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ON TIME

Electrification of car power train and Polish automotive industry

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Ekonomia i Polityka Gospodarcza

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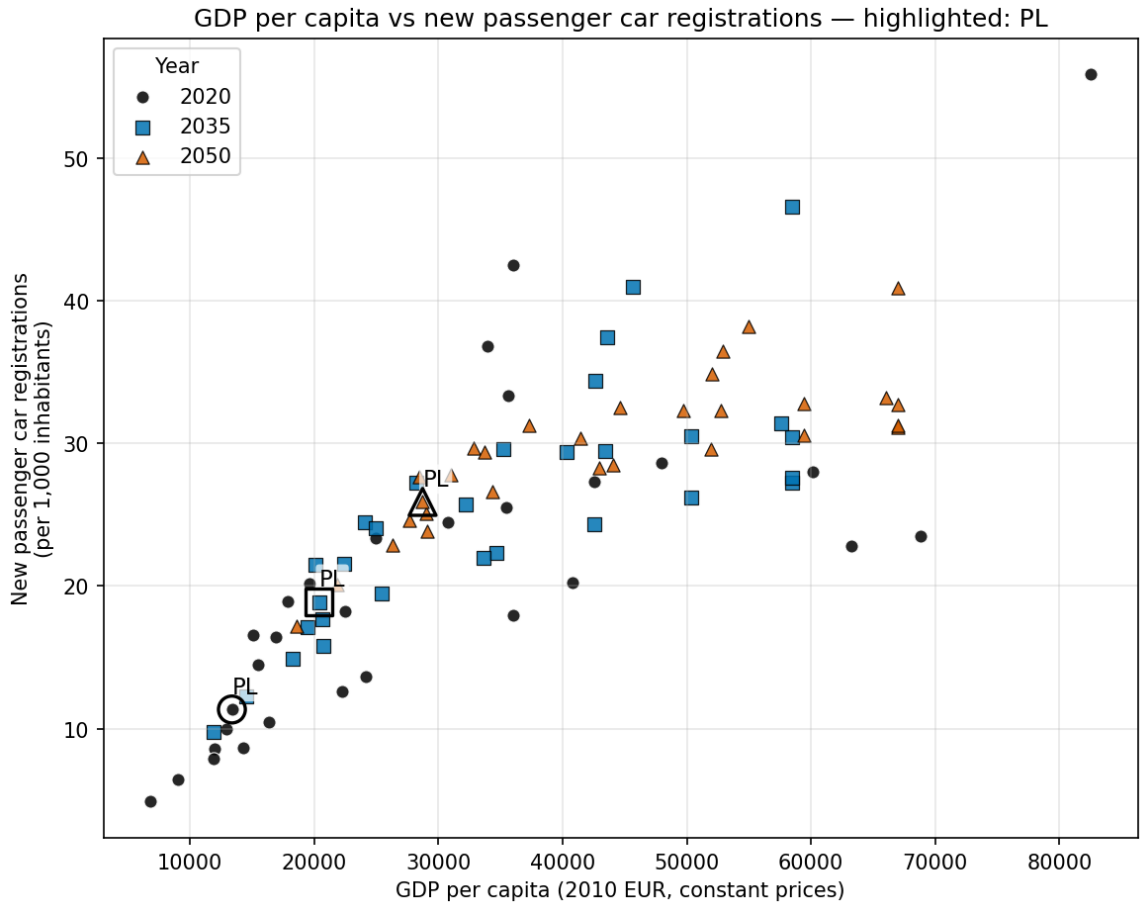
1. Car market in Poland and in the EU

The global automotive market, including Europe, is shaped by economic, social, regulatory, and technical factors. The first group primarily includes household purchasing power. The lower this power is (e.g., due to insufficient earnings or unfavourable exchange rates) or the more uncertain it is (e.g., due to unexpected inflation), the lower new car sales are, and the better used cars sell. Among the social factors, demographics and changing lifestyles are worth mentioning. New cars are primarily purchased by companies and prime-age individuals, especially those in the key age group of 35-55, while in the 18-34 age group, their share rarely exceeds 10 percent. Lifestyle changes also influence demand – the greater importance of collective mobility, characteristic of well-connected cities and smaller households, usually means lower demand for cars and a smaller, relative size of their fleet. The third group of factors differentiating the demand for new and used cars are regulations concerning, for example, emission standards, safety standards, low emission zones, and taxation. These influence the cost of producing and operating vehicles, which, combined with subsidies or tax breaks—for example, support for electric car purchases—can influence household decisions regarding when and which car to buy in a given economic environment. Finally, technological change can influence the propensity to buy cars. If this occurs rapidly, resulting in significant differences between successive generations of vehicles, consumers may be inclined to postpone purchasing a new car, waiting for improved quality or a price drop.

Chart 1. Current and projected purchase of new cars in Poland and in the EU and EFTA vs GDP per capita



Source: Wise Europa, European car market model

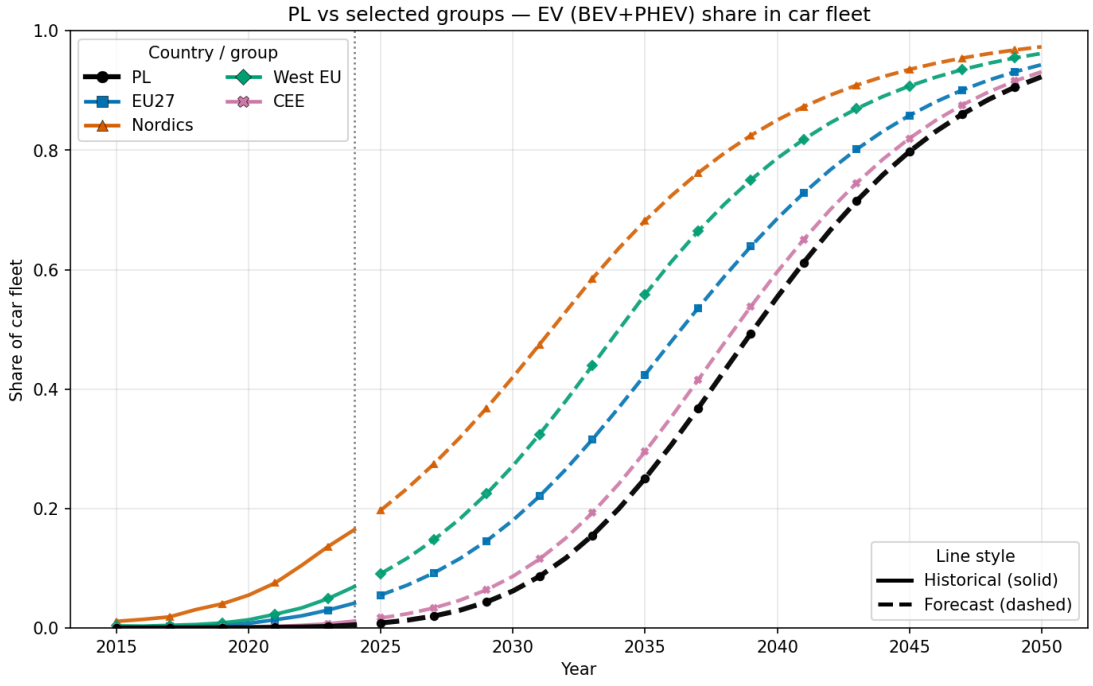
As a result of these phenomena, new, better, and more modern cars are most often purchased by middle-aged individuals with above-average incomes, as well as by companies for business purposes. Macroeconomically, this indicates a positive correlation between the number of new car registrations per thousand inhabitants and a given country's level of affluence. In Europe, this translates into a clear difference in the structure of car demand between the relatively wealthier countries of Western and Northern Europe and the relatively poorer countries of Southern and Central Eastern Europe. In the former, new cars are purchased approximately two to three times more often than in the latter. In the case of used cars, the correlation is reversed. They are particularly popular in places where the cost of purchasing a new car is relatively high compared to the average purchasing power of households. A side effect is a longer car lifespan and a significantly higher average car age in CEE and Southern European countries, compared to a lower average car age in Western and Northern European countries. The European Union is also a macroeconomic convergence club, an economic area in which initially poorer regions are gradually closing the development gap with wealthier regions. This process is relatively slow (closing approximately 1%-2% of the development gap annually) but also universal, affecting most EU regions. Observations indicate that over the next 30-40 years, we can expect significant convergence in GDP per capita levels, and consequently, individual incomes, between the eastern, southern, western, and northern parts of the continent. From the perspective of the automotive market, this will mean a significant convergence in both the scale and structure of demand for new vehicles across Europe. In Poland, demand for new cars can be expected to double by 2050, almost equalling – in terms of intensity – the demand observed in Germany, the Netherlands, and France. A similar trend will likely occur in other CEE countries, which, with a delay of several years, will also translate into a convergence in the average age of cars in individual countries. The share of new cars in the fleet in most EU and EFTA countries will approach the levels currently found in the continent's most affluent countries, while in Central and Southern European countries, the period between the purchase of a new car by the first owner and its scrapping or export outside the EU by the last owner will shorten.

