



Hybrid cars move using the combination of two or more engines using different energies: an **internal combustion engine**, either gasoline or diesel (the engine usually found in cars), and an **electric motor**. These two engines are the most common, but there could be other combinations, such as hydraulic-pneumatic. The main advantage provided by this type of vehicle is the reduction of fuel consumption.

Electric cars, meanwhile work with **one or more electric motors** and are recharged by plugging into the mains. This type of engine reduces greenhouse gas emissions and allows for less driving with less noise by reducing vibrations.

ORIGIN OF THE INVESTMENT OPPORTUNITY



The **introduction** of electricity as a means of propulsion for vehicles is one of the most viable alternatives for **sustainable mobility** to **diversify energy sources** used for transport and mobility of people.

Both electric and hybrid vehicles, significantly reduce fuel consumption and CO₂ emissions, due to the **partial use** of fossil fuels and energy recovery that hybridisation allows. Another advantage is the reduction of vibration and noise while driving.

The environmental benefits provided by these propulsion mechanisms contribute to compliance with **European guidelines regarding noise level** of motor vehicles contained in Regulation (EU) No. 540/2014, and the emission of polluting gases Regulation (EU) No. 253/2014. Along the same lines, in Spain there are **incentives and subsidies** from the government to facilitate their entry into the market.

LOCATION OF THE INVESTMENT OPPORTUNITY IN THE SECTOR VALUE CHAIN



The development of new propulsion mechanisms creates great challenges at the same time as opportunities in the **automotive component industry**. These manufacturers must provide **electric propulsion systems**, which include: the electric motor and power electronics, along with the battery and the brakes' energy recovery device.

DIFFERENTIATING FACTORS OF THE INVESTMENT OPPORTUNITY

CONSUMER/USER	COMPANY/INNOVATION	SOCIETY
<ul style="list-style-type: none"> Innovation (3 red circles) Price (3 red circles) Quality (3 red circles) 	<ul style="list-style-type: none"> Operations (3 red circles) Supplies (3 red circles) New business lines (3 red circles) 	<ul style="list-style-type: none"> Environment (3 red circles) Well-being (3 red circles) Safety (3 red circles)
<ul style="list-style-type: none"> Reduced maintenance costs because the checks are cheaper and some of the costs of conventional car (replacement of oils, liquids, etc.), costs of fuel and parking costs are not incurred. Improved ride and driving quality due to the absence of vibration and quiet ride that these vehicles' drive mechanisms allow. 	<ul style="list-style-type: none"> Harnessing the progress of mechanics to enhance their adaptation to the environment. Compliance with regulations regarding the reduction of CO₂ emissions by 2020 (95g/km for family cars and 147g/km for light commercial). Adaptation to new regulations aimed at reducing noise emissions from motor vehicles by 25%. 	<ul style="list-style-type: none"> Electric propulsion mechanisms significantly reduce CO₂ emissions and that of other polluting particles. The quiet ride that the electric motor gives, avoids noise pollution while boosting the use of renewable energies and helps to optimise the national power grid.

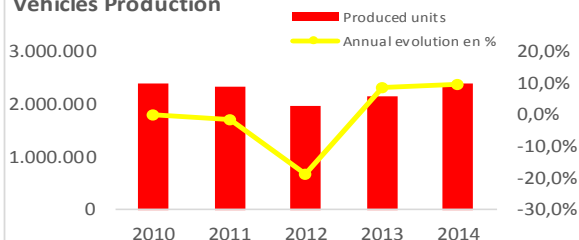
INVESTMENT OPPORTUNITY LIFE CYCLE



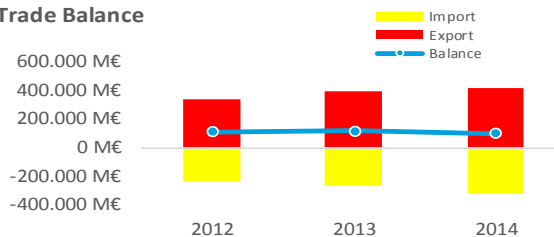
Hybrid cars have been on the market for a decade, however this type of engine did not get much of a welcome, relying mainly on the fleet of taxis. As a result of the 2007-2010 global crisis, the sector's sales fell significantly and escalating oil prices began to be unsustainable, marking a **shift in customer preferences** to prioritising fuel consumption, vehicle price and reducing emissions. This context has favoured the entry into the market of electric vehicles, with cheaper, efficient and sustainable engines. Currently, this market is in a **growth phase** and it is expected that by 2020 electric mobility will be widely disseminated.

