



**European Committee  
of the Regions**

**Commission for  
Territorial Cohesion Policy  
and EU Budget**

**COTER**

# **State of play and future challenges of automotive regions**

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**It does not represent the official views of the European Committee of the Regions**

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# Summary

This study identifies the **preparedness of different European regions** for the upcoming transformation of the automotive sector and suggests **potential mitigation measures**. In particular, it provides elements for a **regional transformation strategy** and provides recommendations on KPIs to keep track of the region's preparedness. The study is prepared for the Committee of the Regions as part of a framework contract.

## The current state of the sector

The automotive industry is one of Europe's most significant sectors, comprising a complex network of cross-border supply chains involving OEMs, suppliers, and related industries spread across the continent but concentrated in specific regions. The automotive industry can be broadly categorised into three types of regions: core regions, semi-periphery regions, and periphery regions.

Core regions in the automotive industry are characterised by the presence of major OEMs where strategic functions like R&D, management, and marketing are primarily conducted. These regions are marked by a large market share, a high concentration of skilled labour, low foreign ownership, high value-added activities, and significant influence within the supply chain. Periphery regions are characterised by smaller companies in the automotive industry, export-oriented operations, limited strategic functions, and low value-added activities such as component manufacturing. They rely on core regions and have a high degree of foreign ownership. Semi-periphery regions, on the other hand, encompass a mix of core and peripheral functions and are positioned between these two categories.

The automotive industry in the EU faces significant challenges as a result of three main trends: the green transition, the digital transition, and increased global competition. Based on these challenges, a survey showed that regions primarily expect difficulties in the electrification of vehicles, closely followed by other challenges such as global competition, digitalisation, compliance with legislation, the availability of raw materials, and geopolitical factors. This reflects the prioritisation of themes in regional transformative strategies. Furthermore, the regional transformation strategy should primarily focus on the local automotive industry and its workforce, and, to a lesser extent, related industries. This can be particularly challenging for periphery regions, as the influence from outside the region is significant in these types of areas. Government capacity and support for raw material suppliers are not expected to be the primary areas of focus according to the regions.

## **Elements for a successful and sustainable regional transformation strategy**

Out of the 27 surveyed regions, 12 have formulated transformation strategies, with 12 regions being in the process of preparing a transformation strategy, and 3 regions neither having nor preparing a transformation strategy.

A survey showed that a successful regional transformation strategy should focus on collaboration between various stakeholders, including government bodies, educational institutions, industry representatives, and unions. Additionally, streamlining funding processes and ensuring timely approval of projects are crucial for the effective utilisation of available resources. Moreover, implementing employment and retraining policies to equip the workforce with the necessary skills and promote lifelong learning is highlighted. These policies should also include social security measures to support workers during industry transitions. Additionally, initiatives such as multi-stakeholder dialogues can promote inclusive policies that align with the needs of the regional automotive sector. Finally, tax incentives and simplified administrative processes are recommended to attract and support businesses, encouraging the growth of both OEMs and suppliers.

The survey also finds that collaboration between various stakeholders, including government bodies, educational institutions, industry representatives, and unions, is key to facilitate a comprehensive transformation strategy.

## **KPI framework**

A KPI framework assessment has been performed as part of the study with reference to the five KPI areas identified in the Route 35 Platform communication, i.e. charging infrastructure, electricity generation capacity, raw materials, jobs, and affordability.

According to the outcome of the survey, nearly all respondents consider it critical to monitor the automotive transformation process, adopting for this purpose a common set of specific KPIs to measure and track regions' capacity to face the challenges imposed by the ecological and digital transition. Respondents believe that automotive regions should invest in implementing a common KPI monitoring program but highlight potential difficulties in terms of financial and resource capacities for their regions to develop and implement such an activity. Other respondents consider that such a framework would benefit from the coordination of Eurostat to produce comparable statistics.

The analyses performed as part of the study, including the outcomes from the survey, interviews and case studies, support the following key considerations and remarks concerning the KPI framework:

- **Charging infrastructure:** monitoring of EV charging infrastructure and more generally of alternative clean fuels infrastructure is critical to measure progress in automotive transformation. This KPI dimension is relevant for all regions, however no official harmonised indicators have been currently defined;
- **Electricity generation capacity and raw materials:** reducing EU dependency from third countries for the provision of both energy and critical raw materials, however, both topics are mostly relevant for national governments and the EU;
- **Jobs:** regions are very much concerned about the impact on jobs of the automotive transformation towards zero-emission vehicles. Such statistics are available in Eurostat on a general level, however, regions seem to be in need of more specific and detailed statistics on the automotive sector.
- **Affordability:** monitoring production and prices of new and second-hand zero-emission vehicles together with population/household purchasing power is paramount for regions to assess progress in the automotive transformation, but limited information, especially on production and prices of zero-emission vehicles is available at the regional level.

## **Towards an Automotive Regions' Just Transition Monitoring Programme**

While efforts at the EU and national levels are progressing, and initiatives can be found at the local level, there is an urgent need to monitor the automotive transition progress at the regional scale with reference to key questions for regions:

- How do firms re-structure their organisation and production processes?
- How are local labour markets making the automotive transition?
- How do skills, education, and training systems adapt to the development of new areas of growth?
- How do local governments, economies, firms, clusters, and regional ecosystems adjust to automotive transformation?
- How do citizens perceive automotive transition and their role within the process?

The five Route 35 Platform KPIs are considered relevant, but they have different importance for regions. The study therefore suggests a 'Monitoring Programme' that focuses on the regional dimension of the Route 35 Platform KPIs. Such a programme could take form in a survey among (selected) regions. This

monitoring programme could serve as a sixth KPI that places the regional dimension at its core.

The study emphasises the importance of defining a set of indicators for monitoring regions' vulnerability in the automotive transition. The approach involves a co-creative process, with regions playing a key role in informing and validating indicator selection. This is because development and extent of the monitoring programme will depend on the availability of human and financial resources by the involved stakeholders and may also imply the involvement of private stakeholders, public-private stakeholders, and citizens.

The suggested indicators for monitoring include:

- Investments, and R&D expenditures and activities in the fields of innovation, digitalisation and transformation of existing carbon-intensive installations, including details for Small and Medium-sized Enterprises;
- Business structural and employment statistics of the entities involved in the automotive supply chain, i.e. subassemblies –tier 1 suppliers, components – tier 2 suppliers, raw materials – tier 3 suppliers, and final assemblies – OEMs, also producing data related to EV and ICE productions;
- Initiatives and number of employees involved in up-skilling, re-skilling, and employees relocation programmes;
- Formal cooperation programmes between automotive players and academia for both training and R&D activities distinguishing between regional, national, and international;
- Incentives/benefits to support Foreign Direct Investments in the automotive sector.

The automotive transition is a process that concerns the entire EU society and all European regions will be affected. The availability of charging infrastructure and the affordability of zero-emission vehicles are a priority for all and any EU regions, similarly to sufficient, affordable and cleaner energy, and accessibility to raw materials, which are topics of limited influence and control by regions. Hence the proposal to focus on the above elements primarily related to the jobs KPI dimension, and the evolution of the automotive supply chain. However, it allows flexibility for regions to include additional indicators related to other KPI areas. Collaboration with existing programmes collecting data on greener economies and transport systems (e.g. SDG programme, TEN-T Policy and AFI regulations) is also encouraged.

The monitoring programme therefore could be subdivided into two groups: one for regions involved in automotive industry production and another for all other



regions. Each type of region requires distinct KPIs. In the former, the emphasis is on the supply side KPIs, whereas in the latter, the focus is on demand side KPIs.

A key question is the definition of an ‘automotive region’, i.e. regions presenting a relatively high concentration of automotive manufacturing industry. An analysis of Eurostat regional structural business statistics on automotive manufacturing suggests that such a monitoring programme needs to extend beyond the current ARA members.



# 1. Introduction

The European Union (EU) has set an ambitious goal of becoming climate neutral by 2050. To achieve this goal, the EU has adopted a new regulation that will prohibit the new registrations of most emission-producing cars by 2035. This regulation will have a significant impact on the automotive sector, which will have to undergo a major transformation in response to technological and environmental challenges.

The EU's industry and the labour market need time and resources to adapt to this transition. The impact and the challenges will differ across regions based on the position of the region in automotive value chains. However, the local and regional implications and the possible ways forward in a climate-neutral and digital automotive industry have not been properly assessed or addressed.

The objective of the study is to identify the **preparedness of different European regions** for the upcoming transformation of the automotive sector and to suggest **potential mitigation measures**. The study will cover the following topics:

- Identify the **current composition** of the sector within different regions, highlighting the different challenges the regions are facing and the **resilience** of the regions (chapter 2 & 3).
- Provide elements for a **regional transformation strategy** (chapter 4).
- Develop a **KPI framework** to keep track of the transition of different regions building on “Route 35 Platform” KPIs and indicators developed in the framework of the Mobility-Transport-Automotive Ecosystem Transition Pathway and potentially develop **new KPIs** specifically targeted at measuring successful regional transformation (chapter 5).

This report will aim to support the Committee of the Regions by responding to a series of research questions and providing insights into the following questions:

- How can Key Performance Indicators (KPIs) be designed to measure regional strengths and weaknesses in the automotive transition towards sustainable mobility?
- What would a KPI on the regional impact – in addition to the generic KPIs proposed in the Route 35 platform – look like?
- Who are the stakeholders in this transition on a regional level (private and public, OEMs and SMEs in the supply chain, enterprises and workers, academia and educational centres,) and how can they jointly prepare for this regional transformation?

- Who are the relevant regional actors with knowledge of the automotive transition? (Gather reliable information about the state of the regional automotive industry and the planned action towards its future).
- Which KPI on regional strengths and weaknesses in this automotive transition can be identified, based on the research, and which EU regions are particularly vulnerable in which area?
- What are possible scenarios for the future development of the automotive sector in the EU?
- Which policy recommendations, based on this study's findings, could be given to the European Union in regards to ensuring a just and sustainable transition of the automotive sector in the context of a holistic and sustainable mobility concept?

The research is based on state-of-the-art literature, a survey, five case studies, and interviews with experts.

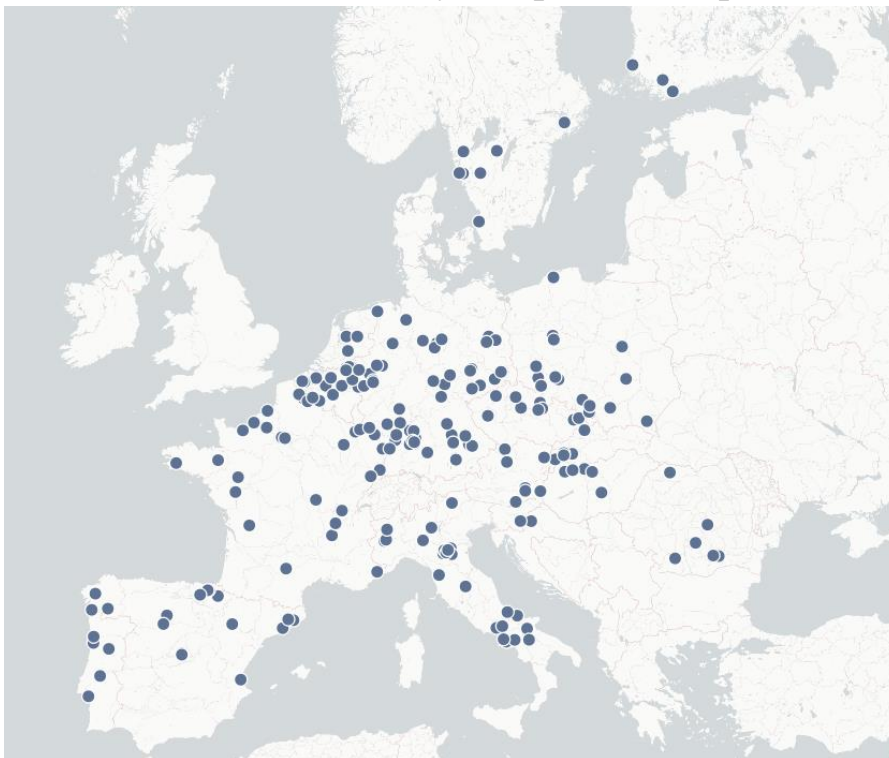
## 2. Current state of the automotive sector

The automotive industry is an important contributor to the EU's economy, accounting for 7% of its GDP and 6.1% of its workforce<sup>1</sup>. The automotive sector provides 13.8 million in direct and indirect jobs in the EU, including 3.5 million jobs in manufacturing, 4.5 million in sales and maintenance and 4.5 million in transport. In addition, the automotive sector has a significant impact on other sectors. It supports industries that supply materials such as steel, chemicals, and textiles, and industries that use its products such as ICT, repair, and mobility services. This chapter provides an overview of the composition of the automotive industry in different regions. It then highlights the different challenges the regions are facing.

### 2.1 Composition of the automotive sector in different regions.

The industry is characterised by a number of the world's leading car makers, including Volkswagen, Peugeot, Volvo, BMW, Stellantis, and Daimler. It is also home to some of the largest parts suppliers in Europe, such as Bosch, Continental, ZF Friedrichshafen, and Michelin. These large players in the automotive industry are supported by a multitude of SMEs and midcaps.

**Figure 2-1: Automotive assembly and production plants in the EU**



Source: Authors, based on ACEA (2023). Interactive map – Automobile assembly and production plants in Europe.

<sup>1</sup> [https://single-market-economy.ec.europa.eu/sectors/automotive-industry\\_en](https://single-market-economy.ec.europa.eu/sectors/automotive-industry_en), accessed on 24 October 2023

Around 1.4 million companies are active in the wider mobility and automotive ecosystem, including motor vehicles (cars, vans, buses, trailers, trucks and motorbikes), parts and accessories suppliers, tractors, batteries, metalworks, dealerships, parts retail & repairers, logistics and mobility services<sup>2</sup>. When only the manufacturing of vehicles is considered, it is estimated that around 18,000 enterprises are active in the sector in 2020<sup>3</sup>. In 2021, 12.1 million motor vehicles were produced in the EU, representing around 15.3% of the global vehicle production<sup>4</sup>. This took place in 214 automobile assembly and production plants across the EU<sup>5</sup>. Over 45% of the production in the automotive industry relies on cross-border value chains, making the sector one of the intra-EU integrated value chains<sup>6</sup>.

The composition of the automotive sector varies across Europe, depending on factors such as market demand, labour costs, infrastructure, regulations and government incentives. These factors have brought about various forms of regional integration of the automotive sector over the last century, culminating in the situation as we know it today.

The EU's automotive supply chain is not concentrated in a single region but rather dispersed across multiple Member States. Historically, countries such as Germany, Sweden, France, Italy, and Spain occupy a central position in the European automotive industry. Notably, the increased economic integration since the beginning of the 2000s has facilitated the ascent of emerging economies into more significant roles within the EU automotive value chain. This transformation is particularly evident in nations like Poland, Czechia, Hungary, Slovakia, and Romania, which have joined the ranks of historically central countries. The primary reason for this is the outsourcing of certain parts of their supplier network and manufacturing by Western European car manufacturers to Central and Eastern European Member States, where labour costs are comparatively lower.

Depending on the local context and history, regions can have various specializations (see

<sup>2</sup> SWD (2020) 98 final/2. Identifying Europe's recovery needs. Europe's moment: repair and prepare for the next generation.

<sup>3</sup> Eurostat (2023). Annual enterprise statistics for special aggregates of activities (NACE Rev. 2, category C29)

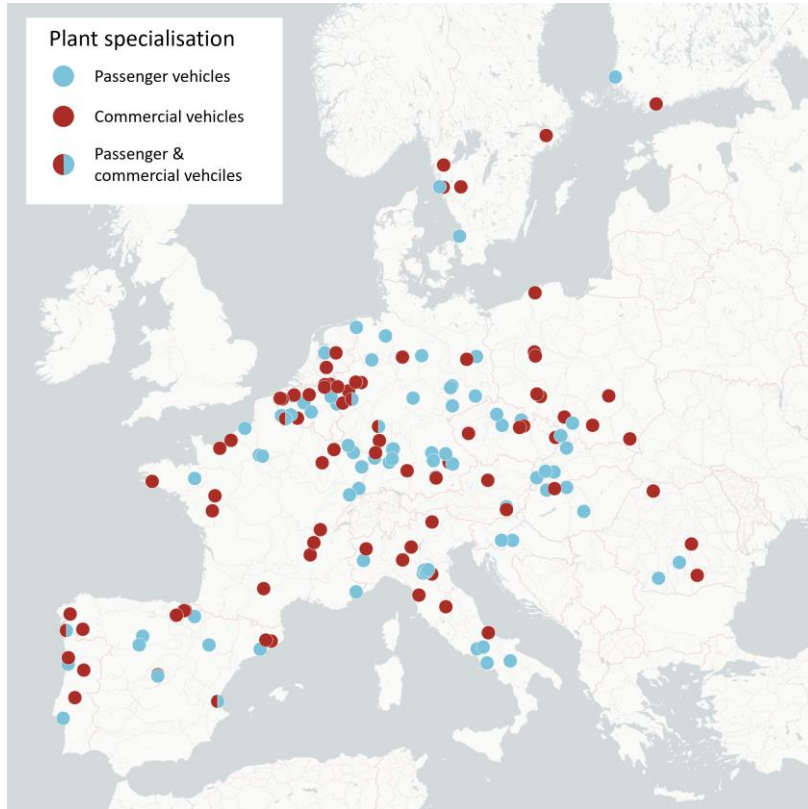
<sup>4</sup> ACEA (2022). The Automobile Industry. Pocket Guide 2022/2023

<sup>5</sup> ACEA (2023). Interactive map – Automobile assembly and production plants in Europe.

<sup>6</sup> SWD (2020) 98 final/2. Identifying Europe's recovery needs. Europe's moment: repair and prepare for the next generation.

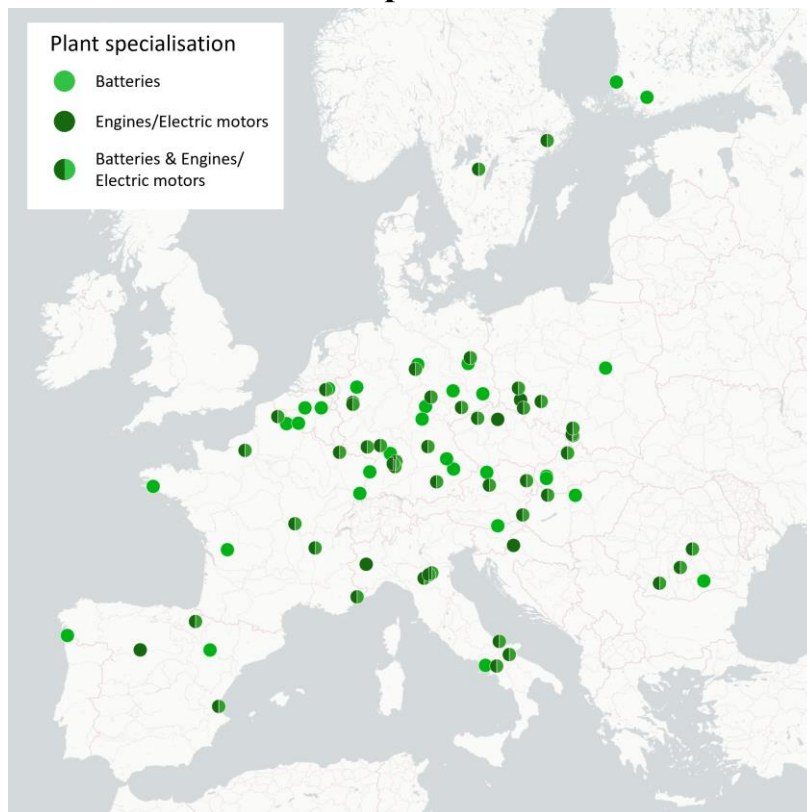
Figure 2-2 and Figure 2-3). Some regions specialise in different aspects of the supply chain, such as suppliers, manufacturing, or research and innovation. Furthermore, there is specialisation based on product type, such as passenger cars, light commercial vehicles, heavy-duty vehicles, or components, with some regions being more specialised in electric vehicles.

**Figure 2-2: Specialisation of automobile plants in the EU – type of vehicles**



Source: Authors, based on ACEA (2023). Automobile assembly and production plants in Europe

**Figure 2-3: Specialisation of automobile plants in the EU – type of components**

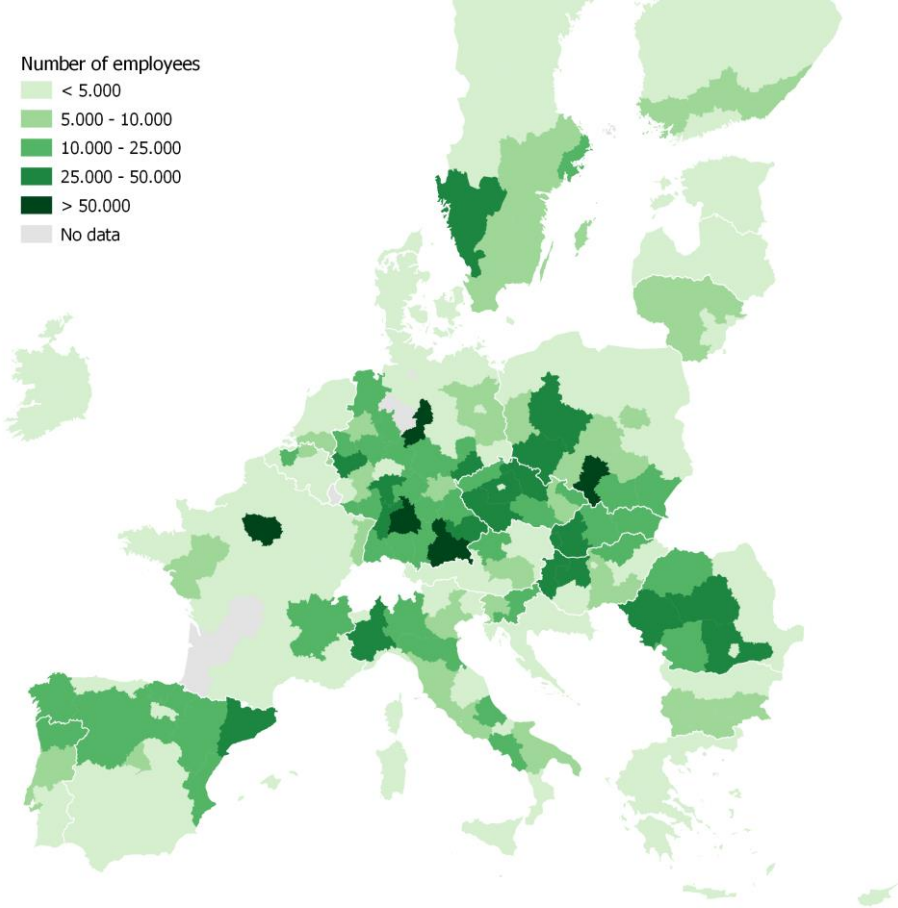


Source: Authors, based on ACEA (2023). Automobile assembly and production plants in Europe



Within countries, it is primarily the regions where the automotive industry forms strong clusters. This is reflected in the regional employment statistics in the automotive industry, see Figure 2-4. The German regions hold the most significant position in this regard, accounting for nearly 26% of car production in the EU in 2021. The Stuttgart and Bavaria regions are crucial high-tech clusters, but regions like Braunschweig, Frankfurt, North Rhine-Westphalia, and in the east Chemnitz, and Dresden, also play significant roles. After Germany, the most car production takes place in Spain, approximately 17% of the total car production in the EU. In Spain, the sector is mainly located in Valladolid, and Castile and León, as well as in the northeast in Catalonia, and Valencia. France, responsible for almost 16% of the total car production in the EU, has major clusters in Rhône-Alpes around Lyon, and in Ile-de-France around Paris.

