagen, Stellantis, Renault, or Hyundai-Kia are assembling passenger cars in the EU-CEECs. In fact, Czechia, Slovakia, Hungary, and Romania are highly specialised in automotive production, helped by the inflow of foreign direct investment during the last thirty years. For Poland and Slovenia, this and other related sectors are of high importance as well and belong to the most important manufacturing industries.

In terms of numbers, Slovakia is the country most specialised in automotive production. Here the automotive industry¹ accounts for 23% of manufacturing value added (VA) and 34% of total exports.² It is followed by Czechia and Hungary, with 20% (VA) and 22% (exports) respectively. In Romania, the automotive industry is the second most important industry with 14% of manufacturing value added and 21% of total exports. In Poland and Slovenia, the shares

are smaller with about 8% (VA) and 14% (exports). The Austrian automotive industry has similar shares to these latter countries, accounting for 7% of manufacturing value added and 13% of total exports. In terms of employment, automotive industry shares are smaller as it is a capital-intensive sector; they range between 15% of total manufacturing employment in Slovakia and 6% in Austria. In the European Union, Germany is in fact the largest automotive producer and here the sector also accounts for 20% of value added, 17% of total exports, and 12% of manufacturing employment. In absolute terms, the German automotive industry shows a value added of EUR 136 bn, accounting for about 60% of the total EU automotive value added. The value added is much smaller in the CEECs and ranges between EUR 11 bn in the Czech Republic, EUR 7 bn in Poland, EUR 5 bn in Hungary and Romania and EUR 4 bn in Slovakia. In Austria, the automotive sector holds a value added of about EUR 5 bn.

In recent years it has become evident that the global automotive sector will undergo major structural changes in the next decades, posing significant challenges for the sector, but also offering opportunities. Some of these changes started years ago, like the tendency to shift production capacities to

¹ Defined by NACE rev. 2 classification as sector C29 'Manufacture of motor vehicles, trailers and semi-trailers'. The terms sector and industry are used interchangeably.

² Data for the year 2019. Source: Eurostat National Accounts, UN Comtrade.

emerging markets, whereas others have come into focus only recently. In particular, the electrification of cars has taken off recently. In addition, a couple of trends are just beginning to develop, including autonomous or connected driving as one of the key emerging new technologies. Some structural changes are happening on the demand side, such as rise of the sharing economy or ride-hailing, while others are occurring on the supply side, such as the emergence of new players like Tesla (US), Chinese producers or IT companies.³ Recently, new specific challenges have emerged from the COVID-19-crisis and the disruption of supply chains, also in the wake of the Russian war of aggression against Ukraine and the various resulting shortages. All these trends will have effects on business models, car sales, value chains and employment in the industry.

The main goal of this policy brief is therefore to zoom in on the automotive industry and analyse three selected disruptive trends: These include the (i) shifts in global automotive production towards Asia, in particular China, (ii) trends in e-mobility, and (iii) problems with supply chains. The focus will be on Austria, Czechia, Slovakia, Hungary, Romania, Poland and Slovenia, how they are being affected by these disruptive trends, and what the main challenges and opportunities are ahead. Germany, as the main automotive player in the European Union, sets the scene and has the main linkages with the region, but will not be the main focus, even though trends there have to be kept in mind.

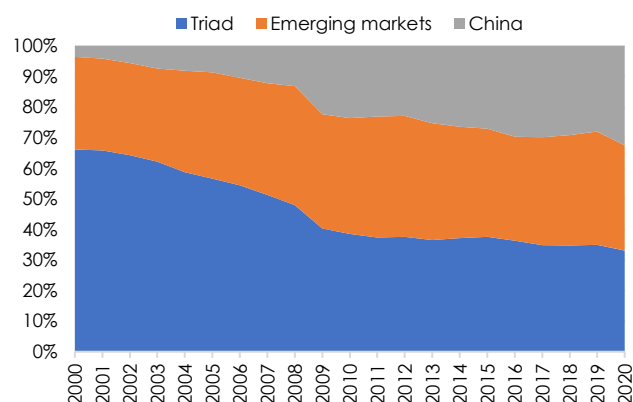
2. Disruptive trend 1: Shifts in global automotive production

