Electric Vehicles in Car Clubs

Carplus Good Practice Guidance

June 2012

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rethinking car use

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This document will be reviewed and updated regularly. Please send any comments or feedback to info@carplus.org.uk.

Contents

Abbreviations

The abbreviations used in this document are as follows:

EV	Electric Vehicle
GLA	Greater London Authority
ICE	Internal Combustion Engine
OLEV	Office for Low Emission Vehicles
PHV	Plug-in Hybrid Vehicle
TfL	Transport for London
ULCV	Ultra Low Carbon Vehicle
VED	Vehicle Excise Duty

1. Introduction

The purpose of this document is to provide good practice guidance for both car club operators planning to add electric vehicles (EVs) to their car club fleet and Local Authorities interested in promoting the take up of EVs within car clubs.

Practical lessons from EV trials in car clubs throughout London and elsewhere are presented, including:

- Vehicle booking and recharging models;
- Options for recharging infrastructure; and
- Membership engagement - Ensuring car club members are provided with information about how EVs work and how to deal with any problems encountered.

It is important for car club providers and service commissioners to understand the opportunities and barriers to wider adoption of EVs in shared and pooled use. In view of the high costs of purchase and ownership compared with the internal combustion engine (ICE) vehicles it is important to ensure that the vehicles – particularly battery EVs – are intensively used. In shared use this will only happen where they are allocated to functions that suit their operating characteristics. As the battery EV is less versatile than an ICE vehicle it needs to be utilised to provide mobility for particular journeys that are local or sub-regional, that are fairly predictable and in some environments are repetitive. There is also a significant issue surrounding the resale value of EVs which is still uncertain due to the early stage of the EV market development.

These issues lend themselves to integration with car clubs. In a closed environment of a car club, many of the technical issues experienced with EVs can be overcome by providing new users with a practical induction on use and recharging of the vehicles available; and also by ensuring that the EV booking system provides sufficient time between bookings to ensure that the vehicle is sufficiently charged to complete the planned journeys.

There are some significant operational issues with the introduction of EVs to car club fleets. The availability of charging points remains a potential barrier to implementation, unless each car club vehicle has a dedicated charging point provided. Charging networks outside of London and a limited number of other cities are still at an early stage of development and it is anticipated that any car club EVs would primarily be charged at their home charging station. The time taken to charge a vehicle is still relatively long and as a result, planning recharging between bookings remains a complex operational issue for car club operators.

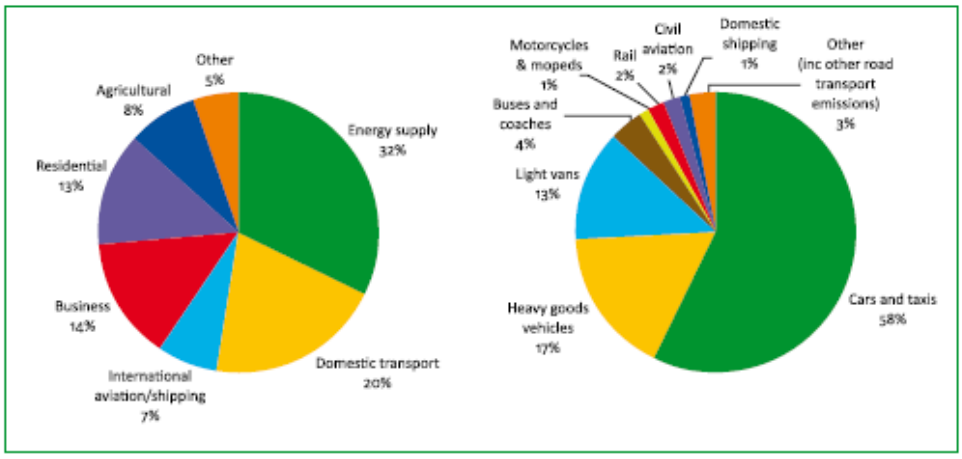
Adoption of EVs for shorter journeys will be more likely if there are incentives in operating such vehicles. Using policy measures on air quality has included restrictions in access to city centres (e.g. in Norway), low emission zones (initially aimed at commercial vehicles and buses, but capable of being extended) and differential parking based on emissions. These can all be used to offer financial incentives that together with the fluctuating price of fossil fuels makes using EVs more attractive.

