Briefing 17/38 October 2017

Electric Vehicle Charging Infrastructure

Key Issue

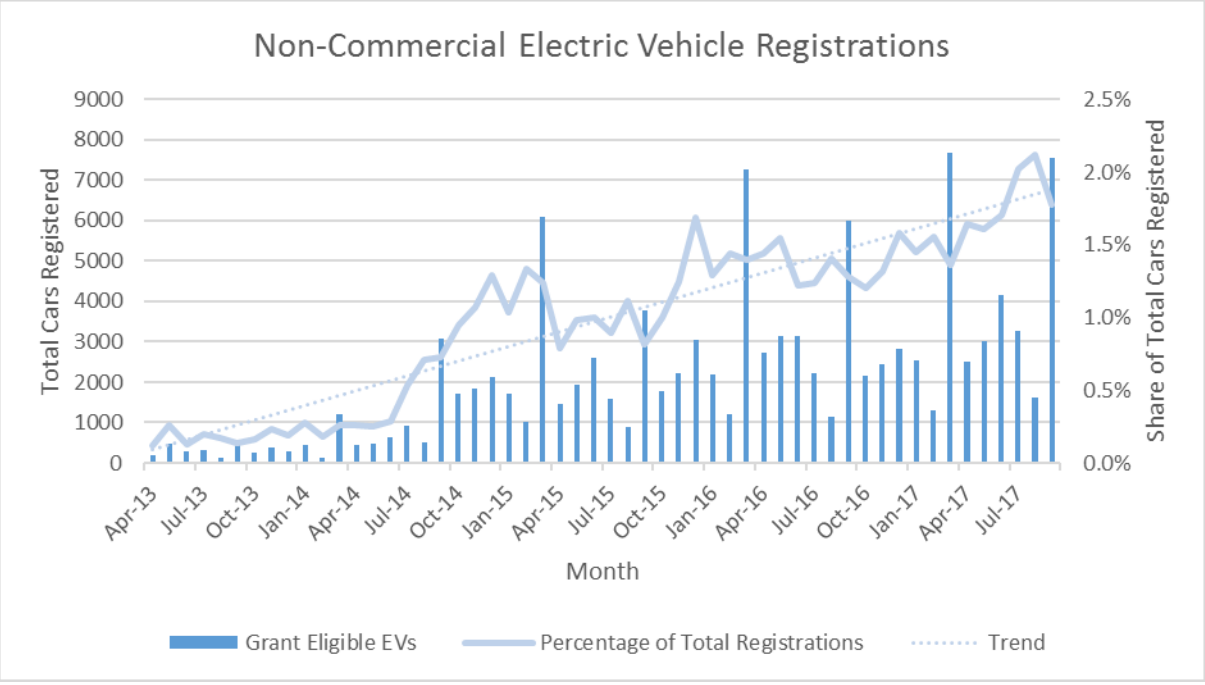
As consumers and the council fleet move towards becoming electrified, there are a number of challenges that Local Authorities will face when developing their infrastructure. This briefing will give an overview for what these are and how they can be tackled.

To: All APSE Contacts

Background

Electric Vehicles have been increasing in popularity amongst consumers. From January to June 2017, cars that require some form of charging (either fully electric or plug-in hybrid) account for 22,348 of new vehicle registrations. This is up almost 15% from the same period in 2016. The Office for Low Emission Vehicles (OLEV) have provided grants for plug-in cars, and the graph below shows how Plug-Ins have been capturing a larger share of the market. As of 5th of September 2017, 109,097 eligible cars have been registered.

This provides a challenge to local authorities, as the demand for charging facilities has



increased alongside this, and this will only grow further as plug-in vehicles become more widespread. The current target is for the U.K. government is to ban the sale of all petrol and diesel cars by 2040, and the Scottish Government aims to achieve the same goal by 2032. APSE has been asked in the past to circulate queries on EV Charging Infrastructure, and this briefing is aimed at highlighting some considerations that must be made when developing an Electric Vehicle Charging Network, and to give a few examples of the work that our members have been undertaking.

Types of Charger

Typically, chargers fall into one of the following three categories. It is expected that councils will use a mix of all three in their charging network.

Slow: 3kw

Slow chargers most often use the standard 3-pin plug, and are almost always used with a cable provided by the driver themselves. Some also use the Type 1 or Type 2 "Gun" connecters. These chargers typically charge a car within 6-8 hours, though it is possible for multiple plugs to be used to decrease charging time significantly. These are mostly being phased out by Councils due to their slow charging speeds. There are currently over 2600 slow connectors across the United Kingdom.

Fast: 7k

Fast Chargers are the most common type of charger in the United Kingdom, with over 7000 connection points installed country-wide. Most provide either a type 1 or type 2 socket, though some units are tethered and provide the cable themselves. Total Charge time is around the 3-4 hour mark.

Rapid: 22-50kw

There are two types of Rapid Charger Unit. AC Units, which provide a tethered Type 2 Connector and can charge an EV to 80% in 30-60 minutes, and DC units, which provides tethered CHAdeMo or CCS Connectors and can charge to 80% in around half an hour. DC units are more common, and Rapid chargers are currently used most often at motorway service stations.

Responses from our members have highlighted a number of things that councils should be aware of when selecting which chargers to install. Many councils have opted to go the route of having a third party install and maintain equipment, in return for a share of the profits. This has the advantage of saving costs upfront for the councils, though there are still other costs that councils will have to pick up.

- The cost of converting parking bays themselves to allow for a charging unit, and then the cost of maintenance on that bay, as any deal with a third party would only cover the charger itself.
- Cost of new signage.
- A loss of revenue from no longer being able to charge money for parking in certain bays.

