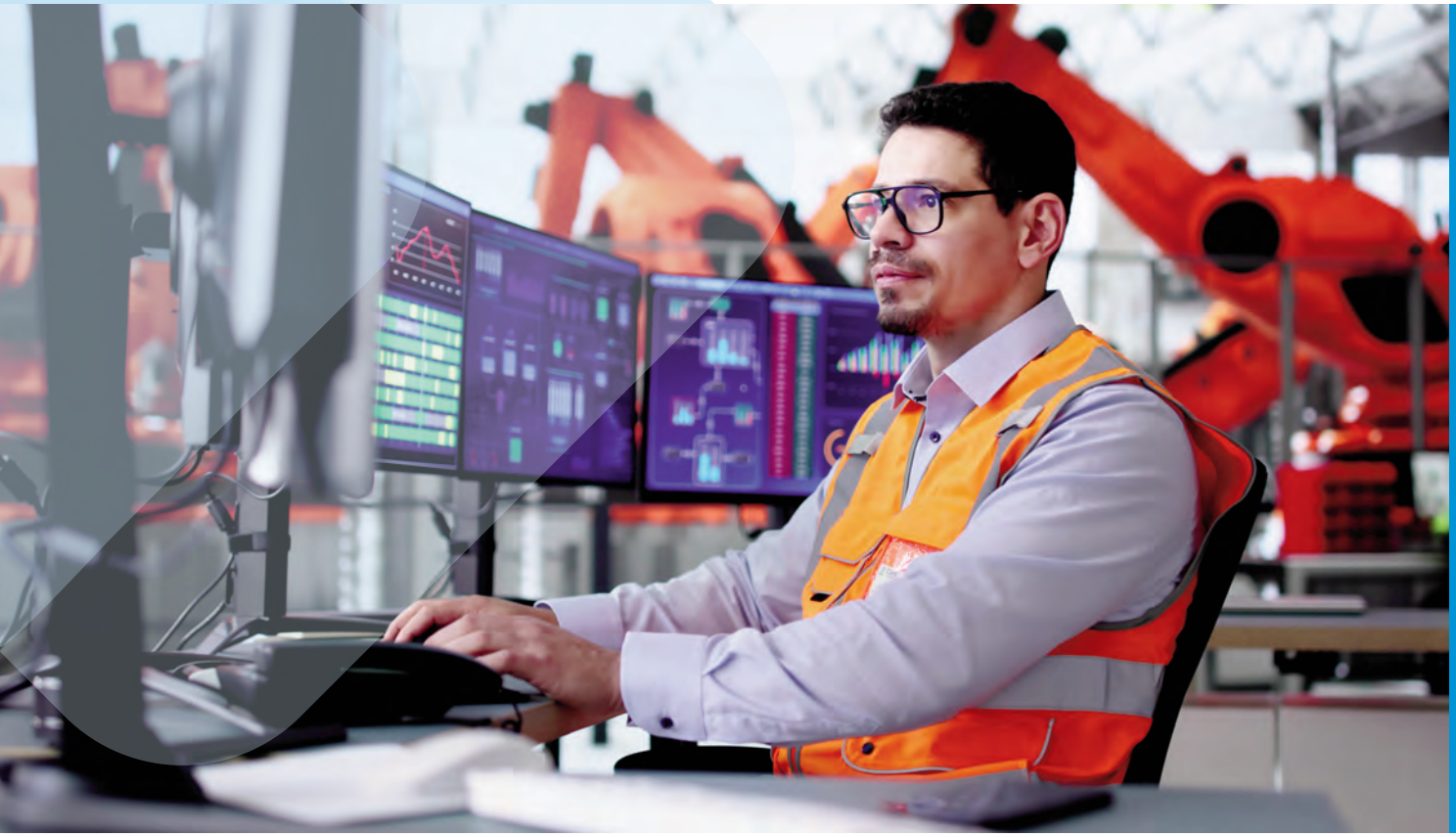
RESEARCH REPORT

Eurofound

Employment and labour markets

Crisis in the EU automotive industry: Remaining competitive amid the twin transitions



Crisis in the EU automotive industry: Remaining competitive amid the twin transitions

Eurofound

European Foundation for the Improvement of Living and Working Conditions

When citing this report, please use the following wording:
Eurofound (2025), *Crisis in the EU automotive industry: Remaining competitive amid the twin transitions*, Publications Office of the European Union, Luxembourg.

Authors: Tina Weber and Dragoș Adăscăliței (Eurofound); and Ștefan Guga, Anne-Gaëlle Lefeuvre and Marie Meixner (Syndex)

Research manager: Tina Weber

Research project: Impact of the twin transitions at the sectoral level

Providers: Zoltan Fazekas (Copenhagen Business School), Jana Vánova (Research Institute for Labour and Social Affairs), Frédéric Turlan (IR Share), Christophe Tessier (Ultra Laborans), Sandra Vogel (German Economic Institute), Alessandro Smilari (Fondazione Giacomo Brodolini), Iñigo Isusi and Jessica Durán (IKEI Research & Consultancy).

Luxembourg: Publications Office of the European Union, 2025

Print:	ISBN 978-92-897-2511-8	doi:10.2806/6972911	TJ-01-25-023-EN-C
PDF:	ISBN 978-92-897-2510-1	doi:10.2806/6339859	TJ-01-25-023-EN-N

This report and any associated materials are available online at https://eurofound.link/ef25024

The European Foundation for the Improvement of Living and Working Conditions (Eurofound) is a tripartite European Union Agency established in 1975. Its role is to provide knowledge in the area of social, employment and work-related policies according to Regulation (EU) 2019/127.

European Foundation for the Improvement of Living and Working Conditions

Telephone: (+353 1) 204 31 00
Email: information@eurofound.europa.eu
Web: https://www.eurofound.europa.eu

Contents

Executive summary

Introduction

This report provides an analysis of the impact of the green and digital transitions on the EU automotive sector in relation to employment, skills and working conditions. It also assesses the contribution of social dialogue to addressing the challenges arising from these transitions. Findings are based on Eurostat data on employment and company structure, working conditions data from the European Working Conditions Survey (EWCS), a literature review, national contributions from the Network of Eurofound Correspondents and two company-level case studies.

Policy context

The automotive sector contributes over 6 % of EU gross domestic product and employs around 6 million workers, when counted narrowly as employment in the manufacturing of vehicles, vehicle bodies and parts and also sales repair and the aftermarket. This figure doubles when related industries and services are included.

The sector is strongly affected by policies surrounding the EU's climate ambitions, with the European Green Deal and the fit for 55 package requiring vehicle manufacturers to transition to zero-emission vehicles by 2035, spelling the end for internal combustion engine technology in automotive production.

In addition, rising prices and technology-based global competition, uncertainty around tariffs, changing consumer incentives and a lack of investment in charging infrastructure have all contributed to market turbulence for the EU car manufacturing and supplier industries.

A strategic dialogue on the future of the sector, initiated by European Commission President von der Leyen in January 2025, led to the publication of an industrial action plan for the European automotive sector in March 2025.

Key findings

- While employment in the automotive industry (manufacturing, sales and the aftermarket) increased by 12 % between 2011 and 2023, this masked job losses of over 7 % in the manufacturing and supplier sector between 2019 and 2023. In 2024 and early 2025, additional redundancy announcements were made for around 106 000 jobs, based on European Restructuring Monitor data. Job expansion cases in the sector were also reported in the European Restructuring Monitor in 2024 and the first quarter of 2025, around one third of which were related to business expansion by Chinese companies in the EU.
- Given the regional clustering of automotive manufacturing (also referred to as original equipment manufacturers (OEMs)) and suppliers, and the different strategies and trajectories of vehicle and part production in western, southern, eastern and central Europe, it is important to note that job losses have so far been particularly prevalent in countries where many of Europe's largest car manufacturers are headquartered. Employment decline has been structural in France (among both OEMs and suppliers) and, from 2019, began among OEMs in Germany, Italy and, to a lesser extent, Spain. The central and eastern European countries and Sweden maintained an upward trajectory in OEM employment until 2023.
- Among suppliers, this trend was reversed, with most of the important supplier industries in western European countries maintaining employment levels between 2019 and 2023, while countries like Czechia, Hungary, Poland, Romania and, to a lesser extent, Slovakia – which had previously benefited from a shift of parts manufacturing from western to eastern Europe – faced lower employment levels due to relocation towards lower-wage countries outside the EU, such as in Africa and Asia.
- Estimates of the future impacts of the twin transitions and other factors on employment trends vary depending on the scope of the sectors considered and the underlying assumptions regarding policy and economic developments. Studies narrowly focusing on employment trends in OEMs and suppliers generally predict negative employment impacts, while studies using methodologies that include estimates of employment creation in charging infrastructure services and wider battery manufacturing usually estimate neutral or positive employment outcomes. None of these studies details the quality of the jobs that could be created.

- New skills requirements are emerging, particularly in relation to the greater digital connectedness of vehicles, calling for more software engineers, data analytics professionals, expertise in AI applications and high-level research and development skills linked to battery and electric drivetrain technologies. Case studies indicate that, while these shifts do affect production workers, new skills requirements are more limited and training tends to be delivered directly by OEMs. This is also reflected in EWCS data showing a trend of an increase in workers receiving informal training in the workplace.
- The impact of the twin transitions on working conditions can mainly be identified in relation to occupational safety and health and battery production, although EWCS data from 2024 point to reduced exposure to chemicals for automotive sector workers and improved physical working environments due to reduced exposure to tiring or painful working positions.
- Trade union representation in the automotive sector is generally higher than the national average and that in other manufacturing sectors. Collective bargaining at the company level plays a key role in addressing the challenges facing the sector, relying as much as possible on the redeployment, early retirement and voluntary severance of workers, while also emphasising internal and external collaboration on training and retraining.

Policy pointers

- As the policy-driven shift towards electrification and the technology-driven shift towards automation, digitalisation and connected vehicles accelerate, policies will have a role to play in guiding the sector and its workers through the transition. Demand for labour is expected to decline for some jobs, including in the production and repair (and potentially sale) of electric vehicles, while skills shortages are likely to persist in emerging areas of employment in the sector. Training, regional development and active labour market measures at the European, national and regional levels will therefore become increasingly important.
- Employment shifts will have to take account of the quality of the newly created jobs. Collective bargaining has a key role to play in mitigating the impact of the challenges facing the sector. The application of the European Commission's recommendation on strengthening social dialogue can ensure the effective involvement of the social partners.
- The future of the EU car industry strongly depends on the shift to electric vehicle production, which must succeed in the face of increasing competition, particularly from Asia. This requires coordinated policies and investment at the EU level, not just in research and development, but also in consumer incentives and supporting infrastructure.

Introduction

In 2024, the future of the EU automotive sector increasingly came to the fore in public and policy discussions, amplifying a longer-standing debate. The impact of rising global competition, the prospect of the introduction of US tariffs, delayed investments in new technologies and business strategies focusing on premium vehicles among some EU manufacturers, changing consumer incentives and a lack of investment in charging infrastructure all contributed to market turbulence for the EU car manufacturing and supplier industries. While new car registrations in the EU increased slightly (by 0.8 %) in 2024, registrations were still 18.4 % lower than in 2019 (ACEA, 2025). EU car production fell by 6.2 % in 2024, while in China production rose by 5.2 %. The sale of battery electric vehicles (BEVs) in particular is struggling to gain the required momentum.

This volatile environment led to redundancy announcements in the car manufacturing and supplier industries in the EU, at times undermining long-standing, collectively agreed commitments to safeguard employment. The Draghi report described the sector as 'a key example of lack of EU planning, applying a climate policy without an industrial policy' (European Commission: European Political Strategy Centre, 2025). A strategic dialogue on the future of the European automotive industry, initiated by European Commission President von der Leyen in January 2025, contributed to the publication of an industrial action plan for the European automotive sector in March 2025 (European Commission, 2025a). The European Commission's work programme for 2026 reinforces the commitment to support the automotive sector to tackle the challenges that it faces and outlines future action to promote small, affordable cars and to provide further support for battery manufacturing. In addition, the Commission proposes to work on social leasing to make zero-emission vehicles more affordable for all (European Commission, 2025b).

These developments are crucial since the sector supports approximately 6.1 % of employment in the EU and accounts for over 6 % of the EU's gross domestic product. Given its economic importance and the high share of EU employment either directly or indirectly dependent on vehicle manufacturing, there is already a substantial body of literature seeking to chart and assess the impact of the green and digital transitions on the automotive industry both in the EU and at the Member State level.

Much of this literature has focused on the employment impact of vehicle electrification in the automotive manufacturing sector (see, for example, Kuhlmann et al., 2021; Galgóczi, 2023), the strategies of different automotive manufacturers in preparing for the future (Pardi and Calabrese, 2017; Krzywdzinksi et al., 2025), the implications of EU and national policies on driving demand for electric vehicles (EVs) and impacts at the regional level (Syndex, 2022), and the position of EU manufacturers in the face of increasing global competition in the market, particularly from China (Pardi, 2025).

Since the automation of manufacturing in the sector is a long-standing trend, the focus of studies on technological changes has more recently been on the impact of digitalisation, the growing share of connected technology in the automotive value chain and its effects on the relationship between large car manufacturers (known as original equipment manufacturers (OEMs)) and suppliers (Burkacky et al., 2018; Humphrey, 2025). Some – albeit more limited – research also exists on the impact of these developments on skills needs and the training infrastructure (World Economic Forum, 2018).

While this report seeks to provide an analytical overview of existing data and research on the employment implications of the twin transitions, in doing so, it extends the focus beyond OEMs and their supply chain to consider the implications of the green and digital transitions for vehicle sales, repair and the aftermarket (see Box 1).

Given that the employment situation in the sector is very much in flux, the report provides an updated picture of employment trends, using data from Eurofound's European Restructuring Monitor (ERM), which provides a dynamic picture of large-scale restructuring announcements (both job gains and job losses).

Furthermore, it aims to address a gap in the literature regarding the impact of the twin transitions on working conditions, including the provision of training and the contribution of social dialogue to the management of change and restructuring in the sector. The research draws on a review of the literature, contributions from the Network of Eurofound Correspondents from seven EU Member States (Czechia, France, Germany, Italy, Poland, Romania and Spain), company-level case studies in two Member States (France and Romania) and an analysis of data drawn from EU Structural Business Statistics, the European Union Labour Force Survey (EU-LFS) and Eurofound's 2024 European Working Conditions Survey (EWCS).

Box 1: Definition of the EU automotive industry

Estimates of the precise employment share of the automotive industry in the EU economy vary depending on the source used and on the precise sectors included in such estimates. The European Automobile Manufacturers' Association (ACEA), which produces regular updates on key trends and developments in the sector, places employment at 13 million, or 6.8 % of total EU employment in 2023. ACEA's employment data are based on information from Eurostat's Structural Business Statistics and include the following items under general industrial classification of economic activities within the EU (NACE) C29:

- the manufacture of motor vehicles (NACE C29.1);
- the manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers (NACE C29.2);
- the manufacture of parts and accessories for motor vehicles (NACE C29.3).

In addition, ACEA includes the manufacture of components that are not classified under vehicle manufacturing, such as elements of the manufacture of electric motors, generators and transformers (NACE C27.1.1) and the manufacture of computers and peripheral equipment (NACE C26.2).

On the non-manufacturing side, ACEA includes data relating to aspects of automobile use, such as:

- the sale of motor vehicles (NACE G45.1);
- the maintenance and repair of motor vehicles (NACE G45.2);
- the sale of motor vehicle parts and accessories (NACE G45.3);
- the retail sale of automotive fuel in specialised stores (NACE G47.3);
- the renting and leasing of motor vehicles (NACE N77.1).

It also includes other aspects of transport, such as other passenger land transport, freight transport by road and construction activities linked to road building.

The data presented in this report refer only to NACE C29.1, C29.2, C29.3, G45.1, G45.2 and G45.3. Wherever possible, the report draws on data from 2023. Data from Eurofound's EWCS from 2010, 2015 and 2024 are also used to provide an insight into trends in working conditions.

The report is structured as follows.

- Chapter 1 sets the scene by providing an overview of the EU policy context and the key technological developments towards electric and more digitally connected vehicles. It also provides insights into trends regarding incentives and the more competitive production and greater take-up of BEVs in the EU.
- Chapter 2 discusses the development of company structures and employment in the sector, including estimates of future employment trends in the seven Member States covered in more detail in this report.
- Chapter 3 focuses on the impact of the twin transitions on skills, working conditions and job quality in the sector.
- Chapter 4 assesses the role of social dialogue in managing restructuring.
- Chapter 5 presents the main conclusions of this report.

1 The European automotive industry at a crossroads

Key takeaways

- The European automotive industry is facing structural transformation due to technological change, global cost and technology-based competition and policy-driven changes linked to environmental prerogatives and trade tariffs arising from protectionist agendas.
- Currently, the European Green Deal requires vehicle manufacturers to transition to zero-emission vehicles by 2035, therefore spelling the end of internal combustion engine (ICE) technology in automotive production, although this ambition has come under pressure in policy discussions in some Member States.
- To ensure the achievement of the EU's climate targets and the future of the automotive industry, policies on support for the purchase of EVs, the improvement of the public charging infrastructure and strategies for improving the development of battery technology in the EU are key. At present, around three quarters of Member States offer purchase incentives to individuals, although there are important differences in the design and scale of such incentives and a trend towards reducing such incentives, contributing to dampening demand for such vehicles.
- More work also remains to be done to improve public charging infrastructure to reduce 'range anxiety' among users. In 2024, there were around 770 000 public EV charging points available across the EU to support about 5 million BEVs and 3.6 million plug-in hybrid electric vehicles (PHEVs); close to 60 % of all chargers were located in the Netherlands, Germany and France.
- In terms of technology and manufacturing capacity, the EU continues to lag behind rivals in China and other Asian countries with regard to battery manufacturing. The EU has set a target of reaching 25 % of global battery production capacity by 2030, but the emerging battery industry is currently highly exposed to competition from foreign producers, particularly from China and South Korea.
- Electrification is, without a doubt, the biggest technological transformation the automotive industry has faced over the past century, requiring a complete overhaul of much of the value chain for both suppliers and large car manufacturers. The scale of this impact varies from Member State to Member State and region to region, depending on historical strategies regarding the vehicle manufacturing and supply industry and the scale of transformation towards EV production.

This chapter sets the context for the discussion on business and employment trends in the sector and their impact on working conditions. It summarises the EU-level policy context and its impact on the push towards electrification and covers the key technological developments towards more connected vehicles. It also provides an insight into trends regarding incentives and support (such as charging infrastructure and innovation in battery technology and battery production) for the more competitive production and greater take-up of BEVs.

Policy context

The European Commission's industrial action plan for the automotive sector characterises the industry as 'a core engine of European prosperity and an essential part of Europe's identity' (European Commission, 2025a, p. 1). It is a sector that has undergone and is still undergoing long-term change and development in the context of the impact of automation, but it is now facing structural transformation: a perfect storm of technological change, global cost and technology-based competition and policy-driven changes linked to environmental prerogatives and trade tariffs arising from protectionist agendas.

To meet the 1.5 °C target set in the Paris Agreement and to avoid irreversible climate change, the EU has to reach zero emissions by 2050 (European Commission, 2014; IPCC, 2018). The European Green Deal endorses this goal (European Commission, 2019). The transport sector accounts for 27 % of total carbon dioxide (CO_2) emissions in the EU, with almost half of these being attributed to passenger cars and the automotive industry (European Environment Agency, 2018). The European Green Deal requires vehicle manufacturers to transition to zero-emission vehicles by 2035, therefore spelling the end of ICE technology in automotive production. Although the 2025 action plan provides some additional flexibility for OEMs in terms of reaching their interim 2025 CO_2 emission targets, for both these large companies and small and medium-sized

enterprises (SMEs) in the sector in the EU, reaching such a target entails challenges for different parts of the value chain (European Commission, 2022) and the target has come under pressure in recent discussions in some Member States, including Germany. It also adds to the pressures on a sector that is still reeling from the effects of the COVID-19 pandemic, component supply shortages linked to Russia's war of aggression against Ukraine and the impact of global oversupply (which has been a feature of the sector for many years).

As mentioned, in response to the growing crisis in the European automotive industry, Commission President von der Leyen initiated a strategic dialogue on the future of the European automotive industry in 2025, which resulted in the publication of an industrial action plan for the European automotive sector in March 2025. The action plan includes measures to boost European collaboration in the development of connected and autonomous vehicles. It seeks to boost demand for such vehicles through purchase incentives and the enhanced roll-out of charging stations. It also includes measures providing continued support to the EU battery industry, building on the European battery alliance initiative launched in 2017. To address the more social dimension of changes in the sector, the action plan provides for alterations to the European Globalisation Fund Regulations to ensure access to support prior to dismissals, increase support from the European Social Fund Plus for reskilling and employment transfers and provide other measures to support upskilling and reskilling for workers in the sector. The EU Fair Transition Observatory is to be established to collect data on future job risks and skills gaps. Skills research and delivery can build on the work of the existing Automotive Skills Alliance. This alliance was formed in 2020 under the pact for skills, with the goal of upskilling 5 % of the workforce (approximately 700 000 workers) each year, utilising EUR 7 billion in funding from industry and EU funds (European Commission, 2024a).

In its 2026 work programme, the European Commission reinforces its commitment to supporting the automotive sector in tackling the challenges it faces and indicates future action to promote small, affordable cars and to provide further support for battery manufacturing. Furthermore, it propose an initiative on social leasing to make zero-emission vehicles more affordable for all (European Commission, 2025b).

The important role of social partners in managing change in the sector is acknowledged, reflecting the tenor of the European Commission's 2023 communication on strengthening social dialogue in the European Union: harnessing its full potential for managing fair transitions. In that document, the European Commission emphasised the importance of collaboration between the Commission and the social partners on the challenges arising from the twin transitions and the vital role played by social partners in addressing such issues.

To ensure the achievement of the EU's climate targets and the future of the automotive industry, policies on support for the purchase of EVs, the improvement of the public charging infrastructure and strategies for improving the development of battery technology in the EU are key.

At present, around three quarters of Member States offer purchase incentives to individuals. However, there are important differences at the Member State level in the design and scale of such incentives. There is also a trend towards reducing purchase incentives.

Another important factor in the adoption of EVs is the availability and affordability of public charging infrastructure. The regulation on the deployment of alternative fuels infrastructure, passed in 2023, requires interoperable, fast-charging stations to be installed every 60 km along highways by the end of 2025 (European Union, 2023). A goal has been set to have 1 million public charging points by 2025 and 3.5 million by 2030 to support the vehicle electrification needed to reach the proposed 55 % CO_2 reduction for cars. Some stakeholders estimate that a much higher volume of charging points will be needed to meet demand. For example, the European Automobile Manufacturers' Association (ACEA) claims that 8.8 million charging points will be needed by 2030, which would require 1.4 million chargers to be installed each year (ACEA, 2024). Various EU-level funding sources are available to support the provision of such facilities in the Member States, including the Alternative Fuels Infrastructure Facility and the EU Just Transition Fund's community facilities EV charging scheme. Member States also offer incentives for the installation of public (and private) chargers.

In 2024, there were around 770 000 public EV charging points available across the EU to support a total of around 5 million BEVs and 3.6 million PHEVs on the EU's roads (European Commission, 2024b). Close to 60 % of all chargers are located in three Member States: the Netherlands, Germany and France. So far, only around 14 % of chargers offer fast charging and 55 % offer limited accessibility.

