



Factsheet

Vigo – Impacts, barriers and potentials of the use of EVs in companies

How can companies benefit from the advantages of electric mobility? Can electric vehicles fulfil their mobility requirements? The eBRIDGE Vigo pilot has some answers to that.



eBRIDGE: Empowering e-fleets for business and private purposes in cities

Programme	STEER
Project number	IEE/12/713/SI2.644746
Authors	Carla Piñero – INOVA, Borja Dapena – CEAGA Vigo, July 2014
Project coordinator	Aida Abdulah – choice GmbH e-mail: abdulah@choice.de



At a glance

The electric vehicle is an excellent opportunity to reduce oil dependence in the transport sector and improve the quality of air in Spanish cities.

According to estimations from the Institute for Energy Diversification and Saving (IDAE), the introduction of 1,000 electric vehicles in a city would avoid the emission of more than 30,000 kg per year of pollutants (including CO, NOx, HC) and more than 2 tones of CO₂.¹

In addition, the introduction of electric vehicles also provides an opportunity for the growth of the national automotive industry and the increase of the implantation of the charging infrastructure, being Spain the 3rd largest European manufacturer of cars (10.54% of the cars produced in Europe) and the largest European manufacturer of light commercial vehicles (27.34% of European production).

There is a commitment among the government, companies and other entities involved, for promoting and supporting the introduction of electric vehicles on Spanish roads.

In this framework, corporate fleets at government and private companies are called upon to play a key role in the consolidation of electric vehicles. From the point of view of the companies, the implementation of the electric vehicle is of great interest, due to benefits related to the improvement of their energy efficiency, the reduction of the emissions from transport, the economic savings and the enhancement of their corporate image.

However, despite the policies and incentives introduced to promote electric vehicles, the market is developing slowly and the current economic crisis has significantly reduced the overall sales of vehicles which also apply to electric vehicles.

Nevertheless, the automotive industry and the Spanish government are strongly committed to sustainable mobility and energy efficiency and are taking actions to promote the implementation of the electric vehicles. In the Seventh Edition of the Corporate Vehicle Observatory (CVO June 2014), the results of the study about current and future trends of the company car were presented. This study was carried among more than 4,500 fleet managers of SMEs and large companies from sixteen countries, and shows that after a long period of budget restraint, the companies plan to restart their investments. Specifically, it is expected that the Spanish companies will increase their fleets by 37% in the next three years, being Spain ahead of the expected growth.

The eBRIDGE Vigo pilot is analysing the potential of electric vehicles for business mobility, bringing electric mobility closer to the companies belonging to CEAGA (the Galician Automotive Cluster) and their employees.

From June 3rd 2013 to September 4th 2014, 372 people from 20 companies have used an electric car for their business trips. This factsheet shows the results of this test, from the company and employee point of view.

¹ A good part of the environmental impact is determined by the primary energy source used to generate the energy. In Spain, 277 grams of CO₂ are emitted to produce 1 kWh of electricity (average of energy mix in 2011), to transport and to distribute it to the point of consumption.



Vigo, the Transport Hub of Galicia

Vigo is located in the province of Pontevedra, in the north-west coast of Spain. As a harbour city, Vigo plays a strategic role for the regional tourism and its solid transport infrastructure makes it a transport hub for the Galician region and the north of its neighbouring country Portugal.

With a population of more than 450,000 inhabitants, Vigo is the largest metropolitan area of Galicia and the 14th biggest city of Spain.

Vigo is one of the leading industrial areas in Galicia, with a long tradition in the sectors of vehicle manufacturing, shipyards, and auxiliary industry. Galicia's leading employer, PSA Peugeot Citroën, and many of its providers, as well as the Galician Automotive Cluster (CEAGA) and the Galician Automotive Technology Centre (CTAG) are located in Vigo.

Spain Square, Vigo



Photo: Turismo de Vigo

The modal share shows that daily trips in Vigo are mainly done using own vehicle (car/motorbike) (47.61%), followed by walking and/or cycling (29.91%) and public transport (20.43%). (PDMAG 2006, Galician Government.)

But there is a downward trend on the Vigo's vehicle registrations, due to the prolongation of the vehicles' life, being the average age of passenger cars closer to 11 in 2012. From 2008 to 2012, there was a fall of 40% in new passenger vehicle registrations. The fall in light commercial vehicles was 70%. (IDEAUTO, ANFAC, 2012).