During the last twenty years, global automotive production has seen strong geographic changes and specifically a shift towards emerging markets, especially China. At the beginning of the 2000s, automotive production took place predominantly in the triad – West Europe, the US and Japan – accounting for almost 70% of world production (see Figure 1). Over the next twenty years, this share steadily dropped and finally reached 33% in 2020. The share of emerging markets in world production without China stood at 30% in 2000, reached its highest share with 40% in 2012 and fell back to 34% in 2020. Most notably is the rise of automotive production in China: while accounting for only 4% of world production in 2000, this share has now reached 32%. As such, by 2020 the triad held one third, and emerging markets and China together held about two thirds of global automotive production.

These global trends – specifically the declining share of the triad – has affected the Central and Eastern European economies only very recently. After the fall of communism, West European car manufacturers grasped the historical opportunity and invested heavily

in the Central and Eastern European region. They continued historical ties, revitalised existing brands or relocated parts of their production. Geographical proximity, a long tradition in mechanical engineering, a well-educated workforce and low unit labour costs strongly benefited the region. Volkswagen was the frontrunner, forming joint ventures with already existing firms in Czechia (Škoda Auto) and Slovakia (BAZ), and producing commercial vehicles in Poland. Fiat invested in Poland, Renault in Slovenia and Romania, and Suzuki came to Hungary. After EU accession, producers from Asia came to the region, such as Kia Motors to Slovakia, and Hyundai and Toyota to Czechia. And other European manufactures have continued to invest in the region, building new greenfield plants (Peugeot Citroën, Mercedes, and BMW). In addition, car part companies followed their OEMs and created a dense network of suppliers.

Figure 1: World passenger car and commercial vehicle production, in % of total



Source: International Organization of Motor Vehicle Manufacturers (OICA).

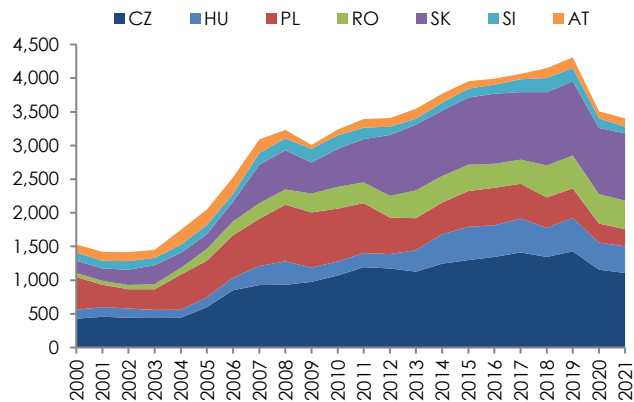
Overall, passenger car production in the EU-CEECs doubled after EU accession in 2004 and reached about 3 million cars by 2008 (see Figure 2). Production capacities were further increased either by existing manufacturers or by the establishment of new plants in the region. Automotive production peaked in 2019 and reached 4 million passenger cars. Overall, Czechia and Slovakia have become the largest producers in the region, with 1.1 and 1 million passenger cars produced in 2021 respectively. Slovakia has become the largest per capita car manufacture in the world. The COVID-19 pandemic hit the automotive industry hard and car production plunged in 2020. Only Slovakia increased production in 2021 while in the other countries production continued to decline. Austria, which has only one contract car manufacturer - Magna Steyr -, naturally shows lower numbers of cars produced compared to the OEMs in the region, with some 125,000 cars in 2021. While the COVID-19 pandemic led

car of the future is electrified, autonomous, shared, connected and yearly updated.

³ See for example PWC (2018) which describes the main trends transforming the automotive industry with the acronym "eascy": The

to problems on the supply side and long car delivery times, inflation will lead to falling household incomes and a decrease in demand. Thus, in the near term, the automotive industry will face tough conditions besides structural factors and may pick up again only in the distant future.

Figure 2: Passenger car production in EU-CEE, in thousands



Source: International Organization of Motor Vehicle Manufacturers (OICA).