CHARACTERISTICS OF THE AUTOMOTIVE SECTOR ⁽¹⁾

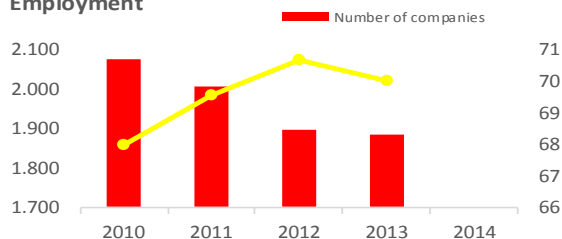
Vehicles Production



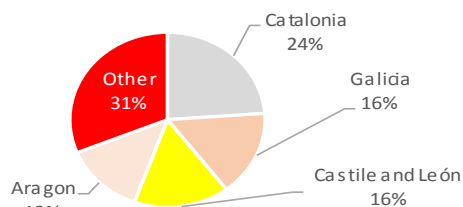
Trade Balance



Employment



Territorial distribution of turnover (2014)



SUPPLY

TOP 5 COMPETITORS IN SPAIN

#	Company	Net sales	Last available data
1	Johnson Controls	€1,877 M	2013
2	Samsung	€9,463 M	2013
3	Panasonic	€211.6 M	2013
4	Bosch*	N. avai.	-
5			

* Data not available in the queried database. SABI.

DEMAND

GROWTH

- Electric cars are **being introduced into the Spanish market**, mainly through the promotion and incentives from the Spanish government through the **Movele Plan**. Proof of this are the sales figures for the electric vehicles market in 2014: **1,076 units**. The Ministry of Industry predicts the use of **500,000 electric cars in Spain in 2020**. ⁽¹⁾
- The hybrid market shows a slight but steady growth compared to previous years. **In 2014 sales figures for cars with conventional hybrid engines exceed 12,300 units**. ⁽¹⁾

SUCCESS STORIES



A consortium of 6 companies; Ingeteam, EDS, Iberdrola Customers, IBIL, ZIV and the Basque Energy Cluster have launched the **AZKARGA project**, supported by the Basque Government through the Etorga program. It will be completed by the end of 2016 and has a budget of 4 million euros.

Its main objective is to develop an original solution for **fast, smart, flexible and manageable recharging** that would encourage widespread deployment of electric vehicles. It focuses on research and development of the most advanced charging technologies, communications (EV-charger and charger-management), energy management and associated charges, obtaining an advanced final product for the fast charging of electric vehicles.



Batteries today have a power density of about 115 Wh/kg, but have a potential of up to 280 Wh/kg. It is estimated that in the next five years there will be a new generation of batteries for hybrid and electric motors, twice as powerful, with half the weight and cheaper.

Currently, **Bosch, GS Yuasa and Mitsubishi Corporation** are working in a joint venture called Lithium Energy and Power, designing **lithium ion batteries** that have a range of at least 150,000 km, and up to 15 years of life. Even after spending all that time in the car, the battery will retain 80 percent of its original storage capacity and performance.



Graphenano, a Spanish company producing graphene on an industrial scale, has joined the University of Cordoba to make the first **graphene polymer batteries**. These batteries are recharged in eight minutes and offer a range of 1,000 kilometres. They will also be **compatible** with existing devices or vehicles, avoiding the need to adapt infrastructure for their use and encouraging its rapid implementation. Grabat Energy Company will be responsible for manufacturing the battery cells in 2015. It is estimated to be 77% cheaper than lithium batteries.

Large firms such as **Mercedes and the Volkswagen group**, are starting to incorporate them into their electric cars.



POSITIVE FACTORS FOR INVESTING IN SPAIN

Favourable factors in Spain for the development of the opportunity

Grants and incentives from the government

Recently, the government has approved the **strategy to promote alternative energy vehicles (VEA)** for 2014-2020, which aims to increase the presence of these vehicles in the Spanish fleet, through 30 measures covering 3 core action areas: Industrialisation, market and infrastructure. Thus, it is intended to facilitate and encourage the development of electric mobility, which is beneficial in its contribution to improving the industry, and energy and environmental efficiency, as well as reducing energy dependence on oil.

