



Empowering e-fleets for business and private purposes in cities

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e-Mobility Fleet Schemes and Market Potentials in the United Kingdom

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1. Executive Summary

Electric mobility is a highly promising technology that, properly used, can help addressing severe global challenges such as climate change and fossil fuel dependency; it can contribute to reducing local CO₂ emissions and noise pollution coming from transport and enable synergies with smart grids and so favour a greater percentage of renewable energy production.¹

The large potential of electric vehicles in urban fleets encompasses: (a) improving electric mobility markets through niche development, thus accelerating mass market adoption of electric vehicles and (b) supporting the achievement of energy and climate protection goals; and (c) contributing to tackling global recession by revitalising the industrial fabric and fostering innovation, growth and job creation, as, for example, with the manufacturing plant for Nissan Leaf in Sunderland, UK.

British gross domestic product (GDP) of 1,747 billion EUR in 2011 represents 13.82% of EU 27 GDP².

With a population of 63 million (2012), United Kingdom represents 12.69% of total European population (500.35 million)³ and 73.08 % of this population lives in cities that have between 50,000 and 300,000 inhabitants. The British modal share shows that in 2011 most of the trips (64%) were accomplished by individual motorised means(car/motorbike), 16% by public transport, 14% walked or cycled and the remaining 6% by other means.

With a car fleet of 28.5 million vehicles in 2011, United Kingdom has the fourth largest European carpool representing 12.1% of the total EU fleet.⁴

Based on the Committee on Climate Change (2010) recommendations, the UK Government should aim for 1.7 million EVs on the road by 2020, in order to move towards the carbon emissions reduction target of 50% by 2025. This means that over 250,000 new EVs per year must be introduced in the UK.

To promote electric vehicle implementation, in 2011, the UK government committed to supporting a national recharging network for electric and plug-in hybrid vehicles. The Plug-In Vehicle Infrastructure Strategy includes a Plugged-In Places (PIP) programme with a budget of £30 million to match-fund eight pilot projects (east of England, Greater Manchester, London, Midlands, Milton Keynes, north east England, Northern Ireland, Scotland) installing and trialling recharging infrastructure in the UK to support the Carbon Plan commitment to install up to 8,500 charging points.

According to the Office for Low Emission Vehicles (OLEV), over 4,000 charging points were installed in the frame of the Plugged-in Places programme by mid 2013. About 65% of these charging points are publicly accessible. Moreover, some local councils and private sector providers are also installing charging points. Based on data provided by charging points manufacturers, it is estimated that organisations may have also installed about 5,000 charging points nationwide (not supported by Plugged-in Places programme).⁵

¹ Council of the European Union. 2010.

² Eurostat, (2013a). GDP at current market prices.

³ Eurostat, (2013b). Population on 1 January.

⁴ European Automobile Manufacturers' Association (ACEA). Pocket guide 2013.

⁵ UK Government (2013). Guidance Plugged-in Places

2. Introduction

2.1 The eBRIDGE 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.

During eBRIDGE, alternatives to current mobility patterns will be explored in order to analyze whether electric mobility is a feasible option to make cities cleaner and more sustainable.

Although electric vehicles fulfil all the requirements to be among the most important players in urban transport systems of the near future – they are clean, efficient, silent, and incur low running costs – significant barriers to a wider diffusion and use of electric vehicles remain to be addressed, including low user acceptance and higher purchase costs compared to conventional cars.

On this backdrop, eBRIDGE aims to demonstrate how the introduction of electric vehicles in fleets for business and private urban travel can efficiently contribute to the improvement of market conditions for the electric mobility sector.

Seven case studies with heterogeneous starting conditions assure a broad-spectrum outcome. 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 and further relevant stakeholders 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:

- choice GmbH (Coord.), Germany
- DB FuhrparkService GmbH, Germany
- Allmenda Social Business e.G., Austria
- Forschungsgesellschaft Mobilität – Austrian Mobility Research gem. GmbH, Austria
- I Nova Consultores en Excelencia e Innovación Estratégica, S.L., Spain
- Galician Cluster of Automotive Companies, Spain
- Movilidad Urbana Sostenible S.L., Spain
- Comunitat Autònoma de les Illes Balears, Spain
- Fondazione Legambiente Innovazione, Italy
- Azienda Trasporti Milanese S.p.A, Italy
- Occam, Portugal
- Câmara Municipal de Lisboa, Portugal
- Cardiff University, United Kingdom



2.2 Scope of the report

The goal of the “Work Package 2: Market Analysis”, is to analyse the current situation and trends of electric fleets in the eBRIDGE targeted regions by assessing information about all context relevant issues such as market overview, best practice, legal framework, policy, and environmental impacts. The work package will also assess the market potential of electric mobility, mainly for fleets.

The present report “e-Mobility Fleet Schemes and Market Potentials – UNITED KINGDOM”, gathered this information for United Kingdom and particularly Carmarthenshire County Council, the British case study site.

2.3 Methodology

In the course of this work package, data from Germany, Austria, Spain, Italy, Portugal and United Kingdom have been gathered and analysed for the period 2008-2012.

The overall goal has been to establish the current state of play on electric urban fleets for every participant country. A factsheet on transferability at a European scale will be based on this report series.

Relevant data regarding national carpoools such as registrations, power train type, ownership, registered EVs models, car sharing hot spots, main charging operators, as well as main national policy and R&D aspects e.g. incentives and favouring policies have been collected and analysed.

Additionally, a brief assessment of the market potential of electric vehicles including identified national barriers and drivers is provided.

Finally, the assessment of the Carmarthenshire County Council case study facilitates the comparison of the local and national levels, showing to what extent the British energy and climate targets are on track.

The methodology is based on four steps as shown in Figure 1. First, the relevant aspects of urban mobility and electric fleets were defined in the data collection template. The contents of the report were likewise defined and main timelines drafted. Finally, the results of the data analysis and complementary sources were added, and presented in the present report.

