

CMA MARKET STUDY INTO ELECTRIC VEHICLE CHARGING
bp Response to the Invitation to Comment – 22 January 2021

Introduction to bp pulse

bp pulse assembles and supplies electric vehicle (EV) charging equipment for domestic, commercial and public locations, operating home, commercial and public charging infrastructure, and providing the products and services that facilitate access to these.

bp pulse in the UK is the trading name of Chargemaster Limited, which is a wholly-owned indirect subsidiary of bp plc. bp pulse has been operating in the EV sector since 2008, initially as the Electric Car Corporation, before entering the EVC sector and subsequently becoming Chargemaster in 2010.

The first charge points operated by Chargemaster were those that were installed with central government funding as part of the initial Plugged-in Places programme. In 2011, Chargemaster established the UK's first privately funded charging network called 'Polar', in which the business began to invest significant private capital in growing public charge point infrastructure.

Chargemaster was acquired by bp in 2018 and became bp Chargemaster. In 2020, we changed our brand from bp Chargemaster to bp pulse, which also replaced the Polar name for our public charging network.

Executive Summary

- The EVC sector in the UK is a nascent market, which is characterised by dynamic competition, including a large and diverse number of domestic and international players and substantial new entry.
- Significant market growth is expected, spurred by the recent Government announcement banning the sale of new petrol and diesel cars from 2030. bp pulse has plans to more than double the number of public charge points in the UK, from 7,500 to 16,000, with a 30-fold increase in the kilowatt hours of electricity sold to our customers.
- Given the nascent nature of the market, future growth and investment are nevertheless dependent on overcoming a number of significant risks, including uncertainty around demand forecasts and utilisation levels and the future regulatory environment (which may affect both pricing and demand).
- The biggest obstacle to the Government's ambition to switch the UK to EVs is the UK housing stock and the fact that 30-40% of households are not able to charge EVs at home; while on-street charging is unlikely to be a sufficient solution.
- To address this, the UK needs a nationwide network of public chargers. While a mix of charging speeds will likely continue to be needed depending on the charging context, this will require in particular investment in ultra-fast charging hubs. There are however significant obstacles preventing the scale up of ultra-fast charging hubs, including access to the right land and the time and costs of DNO connection.
- The shift towards higher powered chargers, especially on the strategic road network, also requires increased capital, given the higher investment cost. This relies in turn on a shift in consumer behaviour to increased adoption of EVs and charging outside the home to deliver sufficient returns on the capital investment.
- There are also specific public charging segments where competition between providers appears to be working less well due to limitations on the number of providers. In particular, this includes en-route charging, especially the amenity parking at motorway service areas, where only a handful of sites offer a choice of providers due to exclusivity arrangements in

place at those sites. Another area is on-street charging – particularly in London – where providers may have a borough-wide relationship with no choice of provision.

Theme one: developing competition while incentivising investment

1. How is the EV charging sector developing and how will technological or other developments (for example smart technologies) impact sector development and competition?

The sector has developed rapidly over recent years and continues to be a nascent sector, as identified by the CMA. This development has taken place across a number of factors, including adoption/expected adoption of EVs (which drives the need for, and utilisation of, charging infrastructure), the technology of the charging infrastructure and the EVs themselves, the nature of the funding (public funding versus increasingly private funding) and the mix of charging segments (from a focus primarily of home charging to an increasing focus on faster charging away from the home and workplaces). Overall, bp considers that these developments have led to a dynamic and competitive market, with a diversity of competition and infrastructure coverage that compares favourably to its international peers.

When looking at the sector, bp considers three main segments: home charging, workplace charging and public charging (which includes the CMA's segments of off-street charging, hubs, key destination and travel routes). This response refers primarily to bp's segmentation of the sector.

Public charging

In the UK, public charging was deployed almost entirely with government funding (e.g. Plugged-In Places) by a relatively small number of players, primarily charge point operators such as Chargemaster (the predecessor to bp pulse). This contrasts with public charging in some other European markets, which was largely driven by utility companies acting as the charge point operator, deploying charging infrastructure that was then accessed via e-mobility service providers (e-MSPs).

Given the public nature of early funding, it was mandatory for early public charge points to be free to use in the UK. This has changed over time to the point where, today, public charging is almost entirely deployed with private capital through a large number of players, including new, well-funded businesses.

