New professional profiles for an electric automotive industry

Executive summary







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1. Overview of the automotive sector in Spain

The advent of the electric vehicle, as a result of the implementation of decarbonisation policies, especially in the European Union (EU), is set to transform the value chain of the automotive industry, incorporating new links of great relevance that can become important business and employment opportunities. In this scenario, the manufacture of batteries and the incorporation of electric motor manufacturing are of special importance among suppliers. For manufacturers, the integration of electric cars will lead to changes in design and assembly plants. In terms of services linked to the electrification of the automotive sector, charging infrastructure and connectivity services are set to play an essential role. In terms of both equipment installation/maintenance and network operators, the charging network and its operation play a decisive role in the successful expansion of electric cars, a scenario that could also include electric production companies and, in particular, supply network management companies. These companies will need to develop networks with operational capabilities adapted to the needs of electric car users, and design energy storage systems that take into account and integrate the batteries of these vehicles. On the other hand, total connectivity and access to online information (location of charging points, preferred routes, availability of parking spaces, carsharing, vehicle delivery and pick-up points, etc.), will likely undergo much development supported by companies in the telecommunications and information technology sectors.

In our country, the implementation of this new value chain poses significant challenges. One of the most important is the procurement of raw materials and their processing for the manufacturing of batteries, semiconductors, and microchips at reasonable costs, shortening supply chains and making them more resistant to external interference. In addition, reference must also be made to adaptation to the changing model of mobility in the productive fabric of the current automotive industry. All of this also has to happen in accordance with criteria of social and environmental sustainability.

At the present time, the Spanish automotive sector is organized mainly around the final stages of the automobile value chain, with most links of that chain, corresponding to the procurement and processing of raw materials, the manufacturing of electronic components and microchips and the production of batteries, not included in the structure for the time being.

The automotive industry in Spain occupies a prominent position in the national economy: its share in the GVA is 11.4%; it accounts for 10.95% of the turnover of all Spanish industry; it ranks third in R&D&I investment in the industrial sector, accounting for more than 10% of the country's total industry; and it has a high multiplier effect on economic activity, with an estimated €3.10 generated in the economy as a whole for every euro of demand for automotive products.

In 2022, Spanish car factories produced 2,219,436 vehicles, up 5.8% from the previous year. Most of them (787,197 or 80.5%) were passenger cars and SUVs. While the figures are significantly lower than those recorded in 2019 -before the pandemic, when 2,822,632 units were assembled-, the figures show signs of a recovery in the industry after the significant deceleration experienced by the automotive industry during COVID¹. These production volumes put Spain in ninth place among car manufacturers worldwide.

87% of the cars manufactured in Spain are for the foreign market -mostly passenger cars-, with Europe as the main buyer. In 2022, they accounted for 9% of exports with a positive balance of 16.457 billion euros. Only 13% of the vehicles that come out of Spanish factories are for domestic demand. The Spanish vehicle fleet is one of the oldest in the EU: it is made up of 30,243,485 vehicles, 25,344,776 of which are passenger cars; the fleet has an average age of 13.9 years, compared to the European average of 11.8 years.

In terms of employment, the automotive sector as a whole provides work for approximately two million people, around 300,000 of whom have direct jobs. In general, it is quality employment. According to figures released by the government, remuneration per employee stands at 11% above the average value in the industrial sector and productivities are 7% higher than the average². In recent years, the number of employees in the automotive industry has fluctuated, especially in the production segment, which has undergone a certain contraction. The factors behind this situation would be the reduction in manufacturing activity as a result of the pandemic and its effects, and the closing of the Nissan factory in Martorell (Barcelona), which led to the loss of approximately 2,500 jobs.

¹ The advance data for 2023 shows a manufacturing volume of 2,451,221 units in the past year, which consolidates the trend towards the recovery of production. (ANFAC; https://anfac.com/).

² PERTE for the development of the electric and connected vehicle. Executive Summary. Recovery, Transformation and Resilience Plan.

2. The manufacture of the electric car

The electric car has fewer parts than a conventional car running on an internal combustion engine. In general, it has simpler mechanics thanks to there being no need for a clutch, gearbox, injectors or heaters. The main differences between both types lie in the composition of the powertrain, which, in electric cars, is made up of the electric motor, the battery pack, and the power electronics block. Manufacturing electric vehicles in conventional factories means that these differentiating elements have to be incorporated into their assembly lines.