This guidance also identifies the benefits of EVs and the contribution which they can make towards wider policy targets.

2. Background

Transport is one of the largest contributors to CO2 emissions in the UK; with 90% of transport emissions coming from road traffic (see Figure 1 below). The *Climate Change Act 2008* created a legally binding commitment to achieving a 50% reduction in greenhouse gas emissions by 2027 and by 80% by 2050[i]. Ultra-low emission vehicles and plug-in vehicles will have a major role to play in achieving these targets, together with improvements to the efficiency of internal combustion engines and a rethinking of car use.

Figure 1 - Sources of UK greenhouse gas emissions and domestic transport emissions (2009)



Source: National Atmospheric Emissions Inventory, 2009, figures rounded to the nearest per cent

The availability and usage of (EVs) and plug-in hybrid vehicles (PHVs) has increased significantly over the past three years. The UK Government has set an ambitious forecast that by 2020 plug-in vehicles will make up around 12% of the vehicles sold in the UK[ii]. This seems very optimistic given that the European Commission has suggested a market share of up to 4% for pure EVs and PHVs by 2020[iii]. The expansion of the plug-in vehicle market will, in part be due in part to advances in vehicle and battery technology, as well as a response to the expansion of charging infrastructure across London and the rest of the UK.

The early adoption of EVs is currently being facilitated through the Technology Strategy Board trials in several locations (including the London Boroughs of Westminster, Hillingdon and Camden, the Metropolitan Police and Transport for London). Trials are also underway at other locations across the UK as part of the Plugged in Places project. This guidance document draws on lessons learned from all of the on-going trials across the UK and examines how these lessons can be applied to the roll-out of EVs in car clubs across London.

The Mayor of London recognises the importance of encouraging the uptake of EVs and TfL is helping to ensure that progress is made in developing charging infrastructure in the city. *London's Electric Vehicle Infrastructure Strategy*[iv] and *The Electric Vehicle Delivery Plan for London*[v] set the structure for delivery of EVs and charging infrastructure in London to 2020.

3. Benefits of introducing EVs as part of a car club

"By experiencing an EV through a car club, potential future EV owners can become accustomed to the EV technology and driving experience."

There are a number of benefits offered by the introduction of EVs to car club fleets in London. There is a general recognition that the purchase price of EVs is currently significantly higher than comparable ICE vehicles, (albeit partly explained by having to – in effect – purchase the 'fuel' in advance (i.e. the battery)). By experiencing an EV through a car club,, potential future EV owners can become accustomed to the EV technology and driving experience.

Use of EVs in car clubs will also help to raise public awareness of both, through publicity, media and the on-street presence. Carplus wishes to encourage car club operators to develop an understanding of how to manage EVs as part of their operations and to make the necessary changes to their tariffs and booking and billing systems to accommodate vehicles with different characteristics.

Other benefits of EVs are more widely understood and include:

- **Reducing carbon emissions**
  EVs emit around 30-40% less CO2 than comparable ICE vehicles. Over the long term, as the amount of energy generated from renewable sources increases, zero carbon motoring will become an option.

- **Improvements to local air quality**
  London's air quality currently breaches EU and national targets. 46% of Greater London's NOx and 83% of Central London's PM^{10} emissions are produced by road transport[vi]. EVs have zero emissions at point of use and can therefore help to improve London's air quality and also reduce the incidence of respiratory related illnesses such as asthma.

- **Reducing noise pollution**
  EVs are virtually noise free and can help to reduce traffic noise for people living or working near to major roads.

- **Improving technology and user experience of EVs**
  The EV trials which are currently underway will help car club operators and EV manufacturers to gather feedback on EV usage and to inform development of future technology to help improve the EV driving experience.

- **Improving energy resilience**
  The use of EVs can help to reduce reliance on fossil fuels and therefore help to ensure that motorists are not vulnerable to increasing oil prices. Whilst electricity costs are currently linked to fossil fuel prices, increasing renewable energy generation over time will help to break this link[vii].

- **Making better use of the UK grid**
  Charging EVs off peak will help to ensure that better use is being made of the UK grid[viii]. It may also be possible in the future to make better use of vehicle batteries to store energy at times of low demand which can then be fed back to the grid at peak times, maximising the use of renewable assets[ix].