Figure 1 Time Plan Methodology



Source: Own diagram

3. Electric Mobility in United Kingdom

3.1 Starting point

Accelerating Electric Vehicle (EV) uptake is important for reaching the UK Government carbon emissions reduction target of 50% by 2025. The Committee on Climate Change (2010) recommends that the Government should aim for 1.7 million EVs on the road by 2020. To reach this target, over 250,000 new EVs per year must be introduced in the UK. By October 2011, there were 1,100 EVs registered in the UK of the total 28.5m vehicles in circulation (Vaughan, 2011). The total number rose to around 5,000 vehicles at the time of writing this report (SMMT 2013, SMMT 2012), and is only a small fraction of what the UK government intended to achieve. Therefore, there is a significant challenge ahead if the government wishes to reach anywhere near their targets, in the stated timescale.

Half of all new cars in the UK are bought by fleets; and this should be the case for EVs as well. There is an additional reason for this: the high cost of acquisition. Thus, if the purchase of EVs starts to materialise in fleets, it will help accelerate their deployment to consumers across the UK. Further incentives include tax or charges savings and exemptions such as free parking and permanent exemption of all EVs from the London congestion charge, or enhanced capital allowances for EVs bought for fleets⁶.

In 2011, the UK government committed to supporting a national recharging network for electric and plug-in hybrid vehicles. This includes the “Plugged in Places” scheme, which offers matched-funding to consortia of businesses and public sector organisations to install electric vehicle recharging infrastructure in eight areas (in London, Manchester, Milton Keynes and North East England). Outside these areas, some private firms and local authorities are installing charging points, but so far geographical coverage is limited⁷. With over 90% of car journeys in the UK being less than 80 kilometres, there is significant potential for local and fleet adopters (Ernst & Young, 2010).

In autumn 2013 the UK government re-affirmed their pledge of £400 million worth of support for EV infrastructure between 2010 and 2015. However, only £92 million was spent by autumn 2013, casting doubts on the potential to reach the intended target in the remaining time (Foy, 2013).

Research on UK public attitudes to EVs, suggests understanding about EVs is limited, but interest in low-emission vehicles is high (e.g., DEFRA, 2009) demonstrated by the recent rapid growth in sales of small, energy-efficient vehicles (Nykqvist & Whitmarsh, 2008). EST (2010) found two-thirds of UK public would like a low-carbon car if they could afford one; 75% would consider fuel efficiency an important factor when buying their next car; but half of respondents do not know whether they can use an EV where they live and only one in four would consider an electric car at that time. In addition, few people thought EVs can now perform as well as conventional cars for many types of travel. Similarly, Graham-Rowe et al (2012) found mainstream car consumers perceived the current generation of EVs as a “work in progress” and too costly, despite offering environmental benefits. Range concerns have also been expressed (e.g. Xenias & Whitmarsh, 2013; Ernst & Young, 2010).

⁶ <http://www.automotivecouncil.co.uk/low-carbon-technology/grants-and-incentives/>

⁷ Source: www.ev-network.org.uk/

Other research shows cost savings, followed by environmental benefits, are the most important factors that would positively influence consumers' decision to purchase an EV as their next vehicle; access to charging points and battery driving range, and price, are the most important factors discouraging purchase of an EV (Ernst & Young, 2010). In some cases, members of the public have some (limited) experience with EVs (Graham-Rowe et al., 2012), but commonly public perceptions are based on little knowledge of current EV technologies. This suggests a major barrier to EV uptake is familiarity and experience of EV use, both of which will be addressed in this project.

UK consumers' interest in lower-cost mobility solutions has also contributed to a growth in car share schemes and car clubs in recent years (Nykvist & Whitmarsh, 2008). There are nearly 500 UK-based "closed" (i.e. organisation-based, local, or regional) car share schemes, over 40 'open' schemes, and 26 active UK-based commercial car club schemes. As of 2006, there were 11,000 members in the UK (Nykvist & Whitmarsh, 2008), rising to over 161,000 members and 3,055 vehicles in 2011 (Carplus, 2011), representing 0.26% of the UK population. Estimates for 2013 raised this figure to 180,000-200,000, representing 0.28%-0.31% of the UK population. Indeed, car sharing and car clubs are growing more than car ownership and have not yet reached their full potential.

Importantly, this potential extends to broader benefits, e.g. use of alternative transport modes: car club members reported local bus trips (66%), walking 20 mins or more (78%), and cycling (32%) at least once a week (CarPlus, 2011).

As far as market development is concerned, early purchasers are expected to be fleet or business users and consumers in urban and suburban locations. It is the owners in these segments of the market who are most likely to reap the full environmental and cost-of-ownership benefits of plug-in vehicles. The UK market will expand its reach as consumer and business acceptance continues to grow.

Fleets, including car-share schemes, are particularly likely to adopt EVs. For example, London established a "green" taxi company in which all fleet cars are HEVs (Nykvist & Whitmarsh, 2008). Furthermore, the Niches project highlighted the City of London's scheme to promote EV adoption in car share schemes, which can lead to a Benefit-to-Cost ratio of up to 4.1 (Niches, 2012). Previous research highlights that fleet demonstration projects create initial infrastructure build-up necessary for mainstream adoption (see Nykvist & Whitmarsh, 2008).

In the design of the fleet trials best practices of the UK, existing demonstration projects will be used. For example the Centre of Excellence for low carbon vehicle technologies (CENEX), published the results of a six months trial of four types of electric passenger cars in North Eastern England (<http://www.cenex.co.uk/projects/electric-vehicle-trials/smart-move>). Qualitative and quantitative data were recorded (perception and attitudes towards the EV, for fleet users, fleet managers and public drive event). Detailed information related to vehicle performance was also recorded.