The main development in public charging has been the increase in the coverage and speed of high-powered public chargers. In 2010, much of public EV charging was on devices with 3-pin domestic socket outlets charging at a little over 2kW, which could take around 10 hours to deliver 100 miles of range. The expansion of the UK's rapid (50kW) charging infrastructure has been led by companies including bp pulse since 2016. Today, some ultra-fast chargers (150kW) are capable, depending on the car, of delivering 100 miles of range in as little as 10 minutes. While a mix of charging speeds will continue to be required depending on the charging context (e.g. home, workplace, key destination, travel route), this increase in the coverage of public charging infrastructure and the ability to charge vehicles quickly is essential to build confidence in public acceptance of the transition to EVs. Access to this technology is widely available through a multitude of hardware providers.

This shift towards higher powered chargers requires, however, increased capital, given the higher investment cost and longer amortisation period of installing high-powered chargers, and investment planning relies on a shift in consumer behaviour towards increased adoption of EVs and charging outside the home to deliver sufficient returns on the capital investment.

The ability to accept these faster charging speeds is governed by the technology in the vehicles themselves, and currently, there are a limited number of EV models that can utilise the maximum 150kW charge. A wider adoption of ultra-fast charging capabilities on the vehicle side to make the most of this infrastructure, as well as further innovation and development in battery technology, will drive down purchase costs for consumers, increase the range of EVs and in turn grow the number of EVs per car that can benefit fully from ultra-fast charging. This will drive higher utilisation levels on which more ultra-fast charging infrastructure investment can be made. While early electric vehicles featured a variation of charging inlets, there is now an agreed European standard for charging connections, which is the Combined Charging System (CCS) for DC charging, incorporating the Type 2 inlet for AC charging. There are only two electric vehicles on sale in the UK that do not feature this standard, and we understand that the manufacturers – Nissan and Lexus – intend to adopt the European CCS standard on future models.

There continue to be other advantageous developments for consumers. This includes the aggregation of networks by digital platforms which allows consumers to locate available charge points and plan their journeys more easily. Another development is the increased ease with which consumers can access a number of networks: this can be seen through (i) “roaming” enabled by agreements between CPO providers; (ii) changes brought in by regulation mandating ‘ad hoc access’ without any registration or accounts being required; and (iii) a move to provide contactless payment terminals on the majority of new rapid and ultra-fast chargers. We expect these developments to continue to address consumer perceptions around the difficulties of EV charging.

There have also been developments in the home and workplace charging segments.

Home charging

In contrast to public charging, public subsidies continue to play an important role in home charging, and to a lesser extent in workplace charging. The amount of these grants has reduced considerably over time, but this has not resulted in a significant increase in cost to consumers due to advances in the technology and reductions in cost of this technology. There is now a wide choice of home charging providers, offering a broad range of units from basic to high-end premium hardware.

Smart charging is currently largely a feature of home charging and, to a lesser extent, workplace charging. For newly installed units that have benefited from the Electric Vehicle Homecharge Scheme, the unit must be “smart”. Smart charging has the ability to balance out the grid demand and allow consumers with smart meters and certain energy deals to take advantage of less expensive overnight electricity tariffs. Some slower public charge points may also offer incentives for customers to charge at preferential rates at night.

Another development is the integration of home charging into home energy management systems, which has started to result in the entry of utility companies into the EV charging sector.

Workplace charging

The workplace charging segment is largely driven by hardware (with some layers of service if businesses want them). Whilst public funding is also available through the Workplace Charging Scheme (WCS), it has played a much less central a role than in the home charging segment. This is due to the larger scale of charge point schemes (the WCS grant is limited to 40 sockets), as well as the administrative burden involved in applying for the grant.

Whilst many workplace charging points do not have “smart” functionality (where, for cost reasons, a more basic model has typically been installed), we expect adoption of this technology to increase as a means of tracking and monitoring consumption and costs.

The development of new technology in a fast-evolving sector can mean that some stakeholders / investors, such as local authorities, are nervous about investing in technology that they fear could become quickly out of date. However, we consider the issue to be less an issue of obsolescence and more an issue of ensuring that both charge point owners and operators have incentives to keep the infrastructure network adequately maintained and updated to ensure consistency for consumers.

2. How well is competition between EV charging providers working at present in the different sector segments and what are the key risks to effective competition (including any emerging competition concerns)?

The UK EVC sector is a nascent and dynamic market with a large number of strong diverse competitors and new entrants, that is arguably not matched internationally.

