



TRANSFORMATION AND INNOVATION TO PLUG INTO THE FUTURE

EXECUTIVE SUMMARY

Electric, connected, self-driving and shared vehicles: challenges and opportunities for employment arising from current mobility

THE AUTOMOTIVE INDUSTRY: TRANSFORMATION AND INNOVATION TO PLUG INTO THE FUTURE

Electric, connected, self-driving and shared vehicles: challenges and opportunities for employment arising from current mobility

The automotive industry is immersed in a process of profound change, to deal with the compulsory decarbonisation of transport, increased digitalisation of vehicles and the sociocultural changes and buying habits in society.

All of this can be seen with the arrival of the electric vehicle, designed to replace combustion engine vehicles, the connected vehicle, self-driving cars and new ways of using vehicles such as carsharing. We are facing a new paradigm, which generates considerable uncertainty for the future of the automotive industry, but at the same time opens up new opportunities for a sector that is constantly renewing and innovating, and which has decisive weight in the Spanish production system.

This transformation of the automotive sector will affect employment, leading to a shrinkage in the traditional industry, given that electric vehicles and the automation of the production process will require less manual labour. At the same time, it will offer the chance to generate new jobs in related emerging sectors, for example, with electrification, electric recharging infrastructures, information and communication technologies and electronics; it is also an opportunity to offer constantly expanding new mobility services.

The objective has to be to ensure that change in the sector is not traumatic for workers and does not involve loss of jobs. For this to happen, a programme of fair transition must be planned, by creating an alliance between all the economic and social stakeholders, in conjunction with the public administrations, to promote the creation of new jobs to counterbalance those that disappear and guarantee that employment is maintained.

CURRENT SITUATION OF THE SECTOR

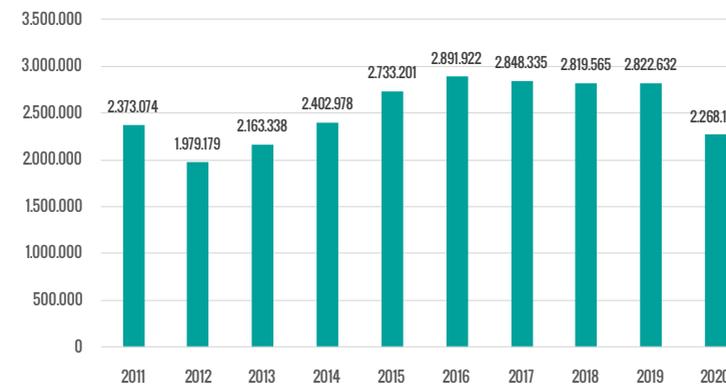
Manufacture

Spain has 17 manufacturing plants distributed around nine Autonomous Regions. All the companies depend on central offices located overseas, which conditions their autonomy when it comes to taking strategic decisions for the future.

In 2020, the effects of the pandemic and the consequent production stoppage for a number of months, together with the slow recovery of the market, meant that 2,268,185 vehicles were manufactured – a 19.6% reduction compared to 2019, when the figure was 2,826,632.

79% of these vehicles were saloons and all-terrain vehicles, and the rest commercial and industrial vehicles.

Manufacture of vehicles in Spain



Own creation. Source: ANFAC

82% of Spanish production was exported in 2019. Of these exports, 93% were channelled to European markets. Germany, France, the United Kingdom and Italy accounted for almost 70% of sales to Europe.

In 2020, Spanish factories maintained a rhythm of continuous growth in production figures for alternative vehicles, with an accumulated total of 164,821 units manufactured (electric vehicles, plug-in hybrids, natural gas and hybrids) reaching 7.27% of the total production figures in 2020. This means that more than twice the number of alternative vehicles were

manufactured than the previous year, even with the general drop in production caused by the pandemic.

The most notable growth has been in plug-in hybrid vehicles. In 2020 they were the most manufactured alternative vehicle in Spain, reaching a figure of 83,965 units produced, compared to 272 in 2019.

Also very noteworthy is the increase in pure electric vehicles. A total of 55,992 electric vehicles were produced, tripling the total production of electric vehicles in 2019.

YEAR	PURE ELECTRIC	%	PLUG-IN HYBRID	%	NON PLUG-IN HYBRID	%	GAS NG	%	GAS LPG	%	TOTAL ALTERNATIVES	%
2016	9,383	0.32	-	-	1,475	0.05	2,858	0.10	24,127	0.83	37,843	1.31
2017	10,781	0.38	-	-	2,413	0.08	4,983	0.17	21,614	0.76	39,792	1.40
2018	17,632	0.63	-	-	8,466	0.30	11,913	0.42	23,756	0.84	61,768	2.19
2019	16,885	0.60	272	0.01	11,557	0.41	29,115	1.03	19,772	0.70	77,603	2.75
2020	55,992	2.47	83,965	3.70	5,504	0.24	19,360	0.85	-	0.00	164,821	7.27

Own creation. Source: ANFAC



Registration

In Spain, 1,501,239 vehicles were registered in 2019; of these, 23% were manufactured in Spain and the rest were imported¹. In 2020, with the impact of the COVID-19 pandemic in full flow, vehicle registrations totalled 1,030,744 vehicles, 31% down on the previous year.

There was a 25% growth in the number of registrations of alternative vehicles between 2019 and 2020², with a 9 percentage point

increase in their market share this year, in which one of every five vehicles registered was a vehicle powered by alternative energy sources.

