

THE ROAD TO POWER

ELECTRIC VEHICLE CHARGING INSIGHTS FOR PUBLIC SECTOR & COMMUNITY ORGANISATIONS

2019



BACKGROUND

Climate change and air quality concerns have seen successive UK Governments lay the foundations for electrified road transport. Efforts began in 2009 but it was 2018 that brought forward major developments in this field, including a firm policy commitment to end the sale of new petrol & diesel vehicles by 2040, a Charging Infrastructure Investment Fund worth £400million to 2020 and new legislation designed to regulate the emerging electric vehicle (EV) charging infrastructure market.

The National Grid has predicted that UK stock of EVs could hit 2.7-10.6 million by 2030, increasing to 36 million by 2040. This is a massive rise from estimated 2019 levels of around 212,000 EVs on the road. Existing EVs are currently served by somewhere in the order of 18,685 public charge points, so if the National Grid's projections are correct then a significant expansion of charging infrastructure will also be vital.

An opportunity now exists for public sector and community organisations across the UK to prepare for the predicted "electric vehicle revolution". This paper offers insights to those looking to provide new or upgraded EV charging infrastructure and in so doing, reduce their carbon footprint and add-value that will attract staff, visitors, customers or residents to their site.

ELECTRIC VEHICLES

Electric vehicles on UK roads today fall into one of three categories:

Battery Electric Vehicles (BEV)

Pure electric vehicles powered only by rechargeable batteries which are charged from an external supply (Nissan Leaf).

Plug-in Hybrid Electric Vehicles (PHEV)

Vehicles with a conventional engine and a small battery pack which is charged from an external supply (Mitsubishi Outlander).

Self-Charging Hybrids

Vehicles with a conventional engine and a small battery pack which is charged by the vehicle as it drives (Toyota Prius).

There are around 120 plug-in vehicle models on the market today and around 212,000 plug-in cars and vans on the road compared to around 235 in 2010. Every year new EV models with larger batteries and greater range come to market and this has a knock-on effect on charging infrastructure provision. For instance, 3 to 3.7kW charge points in public locations will become obsolete, indeed even in domestic installations EV drivers are opting for 7kW fast charging. 3.7kW fast charging may not be the optimal solution for new public facing EVCP installations and even 7kW units should be considered carefully.

CHARGE POINT TECHNOLOGY OPTIONS

An EV Charge Point is simply a unit with outlets or tethered cables at which a driver can charge their EV. Charge points can be broadly categorised by the rated speed (kW) of charge they deliver. The examples given below are typical but the need to provide charge points that match growing EV battery capacities should be borne in mind when specifying charge points for a site.

Slow Charging (2.7kW to 3kW AC)

Slow charge points are commonly found in off-road settings such as residential driveways where an electric vehicle can be slowly charged overnight to give a full battery for the day ahead.

Fast Charging (3.7kW 7kW, 11kW, 22kW AC)

Fast charge points are usually found at destinations where there is a need to park for an hour or more (e.g. supermarkets). Fast chargers can fully recharge some models in 3-4 hours.



Rapid Charging (43Kw AC/50kW DC +)

Rapid chargers are the fastest way to charge an EV and are often found at motorway services or close to major roads. Depending on the vehicle charge times can be 45 minutes to 1 hour. Rapid chargers are ground mounted and have tethered connectors. They require a direct network connection and often additional infrastructure such as a feeder pillar.

Ultra-Rapid Charging

150kW ultra-rapid charge points are just now hitting the UK highway, ready for the next generation of EVs with larger, hungrier batteries. The National Grid has pitched the idea of a strategic network of 350kW charging units wired directly to the high voltage network and already in Europe infrastructure is in place to support charging speeds of up to 350kW.

CHARGE POINT PAYMENT TARIFFS

Use of a public facing charge point is normally charged on a p/kWh basis and, less often, p/time. It is common for an additional session fee to be charged per connection.

Super-fast and rapid charge point tariffs are usually around the 30p/kWh mark with slower charge point tariffs around 10-20p/kWh. Connection fees are around £1-1.50 per session.

Charge point owners can set their own tariff, they can even set varying tariffs for different user groups or they can offer free charging if desired.

ACCESS & PAYMENT METHODS

Accessing and paying for charging sessions on public facing charge points is typically made via smartphone Apps or contactless RFID cards, although charge point product manufacturers are starting to support payment via debit and credit cards.

GRANT FUNDING

The Office for Low Emission Vehicles (OLEV) is currently running three grant schemes to support electric charging infrastructure costs.

Grants are available for workplace charging, private residential charging and a third fund is open to Local Authorities to support on-street charging.

