

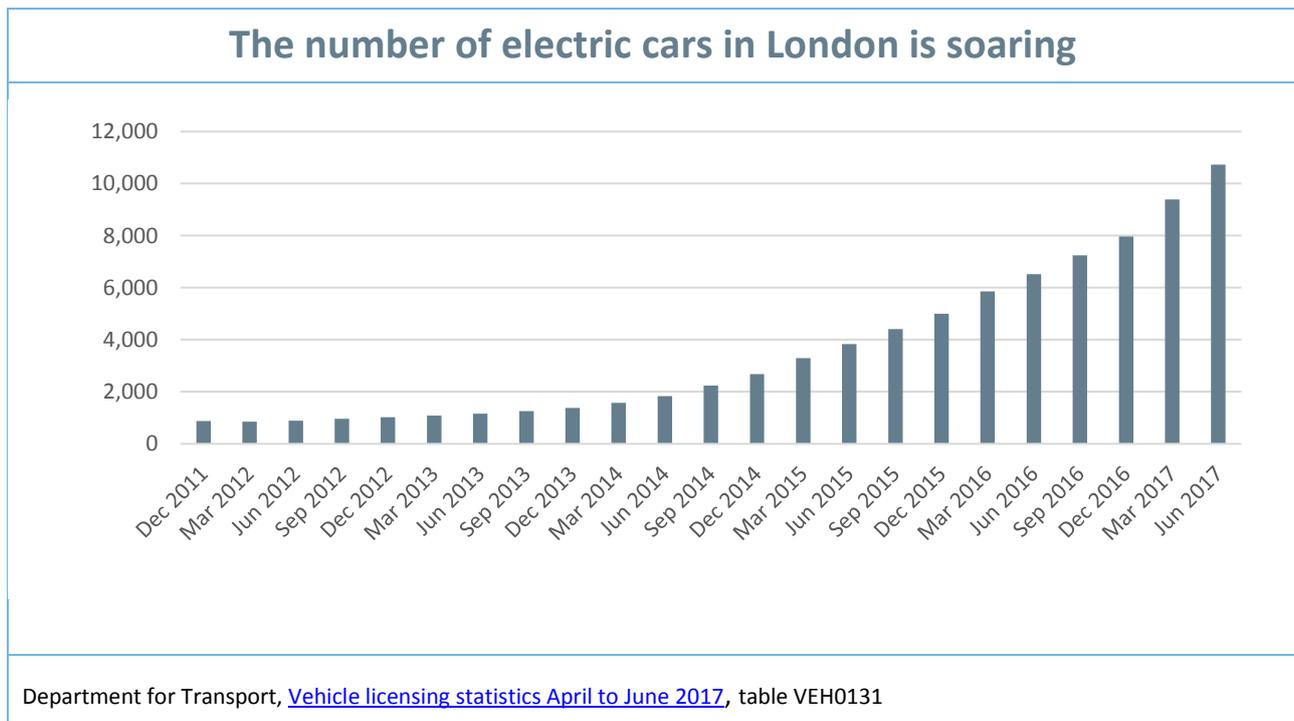
## Electric Vehicles

This project will explore progress with infrastructure for electric vehicles in London.

### Background

Electric vehicles (EVs) can operate electrically, without generating exhaust emissions. This includes electric-only as well as plug-in hybrid vehicles. Plug-in hybrid electric vehicles (PHEVs) can receive both electrical recharging and fuel, and can travel short distances in electric-only mode, but use a mixture of fuel and electric power for longer distances. There are also traditional hybrid vehicles, which cannot be charged with electricity, but use an electric drive in addition to their conventional engine to get more distance from a given amount of fossil fuel. The term Ultra Low Emission Vehicles (ULEVs) is also used, both by the Mayor and the Department for Transport. ULEVs refer to any car which produces less than 75g/km of CO<sub>2</sub>.