3.2 General Aspects of Mobility

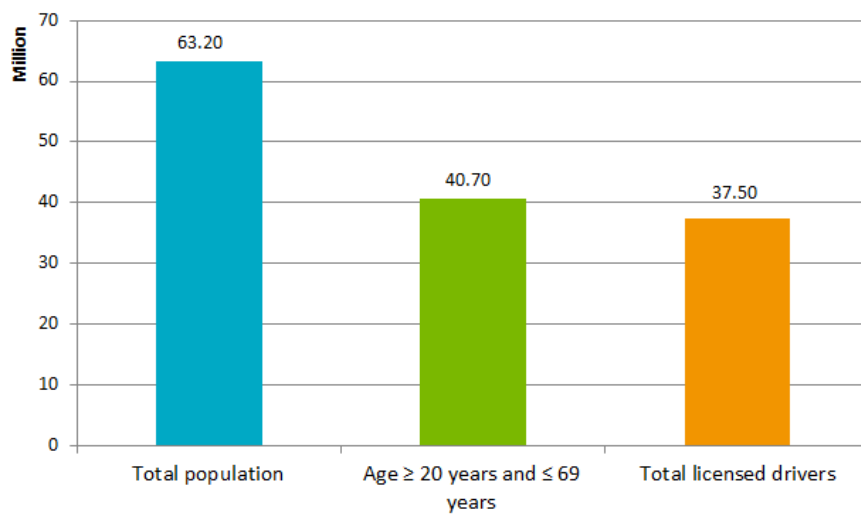
DEMOGRAPHY

United Kingdom recorded a total population of 63.20 million inhabitants in the 2011 census. The median age of population has been steadily increasing in recent decades, being 39.7 in 2012, but is lower than the median age of the EU-27 for the same year, 41.5.⁸

Figure 2 classifies British's population for 2011 in three categories: total population, working population (aged between 20 and 69 years) and total licensed drivers.

Working population represents 64.40% of total population; and from this almost all are licensed drivers (92.14%). This means that over half of total population (59.34%) have a driving license.

Figure 2 Demographic data and driver's license 2011⁹



Source: Own graphic based on Office for National Statistics (2012) UK Census 2011. Driver and Vehicle Licensing Agency (2012)

The country's population is distributed as shown in Figure 3. In 2012, 73.08% of cities have between 50,000 and 300,000 citizens.

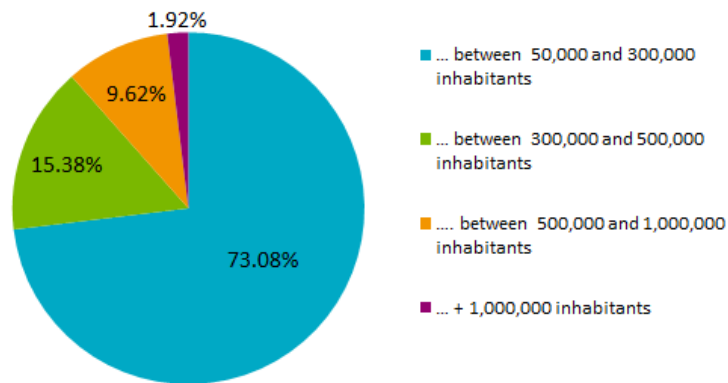
In addition, 80% of British's population lived in metropolitan areas in 2011 ($\geq 500,000$ citizens in 50km, $\geq 1,000$ inhabitants/km²).¹⁰

⁸ Eurostat (2013c) Population structure and Age.

⁹ Figures for 2011 only as UK conducts a national census every ten years, hence previous figures would be for 2001 and the next set of figures not available until 2021.

¹⁰ UK National Ecosystem Assessment (2011) Synthesis of the Key Findings.

Figure 3 Share of cities by size class



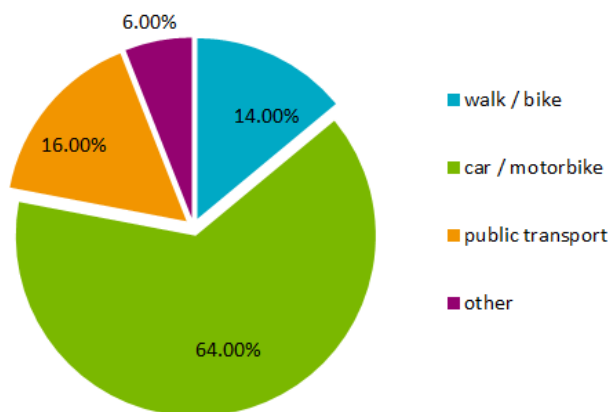
Source: Own graphic based on Office for National Statistics (2012) Key Statistics for local authorities in England and Wales, General Register Office for Scotland (2010) Mid-2010 Populations Estimates for Settlements and Localities in Scotland and Northern Ireland Statistics and Research Agency (2005) Key Statistics for Settlements Tables: Usually Resident Population.¹¹

MOBILITY PATTERNS

The British modal share shows that in 2011 most of the trips (64%) were accomplished by individual motorised means (car/motorbike), 16% by public transport, 14% walked or cycled and the remaining 6% by other means.

The number of average trips per person and day for the same year was 2.6 and the average distance per trip was 11.40 km.

Figure 4 Modal share 2011



Source: Own graphic based on Office for National Statistics (2012) UK Census 2011.¹²

¹¹ These figures include only cities with populations over 50,000 inhabitants. They exclude 15 smaller cities with populations lower than 50,000. This includes the City of London and it is important to note that Greater London is not officially a city despite it holds the largest population of any UK urban area. Wider metropolitan areas surrounding other large cities such as Birmingham, Glasgow and Manchester are also excluded as the box specifically asks for cities. In addition, no town with a population of over 50,000 is included.

¹² These census figures cover England and Wales only - the comparable Scottish and Northern Irish statistics could not be identified. For average travel per person, a yearly figure of 958 trips was offered in the report. To reach a daily figure this was divided by 365.

