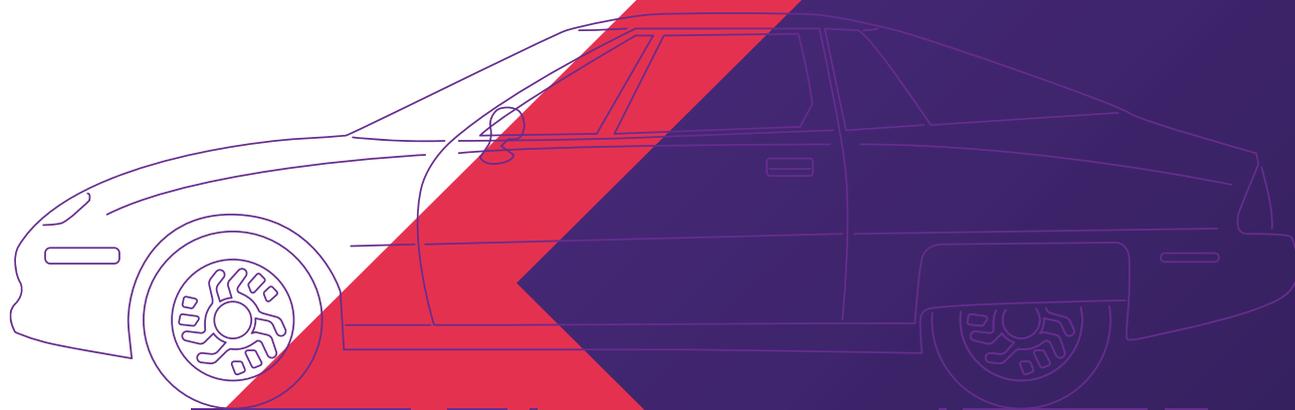


# rEVolution behind the scenes

How electromobility will shape  
Poland's auto parts market



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The Foundation for the Promotion of Electric Vehicles (FPPE) is an NGO that supports the electrification of transport in Poland. It provides the largest forum for dialog and knowledge exchange on electromobility in Poland, bringing together businesses, officials and NGOs. It also provides analytical services on demand.

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# Introduction

Poland's automotive sector is unusually important for the economy, accounting for 8 per cent of GDP. Over half of this is generated by around 1,000 companies, mainly SMEs, which produce automotive parts and accessories. They employ 80 per cent of workers in the sector, some 150,000 people.

Despite its strong position today, the Polish automotive sector's place in the European and global value chain is not uncontested. On the contrary: the automotive sector faces massive changes, which will determine which cars we will drive and how. The four trends of electrification, automation, car-sharing and connected cars will not only affect consumers – today's drivers and passengers – but also producers of cars and parts.

The changes will focus on the engine, the most valuable part of a conventional car. In electric cars, it will become simple to build, less prone to breakdown and a cheap, generic product. The sector will also have to open up to a totally new part fully produced by subcontractors: the battery.

How cars are used and their number will change, too. Shared cars, and ultimately autonomous ones, will be used intensively, but their number will dwindle over time. Meanwhile, the role of the software steering vehicles will grow, reducing the number of accidents while changing the relationship between car manufacturers and app providers. All these changes will transform the market gradually, especially the market for parts and accessories. There will be no revolution, though; new technological solutions and cars will be introduced gradually.

The current position of manufacturers of auto parts in the Polish economy, combined with their fit condition and the growing market, may give companies the impression that these changes are distant and not worth preparing for. For this reason, the state ought to play a prominent role in the sector's transformation. With the right combination of regulations, incentives and sanctions, it will stimulate changes in the automotive sector so that Polish companies not only maintain their position on their market, but also improve it. The sooner the sector feels officials' support, the sooner it will start adapting to the new automotive reality.



## Producers and distributors of auto parts in Poland

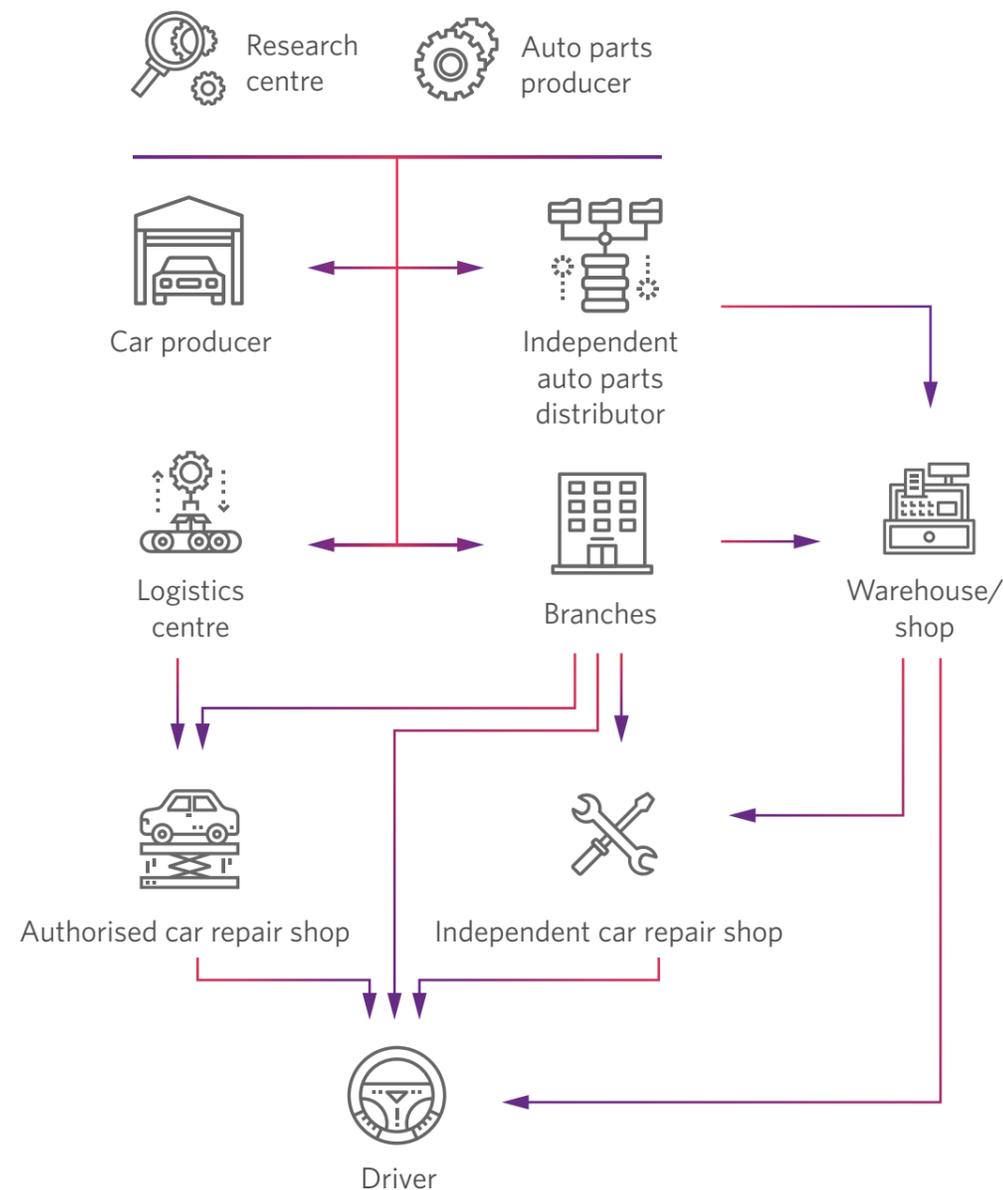
The automotive sector is the biggest and most productive branch of the Polish economy, generating around 8 per cent of GDP. Parts and accessories are the Polish automotive sector's driving force, accounting for 57 per cent of its value. The segment has made Poland one of the centres of automotive production, not just in Europe, but globally.

*The automotive sector generates around 8 per cent of Poland's GDP*

# HOW AUTO PARTS ARE MANUFACTURED AND DISTRIBUTED

Auto parts are designed at research centres owned by independent manufacturers. Revolutionary technology is created there, before becoming standard in all new cars. After being made, the parts are sent to car producers and independent distributors.

**INFOGRAPHIC 1. PRODUCTION AND DISTRIBUTION OF AUTO PARTS**



Source: Prepared by SDCM.

These are often the same parts, only differing in packaging, logo and price. They are sent to car manufacturers, who use them to assemble cars and send them on to authorised service stations via their own logistics centres. They are also sent to independent distributors, who mainly supply unauthorised car repair shops, though some of their goods are also for authorised ones.

*There are around 1,000 producers of automotive parts in Poland, including 115 companies with over 250 employees.*

The independent segment also supplies automotive companies and their supply chains with parts. 80 per cent of parts produced for assembling new vehicles come from independent producers. Just 20 per cent are produced by car companies themselves; above all metal and plastic parts of the upper and lower chassis joined together.

## MANUFACTURERS OF AUTOMOTIVE PARTS AND ACCESSORIES

According to the Polish Investment and Trade Agency, there are around a thousand producers of automotive parts in Poland, including 115 companies with over 250 employees. The world's leading manufacturers of auto parts have factories in Poland, including Bosch, Brembo, Delphi, Federal Mogul, Gates, Johnson Controls, Mahle, Tenneco Automotive, ZF-TRW and Valeo. Companies with Polish capital include Asmet, Tomex,

*Independent manufacturers of parts and accessories generate almost 80 per cent of jobs in Poland's entire automotive industry.*

Lumag and Janmor. In 2017, independent manufacturers of parts and accessories employed 147,400 people, almost 80 per cent of jobs in Poland's entire automotive industry<sup>1</sup>.

<sup>1</sup> Industry outlays and results in 2017, GUS.

## VALUE OF PRODUCTION

In 2017, the value of the Polish automotive industry's sold production amounted to PLN 145.1 billion, of which 84.3 billion was the value of the auto parts and accessories manufacturing sector. Parts manufacturing rose to 57 per cent of the entire automotive industry's value<sup>2</sup>.

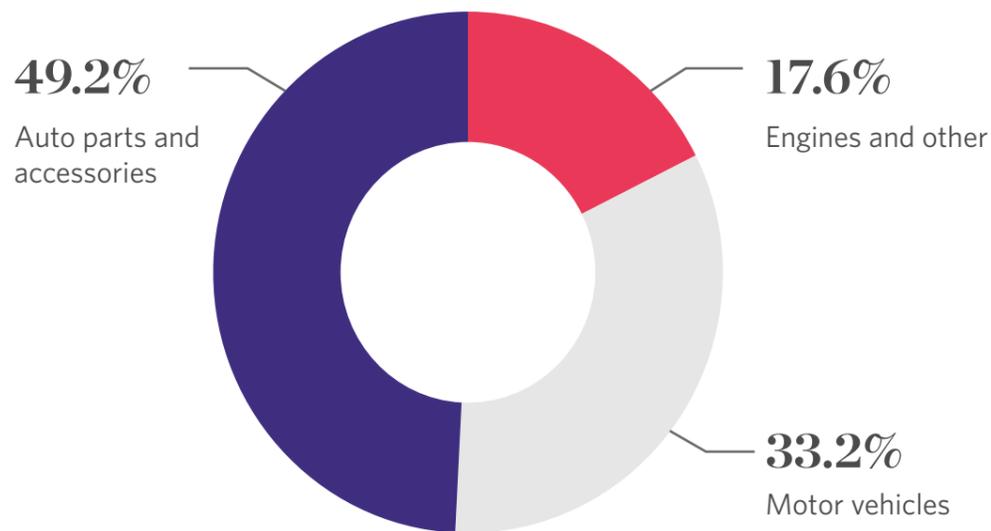
## EXPORT

In 2016, Poland exported 1.6 million tonnes of auto parts and accessories<sup>3</sup>. This figure is increasing gradually, by an average of 0.2 million tonnes per year.

Poland ranks 10<sup>th</sup> worldwide among countries exporting auto parts, with 3.2 per cent of global exports. The country has also been one of the fastest-growing exporters of parts since 2013 (an increased of 28.9 per cent).



**CHART 1. AUTO PARTS AND ACCESSORIES AS A SHARE OF POLISH AUTOMOTIVE EXPORTS IN 2016**



Source: Prepared by SDCM based on GUS data.

<sup>2</sup> Industry outlays and results in 2017., GUS; How many Polish genes in the Polish automotive industry, September 2017, ARP.

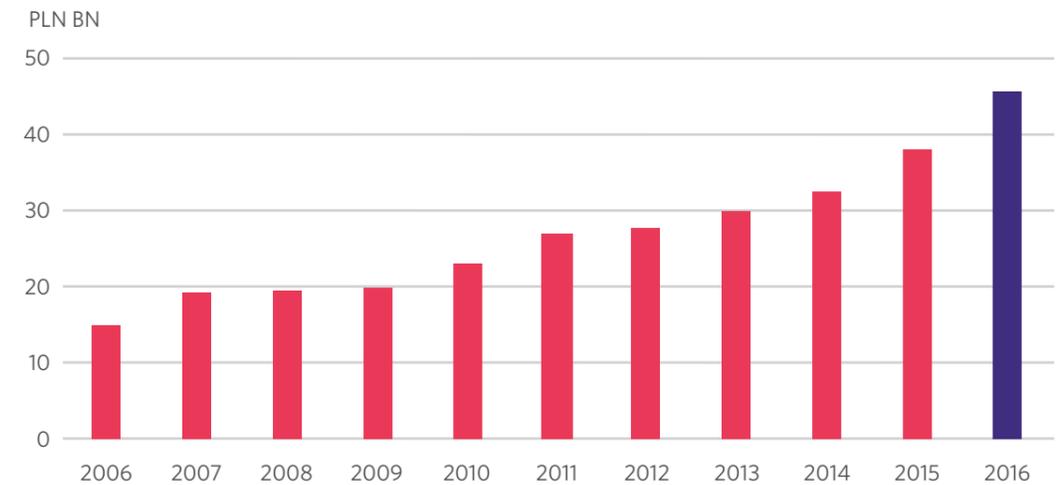
<sup>3</sup> Foreign Trade Statistical Yearbook 2016, GUS.

Poland exported PLN 44.8 billion worth of auto parts and accessories in 2016<sup>4</sup>, up from 37.5 billion the previous year, an increase of over 19 per cent year-on-year. Estimates suggest that this value grew again in 2017, to around PLN 48.9 billion.

Polish manufacturers mainly sell to Germany (42 per cent of exports), Czechia (8.5 per cent), France (5.8 per cent), Britain (5.7 per cent) and Italy (5.3 per cent). Over the past decade, exports of Polish parts have almost doubled.



**CHART 2. EXPORT OF AUTO PARTS AND ACCESSORIES IN 2006-2016**



Source: GUS.

