

Policy Brief

The many headwinds on the road to transition

Car industry at the crossroads of a radical new paradigm



Europe is the birthplace of the automotive industry and has a long history of developing breakthrough innovations. For many decades the European automotive industry, spurred by a demanding market, highly qualified workforce and world-class engineering, has been on a successful trajectory. The European car industry became a global leader and a driver for jobs and economic growth. But today disruptive times are ahead for the automotive value chain and the sector is facing unprecedented challenges which will make fundamental adjustments inevitable.

The car industry was one of the leading sectors during the second, fuel-based industrial revolution end of the 19th century. The assembly line, the internal combustion engine, the mass production of cars, ever extending road networks, and fossil fuels were dominant characteristics of that revolution. However, the sector must now make the transition to the third digital and low-carbon industrial revolution which will be as disruptive as at the end of the 19th century, when we put engines on horse carts. While at that time a completely new transport infrastructure and regulatory framework (roads, maintenance, traffic rules, insurance, and definitions of liabilities) were needed for cars to drive, we will now have to adapt our transport infrastructure and traffic rules for electric and automated/connected cars. The big difference is that phasing out horse carts only made horses redundant. At the same time the mass production of cars (and road infrastructure) created millions of jobs. Today the phasing out of fossil fuels and the transition to electrical cars risk making these workers redundant again as electrical cars have a much lower labour content.

The transition from the second fuel-based industrialisation to the third industrial revolution where mass production and mass consumption will be replaced by sustainable production and consumption and where added value will shift from producing cars to delivering mobility services, will create deep turmoil in the automotive industry. It will completely overhaul the car industry as it must face so many disruptive trends at the same time. Moreover, all these structural challenges are mutually reinforcing each other. While the final goal of a decarbonised road transport system is obvious, there is no visibility on the pathways leading to this.

Disruption ahead

A long list of disruptive megatrends is currently challenging the automotive industry.

1. **Globalisation.** As sales on mature western markets are slowing, automotive sales are growing in the emerging economies. As a result, the economic centre of gravity of the automotive industry, and thus profits and revenues is moving from the EU and the US to Asia. China which until the turn of the century didn't produce any passenger cars, is currently churning out 24 million cars per year, 1 out of three globally and outpacing the EU with its 17 million cars per year. It will be a huge challenge for the European industry to maintain its huge export surplus – EU exports of cars, in value, are almost three times higher than EU imports - as normally production footprint (including R&D centres) follows the markets. The permanent extension of global production facilities also risks creating global overcapacities. At the same time companies of the emerging markets will go global (Volvo taken over by Chinese Geely, which has also become the major shareholder of Daimler; another Chinese company, Dongfeng, owns 12% of PSA; Indian TATA became the owner of Jaguar Land Rover, and the tyre producer Pirelli was taken over by China National Chemical).
2. **The challenge of electromobility and sustainable development.** Although the car industry managed to reduce CO₂ emissions by 36% compared to 1995, the transport sector as a whole accounts for 24% of the EU's greenhouse gas emissions, compared to 17% in 1995. This has led to increased political and societal pressure to decarbonise transportation. Indeed, although extremely challenging this will be key if the EU wants to achieve the objectives of the Paris Agreement. On the other hand, stricter environmental regulations will create first mover advantages, support European leadership in low-carbon technologies and its global competitiveness. However today the pathways to this transition are not clear yet and it could mean the end for those that made the wrong choices or are lagging behind. For the automotive industry it means massive investments in the development of alternative drivetrains (battery-electric, hybrid, range extenders, hydrogen, and e-fuels) without much visibility on the speed of the uptake of these new powertrains and on the pay-back periods of these investments. Nevertheless, in the next two years many electrified vehicles will enter the marketplace and will test the consumer acceptance of these cars. It is expected that strict CO₂-standards, diminishing battery costs, more widely available charging infrastructure and consumer incentives will create the right enabling framework for a viable business case for these cars at least in car fleets and developed dense cities. Mass uptake of electrical cars is supposed to start although there are still considerable question marks related to limited range, lack of charging infrastructure, level of incentives to cover the price difference with conventional cars.
3. **Changing consumer mindset.** Consumer mobility behaviour is changing. Millennials are less interested in owning a car as many of them are living in urban areas with well-established collective transport systems. As a result, the share of young people holding a driver's license is dropping. Instead of having one car for each mobility need, they will look for a mobility solution (car-sharing, public transport, electric bikes, and ride-hailing services) for each specific mobility need. Consumer preferences will also be heavily driven by regulations that discourage private-car use (congestion fees, emission standards, ban on diesel in city centres).
4. **Increasing connectivity.** Or the integration of the car into its environment. Throughout information technologies cars will become permanently connected to each other and to their environment. Cars will be equipped with active safety features, infotainment, traffic information services, vehicle-to-infrastructure communication. Just as phones got smart, so will cars. Higher connectivity of vehicles will also generate large amounts of new data which can be exploited for commercial applications and for the creation of value.
5. **The gradual automation of the car.** The journey to self-driving cars has only started and will lead to ever increasing levels of autonomous vehicle features. Automation will be the result of a combination of hardware (radars, sensors, transponders, cameras, and lidars) and communication networks (internet, mobile networks, and GPS) with software programmes taking over the steering wheel and replacing the driver for making the connection between the steering wheel and the gas-/brake pedal). It will lead to a completely new driving experience.