The number of EVs in London has grown significantly in the last five years. There are now over 10,000 electric cars registered in London, over ten times as many as in 2012.<sup>1</sup> This is still very small in comparison to petrol cars, however: EVs make up less than 0.4 per cent of the 2,863,600 cars registered in London.<sup>2</sup>



It has been suggested that this growth in vehicle numbers is outstripping the supply of charging points, and that this may start to limit vehicle uptake. The number of charging points *in London* is difficult to identify. According to Zap-Map, the TfL-recommended charging point database, charging points *nationally* grew by 17 per cent from December 2016 to June 2017.<sup>3</sup> In the same period, electric vehicles in London increased twice as much—by 35 per cent.<sup>4</sup>

<sup>1</sup> Department for Transport, [Vehicle licensing statistics April to June 2017](#), table VEH0130

<sup>2</sup> Department for Transport, [Vehicle licensing statistics April to June 2017](#), table VEH0104

<sup>3</sup> ZapMap, [Number of UK charging locations and connectors over past 12 months to November 17](#)

<sup>4</sup> Department for Transport, [Vehicle licensing statistics April to June 2017](#), table VEH0131

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There are generally three different types of chargers, rapid, fast and slow. Rapid chargers tend to be able to charge a vehicle to 80 per cent in under 30 minutes, fast chargers in 3 hours and slow chargers in 6 hours. There are very few public rapid chargers in London, with just under 20 in central London.<sup>5</sup>

### Environmental impacts

All-electric vehicles, and PHEVs operating in electric mode, generate no exhaust emissions of toxic airborne pollution such as particulate matter (PM) and oxides of nitrogen, which are serious public health problems in London and which currently come in significant quantities from conventional vehicle engines. EVs do still generate PM from tyre and brake wear, but are overall less polluting than conventional counterparts.

EVs in general also generate less carbon per kilometre than their conventional equivalents, helping London reach its carbon-reduction goals. Reducing vehicle kilometres, including switching to walking and cycling, has greater benefits still, for both carbon emissions and local toxic pollutants.

### Role of the Mayor and the GLA

The Mayor specifically mentioned electric vehicles in his manifesto during the 2016 Mayoral election. The Mayor promised:

“I will deliver the electric charging infrastructure, in partnership with the private sector, necessary for a major expansion in the use of electric vehicles.”<sup>6</sup>

The previous Mayor published an Ultra Low Emission Vehicle Delivery Plan in 2015.<sup>7</sup> This contained an action plan with fifteen key actions. The new Mayor has not updated this delivery plan and it is still the strategy document TfL and the GLA’s environment team are working towards.

The Mayor can directly deliver or influence electric vehicle infrastructure through the Transport for London Road Network (TLRN). While these trunk routes are only 5 per cent of London’s total roads by length they carry around 30 per cent of the traffic.<sup>8</sup>

The Mayor is also able to use the London Plan to influence electric vehicle infrastructure. The 2016 London Plan stipulates that “residential, retail and employment uses should provide electric vehicle charging points...intended to future-proof development in London by enabling greater future choice in EV ownership and usage.”<sup>9</sup> The draft London Plan currently in consultation says that one in five parking spaces should have active charging facilities.<sup>10</sup>

### Non-GLA actors

Local councils in London are important to the issue because they hold responsibility for all roads in London that are not part of the TLRN. This means that they are responsible for on-road parking space, including

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<sup>5</sup> ZapMap database, <https://www.zap-map.com/live/>

<sup>6</sup> Sadiq Khan, [Manifesto for all Londoners](#), March 2016

<sup>7</sup> Transport for London, [An Ultra Low Emission Vehicle Delivery Plan for London](#), July 2015

<sup>8</sup> Transport for London, [What we do: Roads](#)

<sup>9</sup> GLA, [London Plan, Chapter Six: Transport](#), policy 6.13 Parking

<sup>10</sup> GLA, [London Plan Policy T6.1 Residential Parking](#)

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that required for on-road charging points. Councils are also responsible for planning decisions. Therefore most charging points require some form of application to the local council.

Currently all 32 local councils deal with electric vehicles, associated charge-points and parking issues separately. London Councils told us that there is some tension for local authorities if residents complain about charge point installation or electric vehicle dedicated parking. London Councils are working towards a delivery partnership for charge points in London that would support all of the boroughs in London as well as present a single access point for the consumer in the form of a charging “broker” between the vehicle owner and the various different charging networks.

There is a national government Office for Low Emission Vehicles (OLEV). This devises and implements national strategy, and provides grant funding.

Private companies are starting to introduce electric vehicle charging infrastructure as the market continues to grow. Shell has announced plans for rapid chargers at its petrol stations – 9 of which are in London.<sup>11</sup> Other private partnerships are installing and running charging points across the country.<sup>12</sup>

There are several networks in the electric vehicle industry. In London the largest is Source London. Source London was set up by TfL under the previous Mayor but was then transferred to IER, a private company that runs the electric charging network in Paris, in Summer 2014.<sup>13</sup> The transfer was meant to facilitate growth in the number of charge points, and at the time Source London had a target of 6,000 charge points by 2018. This remains an optimistic target. The second largest network is Polar and after Polar there are numerous much smaller, niche networks (these tend to cater to just one brand of electric car).