3.3 The British Carpool

VEHICLE FIGURES

Total vehicles registered

The number of passenger cars and light transport vehicles has remained steady, with a slight trend of grow, from 31.40 million in 2008 to 32 million in 2012. Passenger cars have increased 1.77% for this period and light transport vehicles by 3.13%.

Of all registered vehicles, in this period, 89.82% were passenger cars.

The average age for the cars increased from 6.93 in 2008 to 7.44 in 2011.¹³ Their average age from 2008 to 2011, was 7.17 years.

Figure 5 Total vehicles registered 2008 - 2012



Source: Own graphic based on Department for Transport (2009-2013) Vehicle Licensing Statistics 2008-2012.

Vehicle powertrain type

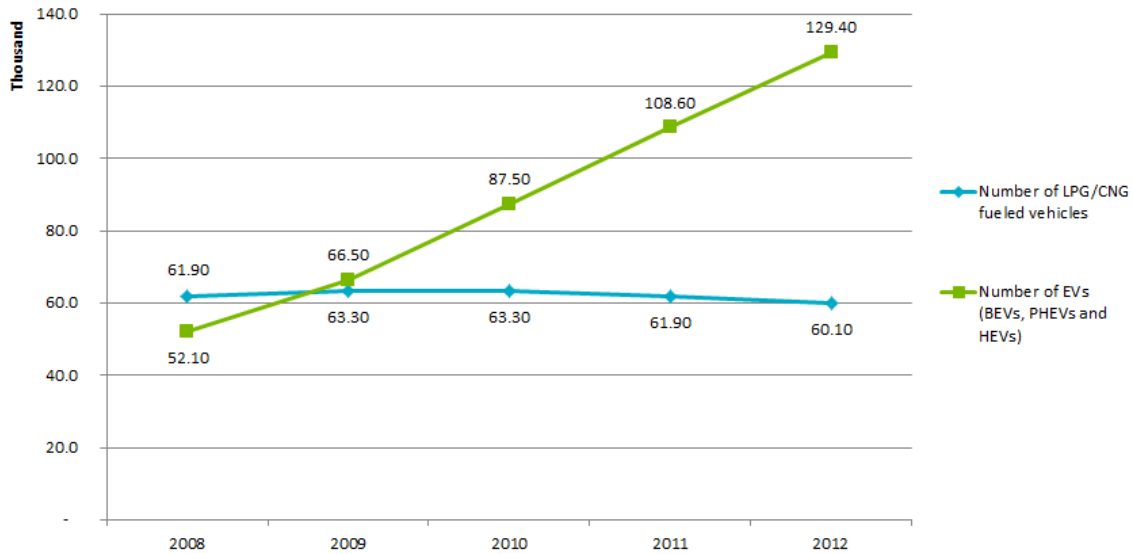
In 2012, 0.59% of the total vehicles were alternative fuelled vehicles; with 99.41% being conventional fuelled vehicles.

Among the alternative fuelled vehicles over half, 68.29% (0.40% of the total), were plug-in hybrid electric vehicles (PHEV), hybrid electric vehicles (HEV) and battery electric vehicles (BEV). 31.71% (0.19% of the total) were liquefied petroleum gas (LPG) or compressed natural gas (CNG) fuelled vehicles.

PHEVs, HEVs and BEVs have increased by 148.37% between 2008 and 2012. In the same period, LPG and CNG vehicles have slightly decreased by 2.91%.

¹³ Figures from British Car Auctions (2012) Used Car Market Report. Age figures cover cars only; data for light commercial vehicles are not available. Most recent age figures published in 2012, and cover up to 2011.

Figure 6 Total vehicles powertrain type 2008 - 2012

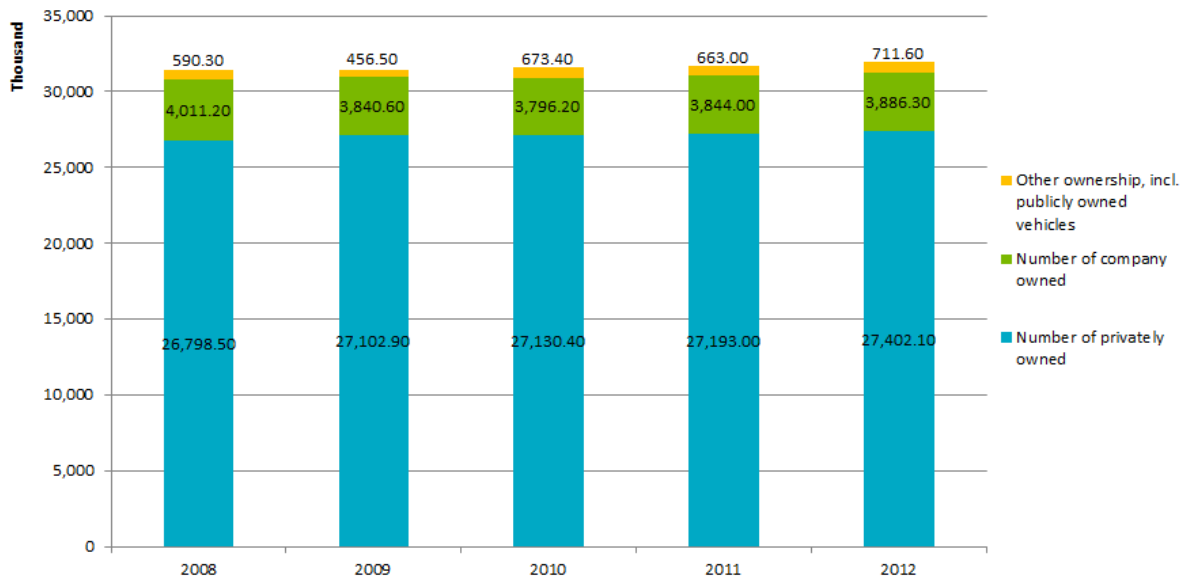


Source: Own graphic based on Department for Transport (2011-2012) Cars licensed by propulsion and Vans licensed by propulsion. Electric vehicle 2012 figures from CENEX (2012) UK Electric and Hybrid Car Registration Statistics.

