



## Automotive

## Electric propulsion mechanisms



**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



#### ECONOMIC/BUSINESS



#### DEMAND



#### REGULATIONS



#### TECHNOLOGY

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 CO<sub>2</sub> 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

#### Components industry

#### Assembly industry

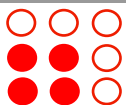
#### Commercialisation and sales

#### After-sales service and maintenance

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

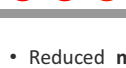
#### CONSUMER/USER



Innovation



Price

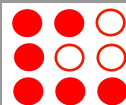


Quality

- 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.

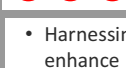
#### COMPANY/INNOVATION



Operations



Supplies



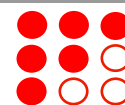
New business lines

- Harnessing the progress of mechanics to enhance their **adaptation** to the environment.

- Compliance with regulations regarding the reduction of CO<sub>2</sub> 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%.

#### SOCIETY



Environment



Well-being



Safety

- Electric propulsion mechanisms significantly reduce **CO<sub>2</sub> 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

#### DEVELOPMENT

#### INTRODUCTION

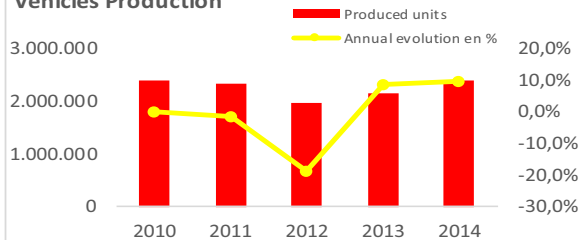
#### GROWTH

#### MATURITY

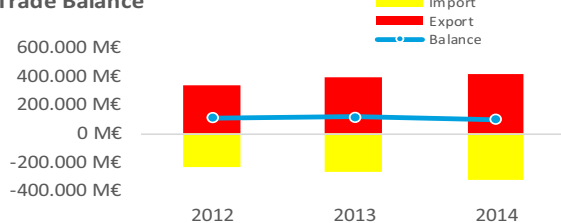
**Hybrid cars** have been on the market for a decade, however this type of engine did not get much of a welcome, relying mainly on the fleet of taxis. As a result of the 2007-2010 global crisis, the sector's sales fell significantly and escalating oil prices began to be unsustainable, marking a **shift 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 <sup>(1)</sup>

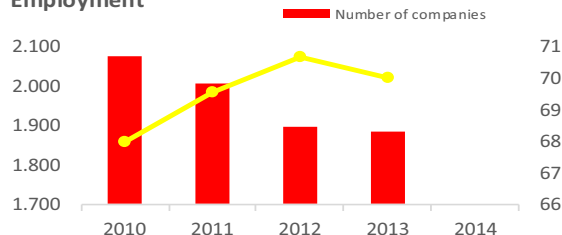
Vehicles Production



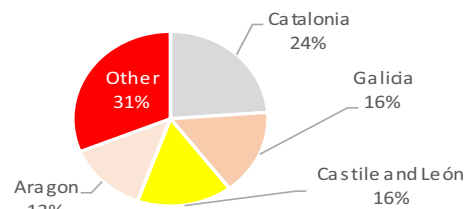
Trade Balance



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**. <sup>(1)</sup>
- 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**. <sup>(1)</sup>

## 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.