In Spain, although electric vehicle (EV) registrations are still low in comparison with the overall market, it should be noted that the recent years have meant the true start of the electric vehicle, due to the entry into force of the Comprehensive Strategy to Promote the Electric Vehicle 2010-2014. As a result, the first electric vehicles have appeared in the market and the streets.

The case of hybrid electric vehicles (HEV) should be highlighted. Hybrid passenger cars have progressively increased their penetration in the market in recent years, representing 1.4% of the registrations in 2012. This means that hybrid vehicles are an accepted option among Spanish consumers. The implementation of these vehicles in the taxi sector has been so important in recent years that they currently represent more than the 30% of taxi registrations. This significant representation of hybrid cars in the taxi market is due to the fact that these vehicles provide significant savings in fuel consumption in normal driving conditions in cities (low speeds and frequent stops), situations in which the hybrid operates in electric mode.

In 2011, the study "Implementation of electric vehicles in Spain, fact or fiction?" conducted by Deloitte Touche Tohmatsu Limited in six European countries (Belgium, France, Italy, UK, Turkey and Spain), revealed that 82% of Spanish users would be willing to buy a full electric



vehicle (European average 69%). Price and range (battery autonomy) are the two main barriers to overcome for the effective implementation of EVs. Both in Spain and Europe most of respondents (60% and 57% respectively) would not pay more for an electric vehicle than for a conventional one. Regarding battery autonomy, respondents claim the maximum (in Spain 82% of respondents expect an electric vehicle to provide them an average range of at least 320 km) although their trips are usually shorter (most of respondents recognized an average daily distance driven with their own car up to 80 km).

In Galicia, the regional government and the Galician Automotive Cluster (CEAGA) developed the MOBEGA PLAN - Pilot Plan for Electric Mobility, supported with regional funds. Led and coordinated by CEAGA, the project provided 28 EVs and 7 multifunctional electric mobility charging stations aimed to promote the use of EVs exclusively for private use among citizens.

Thanks to MOBEGA, 315 tons of CO₂ were avoided in the period 2011-2012. The 28 EVs travelled a total distance of 175,000 km.

Regarding the users, a 74% of them rated the test experience of the MOBEGA PLAN between 7 and 10 (being 1 very negative and 10 very positive). The EVs were mainly used in urban areas (46%) and charged by slow charging. Users highlighted positive aspects of EVs such as the possibility of charging at home (21%) and its environmental performance (19%).

Within eBRIDGE project, CEAGA introduces the MOBEGA e-fleet to the business sector to explore the potential of EVs for corporate use among the companies of the CEAGA Cluster.

Electric Vehicle



Photo: CEAGA



The Vigo Pilot, Driver of Change

The Galician Automotive Cluster (CEAGA) gathers 105 entities, 41 big companies and 64 SMEs which are mainly settled in five locations: Balaidos (Vigo) where the PSA Peugeot-Citroën Centre of Vigo and entities like GKN and CEAGA are located, the Vigo's Technological and Logistics Park, As Gándaras (Porriño), Redondela and Ourense.

The Cluster companies had a turnover of 7,800 million EUR (December 2013), which is equivalent to 14% of Galician GDP, and gave employment to 19,000 people in the automotive industry. That gives a quick overview of the magnitude of the Galician automotive sector.

The companies involved in this pilot present different characteristics, from national SMEs to international big companies, so the outcome of this action will provide data from heterogeneous users from a wide range of companies.

During eBRIDGE, a group of selected companies belonging to the Cluster will be provided with four full electric cars: 3 Citroën C-Zero and 1 Peugeot iOn, equipped with a monitoring system.

Each electric vehicle is being assigned to a company for corporate use for a limited period. This will allow establishing similarities among companies that, although operating in the same sector, present different features and mobility requirements: small, medium and large companies, some of them related to manufacturing, logistics, engineering services, etc.

The local partners CEAGA and INOVA will analyse the degree of success of the implementation of electric vehicles for corporate use in a significant number of heterogeneous companies.

The use of the electric vehicles is monitored monthly and the employee surveys help to assess the user acceptance and the main barriers to vehicle use. Measures and incentives to increase vehicle usage rates are developed together with the participating companies.

Finally, the impacts of the use of shared electric vehicles within the company fleets are being assessed.

Cession to Carlos Casal (Benteler Automotive) by Borja Dapena (CEAGA)



Photo: CEAGA

The results are expected to optimize operational fleet performance and raise awareness about electric vehicles among the CEAGA employees and stakeholders, increasing the number of companies and users/employees familiarized with electric vehicles for business trips, reducing the private car mileage of business travel in participating companies and increasing the number of companies using electric vehicles.