### Previous Assembly work

The last time the Assembly considered electric vehicles was in early 2012. The Environment Committee published [Charging ahead? An overview of progress in implementing the Mayor's Electric Vehicle Delivery Plan](#) in February 2012. The report's key recommendations were around refreshing the Electric Vehicle Delivery Plan, continuing to champion electric vehicles and pursuing greater numbers of electric vehicles in the fleets that the Mayor has direct control over, such as taxis or buses. This was prior to the Mayor's ULEV Delivery Plan in 2015. The Committee has not fully returned to the topic since, although it has touched on elements such as power network requirements in the March 2016 report [Growing, growing, gone](#).

### Equalities issues

The direct benefits of electric vehicle charging are to electric vehicle owners and drivers. As with the general market for up-to-date private cars, this is likely to be a relatively privileged section of the London population.

But air pollution (and potentially climate change) disproportionately impacts less well-off residents, black and minority ethnic Londoners, children and, for short-term pollution peaks, older people and those with certain illnesses, so the indirect benefits of EV charging fall more on these groups.

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<sup>11</sup> The Guardian, [Shell to open electric vehicle charging points at UK petrol stations](#), 18 October 2017

<sup>12</sup> Local Gov, [Partnership to install electric vehicle charging points announced](#), 9 May 2017

<sup>13</sup> TfL press release, [TfL selects IER to drive Source London forward](#), 12 December 2013

# Electric Vehicles

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## Scope

It would not be feasible within one investigation to look at all the various vehicle technologies and different charging infrastructures required. Therefore, the investigation will focus on:

1. Charging infrastructure only – mayoral transport and planning powers can affect infrastructure, but not vehicle price or technology
2. Cars, primarily private cars, and vehicles with similar charging needs. Taxis are to be covered, though not as the main focus. Heavy vehicles are not to be covered: lorries require different charging points, more of which would be provided by businesses; also, the Mayor has already made strong commitments towards an electric and hydrogen bus fleet. The investigation will not seek to address the charging needs of high-mileage light commercial vehicles such as delivery vans.

## On-street charging

The Mayor has made two recent announcements of funding for on-street charging points. In August 2017, the Mayor committed £4.5 million to install 1,500 standard (not rapid) charging points.<sup>14</sup> The money will be distributed to individual local authorities. The funding for the scheme is not strictly Mayoral investment, in that no existing TfL funds are used, rather it is the use of a grant given by the OLEV. In April 2017, the Mayor committed £18 million towards a rapid charging point network.<sup>15</sup> He set targets of 75 rapid charge points by the end of 2017, 150 by the end of 2018 and 300 by 2020. The Mayor's press release says that many of these rapid charge points will be reserved for black cabs only. The OLEV has provided only £2.6 million of this £18 million commitment. This implies that TfL, and by extension the Mayor, is putting capital funding into rapid chargers for black cabs, but not into on-street chargers for ordinary drivers.

It can be difficult to know exactly how many charge points there are in London. The most comprehensive database of charge points is ZapMap, but ZapMap is run by a private company called Next Green Car Ltd and so the ZapMap database is not publicly available other than in map form. When Source London was contracted out to IER in 2014, TfL's press release stated that there were 1,400 charge points at the time.<sup>16</sup> Source London's website says that there are currently 850+ charge points, although this only includes Source London locations.<sup>17</sup> ZapMap creates its database from many different sources, such as the National Chargepoint Registry, Source London, Open Charge Map and other networks. The lack of clarity over how many charge points there are makes it difficult to assess progress in installing new points.

Public charge points may not be as necessary as thought. In 2014 UK Power Networks and Imperial College London did statistical research on the Impact and Opportunities for Wide-Scale EV Deployment.<sup>18</sup> The research recorded usage of Source London charging points across London. The survey found that public charge points were not used very often. Only 17 per cent of charge points monitored were used once a day or more. The majority (82 per cent) of EV users resorted to a public charge point less than once a month. This suggests that public charge points are being used as an insurance policy or for longer journeys.