**Figure 2-4: Total persons employed in the automotive industry (NACE 29)**



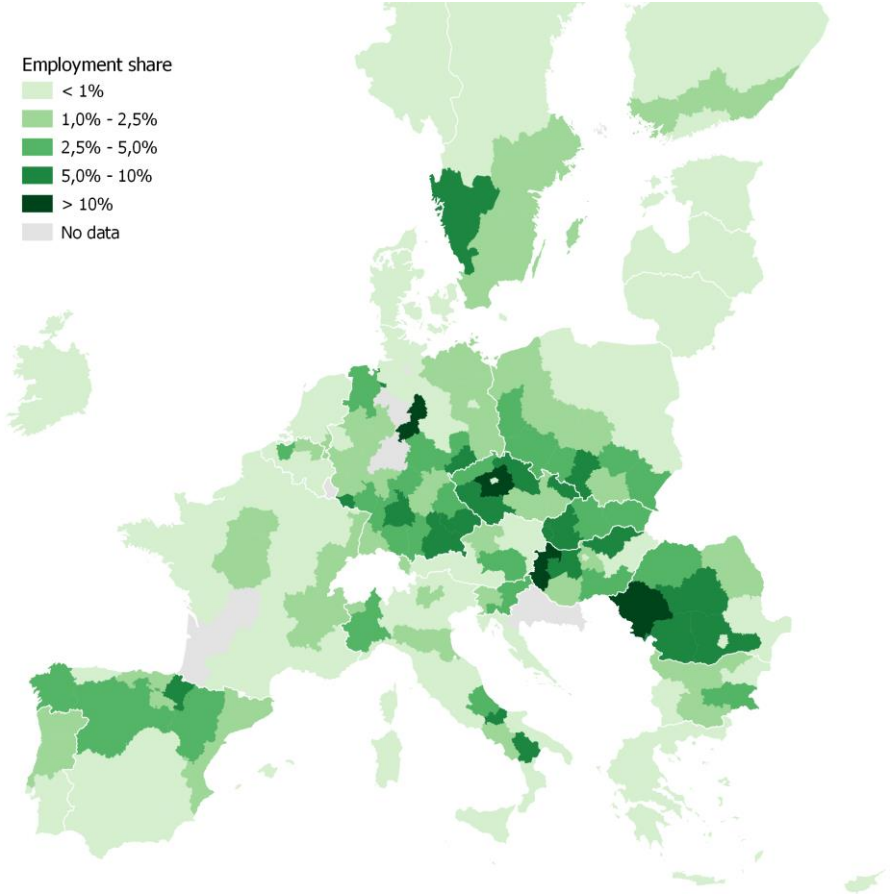
Source: Calculated by authors, based on Eurostat Structural Business Statistics (SBS) data by NUTS 2 regions and commodity group "Manufacture of motor vehicles, trailers and semi-trailers" (NACE rev C29)

Other important regions in Europe include Italy, where significant clusters are found in Emilia Romagna, Piedmont, and Lombardy in the north. Gothenburg, home to Volvo, is an important cluster in the west of Sweden. In Czechia, these clusters are located in the northern Severovýchod region and the region around

Prague, Střední Čechy. The southern part of Poland also features these clusters, specifically in the Dolnośląskie and Śląskie regions. Slovakia has clusters around its capital, Bratislava. Hungary's northern region, around Nyugat-Dunántúl and Közép-Dunántúl, is notable for these clusters. In Romania, you can find them around Bucharest and in the northwest around Cluj and Timisoara. In addition, regional clusters are located in countries not traditionally recognized for their prominent position in the automotive industry. These clusters are evident, for instance, around Lisbon in Portugal, the Flanders region in Belgium, and North Brabant in the Netherlands.

The degree of dependence on the automotive sector varies across regions, largely influenced by their diverse economic activities. Notably, regions such as Gothenburg in Sweden, Bavaria, Braunschweig, and Stuttgart in Germany, as well as the capital areas of Slovenia and the Czech Republic (Bratislavský kraj and Střední Čechy), the Hungarian regions Nyugat Dunántúl and Közép-Dunántúl, and Vest in Romania, stand out for having a significant employment share within the automotive industry (Figure 2-5).

**Figure 2-5: Share of persons employed in the automotive industry (NACE 29)**



Source: Calculated by authors, based on Eurostat Structural Business Statistics (SBS) data by NUTS 2 regions and commodity group "Manufacture of motor vehicles, trailers and semi-trailers" (NACE rev C29)

Research and development in the automotive industry is more concentrated in regions in countries that are historically seen as taking a central position in the European Automotive industry, such as Germany, Sweden, Italy, and France.

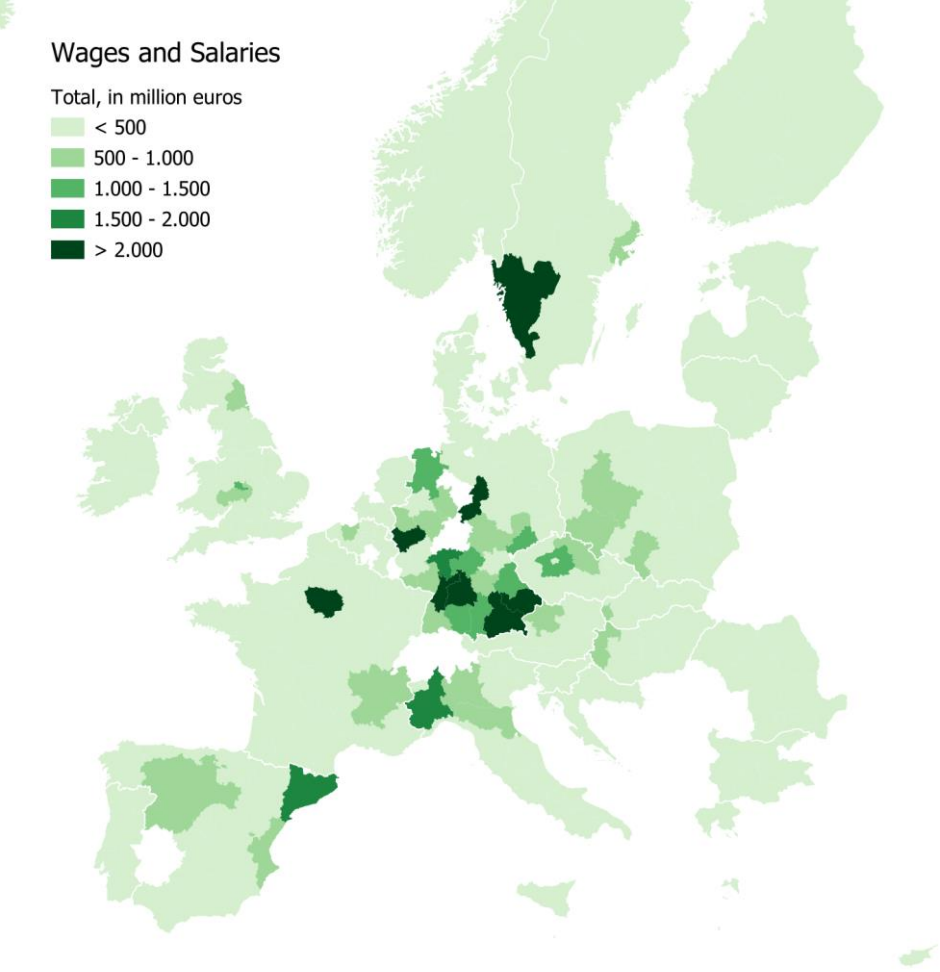
**Table 2-1: The share of R&D personnel and researchers of total persons employed in the automotive industry (NACE 29) of selected European countries in 2019**

<b>Country</b>	<b>Percentage (%)</b>	<b>Percent Germany=100</b>
Germany	16.06	100
Sweden	13.09	81.5
Britain	11.58	72.1
Austria	10.32	64.3
Italy	9.68	60.3
Norway	8.17	50.8
France	7.69	47.8
Netherlands	7.57	47.1
Finland	5.20	32.3
Slovenia	4.90	30.5
Turkey	4.82	30.0
Belgium	4.57	28.5
Spain	4.56	28.4
Hungary	3.56	22.2
Portugal	3.08	19.2
Poland	3.07	19.1
Czechia	2.96	18.4
Ireland	2.51	15.6
Denmark	2.25	14.0
Lithuania	2.21	13.7
Estonia	1.70	10.6
Romania	1.69	10.5
Latvia	1.57	9.8
Slovakia	1.52	9.4
Bulgaria	0.76	4.7
North Macedonia	0.04	0.3

Source: Pavlinek, P. (2023)

Such patterns are confirmed by statistics on regional wages and salaries, see Figure 2-6. R&D involves high-skilled labour and means high wage costs. Gothenburg, Bavaria, Stuttgart, Ile-de-France, North Rhine-Westphalia, Piemonte, and Catalonia stand among the regions with the highest wage costs in the automotive industry in the EU. Regions with strong automotive sectors but low wage costs such as in Hungary, Slovakia, and Romania imply the presence of lower-skilled work such as assembly line work or manufacturing tasks.

**Figure 2-6: Total salary in the automotive industry (NACE 29)**



Source: authors, based on Eurostat Structural Business Statistics (SBS) data by NUTS 2 regions and commodity group "Manufacture of motor vehicles, trailers and semi-trailers" (NACE rev C29)

## 2.2 Regional typology of the automotive industry

The spatial division of labour within the automotive industry in Europe is complex and multifaceted. Different parts of the automotive supply chain cannot be unambiguously assigned to specific regions. Often, regions fulfil different functions within the automotive supply chain. For example, R&D activities are

also found at Audi’s factory in Hungary<sup>7</sup>, and Skoda in Czechia<sup>8</sup>, while these two countries are generally not known for research and innovation functions.

**Table 2-2 : Type of regions based on the characteristics of the economic activity**

Region	Characteristics
Core regions	<ul style="list-style-type: none"> <li>• Large and affluent markets.</li> <li>• Presence of strategic functions (especially R&amp;D), management (decision-making), and marketing.</li> <li>• Complex activities based on highly skilled labour, such as the assembly of high-end models and components requiring complex knowledge.</li> <li>• High value-added activities such as manufacturing electric and autonomous vehicles.</li> <li>• R&amp;D marked by investment in digitalisation, electrification, automation, and connected cars.</li> <li>• Dominant trade relations with the periphery (high power).</li> <li>• Low degree of foreign ownership.</li> </ul>
Periphery	<ul style="list-style-type: none"> <li>• Smaller and less affluent markets.</li> <li>• Export-oriented assembly of inexpensive mass-market models and simple components.</li> <li>• Weak presence of strategic functions.</li> <li>• Low value-added activities such as manufacturing ICE vehicles and electric batteries.</li> <li>• Risky low-volume export-oriented production</li> <li>• R&amp;D marked by investment in electrification (batteries), automation, ICE production.</li> <li>• Dependent trade relations (low power).</li> <li>• High degree of foreign ownership of companies in core countries.</li> </ul>
Semi-periphery	<ul style="list-style-type: none"> <li>• Zones with a mixture of core and peripheral processes.</li> <li>• Neither core nor peripheral processes dominate.</li> <li>• Positioned in-between the core and periphery by housing both peripheral processes in relation to the core and core-like processes in relation to the periphery in the core-periphery structure.</li> </ul>

Source: based on Pavlinek (2022) and Meygeru et al. (2023)

<sup>7</sup> Audi (2023), accessed via <https://audi.hu/en.html>

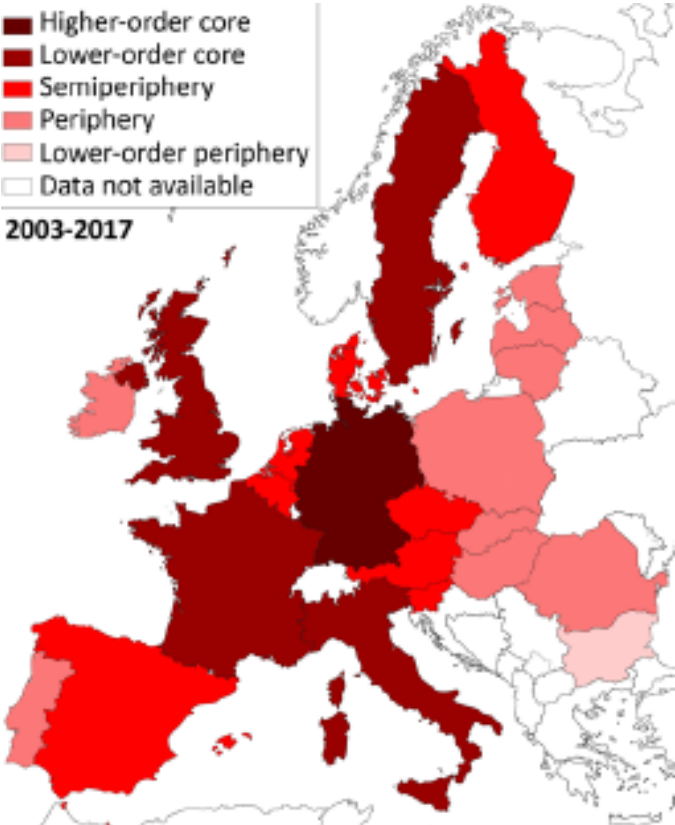
<sup>8</sup> Skoda (2023), accessed via <https://www.skoda-auto.com/company/about>

Nevertheless, at a high level, generic types of regions can be identified, namely, core regions, periphery regions, and semi-periphery regions. The characteristics of these regions are shown in Table 2-2. These different types of regions are expected to experience similar changes as the automotive industry develops into the future.

Pavlinek (2022) classified countries in Europe according to their type of economic activity in the European automotive industry. Countries such as Germany, Sweden, France, and Italy are identified as belonging to the core, while the Netherlands, Spain, Czech Republic, and Slovakia, among others, belong to the semi-periphery, and Portugal, Poland, and Romania, among others, belong to the periphery (see Figure 2-7).

This typology can also be applied to regions. However, the aim is not to assign a classification to every region. It provides a useful framework to systematically address the regional diversity of regions and their challenges and mitigation measures. It can be used to map the automotive supply chain, their challenges and resilience.

**Figure 2-7: Classification of the European automotive industry according to the core-periphery system.**



Source: Pavlinek (2023)

## 2.3 Regional challenges

Currently, the automotive industry is at a crossroads with three main trends changing the sector:

1. the green transition;
2. the digital transition; and
3. increased global competition.

The green transition of the automotive industry represents a shift towards more sustainable and environmentally friendly practices within the sector. This transformation is closely tied to global efforts to mitigate climate change, reduce pollution, and decrease our dependence on fossil fuels. It encompasses the adoption of electric vehicles (EVs) and other alternative fuels such as hydrogen, as well as the usage of eco-friendly materials in manufacturing. The need for the automotive industry to transition is driven by stricter government regulations on the one hand and consumer preferences for eco-friendly options on the other.

The digital transition involves the shift towards smarter transport solutions such as connected vehicles and autonomous driving. It simultaneously drives the digitalisation of car manufacturing. Technologies like 3D printing, robotics, and AI are making production processes more efficient and reducing costs. Furthermore, digitalisation generates better data and analytics, allowing manufacturers, service providers, and traffic managers to gain insights into vehicle performance, user behaviour, and maintenance needs.

Meanwhile, digitalisation is also aiding the sector in its efforts to become more sustainable. Technologies such as battery management systems, smart charging systems, and smart payment systems could significantly increase the attractiveness of EVs, while better traffic management through better data and analytics paired with connected vehicles has the potential to reduce congestion and thus pollution.

While the sector is transitioning to become greener and more digital, global competition is intensifying. Emerging economies like China have rapidly emerged as major players in the automotive industry. Their competitive advantage lies in lower production costs and a growing consumer base. Technology companies such as Google and Apple are entering the automotive sector to facilitate the digital transition of the sector, thereby creating competition for the incumbent manufacturers. At the same time, supply chain disruptions, such as those seen during the COVID-19 pandemic, have highlighted vulnerabilities in the automotive industry and started a trend for policymakers and manufacturers arguing for reshoring and local sourcing.



These three trends have different impacts on the regions, depending on the type of processes found in the region, summarised in Table 2-2. Table 2-3 showcases the main challenges per region.

**Table 2-3: Main challenges of the automotive region depending on the region**

Region type	Challenges
Core regions	<ul style="list-style-type: none"> <li>● Digitalisation requires new talent such as software engineers, data scientists, data architects.</li> <li>● Competition for R&amp;D labour with Asia as labour in Europe is more expensive.</li> <li>● Competition for R&amp;D labour with tech giants.</li> <li>● Factories will need to transition towards the production of EVs</li> <li>● Stricter regulations are accelerating the need to shift to EV production.</li> <li>● Global competition pushes carmakers towards electrification, with Europe currently lagging behind.</li> <li>● Assembly of EVs is less labour intensive, risking job loss.</li> <li>● Batteries are relatively heavy, requiring battery factories in close proximity to reduce transportation costs.</li> </ul>
Periphery regions	<ul style="list-style-type: none"> <li>● Weaker R&amp;D functions.</li> <li>● Dependency on core regions makes the success of periphery regions dependent on core regions.</li> <li>● Digitalisation and automation reduce the need for the periphery region’s key competitive advantage: lower labour costs.</li> <li>● Factories will need to transition towards the production of EVs, albeit at a slower pace than in core regions. While this requires few changes in the short term, it undermines long-term competitiveness.</li> <li>● Lower degree of government incentives (such as deploying charging infrastructure or stimulating EV purchases) to support the adoption of EVs.</li> <li>● Periphery countries are experiencing labour shortages.</li> <li>● Electric engines require fewer components than ICE engines, risking job loss at ICE component factories that need to transition to producing electric engines.</li> <li>● Production of batteries is energy-intensive, leading to increased production costs as energy prices are rising.</li> </ul>



Region type	Challenges
	<ul style="list-style-type: none"> <li>High competition among periphery countries to attract the battery industry.</li> </ul>
Semi-periphery	<ul style="list-style-type: none"> <li>The challenges faced by semi-periphery regions will depend on the mixture of core and periphery activities in the region.</li> </ul>

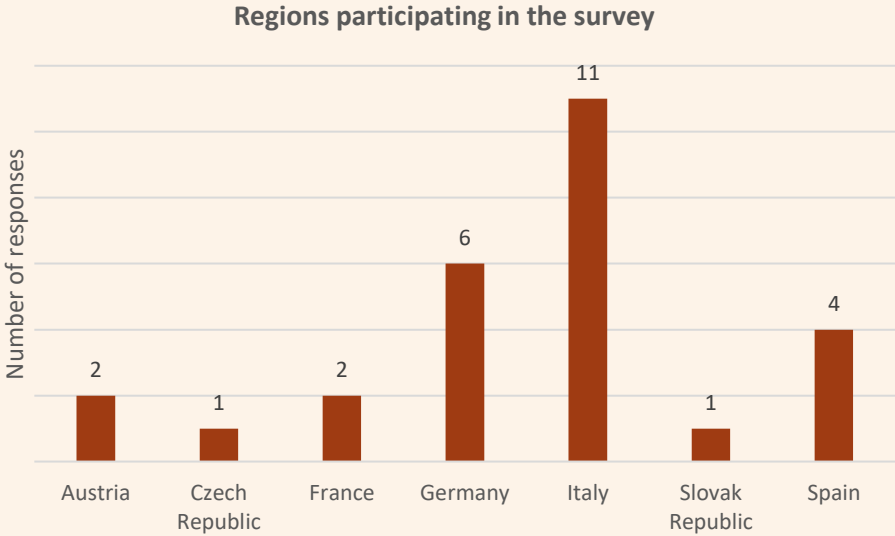
Source: based on McKinsey (2021), Megyeri et al (2023) and Pavlinek (2023)

### Survey among automotive regions in Europe

In order to assess the preparedness of European regions, a survey was distributed among European automotive regions. The survey focusses on the following key areas:

- Challenges faced by the automotive industry in the region.
- Measures taken within the region to support the transition.
- KPIs monitored in the region and the potential for KPI monitoring.

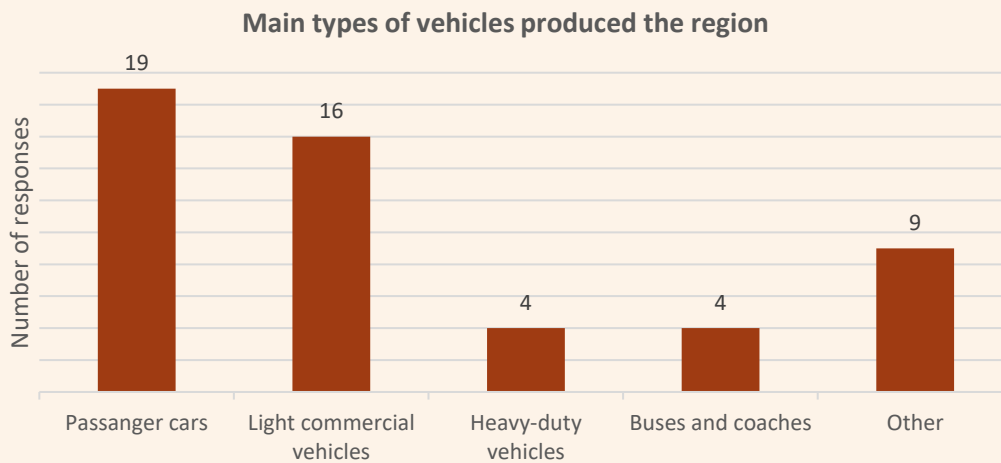
The survey was distributed among members for the Automotive Regions Alliance. In total, 27 responses were received after data cleaning.