Corporate Fleets and Electric Vehicles

The following main benefits of using EVs instead of conventionally fuelled vehicles have been pointed out by the Spanish government:

Area	Benefit
Energy	The electric motor is more energy efficient than the internal combustion engine.
Environment	The EV generates no emissions during operation in electric mode, avoiding therefore the emission of gaseous pollutants in the urban environment, improving air quality in cities. Furthermore, the silent operation of electric motors reduces the noise level in cities.
Industry and Innovation	The EV offers new possibilities and opportunities for the industrial sector, especially in the automotive sector but also those related to energy, ICT and electrical equipment, increasing the added value of products developed and manufactured in Spain, so improving the country's competitiveness.
Citizens requirements	EV meets the mobility needs of citizens, being suitable for urban and suburban area, which represents 50% of the mobility needs of people and goods.

Since 2003, policies to promote electric vehicles have been developed. The Spanish Strategy for Energy Savings and Efficiency 2004-2012 includes the promotion of alternative fuels and vehicle technologies (liquefied petroleum gas – LPG, natural gas, hybrid electric vehicles – HEV, plug-in hybrid electric vehicles – PHEV, battery electric vehicles – BEV, hydrogen and fuel cells) as a key action line.

In 2010, the Spanish government presented the “Action Plan for the Electric Vehicle” (Plan MOVELE), part of the “Comprehensive Strategy to Promote the Electric Vehicle 2010-2014”, which established a target of 250,000 electric vehicles (BEVs and PHEVs) on the Spanish roads by the end of 2014.

The objectives for the introduction of electric vehicles were defined according to the Directive 2009/28/CE of the European Union on the promotion of the use of energy from renewable sources, which establishes for Spain that in 2020 the renewable energies should constitute 10% of all the energy consumed by the transportation sector.

In order to achieve this, the National Plan for Renewable Energies 2011–2020 sets targets for the introduction of renewable energies of 8% biofuels and 2% of electricity of the total final energy consumption in transport. Of this 2%, the 0.5% is assigned to railways and the other 1.5% is assigned to PHEVs and BEVs in road transport according to the following proportions by 2020: 80% for PHEVs (2,000,000 vehicles) and 20% for BEVs (500,000 vehicles).



In addition, Spain is the 3rd largest European car manufacturer (10.54% of the cars produced in Europe) and the largest European light commercial vehicles manufacturer (27.34% of European production).



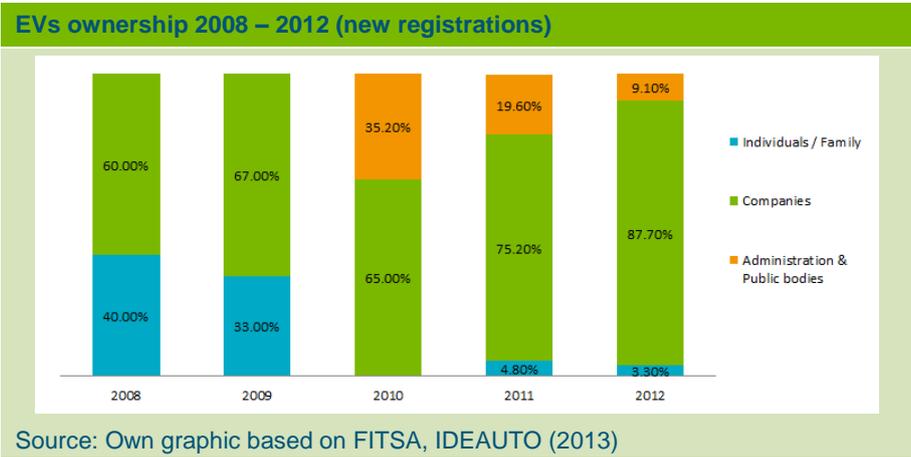
This fact, together with the firm commitment of the Spanish industry to R&D on electric vehicles, puts the country in a very advantageous position.