In 2022, after the closure of the Nissan plant in Barcelona, there were eight makes manufacturing vehicles in our country: Ford, Hispano Suiza, Iveco, Mercedes Benz, Renault, the Seat-Cupra-Audi consortium, Stellantis and Volkswagen. Iveco produces heavy vehicles; Hispano Suiza produces high-end electric cars; and the other makes produce cars and light vehicles. With the sole exception of Volkswagen, they all assemble one or more models of electric car. The German company does not manufacture any electric vehicle models in our country at the present time, although it is adapting its facilities in Landaben (Pamplona) to start production in 2025.

In 2022, 12% of all vehicles manufactured in Spain were electric. Of these 266,496 units, 52% were plug-in hybrid electric vehicles (PHEVs) and 48% were battery electric vehicles (BEVs). Most of the electric vehicles that came out of Spanish factories were passenger cars, with the figure reaching 228,979, nearly 86% of the total. By type of electric vehicle, PHEV passenger cars accounted for the majority, with 139,468 units (61%), while the number of BEVs assembled reached 89,511 units (39%). The remaining 14% of electric vehicles produced is divided among light commercial vehicles, industrial vehicles, and buses. 19 different models were manufactured, including 11 passenger car models and 8 models of commercial vehicle. 13 of them were BEVs and 6 were PHEVs.

As is the case with vehicle production in general, most electric cars are for export and only a modest proportion is for the domestic market, where the hegemony of the combustion engine remains firm. 9.6% of the 815,792 passenger cars registered in Spain in 2022 were electric cars, a far cry from the EU average of 21.6%. At the present time, only 0.9% of the approximately 25.6 million cars in the national vehicle fleet corresponds to electric vehicles, just over 226,000, a figure that has a long way to go if it is to reach the target set by the draft of the new PNIEC (National Integrated Energy and Climate Plan) of 5.45 million electric vehicles in all categories (cars, light commercial vehicles, industrial vehicles, buses, and motorcycles) by 2030.

The reasons for the low penetration of electric cars in Spain include their high price compared to conventional thermal cars, limited range, and an insufficient charging network. The extension, composition, distribution and maintenance of the charging infrastructure in our country is still insufficient to help boost the expansion of electric vehicles. In 2023 it was made up of 8,402 points and 24,020 connectors, a very small number if the target of 200,000 connectors in operation by 2030, set in the government's plans for the decarbonisation of mobility, is to be achieved.

Today, one of the main threats to the production of electric cars in Spain is the emergence of Asian competition in the European market. For example, cars manufactured in China benefit from control over the entire value chain, support from state subsidies, and less demanding labour and environmental requirements than those of the EU, all of which means they enter the market with more competitive prices than their European competitors.

3. Main plans for the development of the electric vehicle

For years, the public administration has been implementing measures to promote the electric vehicle both in industry and in the areas of supply, demand and infrastructure deployment. There are five milestones in the planning for the development and expansion of electric vehicles in Spain: (i) the Comprehensive Automotive Plan 2009; (ii) the Comprehensive Strategy for the Promotion of Electric Vehicles 2010-2014; (iii) the Strategy for the Promotion of Electric Vehicles 2014-2020; (iv) the National Integrated Energy and Climate Plan 2021-2030; and (v) the Strategic Project for the Recovery and Economic Transformation of the Electric and Connected Car 2021 (PERTE VEC). Together with these plans, various aid programmes have been set in motion for the acquisition of alternative vehicles to those with conventional thermal engines.

PERTE VEC is the most recent and comprehensive plan for the promotion of electric vehicles in our country. It seeks to establish an extensive, solid industrial fabric that will enable the development and manufacture of electric and connected vehicles and turn Spain into a benchmark in electromobility. It aims to act across the entire industrial value chain of the electric vehicle, so that the electric car and all its parts are designed, developed and manufactured in national territory. It has two different areas of action: transformative measures in the EV value chain; and the creation of measures that can contribute to creating a new form of mobility and to the development of electric vehicles. This last group of measures includes training and qualification plans for the sector, which have been allocated an investment of 21 million euros from the 4.295 billion euros in public investment earmarked for the PERTE VEC during the period 2021-2023.