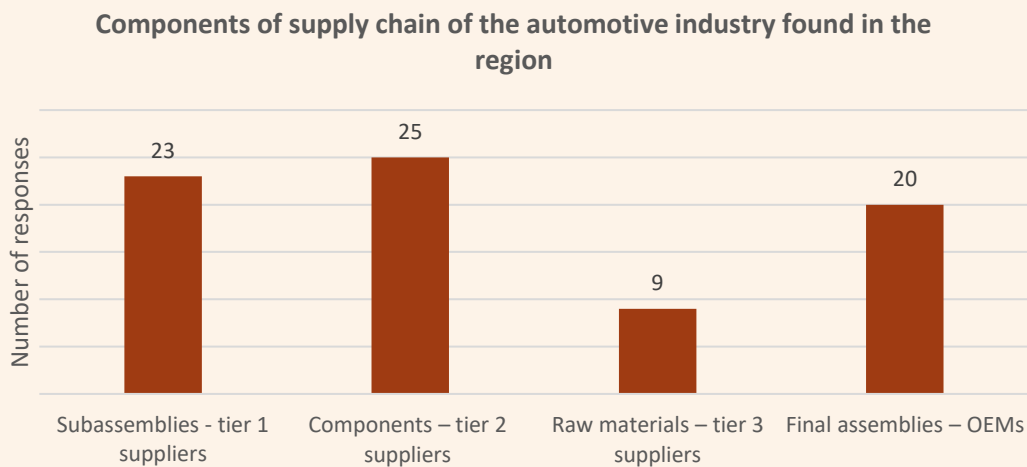
Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe

The majority of respondents are from the western half of Europe, with a notable presence of Italian regions. While this represents a well-balanced mixture of core and semi-periphery regions, peripheral regions are underrepresented. For each respondent, the automotive industry plays a key role in the regional economy, underscoring the strong interest in a successful industry transition. Furthermore, the respondents offer a diverse representation of regions involved in the production of both passenger and commercial vehicles. Finally, the respondents also encompass a wide variety of stakeholders from the automotive industry's supply chain.

The following figures provide the background information for the regions that participated in the survey.

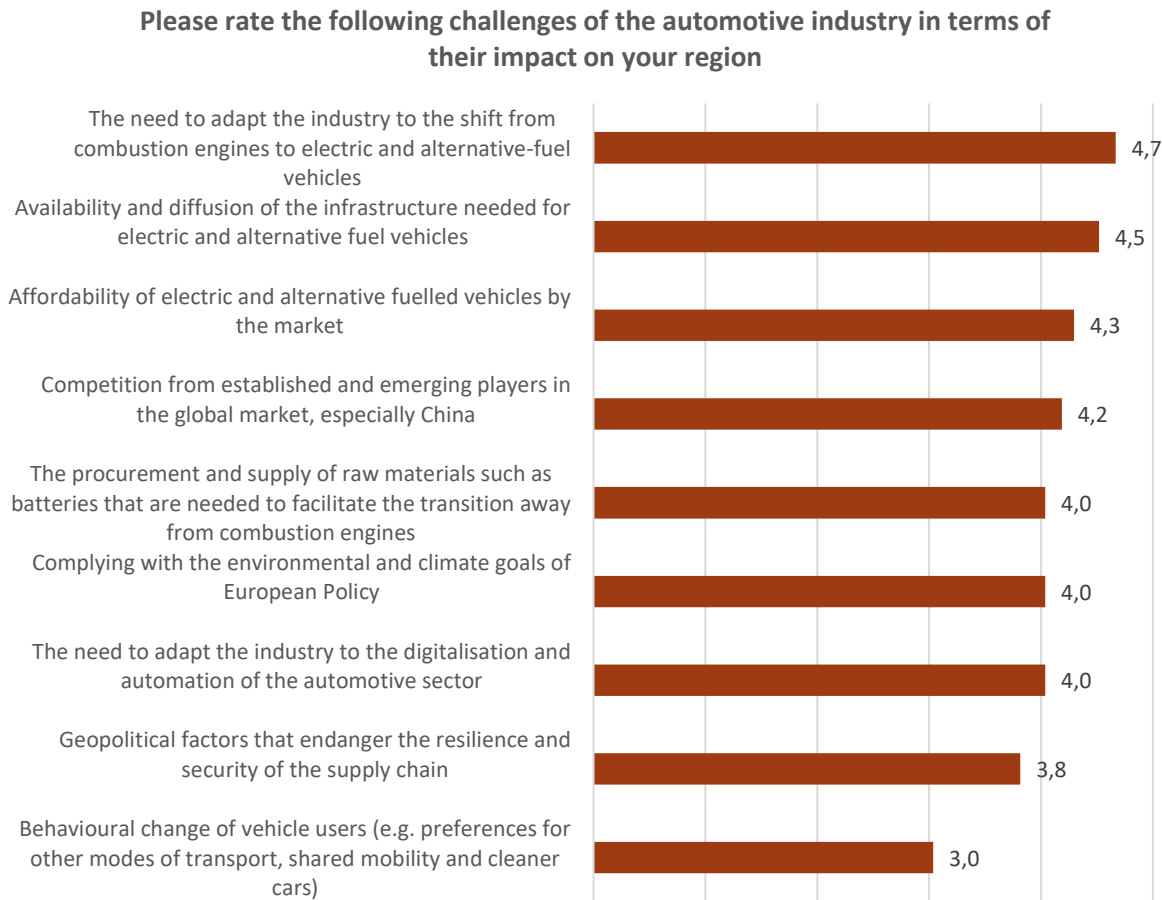


Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe



Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe

**Figure 2-8: Surveyed expected impact of automotive industry challenges in EU Regions**



Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe. Note: The numbers reflect the average rating, with 1 being ‘not important’ and 5 ‘very important’.

To gain a comprehensive understanding of the precise challenges encountered by automotive regions, a survey was conducted in August-October 2023, which received responses from representatives of 27 EU regions. Of those, all but one characterised the automotive industry as “very important” for their region in terms of economy and employment.

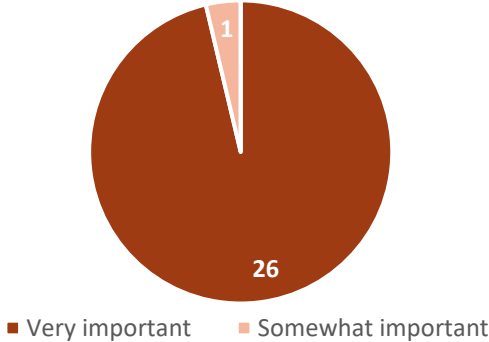
According to the survey respondents, the main challenge for the automobile industry in their regions is the urgent need to recalibrate the industry in response to the transition from conventional combustion engines to electric and alternative fuel vehicles. This is widely confirmed by scientific research and policy papers, illustrating that the shift toward electric and alternative fuel vehicles necessitates a comprehensive restructuring of the entire automotive supply chain<sup>9</sup>. This undertaking includes the procurement of a consistent supply of raw materials

<sup>9</sup> Megyeri, E., Pelle, A., & Tabajdi, G. (2023). The realities of EU industrial policies analysed through automotive value chain dynamics. *Society and Economy*

essential for the production of batteries and electric components. The dependence on specific raw minerals and metals, many of which are sourced from outside the EU, presents a significant challenge in ensuring a stable and secure supply chain.

**Figure 2-9: Surveyed importance of the automotive industry in EU regions**

How important is the automotive industry for your region in terms of economy and employment?



Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe

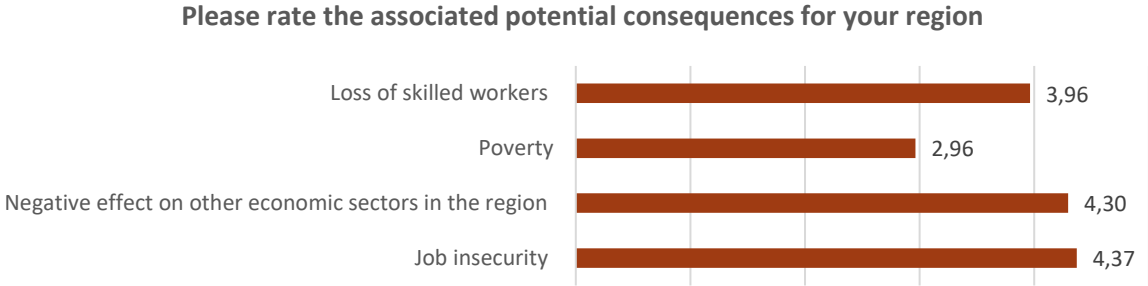
Representatives of EU automotive regions also highlighted another challenge for them, namely one associated with the availability and diffusion of the infrastructure required for electric and alternative fuel vehicles. Evidence indicates that the deployment of charging infrastructure has been uneven across the EU regions<sup>10</sup>. As part of our study, a representative of the European Automotive Cluster Network (EACN) emphasised the insufficient coverage of charging stations in the least densely populated areas of France. Confirming this trend, the survey results indicate that sparsely populated regions like Basilicata and Bourgogne-Franche-Comté (with 50 to 60 inhabitants/km<sup>2</sup>) perceive themselves to be more affected by the challenge of charging station availability compared to densely populated regions such as Sachsen and Comunidad Valenciana (with approximately 220 inhabitants/km<sup>2</sup>).

Respondents also underscored the issue of affordability concerning electric and alternative fuel vehicles. While there exists a growing demand for sustainable and eco-friendly transportation options, the higher initial costs of electric vehicles in comparison to traditional combustion engine vehicles remain a significant barrier for many consumers. Additionally, representatives of EU automotive regions expressed concerns regarding heightened competition from established and emerging players in the global market, such as China. According to survey results,

<sup>10</sup> Pavec et al., (2020) A survey-based assessment of how existing and potential electric vehicle owners perceive range anxiety

all regions expressed apprehension over this challenge, irrespective of their position in the automotive value chain (whether mostly OEMs or suppliers).

**Figure 2-10: Surveyed potential consequences of the changing automotive landscape in EU regions.**



Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe. Note: The numbers reflect the average rating, with 1 being 'not important' and 5 'very important'.

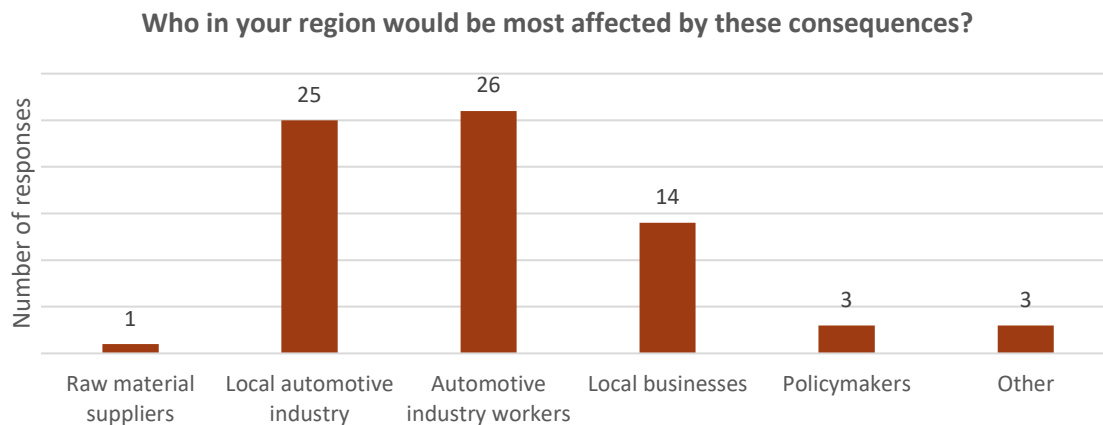
First and foremost, regions are concerned about the impact on employment due to the transition of the automotive industry. This transition demands a different skill set and new factories, which could potentially lead to employers relocating from the region if the local industry fails to adapt or if there are inadequate opportunities for reskilling. Evidence shows that economic downturns, technological advancements, and shifts in consumer preferences can lead to layoffs and job losses in the automotive sector. For example, the rise of electric vehicles and autonomous driving technology may reduce the demand for traditional automotive manufacturing jobs, leading to widespread unemployment in this sector<sup>11</sup>. Notably, according to the survey, the Lombardy Region anticipates a potential loss of 15,000 to 20,000 jobs. Across Italy, job losses in the sector are estimated at 26%<sup>12</sup>.

Furthermore, regions anticipate that the negative repercussions of the automotive industry are likely to extend to other economic sectors in the region. This is also regarded as a major concern by the regions. The departure of skilled workers is seen as a potential impact, resulting in a brain drain from the region. The emergence of poverty is considered a less prominent issue.

<sup>11</sup> Celasun et. Al. (2023) Cars and the Green Transition: Challenges and Opportunities for European Workers, International Monetary Fund, WP/23/116

<sup>12</sup> There are around 278,000 jobs in the automotive sector in Italy. The Italian unions and lobby estimate 73,000 jobs, or 26%, could be lost (Piovaccari, 2022)

**Figure 2-11: Survey responses on who will be most impacted as a result of the automotive transition.**



Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe. Note: The numbers reflect the average rating, with 1 being 'not important' and 5 'very important'.

The regions anticipate that the local automotive industry and its workforce will face a significant impact from the consequences of the transition. The industry will need to adapt, particularly local-oriented businesses like tier 1 and tier 2 suppliers, as opposed to the OEMs. Retraining and upskilling of workers are essential to address the impacts on employees. Regions expect that local businesses in these regions may experience some effects from the transformation, but not to the same extent as the automotive industry and its workers.

Government intervention can play a vital role in the automotive industry's transition. However, it is expected that the regions are well-equipped to engage policymakers in facilitating this transition. Raw material suppliers are expected to be the least affected by these consequences, indicating that regions do not anticipate the need to provide support to raw material suppliers.

## 2.4 Conclusion

The automotive industry is one of Europe's most significant sectors, comprising a complex network of cross-border supply chains involving OEMs, suppliers, and related industries spread across the continent but concentrated in specific regions. The automotive industry can be broadly categorised into three types of regions: core regions, semi-periphery regions, and periphery regions.

Core regions in the automotive industry are characterised by the presence of major OEMs where strategic functions like R&D, management, and marketing are primarily conducted. These regions are marked by a large market share, a high concentration of skilled labour, low foreign ownership, high value-added activities, and significant influence within the supply chain. Periphery regions are

characterised by smaller companies in the automotive industry, export-oriented operations, limited strategic functions, and lowvalue-added activities such as component manufacturing. They rely on core regions and have a high degree of foreign ownership. Semi-periphery regions, on the other hand, encompass a mix of core and peripheral functions and are positioned between these two categories.

The automotive industry in the EU faces significant challenges as a result of three main trends: the green transition, the digital transition, and increased global competition. Based on these challenges, regions primarily expect difficulties in the electrification of vehicles, closely followed by other challenges such as global competition, digitalization, compliance with legislation, the availability of raw materials, and geopolitical factors. This reflects the prioritisation of themes in regional transformative strategies.

Furthermore, the regional transformation strategy should primarily focus on the local automotive industry and its workforce, and to a lesser extent on related industries. This can be particularly challenging for periphery regions, as the influence from outside the region is significant in these types of areas. Government capacity and support for raw material suppliers are not expected to be the primary areas of focus according to the regions.





### 3. Sub-sector resilience and its regional impact

The regions' capacity to deal with the challenges of the transformation of the automotive landscape differs depending on the activities in that region. The table below contains an overview of the resilience of various sub-sectors within the automotive industry, categorised by the type of region in which they are predominantly found. Each sub-sector faces different challenges and opportunities in adapting to the ongoing transformation of the automotive landscape.

**Table 3-1: Resilience of various sub-sectors within the automotive industry**

Description	Expected sub-sector resilience	Type of region
<p><b>Raw material extraction and processing:</b> Mining and refining of metals, plastics, rubber, and other materials that are used to make vehicle components and parts</p>	<p>Mineral extraction, mining and other forms of resource gathering are highly susceptible to market prices and disruptions to supply chains due to slim margins and high upfront costs. However, there are large untapped deposits of valuable minerals such as lithium available to be mined in core and peripheral regions that will boost the sector significantly.</p> <p>A study identified 27 potential lithium deposit sites, which are well distributed in Europe. However, most lithium deposits are found in the Iberian area and Finland<sup>13</sup>. It is estimated that 7% of the world's lithium reserves are found in Europe, and ongoing mining projects in Portugal, Germany, Austria, France, Czech Republic, and Finland are expected to cover 80% of Europe's battery demand<sup>14</sup>.</p> <p>Another option is sodium-ion batteries. Sodium is cheaper and more abundant and can help reduce the dependency of the EU and thus improve its resilience. A major drawback</p>	<p>Core, semi-periphery and periphery</p>

<sup>13</sup> Gourcerol et al. (2019). Re-assessing the European lithium resource potential – A review of hard-rock resources and metallogeny. *Ore Geology Reviews*, 109, pp 494-519

<sup>14</sup> Rustici (2022). Lithium: What Are the Main Mining Projects in Europe? Direct Industry E-Magazine.

Description	Expected sub-sector resilience	Type of region
	<p>however is that sodium-ion batteries are less efficient. It is expected that sodium-ion batteries can complement lithium-based batteries in the long term<sup>15</sup>.</p> <p>As such, there are both positive and negative elements in this sub-sector that both contribute to the resilience.</p>	
<p><b>Component and part manufacturing:</b> Making engines, transmissions, batteries, electronics, tires, and other parts that are assembled into vehicles</p>	<p>As BEVs require fewer components than ICE vehicles, there will be fewer factories/assembly lines needed. This is expected to result in increased market competition for existing factories. Additionally, the conversion of factories producing different components and using more automation in the process requires high upfront investments. There is some resilience, however, as the high investment costs mean that once established there is a high incentive to keep the factory operational, and with high automation levels the upkeep costs are low. As a result, once established the resilience is rather high.</p>	<p>Periphery and semi-periphery</p>
<p><b>Vehicle assembly:</b> Putting together the components and parts into finished vehicles at factories or plants</p>	<p>Vehicle assembly will not change significantly compared to a new ICE car model. EV production will initially be located mostly in the core regions while ICE building will continue in the semi-periphery. This will put a certain path dependency on more peripheral regions which can delay their adoption of new technologies and manufacturing methods for EVs. Therefore, there is a clear distinction to be made between core and (semi-)periphery in this sub-sector. Manufacturing competition from Asia, especially considering labour, will be fierce and this will put a further strain on the peripheral automotive regions in Europe. Thus, resilience</p>	<p>Core, semi-periphery and periphery</p>

<sup>15</sup> Manthey, E. (2023, 14 December). Can sodium-ion batteries replace lithium-ion ones? *ING*. <https://think.ing.com/articles/can-sodium-ion-batteries-replace-lithium-ion-batteries>

Description	Expected sub-sector resilience	Type of region
	in core regions is higher than in the (semi-)periphery in this regard.	
<p><b>Vehicle distribution and logistics:</b> Transporting the vehicles from the factories or plants to the dealerships or customers</p>	<p>Transport networks for distribution of vehicles will not see significant changes because of changes in the automotive industry supply chain. Furthermore, this sub-sector represents a small fraction of the automotive industry.</p> <p>Initially, the most significant impact will be felt in regions at the forefront of transitioning to the use of EVs for transporting vehicles and their parts. In these areas, the adoption of EVs will be necessary, as well as the establishment of the required charging infrastructure and network capacity. The region's resilience depends on the resources available within businesses and the region to make this transition happen. These resources are typically more readily available in core regions and later in the periphery, where the adoption of EVs is slower to start. It is expected that the transition, and consequently, the resilience, will be more challenging in peripheral regions because there are generally fewer public resources available to actively support the adoption of EVs in logistics companies within the automotive sector.</p>	Initially in the core, and later in the periphery.
<p><b>Vehicle sales and service:</b> The sale of vehicles and the maintenance of existing vehicles</p>	<p>Vehicle sales and service companies are found across all regions. Thus, it is mainly a matter of how well individual maintenance and service companies are able to adjust rather than regions. Vehicle sales are increasingly online and not in car dealerships, causing a lower need for these services. Maintenance facilities will need to make adjustments to their services as BEVs require a different kind of maintenance. As a result, the resilience depends on how well vehicle sales and service companies can adjust to these changing market requirements. For</p>	Initially in the core, and later in the periphery.

Description	Expected sub-sector resilience	Type of region
	<p>service companies in particular, it is suggested that the maintenance costs per kilometre are lower for EVs than ICE vehicles<sup>16</sup>. Deloitte<sup>17</sup> expects that the shift to alternative drivetrains will lead to a decline in the aftersales market of \$2.6 billion in 2018 to \$1.7 billion in 2035 in the combined markets of France, Germany, Italy, Spain, and the United Kingdom. This is mainly caused by a drop in revenue from maintenance and services. Thus, lower profits and job loss are expected in this sub-sector.</p> <p>This impact is experienced in core regions first, where the adoption rate of EVs is higher, followed by peripheral regions, where the adoption rate of EVs is slower.</p>	
<p><b>Vehicle recycling and disposal:</b> Dismantling and disposing of old or damaged vehicles in an environmentally friendly way, as well as recovering and reusing valuable materials</p>	<p>An important aspect that determines the resilience of regions is the extent to which batteries of EVs can be reused, either by replacing damaged components (remanufacturing) or by reusing components (recycling). Due to a shortage of raw materials, and from a sustainability perspective, developing the reusability of batteries is crucial to being resilient.</p> <p>Currently, economically viable solutions for reusing batteries are still emerging, although the need for them is recognised by both politics and industry. The European Commission mandates recovery rates for cobalt and nickel batteries of 90% and for lithium batteries of 50% by 2027, increasing to 95% and 80%, respectively, by 2031<sup>18</sup>.</p>	Core

<sup>16</sup> Harto, C. (2020). Electric vehicle ownership costs: Chapter 2-Maintenance. Consumer reports.