## RESEARCH AND DEVELOPMENT

Manufacturing parts and accessories is one of the most innovative branches of the automotive industry. New solutions require knowledge, experience, tests and research, so that goods leaving the manufacturer's research centre are innovative and meet safety

*Independent producers invest 8-10 per cent of their revenue in design work and developing new technologies.*

and environmental standards. Manufacturers' innovative efforts largely focus on R&D, usually financed using their own funds. Independent producers invest 8-10 per cent of their revenue in design work and developing new technologies.

<sup>4</sup> Foreign Trade Statistical Yearbook 2016, GUS.

## REGENERATING PARTS IN FACTORIES

Auto parts are often made of scarce materials from non-renewable sources, which is why regenerating parts in factories is becoming more important.

According to the Automotive Parts Rebuilders Association (APRA), regeneration means reconstructing the used part of a vehicle so that it functionally corresponds to a new part, based on general principles of engineering.

Europe's biggest producer of regenerated parts, Valeo, has factories in Poland, including a regeneration branch in Czechowice-Dziedzice. Many companies doing similar things are active on the Polish market, including Borg Automotive and Polish company Lauber, which has a significant presence in Central and Eastern Europe, regenerating spare parts for cars on an industrial scale.

The most frequently regenerated components assembled in cars include starters, alternators, drive axles, clutches, steering gears and brake callipers.

Regenerated parts are not only sold on the independent automotive market; they are also used to repair cars at authorised service stations.

*Regeneration of auto parts at factories is gaining importance.*

## DISTRIBUTION OF PARTS AND ACCESSORIES

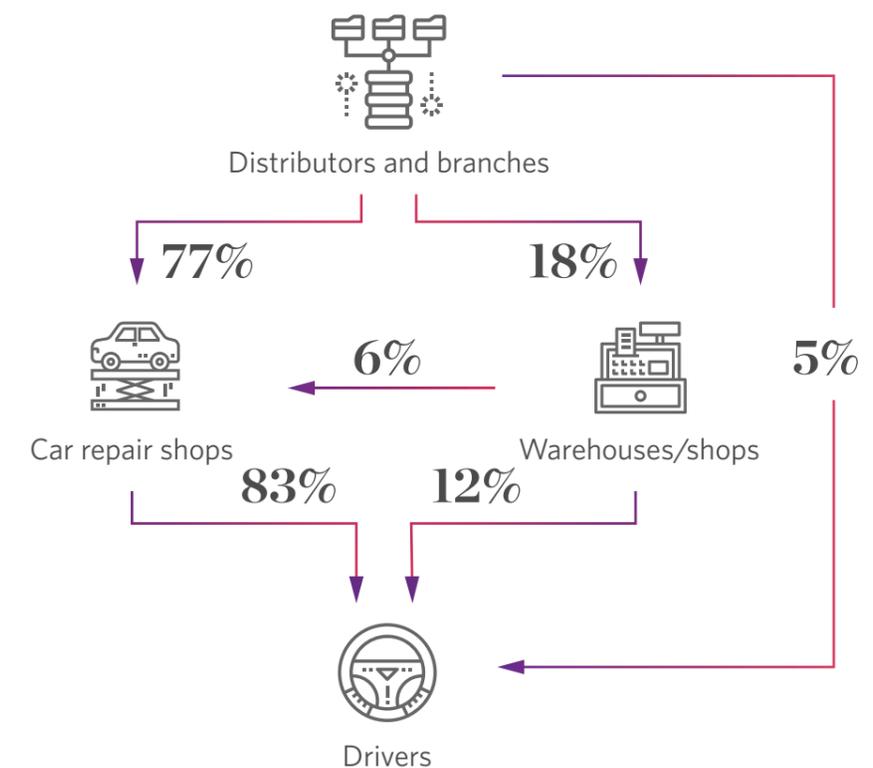
In Poland, auto parts are distributed through several channels. Spare parts can reach the end consumer from three sources: straight from the distributor, via a shop or via a workshop. Over 83 per cent of parts are sold at workshops, where distributors deliver them directly.

Over the course of a month, independent distributors deliver over 19 million spare parts. This means that independent workshops in Poland receive as much as 760,000 parts per day. Almost 1,600 parts are sold to customers every minute.

There are almost 1,200 wholesale points in Poland selling parts for personal and heavy goods vehicles; 75 per voivodship on average. The biggest companies distributing auto parts include two listed companies, Inter Cars S.A. and Auto Partner S.A.

*Almost 1,600 auto parts are sold to customers in Poland every minute.*

**INFOGRAPHIC 2. DISTRIBUTION CHANNELS FOR AUTO PARTS**



Source: MotoFocus.pl.

To ensure a wide range of parts and high quality services, Polish distributors invest in other sectors, such as IT. By buying ready IT solutions from Polish software producers and hiring IT specialists who create solutions for distributors' commercial networks, they indirectly support the development of Poland's IT sector. Specialist software bought or ordered by manufacturers and distributors, such as that monitoring parts warehouses in real time, often costs hundreds of thousands of euros. Distributors' investments also encompass extensions of warehouses and spending on logistics centres, which creates new jobs.

On average, a distributor's warehouse contains 100,000 types of spare parts; at the biggest companies, this may be over 250,000. To remain competitive, distributors have parts from various manufacturers that fit the same car model but vary in price, quality classification and the producer's logo. The wide range allows the distributor to meet individual customers' expectations in terms of price and quality. Before being added to the distributor's range, the parts are checked against Polish and EU standards and technical requirements. Samples are subject to specialist tests, in accordance with inspection procedures.

Polish distributors of auto parts create 32,000 jobs at several dozen distribution centres and local branches. According to GUS, 26 per cent of all people working at service entities were employed at companies in the “Trade and repair of passenger vehicles” category in 2016. This is the biggest separate professional group working in services. The average gross monthly salary in the sector was PLN 3,249 in 2016, 4.6 per cent higher

than the previous year<sup>5</sup>. The companies being considered employ sales people, sales representatives, drivers and warehouse workers, as well as IT specialists, logistics specialists and senior managers.

*Polish distributors of auto parts create 32,000 jobs.*

## DISTRIBUTORS' REVENUE

The total revenue of the largest Polish distributors in the passenger and lorry segments amounted to PLN 14 billion in 2017. Distributors expect it to continue growing. This is confirmed by a survey conducted among distributors and manufacturers of auto

parts at the 12<sup>th</sup> Congress of Industry and Automotive Market, which indicates that 90 per cent of distributors expect their revenue to increase in 2018 compared to the previous year.

*The total revenue of the largest Polish distributors in the passenger and lorry segments amounted to PLN 14 billion in 2017.*

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<sup>5</sup> Domestic market, GUS.





# Key automotive trends and their impact on parts manufacturers in Poland

The automotive sector is on the cusp of a real revolution. This traditional sector, which produces the most complex products, will face rapid changes in technology and consumers' rising expectations. These two tendencies will affect both how cars are manufactured and how they are used.

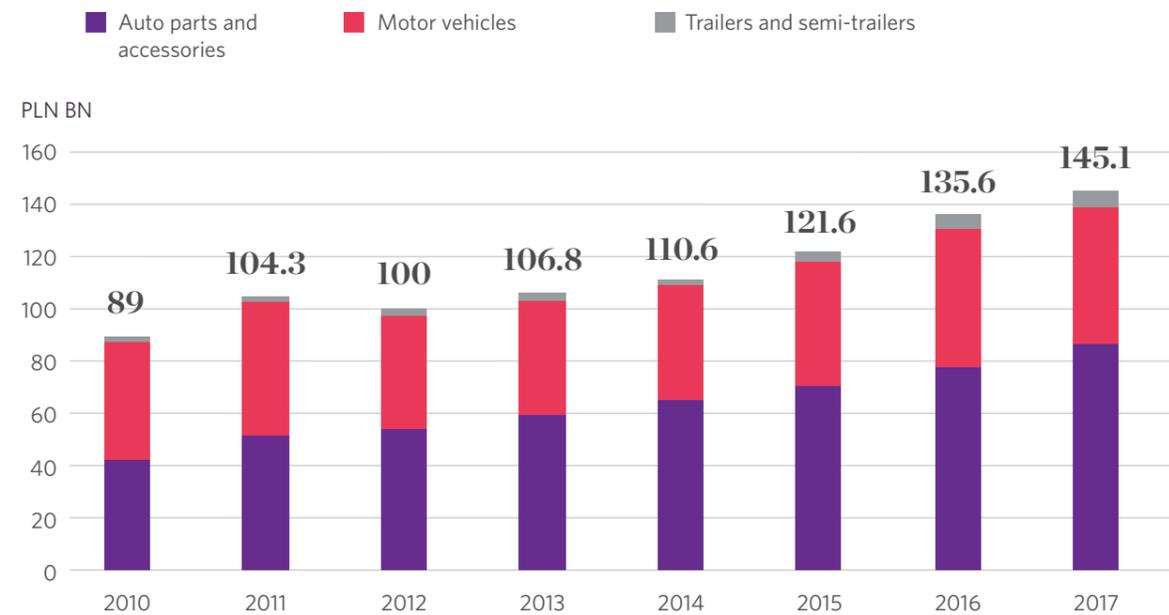
The four most important automotive trends can be summarised with the acronym CASE: connected, autonomous, shared and electric. These trends are linked, reinforcing each other and speeding up changes in the entire sector.

*The four most important automotive trends can be summarised with the acronym CASE: connected, autonomous, shared and electric.*

For example, introducing self-driving cars is the simplest and cheapest in the electric car category. The latter are the best cars for sharing. Meanwhile, a fleet of electric cars cannot be managed without interoperability and two-way communication with their surroundings.

Still, just 1 per cent of all cars currently run on batteries. Although sharing services are rapidly becoming more popular, they are not replacing private cars, but mainly taxis and public transport. Self-driving cars are still at the testing stage. And we are still far from incorporating cars into the Internet of Things. Nevertheless, all four trends herald significant changes for traditional companies in the automotive sector. This also affects companies operating on the Polish market, though to a different degree.

**CHART 3. VALUE OF POLISH AUTOMOTIVE PRODUCTS SOLD IN 2010-2017**

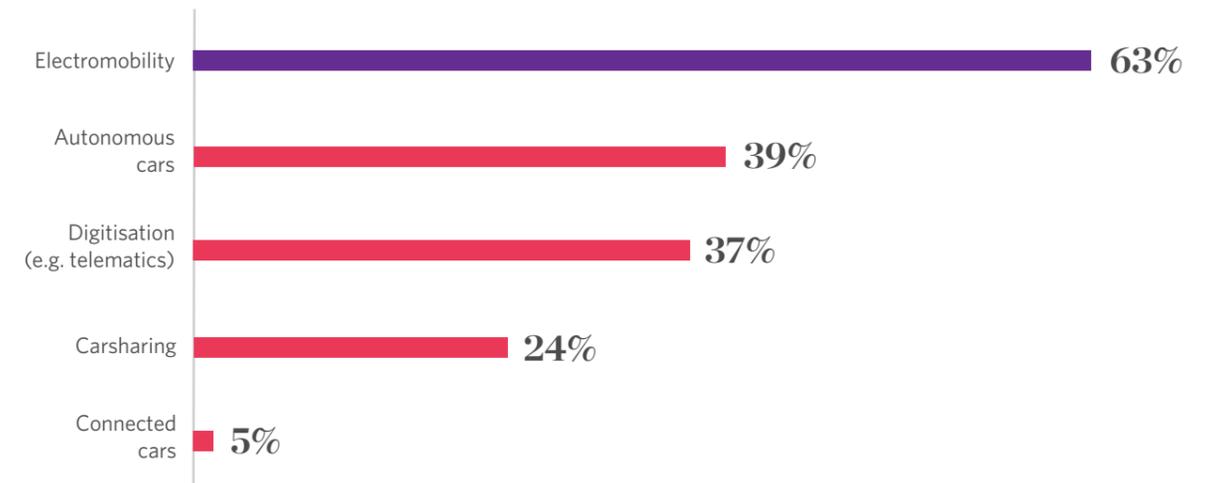


Source: GUS.

The automotive sector is the biggest and most productive branch of the Polish economy. The value of sold production, including parts, accessories, trailers and semi-trailers, has been growing for years. In 2017, it amounted to PLN 145 billion, according to GUS.

According to a survey by Frost & Sullivan and SDCM conducted in Q1 2018, electromobility is perceived as one of the mega-trends that will change the automotive sector. 63 per cent of companies in the sector hold this opinion. Yet responses to the survey do not indicate how deep the change will be and how to prepare for it.

**CHART 4. WHICH MEGA-TRENDS ARE MOST VISIBLE FOR PRODUCERS OF CARS AND AUTO PARTS**



Source: Frost & Sullivan i SDCM - barometr rynku części motoryzacyjnych w Polsce 2018 r.

## 1. CONNECTED VEHICLES

Connected cars exchange data with other vehicles and road infrastructure and provide constant connectivity between passengers and the outside world. In the future, the Internet of Things will make cars a place between home and work, combining features of both.

Digitisation in the automotive sector also means telematics – constant, two-way, wireless communication with the vehicle, used to collect and transmit on-board data from the car and monitor it. The bCall system (from “breakdown call”) will summon help if the car breaks down, and sCall (from “service call”) will order additional maintenance service and remote diagnostics.

Using bCall, the car automatically informs external servers via satellite about every flaw registered by the software and carries out necessary updates. It also collects additional charges; all this without having to stop at a service station. If flaws cannot be fixed automatically, the system asks the driver to visit the closest car repair shop.

Meanwhile, sCall checks the level of oil in the car or the temperature of operating fluids remotely, and can also tell the driver to visit a service station. The data available can also be used for preventative diagnosis.

Communication and use of data also applies to production methods. The cloud is increasingly used when designing and manufacturing, but also selling and diagnosing cars. Increasing large-scale data management capabilities have allowed companies to introduce artificial intelligence, virtual reality, robotics and wider implementation of the smart factory concept or Industry 4.0, in which the entire production and supply chain act as one connected digital organism.

Cars' new functionalities will provide an impulse for the development of new companies, such as in the telecommunications sector, which is vital for telematics. New control,

communication and vehicle steering systems will increase the requirements for car repair shops, which will be forced to invest in improving their employees' qualifications and in new equipment and software.

*New control, communication and vehicle steering systems will increase the requirements for car repair shops.*

## ESTIMATED IMPACT OF NEW SOLUTIONS ON POLISH PRODUCERS

The automotive sector is the most rapidly-developing branch of Polish industry and one of the most advanced in technological terms. The new solutions proposed as part of the Industry 4.0 concept are attractive as they offer entrepreneurs flexibility when adapting to customers' needs and improving their own competitive position.