- Depending on the nature of agreements with third parties, maintenance of the Charging Unit itself may become the responsibility of the council after agreements come to an end
- Rapid chargers have also been identified as being more susceptible to vandalism and needing more repairs than Fast Chargers

There are also a number of practical concerns that must be given consideration when installing equipment.

- There is no one single standard of connector between chargers and cars. Charging infrastructure must be able to offer a variety of charging options for different models of cars. In some cases, Fast Chargers are able to use converters to achieve this, but this is not currently a possibility for Rapid Chargers, which must be tethered.
- Charging cables are a trip hazard for foot traffic, so any on-street chargers must be placed at the kerbside.
- There is a risk of electrocution from charge points if they are ran into or submerged if the station does not have an automatic cut off. Bollards can be used to mitigate the risk of strike damage.
- There are space concerns, particularly with rapid chargers, which may mean less spaces available for parking in total. This could lead to complaints from people trying to park non-electric cars.

A report by the RAC Foundation looked at the current infrastructure for charging in the U.K., and some of the challenges that need to be tackled as this infrastructure continues to be built. It highlighted a number of issues that currently face EV Charging Networks.

The reliability of the charging network is a particularly large problem at the moment. For the report, Zap- Map, a service that maps out charging points across the UK, estimated that 13% of charge points were out of service. This puts an onus on drivers to have back-up plans for charging on longer journeys, and contributes to the issue of 'range-anxiety'.

Certain cars do not benefit at all from Rapid charging, but are still able to use the connection. All Plug-In Hybrid Electric Vehicles (PHEV) currently on the market are unable to receive a charge greater than 3.6kW. This means that Rapid chargers offer no benefit to PHEVs. However, it is sometimes the case that a PHEV has to take up a Rapid Charging Bay due to the lack of alternatives, effectively blocking it for cars that are able to take full advantage of the charger. It is important to consider the mix of rapid and fast chargers when expanding infrastructure, and this is a particular issue for chargers at Motorway services.

Finally, there are a number of policy decisions that need to be made that vary by council on how charging should be implemented.

Many councils offer free electricity and free parking to drivers in EVs, as incentives to move over to Electric cars. This however has proved impractical for some councils, who have had to revise their policy.

Glasgow City Council recently had to change their rules due to misuse of free parking. Drivers were staying in bays much longer than was required to charge their car, meaning

that other drivers were unable to use the chargers as intended. Parking charges were implemented to be the same as for petrol cars, although electricity currently remains free of charge.

Another issue brought up through our queries was that there are a variety of different smart-card services used to access and pay for charging, so drivers have to carry multiple cards for their journeys. There is also a 2-hour time limit, which has received some criticism in the press. It is also the case that consumers do not necessarily care which local authority owns the chargers, so there are advantages to developing a regional approach so that customers can use chargers across local authority areas with ease.

One barrier to the uptake of Electric Vehicles in especially urban areas is the lack of off-street parking available to residents, who will then not be able to take advantage of the OLEV grant scheme for EV charger. One possible solution is currently being explored by a number of London Councils, including Hackney, Haringey, Kensington & Chelsea, Greenwich and Merton.

They are currently conducting a pilot scheme of retrofitting charging sockets onto streetlamps. This is combined with "smart-charging cables" that allow usage to be tracked and then charged for. Drivers can see this information easily online to see their own usage. Naturally there are some limitations to which lampposts are suitable for this scheme. They need to be on the front of the footway and have sufficient internal space for the extra equipment. Distribution Network Operators (DNO) also need to be approached to confirm that there is enough spare capacity for the charger. There is also the option to mount equipment to the outside of the lamppost. Oxford City Council is also pursuing a similar scheme.

There is also an issue about how the National Grid will be affected by the increased demand for charging. As more and more people move to electric vehicles, then there is a danger that the supply will not be able to cope, leading to a 'brownout'. Modelling suggested that as few as six vehicles charging close together at peak time could overload the system. Therefore, it is important that Local Authorities contact DNO's as early as possible to assess their specific situation and the impact it would have on the grid.

There are also a number of ways to mitigate the demand being placed on the grid. Batteries can be used to store energy drawn during off-peak times that can be utilised during peak hours. This can be a cost-effective measure, particularly in the near future when batteries that were once used in Electric Vehicles will become increasingly available.

Renewable energy can also be used to moderate demand on the grid. Dundee Council are currently working to install "EV hubs" that provide a combination of Rapid and Fast charging across the city. These will be supported with a canopy of solar panels that will help reduce the burden on the power grid, especially when there are multiple EVs charging simultaneously. These hubs also have large television screens which could be used to generate revenue through advertising.

APSE Comment

As both Local Authority fleets and the consumer move to electric vehicles, it is important that Councils gear up to meet these new demands. APSE will continue to support Local Authorities in this endeavour, by sharing best practice with our members, and our Network Queries service allows Local Authorities to send questions to the entire APSE network when they are looking for answers or inspiration.

There are also opportunities for Local Authorities to benefit from the increasing use of Electric Vehicles. As mentioned previously, councils may be able to offer advertising at charging points to increase their income. Councils will also have their own fleet of electric vehicles, which will require services such as servicing, that councils may choose to deliver themselves. They will then also be able to offer these services to the public or businesses to further boost revenue. These topics can be discussed at the various advisory groups hosted by APSE, all of which can be found on the APSE website.

We also offer APSE Energy, a collaboration between Local Authorities to enable and facilitate the municipalisation of energy services. This can support Local Councils as they develop their Electric Vehicle Fleet and link it to their wider energy and investment strategies, as well as assisting with communication between councils and DNO's. There will be an EV workshop held in Falkirk on 24 October, and a seminar in Swansea on 31 October 2017. For information on the workshop or APSE Energy as a whole, please contact Phil Brennan, pbrennan@apse.org.uk

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