The processes described will likely be accompanied by a profound technological shift, involving the replacement of internal combustion engine (ICE) vehicles with electric vehicles (EVs). The trend of demand shifting from ICEs to EVs has been observed globally for about a decade. In 2024, approximately 17 million electric cars (both fully electric (BEV) and plug-in hybrids (PHEVs) were sold globally, and their share of new passenger car sales exceeded 20%. Similar results were also observed in the European Union, despite the relatively unfavourable economic climate. In 2024, over 2.2 million new EVs were registered in EU member states, of which approximately 1.4 million (13.6%) were BEVs and 0.8 million (7.3%) were PHEVs. Preliminary estimates for 2025 predict further sales growth – both globally (22 million units and a 24% market share) and in Europe (in the first half of 2025, BEV sales in Europe increased by 34% year-on-year). Internal European regulations are aligned with these trends.

The EU's original 2035 regulation for cars, required a 100% reduction in CO_2 emissions for new vehicles, effectively banning new internal combustion engine sales after the middle of the next decade. In December 2025 this regulation has been watered down to a 90% CO_2 reduction target. The 10% flexibility compared to the previous requirement means that plug-in hybrids, mild hybrids, range extenders, and even conventional petrol and diesel cars can continue to be sold for a few years after 2035, provided manufacturers meet the 90% fleet-wide emissions average. Based on the data (see chart 2), this target is only slightly (about 2%-3%) ahead of the observed market trends across the EU, according to which electric vehicles should account for approximately 50-60% of new car sales in the EU in 2030, and approximately 85% in 2035. Many wealthier EU countries will likely achieve the target of 90% or more several years before 2035, following in the footsteps of Norway, where the share of BEVs and PHEVs in new registrations already reaches 90%. At the same time Central and Southern European countries, where the popularity of electric cars is – for now – limited, remain at the back of the European pack. In Poland, in particular, the BEV share of new registrations in 2024 was only 3%. At the same time, data from the first half of 2025 indicates that this situation is beginning to change, as evidenced by, among other things, the several dozen percent growth rate of EV sales, encouraged by the ongoing price convergence with combustion cars, the increasing number of available models, and attractive subsidies for electric cars offered by the National Fund for Environmental Protection and Water Management.

It can generally be said that in Europe—including CEE and Poland—the factors supporting the widespread adoption of EVs are becoming increasingly stronger year by year, while the limiting factors are slowly fading. Among the most important factors is the rapidly improving financial attractiveness of electric cars, which should reach price parity with their combustion engine counterparts in most segments over the next few years. At the same time, the ranges of new models are increasing, offering 400-600 km of real-world range, fully comparable to ICEs. What's particularly important from the perspective of the average consumer is that more and more models are appearing on the market, including the cheapest ones, bringing the diversity of available consumer options closer to combustion engine cars. Within a few years, EVs should become a mass product, moving beyond the niche of offering advanced and expensive vehicles for the wealthy or those interested in technological innovations. In this situation, a significant barrier slowing the electrification of European road transport may not be the development of technology and the market availability of electric cars, but rather the charging infrastructure and consumer habits. At the same time, the number of public charging points in Europe is growing rapidly. In 2024, it increased by 35% compared to the previous year, exceeding one million units. However, to achieve the goals of the European Green Deal, it will be necessary to continue this, or slightly less, growth for the next 7-10 years. The widespread use of EVs requires covering not only large cities with charging stations but also smaller towns and road areas, which requires significant investments in the energy system, including power management and energy storage. In Central and Southern European countries, including Poland, where the development of EV charging stations lags several years behind Western European countries, this is a particularly significant challenge, and support mechanisms and regulations that encourage investment in both public and private (home and workplace) charging infrastructure are particularly needed.

Chart 2. EV share in the total car fleet in the EU (Automotive package scenario)



Source: Wise Europa, European car market model

Based on the above assumptions, we expect that by 2035, the European new car market will be dominated by electric vehicles: BEVs and PHEVs. Model estimates indicate that in Northern and Western European countries, registration levels between 90% and 100% would be achieved by this date, even if manufacturers were guided by purely market-driven considerations. In Southern and Central Europe, the market adoption of electric cars would follow similar patterns, but due to relatively less affluent consumers and less developed infrastructure, achieving similar levels would require 3-10 years longer (depending on the country). The regulations enforcing zero-emissions standards force manufacturers to lower the prices of electric cars to convince even the most conservative consumers. Importantly, less affluent households – whether in CEE countries, including Poland, or other EU member states – should not lose out from this regulation, as they generally purchase used cars, which will have a much longer lifespan on European roads and are out of the scope of the current regulation. New vehicle buyers in CEE countries are primarily businesses (fleet or individual purchases) and consumers who are on par with their Western European counterparts in terms of affluence. Other consumers choose used cars, which they also use for up to 5-10 years longer than the average in northwestern Europe. This means that although registered new vehicles will become fully zero-emission across the EU by 2035, the complete transformation of the vehicle fleet towards zero-emission will take approximately 5-10 years longer in Central and Southern Europe than in the wealthiest parts of the continent. While in Western Europe it will largely end in 2050, in Poland it will be approximately 80% advanced in that period, reaching 100% a few years later.