Interestingly, it is easier for smaller companies, such as start-ups, to adapt, because innovation is easier to introduce on a modest scale. Big companies are more likely to want to follow existing market trends. Success depends on the enterprise's ability to adapt and the size of the changes introduced.

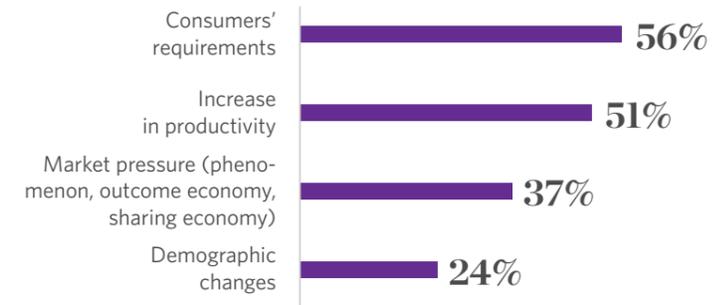
Access to the proposed solutions for all market participants on non-discriminatory basis matters, too. The biggest challenge for Polish companies investing in Industry 4.0 will probably be meeting demand for suitable staff. University graduates are not trained to work in Industry 4.0. Vocational schools also require reconstruction.



## INFOGRAPHIC 3. AUTO PARTS PRODUCTION IN THE CONTEXT OF INDUSTRY 4.0



### WHAT COULD MOTIVATE BUSINESSES TO TRANSITION TOWARDS INDUSTRY 4.0?



### WHAT ARE THE FUNDAMENTAL BARRIERS TO STARTING THE TRANSITION TOWARDS INDUSTRY 4.0?



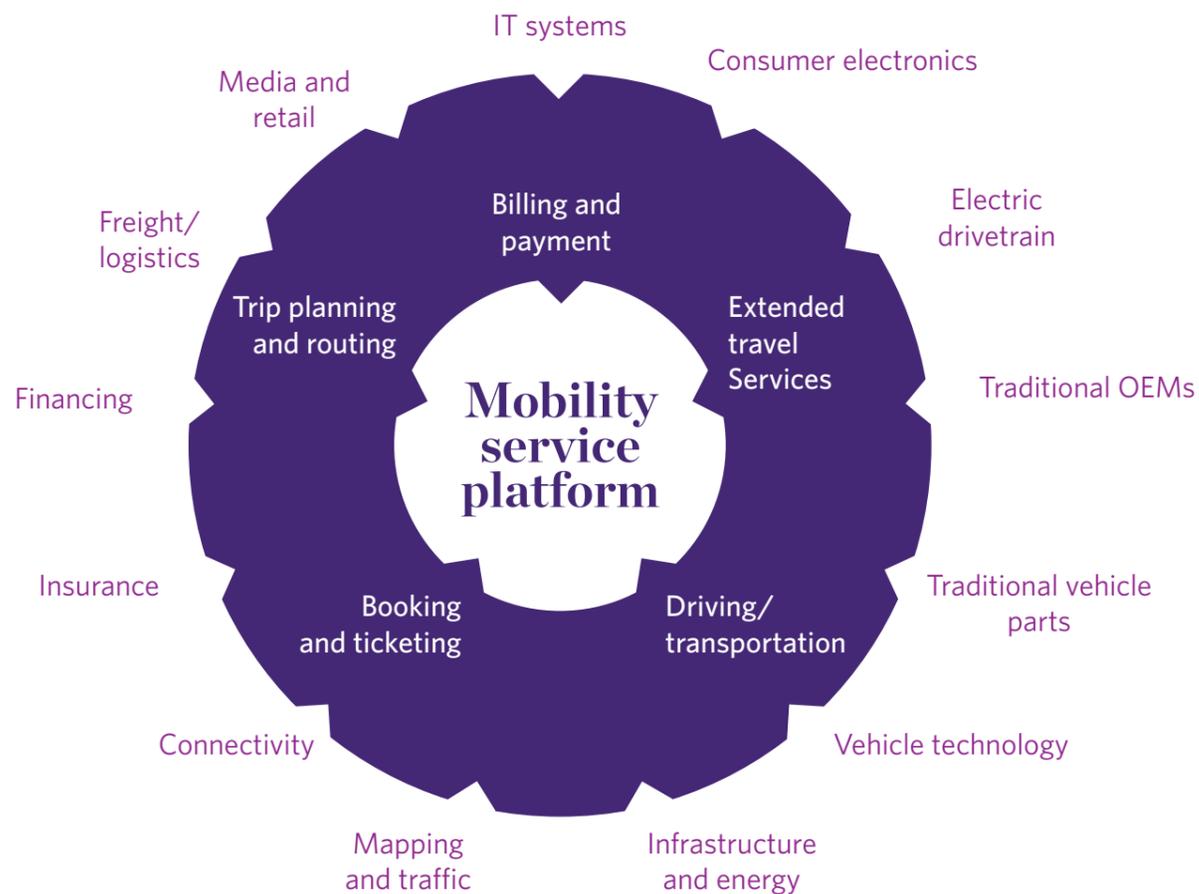
Source: Frost & Sullivan oraz SDCM – barometr rynku części motoryzacyjnych w Polsce 2018 r.

## WHEN WILL THINGS CHANGE

Connected cars will become widespread in the medium term. In the United States, the market regulator is mulling requiring vehicle-to-vehicle (V2V) communication for all new cars as early as 2023. In Japan, western Europe and China, the world's biggest automotive markets, this should happen at a similar time. Given the average age of cars in Poland and the pace at which fleets are being replaced, connected cars will be introduced later. This will not affect the parts manufactured in Poland, just the development of the road infrastructure needed for telematics.

Industry 4.0 solutions are already being introduced in Poland through international automotive companies' investments. This process is likely to accelerate due to the negative demographic trend and the shrinking job market. Robotics and other capital-intensive investments will gradually supplant labour-intensive investments.

**INFOGRAPHIC 4. CONNECTED VEHICLES**



Source: Strategy&.

## 2. ELECTRIFICATION OF CARS

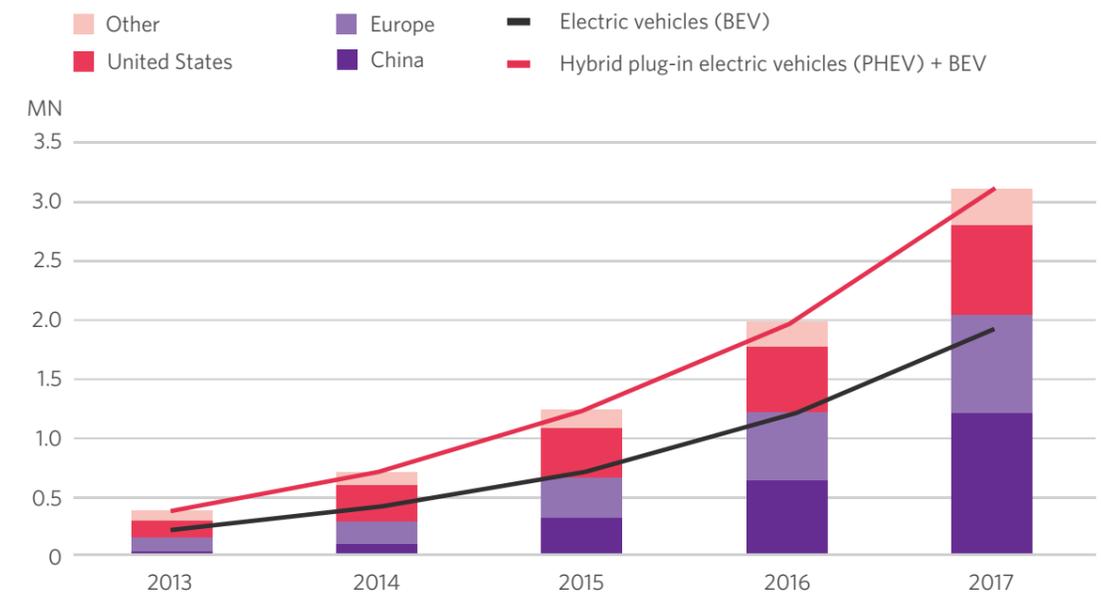
After being forgotten for almost a century, electric cars are experiencing a come-back. Just as cars were being developed, it seemed that the simpler electric motor would triumph over the combustion one. Yet in the end, the mass-produced combustion Ford T won, pushing out electric cars.

Growing environmental awareness, concern about climate change, technological progress and unstable oil prices have led to a revival of electric cars.

The turning point was the launch in 2008 of the Tesla Roadster, the first mass-produced electric car powered solely by a battery. Since then, the number of electric cars has been steadily rising. In 2015, there were more than one million electric cars globally.

There were more milestones in 2017: 3 million electric cars registered globally and one million of them sold in one calendar year, an increase of 54 per cent year-on-year.

**CHART 5. ELECTRIC CARS REGISTERED GLOBALLY**



Source: IEA Global EV Outlook 2018.

According to the International Energy Agency's estimates, the number of new electric cars will rise increasingly fast. By 2030, there will be 125-220 million globally. Experts at Bloomberg New Energy Finance predict that there will be around 11 million battery-powered cars in 2025 and 30 million in 2030.

Electromobility is only just starting to leave its mark on the sector. 90 per cent of electric cars globally are sold in eight countries and they account for just 0.1 per cent of newly-registered cars worldwide. At the same time, the market is growing by leaps

and bounds, led by China, where the share of electric cars is well above average, amounting to 2.2 per cent in 2017.

Traditional car producers did not pioneer electric models but, given the rapidly-growing market, especially in China and the US, they cannot afford to ignore this production segment. Almost all the biggest brands have announced plans to electrify their models. Mercedes-Benz plans to offer 50 electric models in 2020. BMW has announced that it will have

12 electric models from 2025 onwards. General Motors will introduce 20 models with alternative engines by 2023. Even Toyota, which is attached to hybrids, intends to produce at least ten electric models, while Volvo has committed to produce only electric models from 2025.

*In China, the share of electric cars is well above average, amounting to 2.2 per cent in 2017.*

Electrification of cars seems unavoidable; opinions merely differ on when. Fleets will be replaced gradually. In Poland, where the average car is 13.8 years old<sup>6</sup>, the transition to electric cars will probably take several years, especially since electric cars will account for just a few per cent of new cars sold, in the most optimistic scenario. Similarly, changes in car and parts manufacturing will also be gradual. Nevertheless, demand for new cars will slowly move from diesel to electric cars, via petrol and hybrid ones.

This will affect manufacturers of cars and parts, as electric cars are significantly less complicated. For example, an electric car has 18 moving parts, compared to over

2000 in a combustion one. Fewer moving parts means less wear and fewer repairs, which means less money spent on maintenance and spare parts.

*In Poland, the average car is 13.8 years old.*

## ESTIMATED IMPACT OF NEW SOLUTIONS ON POLISH PRODUCERS

Electric cars have just two-thirds of the parts of a conventional car. Most of the differences concern powertrain parts. Manufacturers of these parts will feel the move to electric transport most strongly.

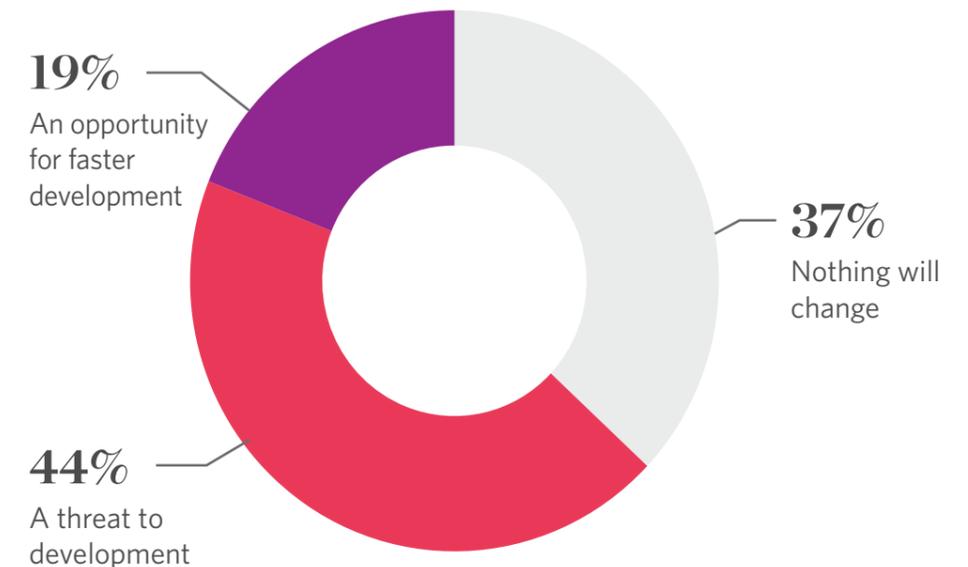
With Poland considered a conventional auto parts manufacturing powerhouse, changes dictated by the development of electromobility in the country will have a significant impact on producers in this sector. Producers of combustion engines and their parts,

<sup>6</sup>According to PZPM methodology ("Branża motoryzacyjna 2018/19").

gears and powertrains will be most exposed to losing the market. Manufacturers of tires, seats and other basic auto parts will be able to continue without major changes.

The scale of challenges on the Polish market is shown by the survey conducted by Frost & Sullivan in Q1 2018. 44 per cent of companies producing in Poland see the development of electromobility as a threat due to their own specialisation; a focus on conventional cars.

**CHART 6. HOW POLISH PRODUCERS VIEW ELECTROMOBILITY**



Source: Frost & Sullivan oraz SDCM – barometr rynku części motoryzacyjnych w Polsce 2018 r.

