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PROJECT
REPORT

Electric Vehicle Home
Charging Options Review

NW Leicestershire District
Council

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1. Background and Approach

1.1 Background

Cenex undertook a fleet review for North West Leicestershire District Council (NWLDC) to assess the operational and economic suitability of ultra-low emission vehicles (ULEVs) and the potential cost and emissions savings associated with their deployment.

The combined fleet consists of some 1,200 vehicles covering a wide range of vehicle segments from small vans to rigid trucks and refuse collection vehicle. Module 1 analysed these vehicles to identify their suitability for replacement by battery electric (BEV) and other low emission vehicle technologies.

However, the switch to BEV is not simply a matter of matching journey characteristics and vehicle type; the charging implications of such a change must also be considered. Since some of the vehicles in the fleet, particularly those associated with Housing Maintenance, are currently taken home overnight, identifying options to allow drivers to charge their vehicles overnight at their homes would dramatically reduce the need for depot-based or on-street charging infrastructure.

Given the overall analysis of the fleet the objective of this work package was to determine:

- What best practice would look like for a home charging scheme.
- Provide recommendations for how such a scheme could work across NWLDC.
- Outline a trial roll-out of the scheme.

1.2 Methodology

Cenex carried out desk based research, including telephone interviews, with fleet operators that have already investigated home charging to give a range of perspectives on the rollout of home charging schemes for operational vehicles.

Cenex also explored a range of chargepoint providers including: Alfen, ChargeMaster, Chargepoint, Electric Blue, EO Charging, Phoenix Works and Ubitricity to review the types of chargepoint infrastructure and back-office systems available for an employee home charging scheme.

1.3 Chargepoint Equipment Introduction

The following table outlines key definitions¹ and terms used within this report:

Table 1 - Key definitions

Term	Definition
Chargepoint	The stand or wall unit which an EV is plugged into, encompassing one or more sockets or tethered plugs, the user interface, access control, energy metering and circuit protection.
Chargepoint access	Domestic chargepoints are often open access, whereas public chargepoints require some way of recognising different users (such as linking to a smart phone app or users swiping an RFID card).
Back-office system	<p>The back-office functions that control and control access to chargepoints. It is usually hosted on a secure server and typically holds data on locations of, and sends/receives commands to/from, chargepoints on the network.</p> <p>The back-office system also holds information on authorised users (i.e. their RFID card or membership details) in order to enable charging access to the EV user when the system is requested by a chargepoint.</p> <p>A typical add-on feature to a back-office system may include instant access billing where the authorised user is billed for access to a chargepoint.</p>
Smart chargers	<p>Smart charging is the ability for EV supply equipment to control the timing of charging and the power output level in response to a user-defined input or signal.</p> <p>At the most basic level, this allows charging to be scheduled for times when grid demand is lower, and electricity is cheaper.</p>

¹ <http://ukevse.org.uk/resources/procurement-guidance/>

RFID cards	<p>Radio Frequency Identification card. A card holding information that is wirelessly read to identify its user.</p> <p>For chargepoints, an RFID card provides authentication to activate and terminate an EV charging event at equipment with access control.</p>
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2. Company Experiences of Employee Home Charging Schemes

This section provides details of the experiences of a range of organisations in terms of the implementation of electric vehicle home charging schemes.

2.1 Leeds City Council

The Leeds City Council (LCC) van fleet supports a range of departments including property maintenance, highway maintenance, greening, parks, and waste management. LCC has an ambition for all its fleet vehicles to operate using an alternative fuel by 2025. It has been adding electric vehicles (EVs) into its operational fleet since 2016 and has currently deployed more than 40 Nissan eNV200 vans. LCC needs to procure an additional 300 vans to meet its target and intends to acquire electric models in all possible cases. Most vehicles operate on a back-to-base model, so LCC identified capacity constraints at their depots as a potential barrier to accelerated vehicle deployment.

2.1.1 Pilot study

LCC undertook a pilot home charging scheme involving 10 employees. Expressions of interest were requested via a Chief Officer Briefing Note, asking for volunteers to take part in the trial. The eligibility requirements for participating stated that employees must:

- Already drive a Council vehicle and (for the pilot only) already take this vehicle home overnight.
- Have off-street parking which they can use for the Council vehicle.
- Agree to have a chargepoint installed at their home.
- Agree to provide feedback on the pilot to LCC.

More than 10 expressions of interest were submitted and LCC was able to identify enough employees who met the above criteria.

The Phoenix Works were commissioned to install the chargepoints and provide the back-office software. 7 kW wall-mounted units were supplied by EO Charging. The Phoenix Works audited participants' homes to ensure they were suitable for installation. LCC paid the cost of hardware and installation directly to The Phoenix Works, so the employees did not get involved in the process or need to pay anything upfront.

During the trial, drivers were paid a flat fee of £3 for each night that they charged the vehicle. This was based on a 'worst case' scenario in which vehicles would be fully discharged before each recharge; in that case, the cost in electricity would still be below £3. Employees submitted claims and were paid weekly in arrears.

2.1.2 Evaluation and deployment

Evaluation of the trial found that the trial participants were positive about their experience with the vehicles and the home charging solution. There was no notable internal resistance within the Council; drivers and managers recognised that EVs were a key component of the transport solution for LCC's fleet. This is due in part to a parallel piece of work to get senior officials and Councillors bought into using EVs and supportive of their deployment within the fleet. Union representatives also endorsed the scheme based on the positive feedback from drivers.