The plans undertaken by the Administration are joined by the proposal presented to the Government in November 2022 by the car and component manufacturers' associations (ANFAC, SERNAUTO), together with the main trade unions (CCOO Industry and UGT Fica). The proposal puts forward a model of mobility centred on the individual, making it possible to achieve decarbonisation targets while maintaining the strategic position of the automotive industry. The initiative comprises seventeen actions, including the promotion of public measures aimed at maintaining employment, with specific plans to retrain and promote training in new technologies, digitalisation and the production of sustainable means of transport, as well as the priority implementation of plans for equality, youth employment, training and the promotion of vocations in Science, Technology, Engineering and Mathematics (STEM careers).

4. Professional profiles for sustainable mobility

The transition to electric mobility implies not only a change in propulsion technology, but also the appearance of new professional profiles and the need for specialised training to meet emerging sector demands.

The manufacture of the electric car includes traditional professions related to mechanics, combustion engines, bodywork and painting, which will be joined by new skills, talents and competences related to the battery engine, the hydrogen cell, synthetic fuels or e-fuels, re-charging points, the circular economy, gas, cybersecurity, connectivity and, undoubtedly, other elements and components yet to be developed.

The labour market linked to the sector is constantly evolving and increasingly diversified. Even so, it stands as one of the driving forces of our industry in this scenario of uncertainty. Manufacturers' strategies evolve with legislation and market demand, and have ambitious European support programmes. Production does not stop, it adapts, and the sector is already incorporating the profiles required for electrification, whether pure or hybrid.

This productive transformation process does not differ from the one that appears as a recurring feature of market economies; however, what is disruptive is the urgency of the change, brought about by the commitments to reduce greenhouse gases. The corresponding administrations are requiring a period of rapid change, involving the introduction of the electric vehicle or the integration of the relevant technological innovations for the change towards sustainable mobility. This changes the strategy for productive and economic development, placing the priority on investments that focus on these precise changes. As a result, both direct and indirect aid policies are focusing on this issue.

These changes have an impact on the labour market, as they may lead to changes in the amount of employment generated in the short or medium term, and also on the qualifications required of the labour force. They could also give rise to social conflict as, ultimately, they entail processes which, depending on the institutional framework in which they take place, may have an impact on the distribution of income.

To lessen this impact, or at least make it more equitable, the changes must be anticipated and appropriate qualification policies need to be drawn up, analysing the net impact on the overall level of employment both in the sector and in the activities that may arise from this change in the energy model or mobility systems.

The development of electric vehicles involves the collaboration of various fields to address electrical and mechanical matters, software and systems. Collaboration among experts from different disciplines is essential for the successful development of electric vehicles, as these projects require an integrated approach that includes mechanical and electrical aspects and software. Furthermore, they are necessary for the development of charging infrastructures and their subsequent maintenance.

Starting with the most specialised profiles, all the sources analysed and the interviews carried out refer to different engineering profiles with different degrees of specialisation: electrical, mechanical, chemical, battery, software and embedded systems, power electronics, electric propulsion systems, electric vehicles, renewable energy, automotive, industrial design and product development, aerospace, double degrees in engineering and business management, data science, etc.

Importance is also placed on profiles specialising in logistics and transport management, with the ability to achieve an optimal flow of information and materials along the entire supply chain; cybersecurity, which is particularly important in connected vehicles and in the autonomous vehicles that are being developed; data analysis for mobility, which makes it possible to obtain valuable information on traffic patterns, driving behaviour and route optimisation; specialisation in the maintenance and repair of electric vehicle systems; design of user experience (UX) for connected vehicles; specialisation in charging infrastructures for electric vehicles, including fast charging stations and home charging solutions; sustainable mobility consultancy to adopt electric and connected mobility solutions, taking into account economic, social and environmental aspects.

All these profiles are already in demand today and are expected to remain so in the future. They are linked not only to electric vehicles, but also to the industrial and technological services sectors in general.

However, it is not only university-educated professionals who are and will continue to be necessary. Heavy demand is also expected for technical profiles with Vocational Education and Training (VET) or equivalent, as they may be the best prepared to deal with the transformations currently affecting technical professions as a result of technological changes in work processes and the transition towards a sustainable economy.