6. **Digitalisation of production.** After the invention of the production chain (Fordism), the application of the principles of lean manufacturing (Toyotism), the introduction of globalised production platforms (led by Volkswagen), the car industry is now embracing the digitalisation of operations resulting from advanced robotisation, digitally integrated supply chains, advanced manufacturing systems. It will allow machines, parts and components to communicate in real time with each other all along the supply chain and this without human interface. These fully integrated production systems will lead to efficiency gains while requiring less human labour.

Bumps on the road from car industry to mobility industry

As a result of these game-changing developments the automotive industry faces a quantum shift that will result in a complete overhaul of the automotive supply chain and the division of added value between the different stages of the production process.

1. **Boundaries between the automotive industry and the IT sector will blur** and information technologies will penetrate at all stages of the supply chain. Data will become a new raw material and a source of revenue. As a result we are going to see a global industry reshuffle with new players from outside the sector entering the automotive industry: mobility providers (Uber), IT-giants (Google, Apple Baidu), chip producers (Intel, NXP, STM), battery producers (Panasonic, CATL, LG, BYD), emerging OEMs- Original Equipment Manufacturers (Tesla), software companies (Mobileye, Here), and telecom operators. The share of electronic components and software as a percentage of the total value of a vehicle has already increased drastically and will continue increasing. Added value will shift away from the core of the industry (the OEMs) to other parts of the supply chain. It obliges the OEMs and suppliers to move from commodity mechanical components to higher added value electronics, software and the exploitation of data. Digitalisation has already revolutionised other industries such as consumer electronics, telecommunications, and lighting. The automotive sector will be no exception. Cars will always be online and always connected and become part of the 'internet of things', highly sophisticated autonomous and connected mobile computers.
2. **Digital platforms will acquire added value** based on user data and algorithms. Digital platforms for e-commerce, autonomous driving, automated production systems, connected vehicles, navigation, car sharing are expected to capture an ever bigger share of the automotive value chains. As these platforms manage and control strategic client data, they are in a position to acquire a dominant position and change the power relations in the sector (the one that controls the brain, the operating system, will also control the value). The role of OEMs could be reduced to just being brand owners and contract manufacturers for IT-companies and cars could become commodity (white-label) products that will be business-to-business markets to the providers of mobility services. The direct relationship with the customer could thereby move from the car producer to a mobility platform.
3. The automotive industry will have to make the **transition from mechanical technologies**, which were for more than a century their core competence, **to low-carbon technologies** such as software development, big data analytics, emission control, and power electronics. They will have to face the choice to develop this in-house or to set up partnerships with specialised companies. Electronics and software will play a growing part in the added value of a vehicle, requiring competences that have, so far, not been among the core competencies of automotive engineering.
7. **New skills and experience** will be needed (electronics, electrochemistry, new materials, information technologies), while in parallel there will be a fall in demand for traditional mechanical skills. Equipping the workforce with these new skillsets will become an important challenge for the automotive industry.
8. More and more added value will be created in **mobility services** as e-hailing and car sharing and plenty of digital services as navigation apps, infotainment, social media, advertising, remote services

(predictive maintenance, software updates), advanced driver assistance systems, feature updates will supplement the slowing growth of revenues of one-time vehicle sales. The automotive supply chain will be extended to include mobility services, data services, road infrastructure for connected and electric cars. Revenue pools will be shifting to new business models and digital services (data-enabled services, advanced driver assistance systems technologies). While OEMs see the car industry as a market for 100 million vehicles, digital platforms are looking at it as a market where 10 trillion miles can be sold every year. Also, a new market for smart transportation systems (new toll systems, new traffic control systems) will emerge. To respond to this challenge many OEMs are currently developing a second business strategy: besides selling cars they have started to invest in the development of a 'mobility on demand' business – ride hailing. They have started to develop their own brands for mobility services (MOIA for Volkswagen, Car2Go for Daimler, DriveNow for BMW, Free2Move2 for PSA) and/or invest in existing car sharing companies (Toyota took a stake in Uber, GM in Lyft and Volkswagen in Gett)