Box 1: Austrian automotive industry

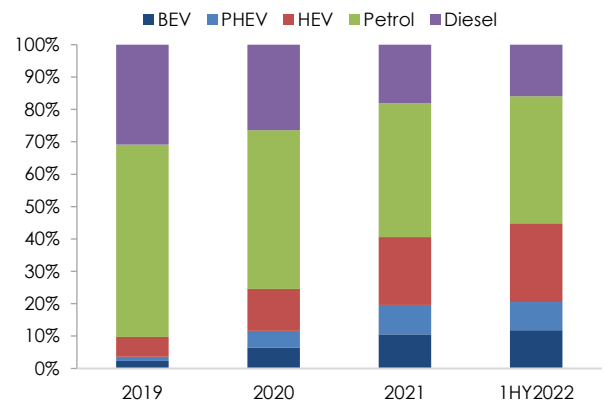
The Austrian automotive industry accounted for 7% of manufacturing value added and 6% of employment in 2019 and belongs to the largest sectors in manufacturing (behind machinery, fabricated metal products, the food industry and manufacture of electrical equipment). It is a very export-oriented industry responsible for 13% of total exports. The main automotive companies in Austria include: Magna Steyr Fahrzeugtechnik, BMW Motoren, AVL List, Robert Bosch, ZKW Group, Kromberg & Schubert, Miiba.

3. Disruptive trend 2: Trends in e-mobility

E-mobility has been in the starting blocks for some time but got its go-ahead in the year 2020. Driven by concerns over climate change and CO2 emissions, European legislation for curbing CO2 emissions for cars⁴ and fiscal support to consumers spurred registration of e-cars and pushed the e-mobility revolution in 2020. As such, registration numbers for electric cars, which had been quite low before, has gone up since 2020 (see Figure 3): Registration of pure battery electric vehicles (BEV) increased from 2.3% in 2019 to 12% in the first half of 2022, plug-in hybrid electric vehicles (PHEVs) from 1.3% to nearly 9% and hybrid electric vehicles (HEV) -

with the largest share - from 6% to 24% in the respective years. Together, their share rose from 10% in 2019 to 45% in the first half of 2022, while shares of petrol and diesel cars declined significantly. However, there is still a long way to go: Passenger cars in use in the European Union are still dominated by petrol (52%) and diesel cars (43%), while the number of electric cars (BEV, PHEV and HEV) is still very low. In 2020, these cars accounted for just 2.3% of the European car fleet (see Figure 4). In its 'Fit for 55' package announced on 14 July, 2021, the European Commission proposed to further curb CO2 emissions from cars by 55% compared to 2021 levels by 2030 and by 100% by 2035. This would mean a de-facto ban on the sale of new internal combustion engine cars, but also plug-in hybrid and hybrid models, from 2035 onwards.

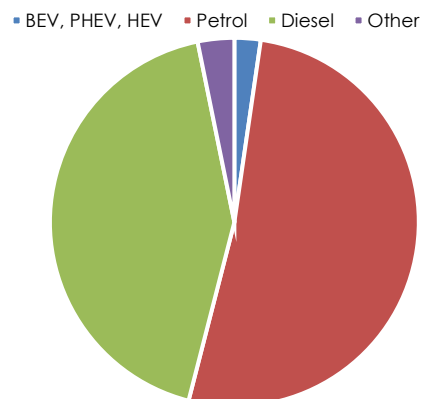
Figure 3: Car registration in Europe by fuel type, 2019-2021



Note: Europe: EU+UK+EFTA. Excluding other alternatively powered vehicles.

Source: ACEA.

Figure 4: Passenger cars in use in the European Union by fuel type, 2020



Source: ACEA.

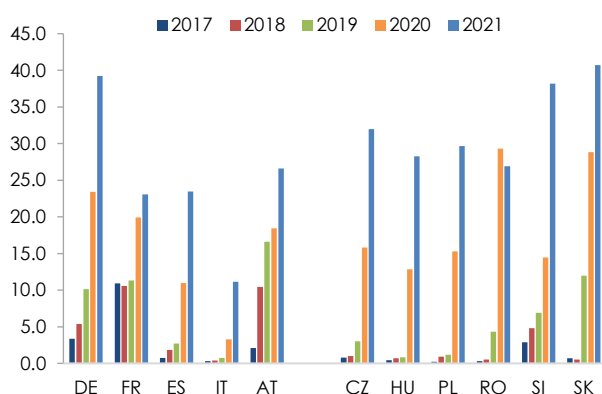
⁴ Regulation (EC) 443/2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles. Mandatory fleet emission reduction targets for new passenger cars were set as of 2015

onward and as of 2020-2021 (phase in 2020, full application as of 2021). Not meeting the targets would lead to huge penalties for car producers.

