PLUGGING INTO THE FUTURE

DOMESTIC ELECTRIC VEHICLE CHARGEPOINTS AND WHY THEY MATTER

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The successful rollout of Electric Vehicles (EVs) is heavily reliant on corresponding infrastructure, of which chargepoints are a fundamental part. Put simply – without enough chargepoints, EVs will not be viable. With the UK requiring roughly 4.1m chargepoints by 2030, how and where we build these chargers is a topic of great importance.

Introduction

As part of the government's net zero carbon strategy, the UK is moving to an electricity-based society. This means transitioning everything from home heating to vehicles to be electrically powered, whilst simultaneously scaling up renewable generation.

Currently, only 2-3% of the cars on the road are fully electric or hybrid, illuminating the scale of the challenge posed by switching away from fossil-fuelled cars. With EV registrations set to nearly double in 2023 from 267,203 to an estimated 448,000, raising the market total to 1.8 million, progress is being made. However, it is no good everyone having an EV if we do not have the chargepoints in place to power them.

In the same way that we all charge our phones overnight whilst sleeping, this is most users' preferred way of charging their EVs. Therefore, homes are one of the most sought-after places for chargepoints, making our properties a key area of the transition.

Policy space

To enforce the transition to EVs the government has set targets for no new cars or vans to be wholly petrol or diesel fuelled by 2030, and from 2035 new hybrid vehicles will be outlawed too. In addition to this, some local councils have

taken their own measures to encourage change, such as the Ultra Low Emissions Zone in London.

When it comes to chargepoints, the newly created Part S of Building Regulations – which covers 'infrastructure for the charging of electric vehicles' – is the most significant legislation. Part S came into effect in June 2022 and requires all new-build homes that have a parking space within the boundary to be fitted with a smart chargepoint, delivering a minimum of 7kW of power.

To support the purchase of chargepoints, the Office for Zero Emissions Vehicles (OZEV) offers the EV Chargepoint Grant. There are three versions of the grant, each with different consumer targets. In all its different guises, the grant covers people who live in rented properties or own a flat with dedicated off-street parking, businesses with staff and fleet parking, and landlords for properties other than that in which they live. The Grant provides £350 or 75% (whichever is lower) off the cost of purchase and installation. In Scotland, additional funding is available on top of the OZEV Grant with its own specific eligibility requirements.

Types of chargepoints

Chargepoints are becoming increasingly common in everyday life, seen in a whole host of locations from supermarket car parks to office spaces, and ironically, petrol stations. The variety of chargepoints is not limited to location but is extended to types of chargers too, with the distinguishing feature being the provided power output.

There are three kinds of stationary chargepoints – each aptly named after the speed at which they can power cars – 'rapid', 'fast', and 'standard'. 'Rapid' chargepoints boast the highest power output ranging from 43kW to 50 kW. These are becoming more common and do tend to come at a premium cost per charge because of the speed at which they can charge cars. As technology progresses, we are even starting to see some chargepoints reach up to 350kW, dubbed 'ultra-rapid'. Currently these are only really found at motorway services.

'Fast' and 'standard' chargepoints are more likely to be seen installed at homes. 'Fast' chargepoints deliver 7kW, meaning they comply with Part S of Building Regulations, so will be commonly installed at new-builds. 'Standard' chargepoints are older and operate at an inferior 3.6kW, hence are only really found at properties where chargepoints have been added post construction.

For reference, to fully charge a small 40kW car battery, it will take 11 hours with a 'standard' chargepoint and six hours with a 'fast' unit. Whereas a 50kW 'fast' chargepoint can charge the same sized battery to 50% in around 20 minutes.

All types of stationary chargepoints have 'smart' versions (Part S compliant chargepoints must be smart). Smart chargepoints give consumers more control over charging, allowing them to monitor, manage, and restrict charging from a mobile app.

As smart chargepoints can automatically adjust charging power, they also give district network operators the ability to alter a car's charging pattern to fit the needs of the electricity grid, known as vehicle-to-grid services. This will only happen at properties where permission is given by the consumer and specific terms are agreed. Possibilities like this, facilitated by smart chargepoints, will be explored more extensively later in this article.