2020 ended with a 64% increase in registrations of pure electric vehicles, and a 28.3% increase in non-plug-in hybrids, which accounted for 13.6% of registrations. These vehicles are the biggest selling of all alternative vehicles, something we might classify as an intermediate step in the process of moving towards electro-mobility.

¹ Annual report 2019. National Grouping of Automobile and Truck Manufacturers (ANFAC), 2020

² Institute of Automotive Studies (Ideauto)

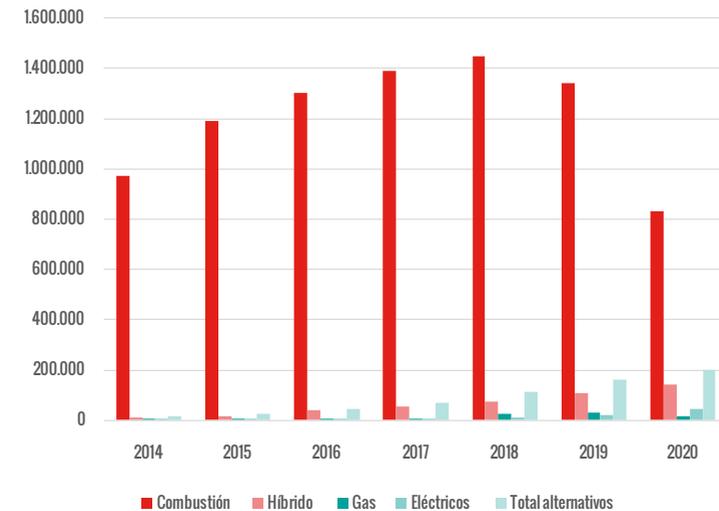
Registration of vehicles by energy source

YEAR	COMBUSTION	%	HYBRID	%	GAS	%	ELECTRIC	%	TOTAL ALTERNATIVES	%
2014	971.701	98,4	12.114	1,2	1.620	0,2	1.846	0,2	15.580	1,6
2015	1.189.323	98,0	18.432	1,5	3.411	0,3	3.046	0,3	24.889	2,0
2016	1.301.156	96,6	39.046	2,9	2.609	0,2	4.533	0,3	46.188	3,4
2017	1.391.157	95,1	55.768	3,8	6.864	0,5	8.446	0,6	71.078	4,8
2018	1.449.312	92,7	76.113	4,9	24.585	1,6	13.440	0,9	114.138	7,3
2019	1.339.690	89,2	109.662	7,3	32.367	2,2	19.520	1,3	161.549	10,8
2020	831.225	80,5	140.869	13,6	17.220	1,7	43.516	4,2	201.605	19,5

Petrol and diesel Hybrid petrol and diesel LPG, CNG and NG Electric and plug-in hybrid

Own creation. Source: ANFAC

Registration of vehicles by energy source



Own creation. Source: ANFAC

It is obvious that there has been a considerable quantitative leap in just a year, which is encouraging if we are to achieve electrification of our fleet of vehicles. However, it is no less true that there is still a long way to go and that these growth figures in registrations need to be repeated and show a more convincing increase if, in a decade's time:

- The pure electric vehicle is to have greater prominence, unseating all the other versions of alternative vehicles.
- All this is to be accompanied by increased manufacture of these vehicles in our factories.

Number of cars

- Replacement is to reach figures that are more compatible with the objectives for decarbonisation of the automobiles on the road.³

The number of saloon cars in Spain in 2019 was 24,558,126, of which 46,301 were pure electric and plug-in hybrids, in other words 0.2% of the total number of cars. This shows us that their presence is merely symbolic, and that greater effort needs to be made if we are to achieve more desirable numbers.

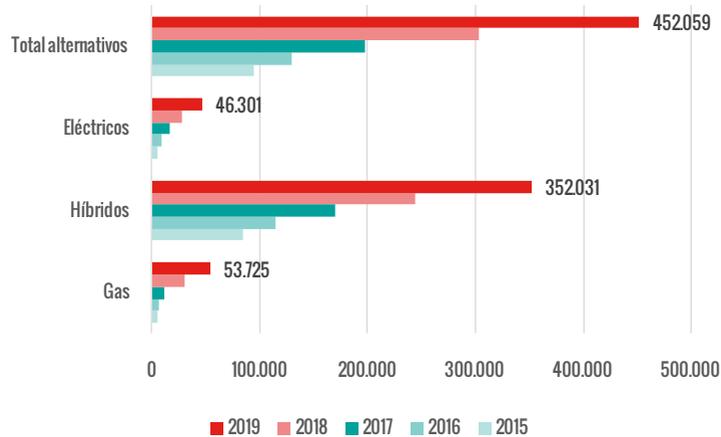
³ National Integrated Energy and Climate Plan (PNIEC) 2021-2030 considers that a fleet of vehicles of 5,000,000 will be reached in 2030 (saloon cars, vans, buses and motorcycles)

Number of saloon cars by energy source

	TOTAL	GAS	%	HYBRIDS	%	ELECTRIC	%	TOTAL ALTERNATIVES	%
2015	22.355.549	5.119	0,02	84.164	0,38	5.044	0,02	94.327	0,42
2016	22.876.830	6.761	0,03	114.652	0,51	8.509	0,04	129.923	0,58
2017	23.500.401	11.615	0,05	169.599	0,76	15.983	0,07	197.198	0,88
2018	24.074.151	30.023	0,13	244.648	1,09	28.135	0,13	302.807	1,35
2019	24.558.126	53.725	0,24	352.031	1,57	46.301	0,21	452.059	2,02

Own creation. Source: ANFAC

Number of saloon cars by alternative energy source



Own creation. Source: ANFAC

Automobile equipment and components

The Spanish industrial fabric that manufactures components for automobile production companies came into being and grew in Spain in the wake of these production companies. Even so, for years now, it cannot be considered as solely dependent on assemblers based in Spain, because a majority of domestically-produced components is intended for export.⁴

The principal activity of the automotive industry equipment and components sector is the development and manufacture of all kinds of elements for the vehicle, with highly specialised products.⁵

The components sector contributes to generating around 75% of a vehicle's final value; in other words, the majority of the vehicle is manufactured outside the large car manufacturers.