In relation to battery manufacture, the EU has set a target of reaching 25 % of global production capacity by 2030, with more than 30 gigafactories by that date. Europe currently accounts for 7 % of the world's battery production capacity, making it the world's second largest producer, ranking equally with the United States but far behind China (76 %). In 2022, lithium-ion battery production capacity in Europe was 70 GWh. According to the European Court of Auditors, based on industry projections, this capacity could reach 520 GWh by 2025 and 1 200 GWh by 2030, mainly in Germany, Sweden, Hungary, France and Italy (European Court of Auditors,

2023). The emerging battery industry is currently highly exposed to competition from foreign producers, particularly from China but also South Korea. Chinese producers enjoy major competitive advantages, notably the control of their supply chain for minerals and components and also economies of scale thanks to the strength of their domestic market. In 2022, the Commission stated that there are 70 major battery projects in the EU, which have created a large demand for experienced and skilled workers. However, there is a shortage of suitably qualified staff in a number of areas, such as high-quality, high-volume, highly digital and technically complex production processes, chemical engineering and mass production expertise (European Parliament et al., 2021). The Commission-led project 'Alliance for batteries technology, training and skills' (Albatts) launched in December 2019 as an initial response to coordinated efforts for future-proofing skills matching (Albatts, undated). However, with the bankruptcy of Northvolt in November 2024, questions have been raised regarding the ability of the EU to achieve its battery ambitions, given challenges in sourcing raw materials and the ongoing competition from lower-cost countries with lower environmental standards (European Parliamentary Research Service, 2025).

The twin transitions in the automotive sector: impact of technological developments

Impact of electrification

Electrification is, without a doubt, the biggest technological transformation the automotive industry has faced over the past century. The rapid advance of electrification is explained mostly by regulatory changes but also partly by faster-than-expected technological development. In China, a decade-long policy aiming to foster both market demand and production capabilities has turned the country into the most advanced EV market in the world. In Europe, the fit for 55 legislative package stipulates a ban on the sale of new automobiles that are not pure electric starting in 2035. Coupled with incentives for buying EVs and state efforts to develop indigenous EV supply chain capabilities, the EU has the most comprehensive policy package for stimulating EV demand and production. The EU and its Member States are, however, latecomers and catching up with China will prove very difficult, especially from the technological and cost base points of view.

The shift to pure EVs involves a massive transformation of the automotive value chain. BEVs do not need combustion engines or gearboxes and nor do they need exhaust and fuel systems, emission control components, filtration or many other components. Conversely, they require batteries, electric motors, converters, inverters, new cooling systems and recharging interfaces. In other words, what is required is a complete overhaul of a large part of the automotive industry, on both the supplier and OEM sides.

Vehicle manufacturers have already begun to adapt their product portfolios, but this is leading to a shift in production processes and skills requirements. Component suppliers often face even greater challenges in repurposing or converting their existing activities towards new growth markets, leading to a decline in employment among certain suppliers and a shift in employment to others where such conversion is not taking place. The challenge is particularly significant in certain regions of the EU where there are severe impacts on jobs. Differences may also emerge between producers in western and eastern Europe not only as a result of differences in the take-up of EVs but also due to decisions on the nature of production and capacity largely being taken at a company's headquarters (largely in western Europe; Pavlinek, 2023).

It is estimated that the labour intensity of a battery electric car is 61 % of that of a diesel car (Galgóczi, 2023). While the assembly plants of the car brands themselves are definitely at risk, it is the suppliers further up the supply chain that are expected to bear the highest cost of the transitions, as the industry outsources up to 75 % of the value of the components (Çinar, 2020). Some estimates suggest that, by 2035, in the absence of any policies or technological advances, if all vehicles produced in Europe are EVs, a large share of workers will have to switch jobs, change tasks in their current jobs or exit the labour market through retirement, emigration or unemployment (Celasun et al., 2023).

Investment is a leading challenge for the twin transitions in the sector. It is estimated that each carmaker will have to spend more than EUR 60 billion to address established and emerging trends in automation, connectivity and electrification (Holland-Letz et al., 2021). A significant challenge will be faced by SMEs that specialise in manufacturing products that the transitions will gradually render less relevant (such as parts of ICEs) and those in the aftermarket. The workers of these SMEs will probably need to participate in reskilling and upskilling programmes to be able to seize new opportunities in other sectors of economic growth. These programmes will need to be appropriately designed to take into account the current skills profiles of these workers and the skills needed in the new (sub)sectors and will need to address the challenge that the geographical and regional distributions of the jobs affected and created may not overlap. Aftermarket SMEs in 'repair shops' will increasingly need digitally literate employees who can be employed as computer technicians and material experts for the repair of 'newer' car models given the likely reduced demand for maintenance staff servicing EVs.

Impact of automation and digitalisation

Automation

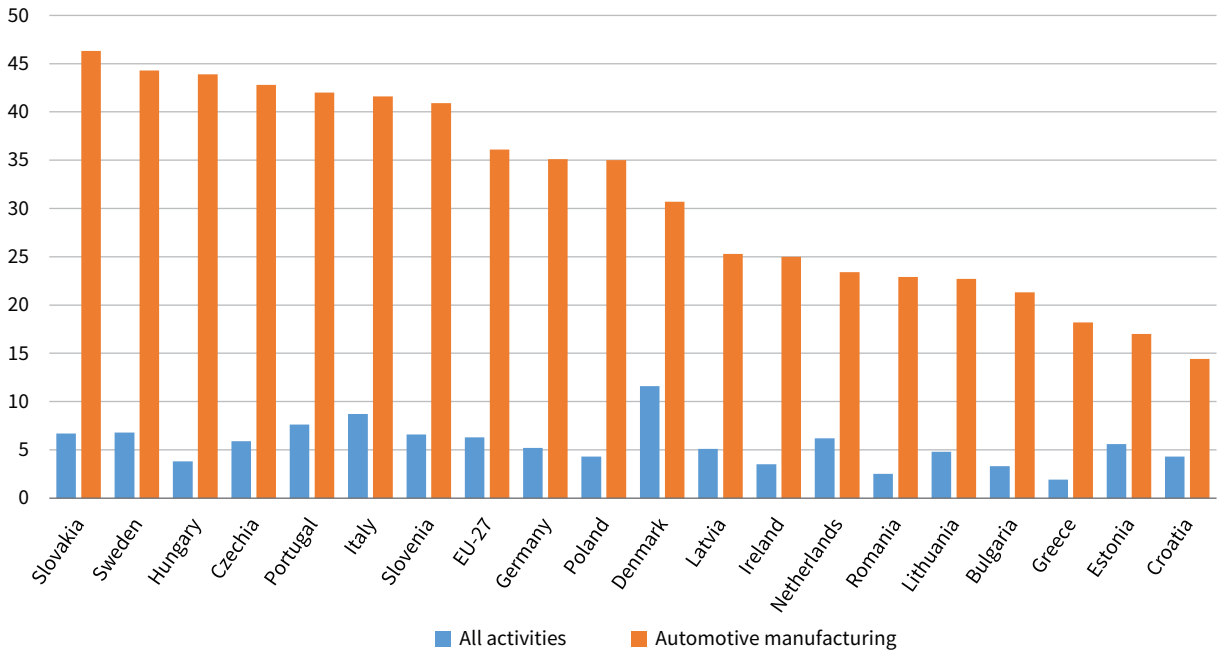
Technological upgrading in automotive manufacturing has been a topic of debate for decades. The digital transition is just the latest iteration of a technological transformation that first focused on hardware (automated machinery). The automotive industry has long been a (if not the) major point of interest for industrial automation in general and remains to this day one of the largest customers for industrial robots and industrial automation.

To a great extent, today's digital transformation is an extension and perfection of the automation trends that swept through the industry in previous decades, with the widespread use of robots, collaborative robots (cobots) and connected logistics. Some trends, such as automated forklifts and remote maintenance, are still being piloted; others, such as three-dimensional printing and nano-electronics, promise significant productivity gains only sometime in the future. The use of the internet of things is becoming more widespread, and big data applications in the production and operation of vehicles are making cybersecurity applications more and more relevant (Lefeuvre and Guga, 2019).

In the EU, the automotive manufacturing sector is one of the most automatised industrial sectors, with the share of companies that deploy robots being much larger than in other industries.

Robot use is characterised by a high degree of geographical concentration. More than half of the total robot stock in the automotive sector (118 000) in the EU is located in Germany. The markets in Spain, France, Czechia and Italy each account for between 5 % and 9 % of operational industrial robots in the EU. Furthermore, more than 40 % of automotive companies in Czechia, Hungary, Italy, Portugal, Slovakia, Slovenia and Sweden use either industrial or service robots. While the industry's degrees of automation in countries such as Bulgaria, Croatia, Greece, Estonia, Lithuania and Romania are much lower, they remain well above the national averages. The widespread use of robots in the sector is not new and is driven by quality and worker safety standards and also the need to raise productivity amid an increasingly competitive global automotive industry (Figure 1).

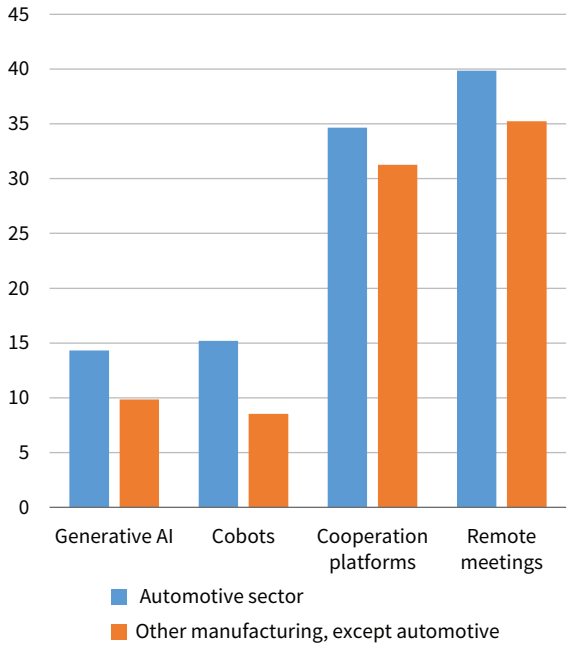
Figure 1: Share of companies using industrial or service robots in automotive manufacturing and all sectors by Member State, 2022 (%)



Note: No data for Austria, Belgium, Cyprus, Finland, France, Luxembourg, Malta and Spain.
Source: Eurostat (isoc_eb_p3dn2).

However, the use of technologies in the automotive sector spans beyond robots. As Figure 2 shows, the sector leads across all technologies. Around 15 % of the workforce in the automotive industry uses generative AI and cobots compared with fewer than 10 % of companies in the rest of the manufacturing sector. At the same time, the use of cooperation platforms and technologies for remote meetings is also more widespread in the automotive sector than in the broader manufacturing sector. Furthermore, EWCS data indicate that more than 1 in 10 workers in the automotive sector use wearable technology more than half of the time, compared with 7 % of workers in the wider manufacturing sector.

Figure 2: Share of workers using various technologies in the automotive sector and other manufacturing (%)



Note: Weighted estimates.
Source: Own calculations based on EWCS trend dataset.

Digitally connected vehicles

As with battery production, Europe is facing competition in the field of digital technologies and research and development (R & D). Under the dual impact of product simplification and increasing complexity of use (the move from the car to the concept of shared, connected multimodal mobility, etc.), the technological and R & D challenges have shifted. While the combination of platforms and power trains has long been a major barrier to entry into the automotive industry, accounting for around a third of a manufacturer's added value, the challenges of the car of the future will revolve around software (whether on board or not) and data (digital platforms, services, etc.). According to PwC, the share of software in the added value of a vehicle could rise from 20 % today to 60 % in 2030 (Strategy&, 2018). At the same time, the market for automotive-related data will increase sixfold, from EUR 2 billion to EUR 12 billion a year.

The digital ambitions that carmakers established in 2021 have technical prerequisites that are far removed from the traditional skills of a carmaker, namely information technology (IT) skills. They must therefore acquire new skills. The strategy for achieving this varies from one manufacturer to another. Some, like Volkswagen, have declared their ambition to internalise these skills. The two major French manufacturers have made different choices. Renault has chosen to use external solutions, while Stellantis has opted for mixed solutions: without completely reinternalising software production, the group has announced the creation of its software department (4 000 people by 2025) to enable it to adapt to the speed of the digital development cycle.

Uncertain outlook

Any assessment of the impact of electrification and digitalisation on employment and working conditions will have to account for the still very high level of uncertainty regarding the implications of vehicle electrification for the European automotive industry. This was most recently evidenced by the rapid and largely unexpected developments in 2023 and 2024, when major European carmakers announced slowdowns in their EV industrial plans. From a technology point of view, European automotive executives claim that the new industry entrants are a generation ahead of European incumbents. This concerns not just battery technology but also software development and overall vehicle engineering. From a cost perspective, it is widely acknowledged that Tesla and Chinese OEMs are capable of producing cars far more cheaply than European OEMs: PwC estimates that production cost differences between China and Germany are of more than 40 % to the advantage of China. Financing has also proven far easier for pure EV companies, with their stock market capitalisation several times higher than that of traditional OEMs (IEA, 2022).

It is unclear whether the situation will change again in the near future, but, at this time, the European automotive industry appears to be facing significant threats, especially from highly competitive EVs from new industry entrants. Negative employment scenarios have emerged as a result, emphasising the possibility of EU automotive incumbent companies losing out massively to imports and new entrants setting up investments in the EU (Waas et al., 2023). The materialisation of such scenarios could lead to major employment changes entirely unanticipated by existing analyses (see also Chapter 3).

A vital aspect of this transformation could be the geographical reconfiguration of the industry. The

automotive industry in Europe is clustered in several regions across the EU, where it plays a central role in local economies, employment and innovation. In these regions, the successful transition of the automotive industry is crucial not only for meeting climate and industrial goals but also for safeguarding the long-term attractiveness, competitiveness and prosperity of the territories involved (European Committee of the Regions, 2024). Recognising the disparities in how this automotive transition will affect different parts of the EU, the European Committee of the Regions established the Automotive Regions Alliance in 2022 in order to bring together regional and local authorities from areas with a strong automotive presence and to highlight the importance of finding place-based solutions.

The European automotive industry has shifted over the past few decades, moving from nationally contained industries to a regionally integrated one.

Three subregions can be identified as a result of this.

- **Core western/northern European countries (primarily Germany, France, Sweden and the United Kingdom).** These are countries with historically strong automotive industries that are the headquarters of the largest OEMs, which control most of the vehicle production across the region.
- **Southern Europe (Italy and Spain).** In the 1980s, southern Europe emerged as a low-cost location and the target for foreign direct investment for OEMs in core countries. Today, the automotive industries are practically entirely controlled by companies from core countries. This was the 'first wave' of the industry's regionalisation, which did not initially involve north–south delocalisation but rather focused on the expansion of core OEMs into markets with high potential. The cost advantage of southern countries became increasingly important (notably that of Spain).
- **Eastern countries (mostly Member States in central and eastern Europe).** In these countries, the automotive industry grew at breakneck pace starting in the late 1990s to early 2000s. Significantly lower costs (primarily but not only for labour) and large amounts of State aid constituted the main incentives for transforming the region into the export-oriented automotive powerhouse it is today.

While electrification is unlikely to radically transform this geographical set-up, some significant shifts are already visible.

- **Reinvestment in core countries (OEM headquarters).** The transition to EVs has, at least in its initial phase, led to a resurgence of investments on the part of OEMs in their home countries (for example, Renault in France and Volkswagen in Germany), including in new manufacturing capabilities specialised in EV production. This has been facilitated by governments and trade unions.
- **Strengthening of industrial capacities in central and eastern Europe (cost competitiveness remains paramount).** Major automotive-producing countries in central and eastern Europe (for example, Czechia and Hungary) have begun to make the transition very early. While core countries maintain their strategic position as the headquarters of OEMs, the cost advantage of central and eastern European countries is proving even more significant in an EV world in which pressures on cost and profitability are more crucial than ever.
- **Potential pincer effect in the south (no headquarters, relatively high cost, large investments favouring broader restructuring).** The exact consequences of the EV transition for southern European countries are difficult to pinpoint at this time, but, given the foreign ownership of their industrial capacities and their cost disadvantage compared with central and eastern Europe, they have not been a priority for EV-related investments thus far. The risk in their case is double: (i) remaining behind in the EV transition, as investments are concentrated in the locations of core headquarters and low-cost countries, and (ii) losing part of their industrial capacities, as companies justify the broader restructuring of their industrial footprint by pointing to the existential need to achieve a successful EV transition.

2 Employment and company structures in the automotive sector

Key takeaways

- Automotive manufacturing is relatively concentrated, with only 19 100 companies active across the EU. OEMs account for 2 800 enterprises, which are much larger on average (396 employees per enterprise) than suppliers (9 400 enterprises, with an average size of 133 employees).
- 120 OEMs have 250 employees or more and employ over 1 million people, with an average size of 8 937 employees.
- The supplier industry is more fragmented, but large companies still account for over 83 % of employment in this sector. More than 60 % of enterprises have fewer than 10 employees, but these account for only about 1.1 % of total employment.
- Both OEMs and suppliers are highly concentrated in regional value chains.
- The situation is radically different for the dealership part of the sector, where SMEs have a much more significant presence than in manufacturing. Enterprises with 0–9 employees constitute over 90 % of all enterprises in sales, maintenance and repair, and the aftermarket.
- Across the EU, while employment in the vehicle manufacturing sector increased between 2019 and 2023, there was a decline in total employment of 8.8 %, from 1.37 million to 1.25 million. In Germany, employment declined from 730 000 to around 614 000 between 2019 and 2023 (– 116 000).
- Overall, 110 000 jobs were lost in the EU vehicle supplier sector between 2019 and 2023.
- In 2024 and the first quarter of 2025, announcements of large-scale restructuring in the automotive industry mostly concerned job contraction and totalled around 106 500 announced job losses. Around 5 700 job losses were related to offshoring, including 3 600 beyond the EU.
- At the EU level, the workforce in both the manufacturing and the sales sector is predominantly made up of men. The share of women in manufacturing employment grew over the period considered, while the share in dealerships stagnated. The workforce is ageing in both sectors, with the share of employees aged 50 years or over increasing from below 25 % to 30 % in both.
- Predictions of future employment effects tend to be affected by the breadth of the sector taken into account; they tend to predict negative developments if only the vehicle manufacturing and supplier industries are considered and indicate stability or employment growth if sectors such as battery manufacture and EV infrastructure management are taken into account.

This chapter provides an overview of the development of company and employment structures and trends in the automotive sector, providing information on the important differences between countries linked to the abovementioned geographical configuration of the industry.

Enterprises in the automotive sector

Automotive manufacturing is relatively concentrated, with only 19 100 companies active across the EU (see Table 1). Among these, OEMs account for 2 800 enterprises, which are much larger on average (396 employees per enterprise) than suppliers (9 400 enterprises, but with an average size of 133 employees).

Table 1: Number of enterprises and average enterprise size, EU-27, 2023

	Enterprises (thousands)	People employed per enterprise
Automotive manufacturing	**19.1**	**128**
OEMs	2.8	396
Bodies and trailers	6.9	24
Suppliers	9.4	133
Dealerships (excluding sales and maintenance and repair of motorcycles)	**880.5**	**4**
Sales	270.5	6
Maintenance and repair	501.0	3
Aftermarket	109.0	6

Source: Eurostat (sbs_sc_ovw).

In reality, both OEMs and suppliers are much more concentrated than these values suggest. Table 2 gives a clearer indication of this.

- 120 OEMs have 250 employees or more. In total, these companies employ over 1 million people (out of a total of 1.1 million), with an average size of 8 937 people employed. More detailed values reveal that a handful (10–20) of OEMs account for the vast majority of economic activity and employment in this sector. The remaining companies are much smaller in size and deal primarily with bespoke and very-low-volume manufacturing.
- The supplier industry is more fragmented, but large companies still account for over 83 % of employment in this sector. However, in contrast to the situation with OEMs, the share of medium-sized companies (50–249 employees) is not negligible in terms of employment, at around 12.8 %.
- At the same time, the business demography in the supplier industry indicates a high degree of fragmentation. More than 60 % of enterprises have fewer than 10 employees. However, these enterprises only account for about 1.1 % of total employment.

The situation is radically different for the dealership part of the sector, where SMEs have a much more significant presence than in manufacturing (Table 3).

- Large enterprises represent less than 1 % in all three subsectors (sales, maintenance and repair and the aftermarket). Another commonality for all three is the large proportion of companies that are self-run or have a single employee: these represent over 50 % of the number of enterprises in the sales subsector and over 40% in the maintenance and repair subsector. When combined, enterprises with 0–9 employees constitute over 90 % of all enterprises in sales and aftermarket and almost 80 % in maintenance and repair.
- Large enterprises nonetheless have a significant presence in the sales and aftermarket subsectors, where they account for approximately 62 % of employment. On average, these companies are quite large (with averages of 696 employees for sales and 915 for the aftermarket), which indicates that large chains of automotive dealers and aftermarket retailers have a strong presence in the EU. Enterprises with 50–249 employees also contribute significantly to employment in sales (22.8 %) and the aftermarket (14.2 %).
- The maintenance and repair subsector shows a different employment pattern. Here, small enterprises (2–9 employees) are the largest employers, accounting for 36.3 % of total employment and 35 % of enterprises. Even microenterprises (0–1 employees) contribute substantially to employment in this subsector (12.1 %). In contrast, large enterprises (250+ people) play a much smaller role in employment in maintenance and repair (1.9 %) than in the other two subsectors.

Table 2: Enterprise size and employment for automotive manufacturing, EU-27, 2023

	Enterprise size (number of people)	Enterprises		Employment		Average number of people per enterprise
		Number	Share of total (%)	Number of people (thousands)	Share of total (%)	
OEMs	**0–249**	2 630	96	17.6	1.6	6.7
	250+	120	4	1 072	98.4	8 937
Suppliers	**0–9**	5 696	60.3	12 803	1.1	2
	10–19	800	8.5	11 178	0.9	14
	20–49	808	8.6	26 277	2.2	33
	50–249	1 245	13.2	152 511	12.8	122
	250+	900	9.5	990 167	83	1 100

Source: Eurostat (sbs_sc_ovw).

Table 3: Enterprise size and employment of automotive dealerships, EU-27, 2023

	Enterprise size (number of people)	Enterprises		Employment		Average number of people per enterprise
		Number	Share of total (%)	Number of people (thousands)	Share of total (%)	
Sales	0–1	138 017	59.3	119.4	8.1	1
	2–9	76 492	32.9	264.5	18.1	3
	10–19	8 549	3.7	116.0	7.9	14
	20–49	5 816	2.5	180.0	12.3	31
	50–249	3 307	1.4	334.0	22.8	101
	250+	650	0.3	452.7	30.9	696
Maintenance and repair	0–1	266 833	43.7	251.6	12.1	1
	2–9	213 587	35.0	756.4	36.3	4
	10–19	16 000	2.6	200.0	9.6	13
	20–49	4 060	0.7	113.6	5.4	28
	50–249	753	0.1	68.3	3.3	91
	250+	70	0.0	39.9	1.9	570
Aftermarket	0–1	52 842	48.6	49.0	7.5	1
	2–9	47 200	43.4	171.0	26.0	4
	10–19	5 142	4.7	68.3	10.4	13
	20–49	2 397	2.2	71.1	10.8	30
	50–249	927	0.9	93.1	14.2	100
	250+	223	0.2	204.0	31.1	915

Source: Eurostat (sbs_sc_ovw).