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<sup>14</sup> Transport for London, [Funding boost for London's electric vehicle charging infrastructure](#), 3 August 2017

<sup>15</sup> Transport for London, [TfL drives forward £18 million electric vehicle scheme](#), 26 April 2017

<sup>16</sup> TfL press release, [TfL selects IER to drive Source London forward](#), 12 December 2013

<sup>17</sup> <https://www.sourcelondon.net>

<sup>18</sup> UK Power Networks and Imperial College London, [Impact and Opportunities for Wide-Scale EV Deployment](#), 2014

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Public charge points might be being used less frequently because of the nature of driving in the capital. Two thirds of car journeys in London are under 5km.<sup>19</sup> The two most popular electric vehicles in the UK are the Mitsubishi Outlander PHEV and the Nissan Leaf.<sup>20</sup> The Outlander boasts 33 miles of pure electric driving<sup>21</sup> and the Leaf 235 miles of electric assisted driving.<sup>22</sup> It is extremely rare that a journey in London would drain an EV's battery.

The image of running out of battery in the middle of London persists. At a national level this perception is clear. Worries about recharging and distance travelled on a single charge consistently top people's worries about buying an electric vehicle.<sup>23</sup> This perception seems strongly rooted. In 2016, 39 per cent of those surveyed by the Department for Transport cited battery range as a worry. In 2014, it was also 39 per cent.

Worries about recharging may lie in parking issues. In London, especially in inner London boroughs, having your own driveway is not the norm. Car owners often rely on on-street parking. That parking is difficult to guarantee at certain times of day, especially in the evening after work. Electric vehicle owners have spoken of being "ICE-d" – when an Internal Combustion Engine (ICE) vehicle parks in a parking space with a charge point.<sup>24</sup> This problem is compounded by the transience of the London renting population – 37 per cent of Londoners have moved three or more times in the last five years.<sup>25</sup>

The current charging network is very fragmented. OLEV have allowed closed networks, where only subscribers to that particular provider can use those points. This is not the case elsewhere in Europe. In Germany "roaming" – the ability to use any charger on any network – is legally required. In London, Source London helps mitigate this problem, but there are still closed networks on London's roads.

Anyone can apply to their local council for a charge point on their street. The Office for Low Emission Vehicles has allocated £2.5 million of funding nationally for installation costs. An individual would apply to their local council to consider a charge point and the council decides whether to apply to OLEV for funding.<sup>26</sup> The maximum amount OLEV will provide per chargepoint is £7,500, although OLEV anticipates that costs will be much cheaper than this in most cases.<sup>27</sup> London Councils have told us that in the very first round this grant was already 50 per cent oversubscribed – i.e. applications from councils have already used up all of this funding.

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<sup>19</sup> Transport for London, [Roads Task Force - Technical Note 14](#)

<sup>20</sup> Next Green Car, [What are the UK's most popular EV models? Statistics](#), September 2017

<sup>21</sup> Mitsubishi, [Explore: Outlander PHEV](#)

<sup>22</sup> Nissan, [The new Nissan Leaf](#)

<sup>23</sup> Department for Transport, [Public Attitudes Towards Electric Vehicles](#), February 2016

<sup>24</sup> Telegraph, [Electric car drivers face queues and quarrels](#), 18 May 2017

<sup>25</sup> Shelter, [Renting families move so often they are nearly nomadic – new research](#), February 2016

<sup>26</sup> Office for Low Emission Vehicles, [Grants to provide residential on-street chargepoints for plug-in electric vehicles](#), December 2016

<sup>27</sup> Office for Low Emission Vehicles, [Grants to provide residential on-street chargepoints for plug-in electric vehicles](#), December 2016

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### Off-street charging

Those with access to off-street parking have traditionally been seen as the early adopters of electric vehicles. Having a driveway means that you have a guaranteed place to park and charge your car.

The government subsidises off-street installation of charge points. You can get a grant of up to 75% of the cost of your charge point, up to a maximum saving of £500.<sup>28</sup> There is a national list of approved installers and the GLA is working towards a network of approved suppliers of home charge points.