It is important to bear in mind that when identifying professional profiles associated with electric vehicles, we refer not only to their manufacture, but also to their sale, rental, repair and maintenance, as well as the installation and maintenance of charging infrastructures. Therefore, we are talking about different business activities: vehicle manufacture; vehicle maintenance and repair; testing laboratories; manufacture and distribution of vehicle parts; manufacture, marketing and maintenance of equipment for vehicle testing and diagnosis, and spare parts; vehicle rental fleet operating companies; vehicle accessory installation companies; public service, passenger and goods transport companies; technical vehicle inspections; vehicle battery maintenance and recycling companies; product research and development; industrial production, industrial maintenance and services; electrical, electronic and optical equipment and material companies; electrical installation assembly and maintenance companies; companies involved in the generation, transport and distribution of electrical energy; companies involved in the installation of low-voltage electrical networks and automated systems; maintenance and repair of telecommunications equipment and systems; design, assembly and maintenance of industrial automation systems; assembly and maintenance of automated systems, low-voltage electrical installations and domotic systems; car sales and repair dealers.

The technical profiles related to all these companies are very diverse and fall into different professional families, mainly Electricity and Electronics, Installation and Maintenance, Vehicle Transport and Maintenance, and Mechanical Manufacturing, but also Sales and Marketing, IT and Communications, Energy and Water, Administration and Management, and Safety and Environment.

The technical profiles that appear as most relevant in our research are process technicians; CNC machining centre specialists; workshop managers; electromechanical/mechatronics specialists; mechanics specialists; electrical, electronic and electromechanical technicians and specialists; electrical technicians in charging infrastructure; electrotechnical installation technicians; industrial automation and robotics technicians; electromechanical technicians in automotive vehicles; maintenance and safety specialists in hybrid and electric vehicles and their systems; automotive technicians; specialists in additive manufacturing; cybersecurity specialists; data management specialists; energy efficiency and sustainability experts; electrical component recycling specialists; dealer sales managers; sales advisors; specialised workers, etc.

Some of the professional profiles we have identified are directly related to qualifications from the education system (from basic Vocational Education and Training to degrees, master's degrees and university specialisation courses) and/or from the National Directory of Professional Certificates. However, others are 'new profiles' that require furthering initial training qualifications with others that can be acquired through professional experience and/or on-the-job training. In any case, it is the companies themselves that have the obligation to re-qualify their workforces for the new requirements of the production system.

5. Training as a tool for a just transition in the automotive sector

The aim of Vocational Education and Training in Employment is to train workers for qualified performance of the various professions, enabling access to employment and encouraging active participation in social, cultural and economic life.

The Workers' Statute and the laws regulating the vocational education and training system provide people with the right to training throughout their working lives and to adapt to the real needs of the productive system.

The Workers' Statute clearly states that the responsibility for adapting the skills of workers to the requirements of production -of electric vehicles as far as this report is concerned- and of any change in production systems in any sector lies with the companies, which must provide their workers with the necessary training at their own expense and consider the time spent on the adaptation process as effective working time.

The new law on vocational education and training marks a significant change in the approach to education and training for the working world. Its main objective is to modernise and adapt vocational education and training to the changing demands of the labour market. Recognising the need for flexibility, for the constant updating of skills and for a direct link with the needs of industry, the law seeks to establish a framework that provides for a more flexible, results-oriented education.

One key aspect of this reform is the integration of partial accreditations of skills (micro-credentials) which, when added together, will lead to successive accreditations and higher level qualifications. A wide offer of accreditable, quality micro-training, structured through the Catalogue of Training Specialities, could be essential for on-the-job training, ensuring its quality and recognition by the labour market. In a dynamic and constantly evolving working world, they can be an essential tool for the development of specific skills and continuous adaptation.

The partial accreditation of skills validates the results of learning that is included at a higher level, making it possible to acquire skills and knowledge in specialised areas through flexible training itineraries. It can make it easier for people to adapt to the changing realities of the working world and it can be essential for recognising the value of on-the-job training; however, it is crucial to address potential challenges such as standardisation, quality of teaching and labour market acceptance if we are to obtain all the benefits it may, in theory, bring to our vocational education and training system.