All sector segments are well-served by a diverse range of competitors. Several new, well-funded competitors have entered the home and public charging markets in recent years, including EO Charging, myenergi, InstaVolt, IONITY, Osprey Charging and Shell, bringing capital and increased consumer choice. As mentioned above, the workplace charging sector is hardware-based and is well-served by global competitors, including the likes of leading charging businesses from the US and Continental Europe. Competitors include ChargePoint, EVBox, NewMotion, Siemens and Tritium.

Competition is generally working well in all segments, as can be seen by the number of competitors and new entrants in each segment and the choice available to customers. Given the nascent state of the sector, there remain however a number of risks which need to be overcome when making an investment decision, including uncertainty around demand forecasts and utilisation levels and the future regulatory environment (which may affect both pricing and demand). Greater uncertainty may, for instance, lead investors to require some form of exclusivity to maximise their ability to earn a return on their investment.

Currently, given that the UK’s EV charging network is still in its infancy, consumers may have more limited options for charging in the immediate vicinity, but we expect this to change as the sector develops and for consumers to have more choice based on location, charging speed and price.

There are specific public charging segments where competition between providers appears to be working less well due to limitations on the number of providers. In particular, this includes charging on travel routes, especially the amenity parking at motorway service areas, where only a handful of sites offer a choice of providers due to exclusivity arrangements in place at those sites. Another area is on-street charging – particularly in London – where providers may have a borough-wide relationship with no choice of provision.

Another potential risk is the introduction of standardisation requirements on infrastructure units that may lead to a hampering of innovation due to the loss of ability to differentiate and compete on product offering. For example, the potential requirement for technical interoperability for home charging points (where one provider’s home charging points will need to be capable of operation by any other provider’s platform or app) may mean that competitors immediately gain access to each other’s latest innovations, which could disincentivise investment – in particular investment in new proprietary technology - in this segment.

3. How can competition in the different sector segments be strengthened as the sector develops, either by building on current policies and/or through other approaches?

Given the market's early stage of growth, investment in the EVC sector is largely driven by the confidence that the EV market will grow significantly over the coming years and that, as a result, the EVC sector will deliver the returns required by those making the investments. Therefore, policies that encourage the growth of the EV market will in turn help to drive investment in the EVC sector, whilst policies that dampen the growth of the EV market may slow down investment in the EVC sector, and thus in particular the expansion of public charging infrastructure (that is more capital intensive).

In the home and workplace charging segments, the choice of provider is down to the individual consumer or business. The multitude of choice of providers (and the growth of the EV market) seems likely to continue to ensure competitiveness in these segments.

While some public charging segments are more nascent or developed than others, we see a high degree of competitiveness in most of them (see Q2 above). As mentioned above, there are a small number of segments, such as amenity parking at motorway service areas, in which there are only one or a small number of players present due to exclusivity arrangements that exist. Clearly, that limits consumer choice in those areas and could potentially hinder network expansion to the level outlined by the Government in its latest announcements (which point to an acceleration of roll-out of charge points on motorways across England). Whilst bp considers that it may be necessary, in certain circumstances, to require exclusivity in order to recoup investment costs, it is unclear whether that is the case for amenity parking at motorway service areas and on-street charging – particularly in London – where providers may have a borough-wide relationship with no choice of provision.

4. What are the main existing and potential barriers to entry and expansion for EV charging providers and how can these be addressed?

The ability and incentive to invest is the main barrier, as this is key to enabling the expansion of the charging network and infrastructure. Other challenges include access to land (sites) and funding any prerequisite grid connection costs to bring power to the sites, in particular for high-powered charge points.

As mentioned in more detail below (see Q6), key considerations for investment include in particular, demand/utilisation levels.

In terms of land, the challenges lie predominantly in public charging (as opposed to home or workplace charging). In particular for charging on travel routes, if Government targets around the number of ultra-fast chargers (in particular) along the motorway and key A-road network are to be met, then there may need to be a greater number of suitable sites available along these routes at which to install. Please also see below challenges around off-street charging (see Q5 below).

While power itself is not a barrier, the issues around it can create significant cost and cause significant delay to the expansion of infrastructure. With an end-to-end timeline of around 40 weeks for an average ultra-fast charging site, from feasibility study to commissioning, around 10 weeks of this can simply be waiting for a quote to be returned from a DNO. It is clear that DNO staffing and overall resourcing levels must be increased if they are to cope with the forthcoming inevitable demand for new connections.