Frame 1: Factors supporting and delaying the adoption of electric cars in Europe

Factors supporting EV adoption:

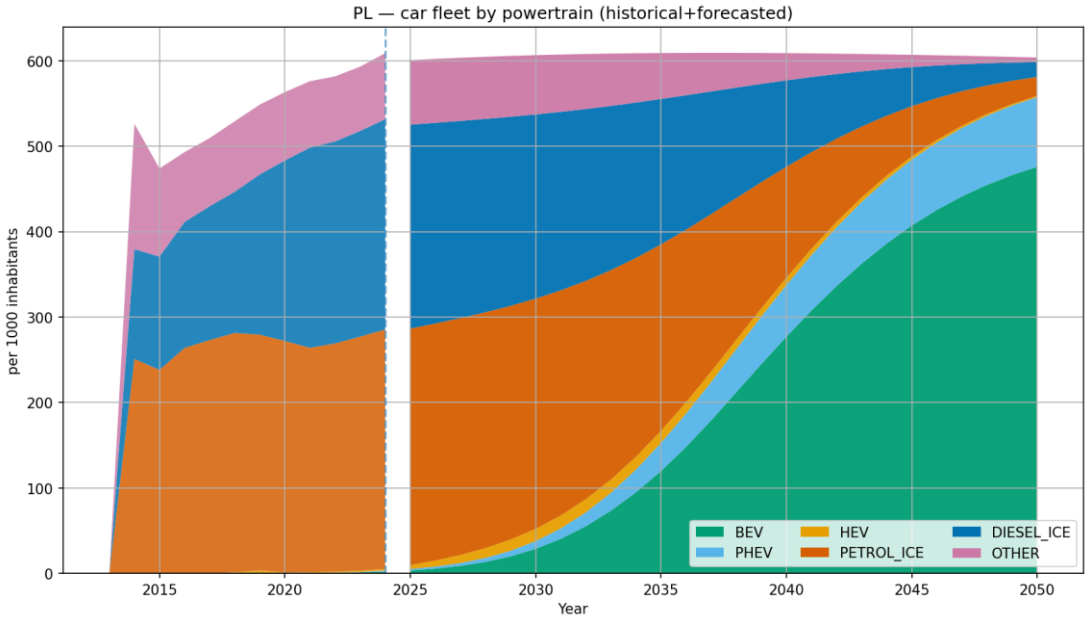
- Falling prices of electric cars, expected to equal those of ICEs between 2027 and 2035 (depending on the market segment).
- An increase in the number of EV models available on the market, with a diversity of offerings increasingly tailored to customer preferences. In 2024, there were ~785 models, and ~1,000 models are expected by 2026.
- Improving range thanks to better batteries and greater charging power make EVs a more viable alternative to combustion cars. More and more BEVs offer a realistic range of >400 km.
- Rising incomes – a factor particularly important in Central and Northern European countries – enabling a larger percentage of households to purchase new electric cars and replace their fleets more quickly.

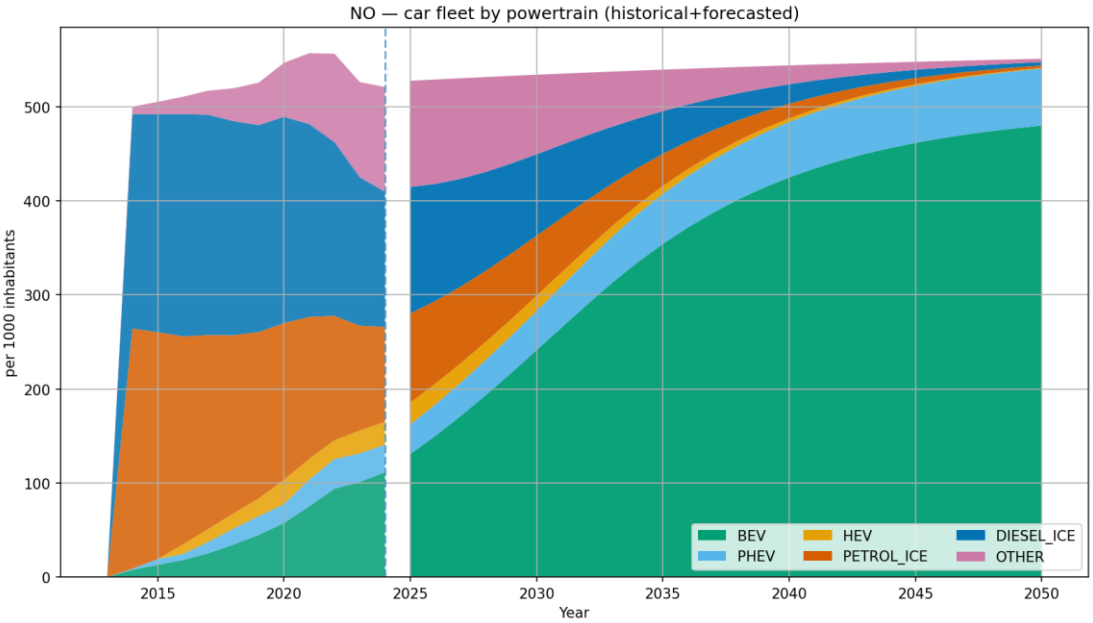
Factors limiting EV adoption:

- Insufficient number of charging points, especially in smaller towns and on regional, national, and international roads.
- Limited availability of EVs for lower-income individuals until a wider selection becomes available on the used car market.
- An older car fleet, resulting from people buying used cars more often and keeping them longer is prolonging the moment of full EV penetration of the car fleet in particular in Poland and other CEE Member States.
- A strong cultural attachment to combustion-engine cars. Concerns about purchasing unfamiliar technology, including unfounded concerns over electric vehicle failure rates, range, resale price, etc.

Source: Wise Europa,

Chart 3. Car fleet structure by powertrain in Poland vs Norway (current regulation and market trend scenario)





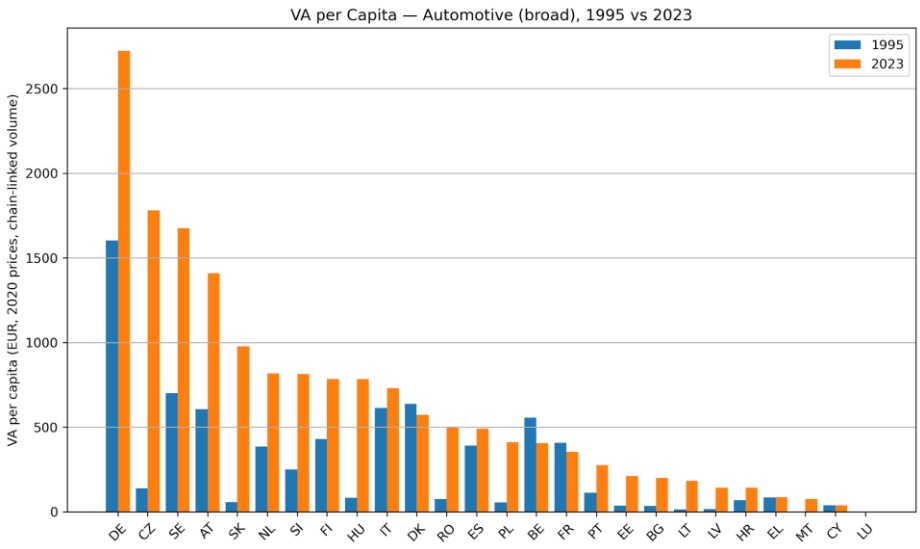
Source: Wise Europa, European car market model

2. Automotive sector in Europe and in Poland in 2024

The EU-27 produces approximately 15 million vehicles annually, including approximately 12 million passenger cars. At the same time, the EU's automotive industry is highly concentrated. Germany is its centre, accounting for approximately 50%-60% of all value added generated in this sector in Europe. This country produces approximately 4.5 million vehicles annually—almost twice as many as second-largest Spain (approximately 2.0–2.5 million). Other large producers include France (approximately 1.5–1.6 million), the Czech Republic (1.3–1.4 million), Slovakia (approximately 1.0–1.1 million), and Italy (approximately 0.8 million). Smaller producers include Poland (approximately 0.3–0.6 million), Romania (approximately 0.5 million), Hungary (approximately 0.5 million), Sweden (approximately 0.3 million), and Portugal (approximately 0.3 million). The particularly high concentration of added value in the European automotive industry in Germany stems from the combination of large-scale production of new vehicles with component production and high-value associated services: design, research and development, engineering, and management of global corporations such as Volkswagen, Mercedes, and BMW.