LCC is preparing a wider roll-out of the scheme. The criteria for participation in this stage of the deployment state that employees must:

- Already drive a Council vehicle.
- Have off-street parking which they can use for the Council vehicle.
- Agree to have a chargepoint installed at their home.
- Provide evidence showing their current electricity tariff (pence per kWh).

LCC is currently undertaking a procurement exercise for various charging solutions, including this home charging scheme. When this evidence was collected, installations were scheduled to take place from 2019 onwards.

The significant change for the full scheme deployment compared to the pilot concerns the reimbursement mechanism for drivers' electricity consumption. The chargepoint software will be specified so that LCC can use a web-based portal to remotely monitor the energy consumption of each chargepoint. This is already a feature of the chargepoints installed by The Phoenix Works, and whoever provides network services for the full deployment will also be required to provide this service. The Phoenix Works charges LCC a fee of £100 per year for the use of the telemetry in the charger and the portal to monitor electricity use. Drivers will submit a utility bill or other proof of the rate they pay for electricity in pence per kWh. LCC will use the energy consumption data and cost information to accurately reimburse employees for the electricity used. Payments will be provided every four weeks in arrears.

The scheme proposes that the chargepoints would remain the property of LCC; this means they can be removed by the Council if an employee terminates employment or stops participating in the scheme for any reason. Drivers sign an agreement binding them to the key terms of the scheme; the driver agreement is provided in Appendix A: Leeds City Council Driver Agreement.

2.1.3 Next steps and remaining challenges

As part of its drive to roll out BEVs and home charging across the fleet, LCC is working to make BEVs the default vehicle type for new employees. As part of the interview process, potential new starters are asked whether they would be happy to drive an EV and have a domestic chargepoint installed.

LCC recognises that this scheme is not suitable for all vehicles, employees and duty cycles. There are three challenges which remain to be addressed:

- EVs are not provided to staff who don't have off-street parking. While various solutions such as lamppost chargers are in trial and early deployment stages, these are not considered suitable for widespread deployment.
- A small number of vehicles are shared between two or more operatives. These vehicles are considered outside the scope of the current home chargepoint scheme, as infrastructure would need to be installed at more than one property. LCC will need to assess how many such examples there are and what the costs and benefits are of installing additional chargepoints.
- While the increased range of the latest Nissan eNV200 has made deployment easier, the increased cost is placing additional pressure on Council budgets. There may be a need to acquire other vehicles such as the Renault Kangoo Z.E. which has a lower specification (e.g. no rapid charging capability) but offers a significant cost saving.

2.2 Transport for London

Transport for London (TfL) operates a diverse fleet of around 1,000 pool cars and vans. Vehicles operate from depots across the capital and are used to support a wide range of jobs including maintenance of public transport assets, lineside tree clearing and movement of lost property. Duty cycles are mixed, with vehicles either returning to base or being taken home by employees at the end of a shift.

TfL is working towards the aim set out in the Mayor's Transport Strategy for all cars to be zero emission capable by 2025 at the latest, and all newly purchased vans (below 3.5 tonnes) to be zero emission capable from 2025 onwards. It should be noted that the financial implications of the coronavirus pandemic mean that this target is currently under review.

The duty cycles of most vehicles, with relatively low daily mileages in an urban environment, is well suited to the adoption of plug-in vehicles. Access to charging infrastructure is their greatest challenge, with two use cases posing a particular difficulty:

- Depots where multiple vehicles would need to be charged at the same time and place, placing constraints on the available electricity supply.
- Vehicles which are already taken home by employees after a shift and therefore can't be charged at the depot.

TfL scoped out a home charging scheme, where chargepoints would be provided at employees' homes for use with operational cars and vans. The challenges identified by TfL's review were as follows:

- Vehicles are not allocated to a single named individual; each vehicle is typically shared between several employees at a department or depot. TfL was, therefore, unable to identify enough vehicles that are taken home by the same driver each night. They would need to install chargepoints at multiple homes for each vehicle, to cover all permutations of duty cycles and shift patterns.

- Many employees don't have off street parking and therefore would not be able to install a chargepoint for their sole use. Some drivers have on-street public infrastructure nearby, but there was no way to ensure that these chargepoints would be available when required.
- Concerns were raised about the capital cost of infrastructure. First, the total cost would be high because installations would be required at multiple properties for each vehicle. Second, it was unclear what would happen in the event of an employee leaving TfL. In this instance, TfL couldn't confirm that they would be able to recover costs or remove the chargepoint.
- TfL was unable to devise a suitable scheme for managing the cost of electricity consumption from the chargepoint. They were concerned that employees would need to pay the bill upfront and then reclaim back the cost. Drivers' representatives, including union officials, argued that employees should receive compensation for being 'out of pocket' in the period between paying the bill and being reimbursed by TfL.
- Issues were raised around liability and insurance costs in the event of a defective chargepoint or installation causing fire or other damages to a property.

TfL concluded that the drawbacks identified would outweigh any potential benefits, so at this time their proposed scheme has not been taken forward.

2.3 Centrica²

When Centrica Business began the process of electrifying its fleet of 14,000 vehicles – the third largest commercial fleet in the UK – the distributed energy and power company faced several challenges. As well as the significant hurdle of electrification of their own fleets, the company also planned to launch Centrica Electric Vehicle Services (CEVS) to help other businesses tackle the challenges of transitioning to the EV future.