With the aim of supporting R&D on electric vehicles, in 2009, the Ministry of Industry Trade and Tourism granted 88 million EUR to the Spanish electric vehicle industry. Currently, four models of electric vehicle are manufactured (mass production) in Spain: Citroën Berlingo (PSA Vigo), Peugeot Partner (PSA Vigo), Renault Twizy (Valladolid) and Mercedes Vito E-Cell (Victoria). Moreover, the Administration of the City of Vigo contributed additional 10 million EUR to PSA Peugeot Citroën Center of Vigo for manufacturing the Citroën Berlingo and the Peugeot Partner electric versions. In 2014, the PSA Peugeot Citroën Center of Vigo is leading the production of electric vehicles in Spain with 1,345 units (from January to August). It is followed by the Mercedes factory in Vitoria, with 100 units and the Nissan plant in Barcelona, with 22 units.

However, despite the policies and incentives introduced to promote electric vehicles, the drastic decrease in the overall car market caused by the economic crisis has played against the development of the electric vehicle market in Spain, together with a lack of supply of electric vehicles and the slow evolution of other factors that favour the demand for electric vehicles, such as the investment in public charging infrastructure.

Nevertheless, the strong commitment of the automotive industry for sustainable mobility and energy efficiency, together with the actions of the Spanish government is making substantial progress towards the implementation of the electric motor. The first success has already become notorious: in the last three years a significant number of plug-in models have been introduced in the market and, most importantly, the electric vehicle has proved to be a viable mobility alternative.

A remarkable fact is that in 2012, the EV sales are almost exclusively concentrated in fleets of enterprises and administrative bodies, which backs up the suitability of targeting these groups to improve the market conditions of electric mobility. In 2012, company ownership represented a high percentage (87.70%) of new registrations, followed by administration and public bodies (9.10%). The remaining 3.30% corresponds to individuals/families. In 2008-2009 only individuals/families and companies registered EV. In 2010, administration and public bodies registered 35.20%, due to the launch of the Action Plan 2010-2012 for the Electric Vehicle (MOVELE Plan).





The main corporate e- fleets in Spain are the followings:

Fleets	Type	Number of EVs	Location
Urbaser S.A.	Private company (waste management)	320	Barcelona
Fomento de Construcciones y Contratas, S.A. (FCC)	Private company (construction)	300	Several points
Remica S.A.	Private company (energy utility)	50	Madrid
Galician Automotive Cluster (CEAGA)	Private foundation	25	Galicia
Aena Aeropuertos, S.A.	Private-public company (airport operator)	33	Madrid, Barcelona, Palma de Mallorca, Lanzarote
Coren Group	Private company (food)	25	Galicia
Municipal Company Water of Malaga (EMASA)	Public company	21	Malaga
Sociedad Estatal Correos Y Telégrafos, S.A.	Public company (postal service)	20 (4 wheels)	80 localities

According to the results of a study presented in the Seventh Edition of the Corporate Vehicle Observatory (CVO June 2014), which was carried out among more than 4,500 fleet managers of SMEs and large companies from sixteen countries to identify current and future trends of the company car, after a long period of budget restraint, the companies plan to restart their investments, so companies are expected to increase their fleet by 10% in the next three years. Interestingly, Spain is ahead of the expected growth in Europe with an expected increase of 37%, although only 12% of the large companies recognize having plans to increase their fleet in the next three years.

However, the climate of cautious optimism of large corporations has not yet reached the Spanish SMEs, which continue to be extremely careful in their investments until the improvement of macro indicators becomes evident. Thus, 2% think that their fleet will be reduced in the next three years, in contrast to the perception in Europe that bet on a 6% growth in its corporate carpool until 2017. This trend shows a clear lack of interest of SMEs in business cars; in fact, more than a third of them (38%) believe that this is a non-very strategic factor for their activity.

CVO revealed that greater public support to more efficient vehicles (as electric vehicles) would also be effective to encourage investment in fleets. Specifically, 32% of the surveyed companies agree on giving priority to incentivise those companies that opt for a minimum amount of energy-efficient models in their fleet. This way, it would help to reduce fuel consumption, recognized by 55% as one of the main obstacles to the growth of the corporate carpool. Currently, fuel costs represent the 28% of the total cost of running the corporate vehicle.

Moreover, improving the use of company cars has become a priority. For this reason, 85% of Spanish companies, well above the European average (61%), have centralized the administrative procedures of their employees' mobility, based on a growing interest in ad hoc technological solutions which make operations more efficient and effective.



Impacts, Barriers and Potentials for the Use of EVs in Companies

As commented in previous sections, the market barriers related with the fear of final users concerns the battery life, an insufficient charging infrastructure network and the reduced amount of electric vehicle models in the market.

