

Taxi and Private Hire vehicle chargepoint recommendations for Maidstone Borough Council

Background

Maidstone Borough Council (MBC) are considering introducing new taxi and private hire licensing measures to accelerate the number of electric vehicles (EVs) in their fleet. As part of this, Energy Saving Trust (EST) has been asked to provide recommendations on the charging provision required to satisfy demand from EVs in the taxi and private hire industry.¹

MBC will use this information to guide their approach to providing chargepoint infrastructure and developing their wider chargepoint strategy.

In this report, Energy Saving Trust offers recommendations on the quantity and speed (kW) of chargepoints for taxis and private hire vehicles required, based on the council's proposed policy.

MBC propose that all new vehicles licensed from 2021 will be:

- **Private Hire:** Battery Electric Vehicle (BEV)
- **Hackney Carriage:** Battery Electric Vehicle (BEV) or Range Extender Electric Vehicle (E-REV or REEV).

As requested by MBC, recommendations are given for the years: 2021, 2025, 2027, 2030. A maximum demand scenario where every licensed vehicle in the fleet is either a battery electric or range-extender EV is also calculated.

Approach

Energy Saving Trust's own chargepoint calculator was used to work out the charging infrastructure requirements of Maidstone's taxi and private hire fleet. The calculation considers a variety of inputs, such as: daily mileage, average charge time and percentage of drivers with off-street parking. Many of these variables were obtained through a survey sent out to drivers licensed with Maidstone. The survey opened 20th January 2020 and closed on 2nd March 2020, it received 59 responses out of 236 potential drivers (25%). Where inputs could not be gained from the survey, appropriate assumptions were made (Table 3 in Appendix).

A vital input to the calculation is the number of EVs on fleet over time. Based on a potential policy start date of 2021, the number of vehicles coming off fleet (no longer being licensed) each year was calculated by the ages of the vehicle (below). The model assumes an existing petrol or diesel vehicle is replaced by an EV only when it reaches its maximum age limit.

¹ This project was funded by the Department for Transport in 2019/20. For more information or similar advice, please contact transportadvice@est.org.uk.

Table 1 The distribution of licenced vehicles by age in 2020 (i.e. 6 hackney carriages were first registered one year ago, 5 two years ago)

Forecast scenarios	Hackney carriage					Private hire					Total				
	<1	1	2	3	4	5	6	7	8	9	10	12	13	14	Licensed
Hackney Carriages															
MPV		3	2	7	1	1			1						15
Saloon			2	1	3	5	1	4	4	7	4	5	1	3	40
Taxicab	1	3	1												5
Total	1	6	5	8	4	6	1	4	5	7	4	5	1	3	60
Private hire vehicles															
Estate	6	7	5	10	7	3	4			1					43
Hatchback	1	3	10	14	7	2	4								41
MPV	5	12	17	12	10	8	4								68
Saloon	1	4	4	7	3	4	1								24
Total	13	26	36	43	27	17	13			1					176
All body types total	14	32	41	51	31	23	14	4	5	8	4	5	1	3	236

Due to lack of like-for-like electric alternatives in the current market, two calculations for each year were done. One calculation excludes Multi-Purpose Vehicles (MPVs) and estate vehicles, the other calculation includes them. Lack of EV availability will be taken into consideration during the licencing changes and allowances will be made for drivers of these vehicle types. The number of vehicles included in the calculation can be found in the results section, **Error!** Reference source not found..

Results

The results of the chargepoint calculation are displayed below. Due to the nature of taxi and private hire drivers' shift patterns, only rapid 50 kW chargepoints are recommended.

Taxi drivers tend to only stop for short periods of time mid-shift, requiring a quicker rate of charge. All popular models of BEV can accept this rate of charge (50kW), as well as the [LEVC TX](#) – an increasingly popular choice for hackney carriage drivers. If MBC considers licensing new Plug-in Hybrid Electric Vehicles (PHEV) after 2021, slower chargepoints (3-7 kW) would need to be considered as these vehicles have a lower maximum charging rate.