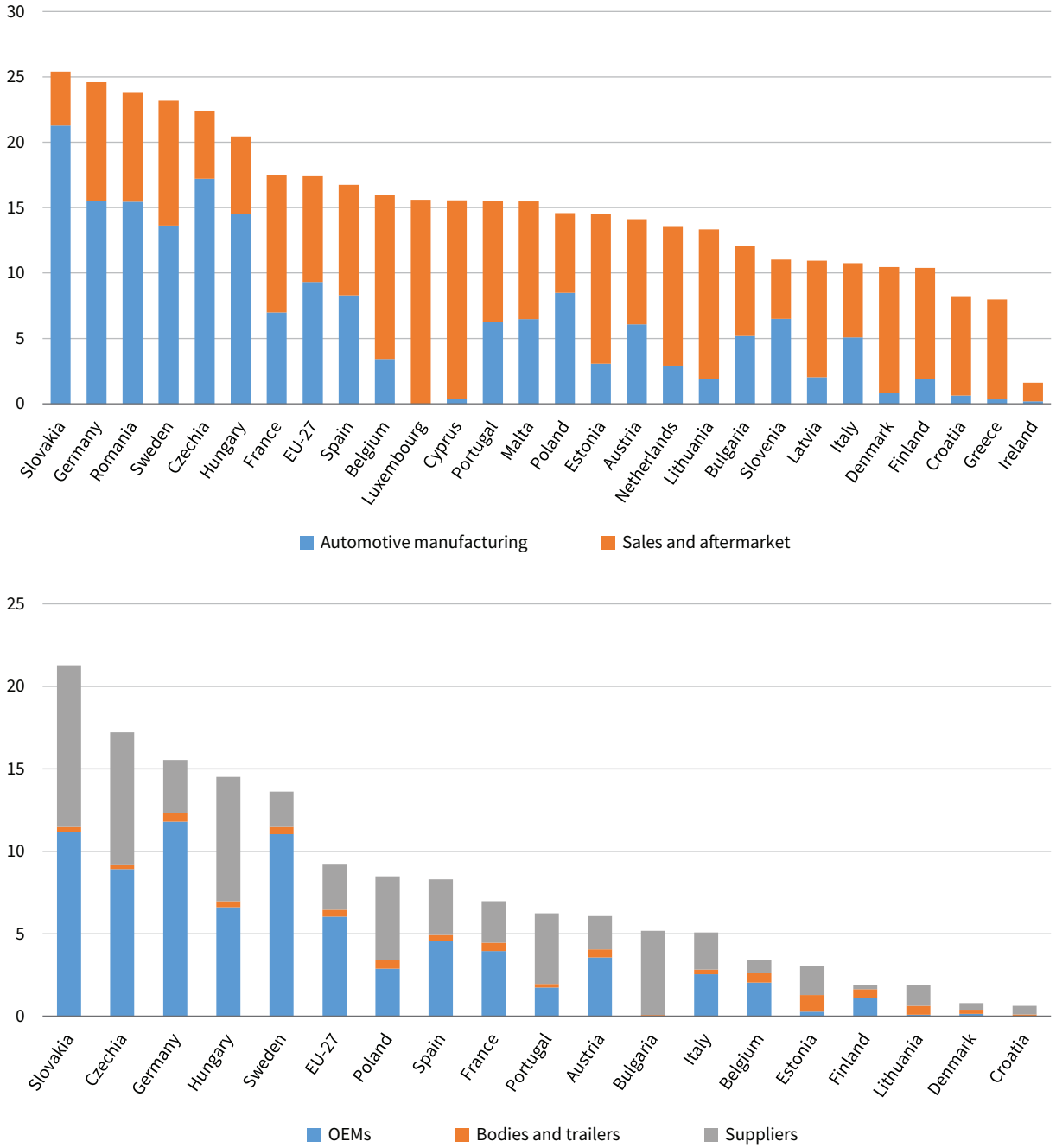
The geographical structure of these two large sectors (manufacturing and dealerships) corresponds to these patterns of concentration/fragmentation. Vehicle manufacturing is highly capital intensive and takes place in large industrial sites. Suppliers are typically found in proximity to vehicle manufacturing locations but, depending on logistics arrangements and costs, some suppliers can be located thousands of kilometres away from their customers. For market coverage reasons, vehicle sales, maintenance and repair and aftermarket activities are geographically spread out. It is important to note that the automotive industry is regional and not global per se. This means that the European automotive industry comprises a practically complete value chain (semiconductors are one significant exception). The same is the case for other major automotive markets (North America, China, Japan, etc.). The reasons for this are multiple: just-in-time manufacturing does not allow for supply chain disruptions or delays, which are more likely the more spread out the industry is; logistics costs have to be kept low; OEMs and suppliers have to maintain close relationships to maintain production flow and quality; and regional markets are very different, with very few truly 'global' vehicles that would allow for a supra-regional concentration of production. Major automotive regions are far from homogeneous, with each typically having low-cost areas (eastern Europe, Mexico, some parts of South-East Asia) where suppliers and some OEMs produce items for export to higher-cost countries in the same region. This geographical arrangement has been stable for decades. Recent supply chain disruptions are very likely to reinforce the regional dynamics of the automotive industry, notably for semiconductor supply (which has, until now, been concentrated in Asia).

According to ACEA data, there are 194 vehicle manufacturing plants in the EU, which include sites producing vans, trucks and buses and those producing engines and batteries (again, historically, engine plants were owned by OEMs, but such ownership remains an exception for battery plants). Germany has the most plants, followed by France, Italy and Spain. France and Germany are also where most OEMs active in Europe are headquartered; much of the European automotive industry (OEMs and suppliers included) is owned by French and German corporations or by non-EU (Japanese, US) corporations that have their European headquarters in these Member States. For decades, southern European countries have been regarded as both low-cost production locations and large markets. Eastern Europe has seen heavy automotive foreign direct investment over the past two decades, notably from western Europe (especially France and Germany), and the sector is today the region's main export driver.

In both eastern and western European countries, the automotive industry is regarded as having huge strategic value for economic developments, albeit in different ways. Western countries, especially Germany, have been particularly keen to maintain and even expand their OEM industrial base, while allowing suppliers to move more freely to low-cost countries. This has also reduced the cost base for OEMs, thus contributing to maintaining cost-competitive vehicle assembly in high-cost countries. Suppliers in eastern Europe are more 'low key', but they typically benefit from comparatively much lower labour costs, coupled with strong incentives from governments (tax exemptions, State aid, etc.). This is most obvious in Poland and Romania, while Czechia, Hungary and Slovakia have OEM capabilities that can rival those of most other countries (except Germany).

These dynamics are evident in Figure 3. The share of automotive value added in the manufacturing sector is relatively similar in Slovakia, Germany, Romania, Sweden, Czechia and Hungary. In all these countries,

Figure 3: Share of automotive value added in manufacturing value added by broad sector (upper panel) and by components of the automotive manufacturing sector (lower panel), by Member State, 2021 (%)



Note: Data in lower panel missing for Greece, Ireland, Latvia, Luxembourg, Malta, the Netherlands, Romania and Slovenia.
Source: Eurostat (sbs_sc_ovw).

the sector accounts for more than a fifth of the total value added in the manufacturing sector. However, while, in western Europe, OEMs account for a much larger share of the value added, in eastern Europe, suppliers rival the relative economic importance of OEMs for national economies.

Employment trends: into an uncertain future

Over the past few years, debates on the employment impact of the structural transformation of the automotive sector have been intense, but clearer indications of the impact are only now increasingly emerging. Much of the discussion initially focused on the sheer quantitative impact – namely, if electrification would lead to job losses or job gains. There are a wide variety of estimates, with some indicating massive job losses (see, for example, CLEPA and Strategy&, 2021), while others estimate job gains; there are also plenty of forecasts that estimate an entirely neutral employment impact (see, for example, Lefeuvre and Guga, 2019; Galgóczi, 2023). The estimates provided essentially depend on the nature of the sector and broader ecosystem that is included in such assessments, with narrowly focused studies generally predicting negative employment impacts while methodologies including estimates for employment creation in charging infrastructure services and wider battery manufacture usually estimate neutral or positive employment outcomes.

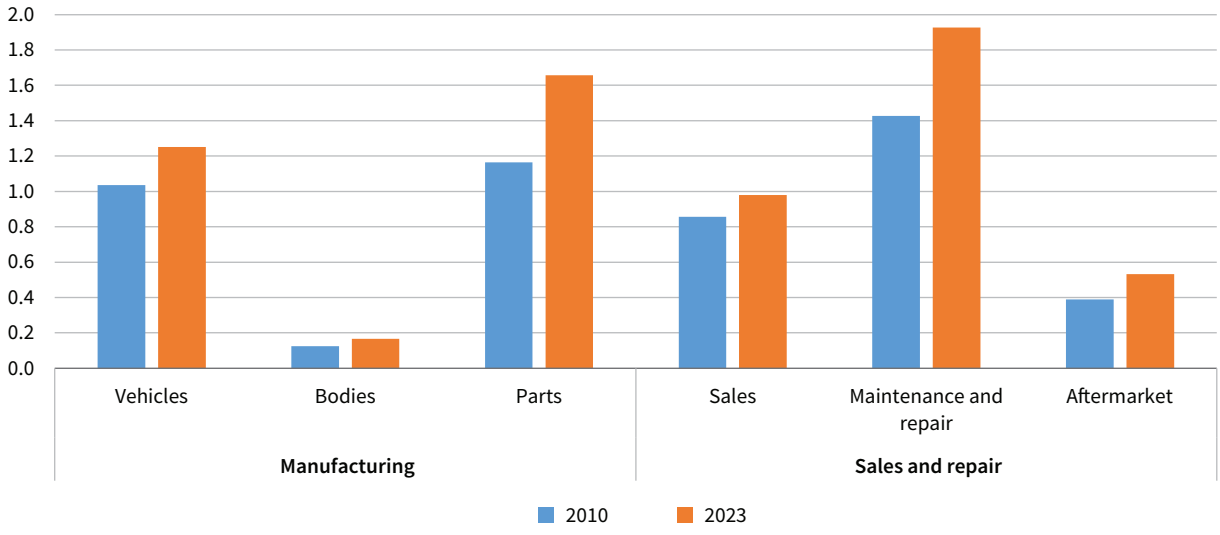
This section presents the development of employment in vehicle manufacturing, sales, repair and aftermarket before summarising the key findings of studies that have sought to assess the impact of the twin transitions on employment at both the EU and national levels.

Development of employment in the automotive sector over the last decade

Figure 4 provides details on employment in the two large automotive sectors (manufacturing and dealerships) based on their full NACE codes. Automotive manufacturing is split into three codes.

- **The manufacture of motor vehicles (NACE C29.1).** This subsector employed 1.25 million people across the EU in 2023. It includes the four 'classic' stages of vehicle manufacturing (stamping, body in white, paint and assembly) but also covers most of the manufacturing of large, key components that OEMs have historically been reluctant to outsource to suppliers (notably, the manufacturing of engines and transmissions). Since 2010, employment in this sector has grown by 214 000.
- **The manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers (NACE C29.2).** This is a much smaller manufacturing subsector (166 870 employees in 2023) and is much more specialised than OEMs. As such, this subsector is less affected by the green and digital transformations. Employment in this sector has expanded by around 40 000 since 2010.
- **The manufacture of parts and accessories for motor vehicles (NACE C29.3).** In short, this is the supplier industry. Over the decades, it has grown significantly as a result of OEMs, efforts to outsource what have been deemed 'non-core' parts of their business. According to Eurostat, the supplier industry employed almost 1.66 million people across the EU in 2023, compared with 1.16 million in 2010. This sector is highly affected by the shift from ICEs to EVs.

Figure 4: Employment in automotive manufacturing and sales and repair, EU-27, 2010 and 2023 (millions)



Source: Own calculations based on Eurostat data (accessed January 2025).

The sales and repair sector is highly diverse, and it encompasses several types of activities.

- **The sale of motor vehicles (NACE G45.1).** As of 2023, the sector employed almost 1 million people in the EU, having added 120 000 workers since 2010.
- **The maintenance and repair of motor vehicles (NACE G45.2).** This was around twice the size of sales activities, as of 2023. This is the sector that has seen the largest growth in employment since 2010, having added 0.5 million workers.
- **The sale of motor vehicle parts and accessories (NACE G45.3).** These activities employed 530 000 people in 2023.

Many of the companies whose primary activity is automotive sales are also considerably engaged in activities relating to maintenance and repair or the aftermarket. Traditional automotive dealers cover all three activities. This is not the case for automotive manufacturing, where the distinction between OEMs and suppliers is stark, no matter how closely some of them may be cooperating.

Trends in employment in vehicle manufacturing

While the figures above paint a relatively positive picture of the development of employment in the automotive sector, closer inspection reveals both significant differences between countries and concerning trends for some key 'traditional' automotive manufacturing countries, particularly after 2019.

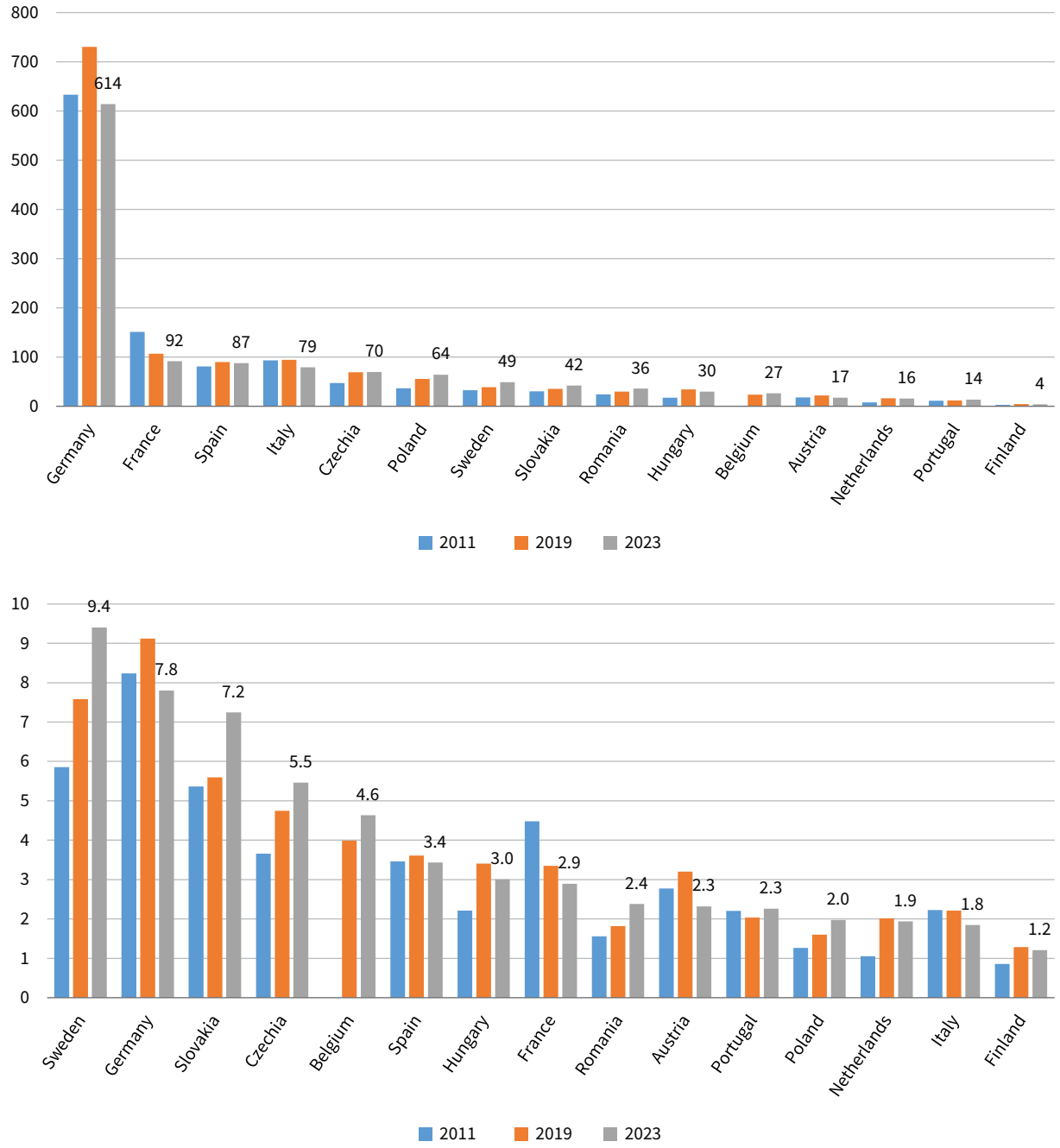
Figure 5 shows employment developments between 2011 and 2023 in Member States with significant OEM presence. Several important observations can be made.

- Across the EU, while employment in the vehicle manufacturing sector increased between 2019 and 2023, there was a decline in total employment of –8.8 %, from 1.37 million to 1.25 million.
- Germany – which, in 2019, had more people employed in vehicle manufacturing than all other countries combined – dominates the sector. Employment in the German vehicle manufacturing sector increased significantly between 2011 and 2019. Although the decline after 2019 is visible in the figures, a simple comparison of 2011 and 2023 would mask the underlying trend: employment first rose by around 100 000 to 2019, then dropped steeply to around 614 000 in 2023 (–116 000).
- France is the only important automotive country that experienced a structural decline over the period, with a decrease in employment of around 59 000 between 2011 and 2023. Between 2011 and 2019, employment decreased by 44 000, with a further 15 000 jobs lost between 2019 and 2023.
- In southern Europe, the sector contracted in Spain, with a loss of 3 000 jobs between 2019 and 2023. Italy experienced some fluctuation (with a small increase in employment between 2011 and 2019), but between 2011 and 2023 employment numbers reduced by 15 000.
- Between 2011 and 2023, there was significant growth in the share of automotive employment in total manufacturing employment in eastern countries (Czechia, Hungary, Slovakia) and also in Sweden. Sweden added close to 16 000 employees to the sector between 2011 and 2023. Hungary and Slovakia both recorded increases in employment in the region of 12 000 additional jobs, while Czechia and Poland added 23 000 and 27 000 jobs, respectively.
- Between 2019 and 2023, Sweden, Slovakia, Czechia, Belgium, Romania, Portugal and Poland increased their shares of employment in vehicle manufacturing as a percentage of total employment, whereas shares declined in the large vehicle production countries of Germany, France and Italy.

Trends in employment in the automotive supplier industry

As with vehicle manufacturing, overall employment in the supplier sector in the EU grew between 2011 and 2023. However, between 2011 and 2023, employment declined in Estonia, France, Germany and Sweden, with Germany witnessing the most significant reductions in employment (– 51 000; see Figure 6). Between 2019 and 2023, headwinds in the sector were also experienced in other Member States, with employment declining in Poland, Romania, Czechia, Hungary, Slovakia and Austria. Overall, 110 000 jobs were lost in the EU vehicle supplier sector between 2019 and 2023.

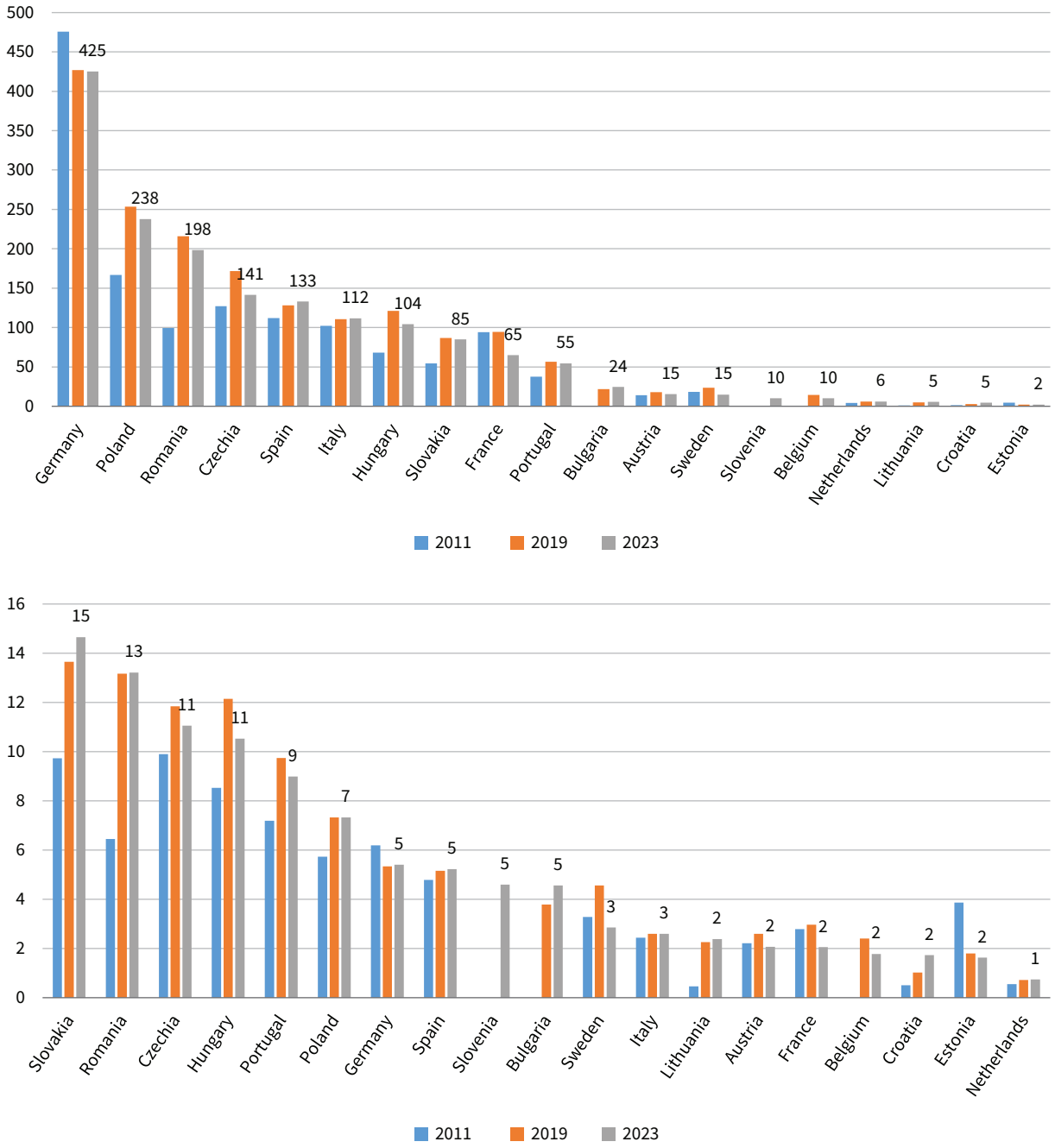
Figure 5: Employment in vehicle manufacturing OEMs (thousands) (upper panel) and share of total manufacturing employment (%) (lower panel) by Member State, 2011, 2019 and 2023



Note: Value labels show values for 2023.
Source: Own calculations based on EU-LFS ad hoc data extractions.

Suppliers have a relatively much heavier presence in eastern European countries. Germany still has the largest absolute number of people employed in the supplier industry, but, compared with countries in eastern Europe, it has stagnated (Figure 6). Poland, Romania and Czechia have the next largest supplier industries in the EU. A clearer east–west divide is apparent when looking at the share of the supplier industry in total manufacturing employment (Figure 6): the ranking is led by four eastern European countries. This is the result of, on the one hand, the development of OEM activity in eastern European countries, which needed much stronger local supplier industries, and, on the other hand, the relocation of much of the supplier industry for western OEM plants to low-cost eastern European countries.