A similar model, albeit on a smaller scale, is pursued in France and Italy, where Stellantis and Renault are headquartered, but which have relocated a large portion of both car and component production to other countries in Europe and Asia over the past two decades. Spain has become one of the largest assembly hubs in the EU over this period, hosting factories for companies such as SEAT, Stellantis, Renault, Ford, and Mercedes. Central European countries also managed to attract foreign investment in the automotive sector significantly increasing the value added produced in this sector over the last 30 years. In particular the Czech Republic and Slovakia managed to reach exceptionally high levels of vehicle production per capita, resulting from the location of very large manufacturing plants in these relatively small countries. This includes VW (Škoda), Hyundai, Toyota, Kia, Stellantis, as well as Jaguar and Land Rover. This translated to the very large value of the automotive production in per capita terms. To a smaller extent this situation is similar in Sweden (Volvo) and Hungary, where Audi, Mercedes, and Suzuki factories are located or in Romania, where Renault (Dacia) and Ford vehicles are produced.

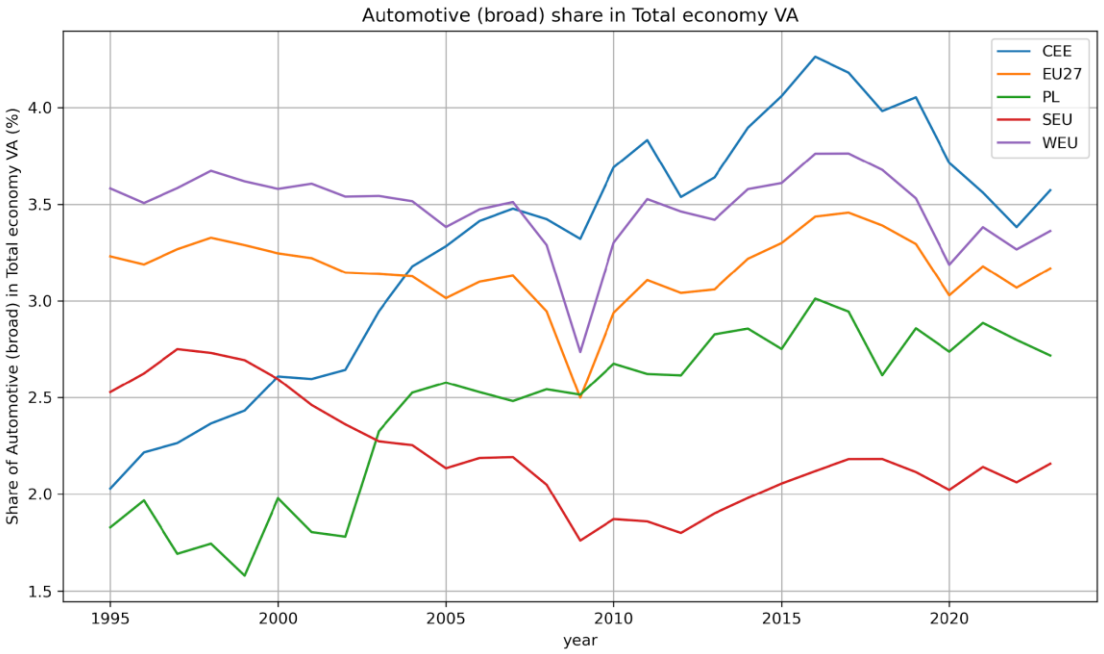
Chart 4 Value added per capita in European automotive sector (broad definition, 1995 vs 2023)



Source: Wise Europa based on Eurostat, * - broad definition includes 100% of C29 sector (motor vehicles and parts), 30% of NACE code C22 (tyres and plastics), 50% of NACE code C27 (electrical equipment), and 40% of NACE code C28 (machinery and equipment); narrow definition contains only NACE code C29

In Poland, the production of cars and their components has much smaller economic significance than in other Central European countries. The automotive industry (NACE codes: C29 industry, i.e., "manufacture of motor vehicles, trailers, and semi-trailers, and part of C22 industries – rubber & plastic, including tires, C27 – electrical equipment, including accessories – and C28 – machinery & equipment, including engines) accounts for approximately 2.5-3% of value added in Poland, which places the country slightly below the EU average (approx. 3.1%), the Western European average (approx. 3.4%), and the average for CEE countries (3.5%), and especially the rest of the V4 group (almost 5%). Its share in the value added generated within the manufacturing sector is rather similar to that of Southern Europe (approximately 12-14%) than that of Northern Europe (approximately 17-20%). The automotive industry in Poland is therefore relatively and absolutely smaller than in the Czech Republic, Slovakia and Hungary. Poland resembles not its neighbours or Germany but rather such countries in the EU like Spain, Belgium or France with smaller but more diversified automotive production. The country produces not only passenger cars, delivery vans, trucks, buses, and special vehicles, but also a full spectrum of components and spare-parts. More than half of the added value generated by the domestic automotive industry results not from vehicle assembly, but from the production of engines, gearboxes, wiring harnesses, and other components like seats, structural elements, suspensions, bodywork, tires, glass, electronics, and increasingly, lithium-ion batteries. While approximately 45% of the EU's automotive sector workforce is employed in "vehicle production," in Poland this figure is approximately 40%, with the remainder working in the production of components and spare parts. This difference is even larger when compared to the car champions like Germany or Czechia where employment in final assembly reaches about 50% of the total employment of the sector.

Chart 5 . Automotive sector (broad definition) share in the total value added

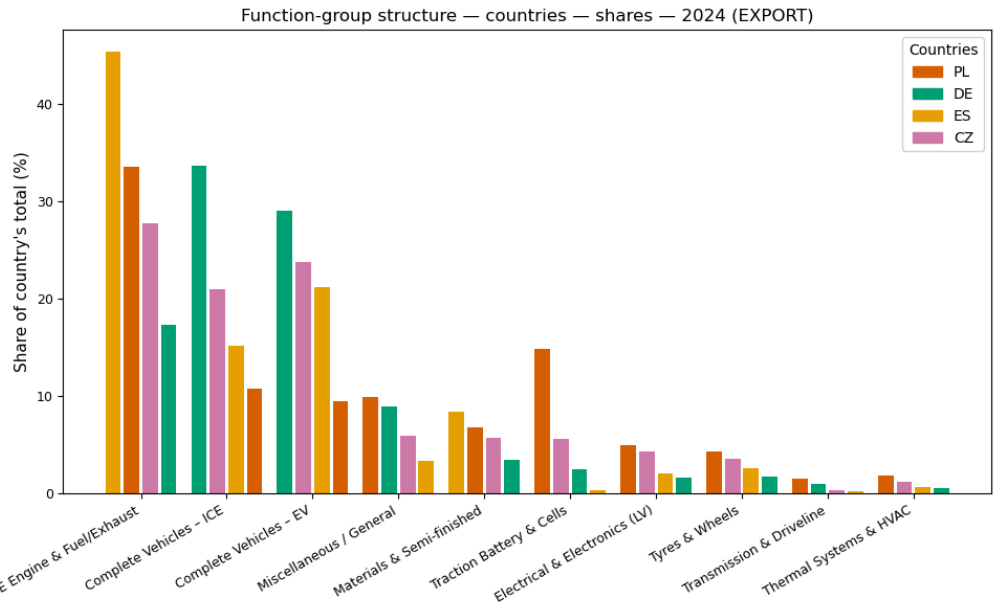


Source: Wise Europa based on Eurostat, * - broad definition includes 100% of C29 sector (motor vehicles and parts), 30% of NACE code C22 (tyres and plastics), 50% of NACE code C27 (electrical equipment), and 40% of NACE code C25 (machinery and equipment); narrow definition contains only NACE code C29