People working in and around the automotive sector will be affected by the profound changeover from the combustion engine to the electric motor. During the transition, ensuring the re-skilling of workers in a changing and constantly evolving environment is essential. It will be necessary to adapt to the changes in order to reinforce certain training profiles, ensure employment for people already working in the sector and improve job opportunities for the unemployed. It will also be necessary to ensure the competitiveness of companies by protecting, advising and training workers, adapting their profiles to the needs of the sector and making sure they are not left out in these processes of change. In order to ensure employment in the sector, structured plans need to be put in place to develop new professional skills related to electric vehicles, taking advantage of the opportunities offered by the new law on vocational education and training. Plans that include the definition of new jobs, the analysis of the workforce's training needs, proposals for the relocation of workers and the corresponding investment as required. For these plans to take into account the needs of enterprises and their workers, they must be designed within the framework of collective bargaining and social dialogue.

Companies already producing electric vehicles and those that know they will soon be assigned an electric model are already training their workforces and readapting their factories. To do so, they can take advantage of the opportunities offered by Temporary Redundancy Programmes (ERTE), RED mechanisms³ and subsidised training, etc. to maintain jobs. Car manufacturers have a wealth of collective bargaining experience and have been able to overcome critical moments, so they are expected to adapt to the changes. The same is true for large parts-manufacturing companies.

The fundamental problem is how to apply these plans in smaller companies which are also linked to the automotive sector and which will be affected by the changes, but which have less capacity to put these plans in action and gain access to the mechanisms that could help them. In these companies, workers' representation is not so prominent (sometimes, it is non-existent) and therefore they also have less experience of collective bargaining. In these cases, the response should come through social dialogue and sectoral collective bargaining to provide them with innovation plans that include training in their business strategy, understood as an investment that must reach all workers. For the transition to electric vehicles to be just, leaving no one behind, good will is required in the implementation of public policies and, according to CC00 Industry, there are currently no specific plans for reskilling workers in general or in electrification in particular.

³ The RED Mechanism is a measure for employment flexibility and stabilisation, and is activated by the Council of Ministers for a given sector of the economy or for a given period of time. The measures a company may be authorised to take are temporary suspension of employment contracts, or reduction of the working day.

6. Conclusions and proposals

If there is one word that defines the future of the automotive sector in Spain, that word is uncertainty. It appears in the texts and has been mentioned in every interview we have conducted in reference to the decisions taken by the European Union on the end of combustion engines and the speed at which electric vehicles are to be integrated, the decisions taken by car manufacturers on the production of electric models at Spanish plants, competition from China and other countries outside the European Union, the development of battery plants, and the extension of charging infrastructures, which are essential if EV sales in the country are to increase.

There is agreement on the idea that the different types of electric car will coexist with the traditional internal combustion engine for some time before the former finally prevails, and that the speed at which it is integrated will depend largely on the decisions taken in the European Union. This shift towards electrification is taking place in an environment of ecological transition towards a low-carbon economy, where the process of change from fossil fuels to renewable energies also involves a technological and cultural change that affects not only car technology, but also the mobility models available and how people choose to use them on their journeys.

In the current context, with growing environmental awareness and the need to address climate change, clean forms of mobility have become crucial to reducing greenhouse gas emissions and improving air quality. However, new forms of sustainable mobility involve not only the replacement of combustion cars with electric cars, but also the coexistence of other emerging technologies and innovative practices, such as:

- The use of electric vehicles for commuting includes not only cars but also electric bicycles, scooters and skateboards, which offer a variety of options for different mobility needs.
- Electrified public transport, e.g. electric buses and trains, plays a crucial role in reducing emissions on a large scale. Cities are investing in the electrification of their public transport fleets, reducing dependence on fossil fuels and improving efficiency in terms of costs and emissions.
- Shared mobility services, such as carpooling, carsharing, bike-sharing, and scooter rental systems, etc. are gaining popularity, especially in urban areas. These services not only reduce traffic congestion, but also increase energy efficiency and reduce individual emissions through carpooling.
- The implementation of smart infrastructures contributes to optimising clean mobility. Traffic management systems, intelligent traffic lights and parking spaces with charging facilities for electric vehicles are examples of technologies that improve the efficiency and safety of sustainable transport.
- Autonomous vehicles are also being developed to improve mobility and reduce emissions. Route optimisation, efficient driving and reduced traffic congestion are some of the promises of this technology; however, large-scale implementation is still in progress.