- **Financial benefits for users**
  EVs tend to have lower running costs compared with ICE cars and reducing dependence on fossil fuels can reduce the impact of increasing fuel prices on a vehicle fleet. Fuel costs for EVs are typically around 3p/mile compared to around 13p/mile for a diesel vehicle[x]. However as the lower running costs need to be balanced by the higher purchase price of EVs, they will only be viewed as a cheaper option if:

    - Fuel prices continue to rise for ICE cars;
    - If concessions in VED, parking and the Congestion Charge provide additional incentives; and
    - If the limited range can be extended by opportunistic charging.

Further information on managing EVs in fleets

The Climate Group – Plugged in Fleets: A Guide to Deploying EVs in Fleets
http://www.theclimategroup.org/_assets/files/EV_report_final_hi-res.pdf

Cenex Fleet Carbon Reduction Guidance
http://www.cenex.co.uk/LinkClick.aspx?fileticket=ZboEATCEtqM%3D&tabid=119&mid=695

Energy Saving Trust Fleet Analysis
(http://www.energysavingtrust.org.uk/Transport/Business/Fleet-advice/Best-practice-guides

4. Incentives, vehicle types and charging infrastructure

Incentives

Incentives exist to encourage both businesses and individuals to purchase EVs through grants available from the Office for Low Emission Vehicles (OLEV).

- The OLEV Plug in Car Grant provides funding for 25% of the vehicle cost, up to a maximum of £5,000.
- The Plug in Van Grant also provides funding for 20% of the vehicle cost, up to a maximum value of £8,000 and is available to both businesses and private consumers.
- EVs are also exempt from Vehicle Excise Duty and Company Car Tax restrictions.

In addition to pure EVs, there are several range extender vehicles available which can help to bridge some of the operational issues that are experienced by users of EVs.

Charging Infrastructure

The launch of financial support for early adopters from the OLEV as part of the 'Plugged in Places' scheme has helped to ensure that EV charging infrastructure becomes more widespread across the UK. However, one of the main criticisms of EVs is that in some areas it is still difficult to find an accessible charging point. The Government has recently set out its vision for the development of charging infrastructure across the UK in 'Making the Connection – the Plugged in Vehicle Infrastructure Strategy (DfT, 2011)'.

This strategy suggests that the majority of EV charging will take place at homes or workplaces and encourages recharging after the evening peak as this delivers the greatest environmental and energy system benefits. However, while off peak charging is the aspiration for EV owners, especially in urban locations, EV trials undertaken by Cenex suggest that only 12% of EV charging took place during the cheap rate night time period, with 88% occurring at other times[xi].

Plugged in Places - scheme locations

East of England	http://www.sourceeast.net/
Greater Manchester	
London	http://www.sourcelondon.net/
Midlands	http://pim.pod-point.net/
Milton Keynes	http://chargemasterplc.com/charging-schemes/milton-keynes/
North East	http://www.chargeyourcar.org.uk/indexx3.php
Northern Ireland	http://www.nidirect.gov.uk/ecar
Scotland	
Further information	www.dft.gov.uk/topics/sustainable/olev/recharging-electric-vehicles

Within London *The Electric Vehicle Delivery Plan for London* and *London's Electric Vehicle Infrastructure Strategy* set out the timescale for delivering charging points across London. Both the Government and Mayor of London anticipate that the majority of EV charging points will be located either in private homes or in workplaces.

The Electric Vehicle Delivery Plan set out a target of installing 25,000 charging points in London by 2015; the majority of these (around 22,500) are proposed to be located in workplace car parks. To ensure that mode shift away from public transport does not occur, workplace charging points must be located in areas where Londoners already commute by car. *The Electric Vehicle Infrastructure Strategy* identifies such locations and also suggests suitable phasing for the roll-out of charging points. The *London Plan*[xii] proposals also require that new developments provide 20% of their parking spaces with EV charging points, thereby helping to ensure the expansion of charging infrastructure. Publicly accessible charging points will be targeted in areas where a high proportion of likely early adopters are located. This may include areas which already have high levels of car club usage.

"A number of equitably dispersed charging points will form the foundation of the charging network and will be positioned with the aim of ensuring no Londoner is more than one mile from a publically accessible [charging] point by 2015."