The costs of local grid connection, particularly for the faster charge points necessary on the strategic road network, can be prohibitive for private investors. The lack of standardisation of connection costs can make it harder to plan effectively for a broader national rollout and leave areas of the country behind where the costs are too prohibitive for the private sector to bear (at least in the short term until more widespread adoption of EVs takes place).

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First movers can also be at a disadvantage, by investing the full amount for the grid upgrade required to enable connection that others (being CPOs or other companies providing services relying on power supply to the site) could free ride off in the future¹. Without a clear and satisfactory regime to spread the cost more equitably, sites with higher initial connection costs are more likely to be rejected for the purposes of EV charging installation or depend on an exclusivity period to recoup the initial investment costs.

5. How can chargepoints be effectively deployed to ensure there is sufficient supply to meet future demand? What factors need to be taken into account?

The idea that there is *currently* not enough charging infrastructure is not borne out in usage statistics as there is typically more than 50% availability across public charging points at any one time. However, this perception remains and should be addressed, together with the expansion of the network.

Given that our plans are based on a dramatic growth in the number of EVs on UK roads, by 2030, bp will aim to have more than doubled the number of public charge points in the UK, from 7,500 to 16,000, with a 30-fold increase in the kilowatt hours of electricity sold to our customers. Other providers have also publicly announced ambitious growth to meet expected demand with the phase out of the sale of new ICE vehicles by 2030.

Whilst this will inevitably lead to an increase in home charging, as the most convenient form of charging, it is estimated that 30-40% of the UK's housing stock is not suitable to have a home charging point installed.² If the UK is to be successful in transitioning away from the internal combustion engine, all motorists need to be reassured that they can charge their EVs quickly at easily accessible sites.

We do not believe that the proliferation of on-street charging in every area is a realistic prospect to provide a solution for all of those who cannot charge at home. It is our experience that local authorities would prefer not to create additional 'street furniture' on footways, which means that converted streetlights become a more attractive candidate for on-street charging. If there are 5.5

¹ This may be the case even where the Electricity (Connection Charges) Regulation 2002 applies, through which certain charges may be refunded for a new or modified connection where used by a second customer.

² In 2010, 40% of dwellings had use of a garage, 26% had other off-street parking, 32% relied on street parking, and 2% of homes had no parking provision whatsoever" – 34% without garage or off-street parking, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/6748/2173483.pdf

million streetlights in the UK³ and just over 90,000 miles of urban roads (excluding 'A' and 'B' roads)⁴, this suggests there would be only one streetlight every 26 metres, equivalent to 5-6 on-street parking spaces. We also know from our experience of working with local authorities that many are moving streetlight columns to the back of the footway, meaning that these assets become even less feasible in terms of being converted to on-street charging points. Accordingly, we do not believe that on-street charging infrastructure can ever be a sufficient solution alone to meet the needs of those who cannot charge at home.

This points to the importance of considering the right mix of charging speeds depending on the charging context, including ultra-fast charging points, and the need to resolve the issues around access to land and the transparency of connection costs, as referred to in our response to Q4 above.

6. What incentives are there for private investment in EV charging infrastructure including within the different sector segments? How might incentives need to change for the future growth of the sector and development of competition?

Whilst investment is taking place across all segments, leading to a mix of charging options (including a mix of charging speeds) for consumers across the segments, the major focus of larger scale private investment currently is within higher powered public charging infrastructure. This is due to expected higher utilisation rates as adoption of EVs increases, as well as the Government's ambitious targets for public charging rollout. Whether a consumer is able to home charge or not, consumers will need fast and convenient charging when making long distance journeys.

A business case would begin with feasibility of a suitable site as a location for the infrastructure, both from a site perspective (i.e. whether it is possible to install the right infrastructure) as well as economic feasibility. For charging on travel routes, the site would need to be able to attract significant traffic from EV drivers, probably due to its proximity to the major road network.

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For public charging, assuming that utilisation rates grow in line with the EV market, we do not see a need for long-term public subsidy (e.g. beyond 2030) to stimulate growth in public charging infrastructure and believe that private capital will continue to lead the deployment of public charging networks. However, where utilisation remains low due to less EV adoption or lower demand (e.g. in rural areas), there may be a need for existing government subsidies to continue, and potentially new government subsidy, to stimulate investment in the short term until levels of utilisation increase. Ultimately, however, bp pulse expects increases in utilisation levels to diminish the need for any continuing public subsidy.