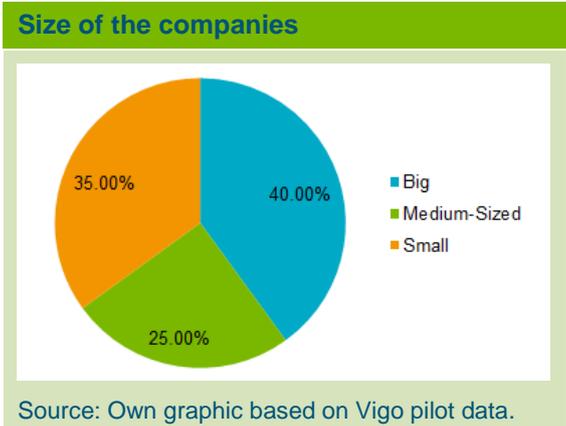
The surveys conducted in the framework of the Vigo pilot confirm these barriers, appearing as main reasons for not considering the purchase of an electric vehicle: battery autonomy, lack of charging points and high price of the models available.

Next we present the main results (from the company and employees point of view) of the Vigo pilot, carried out from June 3rd 2013 to September 4th 2014 with the participation of 372 people from 20 companies, which used EV on business trips.



Company: impacts, barriers and potentials

During the first 15 months, 20 companies belonging to CEAGA have completed their period of cession of an electric vehicle; 8 of them were large companies and the remaining 12 SMEs.



The 4 EVs have travelled a total distance of 44,804 km in 5,062 business trips, and the emission of 5.15 tons of CO₂ has been avoided.

FleetData Market Research indicates that the use of a combustion car in Spain represents a running cost of 23.70 EUR per 100 km travelled (0.23 EUR/km). Taking into account that the average cost per km of the electric vehicles tested is 0.038 EUR/km, during these 15 months, a total amount of 8,600 EUR have been saved in terms of energy consumption (83.48%) due to the use of an electric vehicle instead of a combustion one.



Taking one company as an example, Carlos Casal, Human Resources Manager of Benteler, comments that *“In the eBRIDGE Project, Benteler have used the Citroën C-Zero during 3 months. We drove about 2,521 km and spent approximately 49 Euros for electricity (recharge), meant a cost of 0.02 EUR/km. This is a very low price compared to that of fuel vehicles”*.

Regarding mobility patterns, the average business trip is short:

Business average trip	
Length	8.85 km
Duration	15 minutes
Speed	30.4 km/h
Battery consumed	10.9%
Energy cost per trip	0.13 euros

Regarding maximums by trip:

Business maximums by trip	
Length	38.65 km
Duration	47.33 minutes
Average Speed	68.70 km/h

In the interviews with the companies, the Human Resources managers have identified the following main advantages and disadvantages:

Advantages	Disadvantages
<ul style="list-style-type: none"> ✓ Cheap maintenance ✓ Low cost per km ✓ Comfortable cars ✓ The employees like these vehicles ✓ Emphasis on environmental aspects ✓ Charge the battery in house 	<ul style="list-style-type: none"> × High price × Low autonomy × Charging time × More expensive insurance × Few charging points (infrastructure)

Regarding the insurance, in Spain the price of a comprehensive insurance for an electric vehicle is between 12.4% and 18% higher than for a hybrid and between 13.1% and 29.9% higher than for a conventional vehicle. However, the price of a third-party insurance is the same for the three models.

These are the conclusions of a study carried out in May 2014 by the Internet insurance comparator Rastreator.com in collaboration with the Spanish Association of Car and Truck Manufacturers (ANFAC), in which three models were compared: Citroën C4 (conventional vehicle), Toyota Auris (hybrid vehicle) and Nissan Leaf (electric vehicle).

According this study, the difference in the price of the comprehensive insurance is mainly due to the higher price of the electric vehicles (which determines the rate of insurance), the higher cost of reparations in case of accident (lack of specific knowledge about reparations of these type of vehicles) and the few insurance companies that offers specific insurance policies for electric vehicles.