London's Electric Vehicle Infrastructure Strategy

Several different types of charging point are currently available[xiii]:

- **Standard charge** – Standard 13/16 Amp plug/ 3.7kW power source, plugged into a mains voltage charge point. Suitable for work place charging, as well as on-street. Capable of charging a battery from empty in five to eight hours.

- **Fast charging** – up to 32 Amp/ 7kW power source. Standardised and homologated connector required. On street and dedicated charging posts. Enables a full charge in three to four hours or a top-up in 30 minutes. These are well suited to retail car parks or on-street locations.

- **Rapid charging** – up to 50kW. Stand-alone rapid charge stations and specialist infrastructure required. Capable of charging an empty battery to 80% in around 30 minutes. These are most likely to be located in dedicated off-street charging facilities including in retail car parks.

- **Inductive charging** – A primary inductive coil is buried in the road and a secondary coil is attached to the vehicle underside. Currently most suitable for buses, or for vehicles standing still over the induction point.[xiv]

- **Catenary charging** – Overhead wire at fixed locations (e.g. bus stops). Again only suitable for public service vehicles standing still under the charging point.

Charging and battery technology is developing rapidly and it is likely that the time required for a full charge without damage to the battery will significantly reduce in the future. Some recharging units offer a range of charging options within one unit that can be used by more than one vehicle at any given time. There are a number of service providers that have developed charging solutions for EVs. Source London works with several different charging providers.

Car club operators should work with EV and battery suppliers to ensure that they utilise the most appropriate charging infrastructure for the batteries in their EVs. Developments in battery technology will help to reduce charging times over the next five to ten years but new battery technology is usually more expensive, so the balance will be between using older technology in cheaper cars with limited range and new technology in expensive cars with limited range.

Booking and management of car club charging points

Early trials of EVs in car clubs have highlighted the practical issues surrounding booking and management of EVs and EV charging points.

Providing inductions to EV users

EV trials have highlighted the importance of providing personal or group inductions to EV users to help familiarise car club members with EV technology. Trials undertaken in partnership with Commonwheels in the North East illustrate that technical issues with EVs can be avoided or at least minimised by providing car club members with a hands-on introduction of how to use the EV and the charging post.

Initially introducing EVs into a 'closed' user group, such as an employer's car pool, can also help to minimise operational problems. Restricting usage to a relatively small user group can help ensure that those who do use the EV have a practical induction.

Establishing appropriate booking systems for charging points and EVs

Early trials have illustrated that it will be essential to use a booking system to manage access to charging points and vehicles that takes into account the amount of charging time each EV requires so the charge point will not be blocked to other users.

Whether charging time is required between bookings will be determined by the distance travelled and driving style adopted during each booking or anticipated in future bookings. Any time allocated for recharging will also be influenced by the type of charging point, so the booking systems will need to be able to calculate the amount of time required on a booking by booking basis.

Early experience suggests that there are four charging regimes that can be considered. Note that these scenarios assume that each dedicated car club bay has a dedicated EV charging point:

1. Block out the cars overnight after each day's use. This is known as the "Cinderella" model and is not particularly effective. It is, however easy to implement and manage.

2. Block out the cars after every booking for the same period of time that they were booked for. This is slightly more efficient than the Cinderella model but is still not able to provide optimal use of the vehicle.

3. Intelligent monitoring and alert. This requires the booker to indicate approximate anticipated mileage. The software used then allocates a car with the appropriate charge level available. This will work best if there is a pool of EVs available at one location. During the booking the charge levels are relayed to the server at specified intervals and an alert is provided to both the central system and the customer when a certain level of charge is reached.

4. Block out use prior to the start of the journey. Each booking has time blocked prior to the booked period to ensure the battery is fully charged. A car does not appear as available if a booking is required at short notice and the battery has insufficient charge to complete the planned journey.

Managing range restrictions

In some of the car club trials of EVs, restrictions have been placed on the range of each booking (i.e. a 30 mile round trip) to help ensure that sufficient charge will be available for subsequent bookings. This can help minimise the need to make use of a charging point during a booking in order to complete a journey.

In an urban setting, bookings can potentially be restricted to a zone or city boundary to manage vehicle range limitations, and ensure that even with end to end booking a car will retain sufficient charge to complete all journeys during the working day.

Further information

Information on the Plug in Car Grant together with a complete list of the vehicles eligible for the grant is available here: http://www.dft.gov.uk/topics/sustainable/olev/plug-in-car-grant/.