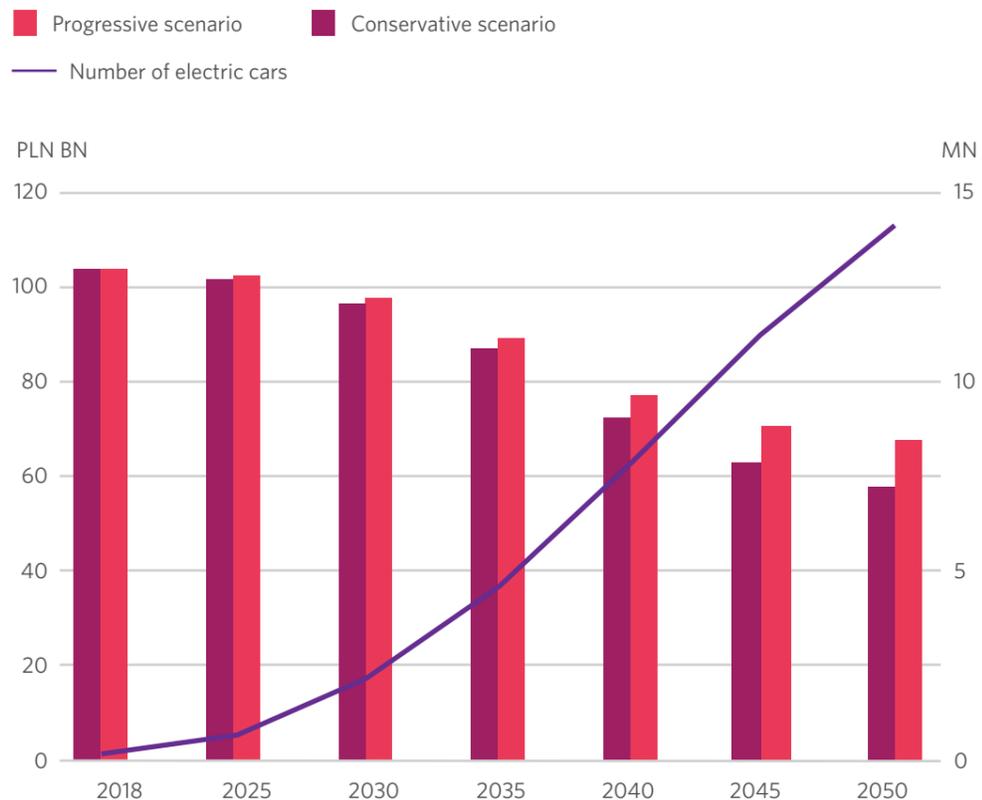
## WHEN WILL THINGS CHANGE

For the purposes of this report, we assume that the car market in Poland is already saturated, that the total number of cars will not increase, but that the ratio of combustion to electric cars will change, as will cars' average age.

To illustrate the scope of likely changes, we prepared two scenarios for the years up to 2050 based on the TECH RAPID simulation by the Electric Vehicles Promotion Foundation and Cambridge Econometrics, on changes in the Polish car fleet in the context of the development of electromobility.

The first, conservative scenario assumes that companies specialising in producing parts for conventional cars will not change their production profile due to the development of electromobility. The second, transformative one, assume that companies will transform in response to changes on the market. In both cases the increase in electric cars, which are less complicated and require fewer parts, will entail a constant downward trend in the market's value, which will lead to significant differences compared to current sales levels in the long term.

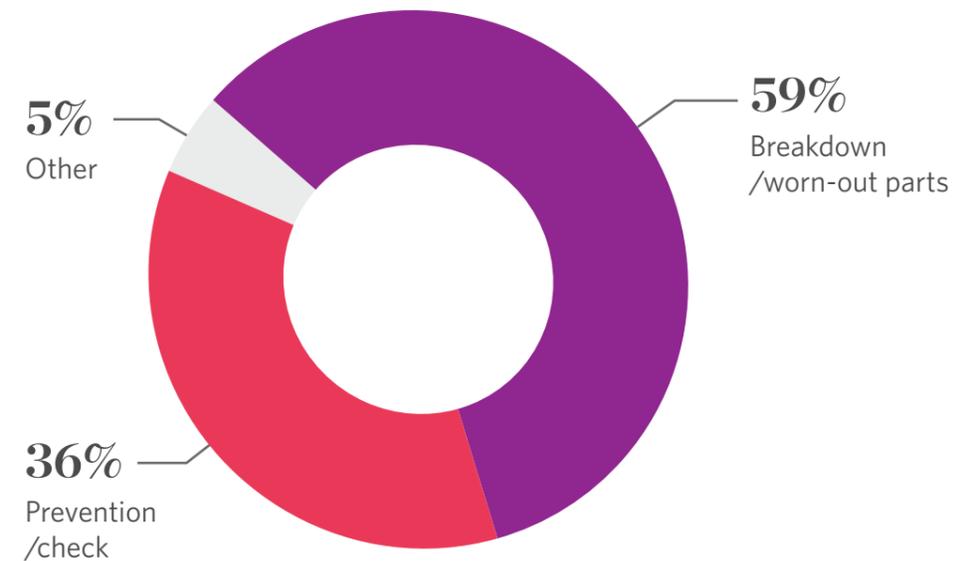
**CHART 7. VALUE OF PRODUCTION AND MARKET FOR CONVENTIONAL CAR PARTS AND THE NUMBER OF ELECTRIC CARS**



Source: Own calculations.

According to the conservative, more pessimistic scenario, the value of the auto parts market will fall by 41 per cent by 2050. The decline will start being felt in 2030, at around 4 per cent. After that, demand will fall more rapidly, reaching 28 per cent in 2040. In the transformative scenario, the parts market will contract too, but much more slowly; by 2 per cent in 2030, 22 per cent in 2040 and 33 per cent in 2050, 8 percentage points less than in the conservative scenario.

**CHART 8. TYPES OF VISITS AT CAR REPAIR SHOPS**



Source: Frost & Sullivan i SDCM - barometr rynku części motoryzacyjnych w Polsce 2018 r.

*In Poland, 59 per cent of visits to car repair shops are to fix faults or replace old parts.*

These scenarios do not consider threats linked to the development of car sharing services, which could also reduce demand for cars and spare parts. It is also worth noting how more electric cars at car fleets will influence the type of visits at repair shops.

According to the survey by Frost & Sullivan, 59 per cent of visits are to fix faults or replace old parts. This does not mean that conventional cars are prone to breakdown. Polish drivers do not look after their cars' technical condition and tend to postpone maintenance visits until something breaks.

Just 36 per cent of visits are preventive inspections to check the vehicle's condition. The remaining 5 per cent are to replace tires, optimise engine performance or for additional forms of service.

An increase in the number of electric cars could lead to a decline in the most common type of repair shop services: repairs and maintenance. This is because they have fewer parts, are less prone to breakdown and require less maintenance (for example, no need to change oil).

### 3. SHARED CARS

Car-sharing is a trend in mobility services that seeks to radically reduce transport costs by better management of car capital.

Research indicates that cars spend around 90 per cent of their lives unused, which makes them one of the least efficiently used assets. Using rented, rather than purchased, cars saves both individuals and companies money. These savings will continue to grow as private car access to city centres becomes increasingly difficult and expensive. In Poland, Kraków and Wrocław are already considering limiting car traffic in certain zones.

So far, car-sharing systems with players such as UBER and Lyft have mainly been changing the passenger transport sector. They compete with taxis and offer an alternative to public transport. As access to shared cars increases, they will gradually replace

private cars, too. The trend will accelerate due to demographic changes. Data suggests that, for millennials, renting a car by the minute is already an alternative to owning a car.

*Research indicates that cars spend around 90 per cent of their lives unused.*

For now, car-sharing services are not influencing new car sales and maintenance – or only positively. Shared cars are a novelty and fleets are only just being built. The replacement effect will only take place once this type of services becomes widespread. Today, owning a car and using car-sharing services exist side by side, which means more cars overall. In the future, city residents will choose to rent rather than own a car, which will reduce the market. The spread of car-sharing services, combined with better allocation of shared cars, will reduce new car sales. According to RethinkX, a

think-tank, shared cars in the US will be able to achieve a mileage of 0.5-1 million km over the course of their lifetime in 2030; five and ten times more than the average car mileage today. This could reduce demand for new cars in the US by as much as 70 per cent in 2030.

*According to RethinkX, a think-tank, in the US shared cars will be able to achieve a mileage of 0.5-1 million km over the course of their lifetime in 2030.*

### ESTIMATED IMPACT OF NEW SOLUTIONS ON POLISH PRODUCERS

It is difficult to assess this trend in Poland in quantitative terms, as it involves generational change and a changing approach to ownership, not just of cars. Young people in generations Y and Z no longer need to own a car as much as their parents did. Moreover, car-sharing will be compounded by the development of urban transport, limiting car access to cities to reduce emissions and the rising costs of owning and maintaining a car.

The rapid development of car-sharing will affect the market. It will reduce – or at least halt the growth of – the car fleet. Yet the Polish market is rather particular. Second-hand cars dominate; in 2017 alone, 869,000 used cars were registered in Poland, compared to just 486,000 new ones. New cars are mainly bought by companies and account for just 30 per cent of cars bought by private individuals (146,000 in 2017). This is the segment that will use car-sharing services the most often.

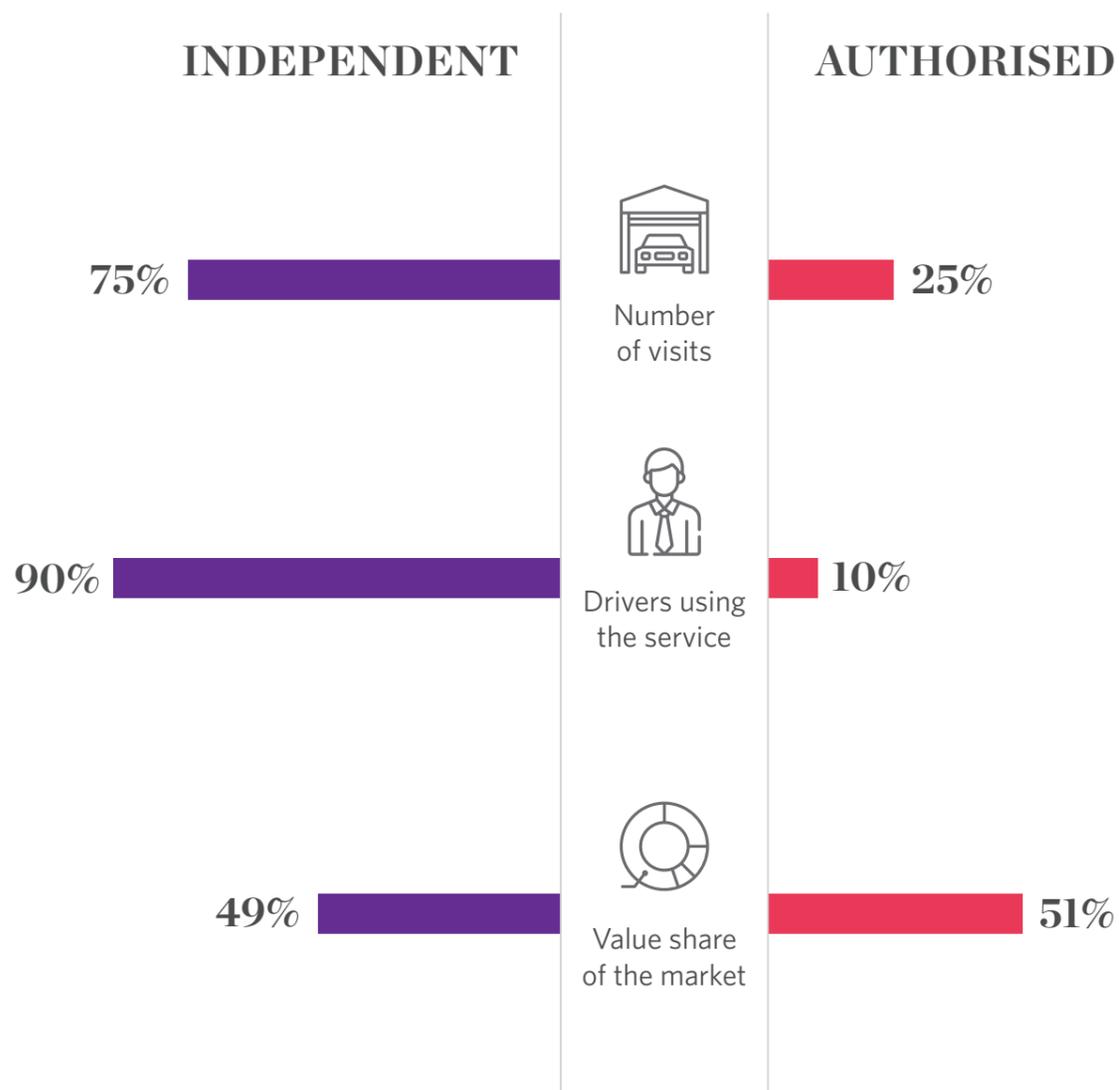
The reduction of the car fleet will directly shape the business climate in the car maintenance and repairs segment. Fewer cars means fewer repairs and fewer parts.

How and where cars are repaired will largely depend on the companies managing the car-sharing fleet. We can expect that these services will be performed by companies in the authorised segment, which will shift market share from the independent to the authorised segments, to the former's detriment. Right now, 10 per cent of drivers in Poland use authorised service stations, while 90 per cent go to independent ones. 75 per cent of visits involving repairs are at independent repair shops and both these segments' share in the market is almost equal.

*New cars account for just 30 per cent of cars bought by private individuals (146,000 in 2017).*

Car-sharing will also indirectly affect companies manufacturing automotive parts sold on the aftermarket to repair cars, as declining interest in repairs in the independent segment will directly reduce demand for products of this kind.

**INFOGRAPHIC 5. INDEPENDENT VS. AUTHORISED CAR REPAIR SHOPS**

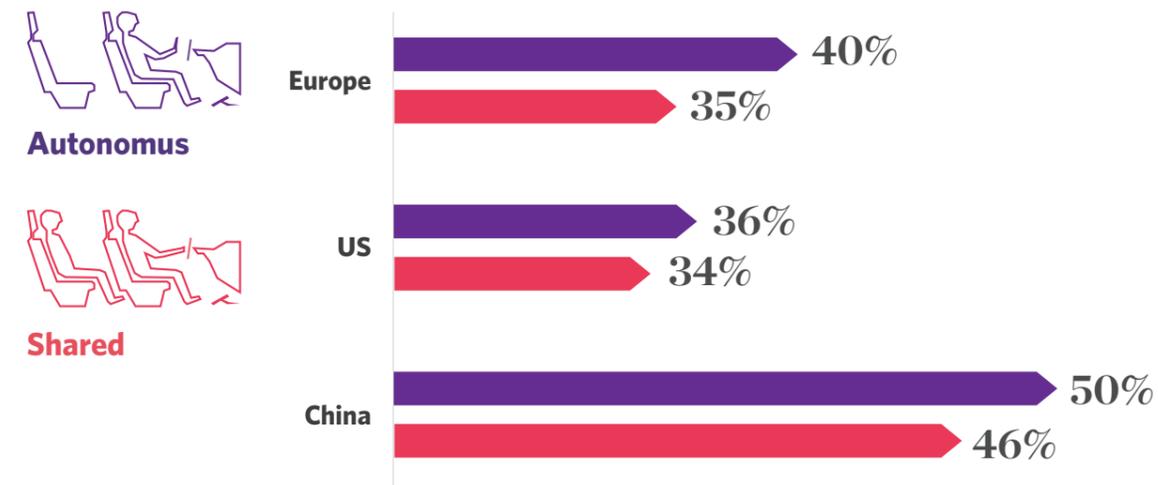


Source: SDCM.