Finally, we have portable charging cables fitted with a 13A supply which can go directly into a wall socket. These tend to come with EVs and require no additional infrastructure making them useful but slow. For this reason, portable chargers tend to be a last resort, to be used at dwellings without a stationary charger. Portable charging cables are not Part S compliant.

Connecting cables

The cables that feed into the vehicle from chargepoints come in three variations. The oldest and least common type in the UK is a five-pin connector known as 'type 1'; these are capped at 7.4kW. 'Type 2' connectors have seven pins and are more common, allowing for faster speeds of up to 43kW. Both cable types deliver grid electricity in AC to the car, which is converted to DC (the form required by the battery in the car).

Cables compatible with even faster charging are becoming increasingly common. Known as CCS cables, they are similar to 'type 2' connectors but have an additional two pins. CCS cables enable enhanced charging speeds because they can deliver DC straight from the chargepoint to the car's battery, where this is available, such as at ultra-rapid chargepoints.

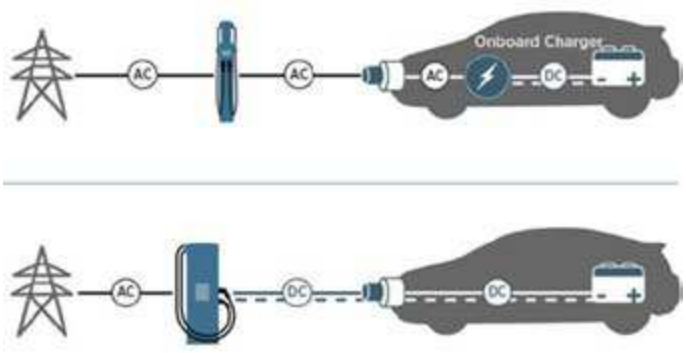

Figure 1: The top diagram depicts the electricity transfer when using 'type 1' and '2' cables, whereas the bottom diagram shows the exchange that occurs when using CCS cables. Credit: ChargePoint

The cable type used is down to the specific port on the car, and most chargepoints are fitted with universal sockets accepting all types of cable. This removes the risk of older vehicles being phased out by a lack of chargepoint availability and stops one car manufacturer from having a monopoly on the market.

Domestic chargepoints and their impact on the property market

EV chargepoints must be installed outside or in outbuildings such as a garage. They can be a standalone post or attached to the wall. Chargers must comply with Part M of

Building Regulations and the Equality Act 2010, to ensure that everyone is able to use and access them. For example, manual controls must be within reasonable reach for all occupants, chargepoints must be void of trip hazards, and there must be adequate surrounding space for ventilation and cooling.

At the time of writing, the average home chargepoint costs around £1,000 including installation. The photographs below show two examples of chargepoints which could be seen in new-build homes as they provide 7kW of power, therefore making them compliant with Part S.

Credit: PodPoint

Credit: Andersen
Figure 2 and 3: examples of chargepoints found in new-build homes

Interestingly, when speaking to the property industry, we heard different stories from two separate sides of the market – valuers and buyers.

Sava Trainer, Fiona Haggett FRICS, said:

"I've not yet seen any lender activity on this point, and it has not been the subject of discussion at any of the forums I attend. The focus recently has been on flooding, EPCs, coastal erosion and subsidence risk.

I have also never seen any mention of EV chargepoints in a valuation report. However, I am sure EV factors are beginning to feed into the "value decisions" made by purchasers and an EV chargepoint in a house has to improve marketability as the number of electric cars increases.

I am actually having my garage rebuilt at the moment and part of the required spec for me is an EV chargepoint – as it has to be a good idea to future proof the property and help sell it in a few years' time."

Conversely, when talking about the importance of EV chargepoints for buyers, Paul Swindlehurst, partner at estate agents Michael Anthony, said:

"Over the last 12 months EV chargepoints have become an increasing issue. This is largely in older and conservation areas that don't have the facility to guarantee near-home parking, let alone somewhere where an EV chargepoint can be placed.