Information on the Plug in Van Grant together with a complete list of the vehicles eligible for the grant is available here: http://www.dft.gov.uk/topics/sustainable/olev/plug-in-van-grant.

Information on Source London and several different charging providers: https://www.sourcelondon.net/source-london.

5. Lessons learned from EV trials

Issues for car clubs

a. Vehicle characteristics

If EVs operated by car clubs are to prove popular to a car club, they must offer a practical and desirable alternative to conventionally fuelled vehicles. In terms of practicality for the customer apart from being able to indicate the range remaining in the battery, the vehicle also needs to provide space for carrying passengers and their possessions. It must be easy to operate and park, especially as car club EVs are likely to be utilised in urban areas. Charging the battery must be simple so that any user can do it properly.

b. Charging infrastructure

There is a certain amount of interest and enthusiasm for EVs and in order to build on this enthusiasm, it is important that a car club member's first experience of using an EV is a positive one.

A number of initial problems have been encountered with charging infrastructure in London. Some charging points were only designated for short stay charging and need to have time limits removed in order to facilitate EV charging. In some locations the charging infrastructure is not compatible across London Boroughs. Some boroughs are still considering joining the Source London Network but their participation may result in an increase in the demand for existing charging points, many of which are already heavily used.

c. Battery technology

Battery technology is continually improving and many of the problems initially experienced such as the lack of a cut-out mechanism to warn when the charge reached a minimum point are being rectified. Introduction of a cut-out mechanism has helped to ensure that the charge does not reach a dangerously low point where damage occurs to the battery. This also ensures that it is not possible to damage the battery through over charging.

The difficulties associated with predicting the range of batteries still remains one of the key barriers to adoption – especially considering that in most areas outside London, charging points will often be more difficult to locate. Vehicle manufacturers are actively developing technology to help counter driver range anxiety (see 'coping with range anxiety' section below) and it seems likely that this, along with the expansion of charging networks, will tackle this issue.

d. Coping with range anxiety

There are several different technology providers currently developing in-car systems to help tackle range anxiety. These include extensions to Sat-nav and telematics systems being developed by Tom-Tom[xv] which can provide the driver with information about the amount of charge remaining, how many miles can be travelled based on current driving style, the locations of compatible charging points and whether a return journey is feasible given the amount of charge remaining. Sat-nav and telematics systems can also provide anonymous user statistics to battery leasing companies and EV manufacturers which will enable them to improve technology development and user services.

e. Vehicle cost

The purchase cost of an EV is still much higher than a comparable ICE vehicle. This makes it very difficult for car clubs to market EVs on the same basis as an ICE vehicle without some subsidy. As the EV industry develops, it is likely that increases in volume production as well as battery leasing schemes will reduce the purchase price. Together with battery replacement and a firmer understanding of residual values (e.g. the value of an EV on the second hand market when sold to renew the car club vehicle fleet), this could, in the longer term make EV costs roughly comparable with those of an ICE vehicle as the technology is developed. Fuel and servicing costs of an EV are also significantly less than a conventional ICE vehicle due to EVs having fewer moving parts that could require replacement. In the future, rising fossil fuel prices may help to make the whole life costs of an EV more comparable with an ICE vehicle.

f. Booking and administration systems

Booking systems need to be able to allow adequate time between bookings to ensure that each vehicle booked out has enough charge available. Or alternatively, to allocate cars with less than a full charge to bookings that have opted to stay within a designated zone or to restrict the journey to a known mileage.

The booking and administration system also needs to be able to monitor the level of charge in the vehicle so that the appropriate adjustments can be made to the charging time allowed between bookings (see section above on establishing appropriate booking systems).

Feedback on battery performance is also useful to provide to vehicle manufacturers as this will enable them to develop batteries that can better meet the needs of EV users and car club operators.

g. Interoperability

Currently several different systems are in operation that provide access to charge points so if vehicle users are provided with a card to access charge points, it is worth considering whether this card is compatible with other local charging networks where a user might want to recharge. Ensuring that a user has access to local charging networks will effectively increase the usability and range of an EV.

Summary

Despite the issues detailed above, there is currently significant enthusiasm and interest in EVs, especially amongst the public. Once technology and range issues have been overcome and the purchase price is more closely aligned with the cost of ICE vehicles (potentially through leasing of battery packs, which significantly reduces the initial purchase cost), there is potential for the considerable expansion of EV usage by car clubs and their customers.