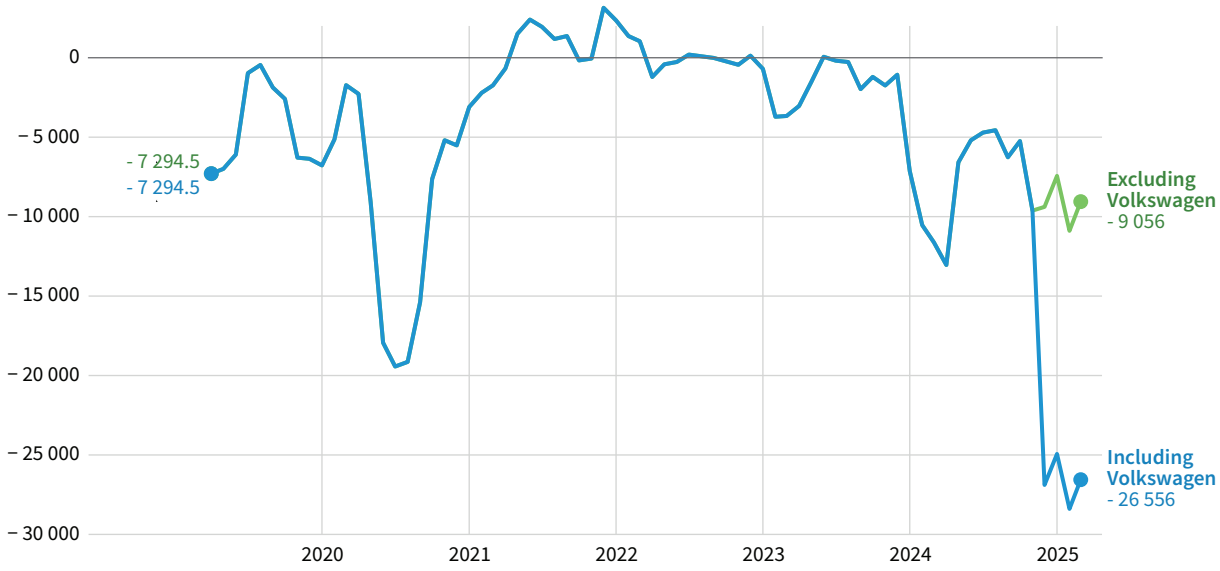
Figure 6: Employment in the supplier industry (thousands) (upper panel) and share of total manufacturing employment (%) (lower panel) by Member State, 2011, 2019 and 2023



Note: Value labels show values for 2023.
Source: Own calculations based on EU-LFS ad hoc data extractions.

In the absence of more recent annual data, indications of the development of employment in the automotive manufacturing sector can be drawn from the number and scale of restructuring cases reported to Eurofound's ERM, which captures announcements of restructuring affecting at least 100 jobs or 10 % of workers in enterprises with 250 or more employees. It may, therefore, not reflect incremental employment changes and developments in SMEs. In 2024 and the first quarter of 2025, announcements of large-scale restructuring in the automotive industry were made in most Member States (Figure 7). These mostly concerned job contraction and totalled around 106 500 announced job losses. Most companies mentioned rising costs, competitive pressures, declining domestic demand and the need to adapt sites to EV production as reasons for the job cuts.

Figure 7: Restructuring announcements in the EU's vehicle manufacturing sector, 2019–2025



Source: ERM.

Around 5 700 job losses were related to offshoring, including 3 600 beyond the EU, demonstrating the continuing emphasis on low-cost production in the context of increased competition from Asia.

Cases of job expansion in the sector were also reported in the ERM in 2024 and the first quarter of 2025. Around a third of these were related to business expansion by Chinese companies in the EU.

Employment trends in vehicle sales, repair and maintenance and the aftermarket

For the dealership sector, the situation regarding the distribution of employment is very different. This sector deals with services offered to the population, so it would be expected that larger countries would have more people employed in these activities (Table 4). We would also expect some variation in the three subsectors, with countries with higher average earnings having relatively more people employed in sales and countries with lower average earnings having relatively more people in maintenance and repair and, potentially, the aftermarket; this assumption is largely because, in poorer countries, the used car market is much more important, people hold on to their cars for longer and thus the cars need more maintenance and repair. These hypotheses are broadly confirmed: the Netherlands has a population similar in size to Romania (and Belgium's is similar to that of Czechia), but the number of people employed in sales is much higher; the reverse is the case for maintenance and repair and the aftermarket.

Between 2011 and 2023, employment in the sales of motor vehicles across the EU increased by around 58 000, after experiencing a decrease of around 39 000 between 2011 and 2015. Between 2015 and 2023, the increase in the number people employed in this sector was highest in Spain (27 000 additional employees), followed by Hungary (12 000) and France (5 800). Employment in the sector declined the most in Germany (– 22 400), Austria (– 10 700) and Italy (– 5 800). Employment also grew in the maintenance and repair and aftermarket sectors between 2011 and 2023, where the EU added 220 000 and 88 000 workers, respectively.

Table 4: Employment in sales, maintenance and repair and aftermarket activities, by Member State, 2023 (thousands)

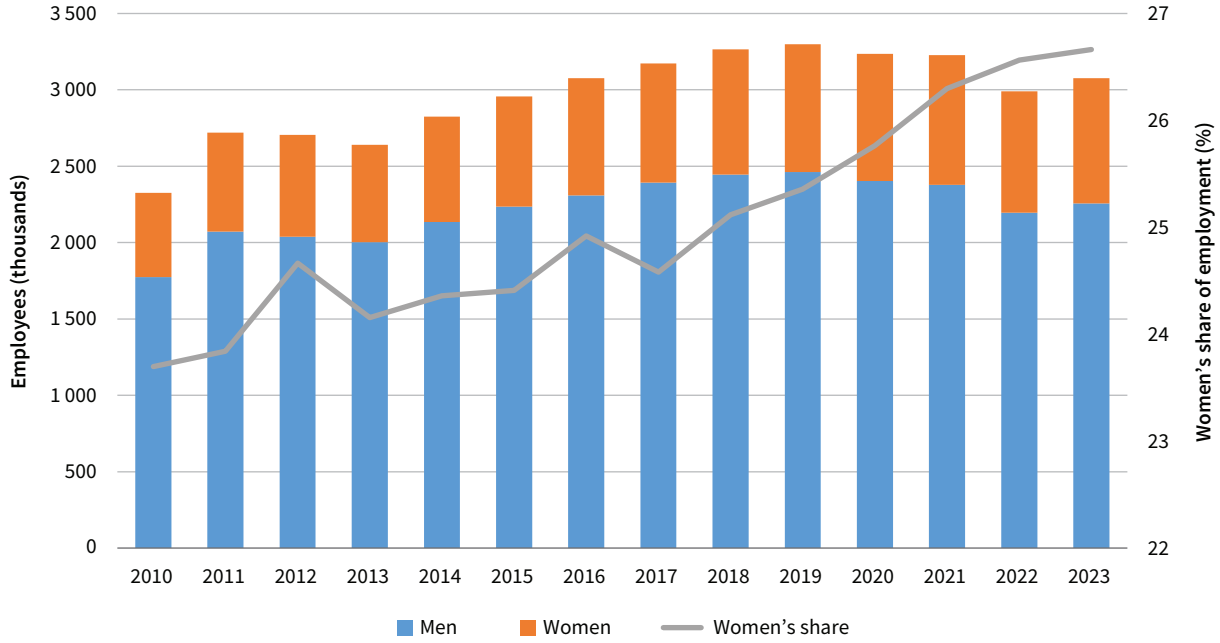
	Sales	Maintenance and repair	Aftermarket	Total	Share of total employment (%)
Romania	14.0	165.5	26.3	205.8	2.7
Latvia	3.2	13.4	3.7	20.2	2.4
Cyprus	1.4	6.8	2.3	10.5	2.3
Lithuania	5.5	14.2	10.6	30.3	2.2
Portugal	19.1	69.8	12.3	101.1	2.1
Poland	52.8	234.6	65.3	352.7	2.1
Estonia	3.1	8.7	1.9	13.6	2.1
Bulgaria	6.4	40.1	12.5	58.9	2.1
Hungary	22.5	47.1	15.0	84.6	1.8
Finland	11.9	22.7	10.7	45.3	1.8
Czechia	16.1	60.7	10.2	87.1	1.8
Austria	12.0	53.1	11.9	77.1	1.8
EU-27	980.0	1 926.1	531.3	3 437.4	1.7
Slovakia	8.7	28.3	6.5	43.5	1.7
Spain	87.8	224.0	41.3	353.2	1.7
Italy	83.7	256.1	46.2	386.0	1.7
Croatia	5.2	16.2	5.3	26.8	1.7
Germany	251.1	323.6	119.2	693.9	1.7
Greece	9.3	47.9	7.9	65.2	1.6
France	186.2	171.2	71.3	428.7	1.5
Slovenia	5.5	6.9	2.2	14.6	1.5
Belgium	28.9	34.7	7.5	71.2	1.4
Sweden	34.8	24.6	11.7	71.1	1.4
Denmark	22.8	11.7	4.5	39.0	1.4
Netherlands	72.6	21.2	14.5	108.3	1.2
Luxembourg	2.6	0.3	0.6	3.5	1.1
Malta	1.0	1.7	0.6	3.2	1.1

Note: No data for Ireland.
Source: Own calculations based on EU-LFS ad hoc data extractions.

At the EU level, the workforce in both the manufacturing and sales sectors is predominantly made up of men. The share of women in employment is higher for automotive manufacturing than for sales, maintenance and repair and aftermarket activities (see Figures 8 and 9). The share of women in manufacturing employment grew over the period considered, while the share in dealerships stagnated overall. In manufacturing, the trend is explained to a great extent by progressive automation, which has, on the one hand, reduced the share of blue-collar workers in the total workforce and, on the other, made the work less physically demanding. There is no such change for dealerships, which means that the traditional division of labour between men and women (for example, women taking administrative jobs while repair work is done by men) has remained mostly intact.

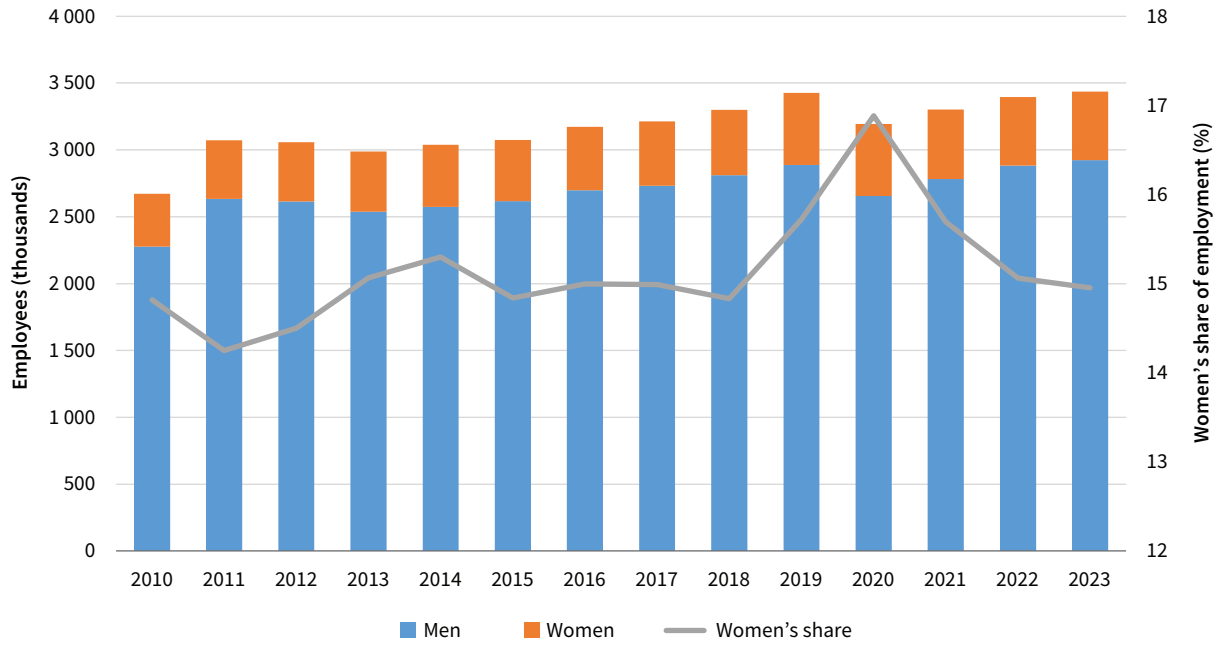
There are some significant differences in the gender distribution in employment between western and eastern European countries. For manufacturing, eastern countries tend to have a higher share of women than western ones (for example, 31.7 % for Poland versus 20.5 % for Germany in 2022). This is due to two factors: (i) the historically high participation rate of women in industrial work, dating from the second half of the 20th century, and (ii) the specialisation in low-cost, labour-intensive manufacturing in the supplier industry over the past two decades. The situation for commercial activities (dealerships) is rather the opposite (for example, 10.7 % women in Poland versus 20.1 % in Germany).

Figure 8: Gender distribution of the workforce in automotive manufacturing, EU-27, 2010–2023



Source: Own calculations based on EU-LFS ad hoc data extractions.

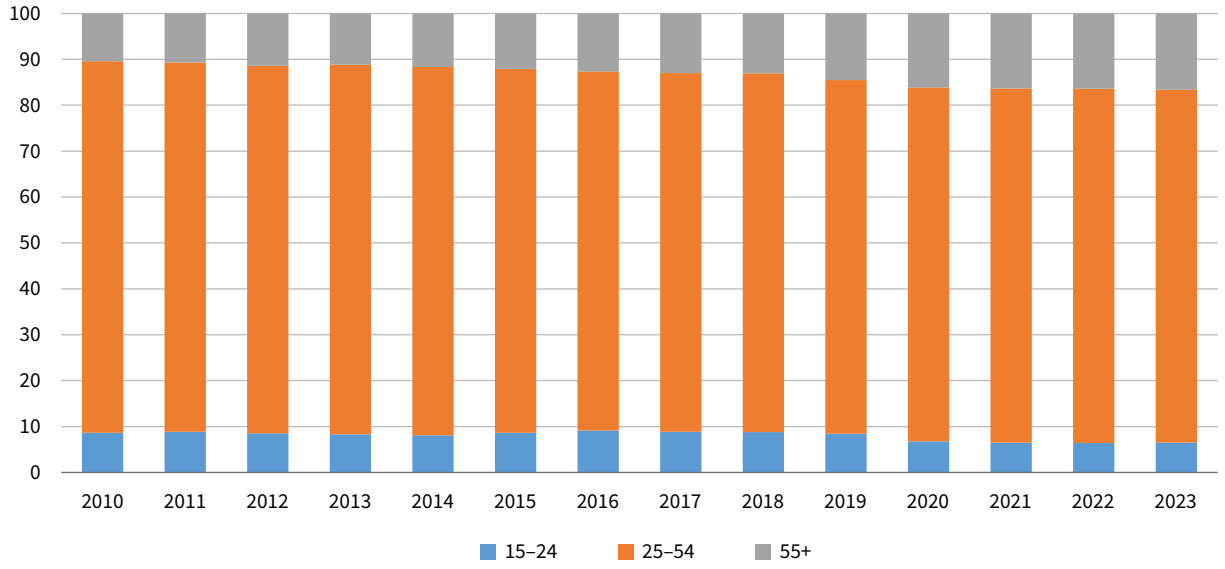
Figure 9: Gender distribution of the workforce in sales, maintenance and repair and the aftermarket, EU-27, 2010–2023



Source: Own calculations based on EU-LFS ad hoc data extractions.

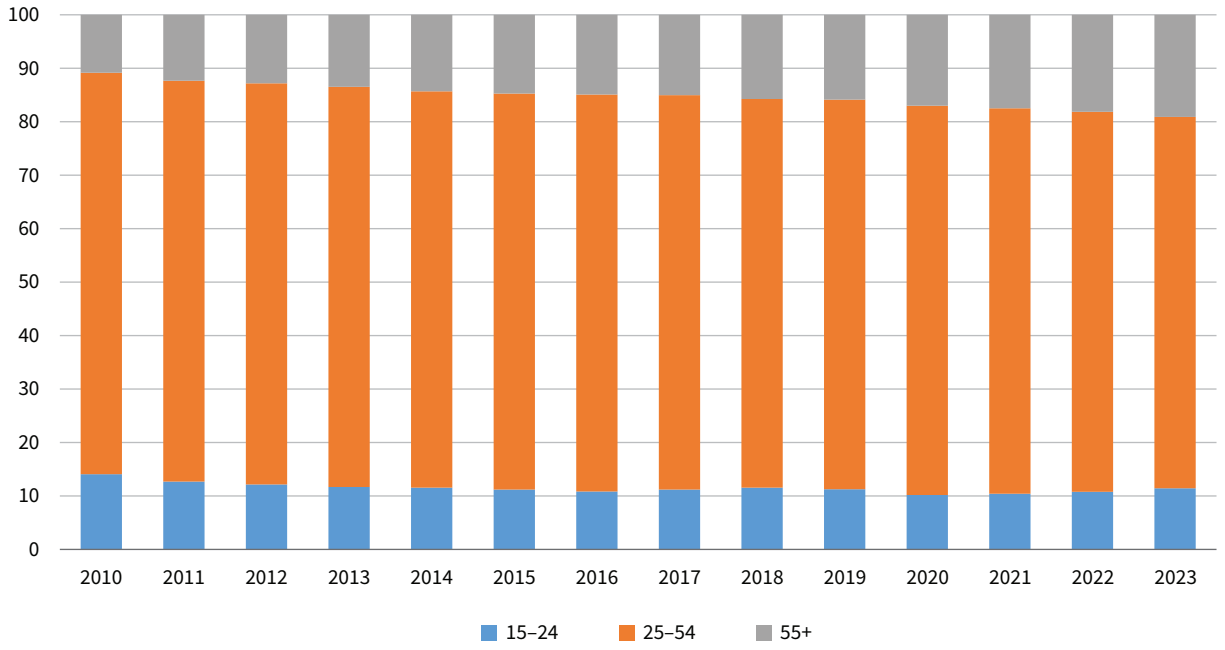
In terms of age, the workforce is ageing in both sectors (Figures 10 and 11). The share of employees aged 55 years or over has increased from around 10 % to almost 20 % in both sectors. The difference is that the share of young workers (aged 15–24 years) in dealerships has remained relatively constant (around 10 % of the workforce), while for manufacturing it has visibly shrunk.

Figure 10: Workforce age structure in automotive manufacturing, EU-27, 2010–2023 (%)



Source: Own calculations based on EU-LFS ad hoc data extractions.

Figure 11: Workforce age structure in sales, maintenance and repair and the aftermarket, EU-27, 2010–2023 (%)

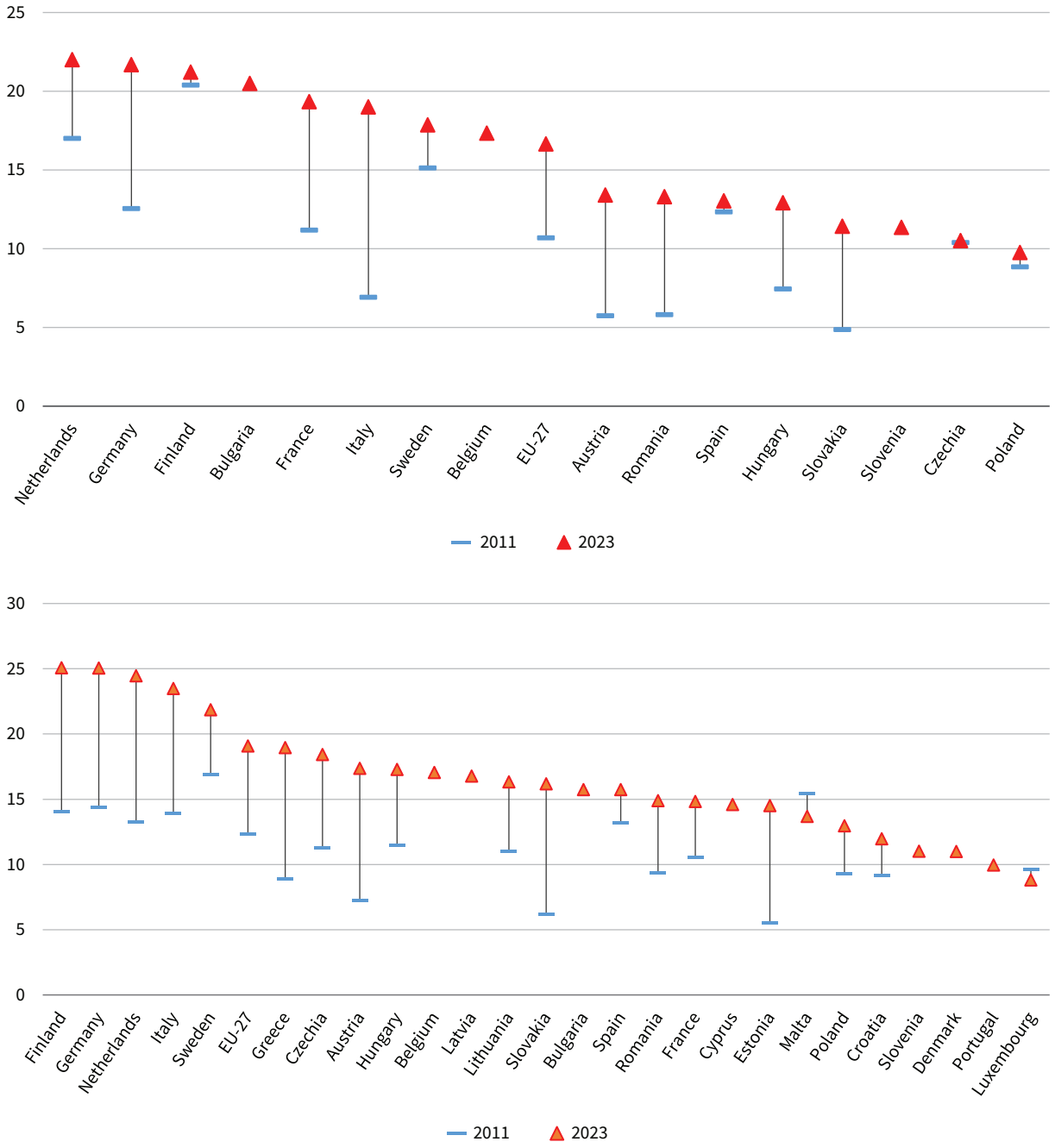


Source: Own calculations based on EU-LFS ad hoc data extractions.

The ageing of the workforce is a characteristic of almost all countries, with only the manufacturing sectors in Czechia, Finland, Poland and Spain not being affected by this over the period (Figure 12). It is notable that the share of older workers is much higher in western European countries, largely due to the fact that the automotive manufacturing industry in eastern countries is still relatively young and markets there have grown significantly over the past two decades.

The ageing workforce is also undoubtedly becoming more and more of a challenge because parts of the automotive industry require skills that are not easily replaceable (see also Chapter 3).

Figure 12: Share of employees aged 55 years or over in the total workforce of automotive manufacturing (upper panel) and share of employees aged 55 years or over in the total workforce of sales, maintenance and repair (lower panel), by Member State, 2011 and 2023 (%)



Notes: No data for Ireland. Data missing for Belgium, Bulgaria, Cyprus, Latvia and Slovenia for 2011.
Source: Own calculations based on EU-LFS ad hoc data extractions.

Future employment impact in different Member States

The development of the automotive industry in Europe is at a crossroads in the face of increasing competition from Asia and the threat of tariff wars, making predictions of future employment impacts challenging. In this section, evidence from Czechia, France, Germany, Poland, Romania and Spain is summarised to paint a picture of the current situation in the sector and anticipated employment trends. Generally speaking, predictions of future employment effects tend to be affected by the breadth of the sector taken into account; they tend to predict negative developments if only the vehicle manufacturing and supplier industries are considered, but are more positive if sectors such as battery manufacture and EV infrastructure management (such as charging networks) are taken into account.