At the same time, Poland is similar to other countries in the region in that, that it forms with them as well as with Germany, Austria, and – to a lesser extent – France, a single, densely interconnected organism in which automotive components cross borders several times before being finally assembled into a finished product. This automotive ecosystem was formed primarily by international corporations seeking comparative advantages resulting from globalization after 1990. The common denominator of the attractiveness of CEE countries was a mix of low labour costs, good management, engineering, technical, and labour personnel, and an existing, albeit neglected, industrial base. Czechoslovakia stood out in this regard, having already had a strong automotive industry during the Comecon era (Škoda, Tatra, Zetor, and a large parts base). A turning point for the Czech Republic was Volkswagen's acquisition of Škoda in 1991, anchoring the German supply chain in the country, which subsequently attracted further investment from Asian manufacturers. Infrastructure and geography also played a role: for years, the highways/logistics corridors on the Germany-Czech Republic-Slovakia axis were the most developed in the region, and Bavaria/Saxony were closer than Poland or Romania, supporting the "just-in-time" model.

Slovakia, inheriting part of the Czechoslovak industrial base (Bratislava, Žilina, Trnava), was at a slightly lower starting point than the Czech Republic. Paradoxically, this facilitated the construction of ultra-modern assembly plants from scratch to meet the needs of global European and Asian corporations, which invested, encouraged by aggressive policies (large investment grants, tax exemptions, industrial zones, and training funding). The results were similar in both countries: a large share of the automotive industry in manufacturing value added, an exceptionally high (although smaller tha n in Germany) share of finished cars in automotive production, a large share of production for export (>90% of volume), and strong ties with Western European and in particular German supply chains. Furthermore, Slovakia has – compared to other countries in the region and the EU – an exceptionally low share of domestic value added in vehicle export volume – approximately 33% vs. the EU average of ~85%. In the case of the Czech Republic, approximately half of the VA in automotive exports is generated domestically, with the remainder in neighbouring countries. In Poland it exceeds 60% which is mostly a result of the limited role of final assembly in the sector's composition that resulted from different comparative advantages of the country compared to its peers especially in the 1990s and less aggressive industrial policy later on. This situation reflects the assembly-line model of Slovakian automotive sector that brings relatively smaller value to the local economy compared to these Central European peers that – like Poland or Czechia – managed to develop more diversified automotive supply chain including local suppliers of large automotive OEMs.

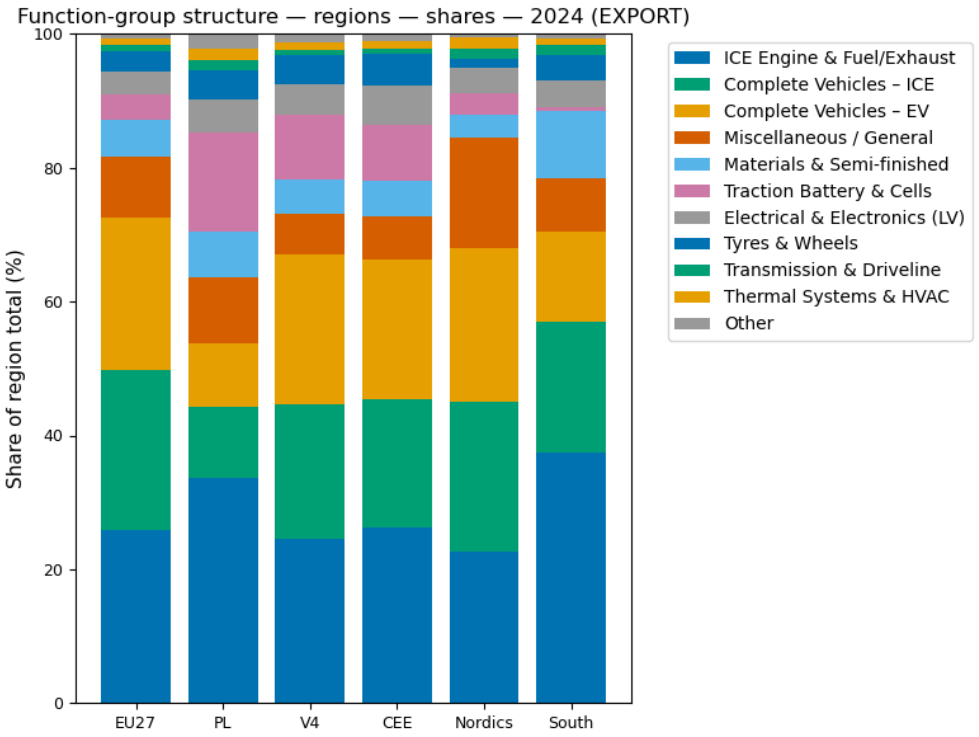
Chart 6 . Structure of the automotive sector (broad definition) in Poland and its peers



Source: Wise Europa based on Eurostat

After initial setbacks to Slovakia, the Czech Republic, and Hungary in terms of final production, Poland began to focus in the late 1990s on attracting OEM and spare parts manufacturers. The growth of final car assembly in the Czech Republic and Slovakia helped in this regard, as it increased the attractiveness of investments in Poland, especially when improved infrastructure improved the timeliness of deliveries from Poland. A deeper labour market and lower wages were additional advantages, favouring both the production of parts and the production of more labour-intensive vehicle types: buses and heavy vehicles (Solaris, MAN, Volvo, Autosan). As a result, automotive production in Poland today is more diversified than in the Czech Republic or Slovakia, and at the same time characterized by a lower unit value, typical of countries producing spare parts and components rather than finished vehicles. On the other hand, the volume of automotive production – per capita – is significantly lower in Poland than in the Czech Republic or Slovakia, which have joined the European leaders in this regard (with the exception of Germany, which is a world outlier). This situation is partly due to the underdevelopment of large-scale passenger car production, and partly to the sheer size of the country. Slovakia, with a population seven times smaller, has significantly higher per capita production despite half the value of automotive production. The Czech Republic is slightly larger, but still small enough that its three to four megafactories have a much greater impact on macroeconomic aggregates per capita than in the much larger and more diversified Polish economy.