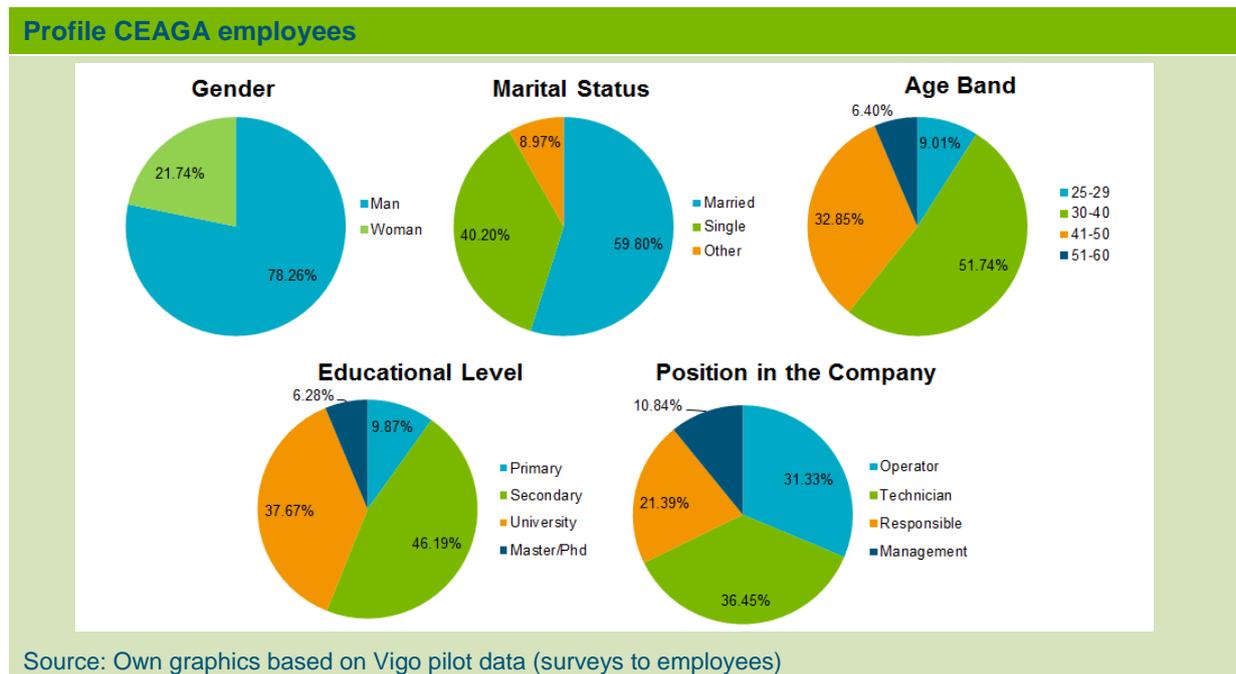
Employees: profile, acceptance, barriers and potentials

During the 15 months of the pilot, 372 employees from companies belonging to CEAGA have tested an electric vehicle. This means 9.72% of all employees or 140.91% of the employees that usually travel during work.

This last data requires an explanation: In a company, not all the jobs require to travel during working hours (business trips), as for example, chain operators. Interestingly, the data indicate that the vehicles have been tested by more employees, and many of them don't have to travel due to job requirements. People wanted to use electric vehicles just to learn more about this kind of vehicles.

In the interviews with the companies, several HR Managers, as for instance Rogelio Fernández of Viza Automoción, indicated that *“It’s very positive that employees from the automotive sector can drive this kind of vehicles with the objective of learning more about environmental aspects and test these new technologies. People like the silence of these vehicles and would like to repeat the experience to drive this kind of cars.”*

The respondents were mainly male, married, aged between 30 and 40 years-old, with secondary school degree and a position in the company as technician.



The dominant means of transport used for business trips by the employees is the private vehicle (95.34%). Although the companies belong to the automotive sector, 81% of the employees have never used an electric vehicle before the test, 17.8% have used it and liked the experience and only 1.2% of them indicated that they didn't like it.

During the test, the electric vehicles were mainly used for interurban (44%) and urban (31%) business trips.

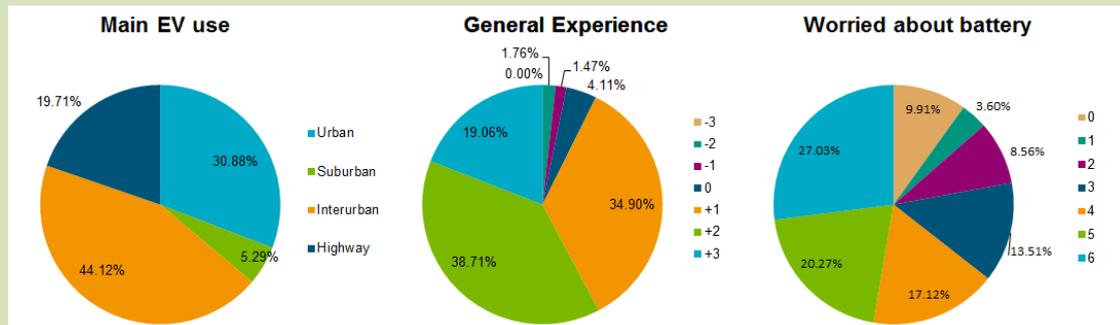
93% of the respondents assessed the experience of driving an electric car as good or very good (between +1 and +3), only 3 % valued it as bad or very bad (between -1 and -3) and