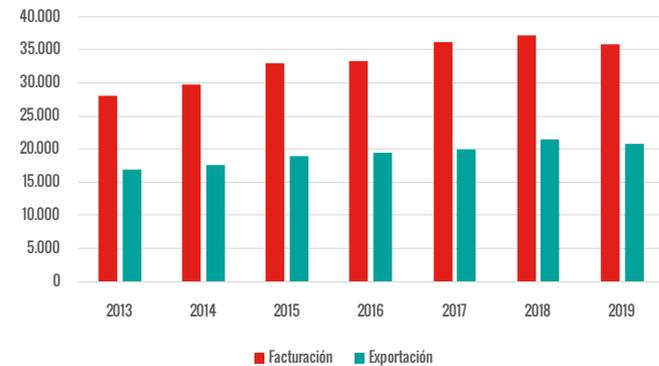
The framework of component companies is made up of a thousand or so companies.

These include foreign multinationals with production plants in Spain, companies with the parent company in Spain and other sub-offices distributed around the world, and an extensive network of industrial SMEs. The Spanish companies with international presence have around 450 plants distributed around the world.

This means that, unlike what happens with vehicle manufacturers, many of them have the decision-making power here, do not depend so much on outside decisions, and have a greater margin of manoeuvre in their strategic business planning to deal with the profound changes that are occurring in the automotive sector.

Spain is the fourth largest producer of components in Europe and exports around 60% of its production. The majority of the products exported are sent to the leading European vehicle manufacturing countries: Germany, France, the United Kingdom and Italy.

Turnover and export of components (million €)



Own creation. Source: Sernauro

⁴ The equipment and components manufacturing sector for the automotive industry in Spain. CCOO Industria. 2016

⁵ Strategic agenda for components 2020. Spanish Association of Automotive Suppliers (SERNAUTO). 201

Two notable examples of large components companies with their main head office in Spain and an extended network outside Spain's borders are **Ficosa** and the **Grupo Antolin**. Both companies have adapted to the new demands related to the transformation of the sector by incorporating high levels of technology, principally digital and electronic, in their specialist products. This has been accompanied by a considerable investment in

R+D+i and the consolidation in their workforces of hundreds of people with engineering qualifications. Beyond their own development, to incorporate the technology they have formed alliances with other companies, until recently outside the automotive sector. This commitment to constant innovation has allowed them to stabilise and increase the workforce in Spain and worldwide.



THE ELECTRIC, CONNECTED AND SELF-DRIVING VEHICLE: REDEFINITION OF THE PRODUCTION PROCESS AND THE VALUE CHAINS

The electric vehicle

The forecast that the electric vehicle will replace the conventional vehicle is becoming a fact that is difficult to counter. It is a result of the European, state and also local regulations, designed to achieve the decarbonisation of one of the main CO₂ emitting sectors, and also atmospheric and sound pollution. This, together with society's increasing environmental awareness of the need to deal with the climate emergency, has called into question the transport model based on combustion engine vehicles, causing the automotive industry to commit itself wholeheartedly to the development of electrified mobility.

Although it appears irrefutable that the speed with which the electric vehicle will penetrate the market will continue to increase, it is also true that it will still coexist for a greater or lesser

period of time with internal combustion engine vehicles. This will provide something of a margin to readapt the industrial framework of the automotive sector, and employment therein, to the new production demands.

With the appearance of electric-powered vehicles, there will be a transfer of the principal technology of internal combustion engines to batteries, electric motors and power electronics, technologies which, until now, have been side-lined by the vehicle manufacturers that controlled the value chain. It is a major shake-up for the sector, which requires a profound transformation that will attract new, hitherto absent players, and will force into a corner others that are omnipresent and consolidated in the current combustion engine vehicles model.



Two of the car manufacturers that have committed themselves to electrifying their production, although at different speeds and with different figures, are the **PSA Group** and **SEAT**. The **PSA group** has plants in Vigo, Zaragoza and Madrid, and is the leading Spanish vehicle manufacturer. In a short time, the three plants have gone from not manufacturing electric vehicles to all three producing them in 2020. The first one was Zaragoza, with the Opel Corsa-e. This model is produced in combustion engine and pure electric versions. The latter already accounts for around 16% of the Corsas that leave the factory.

Seat, meanwhile, is a Spanish company with its head office in Barcelona, which belongs to the Volkswagen group. Even so, unlike the other manufacturers established in Spain, it enjoys a certain degree of autonomy because it designs and develops its own vehicles. Moreover, it is the only one that directly manages mobility services, such as motosharing, which it began to offer in 2020. Seat is the second-largest vehicle manufacturer in Spain.