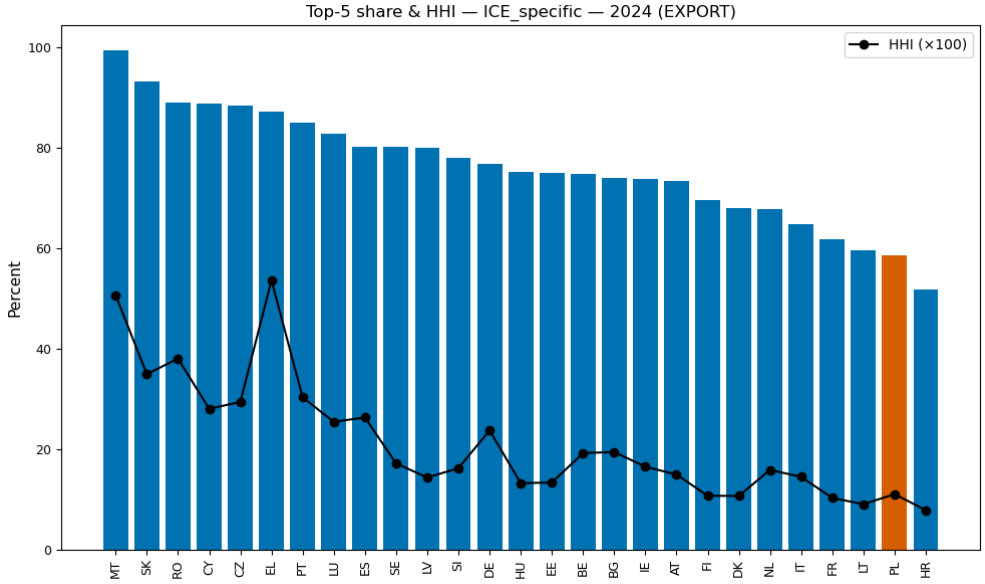
Chart 8 The structure of automotive production in EU member states by major functional groups



Source: Wise Europa based on Eurostat

The high level of diversification of the Polish automotive industry is evident, among other things, in the fact that it produces virtually every type of product found in the automotive sector: cars, buses, trucks, delivery vans, combustion and electric engines, gearboxes, timing mechanisms, seats, structural parts, glass, wiring, tires, air conditioning, etc. As a result, the firms in the automotive sector measured by the Herfindahl–Hirschman Index (HHI) both overall and closely related to combustion vehicle production, is particularly low in Poland. The index ranges in Europe from around 50% in Poland and Croatia (many medium sized firms, competitive market) to almost 100% (close to pure monopoly) in Romania or Slovakia. A high level of concentration is visible however in the production of parts specific to the EV industry. This is due to the rapid development of the electric car battery industry that for several years has been growing in Poland much faster than in other EU countries. Due to large scale investment in Germany, Hungary and other EU countries this picture may change in the near future but mostly in relative terms.

Chart 9 Group concentration of automotive production in Poland and EU member states (index 2021=100)



3. What does the transformation mean?

The widespread replacement of internal combustion engine vehicles with electric vehicles means restructuring the entire production system: the product itself, supply chains, employee competencies, and perhaps even the geographical map of the automotive industry in Europe. An ICE vehicle has a significantly more complex structure than an electric vehicle, consisting of components such as: (i) an engine with pistons, valves, a crankshaft, lubrication and cooling systems, (ii) a fuel system (tank, pump, filter, injection), (iii) an exhaust system (manifold, catalytic converter, DPF, mufflers), (iv) a complex multi-speed gearbox (manual/automatic), etc. In an EV, these components are replaced by: (a) a battery, (b) an electric motor (or motors), (c) additional wiring, (d) programmable power electronics, and usually a very simple, (e) single-speed reduction gear. An EV drive system can have as many as 50%-70% fewer parts than an ICE drive – fewer mechanical components and more mass-produced modules. The expected transformation of first new cars and then the entire vehicle fleet from ICE to EV will therefore entail a significant reduction in the complexity of the entire production cycle, which will inevitably translate into the loss of some jobs, including those in the production of combustion engines and their components, as well as control systems (ICE-specific jobs). At the same time, it could create new jobs, for example, in the production of batteries, electronic components, software, and charging infrastructure (EV+ jobs). However, the net effect will likely be negative, as any change in production technology enables faster automation of production processes, thus reducing costs, without which maintaining market competitiveness can be difficult.

This reduction will affect not only jobs in the ICE-specific category but also those related to the production and assembly of neutral parts (EV-neutral), i.e., those used in both ICE and EV (e.g., seats, bodywork, air conditioning, windows, etc.) and those whose production is already complementary to the transformation (EV+ category). The CLEPA Employment Monitor (2024) indicates that in recent years, 57% of job losses in Europe resulted precisely from low production and cost pressures, while only 26% were directly related to the phase-out of combustion engines. At the same time, as with most technological changes, the popularization of EVs at the expense of ICEs should be expected to result not only in "net job losses" but also in significant job reallocation across industries. New jobs will be created not only in the production of batteries and electric motors but also in the production, operation, and maintenance of charging stations, or in renewable energy (increased demand for electricity). On the other hand, vehicle service and maintenance will also change in the long term, as the maintenance and repair requirements for EVs will differ from those for ICEs.

The impact of this transition on the regional distribution of car production globally and in Europe is yet to be resolved. Companies may, for example, decide to assemble EVs closer to R&D centres or major markets, as less labour-intensive production will require less searching for comparative advantages in the form of lower wages. On the other hand, increased competition from China could lead to the exact opposite effect for European manufacturers: an even more intense search for reserves and a greater emphasis on cost-cutting, favouring countries with lower wage costs. In such a situation, countries with lower wages would have an advantage both in the transition phase (longer opportunities to produce ICE parts, including for the aftermarket) and in the long term (as a base location for production). Overall however the introduction of a new EV technology threatens the market domination of legacy European manufacturers. These are often companies with more than 100 years- history with competitive advantages connected to proprietary technologies in areas that are becoming irrelevant because of the new technology. If these legacy manufacturers lose market share to newcomers, it could have an impact on the remaining part of the value chain in Europe including the non- ICE- relevant production. This impact depends on where the new comers will manufacture their products. If Europe does not retain the overall automotive manufacturing capacity through successful transition towards EV manufacturing then there is a risk that the large parts of the value chain will move abroad creating problems for most of EU countries including those that – like Poland – today enjoy a privileged position of a relatively well diversified automotive production.

	Poland	Czechia	Slovakia
Automotive industry share in GDP (narrow definition vs broad definition)	1,3% vs 2,8%	4,6% vs 6.5%	4,1% vs. 5.5%
The automotive industry's share in employment (narrow definition vs. broad definition)	1,6% vs 3,0%	3,6% vs 6.0%	3,1% vs 5.0%
Role in industry	Important, but one of many sectors, highly diversified economy	One of the two or three key pillars of the industry	The absolute pillar of the industry – approximately half of industrial production is related to automotive
What does it mainly produce?	Parts, components, engines, gearboxes, buses, batteries; passenger car assembly relatively smaller	Passenger car assembly (Škoda, Hyundai, Toyota) + strong supplier network	Almost clean passenger car/SUV assembly hub (VW, Kia, Stellantis, JLR, newly Volvo)
Position in value chains	Rather a supplier country (components hub), relatively high share of domestic VA in exports	Intermediate position: large part of VA in the country, the rest in Germany/region	Typical assembly hub – lots of imported parts, low share of domestic VA in exports
Sensitivity to the ICE → EV transition	Moderate: A major challenge for powertrain suppliers, but amortized by batteries, e-buses and economic diversification	High risk if transformation is weak, but also potential if EV/batteries are successfully attracted	Very high dependence on ICE assembly and low domestic VA mean a strong shock in case of unsuccessful transformation

Source: Wise Europa

4.Is the automotive sector ready for the EV expansion?