On-street charging is often subsidised via the On-street Residential Chargepoint Scheme (ORCS) grant; funding is available for up to 75% of the capital costs of procuring and installing the charge point and associated parking bay. Due to the lower utilisation rates as a result of the desired proliferation of

³ <https://www.luxreview.com/2015/08/10/what-if-all-the-uk-s-streetlights-were-upgraded-with-leds/> - suggests 5.5 million streetlights in the UK, equating to one every 26 metres in an urban area based on the figures above, with the average UK parking space being circa 5 metres in length.

⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/860685/road-lengths-in-great-britain-2019.pdf

infrastructure in areas where EV adoption may not be particularly high, there is generally less appetite for private investment for the full capital amount. However, given that up to 75% is funded by ORCS, there is some private sector interest (including by bp pulse) in 'bridging the gap' for local authority schemes between the maximum 75% funding from the ORCS and the full rollout costs. The ORCS funding provides an incentive for private investment, since the level of investment required could be as low as 25%. If utilisation rates increase as a result of growth in the EV market, then this market may become more attractive for more substantial levels of investment, potentially without any government subsidy.

Most home charging installations are currently subsidised by the EV Homecharge Scheme (EVHS) grant, but we see this developing as integrated/bundled sales models start to emerge, for example with Homecharge points being included in a vehicle lease in the future. Until such models emerge, we see the EVHS incentive continuing to play an important role in enabling most home charging to take place without consumers facing a significant up-front cost. The EVHS has reduced considerably since its introduction, from an initial level of £1,000 (covering the full cost of most home charging installations), down to a maximum of £350 today, meaning that most customers will pay at least £400 to have a home charging point installed.

7. What impact does public subsidy have on private investment incentives; are there any areas/gaps where public support is most likely to be needed?

The impact of public subsidy for home charging has been to help grow the adoption of EVs in the UK. The benefit of being able to have a home charging point installed either for free (previously) or at a significantly lower cost (today) has certainly helped to convince many consumers to adopt EVs. This has resulted in increased private incentives to invest in charging for this segment as well.

In addition, it could be argued that this has also incentivised private businesses to invest in the expansion of public charging infrastructure, since they have had the confidence of increasing utilisation from a growing EV market.

The business case for public charging, where grid connections can be obtained at market rates and utilisation is expected to be good, is positive today; but where the grid connection costs are significantly (e.g. 5x or even 10x) above market rates or where utilisation is expected to be low, the case for private investment is significantly weaker and may therefore benefit, at least in the short term until increased adoption of EVs, from additional public investment. For example, rural areas have historically had lower levels of private investment, due to lower expected utilisation pending increased adoption of EVs.

The private sector is willing to invest in public charging, but there should be a level playing field where all operators can obtain access to power at fair market rates. We have examples of these high costs, including on motorway sites. As mentioned above (see Q6), there is significant variability in DNO connection costs, with some quotes received being 10, or even 30-40 times the average connection cost, making these sites unviable from an investment perspective. We therefore consider that public investment is often better targeted at "below ground" infrastructure (including connectivity and making sites/land available) rather than "above ground" charging infrastructure.

The approach to public charging adopted in England contrasts to that adopted by Scotland and Northern Ireland, where there was public investment in infrastructure with free charging for consumers for a longer period. Whilst this led to a baseline level of infrastructure, it has delayed

private sector investment in public charging (whilst the majority of charge points remained free) and may have also led to a lack of incentives to keep the network up to date.

Separately, the V.A.T. rate is 20% for public electricity and 5% for home charging. An equalisation of the V.A.T. rate for home and public electricity, will help to bridge the consumer price gap between those with and without off street parking and to remove any resulting social injustice. With the current arrangements, those without off-street parking are disadvantaged compared to those – likely to be more affluent – with private off-street parking.

Public spending on research and development in battery technology is also very worthwhile in the growth and deployment of faster charging batteries and improved range. Deployment of indigenous battery production can bring economic benefits, as well as reducing the carbon impact of transporting the product from overseas.

8. What is required in order to ensure that rural / remote communities and those without off-street parking are well served by charging infrastructure?