The number of EVs expected to be licensed by MBC is based on the assumption and policy scenario that a petrol or diesel vehicle is replaced by a BEV or E-REV when it reaches the age limit.

Table 2 Number of rapid chargepoints recommended for taxi and private hire vehicles in MBC over time where all newly licenced vehicles are EVs.

		Number of EVs	Chargepoints (cumulative)	Number of EVs	Chargepoints (cumulative)	Number of EVs	Chargepoints (cumulative)
2021	Excl. MPVs & Estates	3	1	5	1	8	2
	All EV	3	1	13	2	16	3
2025	Excl. MPVs & Estates	20	3	56	6	76	9
	All EV	20	3	136	13	156	16
2027	Excl. MPVs & Estates	28	4	65	7	93	11
	All EV	29	4	175	17	204	21
2030	Excl. MPVs & Estates	37	5	65	7	102	12
	All EV	40	6	175	17	215	23
Whole fleet EV		60	8	176	17	236	25

As per **Error! Reference source not found.**, excluding MPVs and estates: two 50kW chargepoints are recommended by 2021 to cater for the eight EVs expected to be operating. By 2025, nine chargepoints in total are recommended to meet the charging needs of 76 vehicles, rising to 12 chargepoints for 102 vehicles by 2030. Including MPVs and estates: three 50kW chargepoints are recommended by 2021 to cater for 16 vehicles. By 2025, 16 chargepoints are recommended for 156 vehicles, rising to 23 chargepoints for 215 vehicles by 2030. Similar assumptions were made for MPVs / estates as for saloon, taxicab and hatchback bodies. In reality, electric range would differ between these body types, but until EV alternatives come onto the market this cannot be accurately assessed.

A calculation of the whole fleet is also provided - 60 hackney carriage vehicles and 176 private hire vehicles - to demonstrate what charging infrastructure would be required if every single driver in the fleet made the switch to EV.

Points for consideration

Dedicated chargepoints for taxi and private hire vehicles

The figures shown in **Error! Reference source not found.** highlight the number of chargepoints needed to satisfy demand from the taxi and private hire industry, based on the proposed policy scenario. The recommendations assume that these rapid chargepoints are dedicated to taxi and private hire vehicles. Whether this is the case in practice is a decision for the council to take.

Number of licensed EVs

The forecasted figures of EVs for specific years has been assessed by working out when currently licensed vehicles will reach their age limit, and then be replaced by EVs, as per the proposed policy.

Three considerations must be taken when using this approach. Firstly, it does not account for MBC increasing or decreasing the number of new vehicles it licenses year on year. If the overall number of vehicles were to change significantly, the number of chargepoints required would change. Secondly, it does not account for MBC changing the age limit of the fleet. The current age limits are set at 6 years for **private hire** and 15 years for **hackney carriage**. Reducing the age limits would result in more EVs coming on fleet sooner, increasing the number of chargepoints needed. Thirdly, it does not account for drivers or operators choosing to change their vehicles to electric sooner than required by the proposed licensing policy.

EV model availability

Table 3 in the appendix shows that the split for hackney carriage vehicles is set as 100% E-REV in 2021 and 50% E-REV 50% BEV thereafter.

This is due to the availability of EV models for ultra-low emission hackney carriages. The LEVC is a popular model of E-REV for hackney carriages and readily available. Currently however, there is only one wheelchair accessible BEV on the market which is appropriate for use by taxi drivers - the Dynamo taxi. This model was released recently in October 2019, meaning there will be a longer than usual lead time when placing an order. As a result, the forecasted split is expected to even out by 2025 when it becomes easier to obtain the Dynamo, and BEV models from other manufacturers may be available. Beyond 2025 the split has been kept at 50/50. It is difficult to predict how the market may change beyond this as cheaper, second hand LEVCs may be a more attractive option to taxi drivers than a new Dynamo.

Access to private home charging

The results from a survey of Maidstone taxi and private hire drivers (in spring 2020) showed that the majority of drivers had off-street parking (62.7%, Figure 1). This would enable these drivers to install their own private home chargepoint, enabling them to start their day with a full charge.