Clean mobility has made significant progress in recent years, opening up new doors for a more sustainable future. The combination of electric vehicles, electrified public transport, shared mobility, smart infrastructure and autonomous vehicles creates a comprehensive ecosystem that can contribute significantly to reducing emissions and improving air quality in urban areas. However, continued efforts in investment, technological development, regulation and cultural change are needed if we are to overcome current challenges, maximise the positive impact of these solutions on urban and regional mobility and minimise the negative effects these changes may have on employment.

The transformation of the automotive sector towards new mobility-related activities has become a priority for companies, which plan to invest more in sustainability, with the consequent effect on a labour market in which jobs will decrease in number or even disappear while new occupations appear.

In order to face the challenges brought about by these changes, permanent, flowing dialogue is needed among the various administrations, the companies in the sector and their sectoral organisations, and the most representative trade unions to ensure that the actions to be implemented are planned with the needs of the industry, workers, users and society as a whole in mind.

The transition involves significant challenges, but also opportunities for sustainability and innovation. To ensure that employment is maintained during the transition, strategies need to be put in place to encourage adaptation and the development of skills, as well as the diversification of production. The following are proposals drawn up to address these challenges and foster a just transition to electric mobility.

1. Re-qualification and development of competences and skills:

Use of social dialogue, all the tools of the system and the possibilities given in the new law on vocational education and training to implement on-the-job training programmes for people working in or looking to join the automotive industry to equip them with the skills required to work in the manufacture and maintenance of electric cars and in all products and services associated with the new model of mobility. These programmes should include sectoral training schemes aimed particularly at small and medium-sized enterprises that lack the structure they need to implement their own company training plans and plans aimed at unemployed people who want to find work in the sector.

As required by the Workers' Statute, companies should make the necessary investments to conduct their own training plans, which should be negotiated with workers' representatives. They should also be able to count on aid from the Administration to ensure that all their workers can upskill and reskill, and that no one is left behind.

Use of micro-training as a fundamental tool for on-the-job training to enable the partial accreditation of skills which, when added together, can lead to successive accreditations and higher-level qualifications. This will ensure that the effort and investment made by companies and workers in training is officially recognised and validated in the labour market.

Creation of partnerships with educational institutions and research centres to develop sector-specific qualification programmes.

2. Diversification of production:

Dual production: promote dual production, where assembly lines are used to manufacture both internal combustion vehicles and electric vehicles. This would allow for a transition that is gradual, and would minimise the impact on employment.

Components and batteries: promote the local production of components and batteries for electric vehicles, generating new employment opportunities in related sectors.

3. Incentives and financial support:

Research and development incentives: provide fiscal and financial incentives for companies investing in the research and development of technologies related to electric vehicles and charging systems.

Support for small and medium-sized enterprises (SMEs): put in place financial and technical support programmes for SMEs in the automotive supply chain, helping them adapt to the production of electric vehicles.

4. Just transition and labour agreements:

Social dialogue: promote continuous social dialogue between the administration and social stakeholders to agree on measures to support the sector in different areas, measures which simultaneously benefit all citizens by contributing to decarbonisation and safe mobility.

Collective bargaining among companies, workers and trade unions to ensure that the measures taken by the company during the transition are fair and equitable.

Flexible labour agreements: negotiate flexible labour agreements that enable gradual adjustments in production and workforce without significant negative impacts.

5. Promotion of the circular economy:

Recycling and reuse: boost the circular economy by promoting the recycling and reuse of vehicle parts, generating employment in sustainable materials management.

In conclusion, it is important to bear in mind that the transition to electric mobility in the automotive industry involves not only challenges, but also opportunities for innovation and sustainability. Implementing strategies that address labour concerns and promote adaptation and the development of skills will ensure a more sustainable and equitable future for the automotive industry and its workers. Collaboration among governments, companies and workers will be key to achieving a successful transition and to maintaining quality jobs in the sector.