The 30-40% or more of households without off-street parking are likely to be amongst the most difficult to convert from their existing ICE vehicles, due to their reliance on charging methods other than home charging. The needs of these consumers will be met by a mixed ecosystem of charging infrastructure, including on-street, hubs and key destinations, as well as on travel routes. However, we see the provision of easily-accessible ultra-fast charging points as key to building wider public confidence in EVs, given its similarities to the current fuelling for ICE cars and therefore the familiarity for consumers. Consumer perception regarding the charging of electric vehicles is still that it takes too long, so the proliferation of the fastest forms of charging will be particularly important in challenging this misconception.

In urban areas like London, it will be difficult practically to provide the number of chargers necessary on the streets for each individual due to a lack of space on the pavements (see Q5 above and Q9 below), so fast charging hubs, such as bp's retail site in Hammersmith⁵, could be the best solution, in partnership with other types of charging. As mentioned above (see Q6), on-street parking is often subsidised up to 75% through use of the On-street Residential Chargepoint Scheme with private investors increasingly willing to invest the remainder of the amount up to the total cost of installation.

In order to serve those without off-street parking (in both urban and rural settings), local authorities will be important stakeholders in making more sites available (from existing land banks) on which public charging infrastructure could be installed – for example charging hubs for local residents and businesses. Of course, utilisation levels also need to be high enough – or expected to be high enough – to incentivise private investment.

Some rural and remote communities may lack the public charging provision of the urban areas, but there is also a greater likelihood of access to home charging in such areas. Utilisation levels may remain a challenge in the short term in rural areas, requiring the continuation of public subsidy over the next few years. Nevertheless, we expect that, with increasing adoption of EVs (helped by the

⁵ See the following for more details on bp Hammersmith flyover: https://www.bp.com/en_gb/united-kingdom/home/news/press-releases/bp-retail-site-celebrated-as-uks-best-ev-charging-destination.html.

Government's recent announcement relating to 2030 phasing out of sales of new ICE cars), private funding will become more attractive and therefore the need for public funding will diminish.

Many areas with higher levels of social housing (although typically not that remote) are likely to have a higher proportion of households without dedicated off-street parking, so it is not just an urban vs. rural issue. There is a real social equity issue if around 30-40% of the population are unable to access the potential benefits of smart energy systems (e.g. less expensive energy tariffs and in the future, potentially using batteries for grid balancing purposes), and still find themselves without a way to charge their EV rapidly nearby.

9. What role should local authorities play to help deliver EV charging in a way that promotes competition? What support would they need?

Local authorities vary in their ambition and ability to deliver charging infrastructure. Some lack resources and expertise, and the lack of knowledge on what they need and how they can properly provide charge points is a real issue. There has been an emphasis on local authorities playing a role in the deployment of public charging since the earliest public charging points were deployed, which tends to result in an interest in funding. Given that the only specific source of funding available to local authorities for public charging is the On-street Residential Chargepoint Scheme, there is subsequently a tendency to focus on on-street solutions, rather than considering other options. If funding for local authorities is made available from central government, it would be worth broadening its scope to include off-street installations.

The immediate glance towards pavements when it comes to local authorities' role in public charging rollout – with on-street charging, and lamp posts in particular being a focus area – can present a challenge. As discussed above (Q5), a lot of lamp posts have been, or will be, moved to the back of public footways and there is a simultaneous desire to avoid seeing a proliferation of street furniture, as well as avoiding trip hazards for the elderly and visually-impaired.

Many local authorities own significant amounts of land in their local area, unused for years if not decades, which could be put to better use. It is likely that some of these packets of land will be suitable for the creation of dedicated public charging locations, for example local rapid charging hubs. Local authorities can potentially repurpose unused land or under-utilised land assets in this way to increase the availability of public charging points in the local area. Existing examples include Milton Keynes Council's development of the UK's largest universal public rapid charging hub at their Coachway site just off the M1, and Lancashire County Council's development of a rapid charging hub at the Lancaster park and ride site just off the M6. Government guidance or action may be required to ease restrictions on the use of land for charging sites or planning processes for the development of local authority-owned sites.

10. What can be learned from the different policy approaches taken in the devolved administrations for the EV charging market's development?

bp operates the network of around 1,500 charge points under the ChargePlace Scotland brand, on behalf of Transport Scotland. The ChargePlace Scotland model of funding infrastructure across the country, which would ultimately then be owned by the local authorities or local businesses, led to a very rapid deployment of infrastructure.

While this was successful in installing a baseline level of infrastructure, there is a question of how sustainable that model is in the longer term, and also whether it delayed private sector investment in public charging in Scotland, as the majority of the charge points were – and still are – free to use.