As the largest manufacturer of automotive vehicle and vehicle parts, Germany's policy-driven transition to electromobility and its impact on employment is of great importance to not only the German but also the EU economy and its manufacturing sector in particular. Krzywdzinski et al. (2023) argue that the green transition is exerting pressure on the German automotive industry due to the delayed development of alternative drive technologies, with manufacturers instead focusing on optimising the ICE. Ultimately, it was the Dieselgate scandal in 2015, and subsequently the impact of the COVID-19 pandemic, that finally accelerated more fundamental change in the sector. As well as internal investments, the German automotive sector benefited from government support for sectoral innovation and stimulus programmes to boost the domestic EV market in the context of the pandemic (Lechowski and Weis, 2025). Among the reasons for the relatively slow transition of the German automotive industry was the fact that, up to the pandemic, the country was able to maintain a high level of production and employment (although there had been some declines since 2018 and 2019, respectively), increasingly focusing on the middle, upper and premium market segments. In addition, many German automotive companies relocated more routine and less-R & D-intensive parts of their production to lower-wage countries, particularly in eastern Europe. In 2022, while 3.5 million cars were manufactured domestically, around 9.6 million cars made by German automotive companies were manufactured abroad (VDA, undated). While some of the supply value chain shifted to lower-wage countries, the relative resilience of the German automotive industry is also attributed to a system of innovation that concentrates innovative collaboration between OEMs, key suppliers and research institutes towards domestic lead plants (Sorge and Streeck, 2018). Other contributing factors are the well-developed apprenticeship and vocational education system and collaborative labour relations based on works councils (Krzywdzinski, 2019).

The drive towards electromobility is now accelerating. Among the key German OEMs, Volkswagen aims to electrify its entire fleet in Europe by 2040 and to electrify the activities of the entire Volkswagen group by 2035, with in-house manufacturing of its electric motor and battery production in six factories across Europe (three realised so far). To free up resources for this shift, a significant cost reduction programme was initiated, which includes a global job reduction from 680 000 to 640 000 through natural attrition and a hiring freeze, while job security was guaranteed for other workers until 2029 following negotiations with the Works Council. Part of the 30-year collective agreement between the IG Metall union and employers was a 'job guarantee' covering 125 000 employees in Germany. However, in early September 2024, Volkswagen stepped away from this agreement. This meant that the job guarantee was to expire by the end of 2024 and that lay-offs were technically possible by mid 2025, if the conditions for issues such as number of jobs affected, severance payments and the like were agreed by the social partners by that time. Strikes in Germany and the intensive negotiations that followed led to the conclusion of a social partner agreement at the end of December 2024. Entitled 'Zukunft Volkswagen' ('Future Volkswagen'), this agreement includes plans for the 'socially responsible reduction of the workforce by more than 35 000 across Volkswagen's German locations by 2030' and a newly formulated job security plan covering up to 2030.

Daimler AG (now Mercedes-Benz Group AG) is also pursuing an electrification strategy by the end of the decade 'where the market allows it'. As with Volkswagen, almost the entire electric drivetrain is manufactured in-house. Battery cells will be produced in four of its own cell plants in Europe and in collaboration with the Chinese manufacturer Contemporary Amperex Technology Co., Limited. While 2 000 temporary contracts were not extended, a job security plan for other workers was negotiated covering until 2029. Bavarian Motor Works (BMW) also agreed a job security plan covering until 2028 and has drawn on the success of its electric models to extend employment by around 6 000 since 2022 (Boewe and Schulten, 2024). Audi has announced that it plans to introduce only fully electric models to the market from 2026 onwards and aims for a gradual phasing-out of the production of vehicles with combustion engines by 2033. It will invest two thirds of its upfront expenditure for 2023–2027 in the future fields of electrification and digitalisation to convert all its factories for the production of EVs by 2029 (totalling around EUR 28 billion in investment; Audi, undated).

The situation in the supplier industry is even more complex. A survey commissioned by the German Association of the Automotive Industry (Verband der Automobilindustrie (VDA)) in 2021 found that 80 % of automotive suppliers had already taken some measures

in response to the shift to electromobility and 30 % of their R & D expenditure was focused in this area, despite only 15 % of their turnover at the time being generated from electric drive components (VDA, 2022). While such investments and the 'twin tracking' of production are ostensibly more feasible for large suppliers like Bosch, ZF and Mahle, these companies have nonetheless announced significant job cuts in Germany and beyond (Krzywdzinski et al., 2023). Following negotiations with their works councils, these larger suppliers have also negotiated future-oriented collective agreements (*zukunftstarifverträge*), which seek to implement workforce reductions through natural attrition and early retirement plans while offering medium-term job guarantees to other workers (Boewe and Schulten, 2024). For smaller suppliers, the situation is more challenging, and works councils are less likely to be able to negotiate such collective agreements.

A number of studies have assessed the employment impacts of electromobility on the German automotive industry, with some predicting overall job losses, while others forecast job gains (considering a time horizon of 2030–2040) (Peters et al., 2013; Schade et al., 2014, 2020; Diez, 2017; Harrison, 2017; Bauer et al., 2018; Mönning et al., 2018; Kaul et al., 2019). The predictions of these studies, which range from 90 000 job losses to 192 000 job gains, largely depend on whether a narrow or broad definition of the sector is used and on the underpinning assumptions regarding the location of battery and power train production (inside or outside Germany), production volumes and the added value achieved per vehicle. Positive predictions rely on optimistic assumptions regarding production volumes, continued focus on strategies for the medium and premium vehicle markets and battery production located in Germany (Krzywdzinski et al., 2023).

Although it remains to be seen if job creation in new areas of the industry will match the job losses in other parts of the industry, Burstedde et al. (2023) show that labour shortages are already a problem for companies: between July 2021 and June 2022, there was a lack of some 110 000 skilled workers in four main occupational groups, that is metal production and processing, mechanical and automotive occupations, mechatronics and electrical occupations and technical research, development, construction and production control. Out of these, nearly 12 000 skilled workers were lacking in automotive engineering (Burstedde et al., 2023).

In practice, many German automotive companies and suppliers have reported restructuring plans since 2019. One example is the car manufacturer Audi announcing an internal restructuring programme in 2019 to improve its productivity and competitiveness. While the company stated that its plan was to shed up to 9 500 jobs globally by the end of 2025 (mainly through natural attrition and not renewing temporary agency contracts), it also planned to create 2 000 new jobs in its e-mobility division (Eurofound, 2019a). Also in 2019, Daimler announced plans to cut over 10 000 jobs worldwide by the end of 2022. Job cuts were attributed to the shift in production from combustion to electric engines. To reduce its staff, Daimler announced that it planned to use 'natural fluctuation', and also offers of 'part-time retirement' and a severance programme in Germany, to reduce the number of administrative staff. A job guarantee valid until 2029 covers production line workers (Eurofound, 2019b). However, in line with the expansion of EV production and more connected vehicles, Daimler also announced the creation of an additional 1 000 jobs at one of its sites, which was directly linked to the expansion of its software division. In 2020, BMW followed with an announcement of plans to cut 6 000 jobs in Germany, also through natural attrition and a voluntary redundancy package (Eurofound, 2020). The latest related press reports stem from the beginning of 2024 and concern the restructuring plans at Ford's German sites in Saarlouis (2 750 jobs to be lost), Cologne and Aachen (with 2 300 jobs to be lost; Eurofound, 2023, 2024). The largest EV-related job creation has arguably resulted from the opening of Tesla's gigafactory near Berlin, which employed around 12 000 workers by 2024. However, this has not been without controversy due to its negative stance towards trade unions and the absence of a company collective agreement at the plant.

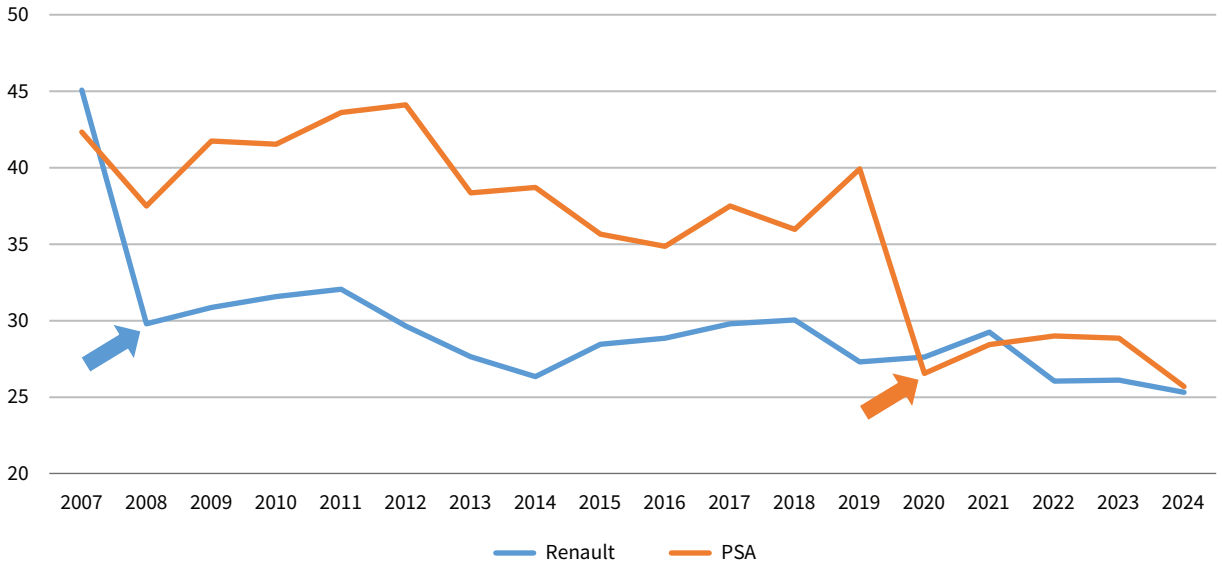
Spain is the second largest vehicle manufacturer in Europe (ranking after Germany), with production focused on the final stages of the automotive value chain. Eight OEMs have production locations in Spain: Ford, Hispano Suiza, Iveco, Mercedes-Benz, Renault, the Spanish Passenger Car Company (SEAT)–CUPRA–Audi consortium, Stellantis and Volkswagen. These eight major groups operated 17 car factories, 15 technology centres and 10 automotive clusters in 2023 (ANFAC et al., 2022; IESEI et al., 2023). All the vehicle manufacturing brands present in Spain assemble one or more of their EV models in Spain, with the exception of Volkswagen (although it is adapting its facilities in Landaben, Pamplona, to start doing so in 2025). In 2023, the manufacture of EVs made up 13.2 % of total vehicle production. Of these, 157 751 were pure EVs (BEVs) and 165 504 were PHEVs. As a result, the Spanish automotive sector is beginning to see the effects of the growing electrification of manufactured vehicles. According to the Business Association for the Development and Promotion of Electric Mobility, the electrification of Spanish car manufacturing will mean a progressive structural readjustment of the workforce, so that up to 29 000 jobs in the automotive industry (manufacturers and components) will be lost in Spain by 2030, in addition to the need to retrain 165 000 professionals (Aedive and Boston Consulting Group, 2022). It is thought that any negative effects on employment are likely to be partly offset by new jobs generated in some emerging sectors, which will have a great need for

labour in the coming years in Spain. The development of the entire battery value chain could have a very significant impact on employment, estimated at around 8 000 additional jobs (Aedive and Boston Consulting Group, 2022). The development of the industry linked to the reuse and recycling of batteries could be a potential source of new jobs, leading, according to some estimates, to an increase of almost 20 % in sectoral employment. The comprehensive deployment of the EV charging infrastructure may represent an additional source of new jobs, with estimates reaching up to 17 000 additional jobs in this sector of activity (not taking into account the manufacture of charging equipment) (Aedive and Boston Consulting Group, 2022). In addition, it is said that far-reaching changes are taking place in car repair or vehicle sales. In this regard and focusing on sales, some authors argue that car sales and aftermarket are also suffering major changes related to digitalisation, not so much because of new manufacturing technologies but because of changes in patterns of consumption and use of vehicles (Merino et al., 2022).

The automotive industry in **France** has undergone a major restructuring under the influence of two manufacturers: Renault and Peugeot SA (PSA) (now part of Stellantis). After enjoying great success until the early 2000s with their small city cars and first multipurpose vehicles, the two manufacturers opted for strategies to relocate important parts of production to lower-cost countries. The decline in the volume assembled in France began in 2005, when 3.5 million vehicles were produced. By 2019, just over 2 million vehicles were assembled in France. Much of production was transferred to Spain, then to central Europe, Türkiye and Morocco. By 2024, French vehicle production in Europe accounted for around 25 % of Renault's and PSA's outputs. Between 2007 and 2024, Renault and PSA plants in France halved their outputs (Figure 13); this trend looks set to continue, with further relocations of production to Morocco.

The strategies of French manufacturers share a number of commonalities, including a focus on mid-range passenger car segments, in competition with sites with lower labour costs. French manufacturers are leaders in the light commercial vehicle market. The future of production in France is thought to depend on the success of the shift to EV production, which is gathering speed. Renault is renewing its electric range and, in November 2022, Renault management announced the full separation of BEV and ICE power train activities for the entire group, splitting them into two new entities named 'Ampere' and 'Horse', respectively. This move was deemed necessary in order to attract funding and increase the market capitalisation of the company and thus ensure that the group is able to finance the EV transition (see also Box 2). The electrification of Stellantis vehicles began with small vehicles produced outside France based on a multi-energy platform. The electrification of production in France is gradually taking place for different models from French plants, but only for small volumes. At the same time, major investments have been made in locating upstream

Figure 13: France's share of assembly volumes at Renault and PSA plants in Europe (including Morocco but excluding Russia), 2007–2024 (%)

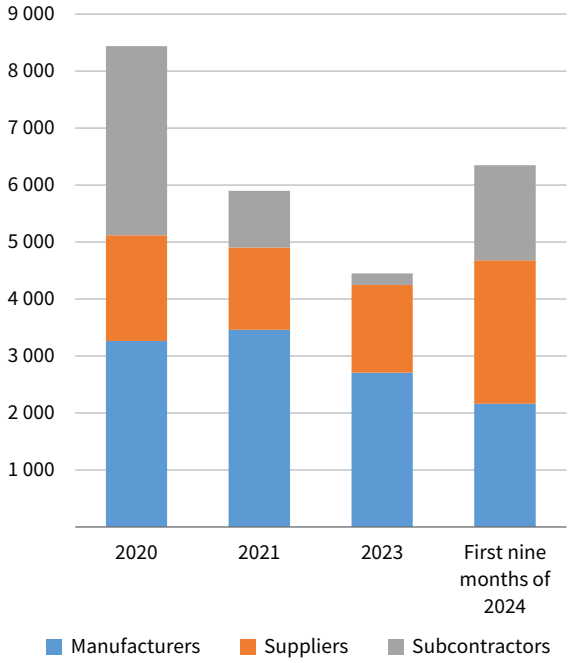


Notes: PSA values include only PSA plants, not Fiat Chrysler Automobile ones. Arrows indicate lowest volumes.
Source: Syndex.

electric value chain activities in France by setting up gigafactories, power electronics and electric motor activities. However, as of 2024, these investments appeared to have been much smaller than expected and to be partly on hold. At the same time, component sourcing from China is steadily increasing, according to a recent study (Pardi et al., 2025).

Estimates produced by Syndex highlight a sharp increase in the number of companies in the automotive industry undergoing restructuring in 2024 (Figure 14).

Figure 14: Estimated job losses in the French automotive industry, 2020, 2021, 2023 and the first nine months of 2024



Source: Syndex, 2024.

In the first nine months of 2024, 43 % more jobs were affected than in the previous year. Job losses to the end of September also exceeded the losses for 2021 and were approaching those for 2020, a year in which subcontractors were hit hard (Syndex, 2024).

In terms of longer-term employment impacts, it is anticipated that job losses could reach 15 000–30 000 by 2030.

Among the **central and eastern European** countries included in this study, the outlook is different and affected by the nature of production and current status in relation to the shift towards EV production. In **Czechia** and **Poland**, the outlook for the automotive sector remains positive. In Poland, this is largely due to the fact that the country ranks second (after China) regarding the manufacturing capacity for EV batteries. In 2022, lithium-ion batteries accounted for 2.4 % of Poland's total exports and the country produced 30 % of all batteries for vehicles manufactured in Europe. The value of the battery sector has increased by a factor of 38 over the past six years, from around EUR 234 million in 2017 to over EUR 8 billion in 2022 (Ciepiela, 2023). It is therefore believed that Poland could become a significant beneficiary of the changes in the automotive industry by transforming into a manufacturing hub for the electromobility sector. The Polish Automotive Industry Association (PZPM) thinks that the growing demand for EVs will contribute to the creation of thousands of new jobs in EV manufacturing, battery production and charging infrastructure development (KPMG and PZPM, 2023).

The **Czech** automotive sector increased as part of the integrated periphery (Pavlinek, 2023). Czechia is one of the countries characterised by relatively lower wages (compared with western Europe) and geographical proximity to large and lucrative markets. Recent years have seen an expansion in the production of BEVs and PHEVs, with these types of EVs now accounting for 11 % of total passenger car production in Czechia. Employment predictions for Czechia indicate that 75 000 jobs in the sector will disappear and 80 000 new opportunities will be created (Barmetal, 2024). Another prediction suggests that, by 2030, 15 000 new highly skilled workplaces will be created, while 22 000 medium-skilled and 8 000 low-skilled jobs will disappear. By 2050, the number of high-skilled positions is estimated to grow by 56 000.

The picture is somewhat different in **Romania**, due to its low-cost, low-tech and low-value-added manufacturing in the sector (the 'low road' trajectory; Jürgens and Krzywdzinski, 2009), which for some time allowed it to benefit from the deep restructuring of western European automotive value chains. Employment grew significantly between 2010 and 2018, largely as a result of the growth of the supplier industry, with German and French multinational suppliers relocating parts of their western European operations to Romania (Guga, 2018). Romania's shift from ICE to EV production has so far been relatively negligible, placing it at risk in relation to the electrification of the vehicles market. Furthermore, employment among suppliers – and particularly in the price-sensitive cable harness manufacturing sector – has already begun to move to even cheaper manufacturing locations, for instance in Moldova and Serbia. In future, the country will probably be affected by similar pressures to those experienced in western Europe with the transfer to EV production, albeit at a slower pace. For example, while, in 2019, less than 6 % of vehicles produced at Ford's Craiova plant were mild hybrid vehicles (with the rest being ICE vehicles),

by 2031, close to 80 % of the plant's planned output is scheduled to be BEVs, with 9 % being ICE vehicles and 11 % mild hybrid vehicles. Dacia has announced it will postpone the EV transition as much as possible due to its low-cost business model and difficulties in producing low-cost EVs for the foreseeable future. For Dacia, the production of mild and fully hybrid vehicles is set to begin in 2024 and will make up the majority of production by 2026. BEVs will make up only 2 % of production by 2029.

3 Impact of the twin transitions on skills, working conditions and job quality

Key takeaways

- The qualitative impact of the shift to electrification and digitalisation is even more difficult to assess than the quantitative impact. Some skills pertaining to internal combustion power trains will disappear, and it is likewise clear that new skills related to battery technology, electric motors and digitally connected vehicles will become increasingly dominant.
- The EU battery industry is probably the best example of industrial transformation still to come, with most investments announced to come online in the next few years to support the major increase in BEV production expected by 2030.
- The technological transformation of vehicles themselves is also an important driver for automotive employment change, and according to Kuhlmann et al. (2021), the software content per vehicle is expected to grow at an annual average rate of 11 % until 2030.
- OEMs have already turned into major employers for software engineers and will be even more so in the future.
- Electrification and digitalisation are closely linked. EVs require more electronics and software to optimise operation and are redesigned from scratch, allowing OEMs and suppliers to add new digital features.
- Between 2020 and 2023, companies mainly recruited for operational, technical-operational, specialist–managerial and change-management roles. Around 30 % of companies reported medium to high difficulty in finding suitable candidates, particularly in production, maintenance and quality assurance roles.
- The industrial action plan for the European automotive sector adopted in March 2025 provides for alterations to the European Globalisation Fund Regulations to ensure that workers in the sector can be supported through training if they are at risk of dismissal.
- According to EWCS data, half of the automotive manufacturing workforce participated in employer-paid training in both 2015 and 2024, while participation in retail trade and repair increased from 38 % to 46 %. On-the-job training followed a U-shaped pattern, recovering to 56 % by 2024.
- The main new risks concern occupational safety and health (OSH), including electrical and chemical hazards and psychosocial risks linked to uncertainty and restructuring. EWCS data show improvements in safety and ergonomic conditions, including a reduction in heavy-lifting and chemical exposure, although tiring positions and high temperatures increased slightly.
- Having said that, restructuring and employment risks in the sector were not strongly reflected in the 2024 EWCS when 13 % of workers in automotive manufacturing and 7 % in retail, trade and repair reported fears of losing their jobs within six months, compared with 33 % and 39 % in 2015 (EWCS).

This chapter elaborates on the impact of the twin transitions on the automotive sector, with an emphasis on skills requirements, working conditions and job quality. It draws on information from the Member States studied in more detail for this report and on data from the EWCS.

Impact on occupations and skills requirements

The qualitative impact of the shift to electrification and digitalisation is even more difficult to assess than the quantitative impact. It is clear that some skills pertaining to internal combustion power trains will disappear, and it is likewise clear that new skills related to battery technology, electric motors and digitally connected vehicles will become increasingly dominant. This impact will be felt most strongly among suppliers, but OEMs will also need a different R & D focus, engineering and information and communications technology (ICT) skills and, to a more limited extent,

blue-collar skills. Synthetic assessments predict increases in skills requirements among production staff of EV components, vehicle service and software developers, engineers for EV component development and those working in the installation and maintenance of high-voltage charging infrastructure. The main reductions in job and skills requirements will be ICE-focused production and logistics operation staff, ICE-related engineers and vehicle mechanics and also marketing and sales staff (Kuhlmann et al., 2021). However, such assessments remain relatively generic, and more visibility is needed regarding the real-life transformations of jobs and skills as a result of electrification based on systematic evidence from concrete cases of industrial transformation. In this context, it is interesting that the two company-level case studies of OEMs carried out for this study demonstrated relatively limited requirements for additional training among workers transferring from ICE to EV production and from vehicle production to battery manufacture, potentially demonstrating that skills transformations along the production line may be more limited than in hardware and software development and engineering and in other R & D roles.

The overall lack of evidence in this area is partly due to the fact that most of the industrial transformation is still to come. The EU battery industry is probably the best example of this, with most investments announced to come online in the next few years to support the major increase in BEV production expected by 2030. While pure EV manufacturing sites are already online for most OEMs, the employment impact in both quantitative and qualitative terms will be visible in the labour market only once EVs are produced at mass scale. Some of the impacts – especially those related to the recycling value chain that is supposed to accompany a fully electrified European automotive industry, and changes in the repair sector, which is considered to be less labour intensive for EVs – will only become apparent much later. For now, the priority is to understand the employment and skills requirements in the new EV sites (battery plants, OEMs' pure EV manufacturing plants, etc.).

There is a plethora of analyses highlighting the imminent decline of many traditional occupations in the automotive industry and their replacement by entirely new ones. The World Economic Forum assessment shown in Table 5 is one prominent example that highlights the decline of predominantly manual labour and low-skill and repetitive white-collar work, leaving room for jobs requiring data analysis, automation and engineering skills.