**WHEN WILL THINGS CHANGE**

The spread of car-sharing in Polish cities, pushing private cars out of the market and limiting demand for new cars and spare parts, is inevitable, but difficult to position in time. Car-sharing systems have already been introduced in a few cities in Poland, but their scale is still limited; they have not replaced private cars and merely supplement existing transport systems.

**INFOGRAPHIC 6. HOW USE OF AUTONOMOUS AND SHARED CARS IN KEY MARKETS WILL GROW BY 2030**



Source: PwC, Five trends transforming the Automotive Industry, 2017-2018.

**4. AUTONOMOUS CARS**

Autonomous cars drive without human help. The development of autonomous transport will change how private vehicles, public transport and passenger transport services are used. New social groups will gain access to individual mobility; for instance, people incapable of obtaining a driver's licence.

The cars are currently being tested. Progress is slow because of a few accidents during pilot programmes. Still, fine-tuning and commercialising autonomous cars in the era of cloud solutions, big data and artificial intelligence is a matter of a decade or so.

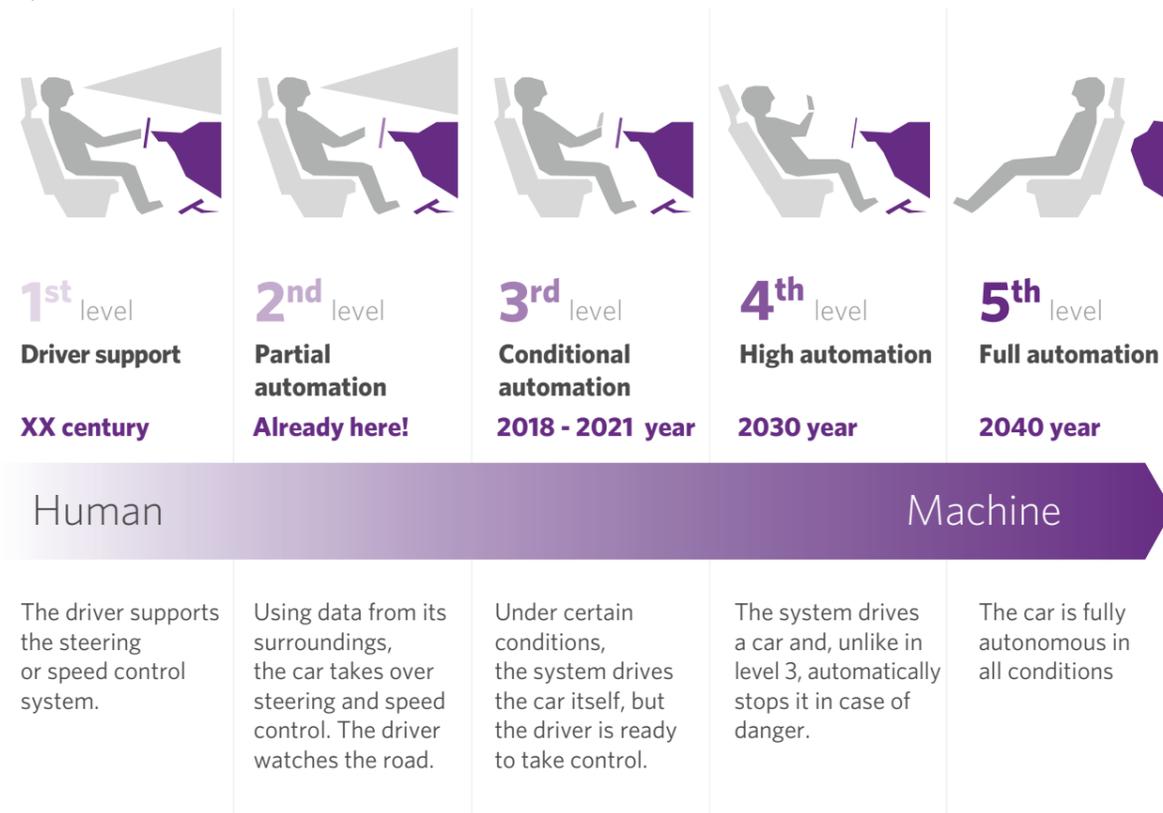
*Automation will enable car-sharing services to be optimised.*

Automation will enable car-sharing services to be optimised. Managing large fleets of cars centrally will help maximise efficiency of use. Combined with electrification, it will also lead to benefits for the energy system. For the latter, a fleet of electric cars is simply dispersed energy storage on wheels.

Significantly, autonomous cars are safer. This benefit will only be maximised in the long term, once the entire transport system becomes autonomous. In this context, it is worth remembering “platooning”, in which lorries drive one after another in a tight group, with mutual communication and special sensors enabling them to accelerate, turn or brake in a synchronised way.

## ESTIMATED IMPACT OF NEW SOLUTIONS ON POLISH PRODUCERS

### INFOGRAPHIC 7. LEVELS OF VEHICLE AUTOMATION



Source: Society of Automotive Engineers.

Like the other trends described above, automation of transport is inevitable. In the not-too-distant future, autonomous vehicles will be computers on wheels processing huge amounts of data; around 4,000 GB per day, according to the Car Transport Institute. That means up to 100 KB per second for radars and 50 KB when using a GPS.

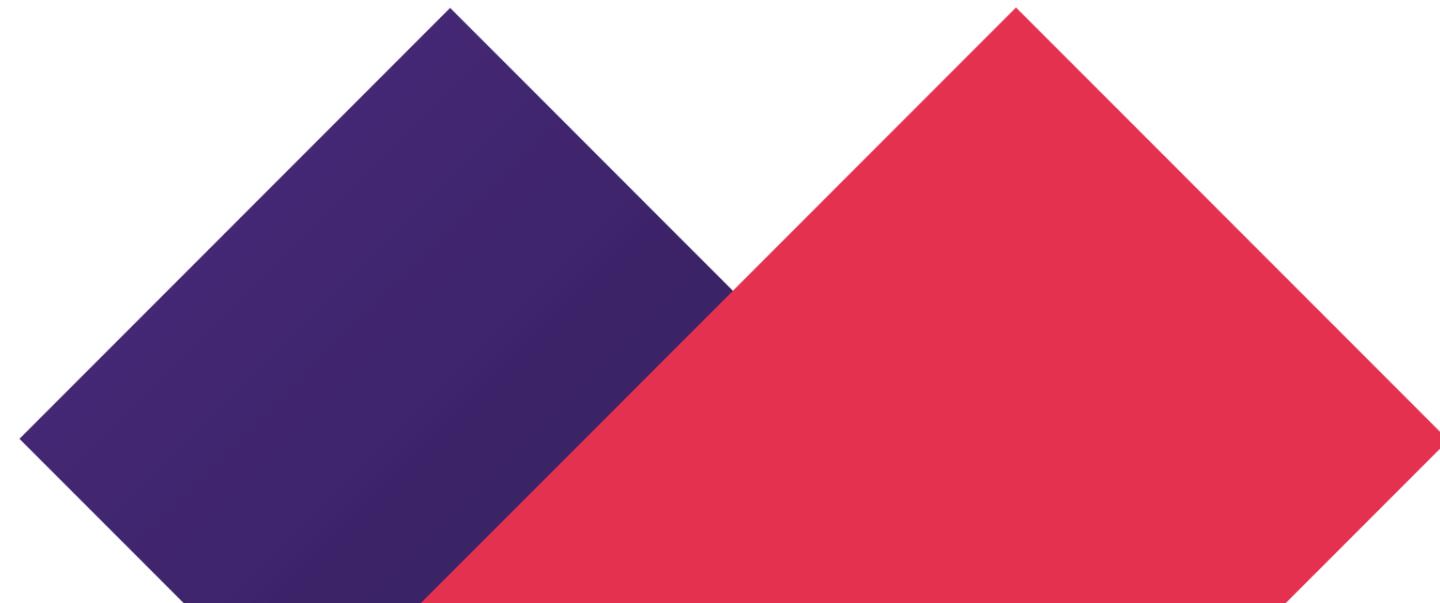
Automation of cars in Poland will go hand in hand with electrification, as it is easier to manage a less complicated car with an electric engine remotely.

It will also accelerate the introduction of better car-sharing systems. Automation will effectively compound the impact on the sector of electrification and the spread of car-sharing. Optimised use, improved safety and fewer collisions will undoubtedly influence producers of spare parts. Fewer cars and fewer accidents will reduce demand in this segment.

Autonomous cars will also mean more technology in vehicles, including cables, software and devices that do not feature in traditional cars with combustion engines, such as radars and lidars. These elements will shift the accents in the automotive sector’s value chain. New companies will enter the market, cooperating with car manufacturers. Moreover, automation will accelerate electrification, with all the consequences described above.

## WHEN WILL THINGS CHANGE

Automation of transport requires the spread of electric cars. Only an electrified and connected fleet of vehicles can be automated. On the Polish market, this will happen in the long term.





# Macroeconomic impact of e-mobility on the Polish automotive sector

The macroeconomic impacts analysis is based on the data produced by the team of Cambridge Econometrics analysts using the E3ME model used i.a. for the preparation of „Charging Poland“. The E3ME model treats the economy, the energy system and the environment as integrated components, which makes it possible to analyse the interactions between them. The data's high level of disaggregation allows for relatively detailed sectoral analysis. The E3ME model describes the changes that may occur i.a. in GDP and employment as a result of the transition to e-mobility.

## AMBITIOUS ASSUMPTIONS

“Charging Poland”<sup>7</sup> analysed a number of scenarios for the development of electric drive technology in Poland. In order to capture the most radical changes in the automotive industry we are basing our analysis in this chapter on the rapid technology development scenario or TECH RAPID. It assumes

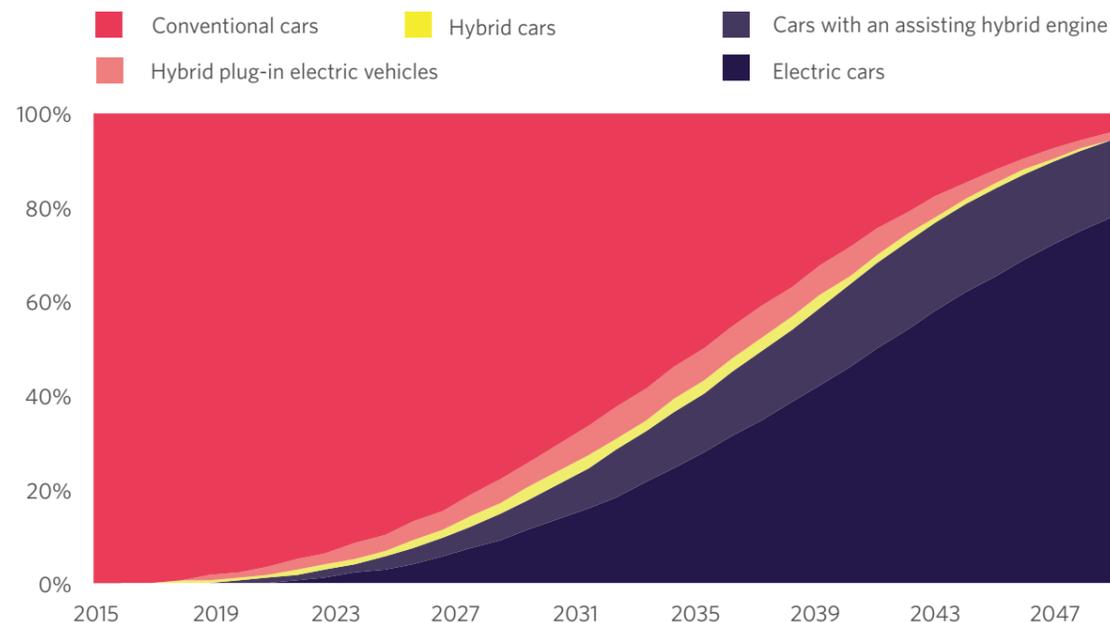
a greater application of new high-efficiency internal combustion engines, with a ban on the sale of new cars equipped with internal combustion engines after 2030, a drop in the price of automotive batteries to such an extent

*In 2030 there could be as many as 3 million electric cars in Poland.*

that battery cars will become the dominant technology, and no development of fuel cell technology in passenger cars. This set of ambitious assumptions would almost allow Poland to meet the government’s aspiration target of 1 million of electric vehicles on Polish roads in 2025 (about 550,000 battery cars and approx. 400,000 plug-in hybrid vehicles). In 2030 there could be as many as 3 million electric cars in Poland (1.9 million battery electric vehicles and 1.1 million plug-in hybrids respectively) and in 2050, 16.5 million electric cars, of which 13.7 million are battery cars and 2.9 million are plug-in-hybrids.



**CHART 9. NUMBER OF CARS ON THE POLISH MARKET, BASED ON SCENARIO OF RAPID TECHNOLOGICAL DEVELOPMENT**



Source: Society of Automotive Engineers.

<sup>7</sup> Charging Poland, Cambridge Econometrics and the Electric Vehicles Promotion Foundation, Warsaw 2018.

When preparing such a scenario for the automotive market two factors were of particular importance; the age of the car fleet in circulation and vehicle turnover.

In Poland, on average people drive much older cars than in the other member states of the European Union. Every year only 2.5% of cars in the Polish market are brand new. For the purposes of this analysis the average age of Polish cars currently in use is 14 years, an assumption based on historical data of vehicle sales and stock size. According to data from the Central Statistical Office, in 2017 1,355,000 cars were introduced on to the Polish market, of which 486,000 were new and 869,000 were imported second-hand cars. Nearly 450,000 old vehicles were withdrawn from use. Thus, the proportions of new and used cars introduced on the Polish market were at the level of approx. 64/36% in favour of second-hand cars.

Understanding the above is crucial when estimating the future car stock and the impact on the automotive market. The average age of Polish cars means that new cars purchased today might still be in use in 20 years’ time, and new cars purchased in

*According to data from the Central Statistical Office, in 2017 1.35 mn cars were introduced on to the Polish market, of which 0.48 mn were new and 869,000 were imported second-hand cars.*

2030 might still be used in 2050. Even in the event of a complete ban on the sale of new cars with combustion engines in Poland and other European Union countries in 2030, 20 years later, in 2050, around 5% of the fleet, or about 700,000 cars, in Poland would still be powered by combustion engines. It has implications for companies operating in the automotive market and how and when they should prepare for change.