<sup>17</sup> Deloitte (2020). The Future of Automotive Sales and Aftersales

<sup>18</sup> Regulation (EU) [2023/1542](#) concerning batteries and waste batteries,

Description	Expected sub-sector resilience	Type of region
	<p>R&amp;D are necessary to make recycling and remanufacturing processes technologically and economically feasible. This requires a highly skilled workforce. R&amp;D activities primarily take place in core regions, so the resilience depends on whether these core regions have access to this skilled labour.</p>	
<p><b>Research and development</b> of new vehicle models and technologies. Innovation in areas such as safety, fuel efficiency, and connectivity.</p>	<p>Highly needed in the upcoming decades as auto manufacturers adapt to BEVs and other technologies such as autonomous driving and connected vehicles. Competition with cheaper Asian R&amp;D centres is expected to intensify in the future. This sub-sector is resilient going into the future due to the high demand for change and the market advantage such changes can bring to manufacturers, but this can come under pressure from abroad.</p>	<p>Core and semi-periphery</p>
<p><b>Regulation compliance:</b> Testing and ensuring compliance with (inter)national laws and standards on emissions, safety, reliability, and efficiency.</p>	<p>Testing facilities will see different vehicles and will need different testing setups to deal with a new generation of vehicles. This process is rather resilient as testing locations are rare and more regulations mean that they will be required into the future.</p>	<p>Core</p>
<p><b>Marketing and branding:</b> Promoting and marketing vehicles to potential customers.</p>	<p>The marketing of vehicles is not expected to be impacted significantly by market changes. However, changing consumer preferences and the advent of micro-mobility and multi-modal transport will be cause for concern as the expected share of cars in transport will decrease. The resilience of this sub-sector is also</p>	<p>Core</p>

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<b>Description</b>	<b>Expected sub-sector resilience</b>	<b>Type of region</b>
Advertising and sales activities.	dependent on the laws and regulations in place which makes this more vulnerable to changes in those laws.	

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Source: Pavlinek (2022), Nickel (2021), Velinov (2020)

## 4. Elements for a regional transformation strategy

This section presents an analysis of the status of automotive regions within the EU, outlining potential measures envisaged for the future as integral components of their transformative strategies.

### 4.1 Future scenarios for the development of the automotive sector

The following sub-section uses the framework developed by De Propris and Bailey<sup>19</sup> to assess pathways of regional transformation of the industry. This section presents the framework and elaborates on how it can be applied to the automotive industry, considering that the complexities and diversities within the EU's automotive regions necessitate tailored strategies that account for the unique characteristics and requirements of each region.

According to the researchers, a region's ability to adapt relies on three key capabilities: the power to innovate, the ability to attract new ideas, and the skill to combine existing and emerging technologies. The way regions and specific industries respond to technological changes leads to four different paths:

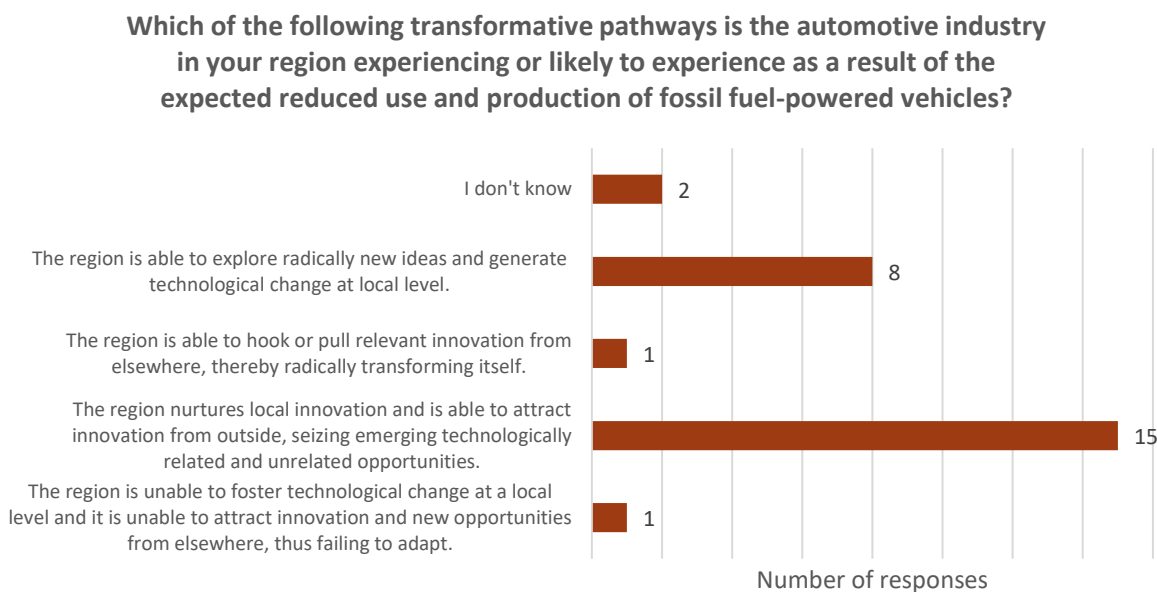
- **Regional obsolescence path.** A mature industrial local system faces the risks of becoming obsolete. The businesses and local stakeholders are resistant to embracing new technological developments related to the same industry, both within and outside the system. Such resistance to change prevents the system from exploring new technological avenues, leading it to detach from necessary advancements. These systems lack the innovation, docking, and translational capabilities needed to adapt to the evolving landscape. However, this defensive stance might be temporary, with systems eventually transitioning to a new transformative path by adopting technologies developed elsewhere.
- **Endogenous transformative path.** This scenario involves an industrial local system that, despite being part of a mature regime, actively explores and generates new ideas. This system must possess strong internal innovation capabilities to foster exploration and experimentation beyond the existing technological norms. The emergence of new niches within these systems is a result of innovative learning processes within local research organizations, start-ups, small firms, or even specialised departments within larger companies.

<sup>19</sup> De Propris L., Bailey D., (2021) Pathways of regional transformation and Industry 4.0. *Regional studies*, 55:10-11, 1617-1629,

- **Hyper-transformative path.** These systems, specialised in industries underpinned by versatile technologies, have the capability to generate radically new internal niches while also attracting diverse external ideas and industries. This constant influx of innovative ideas enables these systems to swiftly transition into new technological regimes.
- **Importation transformative path.** Some specialised industrial systems lack the internal capacity to create and nurture radical innovations, despite having innovation infrastructure and access to public funding. However, these systems can attract external niches and incorporate them within their existing regime, thereby instigating a systemic transformative change and positioning themselves as global hubs for new industries and innovations.

Through the survey, this framework was applied to the automotive industry, specifically to gain insights into the regional dynamics within EU automotive regions. The results reflect an optimistic outlook regarding the future scenarios for these regions. Among the respondents, 15 (out of 27) identified their region's alignment with the "hyper-transformative path," emphasizing the nurturing of local innovation and the attraction of external innovation. Eight respondents associated their region with the "endogenous transformative path," highlighting their region's capability to explore new ideas and drive local technological advancements. Additionally, one region is anticipated to follow the importation transformative path, while one region is expected to face the challenge of regional obsolescence.

**Figure 4-1 Surveyed expected transformation scenarios of EU regions.**



Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe.



Based on the results of the survey, the case studies, and further desk research, it is possible to provide examples for each of the regional scenarios. These are summarised in the table below. As evident from the table, the key drivers and the constellation of stakeholders involved differs for each scenario and is likely to be specific for each particular region. Nonetheless, it is clear that national and regional authorities, educational and training institutions, and OEMs all have an important role to play in any transformation.

**Table 4-1: Table summarising the four regional transformation scenarios and examples from EU regions**

<b>Scenario</b>	<b>Short description</b>	<b>Example of EU region</b>	<b>Key drivers</b>	<b>Key stakeholders</b>
Regional obsolescence path	The region is unable to foster technological change at a local level and it is unable to attract innovation and new opportunities from elsewhere, thus failing to adapt.	<u>Self-Governing Trnava Region, Slovakia.</u> The regional economy is substantially influenced by the automotive industry - Stellantis Slovakia (former PSA Peugeot Citroën).  However, a significant decrease in employment rates in the automotive industry is expected by 2025, due to transition towards the production of EVs <sup>20</sup> and the lack of a formal regional transformation strategy (see case study in Annex 2).	(Lack of) investment in innovation and workforce development	National authorities  OEMs  Suppliers
Endogenous transformative path	The region is able to explore radically new ideas and generate technological change at local level	Baden Württemberg, Germany The region hosts a number of prestigious automotive firms, including Mercedes-Benz, Porsche, and Bosch, in addition to a large number of SMEs.  Collaboration of the industry with universities and research organisations	Investing in research and development, innovation, and technological advancements	National and regional authorities investing in innovation  Education and

<sup>20</sup> <https://www.trendyprace.sk/sk/trendy-trhu-prace/regio-trendy/trnavsky-kraj>

<b>Scenario</b>	<b>Short description</b>	<b>Example of EU region</b>	<b>Key drivers</b>	<b>Key stakeholders</b>
		for R&D activities is enhanced by the government-owned innovation agency and competence centre <i>e-mobil BW</i> (see case study in Annex 2).	Workforce development and skills training	training institutions  (Networks of) OEMs and suppliers
Hyper-transformative path	The region nurtures local innovation and is able to attract innovation from outside, which transforms the local automotive industry, thus seizing emerging technologically related and unrelated opportunities.	Emilia Romagna, Italy Brands like Ducati, Ferrari, Maserati, and Pagani are the backbone of Emilia Romagna’s industrial fabric and form the industrial district “Motor Valley” (see case study). The cooperation with German firms (e.g., Lamborghini being part of the Audi group) plays a significant role in terms of employment and innovative activity in the region <sup>21</sup> .	Investing in research and development, innovation, and technological advancements Strategic partnerships with other industries, research institutions, and technology companies	National and regional authorities investing in innovation  Education and training institutions  (Networks of) OEMs and suppliers  Trade unions

<sup>21</sup> Pollio C. (2018) The Emilia-Romagna automotive industry in the global value chain, *Industria*, 429-456

<b>Scenario</b>	<b>Short description</b>	<b>Example of EU region</b>	<b>Key drivers</b>	<b>Key stakeholders</b>
Importation transformative path	The region is able to hook or pull relevant innovation from elsewhere, thereby radically transforming itself.	Basilicata, Italy SATA-FIAT plant is located in the region and employs more than 5000 people. The local industrial sector thrives on the innovative contributions from the Fiat Chrysler group and specialises in EVs production, bolstering the region's economic fabric <sup>22</sup> .	Rapid specialisation in a niche market, recognised as crucial for future growth, is being propelled by a multinational corporation	Decision-makers at the group level in the automotive industry  OEMs  National and regional authorities

Source: Authors

<sup>22</sup> Greco F. (2021) Auto, Stellantis: a Melfi nuova produzione di 4 modelli di auto elettrica. Corriere della Sera, [online article](#)

## 4.2 Regions in transformation in practice: five examples

Five case studies were conducted in order to identify how various regions are preparing for the transformation of the automotive landscape. The five case studies, shown in Table 4-2, were selected from the three different region types: core, semi-periphery and periphery. Basic statistics on the automotive sector for each region are shown in Table 4-3.

**Table 4-2: Overview of the five case studies conducted in the study**

<b>Region</b>	<b>Region Type</b>	<b>Regional transformation strategy</b>
Baden-Württemberg, Germany	Core	E-mobil BW
Catalonia, Spain	Semi-periphery	Automotive Industry Cluster of Catalonia (CIAC)
Emilia Romagna, Italy	Core	Pact for Labour and Climate
Bratislava-Trnava, Slovakia	Periphery	No dedicated strategy but various initiatives exist
Silesia, Poland	Periphery	No dedicated strategy but various initiatives exist

Source: authors

**Table 4-3: Eurostat regional statistics on the vehicle manufacturing sector**

<b>Region</b>	<b>Employment share</b>	<b>Total employment (number of persons)</b>	<b>Total local units (number)</b>	<b>Total wages and salaries (in million euro)</b>
Baden-Württemberg <sup>a)</sup>	4% - 28%	242,864	1,080	15,932
Catalonia	8%	36,655	396	1,513
Emilia-Romagna	4%	17,842	422	687
Bratislava-Trnava	13%	26,045	310	416
Silesia <sup>a)</sup>	9% - 17%	106,012	548	1,641

Source: authors, based on Eurostat Structural Business Statistics (SBS) data by NUTS 2 regions and commodity group "Manufacture of motor vehicles, trailers and semi-trailers" (NACE rev C29)

a) The statistics of Baden-Württemberg combine data on 4 NUTS2 regions, and Silesia 3 NUTS2 regions, whereas the other regions cover a single NUTS2 region.

How regions are preparing for the transformation is a complex interplay of various factors, including the specific challenges in the region, the culture of collaboration and the proactivity of different actors, including regional politics, larger companies, and the central government. In addition to the characteristics of the automotive sector in the region, the institutional and cultural context also plays a role. The five case studies each have a different strategy for transformation, with one being more mature than the others.

Both Baden-Württemberg and Catalonia have dedicated transformation strategies for the automotive region, with the former being government-initiated, while the latter is sector-initiated. Emilia Romagna, which has a more diversified economy than the other case studies, presents an economy-wide strategy led by the government. In Trnava and Silesia, there is currently no specific transformation strategy for the region, but there are various initiatives at both the national and regional levels to support the transformation of the automotive industry in the region. The brief descriptions of the case studies are provided below. Detailed case studies are included in Annex 2.

## **Baden-Württemberg**

**Baden-Württemberg** is a prominent hub for the automotive industry in Germany and home to prestigious automotive firms, including Mercedes-Benz, Porsche, and Bosch. The Baden-Württemberg transformation strategy combines top-down and bottom-up elements. It involves a fully government-funded public institution, e-mobil BW, which provides the framework for cooperation while relying on various stakeholders beyond the automotive industry to realise the transformation through the implementation of projects. E-mobil BW uses diverse initiatives for regional transformation. It has been active since 2007, serving as a model for other regions, though it requires a substantial workforce to organise and time for collaboration to develop.

## **Catalonia**

**Catalonia** is an important hub within the Spanish automotive sector, with a rich ecosystem of manufacturers, such as SEAT, Nissan, and Volkswagen, suppliers, and research institutions. **Catalonia's** automotive industry transformation is primarily industry-driven through The **Automotive Industry Cluster of Catalonia** (CIAC). Established in 2013 and with its diverse membership, CIAC members collaborate on numerous projects. It focuses on seven key areas, including two areas specifically addressing challenges arising from the impact of new technologies on the sector, such as sustainability and digitalisation. As only a small portion out of CIAC's 497 projects are related to these two areas, this suggests more effort is needed to prepare the region. CIAC is very active in talent development and training, also collaborating with the regional government in this

area. Nevertheless, being managed by the sector itself, the limited regional government involvement poses a risk.

## **Emilia-Romagna**

The automotive industry represents one of the most important industrial sectors of the **Emilia-Romagna** region, with in particular a strong presence of luxurious car brands. The Emilia-Romagna case shows a regional government-led (but co-created with the sector) strategy for the development of the whole economy. It was established in 2020, and although there is no dedicated automotive sector strategy, the region's transition plan shows a collective commitment to ecological transition, focusing on qualified employment, innovation, sustainability, and supply chain integration. In a region known for excellence in multiple sectors, such an overarching policy strategy can enhance resilience, speed up the transition, and increase the likelihood of success. However, the absence of a specific automotive supply chain strategy could be a weakness. The Emilia-Romagna strategy is detailed with specific measures, potential funding sources, and quantitative targets, designed to be adaptable over time. Nonetheless, the multitude of targets and indicators may pose challenges for effective monitoring.

## **Trnava self-governing region**

The automotive industry represents a key economic sector for the **Trnava self-governing region**. Multinational manufacturing companies such as Stellantis Slovakia (former PSA Peugeot Citroën), ZF Slovakia, Schaeffler Skalica or Eissmann SMP Automotive Interieur Slovensko are among the largest employers in the region. Notwithstanding the relevance of the sector, a national automotive transition strategy has not been developed so far, neither coordinated by the Slovak government, nor by the Trnava region, nor proposed by the private sector. Nevertheless, the Trnava self-governing region initiated a number of activities to support the transformation of the automotive industry, focussing on cluster development, local workforce development, and creating innovation hubs. The region collaborates with a regional network of automotive stakeholders, including major OEMs, SMEs, and educational institutions, focussing on education and training programs at regional, national, and international levels. The small size of the country and relevance of the sector may better justify the preparation of a strategy either by the Government or by the private sector, or both.

## **Silesia**

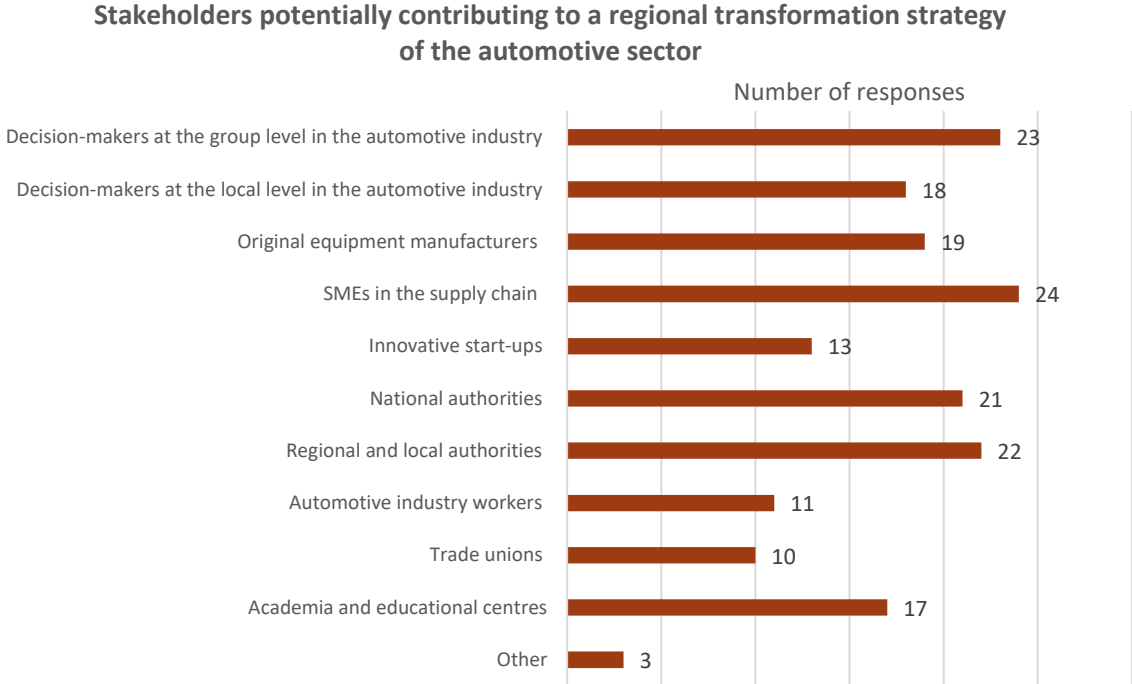
Automotive industry represents the second most important economic sector in **Silesia** after coal mining. Stellantis group is present in this region with Fiat – Chrysler Poland S.A, and Opel Manufacturing Poland, together with lithium-ion battery producers and a number of specialised suppliers. Whereas attention has been given by the region and Polish governments to the transformation of the mining and energy sectors, which actually affect most of the economy in the south of Poland, there is at present no strategy to address just and sustainable transition

in the automotive industry. Silesia region is nonetheless active in supporting the transformation of the automotive industry, facilitating and coordinating the establishment of clusters involving technological parks and business incubators to enhance automotive transition; promoting educational and training initiatives involving automotive industry players from the business sector, research institutions, and academia, to develop skills and competences and thus keep and increase the competitiveness of enterprises and employees. To further regional and central governmental activities, the automotive business sector is also promoting automotive transition initiatives.

### 4.3 Elements for a regional transformation strategy

In this sub-section, measures are identified that are needed to successfully prepare a region for the transition. Based on the survey findings, it is evident that 12 automotive regions have already formulated comprehensive transformation strategies, whereas another 12 regions are currently in the process of devising their respective strategies. Notably, only two regions among the respondents, namely Sachsen in Germany and Trnava in Slovakia, have yet to formalise a structured strategy for the anticipated changes.

**Figure 4-2: Survey responses on stakeholders potentially contributing to a regional transformation strategy**



Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe.



Representatives of the automotive regions were also questioned about the key stakeholders capable of making significant contributions to the transformation strategy of the automotive sector within their respective regions. According to the survey results, SMEs operating within the supply chain were identified as crucial participants in the region's transformation strategy. This recognition stems from their close proximity to the ground-level operations and their ability to swiftly respond to market demands, which makes them essential drivers of technological advancement and efficiency improvements. Following closely, decision-makers at the group level of the automotive industry were highlighted as key contributors to the transformation strategy. Their significance arises from their overarching influence and control over the strategic direction and policies adopted by the larger automotive conglomerates. These decision-makers possess the necessary resources, expertise, and global reach to drive significant changes across various regions.

Additionally, the survey results emphasised the role of regional and local authorities in steering the transformation strategy of the automotive sector. They possess an in-depth understanding of the specific needs and challenges faced by their respective regions. Their ability to enact policies, provide necessary infrastructure, and create conducive business environments significantly influences the trajectory of the automotive sector within their jurisdictions. Similarly, the involvement of national authorities was underscored as integral to the successful implementation of the transformation strategy. National authorities hold the responsibility of establishing overarching regulatory frameworks, providing financial support, and coordinating national-level policies that directly impact the automotive sector.