As such, a rush towards electrification began in 2020/2021, with all major car automakers announcing ambitious plans and strategies for electrification and explicit time schedules for introducing new electric vehicle models (for an overview see Delanote et al., 2022). The largely foreign-owned automotive industry in the EU-CEE countries is highly dependent on the strategies of major automakers and on decisions taken in their respective headquarters. Thus strategies had to trickle down into the respective subsidiaries, although by now, car makers in the EU-CEE have also revealed plans for future electrification and started production. Indeed, some countries have the potential to become major points for electrification based on these announcements. Transport & Environment (2021) for example forecasts that Slovenia, Slovakia and Czechia are expected to have the highest level of battery electric vehicle production per population in the year 2030. On the other hand, in Romania for instance, the shift to electric vehicle production will be less significant as it will also serve other markets outside the EU.

Exports of electric vehicles provide evidence of the start of production of electric vehicles in Europe and the EU-CEECs in particular. The share of electric vehicles (BEV, PHEV and HEV) in total car exports jumped in the year 2020 and further in 2021 (see Figure 5). It was particularly large in Slovakia, Slovenia and Germany with 40%, but also in the other EU-CEECs the share reached about 30% (Austria 27%). A more detailed look reveals differences in the structure: Slovenian exports are dominated by pure battery electric vehicles (68%, Austria 41%) on the one end, Polish, Hungarian and Romanian by hybrids (see Figure 6), largely reflecting the forecast of Transport & Environment (2021).

Figure 5: Exports of electric vehicles (BEV, PHEV and HEV) in percent of total car exports

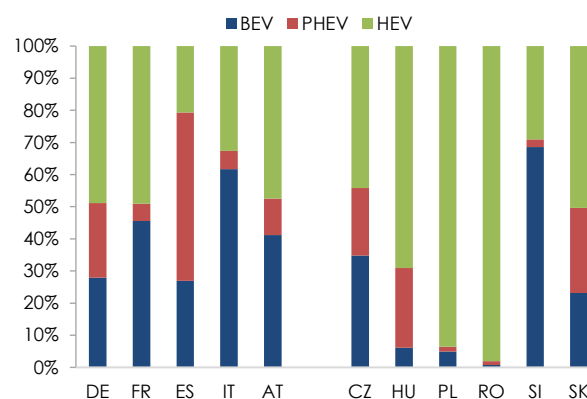


Source: Eurostat Comext.

⁵ <https://spectator.sme.sk/c/22951744/volvo-is-coming-slovakia-will-get-the-fifth-carmaker.html> published on 1 July 2022.

⁶ In 2021, Stellantis was formed from a merger of the Italian-American conglomerate Fiat Chrysler Automobiles (FCA) and the French PSA Group.

Figure 6: Detailed electric vehicle exports, in % of total electric vehicle exports, 2021



Source: Eurostat Comext.