Centrica Business sought a scalable, smart and user-friendly EV charging software to manage both of these tasks and after a procurement exercise, Driivz was selected.

All EV fleets need to be primed and ready to overcome general EV obstacles, such as the availability of chargers, cost of charging, ability to prioritize which cars are charged first and whether drivers can charge at home. The Driivz service provides Centrica Business' own fleet and those of its customers a self-service portal to manage their account, set up payment plans, and be directed to available Centrica chargepoints.

Centrica compensates drivers for home charging, using the Driivz billing system, and has also linked its Hive Active Heating smart product to offer a combined mobility and heating package to CEVS customers.

CEVS has been running since the beginning of 2019, with fleet drivers from Centrica Business and its customers being able to charge at home, at work and on the road, based on the Driivz charging solution.

The next steps for the project are to analyse and use data to futureproof against potential issues with energy supply and demand as customer demand grows. Centrica Business is also aiming to allow its customers to integrate their EV chargers with existing energy infrastructure to generate, store and manage their own power, plus access local energy management services.

2.4 British Gas

As part of its commitment to become a net zero organisation, British Gas, has committed to electrify its 12,000 strong operational fleet by 2025, five years earlier than originally planned.

In addition to the 1,000 Vauxhall Vivaro-e vans purchased in 2020, British Gas has recently ordered an additional 2,000 models, representing the largest commercial EV order in the UK to date. All 3,000 electric vehicles will be on the road by 2022.

While engineers can volunteer to have the new vans during the rollout, the company is prioritising high pollution areas to help lower emissions, or where existing vans need replacing. The engineers will receive a charger installation at their homes, which will be managed as part of a home charging scheme. It is unknown whether this will use Centrica's Driivz solution or take advantage of its 2019 announcement of a partnership with Ford and Bord Gáis Energy that will allow Ford customers across the UK and Ireland to benefit from lower energy prices for overnight charging.

2.5 Mitie

In August 2020, Mitie Group selected Mina³ for a trial to support the transition to an all-electric fleet, using Mina's software to manage, monitor and pay for electric vehicle charging at employees' homes. Mitie are currently trialling the Mina 'EV fuel card' system with a test group within their 500+ EV fleet.

² For further information, see <https://driivz.com/>

³ For further information, see <https://www.mina.energy/>

Previously, Mitie had stated that a major barrier to mass EV adoption within their fleet was the management of home charging at employee houses. Mina’s software integrates with existing chargepoints at employee homes and their home energy supplier to offer payment for energy consumed to charge the EV via an online dashboard. Mitie’s fleet manager can also view the amount of energy used, which helps avoid the need for the expense forms previously used by employees to claim-back the energy used to charge their EVs.

In addition, drivers are able to input a personal/ business mile split into their driver portal, which is recorded using a separate tracking tool to help ensure that businesses only pay for business miles and likewise that employees don’t end up paying for business mileage in their domestic energy bill.

It is expected that the fleets will save money by benefiting from drivers charging at home too, thanks to the low cost per kWh of domestic energy compared to public or business charging.

Cenex discussed with Mina’s representatives about their solution and found out that they offer their platform services with a fee of 2p/kWh to 5p/kWh that is consumed depending on the vehicle volume.

3. Home Charging Scheme Recommendations

Home charging is likely to account for up to 80% of all charging done by EV drivers, including those who drive an EV for business purposes. Therefore, this section gives an overview of the solutions available.

3.1 Charging powers

Most EV drivers have a choice of two options for charging at home either by installing a dedicated EV chargepoint or by using a standard 3 pin household plug.

Home chargepoints typically have a power rating of 3.7 kW or 7 kW, with the UK Government proposing a minimum 7kW chargepoint for residential buildings. Some early home installations are 3.6 kW chargepoints but today the majority of the installations are 7 kW. Expected increases in battery sizes and technology developments could make chargepoints less powerful than 7 kW obsolete for future car models, so these should be avoided.⁴

3.2 Connector types

Typically, charging units are wall-mounted and available either with a tethered Type 2 cable which can be plugged straight into the car or with a Type 2 socket for use with the vehicle’s own charging cable.

Table 2 - Key facts on domestic chargepoint types

Charger Type	Charge Time	Connection Type	Miles of range added per hour of charging
Slow (AC) 2.3 – 3.7kW	0-100% in 10-12 hours	3-Pin Plug 	Up to 15 miles
Fast (AC) 7kW	0-100% in 4-6 hours	Type 2 (Mennekes) 	Up to 30 miles

3.3 Chargepoint providers

There are many models of domestic chargepoint available from several reputable manufacturers. Cenex interviewed a selection of hardware providers and network operators to get an industry-wide perspective on the potential for offering an employee home charging scheme.

All interviewees acknowledged that issues associated with charging multiple EVs at the same place and time (i.e. depot based) is becoming more common as vehicles reach mass adoption. They are increasingly

⁴ <https://www.gov.uk/government/consultations/electric-vehicle-chargepoints-in-residential-and-non-residential-buildings>

developing solutions to mitigate this challenge, including smart charging, and giving customers better remote visibility and control of charging events.

Results of this qualitative data collection exercise suggest that there are hardware and software solutions available in the market to support a home charging scheme, with remote visibility of energy consumption and ability to reimburse drivers accurately for the electricity used.