4% as indifferent. 94% of the respondents would like to repeat the experience, (more people than those who assessed the experience as good-very good).

Almost two third of the employees were worried about battery autonomy (64% with a range of anxiety of 4-6, being 6 “very much”).

Test data: Main use, general experience and concerns about battery

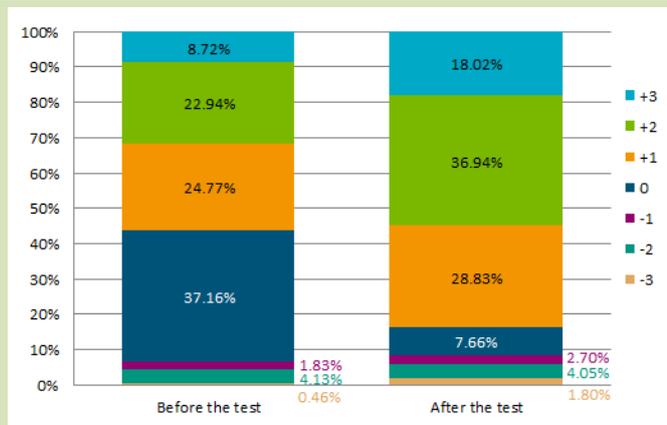


Source: Own graphics based on Vigo pilot data (surveys to employees)

We have identified a change regarding EVs acceptance if we compare the employees’ opinion before and after testing the electric vehicle.

The most relevant change was that the 27% of the employees having no feeling about electric vehicles before the test, changed their opinion to a positive experience once they tested it. This is mainly due to a lack of knowledge about electrical vehicles

Question: How do you feel about electric vehicles?



Source: Own graphics based on Vigo pilot data (surveys to employees)

The most common opinions collected during tests have been:

- Comments**
- ✓ Good concept for urban use
 - ✓ Comfortable, without noise
 - ✓ Good response of the engine
 - ✓ Environmental aspects
 - ✗ Short autonomy (range)
 - ✗ Price must be more similar to conventional cars
 - ✗ Long time for charging
 - ✗ Few public charging points
 - ✗ Lack of knowledge about maintenance



Conclusions

The results from the Vigo Pilot carried out from June 3rd 2013 to September 4th 2014, show that business trips requirements can be perfectly fulfilled by electric vehicles, providing the company economical savings related to consumption and avoiding the emission of significant amounts of CO₂.

In the interviews with the companies, the Human Resources Managers have identified as main advantages the cheap maintenance and cost per km, the comfort of the car especially in urban areas, the employees' acceptance (they like electric vehicles and most of them want to repeat the experience), the environmental aspects and the possibility of charge the battery at the company premises.

PSA Peugeot Citroën Center of Vigo



Photo: CEAGA

As disadvantages they have mainly appointed technical aspects: high price of acquisition and insurance, low range, charging time and the scarcity of public charging points.

Regarding the employees' acceptance to the implementation of electric fleets, the main constraints come from a lack of knowledge about electrical vehicles, what can be easily solved with information, training and testing of this type of vehicles, in order to show how these vehicles fit with their business trips. Once tested the vehicle, they want to repeat the experience of driving it.

Moreover, as it was shown on the information presented in the Seventh Edition of the Corporate Vehicle Observatory (CVO June 2014), the next three years will be a great period for promoting the implementation of electric vehicles among Spanish companies.