Initially, **Seat** was committed to gas for its alternative vehicles, but has gradually put this technology aside. In 2019 it did not manufacture electric vehicles; in 2020, however, it has incorporated two plug-in hybrid vehicles as new products.



The batteries

The European Commission is aware of the weakness posed by considerable dependence on external technology, because Europe produces almost no batteries itself, at this crucial moment in the expansion of the electric vehicle. This is why it has stated that the development and manufacture of batteries is strategic for Europe in the context of the transition to clean energy, and is a key component in the competitiveness of its automotive sector.⁶

In short, it has said that the success of the European automotive industry sector, compared to Asian industry that has a monopoly on the world production of batteries, is dependent on the home-grown development of this key component. It has gone on record in this regard, emphasising that batteries constitute up to 40% of a car's value.⁷

There are many public-private initiatives in Spain designed to make the establishment of battery manufacturing plants in the country a reality, although at the moment there are no consolidated commitments. One of the opportunities for attracting a battery factory might come as a result of the lithium deposits in Extremadura where, in addition to actually extracting the ore, a plant could be set up for the initial transformation of the ore; this would facilitate the installation of a battery factory to supply domestic manufacturers.

⁶ Appendix to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Europe on the move. Sustainable mobility for Europe: safe, connected and clean. Brussels, May 2018

⁷ Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank on the Implementation of the Strategic Action Plan on Batteries: Building a Strategic Battery Value Chain in Europe. Brussels, April 2019

The connected vehicle

Another of the directions in which the automotive sector is making most progress is in connectivity: equipping a vehicle with information and communication technologies via which it receives and emits information.

Communication can be between vehicles, between the vehicle and road infrastructures, and between the vehicle and other users of the road network. The purpose of connectivity is to improve significantly road safety, traffic efficiency, comfort and driving assistance.

Connectivity opens up the opportunity of including technology companies in the automotive sector, giving importance to companies that until now have mostly been unaware of each other and which will now become interdependent.

The appearance of communication and information technologies in vehicles is accompanied by high added value which will have a beneficial effect on the value chain, becoming an element that will be fundamental over time.

The self-driving vehicle

The self-driving, or autonomous, vehicle is another major challenge that the automotive industry will have to get to grips with in the years to come. The self-driving vehicle consists, in its most advanced development, of a vehicle that can move without being driven by a person. In this area, new communication and information technologies are also essential, once again placing the technology companies at the heart of the transformation of the sector. Companies outside the vehicle ecosystem are positioning themselves as providers of high technology solutions, which is accompanied by a new niche of occupation around the automobile.



The integration of the new mobility services

Owning and using a private vehicle in urban areas can be very costly. Added to this are the restrictions being imposed on access to certain urban areas, to tackle atmospheric pollution and climate change. The objective, then, is not to own a vehicle, but rather use mobility services for travel.

To satisfy this new demand, options such as shared vehicle mobility services have started to appear. Car-sharing, with vehicles shared by a number of users, is expanding rapidly. We already have some examples of car manufacturers that have set up or acquired companies to offer this service with their own electric vehicles.

Similarly, mobility platforms are being created that bring together different mobility models as a unique offer of complementary mobility services; car manufacturers are participating in these platforms. Depending on the type of journey, one mode of transport or another can be used, i.e. bicycle, public transport or car.



THE CIRCULAR ECONOMY

The circular economy, understood to be a production system in which waste is converted into a reusable resource brought back into the production cycle instead of being thrown away, may be another paradigm of the automotive industry.

This may take the form of reusing vehicles, renovating their more short-lived parts, and also in the adaptation or conversion of a combustion engine vehicle into a pure electric vehicle.

The reuse and recycling of batteries is another area with great development potential: when the recharging capacity of a battery drops below 70%, it is no longer suitable for powering an electric vehicle; however, it may continue to be used for less demanding purposes such as, for example, supplying stationary energy to homes, retail establishments or public installations. In this scenario, the batteries are charged at times of low electricity demand, such as night-time, and the electricity used when necessary. Another possibility is recycling to obtain the raw materials to manufacture new batteries.



MEASURES TO BOOST THE TRANSFORMATION OF THE AUTOMOTIVE SECTOR

The offensive to tackle the climate crisis, subsequently complemented by measures to emerge from the COVID-19 crisis, has brought with it a large number of arrangements and initiatives, both Europe-wide and in Spain; these are intended to promote the electrification of mobility and the other transformations in the automotive sector. It should be emphasised that the huge assistance for mobility is conditioned by the fact that these changes should not be detrimental for employment and should be carried out as part of a fair transition in which workers do not lose their jobs, and the new jobs generated are quality, decent and stable jobs.

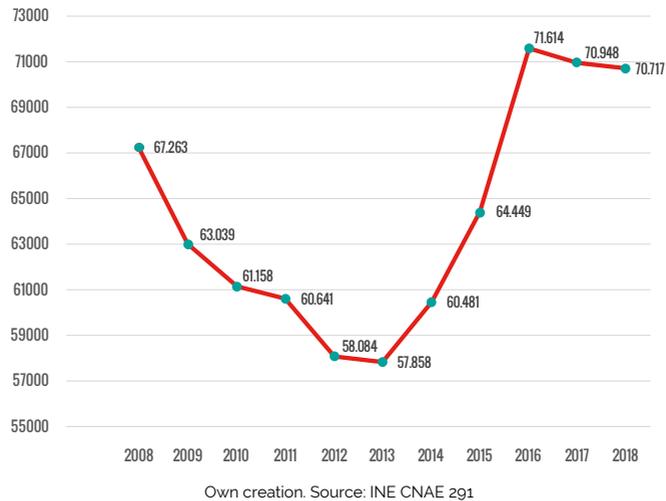


EMPLOYMENT IN THE AUTOMOTIVE SECTOR

In 2018 the automotive sector had 300,817⁸ direct jobs, a figure obtained by adding the 70,717 car manufacturing jobs to the 230,100⁹ in the equipment and components industries. Its size is such that it represents 12% of jobs in industry in Spain. This means that the impact of the changes occurring in the automotive sector are very important for employment on the whole in the Spanish production system.