## GDP IMPACTS

Because the annual purchase rate of brand-new cars in Poland is low – changes in GDP may happen at a relatively slow pace. Nevertheless, the electrification of road transport means additional GDP growth. Under the already mentioned TECH RAPID scenario, electrification would create an economy which is 0.3% larger in the year 2030 and 1.1% larger in 2050. However what is good for the economy at large is not always good for all its sectors. Without a doubt the most severe element of the analysis is the impact of e-mobility on the Polish auto-motive sector.

# IMPACT ON EMPLOYMENT

In the most ambitious scenario developed by Cambridge Econometrics, e-mobility spread will create new jobs in the Polish economy, but the impact will differ from sector to sector. Most of the job creation will occur in services as a result of increased purchasing power due to savings on transport fuels. By 2050 there could be approxi-

mately 81,000 additional jobs in the Polish economy, of which just under 56,000 are in services including retail.

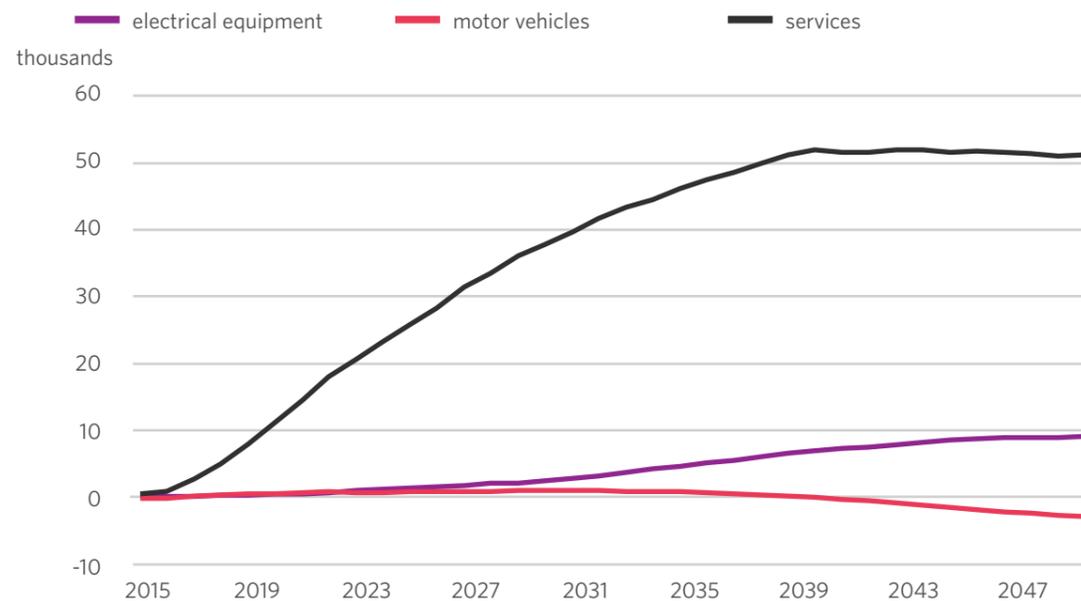
In terms of impacts of electrification of transport on the employment in the automotive sector the picture is far from simple. In the analysed scenario the number of jobs in the motor vehicles sector take a direct hit shrinking by 1% by 2030 and

by as much as 7% by 2050. The traditional automotive sector will lose jobs which is a direct result of greater simplicity of electric vehicles in comparison to petrol and diesel cars. It is mostly for these reason that motor vehicles sector jobs will move elsewhere.

*By 2050 there could be approximately 81,000 additional jobs in the Polish economy, of which just under 56,000 are in services including retail.*



**GRAPH 10. EMPLOYMENT CHANGE IN CHOSEN SECTORS OF THE POLISH ECONOMY RESULTING FROM E-MOBILITY**



Source: Charging Poland 2018.

As regards the spare parts suppliers, electric vehicles require considerably less maintenance. There are less movable parts and they therefore wear less. There is no need, for instance, to replace certain filters or change motor oil. This will mean less work for garages and manufacturers of certain components and spare parts.

The supply chains for electric vehicles will not be the same as for ICEs. There will be less demand for conventional vehicle components, and more for electric components required in an EV. For example some car parts today are sourced from the ‘motor vehicles’ industry (e.g. engine parts, transmission or exhaust producers). An electric car will need less from these suppliers but will source different parts that ICEs do not need from the „electrical equipment” sector.

On balance, employment in the old supply chain in the motor vehicles sector clearly decreases, but is more than compensated for by the increase in employment in the new supply chains in electrical equipment. The scenario shows that the number of jobs in the electrical equipment sector created by e-mobility shift grows by 4% by 2030 and by as much as 10% by 2050 fully making up for losses in the „motor vehicles” sector.

In addition to creating new jobs directly linked to the development of e-mobility, it is also important to consider indirect effects. Most new jobs in the economy connected with e-mobility development will be created in services as a result of additional consumer spending and the redistribution of existing expenditure away from fossil fuels. Instead of petrol and diesel, Poles will buy more fuels produced domestically including electricity and hydrogen. This will allow Poland to capture a greater share of the value from energy used in e-mobility. This value will remain in the Polish economy, which explains the increase in both value-added tax revenue and the growth of employment in the services sector.

The conclusion from this analysis is that the traditional motor vehicles sector will lose employment because of the electrification of transport but the whole automotive supply chain will not. The automotive industry will be different with value migrating to other suppliers than those sitting today under the motor vehicles label. It will be very much up to the companies to react to the changing environment and adapt to

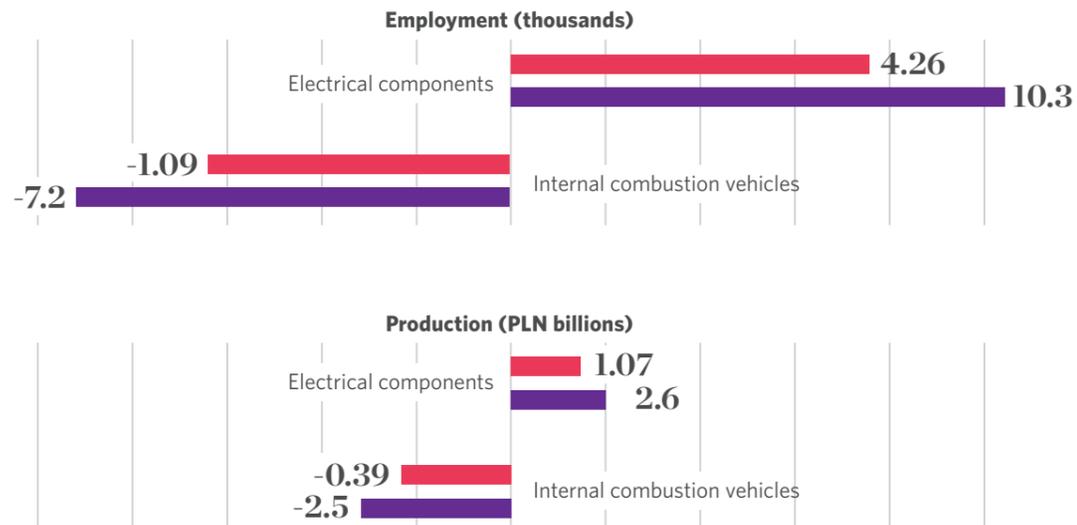
*The traditional motor vehicles sector will lose employment because of the electrification of transport.*

it. It should also be in the interest of the government to incentivise and support transition of companies in the traditional motor vehicles sector as they might not be capable of managing or even surviving the e-mobility shift.



**CHART 11. CHANGES IN PRODUCTION AND EMPLOYMENT IN POLAND'S MECHANICAL VEHICLE SUPPLY CHAIN**

2030 2050



Source: Cambridge Econometrics.

## IMPACT ON OUTPUT

Similar to the employment figures, according to Cambridge Econometrics figures in the TECH Rapid scenario there is a net decrease in output in the supply chain to motor vehicles. Again, this is partially due to the shift of value from this sector of the Polish economy to the electrical equipment sector. A decrease in the motor vehicles sector of EUR 0.4 billion in 2030 will be offset at the level of the whole economy by an increase in electrical equipment output of EUR 1.1 billion in the same period. For 2050 the results are EUR -2.5 billion and EUR 2.6 billion respectively. As in case of employment the cumulative impact for these two sectors of the economy is positive showing an increase of EUR 0.7 billion in 2030 and EUR 0.1 billion in 2050.



**Selected  
opportunities  
and risks for the  
automotive sector**

# 1. DOES AN ELECTRIC CAR REQUIRE OTHER PARTS

From the outside, an electric car resembles one with a combustion engine. At first glance, it simply lacks an exhaust pipe and front air intake grille. Fundamental differences can be seen under the mask. An electric car is a very complicated product, but has just two-thirds of a conventional cars parts; 18,000, rather than 30,000<sup>8</sup>. The main differences are the lack of a combustion engine, multi-stage gearbox and exhaust system. Electric cars have parts that conventional cars lack, such as an electric engine (or several engines) and a battery.

The key difference is the engine. The combustion engine is the most important and most complicated construction in a traditional car, containing around 23 per cent of all its parts. Compared to this, the engines used in electric cars look very modest. They only have a few dozen parts, including slightly over a dozen moving ones, and are simple and inexpensive to build.

*Electric cars have just 18,000 parts, compared to 30,000 for combustion vehicles.*

The second major difference is the battery package, which only electric cars have. Batteries are the biggest, heaviest and most expensive element in an electric car. They take up the car's entire lower chassis; their weight, including the casing and cooling-heating system, differs depending on the electric car's range. The American Tesla, the most popular electric car right now, has a 70-kWh battery package, which weighs 450 kg. Battery systems introduce a completely new dependency in the automotive sector: reliance on raw materials such as raw materials such as lithium, nickel, cobalt, manganese, graphite and aluminium. The Tesla battery package mentioned above contains around 63 kg of lithium and 54 kg of graphite.

Another difference is the gearbox. Electric cars have a very simple gearbox, with one forward gear and one reverse gear. The entire system has around 7 per cent of the car's parts. Two-speed gearboxes for this type of car are currently being researched. They would enable the car to accelerate quickly and, on long journeys, allow engine speed to be reduced. More complex gearboxes will mean more parts, but they are still likely to be simpler than gearboxes in conventional cars, which contain 19 per cent of the entire car's parts.

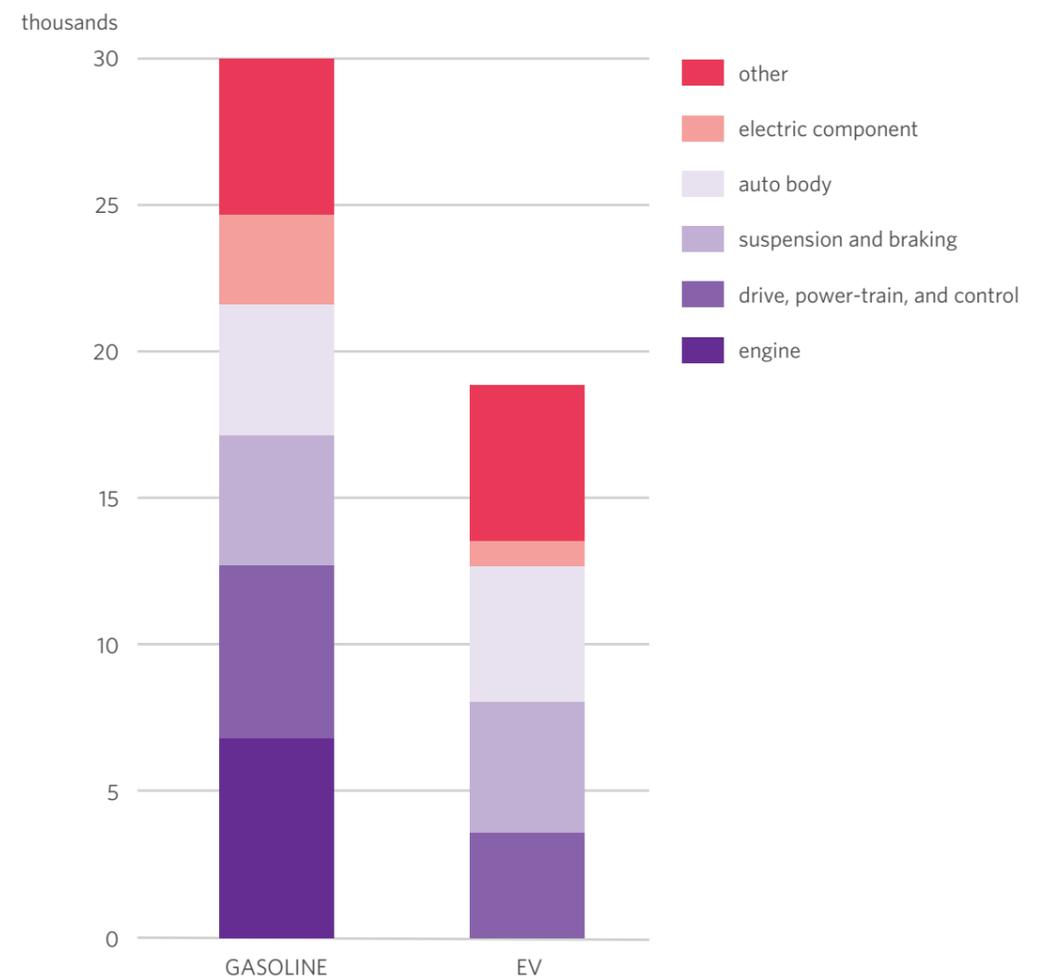
<sup>8</sup> Electric Vehicle Boom: ICE-ing The Combustion Engine, Goldman Sachs, 6 September 2017.

Because electric cars lack a combustion engine, they do not need an exhaust system including catalyts, silencers or collectors.

Certain parts feature in both types of vehicles, but experience different levels of wear. The key example are brake pads, which are used less frequently in electric cars because the engine does much of the breaking. This regenerative break, as it is known, is also designed to charge the battery.

Of course, both types of cars share parts that do not differ significantly, such as tires, windows, seats, other interior and body parts, and as software. For manufacturers of these parts, work will not change significantly, as they will cater to both electric and conventional cars.