The information below is taken from the interviews with a select group of companies. Cenex has not undertaken independent market research into the products and services described. However, all the chargepoint providers had products that supported employee home charging schemes and provided online visibility of energy use.

A summary of relevant experience is detailed by the manufacturers is provided in the table below.

Table 3 - Chargepoint manufacturer experience

Company	Hardware Provided	Provides Back-office?	Installation?
Alfen	Their own smart chargers	Any chargepoint management system	Sub-contracted
Chargemaster	Their own smart chargers	POLAR app	Sub-contracted
Chargepoint	Their own smart chargers	Chargepoint app and dashboard System automatically reimburses employees based on kWh use.	Sub-contracted
Electric Blue	Their own smart chargers	Electric Blue back office can be linked to vehicles' telematics systems to monitor mileage and energy consumption. This means there is no need for drivers to manually enter odometer readings	Sub-contracted
EO Charging	Their own smart chargers	EO Web Portal RFID cards can be used to differentiate between work and personal vehicles	Sub-contracted
The Phoenix Works	All types of manufacturers	The Phoenix Works portal – monthly flat fee of 10£/charger	They are primarily an installer
Ubitricity	Their own smart chargers	Ubitricity/Siemens back office	Sub-contracted

3.4 Vehicle Sharing

Some vehicles may be shared by employees so the overnight location may not always be the same. In these instances, it would need to be ensured that appropriate charging infrastructure is installed at all sites where the vehicle may be parked overnight.

3.5 Type of Parking

Ideally, employees would have off-street parking where a standard 7 kW chargepoint can be connected directly to their home electricity supply.

For those without off-street parking, various solutions such as lamppost chargers are in trial and early development stages but are not considered suitable for widespread deployment by an employer.

Alternatively, these employees could make use of public charging infrastructure, providing there is availability in proximity to where they live. However, this solution relies on these public chargepoints being available when required and relevant chargepoint access cards being provided. It is also likely to be a much more expensive mode of charging.

3.6 Reimbursement Mechanism

When charging at home there needs to be a method for reimbursing employees for the cost of the electricity that they have used. This requires a back-office system connected to the chargepoints with an associated web-based portal through which the relevant manager (e.g. fleet, energy, etc.) would be able to remotely monitor the energy consumption from charging events of all drivers. Some systems offer automatic reimbursement of employees based on tracked charging session data.

- For reimbursement, drivers usually have to submit proof of their electricity tariff. There is a risk that employees might claim for personal use, so procuring a robust system is important.
- Smart cables such as that developed by Ohme⁵ or Ubitricity⁶ can connect to an existing chargepoint and identify the vehicle being charged to record the energy use and allow accurate reimbursement. The smart cables feature an electricity meter and mobile power contract enabling fleet managers to monitor and report the cost of charging at fleet and individual vehicle level, calculate home charging expenses and view CO₂ emissions and savings.
- There are hardware and software solutions (Mina⁷, Chargepoint⁸) available in the market to support a home charging scheme, with remote visibility of energy consumption and ability to reimburse drivers accurately for the electricity used. The idea behind these solutions is that employees' chargepoints are integrated in a platform and the software operator is linked directly to their energy suppliers. All the drivers need to do is plug in and the employer gets a single invoice for all energy used.

3.7 Providing home chargepoints to employees

3.7.1 Grant schemes

The installation of home chargepoints is incentivised by Government funding under the Electric Vehicle Homecharge Scheme (EVHS)⁹ administered by The Office for Zero Emission Vehicles (OZEV). The EVHS scheme provides funding for 75% of the total cost of the purchase and installation (up to a maximum threshold) of a chargepoint providing AC power between 3.5 – 22 kW.

From the 1st April 2020, the maximum eligible grant amount was reduced from £500 to £350 to enable a greater number of installations to be funded under the scheme¹⁰. Contributions will cover no more than 75% of the cost of a chargepoint and its installation, and grants will only be available for those that have the unit fully-installed by an OZEV-accredited installer. It has been confirmed that the scheme will continue to run until at least 31st March 2021 to continue to support the UK's transition to electric vehicles.

Individuals assigned a company vehicle or who are named by their employer as the primary user of an eligible EV for at least six months are eligible for the grant. The EVHS allows for third party contributions so the cost of charger and installation could be covered by NWLDC in this way.

Table 4 - Overview of EVHS grant

Domestic chargepoint funding			
Electric Vehicle Homecharge Scheme	1 point per eligible vehicle	75% Maximum grant	£350 (Incl. VAT)

3.7.2 Taxation implications

According to the Income Tax Earnings and Pensions Act 2003 s149(4), electricity is not treated as a transport fuel.¹¹ As a result, no benefit in kind tax arises if an employer:

- Pays to charge a pure-electric company vehicle;
- Pays for a chargepoint to be installed at the employee's home to charge the company vehicle; or
- Pays for a charge card to allow individuals access to commercial or local authority charging points

3.8 Ensuring installation “readiness”

It is recommended that NWLDC engage with an appropriate chargepoint installer and insist that initial surveys of properties are completed to assess whether any upgrades may be required and the likely costs in advance of rollout.