If we take into account the period from the start of the big economic recession until 2018 (the most recent figures available), employment in vehicle manufacture, even with some regression in the last two years of the series, has risen by approximately 13,000 people in employment (18% of the total) between the year with least employment (2013) and 2018.

Employment in vehicle manufacturing



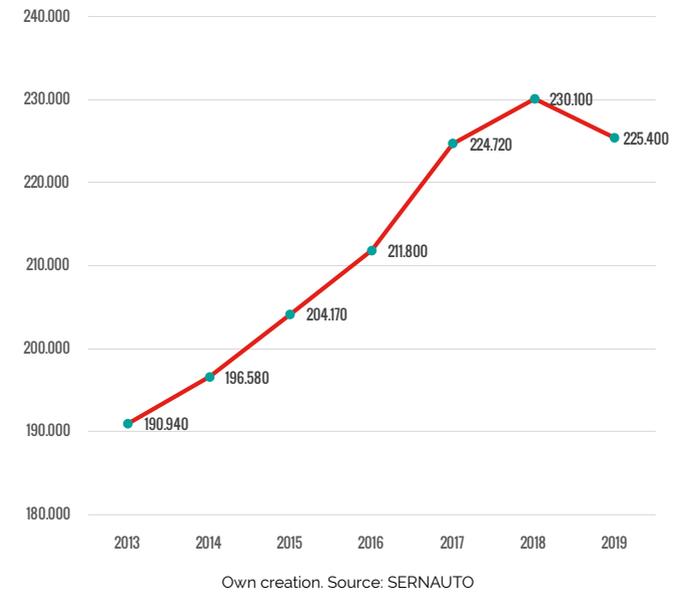
The equipment and components manufacturing sector also saw gradual annual growth in the period between 2013 and 2019. Despite the regression in 2019, at the end of

the period for which we have figures there was a notable increase of around 35,000 jobs (15% of the total).

⁸ National Statistics Institute (INE). CNAE 291 Manufacture of motorised vehicles

⁹ Spanish Association of Automotive Suppliers (SERNAUTO)

Employment in the components industry



As a result of the disruptive transformation of the automotive sector towards the electric, self-driving and connected vehicle and mobility services, the industry will have to manage a long, profound and complex employment transition with repercussions on both the type and amount of employment. As we have repeatedly stated, in this process of change towards electro-mobility, the repercussions on employment are obvious. Although the real impact is somewhat less evident, and the timeline for this simultaneous process of destruction and creation even less so.

This is due, principally, to the disappearance of almost a third of the internal combustion engine-related parts found in a car, which will no longer be involved in its production.

There is consensus that the electric vehicle, which is less complex and involves a greater proportion of automation in its production and assembly, requires less labour than the production of combustion engine vehicles.

On the other hand, increasing importance will be given to skills such as programming software and the vehicle's electronic engineering, to give just two examples of new occupations that are already appearing with more or less intensity, replacing others more related to the mechanics and motorisation of the car. This means that the sector will continue to create many employment opportunities, but the employment needs to be reoriented.

Below we analyse the impact of different processes of change on employment.

Automation and robotisation of the industry

This process is not new and has merely intensified, in parallel with the progress made in robotics. The automotive industry was a pioneer, and has seen one of the highest penetrations of robotics in its production system. The aim is to improve the reliability and profitability of the production, simultaneously increasing the speed of manufacture and the quality of the product.

The electric vehicle

A study examining the difference in employment assembling the power train (the engine and the transmission components) between internal combustion vehicles and pure electric and plug-in hybrids in the German automotive industry highlights that the power train is the distinguishing element between electric and combustion engine vehicles. It is the reason for the greater differences in employment, basically because of the greater complexity of the combustion engine power train.¹⁰ The study estimates an 11% decrease in labour for every million units of electric vehicles manufactured as replacement for units of combustion engine vehicles.

Another method of estimation would be to make a comparison in the productivity per employee in the case of a combustion vehicle or a pure electric one. Put another way, the number of vehicles manufactured by each person employed for a certain period of time according to the type of propulsion. This is an extrapolation,

and the result is only valid as a reference point. The ideal scenario would be to compare the numbers in a company that only manufactures pure electric vehicles, such as Tesla for example, and an industry manufacturing combustion engine vehicles. In this latter case, we will use the figures for Spain in 2018, with pure electric cars accounting for just 0.6% of manufacture.

Specifically, in the state industry, 2,819,565 vehicles were manufactured, involving 70,717 jobs. This equates to 40 vehicles manufactured per person in a year.