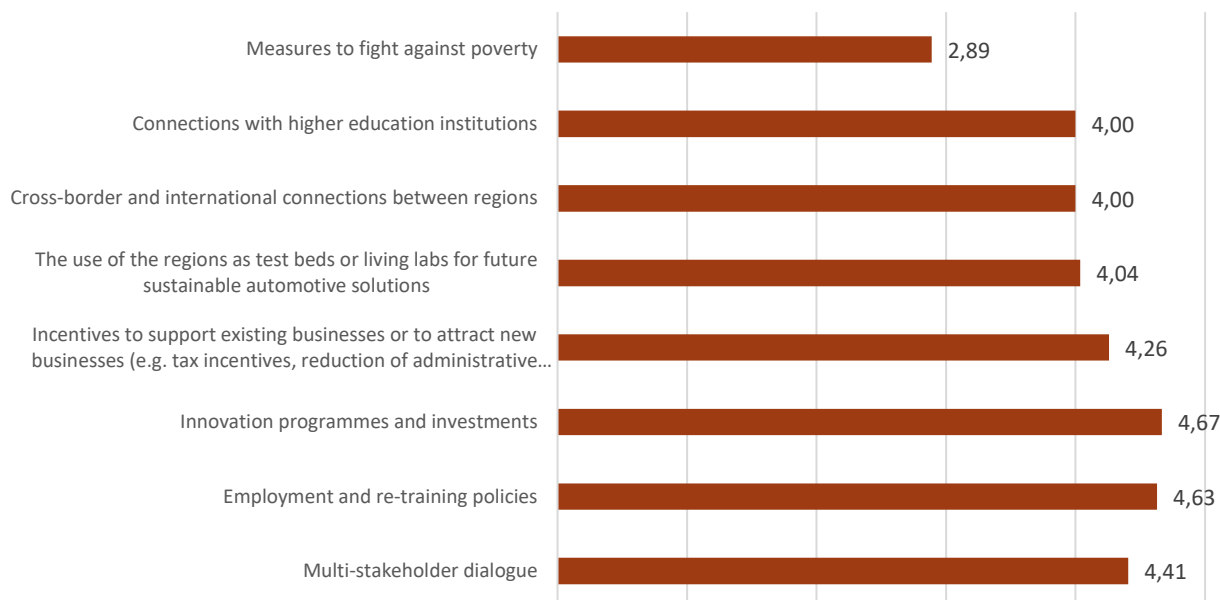
Drawing upon the survey results, case studies, and desk research, specific elements for a regional transformation strategy designed to mitigate the adverse trends and bolster regional transformation efforts are identified. The following four measures represent the most prevalent choices among respondents representing various automotive regions within the EU. For the purpose of conciseness, this section concentrates solely on these four measures, as they accurately represent the respondents' viewpoint:

- Innovation programmes and investments
- Employment and retraining policies
- Multi-stakeholder dialogue
- Incentives to support and attract businesses

Figure 4-3 illustrates an overview of the measures proposed to the survey respondents.

**Figure 4-3 Surveyed perceived importance of potential measures to support regional transformation strategy of the automotive sector in EU regions.**

Please rate the measures needed to counteract the negative direction or to support the positive direction of the automotive industry your region is taking/is likely to take



Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe. Note: The numbers reflect the average rating, with 1 being 'not important' and 5 'very important'.

#### 4.3.1. Innovation programmes and investments

According to respondents, innovation programmes and investments can play a crucial role in fostering regional transformation strategies of the automotive sector. Such investments and programmes can lead to the creation of cutting-edge technologies, contributing to the modernisation and competitiveness of the automotive sector within a region. They can also encourage the diversification of products and services offered by the automotive industry, allowing regions to adapt to changing consumer preferences and market demands, and help the sector reduce its environmental footprint. Moreover, through targeted innovation programmes, regions can ensure that the local workforce remains competitive and capable of driving innovation within the sector and foster a culture of entrepreneurship<sup>23</sup>. **This measure is particularly relevant for regions undertaking the “endogenous transformative” and “hyper transformative” scenarios.**

<sup>23</sup> Tripl, M., Baumgartinger-Seiringer, S., Goracinova, E., & Wolfe, D. A. (2021). Automotive regions in transition: Preparing for connected and automated vehicles. *Environment and Planning A: Economy and Space*, 53(5), 1158-1179. <https://doi.org/10.1177/0308518X20987233>

As the case study developed for the scope of this research shows, Catalonia has invested in fostering a network of research centres, universities, and an industrial cluster (Automotive Industry Cluster of Catalonia - CIAC) to promote innovation within the automotive sector. Such initiatives have led to the development of advanced manufacturing processes and sustainable mobility solutions.

National, regional, and local authorities are considered by respondents of the survey to be the most relevant stakeholders implementing these measures. They can establish a comprehensive policy framework that encourages innovation and investment within the automotive sector, encouraging Public-Private Partnerships that promote joint research and development initiatives, as well as the implementation of innovative projects within the automotive sector<sup>24</sup>. Most importantly, they can allocate financial resources and provide grants that incentivise the development of new technologies, products, and services, and invest in the development of infrastructure that supports innovation (research and development centres, innovation hubs, and testing facilities).

According to a representative from the European Association of Automotive Suppliers (CLEPA), the current state of funding for innovation in the automotive sector is characterised by a lack of cohesion and coordination. Funds are often dispersed in a fragmented manner, resulting in a chaotic landscape that impedes the efficient utilisation of resources. Furthermore, the timelines associated with securing funding do not align with the rapid pace of developments within the industry. In some cases, the approval process for funding can extend over several months or even years, significantly delaying the implementation of crucial projects. Despite discussions surrounding the establishment of a streamlined 'one-stop-shop' for funding initiatives, this proposed solution has yet to materialize. The absence of such a centralised mechanism further exacerbates the challenges faced by stakeholders seeking financial support for their innovative endeavours. As a result, the automotive sector struggles to fully leverage available resources and capitalise on emerging opportunities for growth and advancement. It is imperative that measures are taken to streamline the funding process, ensuring responsiveness to the dynamic nature of the automotive industry.

#### *4.3.2. Employment and retraining policies*

Employment and retraining policies are a key measure that can shape regional transformation strategies. They can help facilitate the transition of the workforce from traditional automotive manufacturing to new, emerging sectors within the industry, such as electric and autonomous vehicles. By providing training programmes and resources for upskilling and reskilling, these policies can equip workers with the necessary skills to thrive in an evolving automotive landscape.

<sup>24</sup> MCKinsey Center for future mobility (2019) Race 2050. A vision for the European automotive industry, [online](#)

This includes training in areas such as electric vehicle technology, data analytics, and advanced manufacturing techniques<sup>25</sup>. Moreover, policies that promote lifelong learning encourage continuous skill development and education, enabling workers to stay updated with the latest industry trends and technologies. This fosters a culture of adaptability and innovation within the regional workforce, **notably in regions following the “endogenous transformative” scenario**. Last but not least, the implementation of robust social security during periods of industry transition can help mitigate the impact of job losses and support affected workers during their transition to new employment opportunities<sup>26</sup>. This priority goes with the acknowledgement of a “social dimension of change”, backed up by a recently published opinion paper by the European Committee of the Regions<sup>27</sup>. This approach should include careful anticipation of change and appropriate measures to enhance human resources and capacities.

The case study highlights Baden-Württemberg as an exemplary model for the successful retraining of workers within the automotive sector. The region's approach involves forging strategic alliances with leading educational institutions such as the *Hochschule für Technik Stuttgart* and the *Karlsruher Institut für Technologie*, alongside renowned research centres like the Fraunhofer Institute for Systems and Innovation Research (Fraunhofer ISI). Through this collaborative framework, the agency offers comprehensive training programmes tailored for both aspiring young professionals entering the industry and established automotive workers seeking ongoing skill development opportunities.

According to the survey results, government authorities and educational institutions are the key stakeholders that can implement employment and retraining policies. It is important to stress, that industry associations and automotive companies can also collaborate with educational institutions and training centres to identify skill gaps, provide practical training opportunities, and design programmes that meet the industry's evolving demands<sup>28</sup>.

A representative from the European Automobile Manufacturers' Association (ACEA) pinpointed the issue of workforce attractiveness within the automotive sector, noting that the industry's overall image could be improved. The challenge is particularly pronounced for SMEs, where the allure of renowned companies like Mercedes or Bosch often overshadows opportunities in less prominent firms. This perception gap affects not only recruitment for OEMs, but also for various critical roles within the supply chain, including those in IT and logistics. To effectively address these concerns, a coordinated effort between different regions

<sup>25</sup> Drahokopil J. et al. (2019) The future of employment in the car sector. Friedrich Ebert Stiftung, [online](#)

<sup>26</sup> European Anti-poverty network (2018) The future of work: labour market trends and their implications for risks of poverty and social exclusion, [online](#)

<sup>27</sup> European Committee of the Regions (2023) A Just and Sustainable Transition for Automotive Regions (opinion paper)

<sup>28</sup> Drahokopil J. et al. (2019) The future of employment in the car sector. Friedrich Ebert Stiftung, [online](#)

and industry stakeholders is imperative. Collaborative actions should focus on bolstering the sector's appeal through targeted initiatives that highlight the dynamic and innovative aspects of automotive work. Moreover, addressing the shortage of skilled personnel demands a multifaceted approach. While funding for training programmes may be available, there is a tangible scarcity of individuals willing to pursue careers in the automotive sector due to lack of attractiveness. To counter this, additional efforts should be directed towards enhancing entry-level recruitment strategies. This could involve showcasing the diverse career paths and growth opportunities within the sector, as well as implementing awareness campaigns and outreach programmes.

#### 4.3.3. *Multi-stakeholder dialogue*

Multi-stakeholder dialogue can significantly foster the regional transformation strategy of the automotive sector. By involving diverse stakeholders such as government bodies, industry representatives, research institutions, and unions, multi-stakeholder dialogue facilitates the development of comprehensive policies that are more inclusive, coherent, and aligned with the needs of the regional automotive sector. It can also encourage the exchange of ideas, knowledge, and expertise among different actors in the automotive sector<sup>29</sup>, **particularly in regions following the hyper-transformative scenario**. The importance of a multi-level political system, involving all key stakeholders including OEMs and suppliers, has also been acknowledged by the recently published opinion paper of the European Committee of the Regions<sup>30</sup>.

The case study from Emilia Romagna illustrates a positive example of shared efforts among several stakeholders. Several networks, both public-private and private, comprising regional OEMs, suppliers, and academic institutions dedicated to the automotive industry, have been established prior to the implementation of the strategy. These networks play a crucial role in supporting the sector's ecological transition. Notable examples include Clust-ER Mech, specialising in Mechatronics and Motoristics, and Clust-ER GREEN, focusing on Energy and Sustainability. Other significant networks such as MUNER (Motorvehicle University of Emilia-Romagna), Motor Valley, BI-REX (Big Data Innovation and Research Excellence), the Regional High Technology Network, Motor Valley Accelerator, EIT Climate - KIC, and EIT RawMaterials, are actively contributing to the collaborative landscape. While not initially part of the regional transition strategy, these networks serve as an exemplary model of effective cooperation between public and private entities, as well as among OEMs and their suppliers. Their collective efforts represent a valuable asset in effectively

<sup>29</sup> European Green Cars Initiative (2014). PPP Multi-annual roadmap and long-term strategy, [online](#)

<sup>30</sup> European Committee of the Regions (2023) A Just and Sustainable Transition for Automotive Regions (opinion paper)

addressing the challenges and opportunities emerging from the ongoing ecological transition.

According to a representative of ACEA, when considering the stakeholders involved, it is evident that many core regions are shaped by the presence of prominent OEMs that significantly influence the region's development trajectory. However, it is challenging for these entities to strike a balance between the differing perspectives of the regional OEMs and the suppliers. This complex dynamic often results in conflicting priorities, with the OEMs pursuing their independent agendas, sometimes diverging from the interests of the suppliers. For instance, in regions like Baden-Württemberg, the dominant OEMs have substantial influence, which can overshadow the collective interests of the entire region. To effectively manage this delicate balance, it is imperative to formulate a comprehensive strategy that considers the collective needs of the entire automotive ecosystem, rather than solely catering to the demands of the dominant OEMs. This necessitates active participation and intervention from the regional government, which possesses the authority to regulate and oversee the activities of the influential OEMs. By leveraging their regulatory powers, the regional government can establish a framework that encourages collaboration and cooperation among all stakeholders, fostering a more equitable and balanced environment for regional development.

#### *4.3.4. Incentives to support and attract businesses*

Measures such as tax incentives and reduction of administrative burden can effectively contribute to a regional transformation strategy of the automotive sector, as they promote innovation, enhance competitiveness, and support the development of advanced technologies. Tax incentives and streamlined administrative processes have proved to encourage existing businesses to expand their operations and attract new businesses to the region, not only encouraging the growth of OEMs but also fostering the expansion and establishment of suppliers within the automotive sector<sup>31</sup>. For OEMs, these incentives can facilitate increased investment in manufacturing facilities, research and development, and the implementation of cutting-edge technologies, enabling them to enhance their production capabilities and remain competitive in the global automotive market. Furthermore, streamlined administrative processes can expedite the approval of permits, licenses, and other regulatory requirements, enabling OEMs to focus on their core operations and accelerate their business growth. Similarly, for suppliers, tax incentives and simplified administrative procedures can reduce operational costs and administrative burdens, allowing them to allocate resources towards enhancing product quality, expanding production capacities, and fostering innovation (**particularly in regions following the importation transformative**

<sup>31</sup> Fredriksson G. et al. (2018) Is the European automotive industry ready for the global electric vehicle revolution? Bruegel, [online](#)



**scenario**). This not only supports the growth of individual suppliers but also contributes to the overall competitiveness and efficiency of the regional automotive supply chain. It is important to stress that such measures can be implemented only in regions with legislative powers regarding industrial development and education, notably in decentralised and (even more) federal countries.

As an example, Bavaria has implemented tax incentives and reduced administrative burdens for businesses operating in the automotive sector. These measures have contributed to the region's attractiveness for automotive companies, leading to increased investment and job creation<sup>32</sup>. Similarly, Valencia has established favourable tax policies and simplified administrative procedures to attract foreign investment in the automotive sector. These initiatives have resulted in the establishment of manufacturing plants and research facilities by international automotive companies<sup>33</sup>.

The survey results underscore the significance of this measure, especially within core automotive regions in Western Europe, where the concentration of OEMs is more pronounced. This can be explained by the fact that OEMs generally operate on a larger scale of operation, with significant investments in manufacturing facilities, research and development, and advanced technologies. Tax incentives can lead to substantial cost savings for OEMs, considering the magnitude of their operations and the volume of production, thereby contributing to increased profitability and overall competitiveness.

According to a representative of the European Automotive Cluster Network (EACN), in the case of suppliers, the effectiveness of tax incentives may sometimes be limited, as they might choose to establish manufacturing plants or operations in other countries despite receiving financial support in a particular region. This can be attributed to various factors, including the availability of skilled labour, logistical advantages, or more favourable market conditions in the chosen country. Additionally, the decision to establish operations in a different country may also be influenced by factors such as proximity to key markets, access to raw materials, or favourable regulatory environments, which can outweigh the benefits of the tax incentives provided in a specific region.

<sup>32</sup> GTA (2023) The Automotive Industry in Germany [online](#)

<sup>33</sup>)Valencia Plaza (2021) El proyecto tractor del automóvil valenciano para transformar la cadena de valor gana músculo





## 5. Towards a Just Transition Monitoring Programme

### 5.1 The 'Route 35 Platform' KPIs

At the launch of the Route 35 Platform, Commissioner Thierry Breton mentioned two conditions for a successful transition of the automotive industry:

- engaging the entire ecosystem in a transformation process that does not only concern manufacturers, but is aimed at accompanying changes for thousands of SMEs, 12 million workers, about 10 million consumers buying a new vehicle each year, and cities, that need reinventing themselves to carry the future of mobility;
- an agreement on Key Performance Indicators to measure progress in the transition process.

To kick-off the work on KPIs, the following five main areas have been proposed on that same occasion that require appropriate tracking and monitoring, while others may be added:

- Charging infrastructure;
- Electricity generation capacity;
- Raw materials;
- Jobs;
- Affordability.

In line with the proposed systemic approach for the platform, reference has been made by the European Commission to the [Mobility Transition Pathway](#), also emphasising the need to adopt key indicators to monitor the transition in the mobility ecosystem, encompassing the entire value chain of the automotive, waterborne, rail, and bike industries. With regard to this, the European Commission Staff Working Document [SWD\(2022\) 16](#), identifies the following relevant KPI areas:

- Development and deployment of the main enabling technologies and, where relevant, the associated infrastructure;
- Re- and upskilling of the workforce;
- Cross-sectorial cooperation, involving for instance suppliers and operators, but also cooperation beyond the traditional mobility industrial ecosystem (reaching out to energy providers, IT providers, etc.);
- Provision of mobility services in Europe. In particular, those that facilitate the twin transition (e.g. co-modality and combined transport, uptake of new solutions such as mobility as a service, etc.).

Although not specifically recalled in the Route 35 Platform communication, two additional ongoing processes related to the ecologic transition are worth

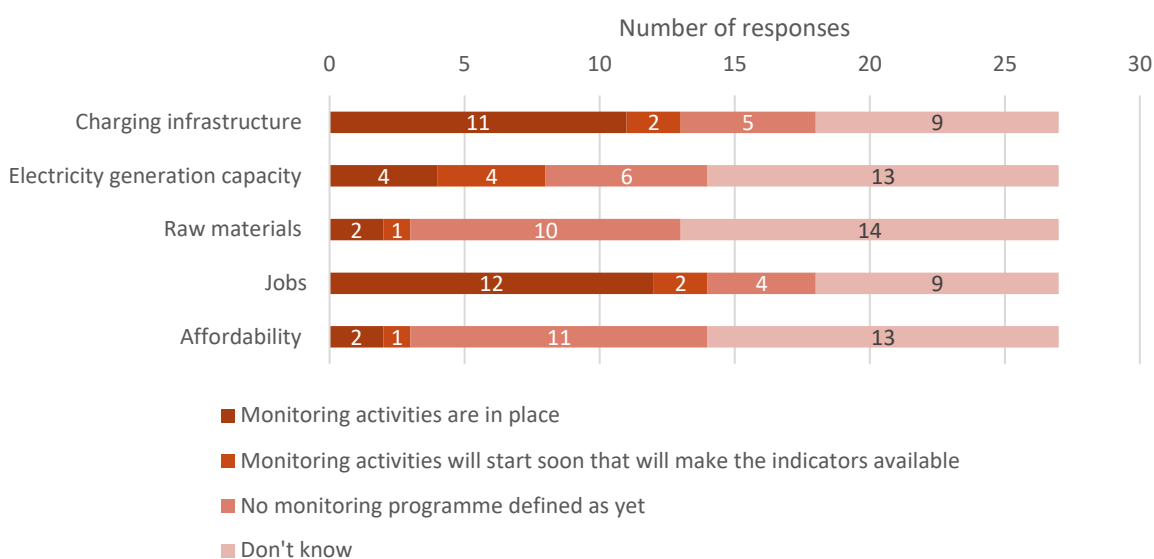
mentioning with regard to the definition of a comprehensive just transition KPI framework for the automotive industry. Firstly, the EU SDG indicator set, in place since 2017 and used by Eurostat to monitor progress towards the 17 Sustainable Development Goals (SDGs), defined in the UN 2030 Sustainable Development Agenda. Secondly, the requirement included in the proposal for the revision of the TEN-T Regulation 1315/2013, which foresees the definition of a set of indicators to be collected as of 2025 by the over 420 urban nodes belonging to the TEN-T network, together with the adoption of a Sustainable Urban Mobility Plan (SUMP).

SDG goals monitored parameters comprise over 100 indicators covering a comprehensive set of policy areas – including poverty, education, energy, economy & labour, infrastructure & innovation, cities, consumption & production, climate, etc. – which can be adjusted and integrated over time to best monitor the achievement of the 17 KPI areas. Art. 40 of the proposed TEN-T Regulation stipulates that the set of data to be collected by the cities as of 2025 should cover at minimum: GHG emissions, congestion, number of deaths and serious injuries caused by road crashes, modal share for all modes, and access to mobility services, as well as data on air and noise pollution. Although not specific to the automotive industry, the SDG indicators, also adopted by the Emilia-Romagna Region in its Transition Strategy, and the ones currently foreseen to be collected as of 2025 by the main European urban nodes, are relevant to the KPI areas identified in the Route 35 Platform Communication and for the monitoring of the transformation of this sector within the mobility ecosystem and in the wider framework of a European just sustainable development.

## **5.2 KPI framework assessment**

According to the outcome of the study survey, nearly all respondents consider it critical to monitor the automotive transformation process, adopting to this purpose a common set of specific KPIs to measure and track regions' capacity to face the challenges imposed by ecological and digital transition.

**Figure 5-1: Quantitative monitoring of progress about the transformation of the automotive industry in the five areas identified in the Route 35 Platform.**



Source: Panteia, Ramboll and Tplan (2023) Survey among automotive regions in Europe.

Some regions are already collecting data about the progress in the transformation of the automotive industry in the five areas identified in the Route 35 Platform. This is the case especially for the development of charging infrastructure and jobs, which are also the two dimensions mostly considered by sector specialists and economists in their papers for the elaboration of automotive transition indexes.

Most respondents believe it essential to monitor specific KPIs within the scope of the five Route 35 Platform dimensions, and particularly on jobs (including reskilling), energy production, and charging infrastructure. Some respondents also highlight the opportunity to monitor structural business and regional accounts to track evolution about the number and size of enterprises and their value added, possibly integrating the available sector economic and labour statistics with more specific analyses, for instance on the number of companies that exclusively produce components for internal combustion vehicles and their employees, the sector diversification capacity, also widening the analysis to assess the transition impact on downstream value chains (garages, dealerships...). Competitiveness is also identified as a relevant topic by certain respondents, which could be related, among other factors, to the presence of research and innovation centres, R&D activities, cooperation initiatives between businesses and academia, regional support for the sector in terms of administrative facilitation, taxes and incentives, etc. Finally, some respondents suggest monitoring the sector transition in the wider framework of the gradual evolution of the mobility ecosystem, also tracking progress of digital infrastructure and use of mobility data in the automotive industry, diffusion of alternative clean fuels, and deployment of retrofiting

technologies to reduce environmental externalities generated by the existing vehicle fleets, analyse trends in GHG emissions, etc...

Whereas respondents are of the opinion that automotive regions should invest in implementing a common KPI monitoring program, some of them highlight potential difficulties in terms of financial and resource capacities for their regions to develop and implement such an activity. Others consider that such a framework would benefit from the coordination of Eurostat to produce comparable statistics. Interviews conducted as part of the study also highlight the possible difficulties by regions to invest in and commit to monitoring activities. With the exception of Emilia-Romagna, case studies on the automotive transformation strategies do not include a detailed set of KPIs to be monitored.

A KPI framework assessment has been performed as part of this study. It aimed to analyse for each of the five KPI areas identified by the European Commission: a) their relevance and specificity, under the region's perspective; b) the indicators available, focussing for comparability purposes, on the statistics produced by Eurostat and/or other EU institutions, or other entities active at the EU geographical scale.