6. Recommendations

It is recommended that any car club operator or local authority interested in promoting the introduction of EVs in car clubs should be aware of the following recommendations that summarise the guidance provided in this document.

1. Choose the right vehicles

This is important both in terms of the initial vehicle cost and the attractiveness to potential users. When selecting a vehicle the potential resale value given the current early stage of the second hand EV market may also be important.

2. Make sure that you are making the EV available for suitable trips

EVs are best suited to shorter, urban journeys where there will be no requirement to recharge during the booking. Typical range of an EV will vary depending on driving style, the type of vehicle and other variables such as use of air conditioning/heating systems.

3. Ensuring that access to appropriate charging infrastructure is available

For car clubs, a dedicated charge point will generally be required for each parking bay so that recharging can occur between bookings. In terms of the type of charging point installed, nationwide standards are being developed and Source London recommends the installation of 32 Amp mode 3 charging points. It is well worth ensuring that any charging points provided are compatible with other local schemes and also with the vehicles that you plan to use. Investment in rapid charging technology is likely to be a game changer for car clubs and other fleet operators. Ensuring that wherever possible, rapid charging points are provided will help to ensure that EVs are able to be charged in the minimum amount of time possible.

4. Develop an appropriate pricing structure that encourages use of EVs

Whilst EVs are more expensive to purchase than ICE vehicles, appropriate pricing structures need to be developed by car club operators to ensure that car club members have an incentive to try out an EV.

5. Promote EVs and educate car club members about their operation

One of the most significant operational challenges is to ensure that car club members receive an induction or some instruction to ensure that they understand how the EV operates. In particular this should include information about charging, starting the vehicle, understanding the range available and any warning systems that the EV operates. EVs should be actively promoted to car club members to ensure that they are encouraged to try them out and gain experience on how they operate.

7. Car Club EV trials in the UK

EV trials with Commonwheels in North East England

Commonwheels has been involved in several EV trials in North East England, through both by CENEX (in Durham) and Switch EV (in Newcastle). The CENEX trial was based at County Hall in Durham and the Mitsubishi i-MiEV EV covered an average daily distance of 25 miles. There was a mix of residential and Council staff usage and monitoring indicates that it could have covered 86% of the journeys that the Ford Fiesta based at the same location travels. Commonwheels set up a calculation system so that an adequate charge buffer was provided between bookings and this worked well. There was considerable positive feedback from users about the vehicle but it was difficult to get the wider car club membership involved in using the EV despite positive feedback from those who did try it out. *The i-MiEV covered 25 miles a day (approximately 9,125 miles per annum) and provided a saving of 7p/mile on fuel (£640 per annum). The overall CO2 saving on an annual basis, compared to an average ICE is approximately 22.2 tonnes*[1].

The Peugeot iOn located on Grey Street in Newcastle as part of the Switch EV trial has had positive press coverage and is currently part way through a 12-month trial period. On average the iOn has had 95 hours of hire per month at an average hire length of 18 miles. Whilst there has been some use by Newcastle City Council staff, and a small number of repeat users, there have been some initial problems with users not using or charging the vehicle properly. The vehicles were popular with business users and where driver inductions were offered this helped to reduce the practical issues.

Hybrid vehicles trialled by City Car Club

City Car Club was the first UK car club operator to introduce hybrid cars into its fleet and has more hybrid cars than any other operator. Approximately 100 hybrid cars have been operated since 2007, originally Honda but more recently the entire hybrid fleet has migrated to Toyota, primarily Prius but also Auris hybrids. Hybrid cars have generally proven very popular with members. However, the hybrid market until recently has been restricted to only larger cars which not every car club member wants to use. Being larger sized, and generally a higher specification, also means the cost of the car is more than other non-hybrid alternatives which impacts both the operator in terms of cost, and members as a higher rental rate is generally passed on. Soon to be released smaller hybrid cars will reduce these impacts. Early stage problems with battery life were experienced but advances in battery production combined with the growth of car club membership, strengthening utilisation rates has resolved previous issues. The automatic transmission of hybrid cars has been an added benefit for many members, increasing the ratio of automatic cars in the fleet through having a high proportion of hybrid cars.