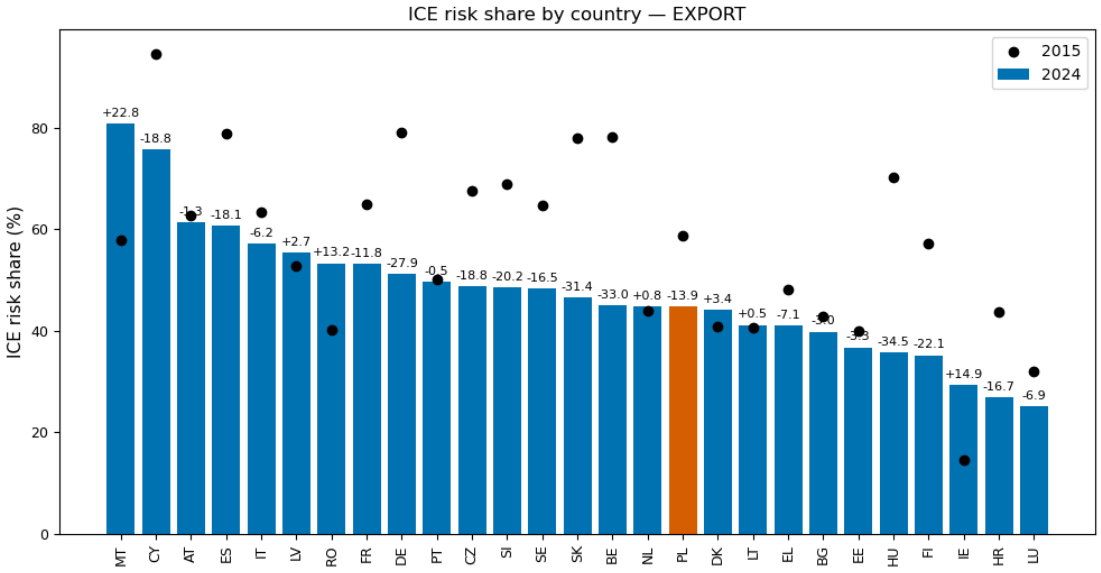
The transition from ICE to EV means the disappearance of a large portion of the traditional combustion engine and a shift in added value toward batteries, electronics, and software, while simultaneously reducing the number of traditional mechanical parts. This is a significant challenge for Poland and many other EU countries, especially other CEE countries and Germany, as they currently rely heavily on the production of ICEs and their components. Based on available statistics, it appears that these can currently be divided into three main types:

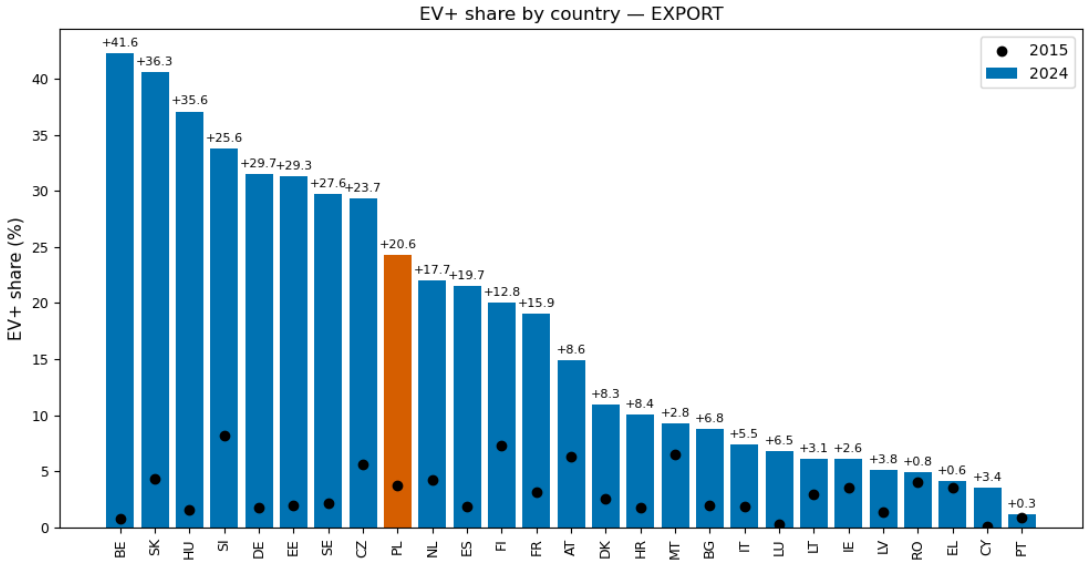
- **Central producers** (Germany, France, partially Sweden, Italy, and the Czech Republic) – with strong brands, R&D, accumulated ICE know-how, and significant innovation potential.
- **Assembly centres** (Slovakia, Spain, partially the Czech Republic, Hungary, Romania) – large car factories using imported parts, weaker R&D, low domestic export value
- **Component supplier countries** (Poland, partially Spain, Hungary, Sweden, Romania) – many parts, both those at risk of transformation (ICE specific), those compatible with it (EV+), and those neutral.

Countries in categories 1 and 2 are generally characterized by high susceptibility to transformation risk due to their large traditional automotive sector, which includes the production/assembly of ICEs and their parts, as well as significant technical traditions and know-how in areas that will become obsolete as a result of the transformation. On the other hand, these are also the countries most conscious of the changes, as they will be the ones where the majority of ICE job cuts will occur and may lose the most from the changes. This group has the greatest potential for design, programming, and production in EV-compatible areas (e.g., electronics), although this potential is not evenly distributed, so Germany will play a key role – as the main European industrial integrator in the automotive industry. For them, maintaining global brands and not losing out to China is paramount, which will require the development of their own battery technology (chemistry -and collaboration with Asian producers should not overshadow the issue of maintaining local VA in this respect). Therefore, it is important for central producers to control the shift of key suppliers from mechanics to electronics and software, which requires supporting innovation and training in these companies.

The strong integration of the Czech Republic and (to a slightly lesser extent) Slovakia with the German economy in the automotive sector suggests that the direction and speed of their industry transformation will depend on Germany. These countries are therefore highly exposed to the global megatrends they can hardly control, including the potential decision of companies to assemble EVs elsewhere (closer to R&D, markets, cheaper energy, or in China/USA). Therefore, in the Czech Republic, Slovakia, but also in Spain and Hungary, it is important to retain automotive production by attracting the EV platforms and diversifying to the component production including , battery gigafactories, and new types of suppliers (e.g., in the electronics and electric drive sectors). Therefore, their priority must be convincing global manufacturers to locate EV production in their territories, which means providing support with local added value. This is already happening in part through the development of battery and electronics clusters, as is the case in Hungary and Spain. For the Czech Republic and Slovakia, industrial diversification beyond the automotive industry (directing FDI also to other sectors) will be crucial, including restructuring programs for monoculture regions to avoid the risk of local structural unemployment following the closure of ICE production.