**CHART 12. NUMBER OF AUTO PARTS BASED ON TYPE OF VEHICLE**

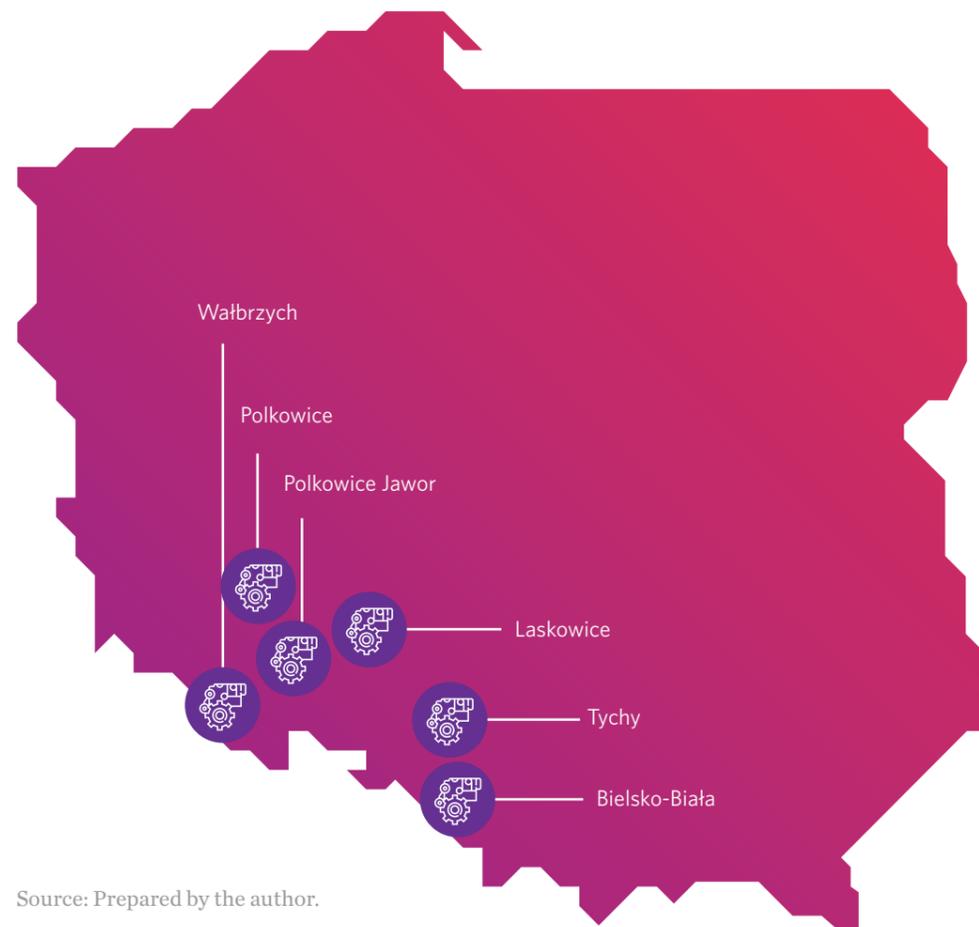


Source: Cambridge Econometrics.

Since the first cars appeared, Europe has had one of the most dynamically developing automotive markets. The combustion engine was successfully manufactured and improved by European car companies, which made it one of their key competitive advantages. There are currently over 90 plants in Europe, manufacturing around 23 million engines and gearboxes for cars and vans per year; almost 25 per cent of the global market, worth almost EUR 70 billion<sup>9</sup>. Six engine factories are based in Poland; production has not yet begun at two of them. Together, they can manufacture around 3.5 million combustion engines per year.



#### INFOGRAPHIC 8. CAR ENGINE FACTORIES IN POLAND



Source: Prepared by the author.

Yet the era of the combustion engine seems to be over. Electric cars are practically emission-free, quiet and their performance keeps improving. Accelerating, they already beat conventional cars. With further improvement in overall driving comfort, car battery range and a fall in the price of electric cars, conventional cars will cease to be attractive in the mid-2020s.

<sup>9</sup> Breakthrough of electric vehicle threatens European car industry, ING Economics Department, July 2017.

Combustion engines will not be abandoned suddenly; the pace at which they disappear from the market will vary by country and vehicle type. Firstly, until electric cars become affordable for consumers in developing countries, combustion engines will dominate, assuming favourable oil prices. Secondly, it is currently difficult to predict when diesel engines in lorries will be replaced. The move to electric would require a huge battery. Its price would have to fall several-fold for electric lorries to make economic sense.

The move from conventional to electric engines will have consequences for manufacturers of parts. The simpler construction and fewer parts means a smaller share for producers, which entails lower turnover and profits for the entire sector. Manufacturing electric engines is also less labour intensive and can be automated to a much greater extent. Moreover, electric cars are made of relatively cheap, low-margin components. Companies that developed competitive advantages on the combustion engine market based on R&D and patents could lose to generic manufacturers of electric motors.

*The move from conventional to electric engines will have consequences for manufacturers of parts. The simpler construction and fewer parts means a smaller share for producers, which entails lower turnover and profits for the entire sector.*

The electric engine will transform the entire production model for car engines. Right now, producers of powertrains use a vertical integration model in which they control sub-suppliers of parts. In contrast, an electric powertrain requires the outsourcing of competences. Batteries and electric engines were never part of the automotive industry's supply chain and there is a risk that traditional producers will permanently lose control over these components. This is illustrated by batteries, which are fully beyond car producers' control.

Paradoxically, one of the possible scenarios is also an increase in the role of manufacturers of parts. For conventional cars, the huge number of components makes it impossible for manufacturers of parts to provide comprehensive solutions. Electric cars' relatively simple construction means that companies like Bosch or Siemens will be able to provide entire powertrains.

Companies that produce parts for combustion engines and other parts of powertrain will be forced to adapt production to the approaching changes and switch to producing parts for electric vehicles. According to our analysis, some could improve their position on the market this way. The alternative will be to halt investment in combustion technology due to the shrinking market. Producers of parts for conventional cars that will not be used in electric vehicles could withdraw from rapidly-changing markets and seek out economies where the car fleet with combustion engines is strongly developed or where the electromobility revolution is proceeding at the slowest pace.

Solutions of this kind are more comfortable, but in the long term, they are doomed to failure.

Forecast changes in the proportion of cars with electric and combustion engines on the Polish market do not assume a revolution in the car fleet. Rather, they predict a gradual transition to electric cars, which means that, in the medium term, producing aftermarket parts for combustion engines and powertrains may be viable. Still, to stay on the market, producers should start gearing towards components solely intended for electric cars. This will not be easy, as the changes on the automotive market will take place slowly and, in the medium term, there will still be more cars with combustion engines than electric ones. The slow fall in revenue will make it more difficult for companies to justify investment in changing sector.

The state's regulatory policy, setting a long-term plan of action and guaranteeing higher investment security, will be extremely important for this segment of the market. Support for companies that are considering investing in products other than engine parts may also be necessary, because a short-term strategy, assuming small increases as part of a long-term downward trend, could require a change in sector.

*Forecast changes in the proportion of cars with electric and combustion engines on the Polish market do not assume a revolution in the car fleet. Rather, they predict a gradual transition to electric cars.*

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## 2. THE BATTERY AS THE CAR'S MOST VALUABLE ELEMENT

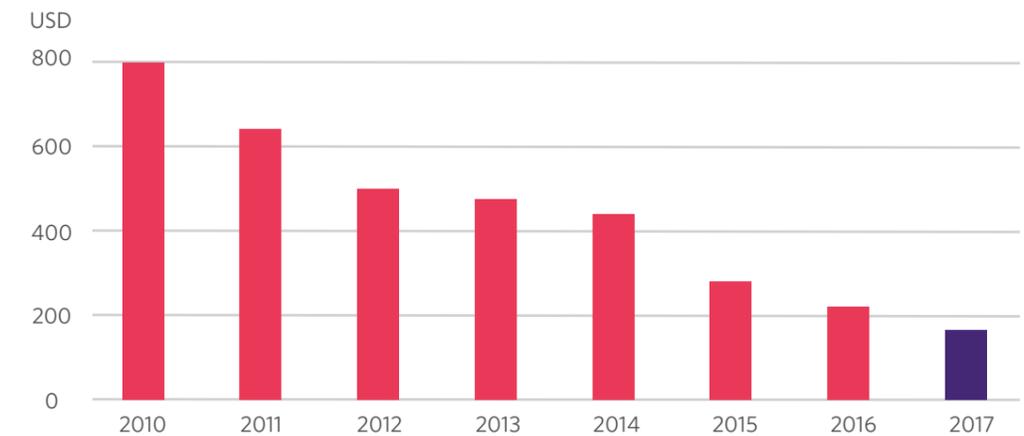
Electric cars, powered by energy stored in batteries, are currently more expensive than traditional conventional cars – mainly due to the battery, their most expensive element. According to data collected by statista.com, batteries account for 48-51 per cent of an electric car's cost, depending on its power<sup>10</sup>. In a car with a combustion engine, the closest equivalent is the entire powertrain, which constitutes around 30 per cent of the vehicle's value.

<sup>10</sup> Statista, Battery costs as a share of battery electric vehicle costs in 2016. Online. Accessed: 27 October 2018. <https://www.statista.com/statistics/797660/battery-share-of-electric-vehicle-cost-bysegment/>.

Battery prices are still very high and are the main obstacle to the spread of electric cars. Nevertheless, battery production costs are falling quickly due to the rapid development of technology, economies of scale and investment in R&D. According to analysis by Bloomberg New Energy Finance, the price of the battery used in electric cars has been falling by an average of around 25 per cent per year since 2010. It can be expected that an increase in electric car sales, which entails an increase in battery production and technological progress, will further lower battery prices.



CHART 13. LITHIUM-ION BATTERY PRICE IN 2010-2017



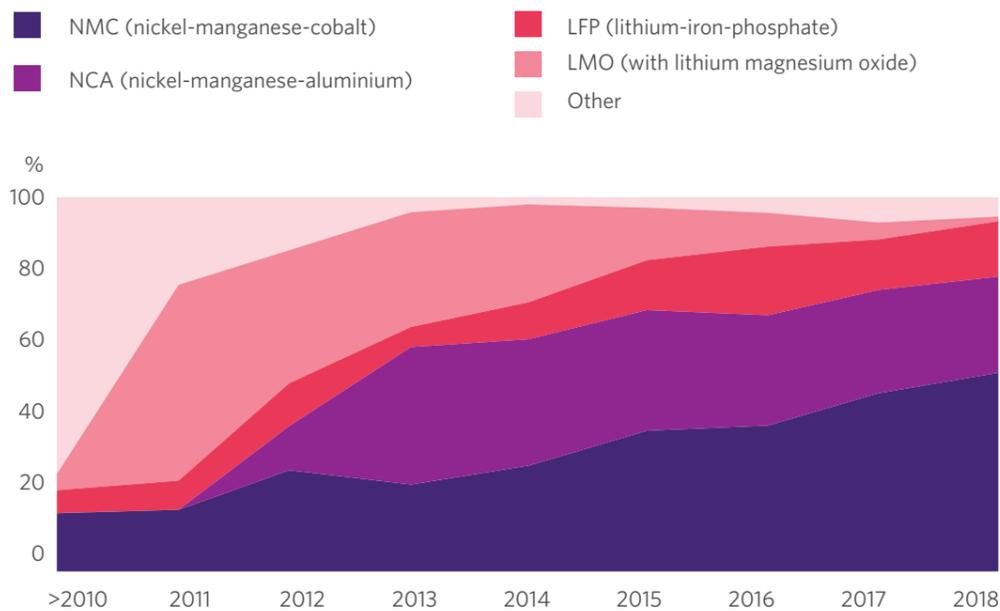
Source: Bloomberg New Energy Finance, based on a survey conducted among 50 companies.

As a result, the price of an electric car will match that of its conventional equivalent within a few years, probably by 2025. Nevertheless, batteries will remain a significant cost, not least due to electric cars' simplicity, described in the chapters above.

The battery market is currently in the development phase, with a number of technologies competing for domination. In its Leaf model, Nissan banked on batteries containing lithium manganese oxide (LMO). General Motors produces its Volt model using nickel-manganese-cobalt batteries (NMC). Tesla cars are powered by nickel cobalt aluminium batteries (NCA) developed by Panasonic. Chinese BYD is investing in lithium iron phosphate (LFP) batteries.



CHART 14. SHARE OF BATTERIES ON THE MARKET IN 2010-2018 (BY TYPE)



Source: EVvolumes.com.

The chart below shows substances' percentage share in the global market for batteries used in electric cars and how it has evolved (according to EVvolumes.com).

Right now, the most popular batteries used in relatively lightweight cars are NMC ones, with CATL, LG Chem and Samsung SDI are the main suppliers.

The chemical composition of substances used in electric cars' batteries is changing, though, which is indirectly linked to the popularity of particular car models. It is also likely that investment in R&D on storing energy will lead to the use of completely new chemical substances.

Car batteries are a completely new element in the automotive sector. Significantly, battery technology is currently beyond most car producers' reach and everything indicates that battery production will permanently remain in subcontractors' hands. This is because of the huge capital intensity of producing and developing electric batteries, which forces producers to sell large volumes of them to take advantage of economies of scale. This is an unprecedented situation in the automotive sector, where car producers always dominated over suppliers of parts throughout the value chain.

Another problem for the European automotive sector, including the Polish one, is Asia's geographical dominance on the battery market. According to analysis by Bloomberg, around 70 per cent of current and planned battery production capacity is in China,

with another 10 per cent or so in Japan and South Korea. The US produces around 15 per cent of batteries and EU countries just 4 per cent.

Limited access to batteries could curb the development of enterprises producing electric cars, especially smaller ones, which is why developing energy storage technologies and production capacity in Europe is so important. The European Battery Alliance established by the European Commission aims to accelerate and facilitate the development of battery production in Europe.

For Polish producers, entering the battery generation (a chemical, rather than mechanical, product) and component market could be incredibly difficult. Polish companies lack the necessary technology and, as subcontractors for huge companies, the necessary capital to invest in this segment. They can, however, look for a place in niche or low-margin services linked to battery production, such as building battery frames, mounting them or cooling systems. Alongside battery production, another new market will be utilising partly used batteries and recycling them, as well as designing specialised software for handling batteries. These niches can be filled perfectly by SMEs. Investments in this segment they are not capital intensive and do not require extensive spending on R&D.

### 3. SHARED TRANSPORT: FEWER CARS, BUT NOT FEWER PARTS?

Just 1 per cent of journeys in Europe currently involve shared transport services but, according to PwC<sup>11</sup>, this could grow to 10 per cent by around 2025. The company's consultants estimate that automatic car technology will develop rapidly over this period too, helping shared transport gain popularity faster. According to forecasts for 2022-2030, the autonomous and shared car market could grow at a rate of over 70 per cent per year.

The spread of car-sharing will allow cars to be used more efficiently and increase their mileage. Nevertheless, because of shared electric cars' simple construction, demand for maintenance services will fall. Only demand for very specific services, such as inspecting or replacing elements that wear out faster (shock absorbers, tires and steering components), might increase.