Total ownership of passenger and commercial vehicles

Regarding ownership, in 2012, of the total vehicles, 85.63% were privately owned vehicles, 12.14% were company owned and the remaining 2.22% were other ownership, including publicly owned vehicles. There have been no significant differences in ownership shares between 2008 and 2012; the growing trend of vehicles privately owned increased 0.34% for this period. 2.8 million vehicles were leased or rented in 2012.¹⁴

Figure 7 Total ownership of passenger vehicles 2008 - 2012



Source: Own graphic based on Department for Transport (2013) Cars licenced keepership and Licensed light goods licenced by keepership.

¹⁴ BVRLA (2013) Workshop on government co-operation.

EVs ownership

No figures were found for electric vehicle ownership segments, likely due to their recently coming to market and the small market share they hold.

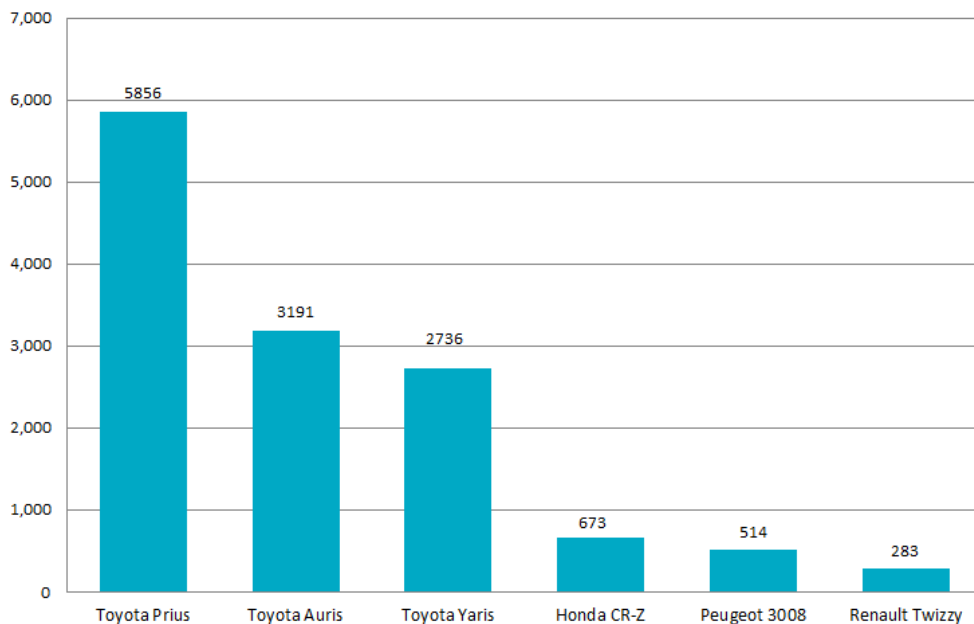
However, research outlined in the International Energy Agency (2012) EV City Casebook suggests that 85% of electric vehicles are purchased by companies in some sections of the UK. The ENEVATE project (2013) highlights that a significant proportion of the UK's electric vehicle stock is utilised by local authorities. Vaughan (2011) reports that electric car sales in the UK were expected to double in 2013 as prices started to fall.

Selection of most registered EVs per supplier & model

Based on the new vehicle registrations 2012, Figure 8 shows a selection of most registered EVs with Toyota leading by far the registrations market.

Among the PHEVs Toyota Prius and two additional models (Auris and Yaris) leads the ranking of the registrations market with 90.85%. Honda, Peugeot and Renault follow with their models, CR-Z, 3008 and Twizzy.

Figure 8 Selection of most registered EVs in 2012



Source: Own graphic based on Department for Transport (2012) Licensed vehicles by make and model, by year of manufacture, Great Britain, annually from 2011. Numbers include BEVs, PHEVs and HEVs.

ENVIRONMENT

The EU has called for the need to drastically reduce world greenhouse gas (GHG) emissions, with the goal of limiting climate change below 2 °C. Overall, the EU needs to reduce emissions by 80-95 % below 1990 levels by 2050, in the context of the necessary reductions of the developed countries as a group, in order to reach this goal.

European Commission analysis shows that while deeper cuts can be achieved in other sectors of the economy, a reduction of at least 60% of GHGs by 2050 with respect to 1990 levels is required from the transport sector, which is a significant and still growing source of GHGs. By 2030, the goal for transport will be to reduce GHG emissions to around 20% below their 2008 level.

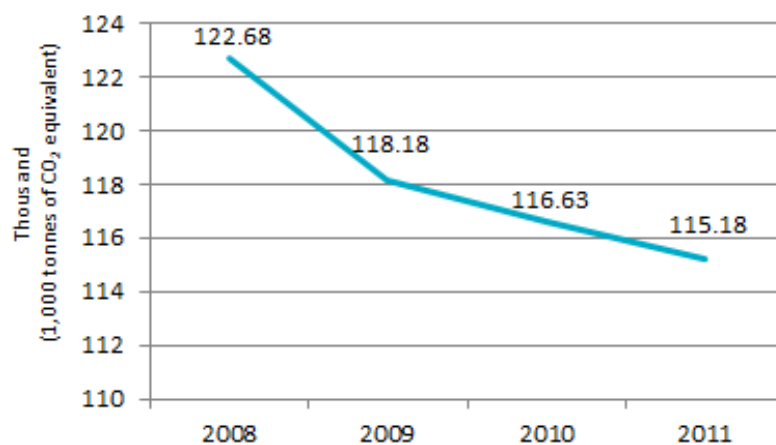
Accordingly, the White Paper on Transport (2011) establishes as first goal to halve the use of conventionally fuelled cars in urban transport by 2030; phase them out in cities by 2050 and achieve essentially CO₂-free city logistics in major urban centres by 2030.¹⁵

Moreover, the European Union's ten-year growth strategy, Europe 2020, established a set of targets including climate, energy and sustainability targets. The EU targets are translated into national targets in each EU country.