Vehicles manufactured per worker per year

YEAR	JOBS	VEHICLES MANUFACTURED	VEHICLES X WORKER
2008	67.263	2.541.644	38
2009	63.039	2.170.078	34
2010	61.158	2.387.900	39
2011	60.641	2.373.297	39
2012	58.084	1.950.000	34
2013	57.858	2.163.338	37
2014	60.481	2.402.978	40
2015	64.449	2.733.201	42
2016	71.614	2.891.922	40
2017	70.948	2.848.335	40
2018	70.717	2.819.565	40

Own creation. Sources: INE CNAE 291 and ANFAC

The batteries for electric vehicles

The manufacture of batteries is an objective both to attract this essential part of the electric vehicle value chain and not depend on overseas production, and to generate direct and indirect employment.

As far as the potential for generating employment in the manufacture of lithium battery cells is concerned, we will use as a basis a study that refers to the installation of a 13 GWh/yr batteries industry in Germany, which is expected to generate around 1300 direct jobs and more than 3000 indirect jobs, including suppliers, subcontractors, logistics, construction and engineering companies, etc.¹³

Recently, the Interior Ministry talked about the possibility of having two battery cell factories in Spain.¹⁴ If two factories were set up in Spain, each with a power of 13GWh/yr, we would be talking about generating between 2300 and 4700 new direct jobs, and between 5300 and 10,800 indirect jobs on top of that, which would replace a large proportion of the jobs lost in the manufacture of electric vehicles.

In the case of Tesla, we are talking about some 500,000 vehicles produced in its factory in Fremont, California, which employs around 10,000 people.¹¹ These figures give us an annual production of 50 vehicles per capita.

In other words, for electric vehicles we are talking about almost 20% more production per job position. To manufacture the same number of vehicles, in the case of the electric model, approximately 20% less labour is required than for a combustion vehicle.

On a different theme, the electrification of the vehicle fleet in Spain, powered by renewable energies, would reduce the dependence on crude oil exports. Consequently, the large amounts used to purchase crude oil overseas could be invested in Spain to promote greater domestic activity and, along with this, more employment. This is the principal theory on employment referred to in a study on the decarbonisation of cars.¹²

Furthermore, the reduced demand for crude oil-based fuels, which would be replaced by electricity from renewable energies, will lead to economic investment in other sectors that will generate more employment, as the fossil fuels production sector is less employment-intensive than other economic activities.

¹⁰ ELAB 2.0. Wirkungenderfahrzeugelektifizierung auf die beschäftigungsbilanzstandortdeutschland. Fraunhofer IAO. 2018

¹¹ <https://www.tesla.com/factory>

¹² Low-carbon cars in Spain: A socioeconomic assessment. European Climate Foundation. Cambridge econometrics

¹³ EU Competitiveness in Advanced Li-ion Batteries for E-Mobility and Stationary Storage Applications – Opportunities and Actions. European Commission. 2017

¹⁴ Industria (casi) confirma dos fábricas de baterías de coches eléctricos en España. November 2020



The **PSA group** is to start up a battery assembly plant in Zaragoza in 2021. This new assembly plant will employ around 150 workers. **Seat** has recently created a testing centre for internal combustion, electric, hybrid and CNG engines, which provides 200 jobs, which The Spanish manufacturer has also started to build its *Test Center Energy*, a laboratory for testing different models of batteries and different chargers for electric vehicles.

Recharging electric vehicles

A study carried out by the European Association of Electrical Contractors defends the theory that the jobs that can be created in the electricity value chain with the implementation of the electric vehicle are more than those that would be lost in car manufacture.¹⁵

It states that the majority of new jobs are associated with the installation, operation and maintenance of the charge points. Altogether, around 112,500 new jobs will be created in Europe. This figure is based on having a vehicle fleet of 10% plug-in vehicles by 2030.

A report by T&E¹⁶ on the number of charge points that will be needed in Europe and its member states predicts that there will be 307,000 public charging points installed in Spain by 2030.

On the basis of this forecast, we estimate around 11,000 jobs related to this recharging infrastructure in Spain. Jobs that would include installation, maintenance, repair and management of the public charge points. If, in addition, we take into account, for example, domestic installations or those in car parks in work centres, shopping centres, hotels, etc. the number of jobs will multiply.

¹⁵ Powering a new value chain in the automotive sector. The job potential of transport electrification. The European Association of Electrical Contractors. 2018

¹⁶ Recharge EU: How many charge points will Europe and its member states need in the 2020s. Transport & Environment. 2020

TRAINING IN THE TRANSFORMATION OF THE AUTOMOTIVE SECTOR

Professional training

Training forms an essential part of the change of model in the automotive sector to electrical, connected and autonomous mobility, but also for the management of the emerging mobility services. The incorporation of new professional profiles with different knowledge and skills to the hitherto most common and established ones in the automotive sector requires a wholesale training programme to go hand in hand with the changes. The quality and qualifications of the workforce may represent a major strong point for attracting and holding onto production activity in Spain.

For all these reasons, there is a requirement for a programme of professional training, ongoing training and higher training, with specialised training cycles adapted to the new demands of the employment market. In other words, the future of the automotive industry is inextricably linked with significant investment in training.

In this area, an essential aspect is a commitment to dual training, which combines academic teaching and work experience in companies throughout the training stage.

The proportion of people with a medium level of training (high school diploma/A-level or vocational training) is very small in Spain, if we compare it to neighbouring countries. Particularly significant is the small number of people choosing vocational training studies in the stage following compulsory education. Compare, for example, Spain's 11.6% to the 47.2% in Germany, one of the countries that invests most in R+D.