City Car Club aims to increase the ratio of hybrid cars from the second half of 2012 through the introduction of new hybrid city cars being produced by manufacturers from this time. They are expecting to trial battery only EV's in late 2012.

EV trials with Zipcar in London

Zipcar have piloted a number of ultra-low emission vehicles in its fleet.

Pure EV: Citroen C1 – was launched in partnership with the City of Westminster. When originally piloted in a controlled closed environment for council staff only it worked well. When opened up to the full membership base issues were encountered with members not reading operational material, not realising range restrictions etc. There were also a number of mechanical issues with the car requiring extensive garage time and expensive repairs. It is also worth noting that the resale value of this car was minimal ensuring non-viability as a core car club vehicle.

Plug-in hybrid: Prius Amberjac conversion: piloted in partnership with Camden Council to look at plug in hybrids as a stepping stone to pure EV's. Conversion was costly but member feedback was largely good and operation issues relatively infrequent. Due to retro-fitting of the technology some issues present for example the car could drive off whilst still plugged in! All in all the cost of conversion was commercially prohibitive but if mass produced by manufacturers this technology could work for a car club.

Extended range EV's: Vauxhall Ampera – currently piloting in partnership with Vauxhall (10 vehicles). Range extender technology allows freedom from range anxiety as well as zero enforced downtime for charging (as petrol generator cuts in to charge electric motor if exhausted). Pilot has only just started but very positive feedback has been received so far. Only downside is the purchase cost of the vehicle which is very high.

8. Car club EV trials in Europe and North America

La Rochelle, France

The Electric Car Club in La Rochelle has been operating since 1999 and provides fifty electric cars (a mixture of Peugeot 106s and Citroen Saxos) which are parked in seven charging stations. The charging locations are near to key attractions such as the city, rail station, bus station and the university.

Subscribers can use any of the 50 vehicles located in the city and can leave the cars at any charging station. The scheme operator redistributes cars as necessary at the end of each day. The schemes is soon to be upgraded with further charging stations to be installed. The vehicles will also be upgraded when the next generation of EVs are available[1].

Nissan Leafs in Montreal and Quebec (Communauto)

Communauto has introduced 50 Nissan Leafs to their fleet in Montreal and Quebec during 2011 and 2012. This is the largest fleet of EVs for a car club in Canada. The Leafs are available for use by any Communauto members who complete the online training.

The Leafs are able to use either normal or slow charging points. It is anticipated that in the future they will be equipped with a quick charge outlet that enables charging to 80% in 26 minutes at a quick charge station. On average each EV has been used for one journey a day, with an average trip length of 27.5kms. This compares with 1.39 journeys a day and an average trip length of 54kms for Communauto's conventional ICE vehicles.

The project is a partnership between Communauto, Nissan, the Provincial government, the City of Montreal and Quebec City. Technical and financial support for the project has been provided by Hydro Quebec.

The main objectives for the project going forwards are to optimise use to reach profitability, to increase awareness on the use of EVs in an urban environment and to build partnerships to support the cost of charging infrastructure.

Launch of EVs in a car club in Holland (Greenwheels)

Dutch car club Greenwheels, in partnership with energy supplier RWE has launched EVs in four cities – Amsterdam, Rotterdam, The Hague and Utrecht. The EVs will be available to the 20,000 customers of Greenwheels and will be able to use 25 charging stations that are operated with green energy.

Promoting combined mobility in Switzerland (Mobility)

Swiss car club Mobility Car Sharing has been undertaking a pilot project with 18 EVs in partnership with SBB (Swiss Railways). This included the provision of parking facilities for EVs next to train stations and EVs located on site for businesses customers. The focus of the trial is on promoting combined mobility. The vehicles used in the trials are Think City's and e-Smarts with charging infrastructure provided in partnership with Siemens. The trial is still on-going so feedback from users is not yet available.