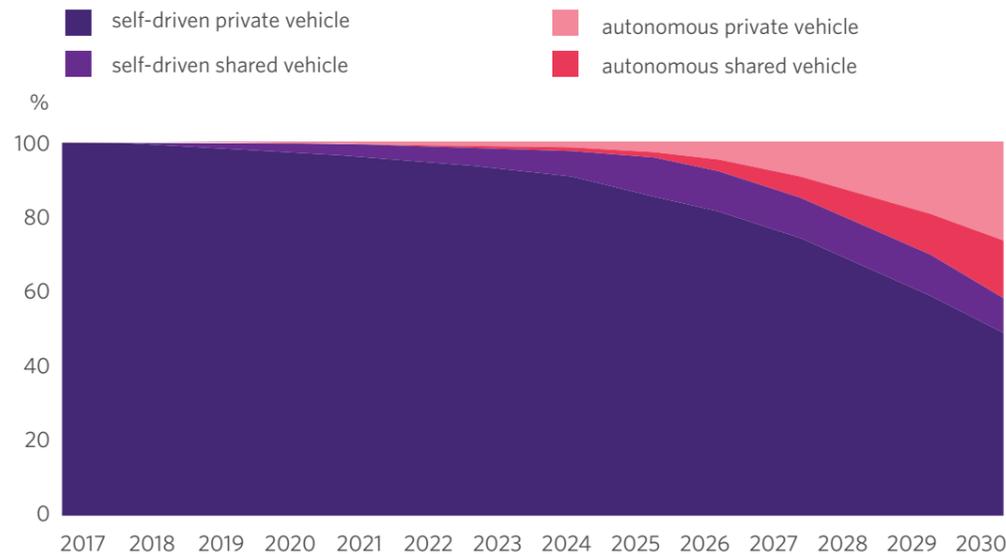
<sup>11</sup> Five trends transforming the Automotive Industry, PwC 2017.

## 4. SOFTWARE, OR COMPUTERS ON WHEELS

Processors' growing computing power has been increasing the capabilities of software used in cars for years. The automotive market is becoming increasingly open to cloud technology and artificial intelligence, including in autonomous cars. Solutions are becoming increasingly complex: in 2010, the number of software lines of code used in new cars was around 10 million. By 2016, it was 150 million<sup>12</sup>. The increasingly complex software used in cars is changing the ratio between the value of a car's hardware and its software, with implications for the producers' market. For now, they deliver cars in which the equipment (wheels, chassis, engine, etc.) constitutes 90 per cent of the vehicle's value, compared to just 10 per cent for software provided by subcontractors. By 2030, this could change radically. Three groups of companies will be involved in car production: 1) providers of hardware (the car itself), whose importance will wane significantly, 2) producers of software responsible for the car's operating system, communication software and remote vehicle management, and 3) various types of service providers and programmers working on expanding cars' capabilities by adding new functionalities and apps.



CHART 15. TYPES OF CARS IN EUROPE IN 2017-2030



Source: PwC.

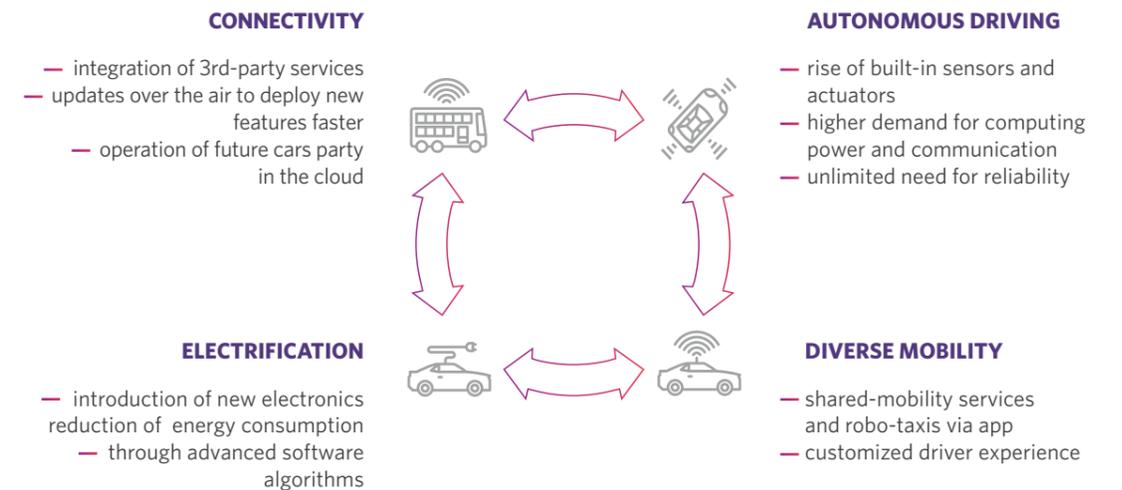
Car-sharing will also alter cars' life cycle. Privately-used ones will still enjoy a long life on the road due to their low mileage. In other words, they will still be used inefficiently and wear out more slowly. In contrast, shared cars will be used more intensively, which could halve their life cycle. This will accelerate the fleet's turnover and initially boost new car sales.

In the long term, as the number of private vehicle and overall number of cars in use falls, sales will stabilise.

The impact of car-sharing on the type of repair shops used by car owners is worth noting. Right now, the ratio between the authorised and independent segments in terms of use is 1:9. This will change, as companies managing car-sharing fleets will probably use authorised services. This will affect the spare parts market, as aftermarket parts are mainly sold at independent repair shops, whereas authorised ones use parts with the producer's logo.



INFOGRAPHIC 9. SOFTWARE BOOSTING INNOVATION IN THE AUTOMOTIVE SECTOR



Source: McKinsey&Company.

<sup>12</sup> Ondrej Burkacky, Johannes Deichmann, Georg Doll, Christian Knochenhauer, Rethinking car software and electronics architecture, McKinsey, February 2018. Online. Accessed: 27 October 2018. <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/rethinking-carsoftware-and-electronics-architecture>

With forecasts indicating that software in cars will gain importance, minor subcontractors are eyeing the market with increasing interest. Traditional car producers and tech companies are fighting to dominate the car operating system segment. For Microsoft and Apple, cars are another area to expand to, offering new opportunities to increase revenue based on collecting and processing data. Meanwhile, car companies are trying to remain in control of their product. The stakes are high, as the software and app market is much more lucrative than traditional segments in the automotive sector.



### INFOGRAPHIC 10. TECHNOLOGY IN AN AUTONOMOUS CAR

#### Application

- Smart Mobility Applications: Travel (hotels, flights, etc.), robo-taxi service, ride/car sharing services, etc.
- Content and Entertainment: Communication applications, commercial applications (e-commerce), video/music content, advertising, etc.

#### Software

- Autonomous driving software
- Safety-related software
- Vehicle and fleet management software
- Software enabling consumer and commercial applications

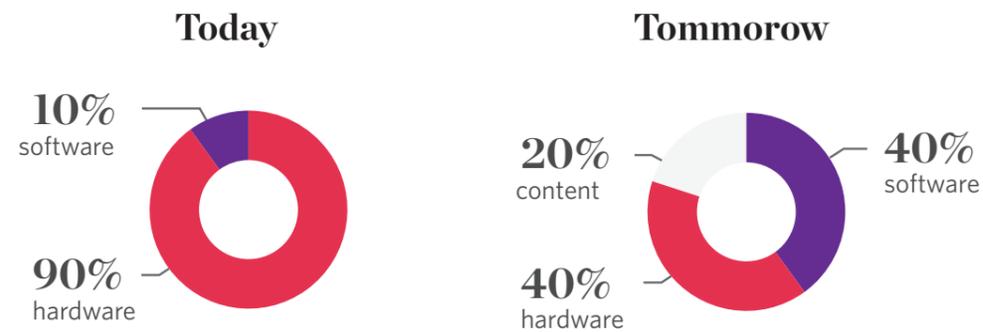
#### Hardware

- The vehicle (interior and exterior)
- Human-to-machine interface
- Driver assistance and control system
- Hardware related to connectivity
- Computing hardware
- Cloud-based enabler hardware

Source: Strategy&, Toptal Analysis.



### CHART 16. CAR VALUE

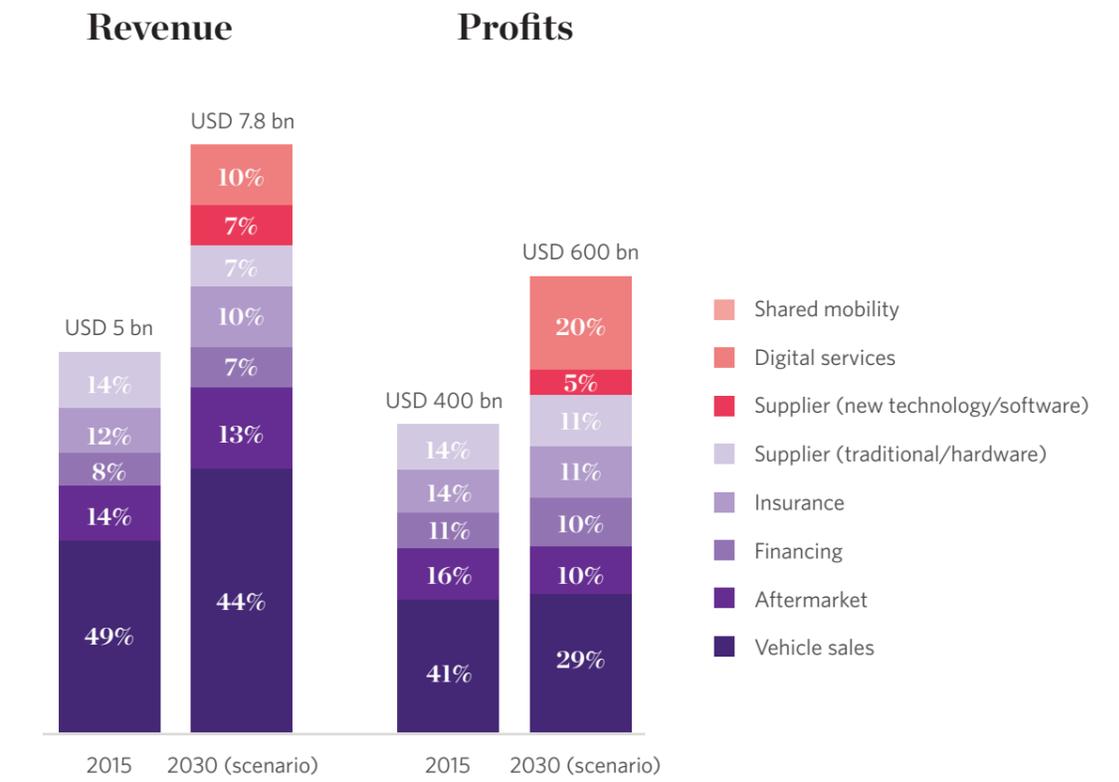


Source: Morgan Stanley Research.

This is confirmed by a study by analysts at Strategy&<sup>13</sup>, which notes that hardware manufacturers' share in the value of car industry sales will decline. Their share in profits will fall even faster.



### CHART 17. VALUE-ADDED CHAIN IN THE AUTOMOTIVE INDUSTRY



Source: Strategy&.

The radically changing automotive landscape places traditional producers of cars, parts and accessories – all of whom manufacture objects – in a particularly difficult position. Car repair shops, which offer services and can benefit from broader use and processing of data, are in a better situation. Cooperation with suppliers of automotive operating systems can also improve the quality of driving, for instance, by providing the bCall and sCall services described above. There are two possible scenarios: access protocols for car operating systems will be open to all repair shops, or only a small number of them will benefit. It seems that regulators should promote broad competition; that is, open protocols.

For manufacturers of parts, cooperation with tech companies will be a good solution, too. Using cloud-based artificial intelligence solutions could improve diagnosis of auto parts, enabling them to be replaced before they break. These types of partnerships would help producers constantly improve their offer and concentrate on what they do best – design and manufacture cars. Cooperation with tech companies could also improve production planning, reducing losses. In contrast, it is difficult to imagine today's manufacturers of parts turning into software producers.

<sup>13</sup> Toby Clarence-Smith, How Software Will Dominate the Automotive Industry, Toptal Insights. Online. Accessed: 27 October 2018.

# Recommendations

 In many respects, the development of electromobility is good for the Polish economy. Based on ambitious scenarios, the electrification of transport could create over 80,000 new jobs by 2050, reduce dependence on oil imports (which Poland paid around USD 12 billion for in 2017 alone), lower emissions of harmful substances, reduce noise and encourage innovative solutions in the transport and energy sectors. The Polish government should promote the development of electromobility using regulations and investment incentives. It should also support the transformation of the traditional automotive sector, which will be hit by the development of electromobility.

 The automotive sector creates a dense network of connections that transcends borders. Cars are manufactured by big automotive companies with a whole army of subcontractors and suppliers. In Poland, the automotive sector is a significant contributor to the economy, generating around 8 per cent of GDP per year. Car companies are also a source of direct investment. In Poland, six combustion engine factories are operating or about to be completed. Unfortunately, producers are often reluctant to embrace change and unwilling to abandon investments that they have already made. They view electromobility as a threat rather than an opportunity. As a country hosting direct investment, Poland should encourage companies to move towards electromobility, rewarding them with public aid. Investment in battery technology – the oil of the future – is particularly desirable. The state should also enforce change by companies present on the market, which order products from local SMEs and set the pace for changes in the entire sector.

 Poland has a rich sector of manufacturers and distributors of auto parts, predominantly SMEs. For them, the development of electromobility is an unavoidable challenge, as the market for their traditional products will shrink. Because electric cars will not replace conventional ones overnight, these companies will not be under urgent

pressure to transition. Nevertheless, the state should encourage them to diversify their operations; for example, by establishing a special transitional fund. Regulatory support is also needed, not limited to tax deductions, but also including minimum standards for cars registered in Poland for the first time, which would speed up the current fleet's replacement. An aspirational, long-term goal of banning the registration of cars with low EURO emission standards would have a similar mobilising effect.

 Changes in the automotive sector are unavoidable. The mutually reinforcing mega-trends of electrification, car-sharing, autonomy and communication mean that companies face huge changes that will shake up the market. Poland can use this to protect the sector from a loss of jobs and revenue, but also to improve enterprises' market position in the whole supply chain. Using regulations, the state should make it easier to provide new transport services; for example, by creating regulatory sandboxes used in fintech or allowing new solutions like autonomous cars to be tested. The state should also enforce open protocols for new products (such as car software) and services (such as charging electric cars), create a suitable environment for start-ups and, where necessary, support businesses with funds for R&D and prototypes.

 The automotive sector of the future will need employees with different qualifications to today's workers. Car companies will need IT specialists, electricians and chemists. Demand for these professional groups will grow. Working with the sector, the state should prepare the education system for changes help meet demand for new workers and prepare them for work in Industry 4.0. The changes should also encompass the continuing education system.

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