Details can be found on the OLEV website

<https://www.gov.uk/government/collections/government-grants-for-low-emission-vehicles>

Recent legislation requires charge point operators in the UK to provide a uniform method of accessing public charging points and ensuring that these charge points are usable by anyone without the need to enter into a pre-existing contract. This means that as of November 2018 all public charge point operators must provide a "pay-as-you-go" option. Site owners looking to provide public charge points should ensure the products they specify can meet the regulatory and legal requirements.

Charge point payments are handled by the Charge Point Management System (CPMS), a remote back-office system that fulfills other functions including capturing data on electricity usage, frequency of use and operational status. Charge points connect to the CPMS via a mobile network or the internet.

Charge point suppliers usually offer a proprietary CPMS with the charge point hardware. However, some suppliers offer agnostic technology that can work with other CPMS systems offering site owners the flexibility to move between CPMS providers if they wish.

COSTS

Installation costs for EVs vary depending on the speed of the charge point unit, the location and the electrical system already in place. Rapid charge points require a dedicated grid connection the cost of which is very site specific and often significant. The table below sets out indicative unit costs for charge points, so simply for the purchase of the unit itself with no allowance for cabling, signage, grid connection etc.

Annual CPMS package costs again vary from supplier to supplier but something in region of £40 per socket per year can be expected. The CPMS managements payments and all income from charging sessions is collected by the CPMS provider and paid to the host on a monthly or quarterly basis. Deducted from these payments are transaction charges which are usually around 5% per transaction.

Other costs for site owners to consider are annual maintenance charges, warranties and public liability insurance cover.

CHARGE POINT	UNIT COST
SLOW	£300-£700
FAST	£1200-£2500
RAPID (50KW)	£19,000-£40,000

Outline Costs for Charge Point Units

CHARGE POINT OWNERSHIP/DEPLOYMENT MODELS

Site owners looking to provide electric vehicle charge points at their site/s can find a range of UK suppliers offering direct purchase or lease deals on charge point units.

Another route to deployment is via a hosting arrangement with one of the UK's existing charge point network operators. Hosting sees the network operator bear the cost of installing, managing and operating the charge point unit/s while the site owner benefits from providing a green community resource and an added attraction to their site.

Network operators with rapid charge points (c. 50kW) are usually looking for sites that offer good facilities for EV drivers to use whilst charging (cafe's, shops etc). They usually seek a 5 to 10 year lease on the land and often offer a share of the profits from the hosted charge point/s of around 10%.

Hosting smaller charge points may not yield a profit share, it is more likely that the network operator will reimburse electricity costs but will offer free marketing of the site to their customer base and other EV drivers.

SITING CONSIDERATIONS

Although every site is unique and every site owner will have different priorities, factors to consider when selecting siting charge points could include:

Access: Is the site open access or are there periods of closure or other restrictions to access.

Competition: Are there other charge points nearby e.g. open facilities, what size are they and what p/kwh cost

Facilities: Are there cafe's or shops that drivers can visit while charging their EV

User Profile: Who will be using the charge points and how long will they be on the charge point

Charge PointType: AC or DC, slow, fast, rapid or a mix

Ownership: Lease or purchase of hardware or host charge points for a third-party network provider

Grid Connection: Is there a grid connection point nearby, will single or 3 phase supply be required

Network/Comms: Can the CPMS connect to the mobile network easily or is a signal boost or hard-wired connection required

Permits: Will the proposed charge points fall under permitted development or, due to size, will they require planning permission

Civil Works: Is there an optimum location within the site that will minimise digging/trenching or landscaping

Construction: Can charge point installation be bundled in with other works to minimise cost



CO-LOCATION WITH RENEWABLE ENERGY AND ENERGY STORAGE

Sustainability is a key priority for many organisations and end users. Driving an electric vehicle already signals strong support for cleaner air and more sustainable transport solutions. Integrating renewable energy sources with electric vehicle charging increases the overall sustainability of a site and ensures that the electricity provided at the charge point is greener whilst reducing the dependence on the National Grid.

Electric vehicle charging is ideally suited to integration with a renewable power installation, in particular to Solar PV co-located with battery energy storage. In this integrated system, all of the electricity produced by the solar PV panels could be held in battery storage and drawn through the charge points before they switch to the National Grid. Battery energy storage could also be integrated with a wind turbine or a hydro turbine site, but the most common integration technology is a solar PV system. The potential of the site to host EV charging integrated with renewable energy and energy storage could be assessed as part of the initial site options appraisal process.

Many businesses, community groups, Local Authorities or other site owners have already invested in renewable energy installations, such as solar PV panels, and installed them on publicly accessible buildings. Any existing solar PV installation could therefore be suited for integration with battery energy storage and EV charging facilities.