Invigoration of demand and tax deductions

Recently, the government announced a tax cut of up to 30% for company cars and a renewal of the **PIMA AIRE Plan**, a programme of incentives for the purchase of commercial vehicles. Thus, the boost to the automotive industry is embodied in two ways: on the one hand, demand is stimulated by increasing the disposable income of citizens and, on the other hand, the financial costs to the companies are **reduced via tax breaks**.

Battery recharging infrastructure

In order to facilitate the entry of electric vehicles into the Spanish market, Endesa has expanded the **conventional recharging points for electric cars** throughout the Spain in the last four years, tripling their number compared to 2011. In addition, the new edition of Movele Plan states that a charging point must be installed for every vehicle sold.

Social factors and habits

Spain is progressively incorporating the use of **alternative energies** into the transport sector. Proof of this is the decrease of 23% of the national energy intensity indicator in the last 10 years, dated 2013. With respect to the European average, the energy intensity of the economy in Spain is 10% lower, this is proof of the **efficiency** of new power generation technologies in Spain. ⁽²⁾

Favourable factors for the sector in Spain

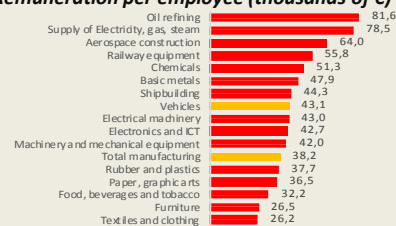
Macroeconomic situation

The **Added Value of automotive sector** in 2013 was 8.382 billion euros, representing 6.73% of the manufacturing sector. Sector **exports** totalled **39.0495 billion euros**, representing **18.5%** of the exports of the industrial sector. ⁽³⁾

Labour market

The **average productivity per employee** in the automotive sector is **63,600 euros** per year. Their **average individual remuneration** is **43,100 euros** per year. The **Unit Labour Cost** accounts for **67.8%** of the ratio between the remuneration per employee and the individual productivity (productivity defined as value added per employee). ⁽³⁾

Remuneration per employee (thousands of €)



Graph created using data from the Sectoral Presentation: automotive sector. April 2015. Ministry of Industry, Energy and Tourism

Incentives

In order to stimulate market demand for electric vehicles versus conventional technology vehicles, in 2010 the government approved a programme of economic incentives for their acquisition, known as the Movele Plans. The aid for 2015 will go towards direct purchases or through financing transactions for leasing of **new electric vehicles**, newly registered in Spain that have been acquired and wholly paid for at the point of sale. This new edition requires dealers to install a **charging point** with a value of up to a thousand euros for every vehicle sold. ⁽⁴⁾

R+D+i

There are 390 **innovative companies** in the automotive and aerospace sector and the **percentage** of innovative companies is 39.3%, **spending** a total of 2.610475 billion euros on innovation. ⁽⁵⁾

Suppliers, Supplies, Raw materials

An sector with a great tradition in Spain and directly linked to the car industry is that of the **machine tool**, which stands out as one of the most advanced in Europe. It is important to highlight the industries producing materials such as **plastic and steel** that are the raw materials for the construction of vehicles and their components. **Spain is a leading producer and exporter** of these materials. ⁽⁶⁾

Geographic location

Spain is **within reach of three main regions**: the **European** region, the **Mediterranean** region and the **Atlantic** region. Spain is considered to be the gateway between North Africa and Europe, and a key link to Latin America, not only because of its geographical location but also because of its strong historical and cultural ties with the region. In Spain the **Canary Islands** play a key role with regards to **maritime traffic with West Africa**.

Technological and research infrastructure

Spain has **17 manufacturing centres** distributed throughout Spain and belonging to **10 different vehicle manufacturers**. Most of the **production of family vehicles** has been specialised in mid-range and small vehicles, with Spain being one of the European leaders in this competitive segment. These centres have a high level of **automation and robotics**, with 89 robots per 10,000 workers, positioning the country 5th in Europe. In addition, there are 9 parks and **34 technology centres** with projects related to vehicle manufacturing in Spain. ⁽⁶⁾

Manufacturing Centres Locations



Graph created using data from the Spanish Automotive Equipment and Components Manufacturers Association (2015).

Transport infrastructure and logistics networks

Spain has the **best high-speed rail network** in Europe and has excellent sea connections to its **46 ports** distributed along the Atlantic and Mediterranean coasts. The agreement signed in 2013 between the Ministry of Public Works and Transport and the Manufacturers Association ANFAC will bring the rail networks together with the automobile manufacturing plants to connect them to the ports with greater importance in the sector and the Spanish border.