Ongoing training

Ongoing training is always necessary, but during periods of disruptive changes this training is fundamental if we are to align workers' skills with the changing requirements for employment skills. Despite this, as far as training throughout the working life is concerned, Spanish adults are involved in educational and training activities less frequently than the European Union average.¹⁷

¹⁷ COTEC Foundation for innovation 2020

One example of a company taking steps in the right direction is **Seat**. In 2020 it created an electric vehicle learning centre called the *Electromobility Learning Center*. The aim is to train the workforce in all aspects related to new electric technology. With the expectation of manufacturing the first electric car shortly, it calculates that its launch will require the direct training of 1500 people for this model, which is 10% of its workforce.

University training

The equivalent of dual training, combining training in the teaching establishment with work experience in the automotive sector company, can also be found in higher training, where research and innovation have to be one of the strong points that the academic world and the company use for feedback.

Until recently, there has been only a small offer of higher university studies exclusively for the

automotive sector. And there has been even less training in the major transformations the automotive industry is involved in with electric, connected and autonomous vehicles. The offer of university studies in these subjects has started to take shape in recent years, thanks to interesting offers from universities in Vic, Tarragona, Madrid, Vigo and Burgos, which offer training programmes involving the participation of large companies located nearby.



The components company **Ficosa** has designed, in conjunction with the Polytechnic University of Cataluña (UPC), a master's degree in telecommunications engineering for the development of communications electronics systems for the automotive industry. Ficosa professionals teach part of the course, and the company also offers students the chance to join the company group when they finish the course. The purpose of the training is the professional development required by the transformation of the automotive sector and, at the same time, it opens the doors to capturing new talent for the company.

FINAL CONSIDERATIONS

As we have repeatedly stated, we are at a turning point at which the medium and long-term future of the automotive industry is at stake. In these circumstances, we can see that our production system has started to react, to adapt and become part of the changes. Our sector is making progress in all four of the parameters that are leading this great transformation - electrification, connectivity, self-driving vehicles and mobility services - but at different speeds.

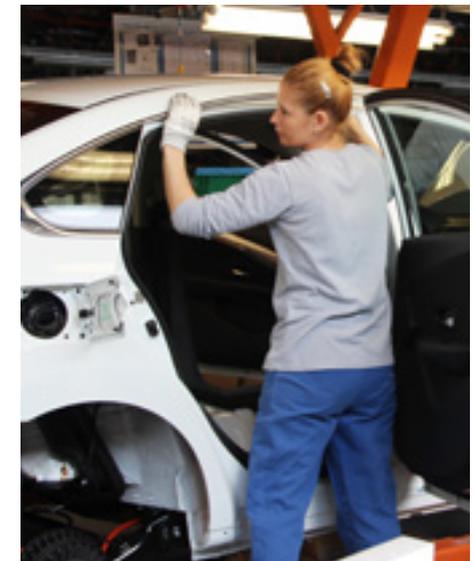
The equipment and components industry is a great asset in the sector. Three quarters of a vehicle's value correspond to equipment and components, which tells us that this industry is the one that must incorporate the majority of the technological changes that will form part of the finished vehicle.

Car makers and component manufacturers are experiencing a symbiosis that makes them dependent on each other, although it is also true that in a globalised market a predominantly export sector, like the components sector, does not depend solely on our vehicle assembly plants. Moreover, the components plants that have their main head offices here have more margin for manoeuvre when it comes to taking strategic decisions, unlike the case of vehicle production plants as a whole.

The most recent measures designed to boost the automotive sector by proposing twofold measures for decarbonisation of transport and support for restructuring of the automotive sector, both Europe-wide and nationally, set the course for the industry's future. At the same time, they must be a wake-up call to establish the bases for change.

The sector transformations that are taking place will lead to a simultaneous process of job destruction and creation. The need for some employment qualifications or skills will be reduced or disappear, while the need for others will increase and new ones will be created. It remains to be seen whether the balance between job losses and the generation of new employment will be positive, in other words, whether there will be a net increase in employment at the end of this period of disruptive changes in the sector.

The theory that we have attempted to clarify, and which is backed by various studies that we have cited, is that these deep-seated transformations are an opportunity to incorporate and generate new employment in the sector in its broadest sense. This is not to overlook the negative effects it will have, with shrinkage in employment that is closely associated with the combustion engine, as a result of the increasing robotisation and automation of the production process.





Our obligation is to ensure that this situation impacts as little as possible on employment, in terms of both quantity and quality. To ensure this, we need a fair transition, which will only be achieved if there is support for the whole process of change, with active employment policies including the adoption of new skills and abilities and the development of new activities that generate jobs. All of this must be established in a framework of participation, consensus and monitoring, involving the public administrations, companies and trade unions as representatives of the workers.

To achieve a fair transition, an intensive effort to promote and adapt training to the new demands of the automotive industry is essential. Training is both a necessity and an opportunity for the Spanish sector to achieve continuity. On the one hand, it will mean

that existing production can be maintained and new production attracted and, on the other, it will be the key for the professional requalification of active workers to enable them to keep their jobs.

Not all the employment related to transformations based on electrification, connectivity, self-driving vehicles and mobility services will be generated in vehicle and component manufacturing companies; part of it will be passed on to other sectors, such as ICT, energy, training and services, traditionally little associated with car manufacture, but which will be heavily involved in the value chain in this new scenario. A situation which will arise from new balances, and will revalidate the driving role of the automotive industry in the Spanish economy, and particularly its industry.