While there is some degree of truth to such analyses, the implicit suggestion is that automation in automotive manufacturing is an implacable trend that will eventually eliminate all manual and repetitive tasks. This is, at least for now, impossible, and there are whole areas of automotive manufacturing (notably, vehicle assembly and quality inspection, generally speaking) that are labour intensive and very difficult to automate. Automation concerns primarily stamping, body in white and paint shops; the degree of automation in these departments is already extremely high for most automotive plants. Further automation depends on significant technological advancement, as it requires that machinery and software be capable of dealing with higher levels of job complexity. This has so far proved to be a considerable challenge and most automotive assembly work remains manual.

Table 5: Assessment of emerging and declining jobs in the automotive industry as a result of continued automation and digitalisation

Emerging	Declining
8 % in 2018; 21 % in 2022	**41 % in 2018; 26 % in 2022**
Roles such as:	Roles such as:
○ data analytics professionals and scientists	○ assembly and factory workers
○ AI and machine learning specialists	○ data entry clerks
○ process automation specialists	○ client information and customer service workers
○ software and applications developers and analysts	○ accountants and auditors
○ innovation professionals	○ accounting, bookkeeping and payroll clerks
○ sales and marketing professionals	○ administrative and executive secretaries
○ service and solutions designers	○ transport attendants and conductors
○ product managers	○ material-recording and stock-keeping clerks
○ industrial and production engineers	○ general and operations managers
○ supply chain and logistics specialists	○ business services and administration managers

Source: World Economic Forum (2018).

Beyond this, the relatively high degree of automation in the automotive industry means it is a major source of demand for engineering, technical and software-related skills dedicated to manufacturing. This is, however, not the most significant digitalisation process that the industry is undergoing. The technological transformation of vehicles themselves is a far more important driver for automotive employment change. Vehicle electrification is, of course, the primary subject in this regard, but the larger content of electronic hardware and computer software in vehicles is also driving transformation. According to Kuhlmann et al. (2021), the software content per vehicle is expected to grow at an annual average rate of 11 % until 2030. This is expected to affect suppliers and especially OEMs, as the whole industry shifts to software-defined vehicles that are loaded with massive amounts of software code. In relation to this, OEMs have already turned into major employers for software engineers and will be even more so in the future. This is, to a very great extent, today's meaning of 'digitalisation' in the automotive industry.

The use of increasingly sophisticated electronics and software in vehicles is intrinsically tied to electrification for two reasons. First, EVs tend to be redesigned from scratch, allowing suppliers and OEMs to add entirely new features for customers. Software's role as a key differentiating element on the EV market is evidenced by new entrants like Tesla or Chinese OEMs that are far more advanced in this respect than historical players. Second, EVs require more electronics and software to optimise their operation. While this remains invisible to vehicle users, EVs (and especially BEVs) require a whole array of sensors and software to monitor and regulate their functioning – for example, to maintain the battery within certain parameters. EVs are software-defined vehicles par excellence and, without electrification, digitalisation would be much more limited.

The greater emphasis on technological positions is confirmed by a study looking at hiring in the sector between 2020 and 2023, which shows that companies mainly recruited for operational, technical–operational (including engineers and ICT professionals) and specialist–managerial roles and those related to change management and innovation. A comparison of hiring trends in 2020–2023 and those anticipated for 2024–2027 shows an upward trend for all professional roles, especially those related to change management and innovation. The study also shows that at least 30 % of companies (OEMs, suppliers and the retail and aftermarket functions) reported medium to high levels of difficulty in finding suitable candidates for various professional roles, with challenges particularly pronounced in production and maintenance and quality assurance roles, whereas accounting and the purchasing and sales areas faced relatively fewer difficulties.

Initiatives to support skills development

The emphasis on the need for transformation in the sector means that increasing attention is being paid to upskilling and reskilling in the sector. The industrial action plan for the European automotive sector adopted in March 2025 provides for alterations to the European Globalisation Fund Regulations to ensure that workers in the sector can be supported through training prior to dismissals, should job losses be inevitable. It also seeks to increase support from the European Social Fund Plus for reskilling and employment transfers and provide other measures to support upskilling and reskilling for workers in the sector. The EU Fair Transition Observatory is to be established to collect data on future job risks and skills gaps. Skills research and delivery can build on the work of the existing Automotive Skills Alliance.

These EU-level initiatives add to packages of measures available at the national and regional levels and to the ongoing efforts of OEMs in particular to ready the workforce for new skills requirements.

Arguably the most important sources of upskilling and reskilling for the existing workforce in vehicle manufacturing are the OEMs themselves, most of which have large training departments and established partnerships with universities and vocational training providers; some, such as Škoda, even have their own universities. Partnerships with large suppliers to deliver relevant training are also not uncommon. However, this is less likely to be the case with regard to smaller suppliers, which therefore often have to rely on external support to secure access to training opportunities for their workers.

This section provides a brief (and non-exhaustive) overview of national and regional measures available to support the retraining of automotive sector workers (Table 6).

Table 6: Examples of upskilling and retraining support for automotive sector workers

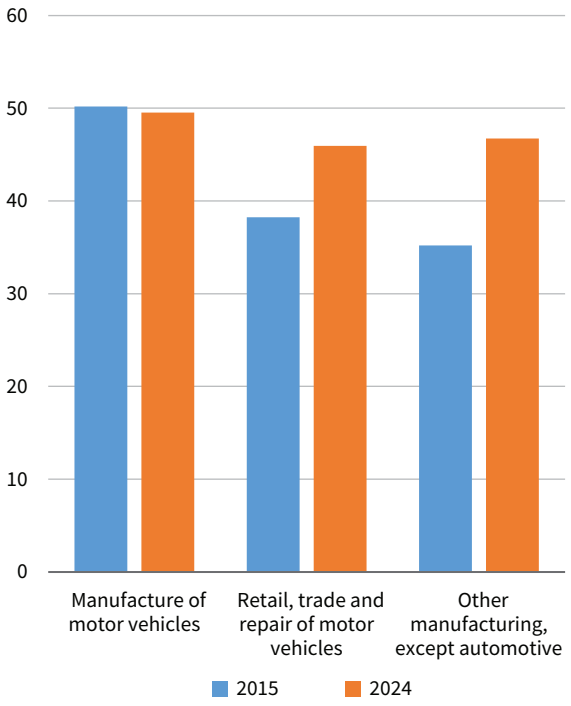
Member State	Type of support	Source of funding
Czechia	Škoda Auto University and partnerships with vocational training centres and secondary schools to provide training for its own workers and some workers among key suppliers where knowledge is product specific	Company, with support from state funding
France	National Employment Training Fund supports the upskilling of workers exposed to the twin transitions	State
	Transition Collective relies on companies to declare which jobs are at risk to provide workers with enhanced access to support for retraining	State
	Industrial rebound scheme used in regions affected by a decline in automotive manufacturing to support industrial projects with job creation potential	State
	Regional training support measures to provide inventories of at-risk jobs and offers of retraining	Regional authorities
Germany	Future-oriented collective agreements (*zukunftstarifverträge*) include provisions on job security and ongoing training provisions	Company
	Qualification grant introduced in 2024, which is a wage replacement benefit for employees taking part in certified further training of at least 120 hours	State
	Local employment services (public employment services) can also support training for employees	Region/state
Italy	OEMs have their own training facilities	Company, sometimes with state support
	Automotive Fund, established in 2022, provides support for training in companies facing industrial conversion	State
Romania	OEMs have their own training facilities	Company, sometimes with state support
Spain	OEMs have their own training centres for reskilling and upskilling (for example, Volkswagen Academy Navarra, Renault Empleo and Ford Training Academy) and have partnerships with universities and training centres	Company, with support from national or local training programmes/funds
	State Foundation for Training in Employment can subsidise training for SMEs	State

Source: Contributions of the Network of Eurofound Correspondents to this study (unpublished).

According to EWCS data, the share of workers who participated in training paid for by their employers in the analysed elements of the automotive sector and compared with other manufacturing subsectors was highest among OEMs. Half of the automotive manufacturing workforce participated in training paid for by their employer in both 2015 and 2024, which is an indication of established training programmes in OEMs. On the other hand, the retail trade and repair subsector saw a significant increase in employer-provided training, with participation growing from 38 % in 2015 to 46 % in 2024 (Figure 15). This substantial shift indicates increased recognition of the importance of skills development in the sector, possibly driven by digitalisation but also changing customer service requirements.

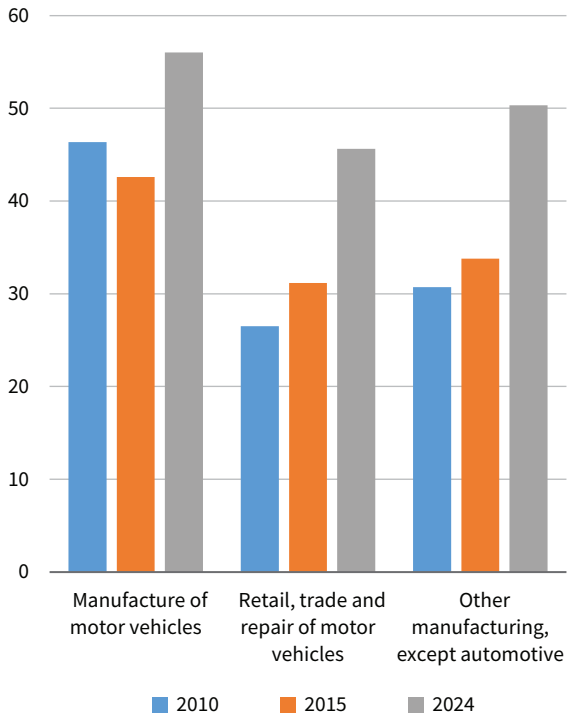
Furthermore, most of the training in the sector is informal. On-the-job training in automotive manufacturing followed a distinctive U-shaped pattern between 2010 and 2024, with participation declining from 46 % in 2010 to 43 % in 2015 – likely reflecting the persistent effects of the global financial crisis – before recovering to 56 % by 2024 (Figure 16). Positive

Figure 15: Share of workers who received training paid for by their employer, by subsector, 2015 and 2024 (%)



Note: Weighted estimates.
Source: Own calculations based on EWCS trend dataset.

Figure 16: Share of workers who received training on the job, by (sub)sector, 2010, 2015 and 2024 (%)

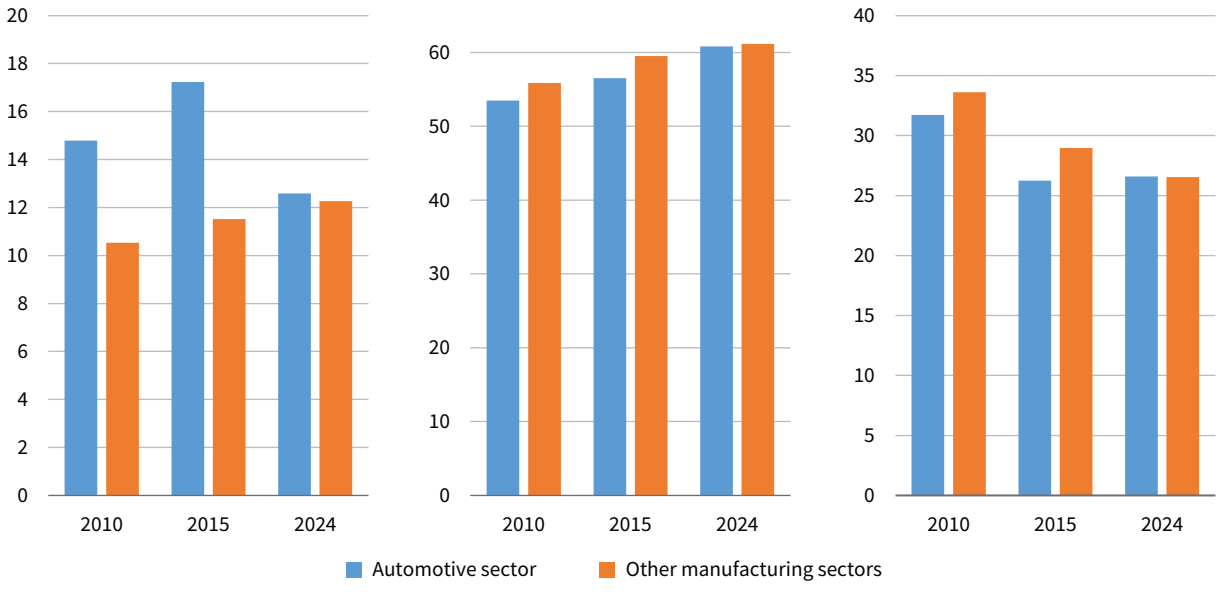


Note: Weighted estimates.
Source: Own calculations based on EWCS trend dataset.

trajectories are evident in the retail, trade and repair of motor vehicles sector (rising from 27 % to 46 %) and in other manufacturing sectors (increasing from 31 % to 50 %) over 2010–2024. Notably, both sectors saw approximately 20-percentage-point increases in informal training participation between 2010 and 2024, reflecting a broader push factor: the need for enterprises to adapt to the green and digital transitions.

Figure 17 further examines the alignment between existing workforce skills and job requirements. In the automotive sector, the share of workers who needed further training to cope with their duties demonstrates the opposite pattern to that indicated by informal training data. This training need fluctuated from 15 % in 2010 to 17 % in 2015, then decreased to 13 % in 2024, potentially suggesting improved access to training and better job matching over time. The broader manufacturing sector followed a different pattern, with training needs remaining relatively stable at around 10–12 % throughout the period and showing only modest variation. Conversely, the share of workers whose skills corresponded well to their duties shows similar patterns across sectors. By 2024, around 61 % of the workforce in automotive manufacturing and in the broader manufacturing sector reported having the skills to cope with their duties, indicating a steady improvement from approximately 54–56 % in 2010. However, data for both the automotive and broader manufacturing sectors indicate that skills underutilisation remains a significant challenge, with more than one in four workers in 2024 indicating the ability to cope with more demanding duties. This suggests that, while basic skills alignment has improved, there remains untapped potential for career advancement and job enrichment across both sectors.

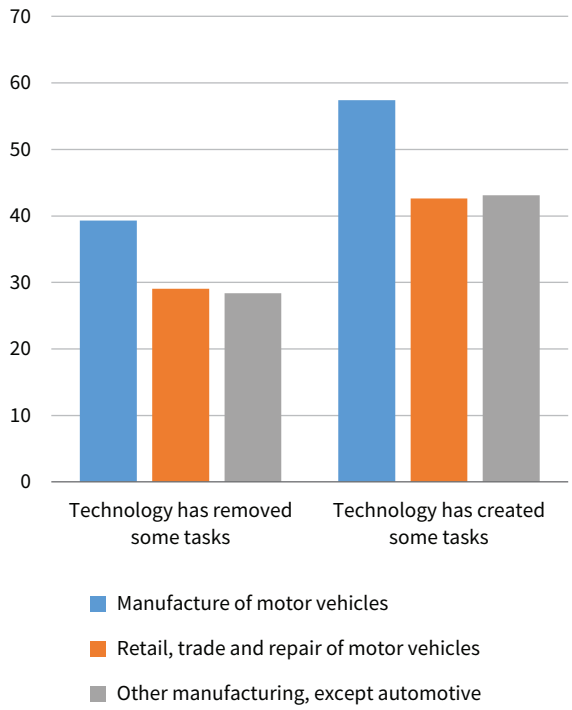
Figure 17: Share of workers who needed further training to cope well with their duties (left panel); share of workers whose skills corresponded well to their duties (centre panel) and share of workers who had the skills to cope with more demanding duties (right panel), in the automotive sector and other manufacturing sectors, 2010, 2015 and 2024 (%)



Note: Weighted estimates.
Source: Own calculations based on EWCS trend dataset.

Technology demonstrates a more pronounced impact in automotive manufacturing, where 39 % of workers report technology removing tasks while 57 % report new task creation, giving a net positive impact of 18 percentage points (see Figure 18). The retail, trade and repair sector shows a similar but more moderate pattern, with 29 % experiencing task removal and 43 % reporting task creation. This differential suggests that, while both sectors benefit from new technologies, the manufacturing environment's higher automation levels and digital integration generate greater task variation. Importantly, the consistent pattern of net task creation across all manufacturing sectors indicates that technological change is expanding rather than contracting the scope of existing jobs, potentially requiring workers to develop new skills and adapt to new responsibilities.

Figure 18: Perceived impact of technology on tasks by (sub)sector, EU-27 (%)



Note: Weighted estimates.
Source: Own calculations based on EWCS trend dataset.

Impact on working conditions

Given the extensive literature available focusing on the transformation of the automotive industry, it is perhaps surprising that research regarding the implications of electrification and the development of more digitally connected vehicles on working organisation and working conditions is scarce. Among the potential reasons for the lack of evidence in this area could be the fact that the sector has been experiencing long-standing transformations linked to automation and other technological change, which mean that the implications of the twin transitions for the production process and associated work organisation and working conditions are relatively limited in comparison, in the context of the gradual shift from ICE to EV production.

Despite some production facilities having to be adapted to switch from producing and assembling ICEs and gearboxes to electric motors and batteries, adaptations to wiring and the integration of complex software features, this does not essentially change the key tasks and stages of the vehicle production process.

The implications of such shifts can primarily be found in the following areas:

- new OSH risks and protocols linked to some aspects of advanced automation and battery manufacture;
- psychosocial risks associated with some aspects of work intensification but primarily due to uncertainty and concerns about job safety and job quality and associated with new demands for upskilling or reskilling;
- linked to the above psychosocial risks, new and ongoing training requirements associated with new processes and the greater integration and complexity of production tasks in some areas.

The further automation of tasks with the use of AI and advanced sensor technology has the potential to reduce physical strain and the risk of developing musculoskeletal disorders. For example, assembly workers may no longer need to move around the vehicle to stock up on parts, thanks to the introduction of kitting, pick-to-light or pick-to-voice systems in the supply of parts to assembly stations. However, the pace of their work is accelerating, as downtime is being eliminated and they are now dependent on the delivery of parts by automated guided vehicles. Such automation can contribute to a loss of autonomy for workers.

New occupational safety and health risks

The main new OSH risks linked to the twin transitions in the automotive sector relate to increased electrical and chemical hazards and psychosocial risks linked to uncertainty and the experience of restructuring.

Risks linked to electric vehicle production and battery manufacture

Car manufacturing and repair workers are traditionally highly exposed to chemical pollutants, a trend that could increase with the focus on EVs and battery components. New risks are mainly related to the use of high-voltage lithium-ion or nickel–metal hydride batteries and to the high-voltage systems in the vehicles. Key risks are electrical risks, chemical risks, associated fire or explosion risks and risks posed by electromagnetic fields. Exposure to the last of these can affect workers throughout the life cycle of EVs. However, this danger is very low in the course of manufacture, use and waste separation and recycling (EU-OSHA, 2018). High-voltage systems can also pose a risk to workers, as touching live parts can cause electrical shorts or electrocution, and electric arcs or short circuits can lead to burns or fires (Castellanos Alba, 2023). Chemical hazards can arise during the battery production and recycling processes. Some of these production processes therefore require the use of specialised tools and training and the use of protective equipment.

The EU, its Member States and OEMs are investing in battery production partnerships to build capacity in Europe, often in collaboration with Chinese or other Asian companies.

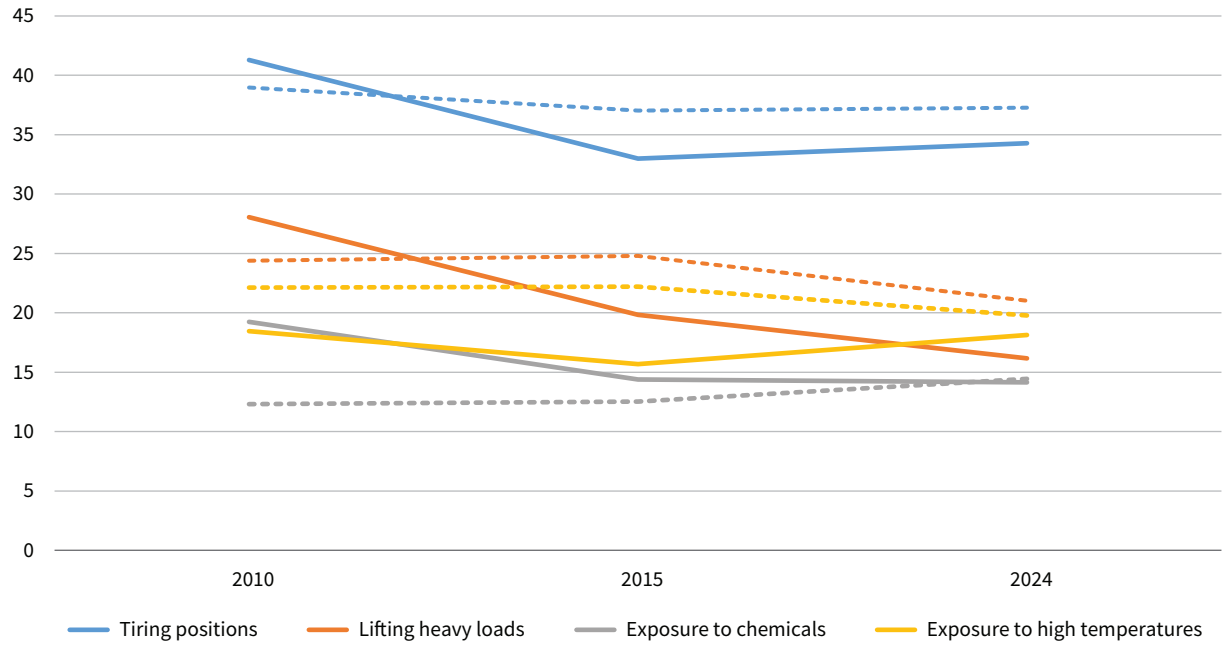
A case study carried out as part of this project indicated that workers who shifted from vehicle to battery production as part of a restructuring process expressed concerns about the fire and electrical risks associated with their new jobs in battery production and sought enhanced pay to cover these new risks, but this enhancement was rejected by their employers.

A number of concerns over worker safety have been raised at various production sites, including at the Northvolt plant prior to the company's bankruptcy. In addition, industriAll Europe has initiated a co-financed two-year EU project (putting trade union power into European batteries, 2024–2026) to strengthen trade union capacity to represent workers, negotiate collective agreements and monitor OSH standards in EU battery manufacturing. It also seeks to support job-to-job transitions through social dialogue and support related training initiatives [1].

Although compulsory preventive measures exist, they are often less well applied in small businesses and by subcontractors. Temporary workers are also exposed to chemical substances more often than permanent employees are.

EWCS trend data on the physical working environment reveal mixed but generally positive trends in workplace safety and ergonomic conditions across manufacturing sectors between 2010 and 2024 (Figure 19).

Figure 19: Exposure to OSH risks in the automotive sector (continuous lines) and the broader manufacturing sector (dashed lines), 2010, 2015 and 2024 (%)



Note: Weighted estimates.
Source: Own calculations based on EWCS trend dataset.

[1] For more information, see the project website: https://news.industriall-europe.eu/p/power4batteries.

In automotive manufacturing, exposure to tiring positions initially improved between 2010 and 2015 but then increased slightly between 2015 and 2024. At the same time, other indicators demonstrated more consistent progress, particularly the substantial reduction in heavy lifting exposure from 28 % to 16 %, probably attributable to investments in automation and enhanced material-handling systems. Chemical exposure showed similar improvement, declining from 19 % in 2010 to approximately 14 % of the workforce in 2024. Given that battery manufacture is increasing in Europe, it will be important to monitor this indicator in the sector in future editions of the EWCS. The share of workers reporting exposure to high temperatures increased, possibly due to new production processes or climate-related factors.