The chargepoint model has accounted for this by reducing the demand for electricity from those drivers. Around 60% of these drivers could start the day on a full charge, reducing the miles (electricity) needed from public charging infrastructure. The other 40% would have to rely on public charging alone.

Providing some form of on-street charging infrastructure would help to reduce the demand on the rapid chargepoints, as the other 40% of drivers would be able to charge on-street overnight.

Figure 1 Responses to the question 'Where is your vehicle kept overnight?'

An EV charging strategy and chargepoint procurement

These recommendations for taxi and private hire vehicles should support a wider EV & chargepoint strategy. It would be helpful to review current or planned chargepoint infrastructure in Maidstone and assess whether these chargepoints could be suitable for the taxi

Variable			Explanation
% Plug-in hybrid vehicle (PHEV)	Hackney carriage	2021: 100%	LEVC TX, an E-REV, is the most readily available and feasible option for ultra-low emission hackney carriages, as of spring 2019.

/ private hire industry, based on their speed, location etc.

The recommendations do not necessarily suggest the council must fully fund and install these itself; chargepoint operators and other private sector organisations may be willing to provide chargepoint infrastructure or agree a concession contract with the council. Naturally, the willingness of chargepoint operators to do this is dependent upon commercial viability of the locations selected, expected demand and contractual terms.

Once chargepoints are installed, whether for general use or dedicated to licensed vehicles, the following aspects should be monitored (i.e. via data sharing between the chargepoint operator and the council):

- how chargepoints are being used (popularity, charging session length, kW discharged, number of unique users, peak times)
- end user experience (reliability, blocking by petrol or diesel vehicles)

Higher powered installations

Higher speeds of chargepoint than 50 kW are available, however, they have been omitted from these calculations. Not all vehicles can accept charging speeds above 50kW and in the current market, many of the compatible vehicles that can accept these charging speeds are outside the budget for most taxi or private hire drivers. Additionally, high powered chargepoints (100kW+) are significantly more expensive to install and operate than rapid chargepoints (50kW). At the current time, it is generally considered better from a local authority perspective to leave these types of installations to the private sector, unless significant funding can be sourced. We recommend that the cost of these installations is reviewed every few years as it may become feasible.

Summary

It is recommended that MBC ensures there are two rapid chargepoints for the taxi and private hire industry by 2021. Installations should then continue in order to provide nine rapid chargepoints in total across MBC by 2025, and 12 by 2030. MBC should monitor uptake of EVs year on year and increase the rate of installations if appropriate.

MBC should also monitor the EV market, particularly for estate vehicles and MPVs. Once appropriate models become available and the licensing policy is reviewed, the number of EVs licensed with MBC will significantly increase. For each year in **Error! Reference source not found.**, a higher scenario of recommended number of chargepoints has been provided, to show how many should be installed if this happens.

Appendix

Table 3 Variables included in chargepoint calculation

		2025: 50%	It is expected the Dynamo taxi (BEV) will be more readily available on the market by 2025.
	Private hire	0%	MBC's licensing policy will only allow private hire drivers to licence BEVs.
% who can't charge at home	40%		From survey results, based on 59 responses in spring 2020. This is slightly higher than the national average, but within expected ranges.
EV range	Hackney carriage	160 miles	Based on Dynamo taxi
	Private hire	180 miles	Based on Nissan Leaf and Hyundai IONIQ
REEV electric range	Hackney carriage	80	LEVC TX electric range
	Private hire	n/a	
Daily mileage	250 miles		90 th percentile of daily mileages, from survey results.
kWh / mile	Private hire	0.3	Based on Leaf and Hyundai IONIQ
	Hackney carriage	0.33	Dynamo taxi
Duration of charge	45 minutes		Time a driver is willing and able to spend recharging. This can be split between multiple charging events during the day. Some will start the day with a full charge from their private chargepoint at home or the depot.
Hours covered	9 hours		Peak usage of chargepoint throughout the day, estimated approximately 9am – 6pm