CASE STUDY: THE ELGIN ESTATE

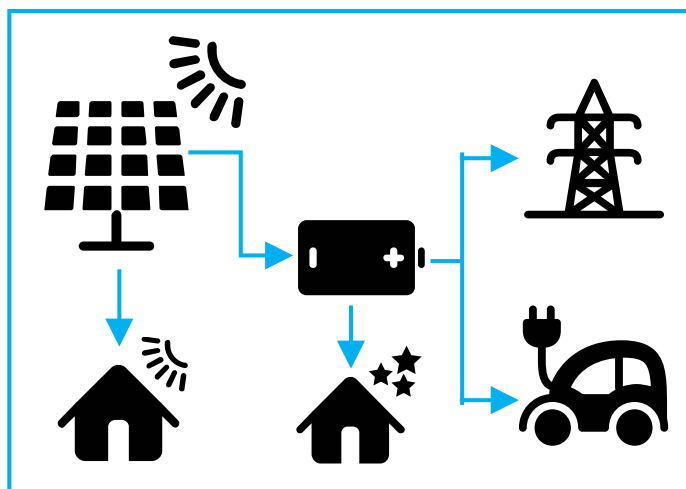
Located in the City of Westminster, the Elgin Estate is owned and operated by Waltherton & Elgin Community Homes (WECH), a successful resident-controlled Housing Association and Community Land Trust. The Estate comprises low-rise blocks of flats, a nursery, a community centre and the WECH offices.

In 2017 work began on a multi-million-pound redevelopment of the Estate to provide a facelift for the Estate buildings, additional new homes, improved facilities and enhanced public realm. A major part of the redevelopment was the installation of solar PV systems to four sites within the Estate boundary totaling 140kWp.

CWP Ltd was engaged to identify options for integrating battery energy storage (BES) and electric vehicle charging with the solar PV systems. Using our bespoke Electric Vehicle Charging Infrastructure Modelling Tool, our consultant's undertook a detailed analysis of electricity demand on-site, the potential for PV generation and the quantity of surplus PV generation that could be stored in a battery energy storage system. Using the modelling tool we ran cost benefit analyses of a range of energy utilisation scenarios including export to grid, on-site use and use for electric vehicle charging.

As a result of the modelling, WECH opted to install two 11kW charge points and CWP were able to introduce them to a potential partner for the hosting of rapid charge point units.

The solar PV systems were commissioned in March 2019 and plans for the co-location of a battery energy systems are in the pipeline for later in the year.



WHAT COULD YOUR ELECTRIC VEHICLE CHARGING PROJECT LOOK LIKE?

Public sector and community organisations could realise range of EV charging infrastructure projects; community groups could partner up with local businesses and create a local charging hub for utilisation by residents and visitors alike. In rural areas it could be a mechanism to provide destination charging, attracting visitors to spend their money in local shops and facilities, whilst providing charging points for residents overnight. CWP would welcome the opportunity to explore bespoke project packages with stakeholders, finding the right solution for the site and the people using it. Whether it is the provision of charging points only or an integrated charging point with a renewable energy generator and energy storage solution, let CWP explore the possibilities with you.

ABOUT CWP LTD

CWP has been providing renewable energy consulting services and delivering successful sustainable energy initiatives for clients since 2008. Our consultants have many years' experience of working within the UK's environmental, renewable energy and sustainability sectors at grass roots level, as campaigners, project developers, technical experts and policy advisors. Our consultants also have a strong background in community renewables and working with community groups and public sector organisations in developing sustainable energy projects. When it comes to electric vehicle charging infrastructure we can offer a range of services including:

IMPARTIAL TECHNOLOGY ADVICE: We are not tied to any specific equipment providers or charge point network operators and can offer impartial advice. We believe that project owners should choose the equipment and suppliers that work for them and meets their requirements.

SITE OPTIONS APPRAISALS: We can work with clients to assess their potential sites and model their charge point infrastructure requirements. We have a long track record of working with community groups, social housing providers and commercial clients. We will work with you to design a system that meets your requirements.

FINANCIAL MODELLING: In response to the rise in demand from clients looking for electric vehicle charging solutions, we have developed a sophisticated and bespoke financial model that can provide annual and 20 year cost profiles with payback and cashflow forecasting. The strength of the model is in its flexibility and management of parameters; whether it is the type of charge points being modelled, the battery size of the vehicles or the profiles of the charging stations, the CWP model has it covered.

CONTACT US TODAY

If you have any questions about our services or require information on electric vehicle charging opportunities for your site please get in touch. Our Consultant's are happy to answer any enquiries you may have and look forward to hearing from you.

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