The installation must be undertaken by an OZEV approved chargepoint installer. Installers will advertise if they are an approved installer, and OZEV also maintains a list¹². Note that installers must also be approved by the

⁵ <https://www.ohme-ev.com/>

⁶ <https://www.ubitricity.com/en/mobilecharging-system-2/>

⁷ <https://www.mina.energy/fleet-solutions/>

⁸ <https://www.chargepoint.com/files/brochures/br-fleet.pdf>

⁹ <https://www.gov.uk/government/publications/customer-guidance-electric-vehicle-homecharge-scheme>

¹⁰ <https://www.gov.uk/government/news/update-on-the-infrastructure-grants-schemes>

¹¹ <https://www.gov.uk/government/publications/advisory-fuel-rates/advisory-fuel-rates-from-1-march-2016>

¹² <https://www.gov.uk/government/publications/electric-vehicle-homecharge-scheme-approved-chargepoint-model-list>

chargepoint manufacturer to install their product. This helps to provide additional confidence that the installer has the necessary product knowledge to be able to deliver a good quality and compliant installation.

In summary, the key responsibilities for the customer and installer are listed below (note that OZEV is currently reforming the EVHS claim process with the intention of reducing the administrative effort and time for grant funds to be released, so the below responsibilities are subject to change):

- Provide evidence of the vehicle ownership or order details.
 - Note that the chargepoint can be installed up to 4 months ahead of the date of delivery or start date of usage of the vehicle.
 - The customer guidance gives details of the acceptable proof that the customer is the vehicle's registered keeper or has ordered the vehicle.
 - If the vehicle is a company car, then the customer is responsible for obtaining proof that they are/will be the primary user for the minimum period of 6 months from their employer. A template form is provided in the OZEV customer guidance document.
- Provide any necessary information to the installer concerning the property electrical system and parking arrangement.
 - This may remove the need for the installer to do a survey prior to performing the installation and can help to reduce the cost to the customer.
 - The exact process will vary by installer.
- Provide details of the installation address and contact information for the primary user.
- Make a declaration to allow the installer to claim the EVHS grant for their installation.
- Provide approval that the installation costs are as agreed with the installer.
 - It is acceptable for a third party, such as an employer such as NWLDC, to contribute to the cost of the chargepoint installation.
 - In this case the customer must verify the source and amount of this contribution(s).

Installer responsibilities:

- Complete the chargepoint installation ensuring compliance with BS 7671 and the IET Code of Practice for Electric Vehicle Charging Installations.
- Provide a breakdown of installation costs to the customer and for the grant claim.
 - A template for this is again provided in the installer and customer guidance documents.
- Declare that the installation has been completed and is compliant with the terms laid out by OZEV for the EVHS grant.
- Complete an Electrical Installation Certificate (EIC) as per BS 7671 and Building Regulations compliance certificate for the installation.
- Provide the installation evidence required by OZEV – at the time of writing this is a photo of the installed chargepoint serial number and the property off-street parking.
- Notify the relevant Distribution Network Operator (DNO) of the installation works.

If NWLDC are interested in installing chargepoints at employees' homes, then all the above responsibilities for the employee as the end customer remain valid. However, the employer can assist by developing a relationship with the installer to start the process. A professional installer will then guide the customer through the process. The employer may wish to give additional guidance to their employees including assistance with completing the necessary claim forms and evidence, in particular concerning the details of the company vehicle for which the chargepoint is being provided.

Note that if the employer wishes to make a contribution to the cost of the chargepoint, it may be necessary to get a quote from the installer for the installation, to first understand the remaining costs that will not be covered by the grant fund as this may vary with installation address, even if the chargepoint hardware being installed is the same.

The supply and installation of a home chargepoint which is approved by OZEV and hence eligible for grant funding typically costs in the region of £400 to £1200. The variation in cost is mostly dependent on the chargepoint model selected. More expensive models will offer additional functions and features such as:

- Solar power compatibility.
- Timing functions.
- Mobile app integration
- Load management devices.
- More aesthetic designs or reduced size.
- Customisable options and colours.

The table below shows a breakdown of typical home chargepoint hardware and installation costs:

Table 5 - Typical hardware and installation costs

Cost Element	Typical Cost Range (£)
Chargepoint unit cost	250 – 800
Other electrical equipment costs (including cabling, switchgear, distribution equipment)	50 – 150
Other eligible costs (such as site surveys)	0 – 100
Labour costs	100 – 300

The cost of hardware is only guidelines and subject to change. The cost of installing a chargepoint depends very much on the individual situation such as whether an energy supply exists and has enough capacity or needs upgrade, how far the installation is from a suitable energy supply and what surface the chargepoint is to be mounted. These may be factors which will impact whether a particular home is selected for home charging.

3.9 Liability for home chargepoints

Cenex recommends that NWLDC only pay for damages to home chargepoints due to general wear and tear and not due to misuse.

NWLDC should encourage employees and train them in proper use of chargepoint equipment to avoid any damages due to misuse (e.g. not dropping the cable, not leaving the cable uncoiled etc). The chargepoint provider may issue such guidelines themselves.

If the installed home chargepoint remains property of NWLDC, this means they can be removed if an employee terminates employment, moves to a new property or stops participating in the scheme for any reason.

4. Recommendations

NWLDC face similar challenges to LCC and other organisations around providing enough charging infrastructure to support widescale BEV uptake.

It is therefore recommend that NWLDC plan, deliver and evaluate a trial of home EV charging for their operational fleet. This section proposes a methodology for such a trial based on the information gathered from stakeholders involved in this research. It also explains how to transition from a trial into a wider deployment phase, assuming the trial is successful.