In the specific case of United Kingdom, the national target is to reduce GHG by 16% with respect to 2005 by 2020.¹⁶

The total GHG emissions transport in MT CO₂ units¹⁷ shows, after a great drop between 2008 and 2009 (3.67 %), that the trend of decreasing continues steadily.

Figure 9 Greenhouse gas emissions from transport 2008 - 2011



Sources: Own graphic based on Eurostat (2013d) Indicators Theme 6 Climate Change and Energy

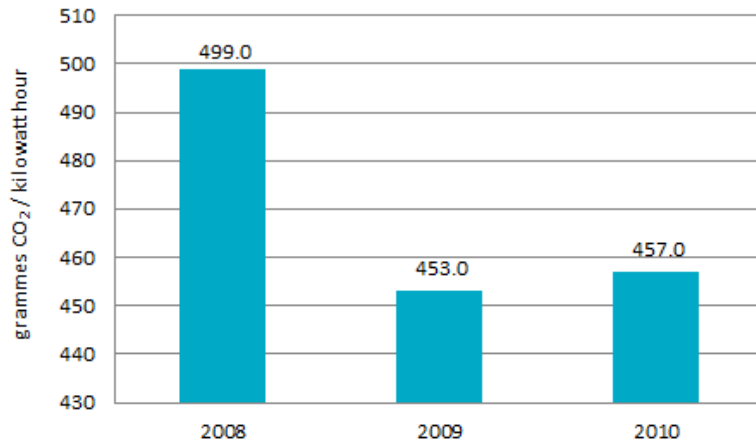
Regarding electricity generation, CO₂ emissions per KiloWatt hour, from 2008 to 2010 shows a decreasing trend, with an average decline rate of 8.42%. This trend can be considered a driver of electric mobility .

¹⁵ European Commission (2011a) WHITE PAPER - Roadmap to a Single European Transport Area: Towards a competitive and resource efficient transport system (2011) COM/2011/0144.

¹⁶ European Commission (2011b) Europe 2020 Targets.

¹⁷ This indicator shows trends in the emissions from transport (road, rail, inland navigation and domestic aviation) of the greenhouse gases regulated by the Kyoto Protocol.

Figure 10 CO₂ emissions per kWh from electricity generation 2008 - 2010



Source: Own graphic based on CO₂ Emissions from Fuel Combustion Highlights, IEA (2012)

3.4 Charging Infrastructure

MAIN OPERATORS

In 2012, the charging infrastructure was owned mainly by private companies with an electric utility profile (designs, manufactures, sells, installs and operates charging points). Two main operators installed more than 8,000 charging points across the UK.

Operator	Charging Points	Profile
CHARGE MASTER	>6,000	Electric utility
ELEKTRO MOTIVE	>2,000	Electric utility

Source: Own table based on Charge Master, Elektro Motive (2013)

3.5 British Fleet Hot Spots

MAIN LOCATIONS FOR CAR SHARING

Transport for London and the Mayor of London have made a concerted effort to establish London as the UK hub for electric vehicles. All the major car sharing operators with electric vehicles in their fleets are present, there has been a huge investment in charging points, numerous demonstration projects are based in the area and financial/infrastructure incentives make driving an electric vehicle the most attractive prospect for any location in the country.

In 2012, London had more than 2,000 charging points for more than 2,000 EVs, and at least five car sharing operators

The Greater London Authority also plans to deliver 1,000 electric vehicles into the Greater London Authority fleet by 2015¹⁸.

BUSINESS CAR SHARING OPERATORS

Table 2 Main business car sharing operators

Operator	Fleet	Technological key aspects				Locations
	Operator private company	Booking	Access	System	Payment	
<u>HERTZ</u>	Hertz	Phone App Internet	Key fob	Station-based	Credit card Visa debit card	20 UK towns and cities including London, Leeds and Edinburgh
<u>ZIPCAR</u>	Zipcar	Phone App Internet	Smartcard	Station-based	Credit card Visa debit card	5 UK cities including London, Oxford and Cambridge
<u>CITY CAR CLUB</u>	City Car Club	Internet	Smartcard	Station-based	Credit card Visa debit card Direct Debit	14 UK cities including London, Edinburgh and Cardiff
<u>E-CAR</u>	National Energy Foundation and Sustainable Ventures	Internet	Smartcard	Station-based	Direct Debit	6 towns and cities in the UK including London, Luton and Oxford
<u>CILGWYN COMMUNITY GROUP</u>	Cilgwyn Community Group	Phone Internet	Car keys	Free-floating ¹⁹	Credit card Visa debit card	Cilgwyn

Source: Own table based on data from Hertz, Zipcar, City Car Club, E-Car and Cilgwyn Community Group (2013), see links

HERTZ, ZIPCAR, CITY CAR CLUB and E-CAR were the main commercial car sharing operators in 2012.

¹⁸ <http://www.london.gov.uk/sites/default/files/electric-vehicles-plan.pdf>

¹⁹ Free floating: you can park where you need within a defined area.