9. The **increased spending on R&D investments** in alternative powertrains (battery electric vehicles, plug-in hybrids, mild hybrids, hydrogen), automated driving, connectivity without any visibility on market potential and economic return forces companies to cut costs elsewhere (with a negative impact on jobs) or to set up strategic alliances, inside (Opel-PSA, Volkswagen-Ford) or outside (in the recent years numerous agreements were made with IT-companies and providers of mobility services) the sector.
10. The **aftermarket** which employs 4 million people and is already suffering from strong economic pressure leading to ultra-thin margins, will be confronted with the switch of the purchasing process to online platforms. Big showrooms will not be needed anymore as customers will use the internet to design their car. Together with the reduced need for maintenance of EVs (electric vehicles) and the quest for economies of scale to increase profitability, the number of dealerships will continue shrinking. They are facing the challenge to start a new life as mobility providers
11. Cars are becoming **less affordable for ordinary people**. Electrification (although price parity between conventional and electrical cars is expected by 2025), automated and connected driving, extra safety features, environmental requirements (exhaust management) are increasing the price labels. This raises the question of fairness towards those that need a car to commute and will have a negative impact on sales figures and thus on jobs.
12. The **employment structure** of the automotive industry will drastically change. While jobs in manufacturing and conventional parts and components will decrease, new jobs will be created in connected industries (software development, power electronics, smart electric grids, charging infrastructure, batteries, new materials, and alternative fuels).
13. The **gradual phasing out of diesel**, which is a European technology, will negatively impact the European automotive industry as this was a typical European technology and one of its strengths
14. The car industry will have to deal with **two business models** at the same time. Trying to create value in selling mobility services (so far, their profitability is still very low or non-existent) and at the same time still trying to sell as many cars as possible. However, the more successful they are in mobility services, the less cars will be sold. Although there is no alternative, betting on both horses could negatively impact profitability.

As a result of all these trends we will see a **global reshuffling** of the automotive industry. The evolution to a digitalised transportation system means the end of the automotive industry as we have known it and an existential threat for automakers. Indeed, the soul of the car (and of the OEMs) which is mechanics and horsepower will shift to data generation and electronic content (as in the mobile phone business). The paradigm shift to mobility as a service, along with new entrants in a globalised industry will put continuous pressure on traditional automotive companies to conclude strategic partnerships, to cut costs, to invest in the automation, connectivity and electrification. The future of suppliers of

conventional technologies that cannot make the transition to digital technologies is at risk (these companies are often SMEs that do not have the human and financial resources to make the shift to more promising businesses). All the above-mentioned megatrends will reinforce each other. But while there is a widespread consensus that game-changing disruption has started, nobody knows how fast these processes will take place and nobody has an idea about how the sector will look in a decade from now and where this journey will end.

Hard times at the assembly lines

Today we have probably reached a tipping point. The combination of the above-mentioned structural changes with a cyclical slowdown and stalling sales have made the sector very fragile. As a result, restructuring has started. Honda has announced the closure of its only European factory in Swindon, UK (3,500 direct jobs, 7,000 if we include suppliers). It will also discontinue its production in Turkey (1,000 workers).

Ford will cut about 12,000 jobs in Europe, roughly 20% of its workforce in a sweeping overhaul of which 5,000 in Germany, 3,000 in the UK, 2,000 in Russia and 1,000 in France. Six plants will be closed or sold of which the Bridgend engine plant in Wales (affecting 1,500 workers), a transmission plant in France, the joint venture with Magna in Slovakia, as well as two assembly sites and an engine plant in Russia. At the same time, it will streamline its model portfolio by phasing out the C-Max and the KA+ small car.

Jaguar Land Rover, which heavily depends on diesel, announced 4,500 job cuts mainly in the UK. Also, Volkswagen intends to shrink its headcount by 7,000 as it is preparing its production facilities for electromobility.

The take-over of Opel by PSA in 2017 resulted in the elimination of 3,700 jobs in Germany and 900 in the British Vauxhall plant in Ellesmere Port. Daimler announced that it expects Mercedes to reduce costs by 6bn euros by 2021, while the truck division must save another 2 billion euros. This could affect 10,000 jobs. The savings are necessary in order to be able to implement a radical transformation of the company over three product cycles. Indeed, Daimler has the ambition to make its entire passenger fleet carbon neutral by the close of 2039. In the supplier sector we had to face the closure of 2 plants in the UK by Schaeffler, which also axed 900 jobs in Germany. Bosch closed its plant for diesel injections in Rodez France (600 jobs) while Ford decided to stop its production of transmissions in Blanquefort, France (900 workers affected). The collapsed merger talks between Fiat Chrysler and Renault, could have created for \$5 billion of synergies. Needless to say, that this will have a deep impact on the workforce. Finally, because of stalling sales automotive workers are currently confronted with a strong increase of short-term work.