4.1 Plan the Trial

4.1.1 Consider an industry partner

Chargepoint providers may be enthusiastic to support a home chargepoint scheme trial since they recognise the need to demonstrate that their products and services can support fleets with mass adoption of EVs.

There may also be potential for private sector funding for the trial including provision of hardware. Working with an industry partner could potentially leverage funding to reduce the cost of running a trial. We recommend contacting more than one potential supplier to compare proposals.

NWLDC may wish to involve Cenex in a privately funded trial, to ensure data monitoring is robust and impartial.

4.1.2 Scale and duration

Decide how many vehicles and drivers should be involved. A trial with 10 – 50 employees, as undertaken by LCC, should be enough to generate plenty of data and driver feedback, and identify any potential challenges.

The trial should be run for several months to allow any initial problems to be addressed and for drivers to get fully accustomed to the technology. The intention should be for the scheme to continue through the vehicle lifecycle, with an evaluation after six months.

4.1.3 *Select hardware and back office system*

7 kW wall-mounted chargepoints are best suited to this type of charging. Slower (3 kW) chargers are available but would mean vehicles would need to be plugged in for around 12 hours to receive a full charge. This means charging could not be scheduled to take advantage of cheap electricity tariffs.

As mentioned before, OZEV administers a grant scheme which offers up to 75% off the total capital costs of qualifying chargepoints and associated installation costs (capped at £300 including VAT). All home chargepoints funded by this grant must use innovative 'smart' technology from July 2019. This means chargepoints must be able to be remotely accessed, and capable of receiving, interpreting, and reacting to a signal. This is a helpful piece of legislation for home charging as it means all of the offerings on the market have the capability to report their consumption for billing and monitoring purposes.

Specify a back-office system which supports remote monitoring of energy consumption and shows when charging events take place. It is vital to have a remote web portal to track electricity consumption to ensure compliance, ensuring drivers are not overclaiming or not being fully reimbursed. Some systems offer automatic reimbursement of employees based on tracked charging session data. We recommend specifying this as 'desirable' rather than 'essential', as it may restrict your procurement to a small number of suppliers. Likewise, consider specifying the ability to remotely control and schedule charging.

NWLDC will need to determine the best route for procuring hardware and installation services. Ideally there will be a framework in place which can be used for purchasing 7 kW wall-mounted chargepoints. However, if an industry partner has been appointed for a private sector funded trial, they may supply hardware directly, without the need to undertake a competitive procurement exercise.

As outlined in Section 2, many of the suppliers Cenex contacted provide the necessary remote visibility of energy consumption.

4.1.4 *Reimbursement mechanism*

The trial should consider how to automate the process of reimbursement to reduce driver and fleet administration.

Reimbursements can either be provided as a flat fee per charging event, as in the LCC trial, or an accurate reimbursement using energy consumption data, as per the full LCC deployment. The former is easier to administrate and provides a small incentive to drivers to take part. Our understanding, based on LCC's experience, is that there would be no tax implications if the vehicle is not driven to the same place of work each day, and the employee can't use the chargepoint for their own vehicle. This mechanism is somewhat similar to paying Approved Mileage Allowance Payments (AMAP rates) to grey fleet drivers, which are provided irrespective of exact fuel consumption. However, we strongly recommend seeking verification from your tax office to ensure compliance with the relevant legislations.

While the flat fee approach is straightforward and could be used to get a trial set up, we recommend using accurate reimbursement when deploying at-scale. As shown in Section 3.6, hardware and software are available to facilitate this approach, and it provides clarity and fairness to drivers and NWLDC.

It is worth mentioning that many electricity suppliers are starting to offer tariffs specifically targeted at EV drivers which charge higher electricity price tariffs at peak times and lower tariffs at off-peak times. In the case of the employer offering a fixed fee for EV use, the employee would be able to maximise their benefit by switching to an EV energy tariff if they wanted. However, as we recommend that employers reimburse for actual EV energy consumption, this will go in the employer's favour, but the employee may lose out as they have a high day time tariff. More information about EV tariffs can be found at Appendix B: EV Tariffs.

4.1.5 *Monitoring and evaluation*

Define the criteria that will be used to evaluate the trial and the methods for data collection. This should include quantitative data such as energy consumption and cost, as well as qualitative feedback from drivers and department managers. Feedback could be gathered via email, internal meetings, or workshops.

4.1.6 *Stakeholder engagement*

Once NWLDC have planned the trial, the next step is to secure support from key internal stakeholders. One of the features underpinning LCC's success was the positive feedback received about the trial from operational departments, drivers, senior managers, and Unions. Undertake a stakeholder engagement exercise as early as possible to achieve buy-in across and at all levels of the organisation. Ideally, identify a senior manager to act as sponsor for this project. Meet with managers from operational departments and union representatives to explain the purpose of the trial and what is involved.

Key points to note are:

- The trial is voluntary, so no drivers are being forced to change their working practices or have a chargepoint installed.
- Drivers will benefit from having an EV to use for commuting to and from work: vehicles are quiet, comfortable and easy to drive.
- Facilitating widespread EV deployment is a key part of achieving the objectives of the Go Ultra Low programme.
- Deployment of home charging will save the council money by avoiding the need to fund expensive network upgrades at the depot.