Chart 10 The shares of automotive production endangered by the transformation towards electric cars (ICE risk share) and complementary to the transformation (EV+ share) in the EU and Poland (2015 vs 2024)





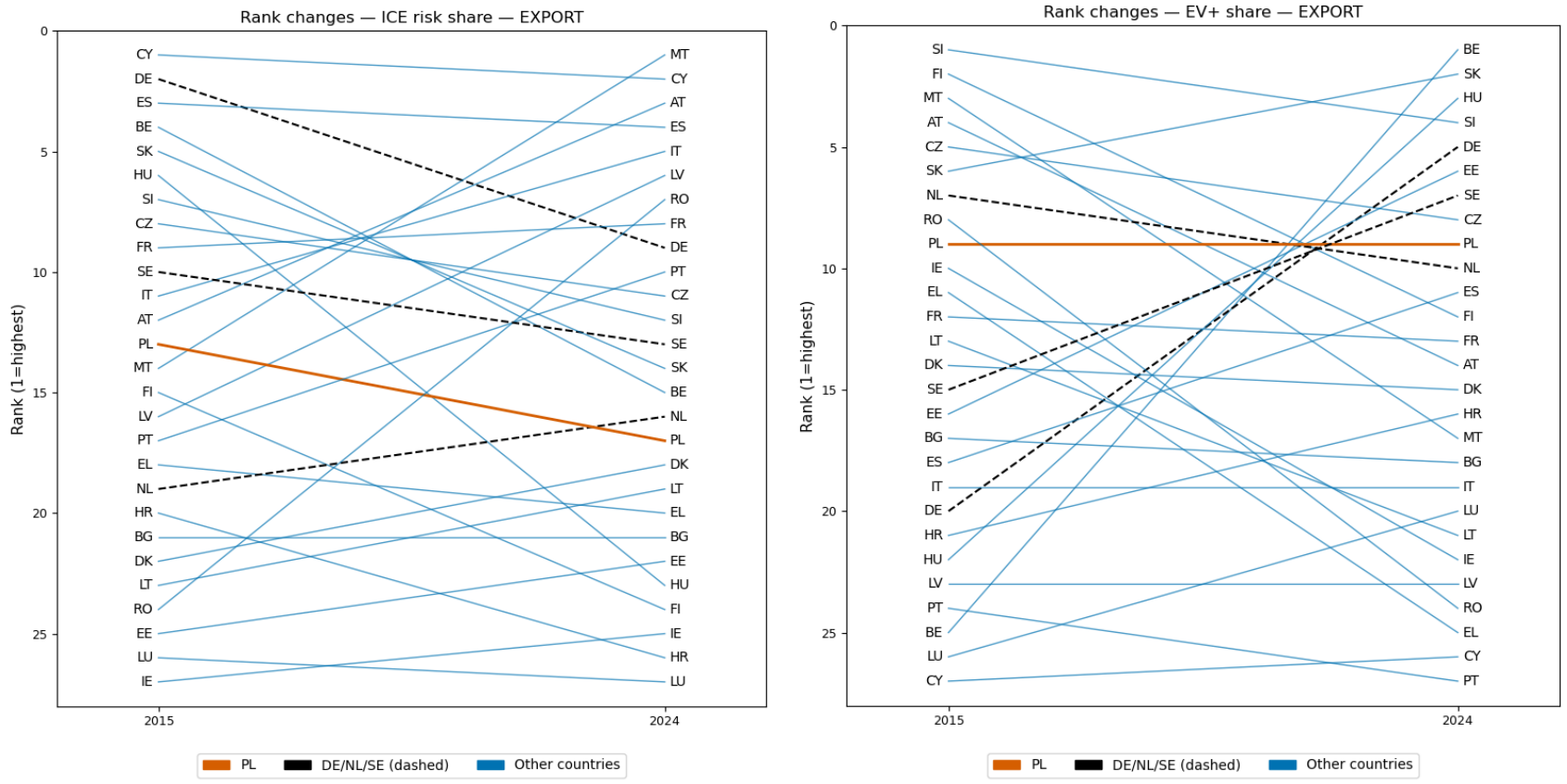
Source: Wise Europa based on Eurostat

Poland belongs to the third group, with a moderate initial passenger car assembly volume, but a very strong parts and components sector. At the same time however this production is composed more or less equally from segments specific to the combustion engine cars (ICE engines, gearboxes), neutral components (suspension parts , seats, glass, tires) and those well aligned with the transformation towards EV (batteries – currently, the largest EV battery factory in Europe is located in Poland).

A major threat is the phasing out of engine and gearbox production. It can be partially mitigated by the development of entirely new products directed for non-automotive markets . Further expansion of the battery cluster (cells, modules, packs, recycling) offers an opportunity, although significant competition for investments undertaken by Germany, Spain, and other CEE countries – can limit the attractiveness of this option from the perspective of Poland. Therefore, this strategy must be complemented by further development of "technology-agnostic" components (bodywork, seats, safety, wiring harnesses, interior components) and new, but less obvious, power electronics, BMS, charging parts, as well as potential rejuvenation of the final car assembly including e-trucks, e-vans and e-buses. Spain is already aggressively pursuing this path, leveraging its transformation to become a key EV and battery hub in Europe, gradually shifting from a role of "cheap ICE assembly" to an integrated EV hub. Spain's strategy can be described as a "full ecosystem" strategy, building the potential for high local VA, from cells and on-site car production to recycling. Spain's advantage lies in leveraging cheap renewable energy and nuclear power as a resource for energy-intensive battery production. CEE countries could follow suit. The challenge for implementing this strategy – both in Spain and elsewhere – is ensuring the effective participation of local companies in investments and knowledge transfer from state-supported foreign projects (e.g., CATL).

As in Spain, Poland may require strong support for the conversion of the existing ICE suppliers towards EVs and attracting new players to invest in the country– such as grants/loans for retooling, support for introducing new products (e.g., battery housings instead of engine housings, battery structural components, parts for charging infrastructure), etc. These programs are already being implemented – as evidenced by the reduction of ICE risk and the increase in EV+ production – but the process is still far from complete. Unlike the Czech Republic or Slovakia, Poland has the luxury of not having a dominant automotive sector in GDP or even in manufacturing, so the current technological shock is much easier to manage, provided a sensible industrial policy is implemented. At the same time the relative comfort now may be a source of disadvantage in the near future if other countries pressured by necessity will move faster and with larger speed gradually replacing Poland from its position of a major car-component hub in Central Europe. In fact as Poland was an early mover in the EV battery production in Europe over the recent years it has started to lose its position due to large investments in other countries showing a relative strategic weakness of its industrial policy within the region.

Chart 11 The fitness ranking of automotive production endangered by the transformation towards electric cars (ICE risk) and complementary to the transformation (EV+) in the EU member states (2015 vs 2024)



Sourrce: Wise Europa

5. Conclusions

The transition from ICE to EV means the disappearance of a large portion of the traditional combustion engine and a shift in added value toward batteries, electronics, and software, while reducing the number of traditional mechanical parts. This is a significant test for Germany, the Czech Republic, and Slovakia, as they require a very comprehensive transformation.

Poland and Spain, as component-rich countries with significant industrial diversification, can, in principle, pursue their current policies of attracting investments from EV+-compatible areas. However, external and intra-European circumstances have also changed. Competition for FDI is intense, pressure from China is high, and investment location selection criteria are potentially different than before due to higher wages in Poland and a higher level of robotization in the automotive industry. Therefore, these countries must also consciously build local EV chains, not relying on the market to take care of them. The elements of such a policy could include:

1) Targeting the full EV value chain • Supporting the construction of battery gigafactories, recycling, advanced components, and automotive IT, not just traditional assembly plants, • Conditioning public aid for investors on local added value (R&D, skilled jobs, participation of local companies).
2) Transforming regions/cities dependent on ICE • Special programs for "engine and transmission" areas, similar to those targeted at "coal regions," • Training for management and employees, incentives for new industries, supporting investments in R&D centres, and collaboration with technical universities.
3) European Coordination • Avoiding a subsidy race between EU countries, especially in the region and with Germany, at a time when the entire EU is competing with China, • Joint projects for batteries, semiconductors, cross-sector integration (including renewable energy), etc.
4) Regulatory Stability • The industry needs a predictable timeline – constant discussions about "whether to cancel 2035" are fuelling investment uncertainty, as evidenced by industry reactions.

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