**Table 5-1: KPI framework assessment**

<b>KPI area</b>	<b>Relevance and specificity of the KPI area under the region's perspective</b>	<b>Applicable indicators and their availability</b>
Charging infrastructure	Availability of charging stations for electric vehicles and, more generally, of alternative clean fuel infrastructure is paramount to support market uptake of low and zero-emission vehicles. This KPI dimension is thus core and critical to success in the ecological transition not just for the EU and its Member States, but also for regions and even for cities and metropolitan areas	The European <a href="#">Observatory on Alternative Clean Fuels (EAFO)</a> started monitoring diffusion of alternative clean fuel infrastructure, which is also visually presented in the <a href="#">TENtec database</a> . Regions also started collecting data with regard to this. However, no official indicators have been defined by Eurostat yet that should be collected at the national or local levels. Due to the relevance of this KPI area, more indicators should be considered, to monitor progress in the availability of alternative clean fuels and particularly of EV charging points, measuring their availability according to standards (AC/DC; power capacity: slow, fast, ultra fast), accessibility (private home/residential/business; public interoperable on-street or in parkings/commercial centres/stations; brand specific on-street or in parkings/commercial centres/stations...); location (e.g. motorways, urban or rural roads; small, mid-size, large cities; TEN-T core or comprehensive networks) etc...
Electricity generation capacity	The diffusion of low and zero-emission vehicles requires availability of alternative clean fuels, and, in particular, capacity to generate sufficient electricity as growth in electric vehicle use will	Eurostat database already includes a detailed set of indicators to measure electricity generation capacity by source, including renewable sources. Data are also produced about electricity consumption for road

KPI area	Relevance and specificity of the KPI area under the region's perspective	Applicable indicators and their availability
	<p>result in extra energy demand. Energy dependency, especially from third countries, represents a clear weakness, as recently confirmed by the Russia-Ukrainian crisis. Cost of energy for both households and enterprises is also a crucial element in the transition process. Furthermore, the automotive transformation towards greener vehicles is basically driven by the need for ecological transition, making dependency on fossil fuels also a main obstacle to overcome. This KPI dimension, although maybe less region-specific and more relevant at the country if not at the EU level, specified that power capacity generation and share of renewable energies affect the competitiveness and effectiveness of regions in succeeding in the ecological transition</p>	<p>transport, as well as for energy prices. <i>Sustainable Development indicators Goal 7 - Affordable and clean energy</i> are also relevant in this regard. Such statistics are apparently produced by Eurostat at the national and EU levels only</p>
Raw materials	<p>Automotive transformation is not just a European process, and global demand for raw materials for batteries is expected to grow significantly in the coming decades, especially for nickel, graphite and lithium.</p> <p>According to the JRC <a href="#">RMIS – Raw Materials Information System</a>, by 2025 the EU domestic</p>	<p>Eurostat is currently producing for the entire union only, a) the <i>EU Self-sufficiency (SS) indicator</i>, which measures how much the EU is independent from the rest of the world for several raw materials, including critical raw materials used for battery construction; b) the <i>contribution of recycled materials to raw materials demand - end-of-life recycling input rates</i></p>

KPI area	Relevance and specificity of the KPI area under the region's perspective	Applicable indicators and their availability
	<p>production of battery cells is expected to cover the EU's consumption needs for electric vehicles and energy storage. However, it is likely that the EU will be import reliant to various degrees for primary and processed (batt-grade) materials. China is likely to continue to be the major supplier of battery-grade raw materials in the mid-term; Australia and Canada will then have the greatest potential to provide additional and low-risk supply to the EU. The EU's supply dependency might be mitigated by enhancing circularity along the battery value chains, especially in the long term. Further to energy generation, this is another KPI dimension that, albeit significant also for regional competitiveness, might be more significant at the national if not at the EU level</p>	<p><i>indicator</i>, that measures, for a given raw material, how much of its input into the production system comes from recycling of "old scrap" i.e. scrap from end-of-life products. As part of the Circular economy indicators, Eurostat is also monitoring patents related to recycling and secondary raw materials, at the EU and national levels</p>
Jobs	<p>Since its inception, automotive transformation towards electric mobility has generated concerns about its impact on employment, and particularly on SMEs and their capacity to succeed in the ecological transition. Specialised education, reskilling and upskilling of personnel, represent key activities to keep employees competitive,</p>	<p>Detailed structural business and employment statistics by economic activity, including for the vehicle manufacturing sector, are produced by Eurostat also at the regional level. Indicators on R&amp;D expenditure and personnel are also available at the regional level. Circular economy indicators, currently produced by Eurostat, also include data for personnel employed in</p>

<b>KPI area</b>	<b>Relevance and specificity of the KPI area under the region's perspective</b>	<b>Applicable indicators and their availability</b>
	<p>while the presence of R&amp;D centres, personnel, investments, and initiatives, together with cooperation between education entities and automotive enterprises increase competitiveness of the automotive industry. Although jobs may reduce as a consequence of the spread of electric vehicles, automotive transformation and more generally ecological transition are likely to bring more jobs in circular economy as waste recycling and secondary raw material activities will grow. Changes in mobility behaviour and ownership/use of vehicles may also change with the diffusion of e-mobility, which might also alter the current pattern of professional activities in the transport sector towards more mobility services. Furthermore, business and economy diversification represent resilience factors for regions, whereas the presence of tax and incentive benefits, and schemes on employment and business may attract/keep investors in the regions. In a globalised market trends in sector salaries are also important to be monitored as EU regions may face competition from inside and outside the EU. Jobs is thus another core and</p>	<p>circular economy, although such an indicator is apparently available only at the EU and national level. Statistics on the type of jobs in the mobility ecosystem do not seem to be produced at any geopolitical levels</p>



KPI area	Relevance and specificity of the KPI area under the region's perspective	Applicable indicators and their availability
Affordability	<p data-bbox="421 308 1050 387">very relevant KPI area to be monitored by regions</p> <p data-bbox="421 411 1155 1353">Affordability very much depends on purchasing power and cost of commodities. A just transition ideally implies the possibility for workers to afford purchasing or at least using the type of commodity they produce. Unaffordable electric and more generally zero-emission mobility and fail in increasing the share of produced and consumed renewable energies may ultimately obstacle ecological transition, and possibly result in increased poverty and lower quality of life. Although optimisation of supply chain, industrial processes and technological developments may reduce prices of zero-emission vehicles and electric mobility, affordability is currently challenged by higher purchase prices of zero-emission vehicles compared to internal combustion ones. Lower salaries in the global market compared to the EU, and even within the EU also affect affordability and competitiveness of EU produced commodities. Whereas the European Commission recently launched an investigation on subsidised electric cars in China</p>	<p data-bbox="1173 411 1984 1353">Regional gross domestic product (PPS per inhabitant), household income and poverty statistics, and digital economy and society data by NUTS 2 regions are produced by Eurostat, that also provides household expenditure statistics by consumption purpose at the EU and national level. <a href="#">ACEA</a> publishes several statistics at the country level, which are of relevance to the automotive transition (i.e. production, registration, sales of vehicles and fleet composition, employment, innovation, efficiency and sustainability of industrial processes, taxation), and an yearly updated overview of fiscal measures for purchasing electric cars in the 27 EU member states, also including specificities for regions. Electric vehicles and electricity consumption statistics by Eurostat include indicators on the number of passenger electric vehicles, and data for all vehicles is provided as part of road transport equipment – stock of vehicle data, although such information is apparently produced at the EU and national level only. Eurostat is also releasing statistics on the trade of vehicles, at the EU and national levels. No official statistics seem to be</p>

KPI area	Relevance and specificity of the KPI area under the region's perspective	Applicable indicators and their availability
	<p>(according to press over \$55 billion of subsidies may have been granted by the Chinese Government to their automotive industry between 2016-2022), Europe may suffer from global competition in the production of affordable electric vehicles. Second-hand market of zero-emissions vehicles is also something that will become more and more relevant in the future, together with data and information on dismantling and recycling of vehicles. Affordability is thus another core and relevant KPI area for the regions, to monitor production and diffusion of electric vehicles and mobility in their territories. Accordingly, affordability also appears to be the KPI dimension showing greater interlinkages between automotive transformation and ecological transition, on the one hand questioning the effects of a just transition not only on the economy, but also on the environment and society, at all different territorial scales, from local to global; on the other hand measuring the progress in the diffusion of greener technologies, digitalisation, circular economy, gender equality, travel</p>	<p>produced concerning prices of new and second-hand zero-emission vehicles. SDG indicators are provided by Eurostat, that are relevant to monitoring ecological transition towards a more sustainable and just global society. Whereas some regions are willing to invest on the collection of SDG indicators data, Eurostat is currently elaborating the SDG set of indicators for the EU and national territories. The <a href="#">International Dismantling Information System</a> by manufacturers includes information on the environmental treatment of End-of-Life-Vehicles, although not available at the regional scale</p>

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<b>KPI area</b>	<b>Relevance and specificity of the KPI area under the region's perspective</b>	<b>Applicable indicators and their availability</b>
	behaviour and modal shift, trends in GHG emissions, safety, etc...	

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Source: authors

The analyses performed as part of the study, including the outcomes from the survey, interviews and case studies, support the following key considerations and remarks concerning the KPI framework:

- **Charging infrastructure:** monitoring of EV charging infrastructure and more generally of alternative clean fuels infrastructure is critical to measure progress in the automotive transformation; data produced by EAFO at the EU and national scale and based on the outcome of the survey and case studies, several regions have started or are willing to start collecting data in this respect. This KPI dimension is relevant for all regions; however, no official harmonised indicators have been defined currently;
- **Electricity generation capacity and raw materials:** competitiveness of the EU automotive sector and achievement of the Green Deal objectives very much depend on reducing EU dependency on third countries for the provision of both energy and critical raw materials. Such a target is coupled with the reduction of dependency on fossil fuels and the increase of the share of renewable energies for energy production, as well as the growth of the circular economy for the production of secondary raw materials. Relevant statistics for both dimensions are currently produced by Eurostat at the EU and national scales. Regions may have raw materials strategies as stand-alone policies (e.g. Baden-Württemberg) or included in industrial/sector strategies, also investing in circular economy. Many of them elaborate energy plans and support renewable energies; however, they are hardly independent under both production of energy and raw materials and both topics are mostly driven and regulated by national governments and the EU;
- **Jobs:** regions are very much concerned about the impact on jobs of the automotive transformation towards zero-emission vehicles. This relates to the difficulties OEMs, and especially SMEs may face to succeed in the transition process and on the sector competitiveness in the global market in terms of cost production, including labour. Detailed structural business and employment statistics by economic activity, including for the vehicle manufacturing sector, are produced by Eurostat also at the regional level. Indicators on R&D expenditure and personnel are also available at the regional level. Based on the outcome of the study survey, interviews, and case studies, regions seem to be in need of statistics specifically of and detailed to the automotive sector, its operations, and activities in the regions, especially concerning R&D initiatives and activities, employment/labour market trends, support to FDI, clusters and cooperation among industry players;

- **Affordability:** monitoring production and prices of new and second-hand zero-emission vehicles together with population/household purchasing power is paramount to assess progress in the automotive transformation. Limited information, especially on production and prices of zero-emission vehicles is available at the regional level. For an appropriate monitoring of this process as part of a wider just ecological transition, some regions consider monitoring additional indicators related to the transition of the mobility ecosystem (e.g. changes in mobility behaviour and trends in GHG emissions...), and/or the SDG ones (e.g. Emilia-Romagna transition strategy).

## 5.3 A Just Transition Monitoring Programme for Automotive Regions

### 5.3.1. *Why a just transition automotive monitoring programme*

The European Green Deal along the lines of the UN 2030 Agenda for Sustainable Development, has set ambitious targets to tackle climate change and achieve carbon neutrality. Reducing transport sector emissions is an important pillar of the green transition, and the decision by the European Union to end the sales of light-duty vehicles with an internal combustion engine by 2035, together with increased regulatory restrictions on emissions, and rising demand for environmentally friendly vehicles, is reorienting the Automotive industry to produce zero-emission vehicles, especially electric powered vehicles.

The EU is among the world's biggest producers of motor vehicles and the automotive industry is a critical economic sector for the EU economy and prosperity. The turnover generated by the automotive industry represents over 7 % of EU GDP. 2.6 million people work in direct manufacturing of motor vehicles and the sector provides direct and indirect jobs to 13.8 million people, representing 6.1% of total EU employment. The industry also represents the largest private investor in research and development (R&D). To succeed in the green transition, the European automotive industry and its value chain need to undergo a profound transformation, which will require investing in new technologies, digitalisation, circular economy, and clean energy. Investments in infrastructure need to be accompanied by upskilling and reskilling of labour capital.

The greening of the Automotive industry and the production of zero-emission vehicles itself is, however, not sufficient to achieve the targets set by the European Green Deal and UN 2030 Agenda for Sustainable Development. At the end of 2021 there were 567 registered passenger cars per 1,000 inhabitants in the

European Union. The total number of registered motorised vehicles was about 328 million, including 253.3 million cars, 37.3 million powered two-wheelers, 36.5 million goods vehicles, and 750 thousand buses. Despite the spread of electric mobility (registrations of new EVs rose from 150 thousand to nearly 2 million in the EU from 2015 to 2022, and shared free-floating of e-bikes, e-scooters or e-mopeds likely exceeds 600.000 units), the current stock of vehicles is dominated by fossil fuel vehicles, and the average age of the vehicle fleet is about 12 years. In 2020, households in the EU spent 10.8% of their total consumption expenditure on transport, of which almost 90% related to purchase and operation of personal transport equipment, primarily the motor car. Motorised transport is embedded in the European society and the entire mobility ecosystem needs to change towards a carbon neutral economy and transport system. Whereas an increased use of active transport modes, and electric micro-mobility, together with public transport solutions is desirable especially in urban and metropolitan areas, a just automotive transition would hardly be possible without ensuring affordability of zero-emission vehicles by European households and citizens.

The launch of the Route 35 Platform Commission clearly aims at involving the entire mobility ecosystem in the transition process, and measuring the transformation progress. The five identified KPI areas overall cover the main elements of the automotive transition, and many indicators concerning electricity generation capacity, raw materials, jobs, and affordability are already produced by Eurostat at the EU and Member State territorial levels. However, the incipient transition process may require adjusting the current set of traditional measures of economic activity, as it will evolve, and official statistics are currently missing agreed indicators for charging infrastructure. The definition of a common set of KPIs is furthermore challenged by the very limited set of indicators currently produced by Eurostat for regions, with reference to all the five identified KPI areas, except for jobs.

While efforts at the EU and national levels are progressing, and initiatives can be found at the local level, there is an urgent need to monitor the automotive transition progress at the regional scale with reference to key questions: How do firms restructure their organisation and production processes? How are local labour markets making the automotive transition? How do skills, education, and training systems adapt to the development of new areas of growth? How do local governments, economies, firms, clusters, and regional ecosystems adjust to automotive transformation? How do citizens perceive automotive transition and their role within the process, etc.

The appropriateness and importance of implementing a monitoring programme for automotive regions is also supported by the recent proposal by the Regional

Development Committee of the European Parliament<sup>34</sup>, demanding the extension of the Just Transition Fund to give the EU's automotive regions adequate assistance to succeed in the automotive, green, and digital transitions.

### 5.3.2. *A co-creative and participatory monitoring programme*

Regions engaging in automotive transition and/or green and digital growth processes have already started measuring and monitoring their activities to some degree. However, measurements, indicator development, and reporting need to be consistent and coherent, a task that is currently challenged by the lack of official statistics at the regional scale, and the possible necessity to monitor aspects of the transition currently not captured by the available indicators and/or data granularity.

A platform for cooperation and coordination is thus firstly needed to enable knowledge exchange based on solid comparison, and find agreement on the set of relevant indicators to be monitored, and the mechanisms for measuring and populating these indicators.

With regard to the definition of the set of indicators to be monitored: whereas regions are expected to ultimately inform and validate the indicator selection process, based on a co-creative approach, the findings from the present study would suggest that starting from a limited set of indicators to measure vulnerability of regions in the automotive transition, aimed at monitoring:

- Investments, and R&D expenditures and activities in the fields of innovation, digitalisation, and transformation of existing carbon-intensive installations, including details for Small and Medium-sized Enterprises;
- Business structural and employment statistics of the entities involved in the automotive supply chain, i.e. subassemblies - tier 1 suppliers, components – tier 2 suppliers, raw materials – tier 3 suppliers, and final assemblies – OEMs, also producing data related to EV and ICE productions;
- Initiatives and number of employees involved in upskilling, reskilling, and employees relocation programmes;
- Formal cooperation programmes between automotive players and academia for both training and R&D activities, distinguishing between regional, national and international level;
- Incentives/benefits to support Foreign Direct Investments in the automotive sector.

As mentioned in the previous paragraph, automotive transition as part of a just ecological transition is a process that concerns the entire EU society, and all European regions will be affected. The availability of charging infrastructure and

<sup>34</sup> <https://www.europarl.europa.eu/news/en/press-room/20231023IPR08146/cohesion-need-for-a-targeted-support-of-automotive-dependent-regions>

affordability of zero-emission vehicles are a priority for all and any EU regions, similarly to sufficient, affordable, and cleaner energy, and accessibility to raw materials, which are topics of limited influence and control by regions. Hence the proposal to focus on the above elements primarily related to the jobs KPI dimension, and the evolution of the automotive supply chain. This does not preclude the possibility and opportunity for regions to include in the monitoring programme additional indicators related to the other KPI areas and measure the transformation of the automotive industry, within the wider transition process of the mobility ecosystem and just ecological transition. In this respect synergies could be explored with other programmes aimed at collecting relevant data on the development of greener economies and transport systems (e.g. SDG programme, TEN-T Policy and AFI regulations).

The development and extent of the monitoring programme will also depend on the availability of human and financial resources to the involved stakeholders. In fact, even limiting the programme to the above listed dimensions would require conducting a dedicated survey to populate indicators, as they are not, or not consistently available across regions, or not produced with the required granularity. Depending on the monitoring dimension, the collection of data may also imply the involvement of private, or public-private stakeholders.

In addition to a dedicated survey to measure automotive supply chain progress in the transition to zero-carbon mobility, the monitoring programme could also involve citizens to measure their perception and/or behaviour in the automotive transition and make automotive transformation in the concerned regions a participatory and deliberative democracy process.

### 5.3.3. *A programme dedicated to automotive regions*

The primary focus of the monitoring programme on the vulnerability dimensions of the automotive supply chain suggests starting the programme with those regions presenting a relatively high concentration of automotive manufacturing industry. To identify such regions Eurostat SBS regional statistics may be considered in first instance, providing employment, local units, and wages and salaries data by region for the automotive sector. Absolute employment and local units figures help to identify those regions that are important to the EU economy as a whole, while the relative figures highlight regions where the automotive industry has substantial regional importance. Statistics concerning wages and salaries are deemed less useful. While they offer an indication of R&D activities, this statistic disregards lower-paid labour, presenting only a limited perspective of the automotive industry. Furthermore, this statistic partially reflects average wages and living standards in a country. As such, automotive regions may be identified as *regions in which a significant portion of the employment and*



*companies are actively engaged in automotive manufacturing, both in absolute and relative terms.*

Based on the absolute and relative numbers of employees and companies, each NUTS 2 region in the EU has been assigned a rank in each category. In total, four categories are identified: absolute and relative employment, and absolute and relative number of local units. Subsequently, an 'overall' ranking has been established, which combines the average rank across the four categories and creates a new ranking based on the highest average ranking. Consequently, three types of regions can be distinguished:

1. Regions with high EU and regional value, i.e., regions within the top 20 in the overall ranking.
2. Regions with high EU value, i.e., regions within the top 20 absolute ranking but outside the top 20 overall ranking.
3. Regions with high regional value, i.e., regions within the top 20 absolute ranking but outside the top 20 overall ranking.

Ranking of automotive regions in the EU, based on Eurostat statistics.

**Table 5-2: Ranking of automotive regions in the EU, based on Eurostat statistics**

<b>NUTS 2</b>	<b>Region</b>	<b>Ranking of total rank</b>	<b>Region type</b>	<b>Ara member</b>
DE11	Stuttgart	1	1	1
SE23	Västsverige	2.5	1	0
DED4	Chemnitz	2.5	1	1
DE21	Oberbayern	4	1	1
DE22	Niederbayern	5	1	1
DE12	Karlsruhe	6	1	1
ITC1	Piemonte	7	1	1
FR10	Ile-de-France	8	1	0
DEG0	Thüringen	9	1	1
DE91	Braunschweig	10	1	1
DE94	Weser-Ems	11.5	1	1
DE14	Tübingen	11.5	1	1
DEA2	Köln	13	1	1
PL22	Śląskie	14	1	0

<b>NUTS 2</b>	<b>Region</b>	<b>Ranking of total rank</b>	<b>Region type</b>	<b>Ara member</b>
DEC0	Saarland	15	1	1
CZ02	Střední Čechy	16	1	0
RO12	Centru	17	1	0
CZ05	Severovýchod	18	1	0
DE27	Schwaben	19.5	1	1
DE23	Oberpfalz	19.5	1	1
SK02	Západné Slovensko	21.5	2	1
DE26	Unterfranken	21.5	3	1
FRK2	Rhône-Alpes	24.5	2	1
ES24	Aragón	26	3	0
HU21	Közép-Dunántúl	27	3	0
RO42	Vest	28	3	0
PL51	Dolnośląskie	30	2	0
ES22	Comunidad Foral de Navarra	31	3	1
ES51	Cataluña	32	2	1
DE50	Bremen	37.5	3	0
PT11	Norte	41.5	2	0
ITH5	Emilia-Romagna	43	2	1
DED5	Leipzig	44.5	3	1
PL41	Wielkopolskie	48	2	0
ITC4	Lombardia	66.5	2	1

Source: authors

Table 5-2 provides a selection of 35 regions based on the criteria set above, of which 22 are ARA members. The 35 regions together represent:

- 59% of all employment in the EU's automotive sector
- 40% of all businesses in the EU's automotive sector
- 24% of EU's population

Whereas the above exercise can be useful to have a first indicative composition of the regions to be involved in the monitoring programme, the final selection of

the regions may depend on several factors, such as the willingness of regions to cooperate in the monitoring programme and the desired scope of the monitoring programme. Additionally, it can be considered to increase the geographic diversity of the sample size to better represent periphery regions. To this end, the following regions can be considered.