4.2 Select participants

Survey drivers to determine who is eligible and gather expressions of interest. At a minimum, drivers will need to have off-street parking and have a vehicle which is allocated solely for their use. NWLDC may wish to set other criteria for participation but be mindful that additional criteria will reduce the pool for potentially eligible drivers. Assuming no other criteria are imposed, drivers can be categorised into three groups:

- Group 1: Have off-street parking, an assigned vehicle, and are willing to participate.
- Group 2: Have off-street parking, an assigned vehicle, but have reservations about participating.
- Group 3: Either don't have off-street parking or share a vehicle with another employee.

Drivers from group one, plus drivers who already have an allocated EV, should be taken forward for participation in the trial. Until the survey has been undertaken, it is not possible to say how many employees will be in this group. The list of drivers and assigned vehicles will need to be cross-referenced against the fleet review to identify cases where a vehicle is due for replacement. Identify a cohort of around ten vehicles and employees that meet these criteria. These individuals will need to sign an agreement, including agreeing to provide structured feedback.

4.2.1 Launch the trial and evaluate

Once underway, the trial should run for several months before carrying out a formal evaluation. Interim evaluation of driver and manager experiences and monitoring of energy consumption data is recommended to ensure any potential problems can be rectified during the trial. After six months, evaluate the trial using the criteria identified. Check that vehicles have been able to meet operational needs and that any concerns from departmental managers, drivers and/or union representatives are collated and addressed.

The business case for EVs should be updated with a 'home charging scheme business case' to include cost of electricity from employees' homes, any additional commuting mileage of the vehicles, cost of hardware and support. This can be compared to the current diesel vehicle business case to evidence the cost saving available.

Communicate findings throughout the organisation and, assuming the pilot was successful, secure funding for wider deployment.

4.2.2 Wider deployment

Wider roll-out of the scheme should be undertaken until all the drivers in group one (see 4.2) have an EV and a home chargepoint. At the same time, any new employees that have off-street parking should be provided with an EV as a default, with a home chargepoint installed. Their interest and eligibility for participating in the scheme can be assessed during the recruitment process.

Drivers in group two (those who met the criteria but were unwilling to participate in the survey) may change their views once a successful pilot has been undertaken. Survey these individuals again to assess appetite for involvement in the scheme.

4.2.3 Further considerations

Drivers in group three, with either no off-street parking or without an assigned vehicle, are a more challenging cohort for a home charging scheme.

- For drivers without off-street parking, local authorities can apply for OZEV funding to help with the costs of procuring and installing on-street chargepoints for residential use. Applicants need to secure a minimum of 25% of capital funds via sources other than OZEV funding. Note that chargepoints must be accessible to local residents, rather than for the sole use of NWLDC employees, so this is likely to only be an option if there is a back-up chargepoint nearby.
- NWLDC will need to undertake further analysis to determine whether it is viable to provide chargepoints to support vehicles which are shared by two or more employees. It may be possible for

two drivers to share an EV with only one of them having access to a chargepoint. This could potentially work if the vehicle has a high range, covers short daily distances, and one staff member takes the vehicle home more often than the other.

5. Conclusions

This report has reviewed the contrasting approaches and outcomes at LCC, TfL and other examples, with a successful trial and deployment in the first, and a decision not to pursue a home charging scheme after challenges with the second. Operationally, there are differences between those two fleets which partly account for the different outcomes. For example, TfL has a substantial number of vehicles which are shared between more than one employee, and fewer drivers with access to off-street parking. These conditions make offering a home charging solution more challenging. It is likely that the NWLDC operations are more like LCC than TfL and would therefore be well suited to a home charging scheme.

A second key difference between LCC and TfL is the ownership of this activity by an individual with the ability to drive it forward and secure buy-in across and at all levels of the organisation. If NWLDC can follow this approach, and bring departmental managers, senior managers and Unions on board, we see no reason why they should not be able to implement a home charging scheme themselves.

Currently more and more fleets offer a home charging scheme for operational vehicles. Chargepoint operators already provide software to facilitate this approach, for example with remote visibility of energy consumption. This is likely to develop further, for example with automated reimbursement and increased scheduling of charging events. From our review of the market we conclude that the systems currently available are already able to support the type of home charging scheme proposed here.

To achieve their ambition to run a zero emission fleet, NWLDC will need to implement innovative measures to provide their fleet with enough supporting charging infrastructure. Installing chargepoints at drivers' homes, while challenging, would overcome the barriers around constraints and unlock the potential for fleet BEV deployment.

We recommend NWLDC proceed with a home charging trial as outlined in this report.

6. Appendix A: Leeds City Council Driver Agreement

6.1.1 Introduction

This document constitutes an agreement between you and Leeds City Council which sets out the terms and conditions of the home charging of the electric van that you use in the course of your work.

6.1.2 The Charge Unit

- You agree for the charging unit to be installed in a suitable position in your property to allow charging of the vehicle within your boundary and off the road.
- The charging unit will remain the property of Leeds City Council.
- You will be responsible for ensuring that the charge unit is used correctly, and you will follow any guidance provided on the use and maintenance of the charge unit.
- Any problems with the device should be immediately reported to Fleet Services who will carry out any necessary repairs.
- The charge unit be made available at all times for the LCC fleet vehicle and its charging requirements.
- If the charge unit is deliberately damaged or misused, then this will become a conduct issue and be dealt with under the Council's disciplinary procedures.
- Use of the charge unit is there to be used at the employee's discretion. However, only works for the fleet vehicle charge will be reimbursed as per the agreement.