FEASIBLE AREAS FOR JOB CREATION FOCUSED ON/INSTIGATED BY THE AUTOMOTIVE SECTOR:

- The development phase of battery and hydrogen fuel cell technology, connectivity and the self-driving vehicle will lead to an increase in R+D+i.
- The introduction of battery cell production factories and final assembly of batteries.
- The reuse and recycling of batteries. For example, the conversion to batteries for homes and the recycling of minerals for new production.
- The re-equipping or conversion of a combustion engine vehicle into a pure electric vehicle.
- The manufacture, installation, management and maintenance of electric vehicle charge points.
- The design, production, programming and maintenance of robots.
- Electronics, with its variety of functions increasingly integrated into vehicles.
- The digitalisation of vehicles will lead to the development and manufacture of hardware and software and information and communication technology.
- Self-driving and connected cars will require the production of sensors and cameras, amongst many other components.
- Self-driving vehicles will promote investment in road infrastructures and urban installations, which will be adjusted to communicate with the vehicles.
- The development and management of mobility services in all their sharing variables and multimodal platforms, etc.
- Re-assembly of the vehicle, reuse and recycling of parts and materials as part of the circular economy model.
- An increase in training focussed on the multiple facets of the automotive sector, to achieve increased employability.

The common goal for all the stakeholders involved is to work together to ensure that any employment that may be generated by the transformation process that we have embarked on is developed and remains in Spain.

CONCLUSIONS

1. The strategic elements for the maintenance of the automotive sector in Spain are the following:
 - a. A commitment to electro-mobility in the necessary process of decarbonisation of economic activity.
 - b. Active participation in the innovations currently ensuring the future of the sector, in terms of the electric, connected and self-driving vehicle, and mobility services.
 - c. Retaining and attracting new production activity throughout the chain of value.
 - d. Guaranteeing growth in the volume of employment in the sector as part of the necessary policy of reindustrialisation of our production apparatus.
2. The EU, with its coherent objective of decarbonisation of the economy, has promoted a whole rollout of regulations and strategies to encourage electric vehicles, and also the automation of vehicles and the promotion of mobility services, which have met with similar initiatives in the Member States. These initiatives associated with the objective of achieving a fairer, more equitable and prosperous society, include defending the rights of workers. If we do not ensure a fair process of transition in the sector, the necessary changes will be hampered, and with them the efficiency and effectiveness of the public policies.
3. The obsolescence and unviability of combustion engine vehicles is both inevitable and imminent. We could go as far as to say that the competitiveness of the sector over the coming decades will depend on the manufacture of electric vehicles and, along with this, employment in the manufacturing and components sectors.
4. The figures available point to this transition leading to a possible significant loss of jobs in the very short term, which are impossible to quantify accurately. However, not embarking on this path will lead to a greater and longer-lasting collapse in the number of unemployed in these sectors. In this regard, the transition ensures long-term growth in employment.



5. The plans to support and boost the automotive sector must be used to ensure that the great transformations are planned and form part of a fair transition process, involving all the stakeholders in society.
6. Both the concept of fair transition and the Spanish strategy with the same name require a sustained effort in terms of detecting employment opportunities and training needs for the emerging professions, with particular attention to the actions aimed at providing current workforces with the skills required to find a place in the new scenarios. This factor is essential if employment is to be preserved and activity maintained and attracted, thereby becoming a comparative advantage. We must also not forget that these active training policies need to be accompanied by passive policies that guarantee the income of working people who might be affected negatively by this transition process, and also economic policies that increase the capacity to generate employment in the economy.
7. Registrations of companies and public administrations account for around 35% of the total number of registrations. In this regard, the Public Administration has a fundamental role in speeding up the process of decarbonisation of transport, and must be the spearhead for change in the country's fleet of vehicles, in a way that is coherent with policies on environmental responsibility.
8. As part of the objective to strengthen the sector, the establishment of plants producing cells for batteries is a great opportunity to create employment and a strategic objective for attracting a very large portion of the chain of value in the sector.
9. In the long term, hydrogen fuel cell vehicles are very well placed to become the most sustainable option, making investment in this technology a stake on the future. Public policies in this regard may be essential for a change of production in the sector.
10. Within the paradigm of the circular economy, there must be a stimulus for the re-use of batteries that no longer offer the performance required to power a car, to put them to other compatible uses, such as residential. The same thing could apply to other components. Considering waste as a production resource forms an essential part of a long-term sustainable production model and, furthermore, establishes a greater volume of employment in the territory.
11. A considerable increase in the number of charge points, preferably rapid charge, must be a priority, as this is the basic infrastructure and a necessary condition for electric vehicles to be rolled out in full. Moreover, this rollout has interesting potential in terms of generating employment.

12. Connectivity, in conjunction with digitalization, is the gateway for new players in the sector which need to converge and work together for mutual benefit with the automotive industry, facilitating the incorporation of new professionals in the sector.
13. The self-driving vehicle, which is still at the development and experimentation stage, represents an opportunity for innovation, for example, in our technology centres in collaboration with the industry. This may be a criterion to be taken into account when taking decisions that will ensure that vehicles are produced in our plants.
14. The new paradigm of mobility and the evolution of demand, which is moving away from "buying and owning a vehicle" to "buying mobility services", gives us a glimpse of the reduction in automobile and vehicle fleet production in parallel with increased employment in management of the service.
15. Vehicle manufacturers must continue to forge alliances to promote joint services with other means of mobility, principally electric, such as public transport and shared vehicles, in a search for a complementary offer that takes in the maximum possible number of movements.