- SK01, Bratislavský kraj, rank 23
- RO31, Sud – Muntenia, rank 24
- CZ03, Jihozápad, rank 36
- SK04, Východné Slovensko, rank 40
- HU22, Nyugat-Dunántúl, rank 47

Finally, other criteria may also be considered, such as the participation of a region in the Automotive Regions Alliance, or the definition by the European Parliament or the European Commission of a list of Automotive Regions according to the evolution of the above-mentioned initiative on the extension of the Just Transition Fund to automotive regions, by the Regional Development Committee of the European Parliament.

## Annex 1 Survey questions

### Region composition

- Which region do you represent?
  - [\_\_ free text \_\_]
  
- What is your role or position in the region?
  - [\_\_ free text \_\_]
  
- How important is the automotive industry for your region in terms of economy and employment?
  - Very important
  - Somewhat important
  - Not very important
  - Not important at all
  
- What are the main types of vehicles produced in the region? Select all options that apply.
  - Passenger cars
  - Light commercial vehicles
  - Heavy-duty vehicles
  - Buses and coaches
  - Other
    - [\_\_ free text \_\_]
  
- What parts of the supply chain does the automotive industry in the region mostly consist of? Select all options that apply.
  - Raw materials – tier 3 suppliers (basic materials that are used to produce components or systems for vehicles, such as metals, plastics and rubber)
  - Components – tier 2 suppliers (parts that are produced from raw materials which are used to make subassemblies or final assemblies for vehicles, such as engines, transmissions and brakes)
  - Subassemblies - tier 1 suppliers (groups of components that are assembled to form a larger unit or system for vehicles, such as chassis, body and dashboard)
  - Final assemblies – OEMs (complete vehicles that are assembled from subassemblies and components, such as cars, trucks and buses)

## Challenges

- Please rate the following challenges of the automotive industry in terms of their impact on your region, using a scale from 1 (not important or impactful at all) to 5 (very important or impactful).
  - The need to adapt the industry to the shift from combustion engines to electric and alternative-fuel vehicles
  - The need to adapt the industry to the digitalisation and automation of the automotive sector, such as connected and autonomous vehicles, smart mobility solutions, etc
  - Behavioural change of vehicle users (e.g. preferences for other modes of transport, shared mobility and cleaner cars)
  - Complying with the environmental and climate goals of European Policy
  - The procurement and supply of raw materials such as batteries that are needed to facilitate the transition away from combustion engines
  - Competition from established and emerging players in the global market, especially China.
  - Geopolitical factors that endanger the resilience and security of the supply chain
  - Availability and diffusion of the infrastructure needed for electric and alternative-fuel vehicles
  - Affordability of electric and alternative fuelled vehicles by the market
  - Other, please elaborate (per challenge, include a rating on a scale from 1-5 in your answer)
    - [\_\_ free text \_\_]
  
- Please rate the associated potential consequences for your region, using a scale from 1 (no consequence) to 5 (very severe consequence)
  - Job insecurity
  - Loss of skilled workers
  - Negative effect on other economic sectors in the region
  - Poverty
  - Other, please elaborate
    - [\_\_ free text \_\_]
  
- Who in your region would be **most** affected by these consequences? Select all options that apply.
  - Raw material suppliers
  - Local automotive industry
  - Automotive industry workers
  - Local businesses

- Policymakers
- Other, please elaborate
  - [\_\_ free text \_\_]

### **Future strategies**

- Does your region have a strategy aimed at addressing the challenges related to the transformation of the automotive industry?
  - Yes
  - Not yet, a strategy is under development.
  - No
  
- What transformative pathway is the automotive industry in your region experiencing or likely to experience as a result of the expected reduced use and production of fossil fuel-powered vehicles?
  - The region is unable to foster technological change at a local level and it is unable to attract innovation and new opportunities from elsewhere, thus failing to adapt.
  - The region is able to explore radically new ideas and generate technological change at local level.
  - The region nurtures local innovation and is able to attract innovation from outside, which transforms the local automotive industry, thus seizing emerging technologically related and unrelated opportunities.
  - The region is able to hook or pull relevant innovation from elsewhere, thereby radically transforming itself.
  
- Please rate the accompanying measures needed to counteract the negative direction or to support the positive direction of the automotive industry your region is taking/is likely to take using a scale from 1 (not important or impactful) to 5 (very important and impactful)
  - Multi-stakeholder dialogue
  - Employment and re-training policies
  - Innovation programmes and investments
  - Incentives to support existing businesses or to attract new businesses (e.g. tax incentives, reduction of administrative burden, etc.)
  - The use of the regions as test beds or living labs for future sustainable automotive solutions
  - Cross-border and international connections between regions
  - Connections with higher education institutions
  - Measures to fight against poverty
  - Other, please elaborate
    - [\_\_ free text \_\_]

- Who are the key stakeholders to implement these measures?
  - Decision-makers at the group level in the automotive industry
  - Decision-makers at the local level in the automotive industry
  - Original equipment manufacturers
  - SMEs in the supply chain
  - Innovative start-ups
  - National authorities
  - Regional and local authorities
  - Automotive industry workers
  - Trade unions
  - Academia and educational centres
  - Other, please elaborate
    - [\_\_ free text \_\_]

### **KPI**

- Are progresses about the transformation of the automotive industry in the five areas identified in the Route 35 Platform quantitatively monitored in your region?
  - Charging infrastructure
    - Yes, monitoring activities are in place and the following indicators produced
      - [\_\_ free text \_\_]
    - Not yet, but monitoring activities will start soon that will make the following indicators available
      - [\_\_ free text \_\_]
    - No, there is no monitoring programme defined as yet
  - Electricity generation capacity
    - Yes, monitoring activities are in place and the following indicators produced
      - [\_\_ free text \_\_]
    - Not yet, but monitoring activities will start soon that will make the following indicators available
      - [\_\_ free text \_\_]
    - No, there is no monitoring programme defined as yet
  - Raw materials
    - Yes, monitoring activities are in place and the following indicators produced
      - [\_\_ free text \_\_]
    - Not yet, but monitoring activities will start soon that will make the following indicators available
      - [\_\_ free text \_\_]
    - No, there is no monitoring programme defined as yet
  - Jobs

- Yes, monitoring activities are in place and the following indicators produced
      - [\_\_ free text \_\_]
    - Not yet, but monitoring activities will start soon that will make the following indicators available
      - [\_\_ free text \_\_]
    - No, there is no monitoring programme defined as yet
  - Affordability
    - Yes, monitoring activities are in place and the following indicators produced
      - [\_\_ free text \_\_]
    - Not yet, but monitoring activities will start soon that will make the following indicators available
      - [\_\_ free text \_\_]
    - No, there is no monitoring programme defined as yet
- The Route 35 Platform does not propose specific KPIs, but rather main areas of focus. Would you recommend the adoption of an additional area of KPI specific to the regional impact of the automotive transition?
  - Yes, I would suggest adding the following area and related specific KPIs
    - [\_\_ free text \_\_]
  - An additional area is not strictly necessary, provided that the following specific KPIs are monitored within the scope of the five main Route 35 Platform areas
    - [\_\_ free text \_\_]
  - Other, please elaborate
    - [\_\_ free text \_\_]
- How would you see the adoption of a common set of specific KPIs to monitor the capacity of the regions to face the challenges imposed by the automotive transition?
  - Useful and my region should invest in such a monitoring programme
  - Useful, but my region would not have sufficient financial and human resources to properly monitor the transition process
  - Useful, but should be ultimately governed by Eurostat
  - Other, please elaborate
    - [\_\_ free text \_\_]



## **Annex 2    Case studies**

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## ***Baden-Württemberg: Strengthen networks. Promote Innovation***

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Baden-Württemberg is an important hub for the automotive industry in Germany. It has a close-knit ecosystem of car manufacturers and component suppliers, as well as being home to manufacturing equipment suppliers, service companies, universities and research institutes. The region hosts a number of prestigious automotive firms, including Mercedes-Benz, Porsche, and Bosch, in addition to a large number of SMEs. The region's automotive sector is characterised by innovation, high-quality manufacturing, and a strong emphasis on research and development.

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NACE rev C29 (Eurostat 2020)		Employment share in automotive industry	Total employment (number of persons)	Local units (number)	Wages and salaries (in million euro)
Structural Statistics	Business	28%	161,967	506	11.360
Relative EU ranking, limited to the top 50 NUTS 2 regions		9	1	5	1

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Note: Statistics refer to the Stuttgart region (DE11), one of the four NUTS2 regions in Baden-Württemberg with the largest automotive industry

### **TRANSFORMATION STRATEGY**

As a response to the challenges the green and digital transition pose for the automotive sector in Baden-Württemberg, the State government introduced the Strategic Dialogue for the Automotive Sector BW in 2017 as a political integrator for inter-institutional and cross-sectoral collaboration. Together with representatives of industries, ministries, administration, academia, research and civil society organisations, the Strategic Dialogue adopts a targeted approach to the changes that must be made in the mobility sector for the sake of climate protection, thereby maintaining and/or reconfiguring both value creation and jobs within the automotive sector in Baden-Württemberg. On an operational and project-focused level, the regional transformation strategy of Baden-Württemberg involves the establishment of a government-financed State Agency for New Mobility Solutions and Automotive Baden-Württemberg, *e-mobil BW* as independent innovation and competence centre. Initiated in 2010, it functions as the central office for contact and advice for all matters related to the transition of the automotive industry. *e-mobil BW* supports regional initiatives through networking and knowledge offerings and assists with funding opportunities and finding project partners. The work of *e-mobil BW* covers a **variety of themes related to future mobility**, including electric mobility, charging infrastructure,

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hydrogen and fuel cell technology, synthetic fuels, automated driving as well as digitalisation and data in mobility. *e-mobil BW* collaborates with **industry, universities, research organisations, civic society and public institutions**, cities and municipalities as well as **international partners**.

*e-mobil BW* organises a number of initiatives, all geared towards achieving a successful regional transformation of the automotive sector. Its most prominent initiatives include:

- [Cluster Electric Mobility South-West](#) was initiated in 2008 and with more than 200 stakeholders from companies, universities and research institutes, this cluster aims at promoting sustainable mobility in the region through developing capabilities for new services and products.
- [Cluster Fuel Cell BW](#) was established as a cluster initiative in 2013 and currently consists of more than 240 partners from industry and science. The cluster aims at achieving market readiness for hydrogen mobility with marketable and customer-friendly series of products.
- In 2020, the State of Baden-Württemberg has additionally established the [H2BW platform](#), an overarching umbrella for all activities in the field of hydrogen technology in the region with the aim of implementing the 29 measures defined in the [hydrogen roadmap](#) of Baden-Württemberg.
- In 2023, the [Network Intelligent Move](#) was spun off from the Cluster Electric Mobility South-West because digitisation and data are becoming increasingly important in mobility. The new network brings together more than 50 partners from science and industry and is rapidly growing. It focuses on digital vehicles, digital infrastructures and digital services.

In addition, *e-mobil BW* coordinates **two smaller-sized single-issued networks** on [charging infrastructure](#) and [zero-emission buses](#). Several **local initiatives** within Baden-Württemberg are also supported by *e-mobil BW*, such as [CARS 2.0](#) in the Stuttgart and Neckar Alb region, and the transformation network of the [East Württemberg](#) region. *e-mobil BW* also actively pursues **international cooperation** through their [internationalisation strategy](#). An example is the ‘[Four Engines for Europe](#)’ initiative, where Baden-Württemberg cooperates with the regions Auvergne-Rhône-Alpes, Catalonia and Lombardy in exchanging information and experiences, as well as cross-border activities. Other than the network, *e-mobil BW* manages the [Information centre for the transformation of the automotive sector in Baden-Württemberg](#), a database with a knowledge repository, education offers, networking events and knowledge professionals in order to support SMEs of the automotive ecosystem in the transformation process.

*e-mobil BW* offers a [data centre](#) which provides information on the topics of existing and new registrations (cars, trucks and buses), electricity charging infrastructure and hydrogen filling stations, drivetrain types and resources as well

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as the automotive industry in Baden-Württemberg and Germany. This data is used in the quarterly published ‘e-mobil BW data monitor’ as well as in various studies.

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## GOVERNANCE AND NETWORKS

The [Strategic Dialogue for the Automotive Sector BW](#) is a political initiative. Its most senior committee, known as the **top-level meeting**, convenes annually by invitation of the minister-president at the CEO/minister level in order to define the overall stance and objectives, discuss the latest progress and – where necessary – make adjustments and identify new milestones. Since 2021 the Strategic Dialogue focuses on three overarching topics: “Vehicles”, “Data”, and “Energy”. The focus topics are managed by a Ministry (lead) and by one to two partners from industry (co-leads) as part of “**focus topic steering groups**” that define objectives and missions, then commission “**agile working groups**” to handle these for a specified period and deliver the necessary results. An **inter-ministerial working group** ensures the operational implementation of the SDA and its interlinking with state strategies and initiatives. On a political and operational level, the Strategic Dialogue holds two **offices** at the State Ministry and at e-mobil BW.

*e-mobil BW* is a **wholly-owned subsidiary** of the State of Baden-Württemberg. Its staff is dedicated to managing all the initiatives under the responsibility of *e-mobil BW*. The **supervisory board** of *e-mobil BW* oversees and supports the management and is composed of Members from the government and relevant ministries of the State of Baden-Württemberg. An **advisory committee**, composed of 31 representatives from business, science, local regions and municipalities, assists e-mobil BW GmbH with advice and support. The advisory committee meets three times a year.

Several initiatives are overseen by *e-mobil BW*, allowing interested parties to join as members without incurring any fees. Typically, a variety of parties are members of *e-mobil BW*’s initiatives, including stakeholders from the industry, universities, research organisations, social groups, and public institutions.

In the two largest initiatives, [Cluster Electric Mobility South-West](#) and the [Cluster Fuel Cell BW](#) (along with the affiliated [H2BW](#) platform), there are more than 200<sup>35</sup> and more than 240 members respectively from the region. For the Cluster Electric Mobility South-West, it is known that 32% of the stakeholders are from the automotive industry, 24% are in machine and plant construction, 21% are in ICT, 9% are in energy, and 14% are in other industries, with approximately half of the organisations being SME’s<sup>36</sup>. The other initiatives focus on more specific themes and involve a smaller number of stakeholders for whom these specific themes are relevant.

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<sup>35</sup> <https://www.plattform-h2bw.de/cluster-brennstoffzelle-bw/partner-des-clusters>, accessed on 10 October 2023

<sup>36</sup> Electric Mobility South-West (n.d.) A strong Cluster for the Mobility of the Future

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Governance is primarily held by *e-mobil BW* with the organisation of regular meetings, and specific working groups, hosting a digital platform for collaboration and providing information about current calls for funding projects, as well as assisting in the search for further project partners.

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## **READINESS FOR TRANSITION**

The Baden-Württemberg transformation strategy combines top-down and bottom-up elements. It involves a fully government-funded public institution, *e-mobil BW*, which provides the framework for cooperation while relying on regional stakeholders to realise the transformation through the implementation of projects.

One notable aspect of the strategy is its inclusivity, as it engages not just stakeholders within the automotive industry but also stakeholders integral to the broader automotive ecosystem, encompassing, for example, ICT, energy, and social partners. Another key strength lies in *e-mobil BW's* diverse set of initiatives, ranging from specialised theme-focused networks to international partnerships, collaborations with local authorities, knowledge repositories, and expert databases. Through these multifaceted efforts, the region strives to achieve a successful regional transformation through multiple fronts.

Nonetheless, a limitation of this bottom-up approach is that the region may have limited influence over the direction of the sector and could potentially be overly reliant on the stakeholders. While subsidies and specific events can somewhat influence this, a significant portion of the initiative for projects remains with the stakeholders, whose interests do not always align with those of the region. Nevertheless, this bottom-up approach seems to work for the region, in many cases, thanks to the commitment of many companies and research institutions. While dozens of projects have been completed during this period, with the help of millions in subsidies, it is yet unclear what precise impact these projects have had on regional transformation.

Due to *e-mobil BW's* long history and the many stakeholders involved in its initiative, it appears to be a format that works for the region. Thus, it serves as a relevant example for other regions. Moreover, this example also suggests the substantial labour and effort required to facilitate the transformation of the automotive sector as a public entity. *e-mobil BW* has been in existence since 2010, and it may take years for other regions for the right context to develop in which stakeholders effectively collaborate with each other.

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**Catalonia Region: Automotive Industry Cluster of Catalonia**

Catalonia is an important hub within the Spanish automotive sector, with a rich ecosystem of manufacturers, such as SEAT, Nissan, and Volkswagen, suppliers, and research institutions actively driving innovation and sustainability. The **Automotive Industry Cluster of Catalonia** (CIAC) promotes regional transformation efforts through collaboration and competition among over 190 companies.

NACE rev C29 (Eurostat 2020)		Employment share	Total employment (number of persons)	Local units (number)	Wages and salaries (in million euro)
Structural Statistics	Business	8%	36.655	396	1.513
Relative EU ranking, limited to the top 50 NUTS 2 regions		-	15	7	11

**TRANSFORMATION STRATEGY**

The regional transformation strategy of Catalonia is led by the [Automotive Industry Cluster of Catalonia](#) (CIAC), a non-profit organisation funded by the key private entities active in the region. The main aim of the association is to boost the competitiveness of the automotive industry in the Catalan region. To achieve this, the CIAC operates in [seven strategic areas](#), including:

- Industrial Competitiveness, which focuses on achieving cost efficiency and attracting investments;
- New Business & Mobility as a Service (MAAS), aimed at developing future mobility solutions;
- Product Innovation, involving the development of innovative solutions, in particular, to address the challenges arising from new mobility concepts;
- Training & Talent. This area aims to address the training and talent needs of the sector;
- Supply Chain optimisation, focussing on improving logistics operations;
- Project Financing, for supporting access to funding;
- Sustainability promotion, aiming to incorporate sustainability into the sector's strategic focus.

The main initiatives of the cluster include:

- Hosting work commissions in line with the seven strategic areas, in order to identify, implement and participate in project development in line with strategic challenges of different types and dimensions.
- Hosting workshops, conferences, seminars and (international) visits, allowing members to network. CIAC also provides support to its members to organize these initiatives.
- Talent platform, facilitating students, educational institutes, companies and professionals to collaborate.
- The CIAC Grants Observatory, an information portal aiming to publicise all the grants and funding schemes available to the automotive sector so that cluster members can benefit from them.
- A project management platform.

As of October 2023, CIAC facilitates [492 projects](#), of which 213 are completed, 72 are ongoing and 207 are in the start-up phase. Some relevant projects include:

- Addressing the disruptions in automotive production caused by the COVID-19 pandemic by leveraging Additive Manufacturing (3D Printing) as a solution to produce components.<sup>37</sup>
- “Quantification of carbon emissions associated with the entire value chain”: aimed at designing a tool enabling automotive sector companies to quantify the emissions linked to their complete value chain.<sup>38</sup>
- Several studies on [Electric Vehicles](#), their [components](#), and their impact on the automotive industry.

Examples of events and webinars organized by CIAC are the Automotive Suppliers’ Day, the e-Mobility Experience, the Evolute virtual networking event, and the “What is tomorrow?” Mobility World Congress.

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## GOVERNANCE AND NETWORKS

CIAC was founded on the 24th of April 2013 by SEAT, NISSAN, GESTAMP, FICOSA, and DOGA, five large players in the automotive region in Catalonia. Since its establishment, over 190 companies, providing employment for more than 40,000 people, have joined the cluster. The members of CIAC represent a varied spectrum of the automotive sector. This membership mix includes not only automotive manufacturers but also technological institutes, environmental advocates, consultants, and other stakeholders. CIAC's funding model is driven by contributions from its associate companies, emphasizing a collaborative approach to achieving common goals. No public stakeholders are directly involved, but the CIAC does cooperate with the government on projects for grants and subsidies to promote the development of technologies, such as industry 4.0, materials or products. CIAC is supported by the [Catalan Government’s Agency for Business Competitiveness](#) and collaborates with the Catalan government in the [Automotive](#)

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<sup>37</sup> CIAC, [Roadbook 2022](#), page 8.

<sup>38</sup> CIAC, [Roadbook 2022](#), page 11.



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[Professional Training Consortium](#), which aims to promote training and talent in the automotive sector.

The CIAC is managed by a Board of Directors made up of GESTAMP, SEAT, FICOSA, DOGA, IDIADA, RELATS and SIEMENS, while the organisation itself employs 12 individuals. These board members play a crucial role in shaping the strategic direction and priorities of CIAC. In 2020, CIAC started hosting monthly top-level meetings with executives, CEOs, and directors from cluster-affiliated companies with the aim of discussing present and future challenges of the automotive sector in Catalonia.

In addition to its regional activities, CIAC actively participates in several national and international networks. It is a member of the [Enterprise Europe Network](#), a platform for fostering business cooperation, innovation, and internationalization. Furthermore, the organisation actively engages with the [European Automotive Cluster Network](#), enabling cross-border collaboration and knowledge exchange with other leading automotive clusters across Europe.

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## **READINESS FOR TRANSITION**

The strategy for transformation in Catalonia's automotive industry is initiated and driven by the industry itself. The members of CIAC represent a varied spectrum of the automotive sector, indicating a comprehensive and inclusive approach to the development of the sector. CIAC's dedication to project development and collaboration with almost 500 projects within 10 years positions it as a relevant example for other regions. The CIAC's solid presence and expansion reflect its effectiveness as a facilitator, although the precise impact of these initiatives on regional transformation is yet to be fully realised.

IAC focuses on seven strategic areas, two of which, "Product Innovation" and "New Business & Mobility as a Service (MAAS)," specifically address challenges arising from the impact of new technologies on the sector, such as sustainability and digitalisation. This focus demonstrates that the sector is actively preparing for these changes. However, the number of projects within these areas remains limited. Out of 497 projects, only 16 are related to "Product Innovation," which addresses challenges brought about by emerging trends like electromobility and autonomous driving. This suggests that more work is needed in this particular area.

Additionally, the strong emphasis on talent development and training through a talent platform and collaboration with the Catalan government's Automotive Professional Training Consortium is a notable strength, given that this is a significant challenge for the sector. The limited involvement of the regional government poses a risk that the region's interests may not be adequately considered.