Slovakia has been the latest to attract foreign-direct investment in the automotive industry. In July 2022, Volvo Cars announced it would build its third production plant in Slovakia (besides the ones in Ghent, Belgium and Torshavn in Sweden) and specialise in electric car production there. The plant will be built in the eastern part of Slovakia, near Košice, producing about 250,000 vehicles a year and employing 3,300 people. The investment sum amounts to EUR 1.2 billion.⁵ Slovakia is already home to four carmakers, all located in the west of Slovakia: Volkswagen Bratislava (about 400,000 cars produced in 2019), PSA Peugeot Citroen, now Stellantis⁶ (370,000 cars produced in 2019), KIA Motors (340,000 cars produced in 2019) and Jaguar Land-Rover (plant capacity of 150,000 cars). Overall, Slovakia has some tradition in producing e-cars: Volkswagen Bratislava has produced the Touareg hybrid since 2010 and the small Volkswagen e-up! since 2013. Stellantis announced an investment plan of EUR 180m in 2021, covering new car models, with mostly hybrid and electric vehicles gradually launched in 2023.⁷ According to recent news 'Slovakia is currently leading the way in EV manufacturing with nine models in production or on the drawing board.'⁸ In **Czechia**, Škoda announced in June 2021 its new corporate strategy until 2030 "Next Level – Skoda Strategy 2030" and plans to become an electro-mobility hub in the region. In the first half year of 2022, Škoda produced about 34,000 electric vehicles (BEV + PHEV), accounting for 10% of car production. For comparison, Hyundai Motor Czech Republic also produced some 30,000 e-cars, accounting for 18% of total car production. In **Hungary**, electric drives for the Audi e-tron quattro have been manufactured there since 2018 at Audi Hungaria. Mercedes-Benz Manufacturing Hungary started production of purely electric cars in

⁷ <https://spectator.sme.sk/c/22691638/trnava-based-carmaker-will-manufacture-new-models.html> as of 28 June 2021.

⁸ <https://centraleuropeantimes.com/2022/09/batteries-power-cee-e-mobility-transition/> 2022/09/12

October 2021 and a new BMW plant will be dedicated to electric vehicles in 2025. **Poland** is the leader in manufacturing electric vans and buses. The Polish government announced in 2020 plans to build an electric vehicle factory and to manufacture e-cars under the brand Izero. In **Romania**, Dacia has revealed its first fully-electric vehicle in 2020, the Dacia Spring. However, the car will not be made at Dacia's plant in Romania, but at the parent company Renault's facility in Shiyang, China. Dacia has further plans for electrification for 2026. Ford Romania, commercial vehicle producers, announced a USD 300m investment in 2021. In **Slovenia**, Revoz also manufactures the Renault Twingo Electric, which already makes up one-third of output.

In **Austria**, Magna Steyr in Graz, the only vehicle contract manufacturer in Austria, covers the entire range of drive technologies from conventional to plug-in hybrid to purely electric vehicles, e.g. it produces the pure-electric Jaguar I-PACE. In 2020, Magna Steyr signed a preliminary agreement with the California-based car manufacturer Fisker to potentially build a battery-powered electric luxury SUV Fisker Ocean.⁹ Production is scheduled to start in November 2022 and expand to 150,000 cars in 2024.¹⁰ In June 2022, the BMW group announced a major investment for BMW Motoren GmbH, which has produced combustion engines in Austria for 40 years and is one of the largest companies in Austria. The BMW group will invest EUR 1bn in the site by 2030. E-drives will be manufactured from 2025 onwards, and the development of BMW eDrive powertrains will also be partially relocated to Austria.¹¹

Thus, overall there is an emerging shift towards electric vehicles in the EU-CEE countries. However, over the medium run, the production of internal combustion engine cars might stay longer in these countries. For example, car companies like Skoda or Dacia plan a slower transition towards electric vehicles, and Skoda has been mandated to cover activities and strengthen the position of the entire Volkswagen Group in India and southeast Asia. In addition, innovation in the EU-CEEs is limited as headquarters tend to keep their R&D facilities in the home country. Other factors mentioned in recent studies (see Delanote et al., 2022 and Slačik, 2022), are the tendency of older technologies to persist longer in peripheral locations, and the existence of lower unit costs in the region which are still beneficial for the more labour-intensive production of internal combustion engines.

⁹ <https://investinaustria.at/en/news/2020/09/magna-steyr-wants-to-build-new-e-powered-car.php>

¹⁰ <https://industriemagazin.at/automotive/magna-steyr-will-mit-produktion-auf-den-us-markt> as of 7 September 2022

4. Disruptive trend 3: Problems in supply chains

Overall, the automotive sector is one of the most integrated sectors in global trade and in global value chains (see WTO, 2021). For the Central and Eastern European automotive industry, integration into the so-called German-manufacturing supply chain played a particular role for transforming the sector into a competitive and export-oriented industry. Also, Austria is part of this German-manufacturing supply chain, which is characterised by a large share of German value added in the countries' exports (IMF, 2013, Hanzl-Weiss, 2016).