The Project

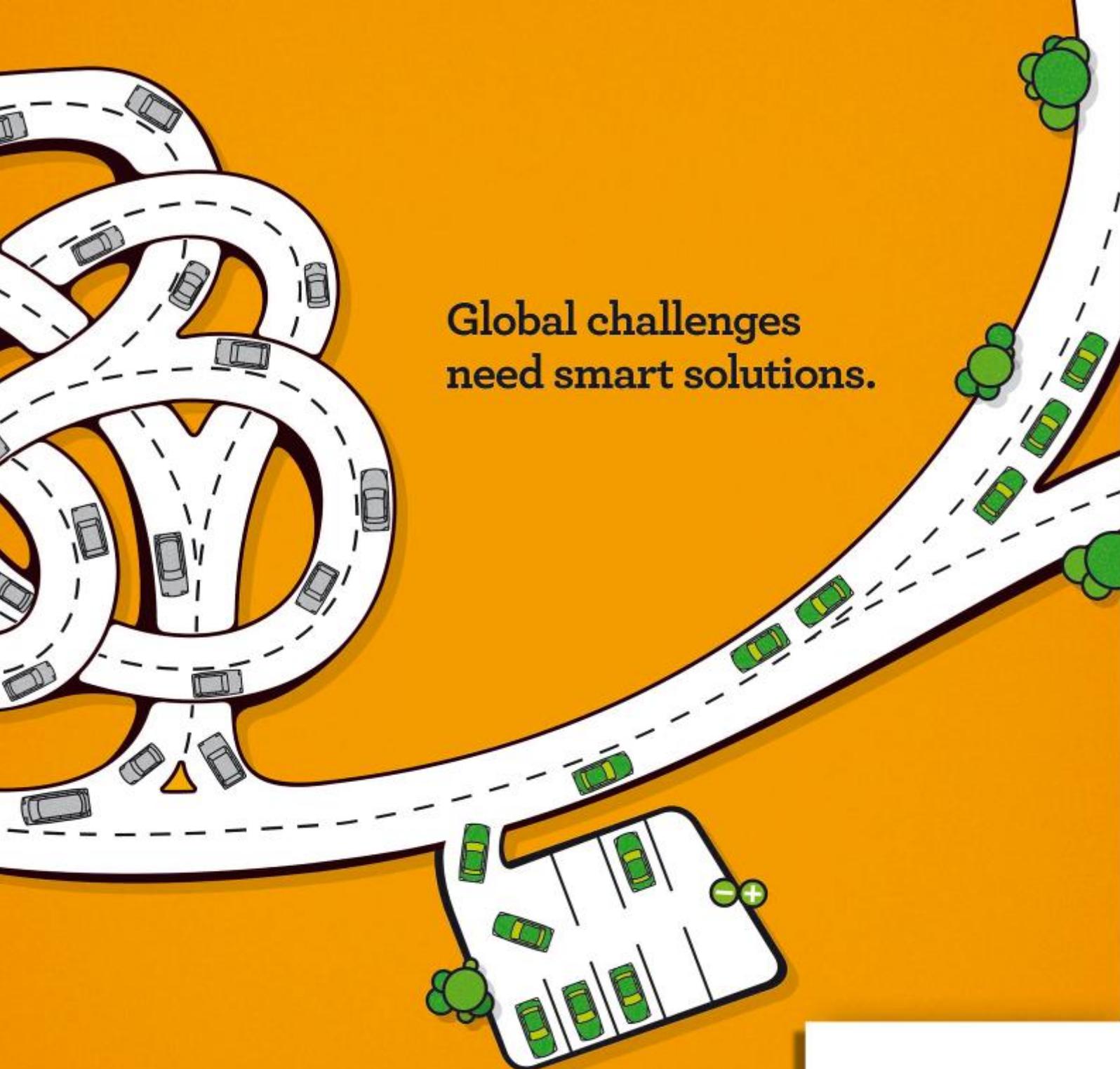


eBRIDGE is a co-funded EU project to promote electric fleets for urban travel in European cities. The project aims to bring innovation and new technologies to make today's mobility cleaner, more efficient and sustainable.

The project explores alternatives to the current mobility patterns and evaluate whether electric mobility is a feasible option to make cities cleaner and more sustainable.

The seven pilots, Berlin (Germany), Milan (Italy), Lisbon (Portugal), Vigo (Spain), Valencia (Spain), a selection of Austrian municipalities and Carmarthen (Wales) are developing actions to optimise operational fleet performance, test and launch solutions to increase the convenience and ease of use of car sharing offers and finally, raise awareness among the target groups through engaging marketing approaches on the suitability of electric mobility for urban transport and commuting.

The eBRIDGE team involves technical experts, academics, associations, public administrations, mobility providers and public transport and car sharing operators.



Global challenges need smart solutions.

The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.



eBRIDGE
Power to urban fleets



Co-funded by the Intelligent Energy Europe Programme of the European Union



ebridge-project.eu

Follow us