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### *Emilia-Romagna Region: from Motor Valley to E-Valley*

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**The automotive industry represents one of the most important industrial sectors of the Emilia-Romagna production system.** It provides about 15% of the global value added in the manufacture regional sector. Brands like **Lamborghini, Dallara, Ducati, Ferrari, HaasF1Team, HPE COXA, Marelli, Maserati, Pagani, Scuderia AlphaTauri, Energica Motor Company,** are just the top of a production chain that includes a high number of specialised suppliers, operating in a long series of subsectors (automotive, motorcycles, industrial-agricultural-marine motorvehicles, etc.).

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<b>NACE rev C29 (Eurostat 2020)</b>	<b>Employment share</b>	<b>Total employment (number of persons)</b>	<b>Local units (number)</b>	<b>Wages and salaries (in million euro)</b>
Structural Business Statistics	4%	17,842	422	687
Relative EU ranking, limited to the top 50 NUTS 2 regions	-	41	6	34

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### **TRANSFORMATION STRATEGY**

**On 14<sup>th</sup> December 2020, under proposition and coordination of the Emilia-Romagna Region, 60 regional stakeholders, signed the [Pact for Labour and Climate](#).** Signatory entities involve the Emilia-Romagna Region and other 23 local governments and their associations, 23 business, trade and professional associations from a variety of sectors, 4 labour unions, 8 education, research and university bodies and 1 environmental association. **The Pact defines, among many other objectives, a common strategy to tackle the environmental transition challenges and achieve the objectives of the 2030 Sustainable Development Agenda.** To implement the Pact and achieve its targets – i.e. investing in knowledge and know-how, supporting ecological transition, promoting rights and duties, and facilitating businesses and opportunities – the Region adopted the [Regional Strategy “2030 Agenda for Sustainable Development](#), aligning the Pact to the 17 Goals of the 2030 Agenda and the [Regional pathway to carbon neutrality by 2050](#), defining the targets for the different policy sectors, the actions needed and simulating the effects of the proposed policies. **The Pact and related Strategy and Pathway are synergic with a number of other regional plans, including those related to mobility,**

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energy and digital transitions ([Integrated regional plan for transport, Regional Energy Plan](#) and [S3 Smart Specialization Strategy](#)).

The strategy concerns the regional territory as a whole. It is relative to all productive sectors and focuses on the main policy areas of territorial administration and development; it is not a government top-down driven strategy but rather a co-created strategy built with all the different stakeholders that subscribed it. As a comprehensive strategy, the Emilia-Romagna Region also includes within it the automotive sector. **Many targets are in fact recognised by the automotive industry as key drivers to succeed in the green transition**, such as increasing: the student population with tertiary education; lifelong learning; regional expenditure for R&D; the number of researchers employed in companies; the percentage of companies carrying out R&D activities; the participation in green transition international projects. The Pact and the other regional strategies give a wide attention to the technological improvement and energy transition of “transversal” sectors for manufacture development, such as mechatronics industries. The S3 strategy identifies among the 8 major production specializations, the mechatronics and motors’ one, with a focus on the *priority thematic area* “Sustainable and innovative mobility and motor industry”. The Motorvehicle University of the Region - MUNER –involves the most famous enterprises and the regional universities. With a huge financial and operative effort by the Regional Government, MUNER promotes many initiatives for enhancing innovation and green transition in the motorvehicle sector. Regional Strategies are also in line with the industrial policies set by the European Commission for the [Mobility-Transport-Automotive Ecosystem](#). Targets are indeed quantified also in terms of reduction of poverty and salary increases, as well as for power charging stations, growth of public transport infrastructure and increased modal shift towards greener transport modes. The transition towards e-mobility implies challenges in terms of the affordability of electric cars and possible changes in transport behaviour.

Such activities are also supported by an extensive ecosystem of innovation and research centres: 91 accredited **research labs**, 11 **Innovation centres**, 10 **Technopoles** with 20 local seats and 2 **research associations** (relevant for the automotive sector) such as the aforementioned **CLUSTER MUNER** but also the **CLUSTER MECH**, dedicated to vocational training and innovation in mechanic and motor industry as a whole.

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## GOVERNANCE AND NETWORKS

Regional and local administrations, business, trade and professional associations, labour unions civil society and research institutions and universities signed the Pact for Work and Climate in 2020. Business and trade associations represent **OEMs (acronym for “Original Equipment Manufacturers”)** and their **supply chain companies**. Such composition is adequate for the type of transition strategy

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adopted by the Region, which is a **policy transition strategy** for the development of the whole territory, and of all the economic sectors active in the regional context. **The Pact Strategy** implementation is under responsibility of the Vice-President of the Region, who is also in charge of the 2030 Agenda. The Pact was signed by the main regional stakeholders usually involved in policy development and implementation. To guarantee the highest level of participation throughout the region both in the development phase of the Strategy and in its implementation, a **"Forum for the Regional Strategy "2030 Agenda for Sustainable Development"** was established as a consultative body. A working group on "battery" first and on "automotive revamping" later is active in the region since 2018 (and with an ancestor called ER-MES even since 2012). This working group on "automotive revamping" is coordinated by ART-ER and involves some of the main stakeholders (companies and research centres) of the Region active on electrification. The aim of this WG is to disseminate information on the transition (based on a state of the art analysis) and to gather all the input coming from the territory, in order to understand, with a bottom-up process, the best approaches to transition that may be applied to the regional value chain. Moreover **a number of public-private and private networks involving regional OEMs and suppliers, as well as academic institutions dedicated to the automotive industry is in place**, established already before the adoption of the strategy, relevant to support the ecologic transition of the sector: [Clust-ER Mech – Mechatronics and Motoristics](#) and [Clust-ER GREEN – Energy and Sustainability](#); [MUNER – Motorvehicle University of Emilia-Romagna](#); [Motor Valley](#); [BI-REX - Big Data Innovation and Research Excellence](#); [Regional High Technology Network](#); [Motor Valley Accelerator](#); participation in the [EIT Climate - KIC](#); [EIT RawMaterials](#). Such networks are a good example of cooperation between public and private entities and among the OEMs and their suppliers, which will represent a key asset to tackling the challenges and opportunities arising from the ecologic transition. The activities and initiatives of such networks prove that the **regional production system is strongly oriented towards Industry 4.0 and electrification**, reinforced by the innovation ecosystem and a business environment that are able to create collaborations and synergies between knowledge systems and business, in several key areas of relevance for a good transition strategy, i.e. R&D, specialised training to employees, raw materials, big data and digitalisation, automobility as a way of living and tourism attraction etc. Worth to be mentioned are other regional strategies aimed at improving green transition, such as the **Regional Plan for Energy Transition** (which includes EU targets for climate and energy transition in 2030 and 2050); the **Green hydrogen initiative**, aimed at providing green, safe and accessible energy, as one of the most innovative areas of regional intervention in Smart Specialisation Strategy for Emilia-Romagna; the **Plan for Regional Industries** and the **Regional Plan for Industrial Research, Innovation and Technological Transfer**, that include an extensive series of interventions for innovation and green transition in vocational

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industrial sectors for the regional context, among which motorvehicle production is a central and key driver for regional growth.

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## READINESS FOR TRANSITION

The Emilia-Romagna example shows the **co-presence of a regional government co-created policy transition strategy for the development of the whole territory and well-established specialised clusters collaborating with a vibrant innovation ecosystem involving a number of regional, national and international networks**. A dedicated automotive sector transition strategy is not formally in place. Yet both the regional transition strategy and the activities by the existing networks prove that **all stakeholders and players are working in the same direction to succeed in the ecologic transition: qualified employment, innovation, sustainability, and integration with regional supply and value chains**. For a regional economy that represents excellence in many sectors further to the automotive industry, where cooperation among economic entities, academia and the public sector is somehow a historical business pattern, an **overall policy transition strategy may nevertheless represent an advantage in terms of resilience, speediness of transition, and probability of success**, due to the possibility of relocation of employees from one sector to another, more chances to attract highly qualified employees and offer better salaries, and frame automotive transition within the transformation of the whole economy and transport system. A supply chain strategy, made by and for the automotive industry specifically, with a structured governance, clear roles, measures and targets for the sector, can represent an opportunity to effectively address the challenges posed by the ecological transition. Such a strategy is already designed in aforementioned experiences as the MUNER initiative. **The Regional Pact Strategy is furthermore very concrete with specific measures, possible funding sources and quantitative targets for the different policy areas**. It has been appropriately conceived as a dynamic tool to be adjusted and updated over time. The significant number of targets and indicators adopted might make it difficult for the regional Government to monitor its implementation as a whole. From a general point of view, **these elements make the Emilia-Romagna region a relevant example for well-developed diversified economic regions, which enjoy a privileged position in the national and international economic context**.

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### *Silesia Region: towards just and sustainable transition*

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**Automotive industry represents the second most important economic sector in Silesia after coal mining.** Stellantis group is present in this region with **Fiat – Chrysler Poland S.A.** (Bielsko-Biała and Tychy) and with **Opel Manufacturing Poland** (Gliwice), together with lithium-ion battery producers (es. **SK Innovation** in Dąbrowa Górnicza) and a number of specialised suppliers.

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NACE rev C29 (Eurostat 2020)		Employment share	Total employment (number of persons)	Local units (number)	Wages and salaries (in million euro)
Structural Statistics	Business	16%	60,897	330	911
Relative EU ranking, limited to the top 50 NUTS 2 regions		32	5	11	24

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#### TRANSFORMATION STRATEGY

The Polish Region of Silesia is the **most industrialised region in Poland.** Automotive represents the second largest sector and **two automotive manufacturers** are present in the region, as well as **lithium-ion battery producers** and other **specialised suppliers.** In order to support the development of the automotive industry, the Polish government set up the Katowice Special Economic Zone already back in 1996, which attracted relevant investments. Yet coal mining is the first economic sector in Silesia, representing a major challenge for both the region and Poland towards ecologic transition. A [Low emission economy policy for Silesia Region. Regional energy policy until 2030](#) was already elaborated in 2020, which supports transition of the energy sector towards **circular economy**, development of **electromobility and other forms of sustainable transport**, followed by the [Just Transition of Silesia](#) strategy, which calls for transformation protecting climate and the environment, **taking the opinions and interests of local communities into account** and offering support to workers who lose their jobs, helping them to retrain. Such documents were elaborated in the framework of national strategies towards sustainable, economically effective and just transformation in energy sector, such as the [National Energy and Climate Plan for the years 2021-2030](#) (2019) and the [Energy Policy of Poland until 2040](#) (2021).

Whereas attention has been given by the region and Polish governments to the transformation of the mining and energy sectors, which actually affect most of

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southern Polish economy, there is at present **no strategy to address just and sustainable transition in the automotive industry**.

Silesia region is nonetheless very active in supporting the transformation of the automotive industry, facilitating and coordinating the **establishment of clusters** involving technological parks and business incubators to enhance automotive transition; **promoting educational and training initiatives** involving automotive industry players from the business sector, research institutions, and academia, to develop skills and competences thus keep and increase competitiveness of enterprises and employees; creating favourable conditions for foreign investments in the automotive sector. In this respect the following additional policies are also worth mentioning that combine ecologic transition targets with digital transformation and innovation goals: the [Regional Innovation Strategy for Silesia Region 2030](#) (2020), standing for economic development to **generate and implement innovative solutions and technologies, and invest in R&D**; and the [Regional Strategy for Silesia Region Development “Silesia 2030”](#) (2022), defining the way forward towards green, climate neutral transformation in line with the EU Climate Package. The latter strategy identifies the need to **develop innovation and technology**, along with a well functioning high **education sector** offering professional knowledge on green and digital transformation.

Further to regional and central governmental activities, the **automotive business sector is also promoting automotive transition initiatives**, such as the recently released report on the status and perspectives of the automotive sector in Poland, i.e. [Poland Exchange Group: Just Transition in the European Car Industry](#) (2023). This document, providing an analysis of the sector and some direction on the pathway to zero-emission mobility in the country, with a focus on exports of e-buses and batteries. This document denounces the **lack of appropriate dialogue between the public administration and the automotive industry**. Nonetheless it represents more a sector paper than a strategy.

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## GOVERNANCE AND NETWORKS

The Silesia region government recently developed a number of policies aimed at tackling coal and energy transformation. These strategies set targets and objectives for the industry in the regions, and mobilise all the stakeholders to cooperate towards supporting regional economic development towards a just and ecologic transition. Such documents are however not specific to the automotive sector and **an automotive transformation strategy is currently lacking**.

Nonetheless a number of initiatives by the regional government are in place, also involving the automotive players from the business sector and academia, especially focussing on education and training initiatives. **The private sector is furthermore active in promoting activities**. A good example of bottom-up initiative towards the development of automotive sector in the region, is the **Silesia Automotive & Advanced Manufacturing (SA&AM) Cluster**, involving 90

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automotive sector members and 30 advanced technology sector associated. It supports automotive and advanced manufacturing companies. The Cluster aims to build a strong **cooperation and best practice exchange platform for companies and educational and research institutions**. It focuses on two core areas, innovation and cooperation as well as labour market and education. It is involved in the European Automotive Cluster Network ([EACN](#)) joint industrial modernization investments, coordinates the activities within the [Digital Innovation Hub](#), takes advantage from the EU funded initiative of building a comprehensive set of tools supporting SMEs in industrial transformation and to ensure efficiency and effectiveness of support services for companies ([Boost4BSO](#)).

There are also relevant **educational activities** available in the region, including: the **Automotive Sector Competence Council** aiming to develop **solutions and adapt the education system to the needs of the automotive sector**; and various **training programmes and educational programmes** implemented in the framework of regional universities (e.g. dual education at the Faculty of Mechanical Engineering at Silesia University of technology, post-graduate studies and Industry 4.0 MBA courses).

Another good example of consolidated efforts in the sector, is the governmental [Lukasiewicz Research Network](#) (i.a. Upper Silesian Institute of Technology), which brings together previously independent research institutes combining R&D potential.

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## READINESS FOR TRANSITION

**Representing the most coal dependent region in the entire EU**, Silesia and Poland face a great challenge towards ecologic transition. Most of the policies tend to focus on the mining and energy sector, due to the implications they have on sustainability targets. At the same time **automotive industry is the second largest economic sector in the region and the main one in Poland**. This notwithstanding, **an automotive transition strategy has not been developed so far, neither coordinated by the Polish government, nor by the Silesia region, nor by the private sector**, specified that any of them would be legitimate to develop one independently or conjointly.

Also in the opinion of many sector stakeholders, **such a strategy would be relevant to support R&D and training activities** to keep and increase competences and competitiveness of enterprises and employees, but also and especially **to ensure access to cheap and green energy for vehicle charging and production**. Poland's current energy mix is based on almost 86% fossil fuels, including 80% coal, which makes the Polish energy system one of the most carbon-intensive in Europe. Without investing in renewable energies, electric vehicles in Poland would still not be “zero-emission”. Further to the use of vehicles themselves, also relevant is the **carbon footprint of vehicle production and of**

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**the supply chain**, with a risk of worsening the carbon balance of Polish companies, potentially affecting their competitiveness in the EU global markets. Such a situation also represents a **potential risk of negative impact on employment**. Accordingly, stakeholders see a strong need for immediate actions, including a **dialogue between decision-makers, car industry players and labour unions**. At the same time, automotive transformation requires adopting the newest technological solutions and hence, **cooperation between academia, public and private sectors** is also essential to be further promoted.

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### *Trnava Region: changing automotive industry landscape*

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The automotive industry represents a key economic sector for the Trnava region. Multinational manufacturing companies such as **Stellantis Slovakia** (former PSA Peugeot Citroën), **ZF Slovakia**, **Schaeffler Skalica** or **Eissmann SMP Automotive Interieur Slovensko** are among the largest 15 employers in the region.

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NACE rev C29 (Eurostat 2020)		Employment share	Total employment (number of persons)	Local units (number)	Wages and salaries (in million euro)
Structural Statistics	Business	13%	26,045	310	416
Relative EU ranking, limited to the top 50 NUTS 2 regions		44	24	13	-

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#### TRANSFORMATION STRATEGY

The Trnava self-governing region, as one of the founding members of the **Automotive Regions Alliance (ARA)**, is preparing the region for the transformation of the automotive industry. Trnava is a rather small region in a relatively small country, where **car manufacturing is the largest industry**, generating about 50% of industrial production and approximately 40% of industrial exports. The region did not directly engage in the definition of an own transformation strategy and the transition process is actually ongoing within the framework of **government defined policy strategies**, that are also **not specific to the automotive sector**, but rather related to promote the development of the country in line with the sustainability targets and goals set in the relevant EU policies and programs, that also support the country economy. Such policies include the [Concept of Intelligent Industry for Slovakia](#), as a the response to the fourth industrial revolution, recognising the automotive sector as the fastest growing industry for Slovakia and driver of economic growth together with electrotechnical sector. The Concept was then followed by the [Smart Industry Action Plan for 2019-2022](#), aimed at **creating better conditions for the implementation of digitization, innovative solutions and increasing competitiveness**: by simplifying bureaucracy and legislation and supporting educational programs and training, and co-financing research. The national research and innovation strategy for smart specialisation of the Slovak Republic, [RIS3 Strategy](#) (2021) subsequently denounced the overall **low level of product and technological innovation**, as well as the declining quality of human capital, in particular the **lack of research and development jobs in the Slovak**

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**automotive sector.** Accordingly the strategy calls for reforms in the area on industrial innovation to support job competitiveness and industry adaptation to the green economy. Additionally, the [Slovakia 2030 – Vision and National Sustainable Development Strategy of Slovakia until 2030](#) (2021) identified national and regional priorities related to sustainable development, among which moving towards a knowledge-based and environmentally sustainable economy in face of demographic change and a changing global environment. This strategy also recognises **dependency of the national economy on foreign investment in automotive industry as a weakness**, also in light of recently experienced labour shortages. To improve the current situation, the strategy promotes **cooperation between the academic, industrial, public sectors and civil society** focussing on innovation and research. [The Strategy for smart and sustainable mobility](#) (2022) was additionally adopted, which tackles the EU objectives of reducing the GHG emissions by at least 55% by 2030 and achieve climate neutrality by 2050. This Strategy assumes **creating an ecosystem for smart mobility**. Investing in **knowledge transfer, innovations and know-how** will support the emergence of innovation, and create highly qualified jobs. Finally, key climate targets for Slovakia at 2030 are defined in the [Integrated National Energy and Climate Plan 2021-2030](#) (2019). Actions towards climate neutrality identified for the transport sector include electrification of transport, development of infrastructure for clean transport, promoting environmentally friendly passenger transport, support for infrastructure for alternative fuels vehicles.

Within this policy context, and in absence of a dedicated automotive transformation strategy at the national and local levels, the Trnava self-governing region initiated a number of activities **to support the transformation of the automotive industry**, focussing on the following areas: **Cluster Development:** establishing automotive industry clusters that bring together companies, research institutions, and educational facilities to support knowledge exchange and innovation; **Local Workforce Development:** collaborate with educational institutions to tailor training programs to the needs of the local automotive industry, ensuring a skilled workforce; **Innovation Hubs:** create innovation centres that offer resources and support for startups and small businesses focused on automotive technologies.

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## GOVERNANCE AND NETWORKS

**A number of policies have been prepared by the Slovak government**, some of them (e.g. the Concept of Intelligent Industry for Slovakia) directed to the industry sector and appealing to all stakeholders to identify the main areas of intervention and actions to support regional economic development. Although relevant to support ecologic transition of the country within the framework of implementation of the EU industrial and transport policies, *such strategic documents are not specific to the automotive sector*. Within such framework, **Trnava self-governing**

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**region is currently implementing a number of initiatives in order to support the region in the automotive transformation process.** Although very relevant, **such activities are also not included in a dedicated automotive transition strategy**, and are apparently coordinated by the regional government without a direct formal/institutionalised involvement of all the OEMs or Tier 1, 2 or 3 supply chain parties.

**A number of public-private and private initiatives involving regional OEMs and suppliers, as well as education institutions dedicated to the automotive industry is in place**, to support the transition of the sector, which also see the coordination by the Trnava region, especially to promote competitiveness of the labour market, by enhancing **vocational training, dual education, retraining, and career advisory services**. Relevant examples of such projects in the field of education, upskilling and reskilling include: the [PASS project](#) to enhance competencies in the automotive ecosystem; the [CAR Master project](#) involving partners from six EU countries aimed at developing a joint platform to offer masters education in automotive production; the [Green Wheels](#) project also aiming at developing open educational materials in the emerging field of operation, repair and servicing of hybrid and electric vehicles; the national project - **System of verification of qualifications in the Slovak Republic**, focussing on lifelong education and workers qualifications; the [Ready-to-work](#) project that will enable the retraining of 20,000 job seekers. Other relevant initiatives involving key automotive players in the field of education and training include: a **dual education program by Schaeffler Skalica** in cooperation with Mechanical engineering secondary school in Skalica; a **dual education program by Stellantis and ZF** and other SMEs at the Automobile Secondary school of Trnava.

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## READINESS FOR TRANSITION

There are currently four **main automobile manufacturing plants in Slovakia – Volkswagen Slovakia, Stellantis Slovakia (former Groupe PSA Slovakia), Kia Motors Slovakia and Jaguar Land Rover**, supported by a network of more than 350 production plants and suppliers at all levels. **The automotive sector is the largest industry in the country**, with about 261,000 employees. Notwithstanding the relevance of the sector, **a national automotive transition strategy has not been developed so far, neither coordinated by the Slovak government, nor by the Trnava region, or proposed by the private sector**, specified that the small size of the country and relevance of the sector, may actually better justify the preparation of a strategy either by the Government or by the private sector, or both. Automotive private and public stakeholders are actually recognising that the automotive industry is a major investor in R&D, although the level of R&D expenditures as a share of GDP in Slovakia seem to be low compared to other European countries. This contrasts with the significant number of workers employed by the sector, with a possible risk for Slovakia not to fully exploit the presence of major automotive players in its territory towards an increase of the

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competitiveness of the labour market. Sector players consider that an automotive transformation strategy would be needed to define **conditions, measures and actions towards a successful automotive transition**, particularly focussing on **infrastructure investments needed, training and education programs, PPPs and circular economy initiatives**.

In the absence of such a strategy, which would likely increase the effectiveness for Slovakia and its automotive regions in succeeding in both the automotive and ecologic transitions, **the Trnava region is nonetheless very active in cooperating with a regional network of automotive players, which involve the main OEMs operating in the region, SMEs and educational institutions, with a focus on education and training programs and projects** at the regional, national and international levels. The Brussels representation of the **Trnava region is also leading the work within the Automotive Skills Alliance on regional cooperation and implementation**.

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