The COVID-19 pandemic which hit the world in 2020 had a significant effect on trade and led to severe supply-chain disruptions. Lock-downs in Asia/China and the closure of harbours led to long delays in the supply of products and disruption in transportation. In addition, the pandemic has triggered a shortage of semiconductors, essential for the automotive industry and mainly supplied from Asia. In fact, the chip shortage was aggravated in 2021 and peaked in September of that year. Thus, OEMs were forced to temporarily shut down production or cut shifts. As new production capacities take time to build up, the situation will persist throughout 2022 (see Hanzl-Weiss, Reiter, 2022).

In February 2022 then, the Russian invasion in Ukraine revealed the dependence of European automotive producers on wiring harnesses being imported from Ukraine. Ukraine is also a major producer of neon gas, which is used in the production of semiconductors, aggravating the chips shortage further. In turn, Russia is a main exporter of metals, including palladium used in catalytic converters and nickel used in batteries – accounting for 25% and 14% of world exports respectively (OECD, 2022). For the future of the automotive industry and its shift toward electric vehicles, the availability and affordability of main inputs is thus of utmost importance. The prices of these metals have soared as a result of the war and sanctions.

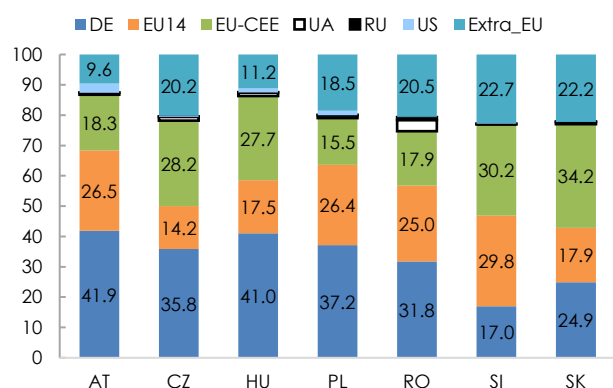
Looking at the import structure of car parts¹² in the CEECs and Austria in the pre-COVID year 2019 (see Figure 7), there were only small import shares stemming from Ukraine, Russia and the US. About 80% of car parts came from European countries, and only 20% from outside. For Austria and Hungary the intra-EU share is even higher at 90%. Car part imports coming from Ukraine were only larger for Romania (3.7%) but were smaller for the other countries. They ranged between 0.6% in Austria and 1.2% in Czechia and Hungary. Also, Russian imports were relatively larger in Romania only

¹¹ <https://itsbmw.com/series/bmw-i/bmw-plant-in-steyr-one-billion-for-building-up-electrical-competence/> as of 20 June 2022.

¹² Defined by NACE rev. 2 classification as sector C29.3 'Manufacture of parts and accessories of motor vehicles'.

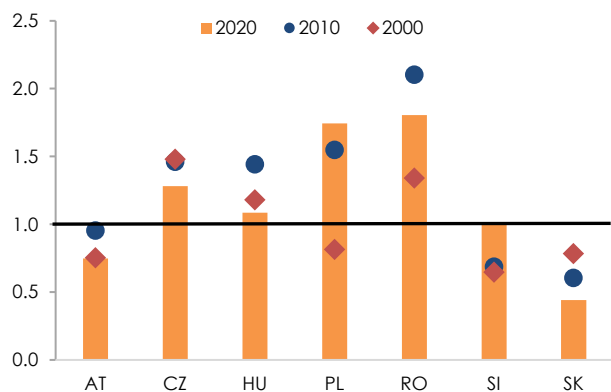
(0.9%). Imports from the US played a larger role, especially for Austria (3.1%), Hungary and Poland (about 1.5%). Interestingly, for Austria in comparison to the EU-CEECs, imports from Germany are the largest (42%), followed by those from the EU14-countries (27%), while imports from the EU-CEE are relatively smaller (18%).

Figure 7: Parts and accessories for motor vehicles, in % of total imports, 2019



Source: UN Comtrade.