In general electrification will have a deep impact on the employment structure of the sector. Electric powertrains contain 6 times fewer components than combustion engines. Electrical cars don't need complex conventional engines, exhaust systems, water pump, oil pump, alternator, carburettor, gearbox, and starter. Out of the 2,4 million employees in the automotive industry, some 600,000 jobs are producing conventional parts and components. These jobs will be at risk during the journey towards electromobility (unlike hybrid cars which will become the dominant business model as these cars create extra jobs because they combine a conventional and an electric engine). On basis of an extrapolation to the European level of the study made by the Fraunhofer Institute for Germany¹, we can conclude that the new CO2 standards for passenger cars, recently voted in the European Parliament (-37,5% CO2 reductions by 2030) will affect 108,000 direct jobs in the automotive industry.

Mastering the transformation

The decarbonisation and digitalisation of the automotive industry is a major technological transformation which will entail profound structural change in the economy and society. It will have a deep impact on the structure of the sector, the distribution of the added value in the supply chain, the division of labour between OEMs, ICT companies, suppliers, and mobility providers. For industriAll Europe mass redundancies and plant closures have to be avoided at all costs and a 'just transition' with sufficient lead times for the workers concerned should be guaranteed. Indeed, the transformation of the automotive industry will have a massive impact on the quantity of jobs needed in the manufacturing of cars and their components. It will also radically shift the job profiles needed. Therefore, labour market policies should focus on maintaining/increasing the employability of the workforce e.g. by means of lifelong learning and on creating flexible pathways between the world of education and the world of work (e.g. dual learning systems). The internal mobility of workers in companies should be promoted by up- and re-skilling in order to equip them with the skills of the future (decrease of manual work and sharp increase of digital skills with special attention for software and electronics engineering). For those having to leave the company a smooth transition to another job should be organised (preferably during the labour contract). Income security must be guaranteed, working time reduction envisaged. Proper and timely information of the workforce must be ensured in order to be able to timely anticipate change and avoid social disruptions and conflicts. This will only be possible when workers have real perspectives on a new future. They must offer access to the new jobs that indeed will be created in adjacent industries as IT, 5G networks, power electronics, charging infrastructure, production of renewables, smart grids, smart roads, mobility services, batteries, alternative fuels, energy storage, electricity production and distribution. This will be very challenging as these jobs will probably be created elsewhere at another moment and with other skillsets than the jobs that will disappear.

Finally, industrial policies should focus on preserving/reinforcing the presence of European companies in a transformed automotive supply chain (e.g. by promoting industrial collaboration to allow the sector to share R&D costs and IT development) as well as on ensuring the industrial re-development of regions adversely affected by this major technological disruption.

The automotive industry is currently facing a major shift. However, we don't know yet how and when these disruptions will take place. But looking at the recent wave of restructurings the process has undoubtedly started. Digitalisation and decarbonisation will revolutionise the industry. How it will look when the dust has settled is totally unclear today. The automotive industry is entering a period of creative destruction with the car becoming a completely different product with a completely different supply chain. Gradually the added value creation will move away from producing cars towards organising a digitalised transport system. It will be a key challenge for the established automotive companies and for Europe's industrial policy to maintain the generation of added value (and the related jobs) of a transformed automotive industry inside the EU.

The preamble of the Paris Agreement includes a commitment to the 'imperative of just transition'. Organising a fair transition of the automotive industry creates huge challenges about making disruptive economic/technological change socially linear/progressive. IndustriAll Europe regrets that so far only lip service has been paid to this principle and that the social dimension was not taken into account when setting very ambitious new CO2 standards for passenger cars. Therefore, industriAll Europe calls for a European Just Climate Transition Programme for all carbon-dependent sectors and regions. Such a programme should streamline the transition of carbon-intensive industries (automotive included) in all existing European funds (ESF, ERDF, Cohesion Fund, Globalisation Fund, Modernisation Fund, and

InvestEU), coordinate regional re-development plans, support social plans, exchange good practices, organise technical assistance and provide extra financial support.

ⁱ Fraunhofer Institute for Industrial Engineering, Effects of Vehicle Electrification on Employment in Germany (ELAB), 2018.