Residential charging brings extra demand on the power network. Some stakeholders are worried that charging might mean power shortages. The Green Alliance think tank claims that it could take as few as six closely located vehicles for power shortages<sup>29</sup>, and My Electric Avenue (a collaboration between two power networks and other stakeholders) has said that when 40-70 per cent of vehicles are electric over 30 per cent of electricity networks will require intervention.<sup>30</sup>

This extra demand could be much better managed. Residents tend to require electricity to charge their vehicles at around the same time as each other. Peak demand for electric vehicle charging is 9pm in the evening and the majority of charging happens between 6pm and midnight.<sup>31</sup> This corresponds with people coming home from work and plugging in but not whilst sleeping. Networks have started talking about future solutions already. National Grid have suggested a fuse that will trip and stop the charging event if other power-intensive appliances are being used at the same time.<sup>32</sup> UK Power Networks already offers a different tariff for charging at off-peak hours.

Smart charging points may turn EVs from a problem for peak power use to an asset, enabling the vehicle to draw power when it is available, and even to sell charge back to the grid when it is needed.

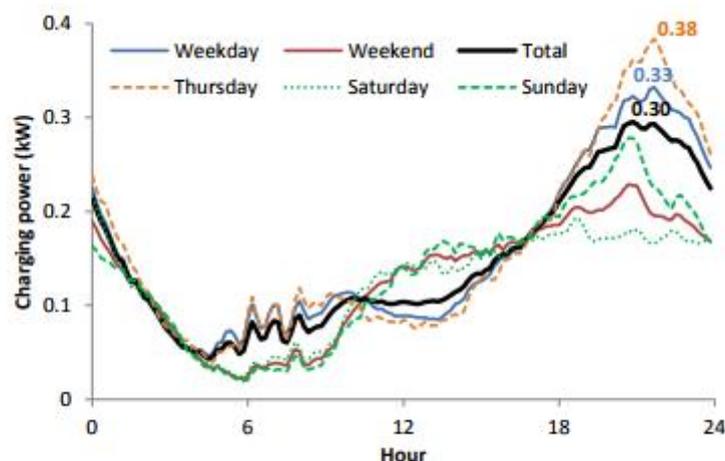


Figure 9. Average charging profiles per EV for different days of week

<sup>28</sup> Office for Low Emission Vehicles, [Electric Vehicle Homecharge Scheme](#), November 2016

<sup>29</sup> Financial Times, [Power networks navigate electric car challenge](#), 21 May 2017

<sup>30</sup> My Electric Avenue, [How local electricity networks can cope with charging clusters of electric vehicles](#), 4 December 2015

<sup>31</sup> UK Power Networks and Imperial College London, [Impact and Opportunities for Wide-Scale EV Deployment](#), 2014

<sup>32</sup> National Grid, [Forecourt thoughts: Mass fast charging of electric vehicles](#), August 2017

# Electric Vehicles

## Car clubs

Car clubs are a small part of London’s vehicle fleet. There are between 2,000 and 3,000 car club vehicles in London, and each one takes up to ten private vehicles off London’s roads.<sup>33</sup> Therefore car club vehicles are 0.09 per cent of all cars in London and may remove nearly one percent of all cars. There is significant scope to increase membership.

The previous Mayor had a specific target for 50 per cent of the car club fleet in London to be ULEVs by 2025.<sup>34</sup> Car clubs are a long way off this target. The below two maps show ZipCar’s map for central London.

### All vehicles available for hire



### Electric vehicles



<sup>33</sup> Carplus, [Carplus annual survey of car clubs, 2016-17](#)

<sup>34</sup> Transport for London, [An Ultra Low Emission Vehicle Delivery Plan for London](#), July 2015

## Electric Vehicles

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Carplus, a charity that tries to encourage shared transport, surveys car clubs in London every year. According to Carplus three per cent of club vehicles in London in 2016-17 were electric and fourteen per cent were hybrid.<sup>35</sup> Car clubs will need to replace numerous vehicles with ULEVs in the next eight years if the ULEV Delivery Plan is to hit its target.

Attitudes towards electric vehicles in car clubs are generally positive. Of those who have used one, 74 per cent rated the experience as good or very good.<sup>36</sup> 60 per cent rated the charging experience as good or very good, an improvement on just 38 per cent in 2014-15.<sup>37</sup> Nine out of ten people who had not yet used an electric vehicle in their car club expressed an interest.<sup>38</sup>

### Taxis

Taxis represent a large proportion of vehicle kilometres driven in London, especially the central zone, and so electric taxis are a key measure against air pollution limit breaches. TfL estimates that taxis generate 16 per cent of NO<sub>x</sub> and 26 per cent of particulate matter (PM) emissions in central London.<sup>39</sup>

The Mayor has already recognised and has taken direct action to help taxis go electric. From 1 January 2018, all new licenced taxis in London will need to be zero emission capable (ZEC).<sup>40</sup> The Mayor has created a £42 million fund that will provide taxi drivers with a grant of up to £5,000 in exchange for retiring an old diesel taxi. The Government's Plug-in Taxi Grant, part-funded by the Mayor, will also give cabbies purchasing new ZEC taxis up to £7,500 towards the purchase of a new vehicle.