6.1.3 Length of Agreement

The charging unit will remain on site for the length of the vehicle's life cycle (6 years) or until the agreement is terminated by either party.

6.1.4 Charging Costs and Payment

Your electricity usage will be recorded by the charging unit which will be accessible via a web portal by yourself, the council and the company operating the charging unit. A monthly summary of the electricity used will be sent by the company to Business Support Services who will check this against expected usage. This sum will then be included in your monthly pay.

6.1.5 Driver Responsibility

By signing this agreement, you agree to maintain the charger in good order and keep the electric vehicle charged to suit your needs.

6.1.6 Termination of the Agreement

You may terminate this agreement by informing your line manager in writing that you no longer want to participate in the scheme.

Leeds City Council may terminate this agreement for any one or more of the following reasons:

- Ending the pilot agreement.
- Due to outcome of any disciplinary procedures.
- The ending of your employment with Leeds City Council.

On termination of the agreement for any reason Leeds City Council will attend at your property to remove the chargepoint and make good.

Writing termination within the 3 months.

By signing this agreement, I confirm I have read, understood, and agree to the above terms and conditions.

Signature

Name

Job Title

Date

Fleet Strategy Review – Home Charging

Signature

Name

Line Manager

Date

7. Appendix B: EV Tariffs

Previously, the only way to save money on electric vehicle charging was by making use of the Economy 7 or Economy 10 tariffs, charging overnight when electricity was cheapest. However, some suppliers are now introducing targeted electric vehicle tariffs (EV tariffs).

With no EV tariff in place, for a typical electric car with 60kWh battery and around 200-mile range, charging your car at home from empty to full will cost about £7.80 on an average tariff. With an EV tariff or an Economy tariff giving cheaper overnight electricity, combined with intelligent charging control, you could halve this cost. This means it's important that EV owners consider switching to a focused EV tariff to keep costs down.

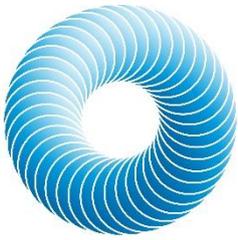
Further details of currently available EV tariffs are provided in the table below.

Table 6 - EV Home Energy Tariffs (as per Sep '20)

Supplier	Tariff Name	Cost	Other benefits
British Gas	Electric Drivers Nov 2021	Standard: 20p/kWh Off-peak: 4.7p/kWh	<ul style="list-style-type: none"> Free smart meter installation, if you haven't got one already For dual fuel, smart meter customers 5 hours of lower priced electricity 00:00-05:00 every day (35 hours per week)
Ecotricity	Green Electricity + EV	Standard: 16.54p/kWh Off-peak: 10.31p/kWh	<ul style="list-style-type: none"> 1/2 price Electric Highway charging Discounted home chargepoint
EDF Energy	GoElectric Nov21	Standard: 12.75p/kWh Off-peak: 8p/kWh Peak: 19.9p/kWh	<ul style="list-style-type: none"> 5,000 free miles when you also lease an electric vehicle through EDF Save up to £210 on the single rate version (No Smart meter required) Half-Price off-peak charging 21:00-07:00 Mon-Fri, and all day Sat-Sun (with a compatible smart meter)
E.On	Fix and Drive v9	Standard: 17.81p/kWh Off-peak: 10.9p/kWh Peak: 20.67p/kWh	<ul style="list-style-type: none"> 850 free EV mile reward equivalent to £30 Carbon offset gas Cheaper overnight charging 00:30-07:30 every day (49 hours per week)
Good Energy	EV Driver 4	Standard: 16.27p/kWh Off-peak: 12.2p/kWh Peak: 16.34p/kWh	<ul style="list-style-type: none"> Standard, Economy 7 & Economy 10 available Three tariffs depending on meter set-up
Octopus Energy	Octopus Go	Off-peak: 5p/kWh Peak: 13.33p/kWh	<ul style="list-style-type: none"> 50% cheaper than typical Economy 7 night time rate Smart friendly API: Automatically charge when it's cheapest with a smart charger or cable Upgrade to 100% carbon offset gas with Supergreen Octopus 4 hours off-peak electricity 00:30-04:30 every day (28 hours per week)

Table 7 - EV Home Energy Tariffs (as per Sep '20) – Con't

Supplier	Tariff Name	Cost	Other benefits
OVO Energy	EV Everywhere	Standard: 15.89p/kWh Off-peak: 10.33p/kWh Peak: 17.78p/kWh	<ul style="list-style-type: none"> • Polar Plus membership • 2 Year Fixed Energy plan • 7 hours off-peak electricity, typically 00:00-07:00 every day (49 hours per week)
Tonik	Home & Smart EV	Standard: 10p/kWh Off-peak: 4.17p/kWh	<ul style="list-style-type: none"> • Charge your EV with 8,000 miles for only £80 • Two rate meter or compatible smart meter • Get a Zappi installed by us and receive £100 reward credit on selected tariffs, inc our EV tariff • 7 hours of cheaper overnight energy, every day (49 hours per week)



cenex

**Lowering your emissions
through innovation in transport
and energy infrastructure**



Transport



**Energy
Infrastructure**



**Knowledge
& Enterprise**

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