Figure 8: Import dependence of parts and accessories for motor vehicles, 2000, 2010 and 2020



Source: UN Comtrade.

All countries both import and export car parts. In order to give a very rough measure of import dependence, the share of exports to imports of cars parts is given in Figure 8. A number above 1 means that exports are larger than imports, a number below one shows the reverse. As Czechia, Poland and Romania are the largest exporters of car parts, these countries export more car parts than they import. It is the other way round in Austria and especially Slovakia.

Specific challenges also arise concerning the production of electric cars. Structural change towards the production of electric cars has significant implications for the automotive value chain and thus for employment. In fact, 60% of the content of an electric vehicle comes from outside the traditional supply chain (electronics, batteries). An electric vehicle has less mechanical complexity and requires less maintenance on the one hand, but on the other hand needs more software, semiconductors or rare earths (see UBS, 2017). Thus, shifts in supply structures are required and concerns over automotive employment are looming, with the fear of severe employment cuts, especially among car suppliers (see CLEPA, 2021).

Looking more closely at one core input, batteries are an important part of electric vehicles and contribute up to 40% of the total cost of an electric vehicle. Europe, however, depends on imports from Asia, especially China (see European Commission, 2021). Europe has recently stepped up efforts to set up its own battery supply chain, e.g. through the establishment of the European Battery Alliance or special Important Projects of Common European Interest (IPCEIs). For example, the IPCEI European Battery Innovation includes six Austrian companies¹³, three Slovak ones and the Croatian Rimac¹⁴, and the IPCEI Batteries includes two Polish companies. Producing batteries close to where electric vehicles are assembled is reasonable, as the heavy weight of batteries makes long-distance logistics and shipping costly. Thus, investment in battery plants hints at which locations are favoured and where the production of electric cars will be located.

EU-CEE countries are making efforts to secure a role in battery production and to attract foreign direct investment in this area. Poland and Hungary have been most successful in this respect: In Poland, there is already one gigafactory in operation since 2017. South Korea's LG invested there and recently pledged further expansion of its investment. In Hungary, South Korean SK Innovation is planning its second plant¹⁵, and South Korean Samsung SDI plans to expand its plant there¹⁶. The Japanese GS Yuasa' began operations at its first overseas lithium-ion battery plant in Hungary in late 2019¹⁷. The newest announcement in this field occurred in August 2022, when the world's largest battery producer, CATL from China, pledged to invest in a greenfield plant in Hungary. With a sum amounting to EUR 7.3bn, this will be the largest ever investment in Hungary and with a capacity of 100GWh per year it will be the largest gigafactory in Europe. It should provide about 9,000 jobs.¹⁸ In Slovakia in 2019, the Slovak InoBat

¹³ AVL, Borealis, Miba, Rosendahl Nextrom, Varta Micro Innovation and VOLTLABOR

¹⁴ The Croatian company Rimac produces electric hypercars, which belong to the fastest in the world. In 2021, Rimac combined forces with Bugatti and began cooperation in a new group.

¹⁵ <https://www.electrive.com/2021/07/20/sk-innovation-subsidized-for-hungarian-battery-plant/>

¹⁶ <https://www.electrive.com/2021/02/24/samsung-sdi-expands-battery-production-in-hungary/>

¹⁷ <https://www.bestmag.co.uk/gs-yuasa-first-overseas-lithium-ion-battery-plant-start-operations-hungary/> published on 23 October 2019.

¹⁸ <https://www.ft.com/content/5e896f2e-faf2-4d64-bf73-b04bcbbf55d8> published on August 12 2022.

Auto firm and the US company Wildcat Discovery Technologies formed a strategic cooperation for a combined research and development centre and production line.

Automakers are also active in securing raw materials and supplies of batteries. Carmakers are entering into commercial or partnerships with battery cell manufacturers, establishing joint ventures or even investing in such companies (see Delanote et al., 2022). Recently, a trend towards vertical-integration is being seen in some carmakers not only in the field of batteries (e.g. raw materials for batteries, in-house battery-making or closer links, also to chips manufacturers and software development). Volkswagen for example plans to invest EUR 20bn in six European battery plants, starting in Germany, Sweden and Spain. Czechia and Poland are the front-runners for winning another plant.¹⁹ Overall, according to announced investments²⁰, Germany would lead battery production in Europe, and Hungary and Poland would be placed next.