Taxis have very different charging requirements to private vehicles. A single taxi covers much greater mileage than the average London car, and therefore will require re-charging during the working day. For this, cabbies need rapid charging, ideally where there are already break facilities—such as at the established rest ranks in central London.

In terms of charge points the Mayor has also made a commitment to taxis. Many of the rapid charge points the Mayor has put £18 million towards will be reserved for black cabs.<sup>41</sup> The Mayor set targets of 75 rapid charge points by the end of 2017, 150 by the end of 2018 and 300 by 2020. It remains to be seen if this is sufficient to meet demand, and if the charging points will be in the right places.

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<sup>35</sup> Carplus, [Carplus annual survey of car clubs](#), 2016-17

<sup>36</sup> Carplus, [Carplus annual survey of car clubs](#), 2016-17

<sup>37</sup> Carplus, [Carplus annual survey of car clubs](#), 2016-17

<sup>38</sup> Carplus, [Carplus annual survey of car clubs](#), 2016-17

<sup>39</sup> TfL press release, [Mayor's new £42 million fund to help cabbies ditch the dirtiest diesel taxis](#), 28 July 2017

<sup>40</sup> TfL, [Taxi and Private Hire Action Plan 2016](#), September 2016

<sup>41</sup> Transport for London, [TfL drives forward £18 million electric vehicle scheme](#), 26 April 2017

## Electric Vehicles

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### Terms of reference

1. Appraise the current status of on-street and off-street electric vehicle charging infrastructure for private cars and similar vehicles
2. Identify charging barriers to the growth of electric vehicles in London
3. Explore the Mayor's and others' plans to increase electric vehicle infrastructure and consider whether it will meet forecast demand.

### Impact

Category	Evidence of impact
Challenging	<p>Evaluating whether existing policies (continuing from the previous administration) are facilitating or hindering the rapid growth in electric vehicles.</p> <p>Highlighting GLA (or other) strategies and programmes that require improvement by the new administration.</p>
Influencing	<p>Identifying potential improvements to Mayoral strategies and programmes for electric vehicles.</p> <p>Encouraging other actors to support these goals.</p> <p>Potentially helping London Councils to develop and gain support for their idea of a Delivery Partnership</p>
Engaging	<p>Providing additional channels for stakeholders to contribute to City Hall policy making in this area.</p>

# Electric Vehicles

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## Stages of the investigation

1. **Further desk research** (December onwards).
2. **A call for views and information in writing** (December). We are especially keen to hear from:
  - Academics and other independent experts
  - Local authorities (London, and might approach other UK authorities with good records)
  - Electric vehicle networks
  - Public and third-sector bodies involved in promoting electric vehicles
  - Car clubs
  - The taxi trade

Questions on which views and information are sought are set out below. More general contributions are also welcomed.

3. **Meeting** (January 2018). To discuss future needs for charging infrastructure. Potential guests include:
  - London Councils and/or leading borough
  - Source London
  - Car club representative such as ZipCar
  - GLA environment team
  - Office of Low Emission Vehicles
  - National Grid and/or UK Power Networks
  - Representative (via Skype) of a leading EV city – such as Paris, Oslo, Amsterdam. Within the UK, Birmingham has the most EVs, and Peterborough for its size.
4. **Short Report** (March/April 2018). The Committee plans to publish a short report setting out the findings and recommendations from the investigation.

## Questions seeking written views and information

1. What forecasts do you have for electric vehicle use in London and infrastructure needs arising?
2. In your opinion what is holding back electric vehicle growth in London?
3. What charging infrastructure is needed for private motorists in London to adopt electric vehicles?
4. What charging infrastructure is needed to enable zero emission taxis?
5. How do London's electric vehicle needs differ from other parts of the country?
6. How does, or might, electric vehicle charging challenge or assist the management of supply and demand over time in the electricity grid and distribution networks?
7. What sorts of charging and electricity distribution infrastructure are needed for an electric vehicle future?
8. What role do boroughs play in encouraging electric vehicle use?
9. What more could the Mayor do to stimulate electric vehicle use?