3.6 Research & Development

KEY RUNNING R&D PROJECTS ON ELECTRIC VEHICLES

Programme	Key areas covered	Budget	Funding
Low Carbon Vehicle Integrated Delivery Programme	<p>Research and propose solutions to overcome barriers to electric vehicle uptake in the UK.</p> <p>These barriers include battery, volume, cost, reliability and safety, lack of domestic sources for batteries, consumer behaviour and expectations and robust operation in a range of environmental conditions</p>	£100million	Technology Strategy Board

Source: Own table based on projects web page (2013)

DEMONSTRATIVE E-FLEET PROJECTS

Project	Key areas	Years	N° of EVs	N° of partners	Coordinator	Budget
Ultra Low Carbon Vehicle Demonstration Programme	Eight separate consortia were tasked with investigating new user experience of electric vehicles to speed up the transition to ultra low carbon vehicles.	2009 - 2012	340	39	Technology Strategy Board (public body)	£25.5 Million
Cilgwyn Community Group	Investigating the value of using electric vehicles in rural locations as both a sustainable mode of transportation and a means to reinvigorate an isolated community.	2013 -	2	1	Cilgwyn Community Group (private company)	£25,000
ENEVATE	A transnational project investigating market drivers for electric vehicles so as to encourage consumer uptake.	2011 - 2013	0	14	Cardiff University (public body) Automotive NL (private company)	>5 million EUR
Badenoch & Strathspey Community Transport Company	Investigating the value of using electric vehicles in rural locations as a sustainable mode of transportation for locals and tourists.	2009 - 2011	1	3	Perth College (public body)	-

Source: Own table based on projects 'web page (2013)

3.7 Policy Framework

KEY REGULATIONS REGARDING ELECTRIC VEHICLES

Table 5 Key regulations regarding electric vehicles				
Regulation	Key aspects being regulated	Date of release	Public body/ authority	
Car CO₂ emissions	<p>In 2008, legislation committing vehicle manufacturers to specific CO₂ emission targets for new car registrations was passed by the European Union.</p> <p>Subject to their individual targets, vehicle manufacturers have to comply with new car average CO₂ emission targets of 130g/km CO₂ by 2015 and 95g/km CO₂ by 2020.</p> <p>The legislation sets out an exacting programme for car manufacturers with 65% of new cars averaging the 130g/km target by 2012, 75% by 2013, 85% by 2014 and 100% by 2015.</p>	2008	European Union	
Van CO₂ emissions	<p>In 2011, the European Commission agreed an initial CO₂/km emissions target for vans and light commercial vehicles.</p> <p>From 2017, vans and LCVs will be required to meet an emissions target of 175g/km CO₂ (phased in annual compliance levels of 70%, 75% and 80% respectively between 2014-2016), with all manufacturers reaching the 100% target emissions levels from 2017 onwards.</p> <p>Manufacturers who fail to reach the targets will be fined 95 EUR per additional gram of CO₂ emitted, for every car registered across Europe.</p>	2011	European Commission	

Source: Own table based on regulations of European Union and European Commission.

FINANCIAL INCENTIVES

Table 6 Financial incentives				
Sector	Key incentives	Date of release	Level	Public body/ authority
Plug-in Car Grant	Consumer incentive scheme offering up to £5,000 or 25% off the purchase price of an electric vehicle for private or business customers.	2011	U.K.	Office for Low Emission Vehicles (OLEV)
Plug-in Vehicle Grant	Business incentives scheme offering up to £8,000 or 20% off the purchase price of a commercial electric vehicle of 3.5 tonnes or less.	2011	U.K.	Office for Low Emission Vehicles (OLEV)
Low Carbon Vehicle Procurement Programme	Fund to support public sector organisations introduce electric vehicles and other low carbon vehicles into fleets.	2007	U.K.	Centre of Excellence for low carbon and fuel cell technologies (CENEX)

<p><u>Tax Incentives</u></p>	<p>No Vehicle Excise Duty for electric vehicles - saving up to £1,000 a year. First year enhanced capital allowance for electric cars bought in fleets. 100% first year rate enhanced capital allowance for electric vans. Electric vans exempt from van benefit charge for 5 years. Electric cars exempt from company car tax for 5 years.</p>	<p>2010</p>	<p>U.K.</p>	<p>HM Treasury</p>
<p><u>London Electric Vehicle Delivery Plan</u></p>	<p>Electric vehicles free from congestion charge, saving up to £2,000 a year. Numerous incentives operating across different boroughs including free parking for electric vehicles. Installation of 25,000 charge points.</p>	<p>2009 - 2015</p>	<p>England (Greater London)</p>	<p>Transport for London</p>
<p><u>Plugged in Places</u></p>	<p>£30million infrastructure support to consortia of businesses and public sector organisations for the installations of charging points.</p>	<p>2011</p>	<p>England, Scotland and Northern Ireland</p>	<p>Office for Low Emission Vehicles (OLEV)</p>

Source: Own table based on Office for Low Emission Vehicles (OLEV), Centre of Excellence for low carbon and fuel cell technologies (CENEX), HM Treasury and Transport for London.

4. Market Potential

4.1 Main Drivers and Constraints

In general terms and at European level, the main market barriers for the successful integration of electric mobility into European transport systems include technological, infrastructural and cost-related aspects. Finding integrative solutions to overcoming the current challenges concerning battery technology, standardisation of the recharging infrastructure, interaction with electricity generation systems and cost and business case of large scale introduction is crucial for the development of the electric mobility market in the short and long term. The increased demand for EVs, along with the sharing of best practice and extensive public and organisational awareness-raising activities, will help encourage infrastructure and technological investments and reduce costs.