5. Conclusions and policy options

The automotive industry is witnessing a number of structural shifts which will have significant impacts on its supply chain and employment patterns. The most important policy challenges connected to these shifts and options for the sector as identified in the recent study by the EIB/OenB/wiwi (see Delanote et al., 2022) include the following: massive and risky infrastructure needs in terms of charging infrastructure, which are a pre-condition for increased demand of electric vehicles. Also, infrastructure needs in terms of green electricity generation and transmission are necessary. Shortages of inputs and global competition for scarce resources will be a major challenge in the turn towards electric vehicles. The shortage of semiconductors triggered by the pandemic has shown vulnerabilities and dependencies on Asian suppliers. Also for other inputs (raw materials, rare earths) dependencies are large, while prices are surging. China has come into the focus as a main supplier of inputs on the one hand, but also as a competitor for electric vehicles on the European market on the other hand. Chinese e-car producers such as Byd, SAIC (acquired the British MG brand in 2007), or Gheely (which took over Volvo Cars in 2010) as well as e-car start-ups like Xpeng, Byton, or NIO, are in the starting blocks.²¹

On the European level, policy options have widened with the shift of European industrial policy away from purely horizontal measures. New European initiatives include the preparation of the European Critical Raw

Materials Act, the European Chips Act or IPCEIs in the field of microelectronics, batteries, and hydrogen which will help the automotive sector and its supply chains in particular. The Recovery and Resilience Facility (RRF) supports the digital and green transition, reserving 37% of funds for green investment. This includes electric vehicle purchase incentives or building alternative fuel stations.

During the last thirty year, the EU-CEE countries have benefited from the relocation of automotive companies in emerging countries and have been integrated into global, in particular German supply chains. The e-revolution began in 2020 and the EU-CEE had a rather good start then, both in terms of battery FDI in Hungary and Poland and electric vehicle production (Slovakia, Slovenia). However, the challenges with electrification are huge, and CEECS have to keep pace with new trends and try not to be left behind. In addition, effects on employment have to be kept in mind. Overall, however, in the race towards electrification, the EU-CEE countries are in a worse position, as they are dependent on decisions taken at the headquarters of OEMs and innovation is being kept there, thus minimising R&D in the EU-CEE countries. Also, in terms of charging infrastructure and the uptake of electrical vehicles by the population, the EU-CEE countries lag behind. Generally, incentives for electric cars are available only in half of the EU-CEE countries while they are prevalent in the West.²² Also, Recovery and Resilience Facility (RRF) funds are not particularly directed towards electrification purposes in these countries: only a small share of the funds goes to automotive and supporting infrastructure in CESEE, despite the strong specialisation on the sector. Poland with 5% of the RRF is spending the largest share, but all other EU-CEEs show spending below that level (see Delanote et al., 2022). Austria, due to its good record in R&D and innovation, has a competitive and export-oriented car-parts industry and seems to be in a good position for this transition. For the future, it should promote and advance participation in EU-initiatives.

Overall, new challenges coming from the COVID-pandemic and the Russian war in Ukraine have to be overcome and energy-related issues which are on the forefront need to be taken into account. While challenges and risks seem to be mounting, new structural shifts also provide opportunities, either in new fields (electronics, chemistry, software) or opportunities for nearshoring of production facilities to the region in the future.

¹⁹ <https://www.politico.eu/article/central-europe-struggle-keep-up-electric-car-race/> published on 20 May 2022.

²⁰ <https://www.fleeteurope.com/en/new-energies/europe/features/how-europe-aims-achieve-battery-independence-china> published on 2 August 2021

²¹ <https://ecomento.de/2020/06/16/renault-heftige-konkurrenz-durch-chinesische-elektroautobauer/> published on 16 July 2020.

²² <https://www.acea.auto/figure/interactive-map-electric-vehicle-purchase-incentives-per-country-in-europe-2021-update>

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