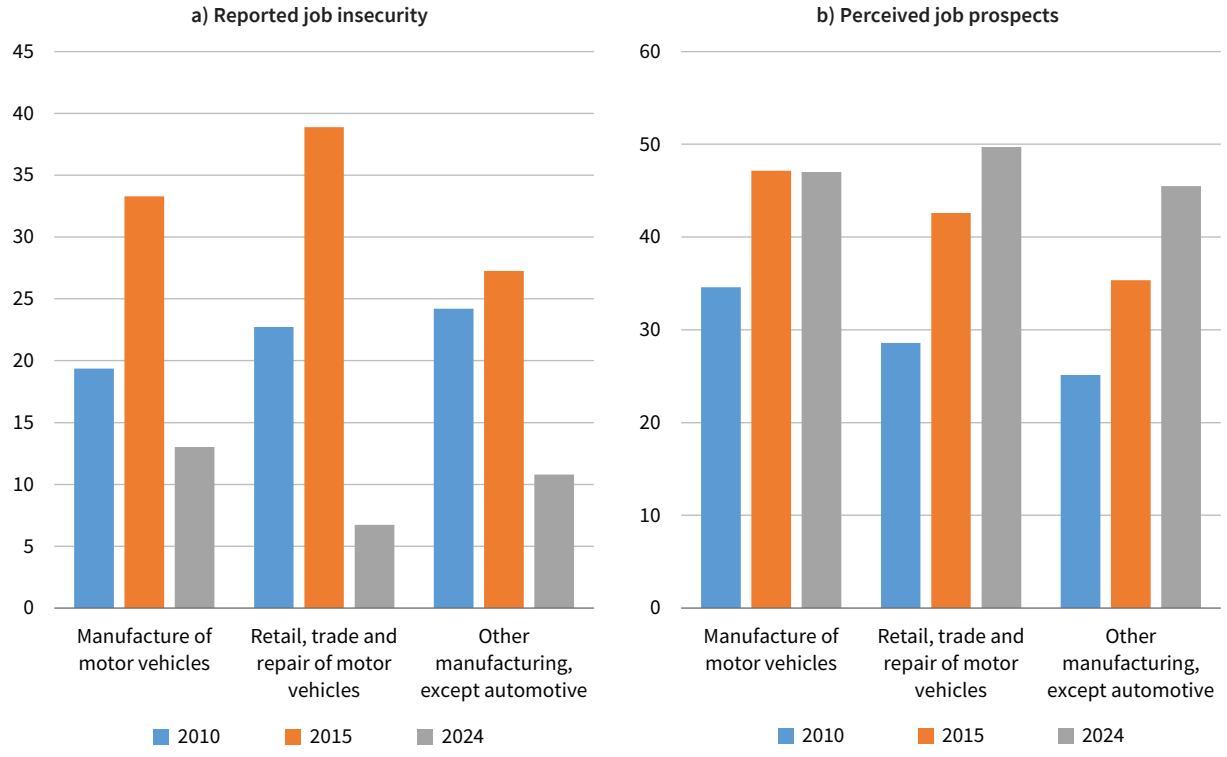
Psychosocial risks

Psychosocial hazards linked to uncertainty and fear of job loss or transformation and its impact on new training needs and working conditions are among the most important risks for workers at times of intensive restructuring (EU-OSHA, 2018), such as that increasingly being experienced in EU car manufacturers and suppliers. Even where longer job security is negotiated as part of company-level collective agreements, there is often a concern that such security has to be 'bought' with concessions in relation to wages and benefits or working hours, with the latter resulting in the potential for work intensification, which could be detrimental to workers' mental or physical health.

Data from the 2024 EWCS indicate that 13 % of workers in the automotive manufacturing sector and 7 % of workers in the retail, trade and repair of motor vehicles sector reported fears that they were at risk of losing their jobs in the subsequent six months (Figure 20). The share of workers fearing job loss was significantly lower than in 2015, when it averaged 33 % and 39 % in the two sectors, respectively. These findings go against the recent restructuring trends in the sector and might indicate that the EWCS did not capture the effects of announced job losses in the automotive industry. It could also be indicative of the role of collective bargaining in seeking to limit recourse to redundancies, as will be discussed further in the next chapter.

In terms of job prospects, although workers indicate that they remain positive about their prospects in the automotive industry, the assessment of prospects in other manufacturing sectors has improved since 2015. In contrast, in vehicle manufacturing and supply, it has remained more or less static, with a more positive picture in relation to sales and repair activities.

Figure 20: Job insecurity – share of workers who believed that they were at risk of losing their job in the subsequent six months, 2010, 2015 and 2024 (%)



Note: Weighted estimates.
Source: Own calculations based on EWCS trend dataset.

4 Managing restructuring: the role of social dialogue in shaping sectoral adaptations

Key takeaways

- The European automotive industry has been undergoing long-term restructuring resulting from technological change, globalisation, increased competition and global overproduction. Policy-driven shifts towards electrification and uncertainty over tariffs have added to these trends, leading to a decrease in OEM and supplier employment between 2019 and 2023 and an acceleration of job losses in 2024 and early 2025.
- The OEM segment is characterised by above-national-average trade union density, giving unions an important role in shaping change at the company level. The more SME-dominated supplier sector and the vehicle sales and repair subsector are less unionised, exposing employees to greater risks during restructuring.
- Union membership in automotive manufacturing increased from 78 % to 82 % between 2015 and 2024, while union membership in retail, trade and repair of motor vehicles also saw an increase from 34 % to 40 %.
- The involvement of social partners in consultations on future strategies for the sector and in the anticipation and design of forward-looking training profiles is comparatively high, particularly in industrial relations and industrial democracy models.
- Collective bargaining at the company level is central to managing restructuring. It focuses on the preservation of sites, employment security and socially responsible workforce reductions through early retirement or voluntary departures, together with retraining measures for workers moving from ICE to EV or battery production.
- The strong presence of trade unions in most OEMs has a clear impact on the quality of the process of consultation and negotiation and its outcomes.
- Company-level agreements illustrate the range of approaches to managing restructuring: Renault, Ford and SEAT in Spain introduced voluntary redundancy plans and training linked to EV production; Stellantis Figueruelas maintained employment through EV assembly; and in Germany, the Future Volkswagen and future collective agreements balanced job security with competitiveness and innovation.
- Examples of social partner involvement in policy include Germany's National Platform Future of Mobility (NPM), Spain's 2022 'manifesto for the promotion of the automotive industry', and France's Strategic Committee for the Automotive Sector.
- At Renault in France, the 2025 re-nouveau agreement provides for the creation of an internal university to train and retrain 10 000 employees, illustrating how social dialogue supports skills renewal during transformation.

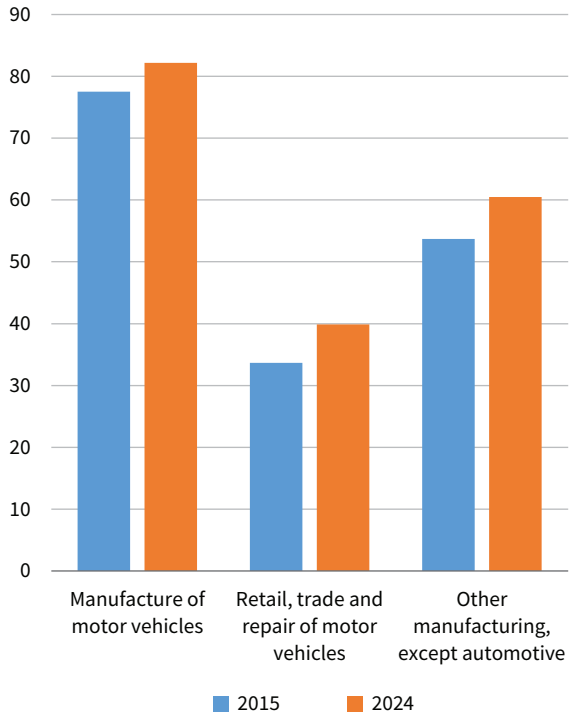
The European automotive industry has been undergoing a process of long-term restructuring resulting from technological change, globalisation, increased competition and global overproduction. More recently, policy-driven shifts towards electrification aiming to reach greenhouse gas emission targets and uncertainty over tariffs have added fuel to these ongoing trends. As a result, the OEM and supplier sector in the EU decreased its employment between 2019 and 2023, a trend that accelerated markedly in 2024 and early 2025. This chapter discusses the roles and contributions of social dialogue and collective bargaining in shaping restructuring in the sector.

Although differences in industrial relations systems remain an important factor in shaping the roles and influence of social partners in different spheres of decision-making, an important feature of the OEM segment of the automotive industry is the above-national-average organisational density of trade unions, which accords them an important role in shaping the implications of change at the company level. This is less evident in the more SME-dominated supplier sector, exposing employees in this segment of the automotive sector to greater risk of adverse employment impacts, with more limited access to training, retraining and redeployment support, unless action is taken at the policy level to support the transitions.

The vehicle sales and repair sector is also less likely to be unionised, which could be important in the future, since there are increasing tendencies for sales to move online. In vehicle repairs, due to the more limited number of mechanical parts found in BEVs, it is also anticipated that employment in this area could be affected by the twin transitions in the future, although this is not yet evident in comparative EU-level employment data.

Data from the 2024 EWCS also indicate that union membership in the automotive manufacturing sector is very high compared with that in other manufacturing sectors (see Figure 21). Between 2015 and 2024, union membership in automotive manufacturing increased from 78 % to 82 %. During the same period, interestingly, union membership in retail, trade and repair of motor vehicles also saw an increase from 34 % to 40 %. While union membership saw increases in both subsectors, the sizeable difference in unionisation rates between them is primarily explained by the different enterprise structures that dominate each subsector (see Tables 2 and 3).

Figure 21: Union membership in the automotive and manufacturing (sub)sectors, EU-27, 2015 and 2024 (%)



Note: Weighted estimates.
Source: Own calculations based on EWCS trend dataset.

This chapter discusses the role of the social partners in strategic policy development affecting the automotive sector and demonstrates their key role in striving to safeguard employment or to limit the social impact of employment contraction at the company level.

Role of the social partners in strategic policy development

In light of the importance of the automotive sector in the Member States covered by this report, it is perhaps not surprising that the involvement of social partners in consultations on future strategies for the sector and in the anticipation and design of forward-looking training profiles is comparatively high, particularly in industrial relations and industrial democracy models traditionally focused on the strong involvement of social partners in decision-making. This is less the case in market-oriented and company-centred governance models (Eurofound, 2023), although some formal or informal consultation still occurs.

Although the industrial-democracy-based model applicable in Germany emphasises the strong works council and board-level involvement of trade unions at the company level and formal structures for social partner involvement in policymaking are generally lacking, the social partners representing the automotive sector were invited to participate in different consultation formats on the future of the automotive sector by successive governments. In 2018, the federal government set up the NPM, which sought to develop recommendations on solutions for a climate-neutral, flexible and affordable transport system, ensuring the competitiveness of the German automotive industry and promoting Germany as an employment location. Several NPM recommendations were taken up by the government at the time. Among other things, the NPM recommended supporting the development of alternative drivetrains, fuels, batteries and battery cells; continuing funding programmes for a faster roll-out of charging stations across Germany; and setting up new funding programmes providing incentives to buy EVs (NPM, 2019). However, the last of these was rapidly phased out as a result of a ruling by the Federal Constitutional Court. In 2022, the government of the day set up its own expert council on the ‘transformation in the automotive industry’, which included social partners (BMWK, 2022).

Strong involvement of social partners in consultative forums organised by the government can also be found in Member States characterised by state-centred governance. In Spain, in November 2022, the social partners representing the automotive sector in Spain (the Spanish Association of Automobile and Truck Manufacturers (ANFAC) and the Spanish Association of Automotive Suppliers (Sernauto) on behalf of the companies, and the Workers’ Commissions (CCOO) and the General Union of Workers (UGT) on behalf of the workers) presented the government with a ‘manifesto for the promotion of the automotive industry’, with the main objective of moving towards a single mobility model for Spain that enables meeting the

decarbonisation objectives while maintaining the strategic position of the automotive industry in the Spanish economy and employment in the sector (ANFAC et al., 2022). Among the proposed measures is the promotion of training in new technologies, digitalisation and sustainability issues. Furthermore, the manifesto stresses the need to promote spaces for social dialogue and consultation to work on employment, innovation, competitiveness and export promotion, involving all stakeholders and the different levels of administration.

In France, the 2010s saw the emergence of a desire to change the way the industry is represented on the employer side, notably with the creation of the Automotive Industry Platform in 2010, a move largely supported by the government. In parallel with this structuring of the organisations representing the sector, the regional/industry network has been strengthened, benefiting from a regional dynamic reflected in the creation of competitiveness clusters in 2005, some of which are specialised in the automotive sector, and the development of regional automotive industry associations. Lastly, a sector roadmap, regularly assessed under the umbrella of the Strategic Committee for the Automotive Sector, will oversee and complement the system.

In Member States with more market-oriented and company-centred governance models, the involvement of social partners in policymaking is somewhat less intensive, although Poland reports collaboration between the Polish government and industry stakeholders regarding relevant social dialogue platforms in relation to training development and in the National Centre for Research and Development, where innovation and research in the automotive sector is discussed.

Role of collective bargaining at the company level in managing change

The company level is the most important locus of decision-making and, in OEMs in particular, it is at this level that decisions are made that subsequently affect strategic production and location decisions in various Member States (and beyond), while the individual establishment level is often also involved in more detailed decisions regarding the socially responsible management of restructuring, based on the possibilities offered within national regulatory and policy support frameworks.

Where transnational restructuring is involved, in larger companies, this often involves the European Works Council and national- and establishment-level representative structures. The main focus of such bargaining has been on the preservation of sites (where possible), employment security or socially responsible restructuring through early retirement or voluntary departure incentives in cases of employment reduction. Furthermore, greater importance has been placed on retraining measures, particularly where workers have transitioned from ICE to EV production or to battery production. With the exception of examples of site closures or threatened site closures, which have led to strike action in some instances (such as at Audi in Belgium and Volkswagen in Germany), it has generally been possible to manage such restructuring through a process of negotiation, reducing capacity where necessary through natural wastage in a context of tight labour markets, which provide greater opportunities for redeployment. Among the challenges for such redeployment are comparatively high salaries and good working conditions in the OEM sector in many countries, making it more difficult for workers to find employment at comparable salaries and with similar terms and conditions.

Where workers face possible transfers from ICE to EV or battery production, experience shows that considerations regarding the long-term viability of ICE commitments influence decision-making. It is also notable that it is generally thought that such transfers do not require significant additional training or retraining, with any additional skills needed usually being ensured by employers through short modular or on-the-job training.

The strong presence of trade unions in most OEMs has a clear impact on the quality of the process of consultation and negotiation and its outcomes. Furthermore, the presence of extensive experience of managing restructuring processes over the years is seen to ease negotiation processes in the current climate, since trust and methods of collaboration at various levels of decision-making have often been established.

This section provides some examples of company-level agreements reached to deal with restructuring, with a more detailed discussion of recent restructuring at Renault in France (Box 2).

Company-level examples of agreements securing jobs

In Spain, there are several examples of social dialogue and collective agreements in the automotive sector dealing explicitly with the twin green and digital transitions. An agreement reached at Renault in Spain for 2021–2024 provides for the creation of the New Technologies Committee, a joint committee made up of company and employee representatives. Within the framework of this joint committee, the company management provides information on new technologies and their expected impacts on employment and working conditions. Ford in Spain announced a surplus of 1 144 jobs at the Almussafes factory in March 2023 (the plant currently employs 5 800 people) due to Ford's transition towards the production of EVs and the restructuring of its operations, with a significant

reduction in the required working hours. A plan for voluntary redundancies has been agreed with the trade unions. Another example is given by car manufacturer SEAT, where the company and trade unions have agreed on a voluntary redundancy plan to reduce the workforce by 1 330 people (the plant currently employs 14 590 workers between production and offices) by 2026 to prepare the company for the arrival of the EV production platform, to be used in the assembling of two types of EVs. In both cases, the Spanish Ministry of Industry and Tourism warned that the government's public aid to promote the electric transition in the automotive sector is conditional on maintaining employment (López Maeztu et al., 2024). However, in other cases, the transition to the electric car has allowed for the maintenance of existing employment levels. This is the case for Stellantis Figueruelas (5 200 jobs), where the factory already assembles the electric Corsa model, ensuring the workload and existing employment levels are maintained.

In Germany, automotive companies and their suppliers can make use of various collectively agreed measures but also publicly available measures (such as further training support from the public employment agencies) when it comes to dealing with structural changes and transformation processes. By 2004, social partners in the metal industry had already produced the Pforzheim agreement. This agreement expanded the opportunities for companies to deviate from the sector-level collective agreements. This allows companies to negotiate supplementary agreements with the union if needed to ensure their international competitiveness, strengthen their innovation processes and capabilities or spur investments. In 2008, the Pforzheim agreement was integrated into a collective agreement on safeguarding employment dating back to the 1990s. Sectoral collective agreements in the metal industry are agreed regionally, with one pilot agreement usually setting the tone for other regional negotiations. These regional agreements then provide further leeway for negotiations at the company/establishment level. In the 2021 collective bargaining round, sector-level social partners in Baden-Württemberg agreed that management and employee representatives deliberating on supplementing sector-level standards at the company level can also agree to conclude a 'future-oriented collective agreement' (IG Metall Gelsenkirchen, 2021). Future collective agreements put a stronger focus on initiating talks between management and employee representatives on transformation issues. The new rules state that future collective agreements need to balance competitiveness, innovation and investment measures and employment and qualification measures (IG Metall Gelsenkirchen, 2021). Such agreements have already been concluded for a number of large automotive suppliers, including ZF (ZF, 2020), Mahle (Mahle, 2023) and Bosch (Bosch, 2023; IG Metall, 2023). For example, management and works councils can voluntarily conclude a works agreement on reducing weekly working hours from the standard of 35 hours per week to a minimum of 28 hours at sites facing too little work due to structural changes. Working time reduction is introduced to avoid lay-offs and can affect all or only some staff. Such voluntary works agreements must run for at least 12 months. During this time, employees can only be given notice due to operational reasons and with the consent of the works councils. Management and works councils can also agree on partial pay compensation to stabilise the monthly wages of employees who reduce their working time (IG Metall Baden-Württemberg, 2021).

Following the announcement of job losses at Volkswagen, a series of strikes in Germany and the intensive negotiations that followed led to the conclusion of a social partner agreement at the end of December 2024. Entitled 'Zukunft Volkswagen' ('Future Volkswagen'), this agreement includes plans for the 'socially responsible reduction of the workforce by more than 35 000 across Volkswagen's German locations by 2030' (through retirement and voluntary departures) and a newly formulated job security plan covering up to 2030. The deal avoids compulsory redundancies and site closures, but it also requires concessions from workers in relation to wages (no wage increases for four years) and the scrapping of some bonuses.

In Italy, restructuring efforts often involve managing redundancies through social shock absorbers provided by law, without causing severe disruptions. Specific company- or plant-level agreements to address restructuring towards EV production and distribution have been negotiated, exemplified by the Termoli case, where negotiations involving government representatives, trade unions, Stellantis and the Automotive Cells Company focused on transitioning workers from the ICE engine plant to a new gigafactory for battery production, indicating a significant shift towards EV manufacturing. The new Automotive Cells Company facility, set to include three modules dedicated to vehicle battery production, will each employ 600 workers. Production is scheduled to begin in 2026 for the first module and in 2030 for the third. Discussions primarily revolve around training and upskilling employees transitioning from the old engine plant, where skills were centred around mechanical processes and assembly, to the new facility, which requires different competencies for battery production.

In Czechia and Poland, due to the comparatively positive performance of the sector in these Member States, limited examples of restructuring activities at the company level have been reported. In Czechia, Škoda is providing ongoing training to its workforce, including through its own university for higher-level qualifications.

Box 2: Restructuring at Renault in France

The Renault Group employs nearly 100 000 people worldwide, including 39 000 in France. In Europe, the company has a market share of around 11 % for passenger cars and 15 % for commercial vehicles (early 2025). The group comprises four brands: Renault, Dacia, Alpine and, from 2021, the Mobilize brand associated with mobility services activities. The group is 15 % owned by the French state and 15 % owned by Nissan. Employee share ownership represents 5.6 % of the capital.

The Renault and Nissan Groups were among the first players in the EV market: the Nissan Leaf was launched in 2010 and the Renault Zoe in 2012. As a result, the Renault Group has long-standing expertise in EVs, whether in engineering (vehicle, engine and battery), engine production or vehicle assembly at all its French sites, including at its Douai site, which is now 100 % dedicated to EV assembly. The group has launched a wide range of new EV models in recent years, and more are planned. It is anticipated that, by 2030, 50 % of Renault's passenger cars in production and 42 % of its light commercial vehicles will be 100 % electric.

Renault is developing its electrical and electronic architecture in parallel with the electrification of the propulsion system towards a centralised tree structure, where hardware and software are dissociated, offering increased computing power and greater, up-to-date functionality. In addition to the increasing integration of software, the digitalisation of plants is advancing. In 2018, the group announced the deployment of self-correcting machines and connected lines in several plants, ensuring the traceability of parts; the introduction of new workstation assistance tools (virtual or augmented reality tools, cobots, exoskeletons and drone projects). Since 2024, the Renault Group has been training its employees in the use of AI using its own generative AI tool, GenAI@Renault. More than 200 champions have been identified to roll out generative AI training to as many users as possible. Different use cases for AI have been defined: solutions to automate code generation (for engineering and IT) and access to Microsoft Copilot to make it easier to search for information or generate content, among other tools still under development.

In order to be able to attract funding for its further EV transition, Renault created two separate entities in 2022, with Ampere responsible for EV production and Horse active in the legacy ICE segment. Operating under the Horse name, Renault's ICE and hybrid power train activities are a joint venture with the Chinese company Geely. Ampere's initial public offering was cancelled in January 2024 due to the lack of a satisfactory market trend for shares and EVs, according to the group's management.

In France, the impact of the transformation of the automotive market on the Renault Group has been the subject of social negotiations since 2013. Since then, several agreements have been negotiated on the subject, the latest dating from the end of 2024. There are several common threads running through these 10 years of negotiations. First, there was a greater centralisation of collective bargaining that placed importance on the search for a shared diagnosis of the situation and its challenges prior to social negotiations. Second, negotiations were guided by a concern about avoiding any reduction in the workforce through forced redundancy measures. Collective learning in terms of managing restructuring has played an important role.

Social dialogue at Renault has a history of engagement that goes beyond the requirements of the law. The process of dialogue between management and employee representatives takes place in four stages:

- the holding of bilateral talks between management and each of the trade unions;
- the setting-up of a joint committee to establish a shared diagnosis of the economic situation and the issues at stake;
- the negotiation of an agreement that defines the subject of the forthcoming negotiations and provides resources and a timetable;
- the actual negotiation of social issues.

The 2023 agreement on social dialogue provides for a central structure of trade union representation, which is not provided for under French law, and also guarantees time, budget and expert resources for trade unions to perform their role. While this centralised structure has led to some loss of autonomy for local negotiators, trade union representatives have adjusted for this by involving local representatives during negotiation processes.

Negotiations have focused on the challenge of reducing employment as a result of increased low-cost competition and the impact of electrification requiring fewer workers. Priority was given to avoiding forced redundancies through the use of collective labour agreements (*rupture conventionelle collective* (RCC)) rather than the processes standardised in the Labour Code. The use of RCCs requires a majority collective agreement and the departure of employees on a voluntary basis. Unlike a job security plan, an RCC must provide for severance pay, but it does not have to provide for measures to support employees' future employability.