In the specific case of United Kingdom, the following drivers and constraints have been found:

Potential Drivers	Constraints
<ul style="list-style-type: none"> Financial incentives have been put in place by government for purchase and running of electric vehicles Manufacturers are bringing an increasing number of electric vehicles being brought to market - including the mainstream automotive companies Charging infrastructure is seeing public and private investment meaning that points being located in important mass hubs such as motorway service stations, multi-storey car parks and supermarkets Local authorities are innovating to meet sustainability targets by introducing electric vehicles into work fleets EU regulation placing CO₂ emission targets on UK is forcing the electric vehicle issue onto the agenda to reduce pollution from road transport There is a strong car culture with a ready desire to explore new technologies and would be potential for innovations in automobile drive train if transition were managed appropriately 	<ul style="list-style-type: none"> Purchase cost of electric vehicles remains considerably higher than internal combustion engine equivalents even with financial incentives factored in Lack of an integrated charging network creates feelings of range anxiety, especially when directly compared to the large number of petrol stations Battery cost remains prohibitive under present business models with a lack of understanding from consumers over just what they are paying for, how reliable it is and why there are no other options to mitigate outright purchasing Vehicle leasing and other co-operative usage schemes are still in their early stages and face significant challenges to overcome the deeply ingrained presumption for private ownership Obsolescence remains a worry for many consumers, concerned that early electric vehicles, battery technology and charging infrastructure are not future-proof and may be superseded rendering present investment foolhardy There is also an undercurrent of climate change scepticism and distrust at the more costly green alternatives being supported by the government, as echoed in other sectors such as energy provision

Source: Own table based on Department for Business Enterprise and Regulatory Reform (2008) Investigation into the Scope for the Transport Sector to Switch to Electric Vehicles and AEA Group (2009) Market outlook to 2022 for battery electric vehicles and plug-in hybrid electric vehicles and Plug-in Hybrid Vehicles, and Xenias & Whitmarsh, (2013).

5. Local Assessment

5.1 Starting Point

In April 2011 Carmarthenshire County Council (CCC) introduced two Mitsubishi iMiEVs battery electric vehicles to their car pool, bringing the total number of vehicles to 8 (of which six were diesel cars). This made Carmarthenshire County Council the first local authority in Wales to introduce electric vehicles to its fleet. These vehicles are provided for employees to utilise in their day-to-day duties as an efficiency saving in both economical and environmental matters.

In late 2012 Carmarthenshire County Council investigated the possibility of expanding the Parc Myrddin's Campus current fleet of 2 Mitsubishi iMiEVs to 6 electric vehicles in the duration of the eBRIDGE project. 4 of these will remain at Parc Myrddin and will be accessible to employees based at this site, whilst the other 2 will be based at other locations. As of summer 2013, two of the new EVs were tested and established at Parc Myrddin, two were under assessment and two more were delivered at another location at Carmarthen.

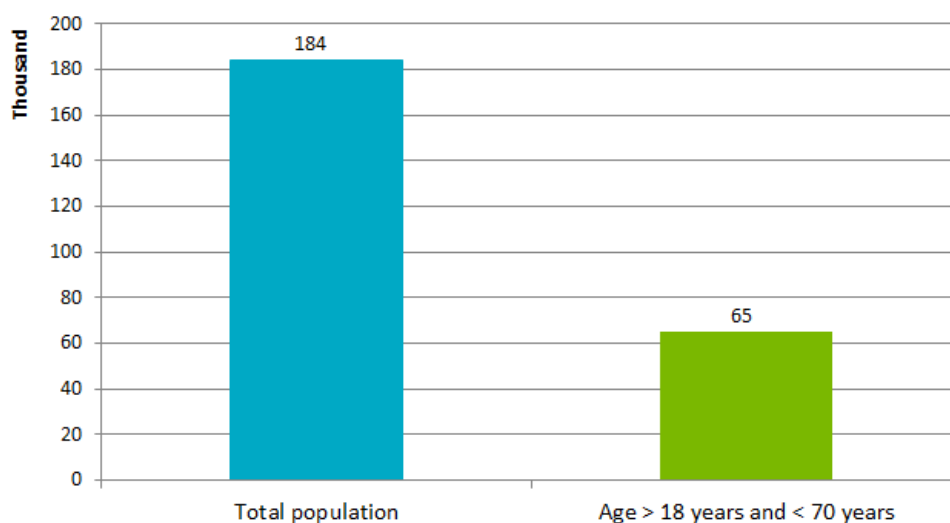
5.2 General aspects of Mobility

DEMOGRAPHY

Carmarthenshire County population is classified in 2011 in two categories: total population and population aged between 18 and 70 years.

Working population represents 35.35% of total population and the average age is 42.78, higher than national average (39.7) and EU-27 average (41.2) for the same year.²⁰

Figure 11 Demographic trends and driver's license



Source: Own graphic based on Office for National Statistics (2013)

²⁰ Eurostat (2013c) Population structure and Age.

EVS USER PROFILES

Based CCC figures, in 2012 70% of the CCC employees who drove an electric car were male and on average 43.5 years-old.²¹

5.3 The Carmarthenshire County Council Carpool

Two Mitsubishi iMiEV have been acquired by Carmarthenshire County, by 2012. Both vehicles are owned by a public body, one acquired in 2011 and one in 2012. Four more EVs were acquired in 2013, bringing the total to six.

Source: Carmarthenshire County Council

5.4 Main Local Drivers and Constraints

In the specific case of Carmarthenshire County Council, the following drivers and constraints for EVs market implementation were:

Table 8 Drivers and Constraints Electric Mobility at Carmarthen	
Potential Drivers	Constraints
<ul style="list-style-type: none"> • Installation of fast charging infrastructure • Use for specific type of trip • Better battery 	<ul style="list-style-type: none"> • Range anxiety • Size of vehicle / carry capacity • Lack of attractiveness • Limited recharge infrastructure • Need to plan journey • Price of EVs

Source: Own table based on interviews at Carmarthenshire County Council

²¹ Cardiff University, 2013. Interviews with the Carmarthenshire County Council fleet manager.

6. General outlook

In conclusion, there are considerable policy measures supportive of EVs in the UK. These include direct subsidies, tax allowances and exemptions as well as funding for infrastructure and subsidies for EV purchase. Despite this array of measures, and the recent increases in EV sales, total numbers are only a fraction of the UK government envisaged targets for 2020.

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