9. Further information

Policy background

- GLA, 2009, Electric Vehicle Delivery Plan for London http://www.london.gov.uk/who-runs-london/mayor/publications/transport-and-streets/electric-vehicle-delivery-plan-london
- GLA, 2009, London's Electric Vehicle Infrastructure Strategy https://www.sourcelondon.net/sites/default/files/draft%20Electric%20Vehicle%20Infrastructure%20Strategy.pdf
- Department for Transport, 2011, Making the Connection – the Plugged in Vehicle Infrastructure Strategy www.dft.gov.uk/publications/plug-in-vehicle-infrastructure-strategy
- Liz Gray and Carplus, 2010, Electric Vehicle Opportunities http://www.carplus.org.uk/wordpress/wp-content/uploads/2010/03/Electric-Vehicle-Opportunities.pdf
- Carplus, 2009, Car Clubs for a healthier, equitable and sustainable Transport Future http://www.carplus.org.uk/wordpress/wp-content/uploads/2009/12/Low-Emission-Car-Clubs-for-a-Healthier-Equitable-and-Sustainable-Transport-Future-Draft4-nov09.pdf

EV trials and funding sources

- OLEV - Plug in Car Grant http://www.dft.gov.uk/topics/sustainable/olev/plug-in-car-grant/.
- Technology Strategy Board – EV trials - http://www.innovateuk.org/
- Joined-Cities Plan http://www.energytechnologies.co.uk/Home/Technology-Programmes/Transport_copy1.aspx
- Infrastructure Grant Programme - http://www.cenex.co.uk/programmes/igp.
- Source London - https://www.sourcelondon.net/about-us
- Cenex Smart Move EV trials - http://www.cenex.co.uk/consultancy/vehicle-deployment-trials/smart-move

Other useful reports

- The Climate Group, 2012, Plugged in Fleets: A Guide to Deploying Electric Vehicles in Fleets http://www.theclimategroup.org/_assets/files/EV_report_final_hi-res.pdf
- BVRLA, 2011, Business Guide to Electric Vehicles http://www.bvrla.co.uk/Publications/Publications_full_listing.aspx
- WWF, 2011, Electric Avenues: Driving home the case for Electric Vehicles in the UK http://www.wwf.org.uk/wwf_articles.cfm?unewsid=4784
- IET, 2012, Successfully Implementing a Plug in Electric Vehicle Infrastructure – A Technical Roadmap for Local authorities and their Strategic Stakeholders www.theiet.org/resources/standards/ev-report-toc.cfm

Further Carplus Good Practice Guidance

1. Local Authority TMO consultation guidance
2. Local Authority car club starter pack
3. Employers pack
4. Car clubs in property developments
5. Car clubs: A Cost Effective Route to a Low Carbon Britain
6. Guidance on setting up an Informal Car Club

These documents are available from http://www.carplus.org.uk/cms/resources/

References

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[ii] Making the Connection – the Plug-in Vehicle Infrastructure Strategy, DfT 2011 pg 15

[iii] Electric car sales forecasts too optimistic says Volvo (the Charging Point, 21st March 2012) http://www.thechargingpoint.com/news/Electric-car-sales-forecasts-too-optimistic-says-Volvo.html

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[vii] London's Electric Vehicle Infrastructure Strategy (GLA, 2009) pg 11

[viii] Research commissioned by the UK Government examined the impact on the national grid of significant growth in EVs. This research concluded that there is sufficient electricity generating capacity to cope with increased demand, assuming that demand for charging is managed and targeted at off peak periods. (See 'Investigation into the Scope for the Transport Sector to Switch to EVs and PHVs', Arup report for BERR and DfT, 2008)

[ix] London's Electric Vehicle Infrastructure Strategy (GLA, 2009) pg 11

[x] Plugged in Fleets – A Guide to Deploying Electric Vehicles in Fleets, The Climate Group, 2012 http://www.theclimategroup.org/_assets/files/EV_report_final_hi-res.pdf

[xi] The Smart Move Case Studies – Cenex, 2011 http://www.cenex.co.uk/LinkClick.aspx?fileticket=1PElynEh5mA%3d&tabid=474 pg 22

[xii] The London Plan, (GLA 2011) http://www.london.gov.uk/thelondonplan/

[xiii] Source London information on charging points https://www.sourcelondon.net/charge-points

[xiv] Electric Vehicle Opportunities – Liz Gray and Carplus (2010) http://www.carplus.org.uk/wordpress/wp-content/uploads/2010/03/Electric-Vehicle-Opportunities.pdf and London's Draft Electric Vehicle Infrastructure Strategy (GLA, 2009) pg 7

[xv] https://s3.amazonaws.com/awpresenter/Presentations/TomTom+Overcoming+range+anxiety.pdf