There have been several instances where potential buyers have turned up to view properties and have then said that they have an electric car and how would they charge it, the only answer is – in these locations they can't. This is an issue that will only rise, and a viable solution needs to be found."

What seems to be clear is that although EV chargepoints are yet to have an impact on valuations, it is an asset that buyers are now looking for. Therefore, it is likely it won't take long for this demand to be reflected in valuations.

Outside the home

Associated parking spaces for multi-residential and mixed-use buildings also fall under the provision of Part S. Associated parking for residential use must provide one chargepoint per household in multi-use buildings, and for every 10 parking spaces one must come with an EV chargepoint. These requirements will help to ensure that those without domestic private parking can still access chargers.

The requirement to increase levels of chargepoints, which Part S places on developers, is important and will help to make the target of 4.1m chargepoints by 2050 more attainable.

The electricity network and grid demand management

When it comes to the electricity provision of a property, EV chargepoints can operate on a standard single phase electricity supply. However, if heating also becomes electrified, using a heat pump for example, the electricity supply may no longer be sufficient. Therefore, to future proof homes in the most cost-effective way, it might be wise to upgrade the network connection to a three-phase supply at the time of connecting a chargepoint to the home. The 2025 Future Homes Standard supply may also require all new homes to be built with three phase

provision, so it seems like this will become the standard to keep up with future domestic electricity demand.

It would be foolish to think that by ramping up EVs and domestic chargepoints there will be no extra demand placed on the grid. This is an issue that will have to be addressed, with EV charging and heat pumps set to double the UK's electricity demand by 2050. To match this demand, both generation and network infrastructure will have to be scaled up.

How this will be done is currently up for debate. The government are considering how this task will be best undertaken in its ongoing Review of Electricity Market Arrangements, which seeks to identify the reforms needed to transition to a decarbonised, cost-effective, and secure electricity system. In the meantime, what can be said with confidence is that this will be a costly task that requires a high degree of government involvement.

Although EV chargepoints will increase demand on the grid, interestingly they can actually be used to help manage demand too.

As previously mentioned, smart chargers allow electricity from an EV's battery to be transferred to the grid at peak times to help manage the supply. With electricity demand only increasing, vehicle-to-grid services will start to play a more significant role in balancing demand, and operations of this kind will likely become commonplace. It is worth noting that this is only possible with the approval of the car manufacturer, as such schemes may place greater stress on the car's battery, which could cause complications with the warranty.

Another form of grid balancing supported by smart chargers, which is already being incentivised by energy suppliers, is 'time-of-use' tariffs. These offer customers cheaper electricity prices during various periods of low demand. This works well with EV charging, as night-time tends to be the preferred time of charging for most consumers and is also when grid demand is lowest. In essence, tariffs encourage consumers to shift demand away from peak times, helping to lessen the burden on the grid.

Another type of vehicle-to-grid service is to use the battery of an EV like a domestic energy storage system, by connecting the chargepoint to the property's power supply. EV batteries could store excess generation from solar PVs or just charge up on cheaper off-peak prices. This electricity can then be used at the household's convenience.

It is worth bearing in mind that with solar generation at its greatest during the day, the car must also be at the property during this time. This means, it may transpire that this is not for regular use but more of an infrequent bonus.

As discussed, the potential role of domestic chargepoints in grid demand management and the electricity network are huge, and this is only the beginning. No doubt as technology becomes more widespread and the need to manage demand more pressing, we will see an increase in innovative uses for EVs and their chargepoints.

The future of chargepoints

There is even the prospect of wireless EV charging like that already used for phones. Siemens have forecast that the wireless EV charging market could be worth $2bn by 2028. Wireless charging would increase the ease of car charging by removing the need for cables, however this is only in pilot form at this point, with the amount of power that could be delivered being explored. Cars are also not yet designed to support wireless charging, with the change not likely to be made until the charging infrastructure itself is fully developed.

Considering the fascinating potential held by EVs and their chargepoints to assist in grid demand management, it is apparent that chargepoints will be more than merely a vehicle to charge your vehicle.

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