At every negotiation, employee representatives have been concerned with securing jobs and skills in France. In response to the risk of a decrease in employment identified by the trade unions, Renault's management undertook, in a 2017 agreement, to provide the French sites with a business outlook until the end of 2019. In concrete terms, the agreement guaranteed vehicle production volumes for production sites, including the allocation of new vehicle models. For engineering sites, management agreed to invest significantly in R & D centres in France and to guarantee their distinctive skills would have a role within the group's global network.

In the negotiations over the last few years, a central place has been given to the challenges of renewing skills in connection with technological change. Dialogue on the issue of business transformation has become more methodical over time and now produces solutions that are tailored as closely as possible to specific teams. Intelligence about the requirements arising from transformations is gathered in the business lines' observatories, composed of management and trade union representatives. Renault operates its own in-house training organisation. To ensure the major training effort that management and the trade unions consider necessary in this period of transformation, the 2025 re-nouveau agreement, negotiated in 2021, provides for the creation of an internal university to provide training and retraining for 10 000 of the 39 000 employees in France. The human resources department states that the training target set by the agreement has been significantly exceeded in practice: 17 000 group employees were trained at the various campuses between 2021 and 2024. The company's 2024 collective agreement provides for more leeway for local negotiations to define transformation needs. This is intended to avoid the setting of targets for job cuts at the head-office level, which may have led to too many departures in relation to the needs of specific local teams. The 2024 negotiations were, for the first time, conducted without prior dialogue on the group's strategy, which management ascribed to the uncertain nature of the business environment.

5 Conclusions

The automotive sector directly employs approximately 6 million people in the EU, out of which 2.5 million are in manufacturing and 3.5 million are in sales, maintenance and repair and aftermarket activities. While employment in the automotive industry increased by 12 % between 2011 and 2023, this disguised job losses of over 7 % in the manufacturing and supplier sector between 2019 and 2023. The year 2024 and early 2025 saw additional redundancy announcements, prompting policy action at the European level. The impact of such job reductions in vehicle manufacturing currently mainly affects western Europe, while, among suppliers, many jobs that had previously moved to eastern European Member States are now shifting to lower-cost countries outside the EU.

Estimates of the future impacts of the twin transitions and other factors on employment trends vary depending on the scope of the sectors considered and the underlying assumptions regarding policy and economic developments. Narrowly focused studies generally forecast further job reductions, while studies also taking account of sectors such as charging infrastructure and battery manufacture predict stable employment or job growth, without giving indications of the quality of such jobs.

The impact of the twin transitions on working conditions can currently mainly be found in the area of OSH with regard to both physical risks (generally reducing) and psychosocial risks (increasing in an atmosphere of uncertainty).

Policies will have a role to play in helping to guide the sector and its workers through a transition when the demand for the labour force decreases for some jobs, including in the production and repair (and potentially sales) of EVs, while skills shortages will continue affecting new jobs in the sector. Training, regional development and active labour market measures at the European, national and regional levels will become increasingly important. Employment shifts will have to take account of the quality of the newly created jobs. Collective bargaining has a key role to play in mitigating the impact of the challenges facing the sector. The future of the EU car industry strongly relies on the shift to EV production, which can succeed in the face of increasing competition, particularly from Asia. This requires coordinated policies and investment at the EU level to support companies in their competitiveness (particularly in relation to Asia), not just in R & D but also in relation to consumer incentives and the supporting infrastructure.

References

All Eurofound publications are available at www.eurofound.europa.eu

ACEA (European Automobile Manufacturers' Association) (2024), *Tax benefits and incentives: Electric cars, 27 Member States (2024)*, Brussels.

ACEA (2025), *Economic and market report – Global and EU auto industry: Full year 2024*, Brussels.

Aedive (Asociación de Empresas para el Desarrollo e Impulso del Vehículo Eléctrico) and Boston Consulting Group (2022), 'Transición hacia el vehículo eléctrico: Observatorio del empleo – Estudio y análisis de la evolución del empleo en el ecosistema industrial de la movilidad eléctrica en España'.

Albatts (Alliance for Batteries Technology, Training and Skills) (undated), 'About Albatts', Albatts website, accessed 1 September 2025, https://www.project-albatts.eu/en/aboutus.

ANFAC (Spanish Association of Automobile and Truck Manufacturers), Sernauto (Spanish Association of Automotive Suppliers), UGT (General Union of Workers) and CCOO (Workers' Commissions) (2022), 'Propuesta de medidas para impulsar la industria de la automoción', November 2022, https://www.sernauto.es/storage/publicaciones/manifiesto-industria-automocion-anfac-sernauto-ugt-y-ccoo-9878.pdf (PDF).

Audi (undated), 'Electrification', Audi website, accessed 1 September 2025, https://www.audi.com/en/sustainability/environment-resources/electrification/.

Barmetal (2024), 'Barmetal: Digitalization, automatization and decarbonization: Opportunity for strengthening collective bargaining in the metal sector (101052331) – Country factsheet: – Czechia', Charles University, Prague.

Bauer, W., Riedel, O., Herrmann, F., Sachs, C., Schmid, S. et al. (2018), *ELAB 2.0. Wirkungen der Fahrzeugelektrifizierung auf die Beschäftigung am Standort Deutschland*, Fraunhofer Institute for Industrial Engineering, Stuttgart.

BMWK (Federal Ministry for Economic Affairs and Energy) (2022), 'Expertenkreis "Transformation der Automobilwirtschaft" nimmt die Arbeit auf', BMWK website, 28 July 2022, accessed 21 March 2024, https://www.bmwk.de/Redaktion/DE/Pressemitteilungen/2022/06/20220628-expertenkreis-transformation-der-automobilwirtschaft-nimmt-die-arbeit-auf.html.

Boewe, J. and Schulten, J. (2024), 'Same, but different? Union responses to the double transformation of the automotive industry in Germany – The arena of collective bargaining and the arena of company labor relations', European Trade Union Institute conference paper, https://www.etui.org/sites/default/files/2024-03/07%20Germany-%20actors%20and%20policies.pdf (PDF).

Bosch (2023), 'Verhandlungen bei Bosch: Unternehmen und Arbeitnehmervertreter erzielen Einigung zur Zukunftsgestaltung des Mobilitätswandels', Bosch website, 4 July 2023, accessed 25 March 2024, https://www.bosch-presse.de/pressportal/de/de/verhandlungen-bei-bosch-unternehmen-und-arbeitnehmervertreter-erzielen-einigung-zur-zukunftsgestaltung-des-mobilitaetswandels-255873.html.

Burkacky, O., Deichmann, J., Doll, G. and Knochenhauer, C. (2018), 'Rethinking car software and electronics architecture', McKinsey & Company website, 14 February 2018, accessed 1 September 2025, https://www.mckinsey. com/industries/automotive-and-assembly/our-insights/rethinking-car-software-and-electronics-architecture.

Burstedde, A., Risius, P., Tiedemann, J. and Werner, D. (2023), *Weiterbildungsbedarfe der Automobilbranche in der Transformation*, Cologne Institute for Economic Research, Cologne.

Castellanos Alba, J. C. (2023), *Riesgos en las tareas a realizar sobre vehículos con motor eléctrico, derivados de aa incorporación de baterías de tracción de ion litio, y medidas preventivas para combatirlos*, Invassat, Burjassot, Spain.

Celasun, O., Sher, G., Topalova, P. and Zhou, J. (2023), 'Cars and the green transition: Challenges and opportunities for European workers', *IMF Working Papers*, No 2023/116, International Monetary Fund, Washington DC.

Ciepiela, D. (2023), 'Polska światową potęgą w produkcji baterii do samochodów elektrycznych', WNP website, 4 April 2023, accessed 1 September 2025, https://www.wnp.pl/energetyka/polska-swiatowa-potega-w-produkcji-baterii-do-samochodow-elektrycznych,695947.html.

Çinar, G. (2020), 'The Green Deal and the automotive industry in the EU – Transforming the automotive industry: Impact on EU regions', Renew Europe.

CLEPA (European Association of Automotive Suppliers) and Strategy& (2021), *Electric vehicle transition impact report 2020–2040*.

Diez, W. (2017), 'Der Einfluss der Digitalisierung und Elektrifizierung auf die Beschäftigungsentwicklung in der deutschen Automobilindustrie', Institut für Automobilwirtschaft, Hochschule für Wirtschaft und Umwelt Nürtingen-Geislingen.

EU-OSHA (European Agency for Safety and Health at Work) (2018), 'Electromobility', OSHwiki website, 12 March 2018 (17 May 2013), accessed 1 September 2025, https://oshwiki.osha.europa.eu/en/themes/electromobility.

Eurofound (2019a), 'Audi – Internal restructuring, Germany', Factsheet No 99384, European Restructuring Monitor, 26 November 2019, accessed 1 September 2025, https://apps.eurofound.europa.eu/restructuring-events/detail/99384.

Eurofound (2019b), 'Daimler – Internal restructuring, world', Factsheet No 99295, European Restructuring Monitor, 29 November 2019, accessed 1 September 2025, https://apps.eurofound.europa.eu/restructuring-events/detail/99295.

Eurofound (2020), 'BMW – Internal restructuring, Germany', Factsheet No 101224, European Restructuring Monitor, 19 June 2020, accessed 1 September 2025, https://apps.eurofound.europa.eu/restructuring-events/detail/101224.

Eurofound (2023), 'Ford Europe – Internal restructuring, Germany', Factsheet No 108433, European Restructuring Monitor, 14 February 2023, accessed 1 September 2025, https://apps.eurofound.europa.eu/restructuring-events/detail/108433.

Eurofound (2024), 'Ford – Internal restructuring, Germany', Factsheet No 200814, European Restructuring Monitor, 7 February 2024, accessed 1 September 2025, https://apps.eurofound.europa.eu/restructuring-events/detail/200814.

European Commission (2014), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A policy framework for climate and energy in the period from 2020 to 2030, COM(2014) 15 final of 22 January 2014.

European Commission (2019), Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions – The European Green Deal, COM(2019) 640 final of 11 December 2019.

European Commission (2021), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Updating the 2020 new industrial strategy: Building a stronger single market for Europe's recovery, COM(2021) 351 final of 5 May 2021.

European Commission (2022), Commission staff working document – For a resilient, innovative, sustainable and digital mobility ecosystem: Scenarios for a transition pathway, SWD(2022) 16 final of 24 January 2022.

European Commission (2024a), 'Pact for Skills large scale partnerships commit to upskilling and reskilling over 25 million people by 2030', Pact for Skills website, 21 March 2024, accessed October 2025, https://pact-for-skills.ec.europa.eu/about/news-and-factsheets/pact-skills-large-scale-partnerships-commit-upskilling-and-reskilling-over-25-million-people-2030-2024-03-21_en?utm.

European Commission (2024b), 'EAFO analysis: Trends in EV charging infrastructure across Europe', European Alternative Fuels Observatory website, 10 May 2024, accessed August 2024, https://alternative-fuels-observatory.ec.europa.eu/general-information/news/eafo-analysis-trends-ev-charging-infrastructure-across-europe.

European Commission (2025a), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Industrial action plan for the European automotive sector, COM(2025) 95 final of 5 March 2025.

European Commission (2025b), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Commission work programme 2026: Europe's independence moment, COM(2025) 870 final of 21 October 2025.

European Commission: European Political Strategy Centre (2025), *The future of European competitiveness – Part A: A competitiveness strategy for Europe*, Publications Office of the European Union, Luxembourg.

European Committee of the Regions (2024), *State of play and future challenges of automotive regions*, Brussels.

European Court of Auditors (2023), *The EU's industrial policy on batteries – New strategic impetus needed*, Publications Office of the European Union, Luxembourg.

European Environment Agency (2018), 'Indicator assessment: Greenhouse gas emissions from transport in Europe', European Environment Agency website, 22 November 2018, accessed August 2024, https://www.eea.europa.eu/data-and-maps/indicators/transport-emissions-of-greenhouse-gases/transport-emissions-of-greenhouse-gases-11.

European Parliament, Brown, D., Flickenschild, M., Mazzi, C., Gasparotti, A. et al. (2021), *The future of the EU automotive sector*, European Parliament: Policy Department for Economic, Scientific and Quality of Life Policies, Luxembourg.

European Parliamentary Research Service (2025), *Powering the EU's future: Strengthening the EU battery industry*, Brussels.

European Union (2023), Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU (OJ L 234, 22.9.2023, p. 1, ELI: http://data.europa.eu/eli/reg/2023/1804/oj).

Galgóczi, B. (2023), *On the way to electromobility – A green(er) but more unequal future?*, European Trade Union Institute, Brussels.

Guga, Ş. (2018), *Industria auto, încotro? Tendinţe globale, perspective periferice*, Friedrich Ebert Foundation, Bucharest.

Harrison, P. (2017), *Low-carbon cars in Germany – A summary of socio-economic impacts*, Cambridge Econometrics and European Climate Foundation, Berlin.

Holland-Letz, D., Kässer, M., Kloss, B. and Müller, T. (2021), 'Mobility's future: An investment reality check', McKinsey & Company website, 14 April 2021, accessed 1 September 2025, https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/mobilitys-future-an-investment-reality-check#/.

Humphrey, J. (2025), 'Incumbents' responses to the challenges of producing connected, autonomous, shared and electric vehicles', in: Krzywdzinski, M., Lechowski, G., Humphrey, J. and Pardi, T. (eds), *Global shifts in the automotive sector: Markets, firms and technologies in the age of geopolitical disruption*, Palgrave Macmillan, Cham, pp. 41–66.

IEA (International Energy Agency) (2022), *Global EV outlook 2022: Securing supplies for an electric future*, IEA Publications, Paris.

IESEI (Instituto de Estudios Sociales y Económicos sobre la Industria), CCOO (Workers' Commissions) and Fundación Primero de Mayo (2023), *El sector de automoción en 2022 – Situación y perspectivas*, Madrid.

IG Metall Gelsenkirchen (2021), 'Tarifrunde Metall- und Elektro 2021 – Mehr Geld, Arbeitsplätze und Zukunft gesichert', IG Metall Gelsenkirchen website, https://igmetall-gelsenkirchen.de/tarifrunde-metall-und-elektro-2021-mehr-geld-arbeitsplaetze-und-zukunft-gesichert/.

IG Metall (2023), 'Zukunftstarif bei Bosch – Arbeitsplätze bis 2027 sicher', IG Metall website, accessed 25 March 2024, https://www.igmetall.de/tarif/besser-mit-tarif/ig-metall-erreicht-zukunftstarif-bei-bosch.

IPCC (Intergovernmental Panel on Climate Change) (2018), *Global warming of 1.5°C – An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, Cambridge University Press, Cambridge.

Jürgens, U. and Krzywdzinski, M. (2009), 'Changing east–west division of labour in the European automotive industry', *European Urban and Regional Studies*, Vol. 16, No 1, pp. 27–42.

Kaul, A. (2019), *Automobile Wertschöpfung 2030/2050*, IPE Institut für Politikevaluation, fka GmbH and Roland Berger GmbH.

KPMG and PZPM (2023), *Branża motoryzacyjna – Raport kwartalny PZPM i KPMG*, https://www.pzpm.org.pl/pl/Publikacje/Raporty/Raport-kwartalny-PZPM-KPMG-Q2-2023.

Krzywdzinski, M. (2019), 'Globalisation, decarbonisation and technological change: Challenges for the German and CEE automotive supplier industry', in: Galgóczi, B. (ed.), *Towards a just transition: Coal, cars and the world of work*, European Trade Union Institute, Brussels, pp. 215–241.

Krzywdzinski, M., Lechowski, G., Ferdinand, J. and Schneiß, D. (2023), 'The German path to electromobility and its impacts on automotive production and employment', in: Galgóczi, B. (ed.), *On the way to electromobility – A green(er) but more unequal future?*, European Trade Union Institute, Brussels, pp. 179–200.

Krzywdzinski, M., Lechowski, G., Humphrey, J. and Pardi, T. (2025), *Global shifts in the automotive sector: Markets, firms and technologies in the age of geopolitical disruption*, Palgrave Macmillan, Cham.

Kuhlmann, K., Küpper, D., Schmidt, M., Wree, K., Strack, R. et al. (2021), *Is e-mobility a green boost for European automotive jobs?*, Boston Consulting Group.

Lechowski, G. and Weis, N. (2025), 'The German industrial model in transition: Electromobility challenges in the automotive sector', in: Krzywdzinski, M., Lechowski, G., Humphrey, J. and Pardi, T. (eds), *Global shifts in the automotive sector: Markets, firms and technologies in the age of geopolitical disruption*, Palgrave Macmillan, Cham, pp. 115–141.

Lefeuvre, A.-G. and Guga, Ş. (2019), 'Troubled waters ahead: What's next for the European automobile industry and jobs?', in: Galgóczi, B. (ed.), *Towards a just transition: Coal, cars and the world of work*, European Trade Union Institute, Brussels, pp. 157–192.

López Maeztu, O., Miñambres Maldonado, J. I. and Moros García, P. B. (2024), *Nuevos perfiles profesionales para una automoción eléctrica*, Fundación Primero de Mayo, Madrid, https://industria.ccoo.es/3d4f2aa0cd178ac997cb93e9969719b6000060.pdf.

Mahle (2023), 'Zukunftstarifvertrag bei Mahle: Transformationsprozess und Beschäftigungssicherung bis Ende 2025', Mahle website, 9 August 2023, accessed 25 March 2024, https://newsroom.mahle.com/press/de/press-releases/zukunftstarifvertrag-bei-mahle-transformationsprozess-und-beschaftigungssicherung-bis-ende-2025--99776.

Merino, R., Yepes, L. and Pérez, F. (2022), *Digitalización, cambios en las cualificaciones y nuevas competencias en las PYMES de automoción, logísitica y facility management*, IMANcorp Foundation, Madrid.

Mönning, A., Schneeman, C., Weber, E., Zika, G. and Helmrich, R. (2018), *Elektromobilität 2035: Effekte auf Wirtschaft und Erwerbstätigkeit durch die Elektrifizierung des Antriebsstrangs von Personenkraftwagen*, IABForschungsbericht 8/2018, Institute for Employment Research, Nuremberg.

NPM (National Platform Future of Mobility) (2019), *Fortschrittsbericht 2019 der Nationalen Plattform Zukunft der Mobilität*, Federal Ministry of Transport and Digital Infrastructure, Berlin.

Pardi, T. (2025), 'Car markets in transition: Can emerging countries take the lead?', in: Krzywdzinski, M., Lechowski, G., Humphrey, J. and Pardi, T. (eds), *Global shifts in the automotive sector: Markets, firms and technologies in the age of geopolitical disruption*, Palgrave Macmillan, Cham, pp. 15–40.

Pardi, T. and Calabrese, G. (2017), 'Introduction to the special issue on the "new frontiers" of the world automotive industry: Technologies, applications, innovations and markets', *International Journal of Automotive Technology and Management*, Vol. 17, No 2, pp. 117–121.

Pardi, T., Alochet, M., Jullien, B. and Kuyo, A. (2025), 'Made in Europe – Local content policy for the European automotive industry', *Actes du Gerpisa*, No 44, Gerpisa, Gif-sur-Yvette, France.

Pavlinek, P. (2023), 'Transition of the automotive industry towards electric vehicle production in the east European integrated periphery', *Empirica*, Vol. 50, pp. 35–73.

Peters, A., Doll, C., Plötz, P., Sauer, A., Schade, W. et al. (2013), *Konzepte der Elektromobilität: Ihre Bedeutung für Wirtschaft, Gesellschaft und Umwelt*, Edition Sigma, Berlin.

Schade, W., Zanker, C., Kühn, A. and Hettesheimer, T. (2014), *Sieben Herausforderungen für die deutsche Automobilindustrie: Strategische Antworten im Spannungsfeld von Globalisierung, Produkt- und Dienstleistungsinnovationen bis 2030*, Edition Sigma, Berlin.

Schade, W., Berthold, D., Mader, S., Scherf, C., Stich, M. et al. (2020), *Gesamtwirtschaftliche Wirkungen durch die Transformation zu nachhaltiger Mobilität*, Hans Böckler Foundation, Karlsruhe.

Sorge, A. and Streeck, W. (2018), 'Diversified quality production revisited: Its contribution to German socio-economic performance over time', *Socio-Economic Review*, Vol. 16, No 3, pp. 587–612.

Strategy& (2018), *Transforming vehicle production by 2030: How shared mobility and automation will revolutionize the auto industry*, PwC.

Syndex (2022), *Electrification and employment in the French car industry*, European Trade Union Institute and European Climate Foundation.

Syndex (2024), 'Auto: Les restructurations s'amplifient', Syndex website, 4 November 2024, accessed 1 September 2025, https://www.syndex.fr/actualites/actualite/auto-les-restructurations-samplifient.

VDA (German Association of the Automotive Industry) (2022), *Jahresbericht 2022 – Themen und Zahlen zur Entwicklung der deutschen Automobilindustrie*, Berlin.

VDA (undated), 'Allgemeines – Angaben zu Forschungsausgaben, Umsätzen und Beschäftigten in der Automobilwirtschaft', VDA website, 1 April 2025 (6 May 2008), accessed 20 March 2024, https://www.vda.de/de/aktuelles/zahlen-und-daten/jahreszahlen/allgemeines.

Waas, A., Sadek, P., Hofmann, B. and Gruener, J. (2023), 'European auto industry is at a crossroads', Boston Consulting Group website, 5 September 2023, accessed 1 September 2025, https://www.bcg.com/publications/2023/european-auto-industry-is-under-pressure.

World Economic Forum (2018), *Towards a reskilling revolution – A future of jobs for all*, World Economic Forum, Geneva.

ZF (2020), 'Tarifvertrag Transformation: Zwei Jahre Sicherheit für Mitarbeiter und Flexibilität für das Unternehmen', ZF website, 24 July 2020, accessed 25 March 2024, https://press.zf.com/press/de/releases/release_17729.html.

Getting in touch with the EU

In person

All over the European Union there are hundreds of Europe Direct centres. You can find the address of the centre nearest you online (https://european-union.europa.eu/contact-eu/meet-us_en).

On the phone or in writing

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

– by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),

– at the following standard number: +32 22999696,

– via the following form: https://european-union.europa.eu/contact-eu/write-us_en.

Finding information about the EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website (https://europa.eu).

EU publications

You can view or order EU publications at https://op.europa.eu/en/publications. Multiple copies of free publications can be obtained by contacting Europe Direct or your local documentation centre (https://european-union.europa.eu/contact-eu/meet-us_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1951 in all the official language versions, go to EUR-Lex (https://eur-lex.europa.eu).

Open data from the EU

The portal https://data.europa.eu provides access to open datasets from the EU institutions, bodies and agencies. These can be downloaded and reused for free, for both commercial and non-commercial purposes. The portal also provides access to a wealth of datasets from European countries.

TJ-01-25-023-EN-N

This report assesses the impact of the green and digital transitions on the EU automotive sector in relation to employment, skills, work organisation and working conditions. It also examines the contribution of social dialogue to addressing these challenges. The report finds that, while employment in the automotive industry – covering manufacturing, sales and the aftermarket – increased by 12 % between 2011 and 2023, this masked job losses of over 7 % in the manufacturing and supplier sector between 2019 and 2023. In 2024 and early 2025, further restructuring was announced. Job losses in vehicle manufacturing were mainly concentrated in western Europe, while some automotive supply jobs moved to lower-cost countries outside the EU. Electrification and digitalisation are also creating shifts in skills profiles and requirements, particularly among highly skilled occupations.

The European Foundation for the Improvement of Living and Working Conditions (Eurofound) is a tripartite European Union Agency established in 1975. Its role is to provide knowledge in the area of social, employment and work-related policies according to Regulation (EU) 2019/127.

Publications Office
of the European Union

ISBN 978-92-897-2510-1
doi:10.2806/6339859