Publicly-funded charging is also predominant in Northern Ireland, where the Electricity Supply Board (ESB) owns and operates the ecar NI network. It also owns and operates the ESB cars network in Ireland. Apart from small numbers of privately funded charging points, these networks were largely unchallenged until private operators such as EasyGo entered the market in the last 2-3 years.⁶ This has stifled private investment in charging and the infrastructure has not been regularly upgraded.

⁶ <https://easygo.ie/news/eir-and-easygo-to-replace-up-to-180-telephone-kiosks-with-electric-vehicle-charge-points/>

Theme two: effective consumer interaction with the sector

1. What challenges or difficulties related to chargepoints might act as a barrier to consumers switching from a conventionally fuelled passenger vehicle to an EV and how might these be overcome?

While non-public charging (i.e. at home and workplace) is important for consumer adoption of EVs, we believe that providing a hassle free and reliable public charging experience is key to supporting consumer uptake. While some element of behaviour change is inevitable, consumers who do not yet drive EVs are often looking for a similar charging experience to that of their refuelling experience, meaning a fast charge in a convenient and known location. While a mix of charging speeds will continue to be required depending on the charging context, ultra-fast charging would reduce the requirement for dramatic consumer behaviour change. Complementary to home and destination charging infrastructure, it would address range anxiety and benefit those without access to off-street parking. The familiarity of a service station forecourt is better for drivers searching for charging in an unfamiliar location, and some ICE vehicle drivers are being introduced to EVs for the first time on these forecourts. This visibility of charge points for people not searching for them, will help build confidence and encourage them to seek further information.

A gap in consumer knowledge in relation to EVs, in particular, has been found to be an important reason for the slow adoption of EVs⁷. This could also translate to a knowledge gap in relation to EV charging. Education through resources such as bp's EV Experience Centre in Milton Keynes⁸ are very helpful in having an informed resource to answer questions and test drive EVs. The Experience Centre was opened in 2017 and provides consumers with free, no obligation advice looking to switch and needing help to choose the right car, or those wanting more information. Our aim is to bust the myths about EVs, answer any questions our visitors may have and improve public opinion of electric and plug-in vehicles through short and long-term test drives.

We are also seeing the early stages of more mainstream marketing of such services – e.g. bp undertook London-wide billboard advertising when the first ultra-fast chargers went live on our forecourts. We hope that the appeal of hassle free and reliable public charging along with associated services at our retail sites will incentivise customers to charge with us.

Whilst this type of initiative has been relatively common for CPO providers, car manufacturers have been slower to promote EVs. This may however change given the Government's revised 2030 deadline for the phasing out of sales of new ICE cars.

2. What are the key challenges for consumers already interacting with the sector and how might these change over time as the sector grows?

Reliability of charge points is key to maintaining consumer confidence in the charging network. The EV community can be quite close (connecting, for example, on social media sites), so even those drivers that do not experience faulty equipment themselves, can receive information from other customers that negatively affects confidence.

⁷ <https://www.whatcar.com/news/knowledge-gap-to-blame-for-slow-electric-vehicle-sales/n19097>

⁸ More information about EVEC can be found at: <https://evexperiencecentre.co.uk/>

Many of the reliability issues that are seen on public charging networks today are on legacy hardware that is no longer properly maintained. That is due to either apathy or affordability on the part of the charge point owner (for older infrastructure, often local authorities that procured the infrastructure with central government funds), which is very often not the charge point operator. Most of the latest infrastructure being rolled out is being installed with the charge point operator owning the asset (and therefore responsible for ongoing maintenance), but older charge points were not typically deployed in this way. As more public charging infrastructure is deployed on an 'own and operate' basis, overall reliability will inevitably improve. Whilst we expect that periodic upgrades will continue to be required, and provided the equipment is adequately maintained, we do not expect upgrades to the hardware to be required due to slow speeds or redundant technology in the short to medium term.

For the legacy hardware, provided the location is sufficiently attractive to drive utilisation, private operators, including bp, can finance an upgrade in return for a transfer to the operator of ownership of the charge point. This could be on a like-for-like basis (e.g. if a fast charger is already in place) or, depending on demand, upgrading to a higher-powered unit (although this may require significant, additional investment if upgrading to ultra-fast charging). This type of upgrade has happened recently in York, where bp pulse is the delivery partner for York Council for the delivery of 250 fast charging spaces and 7 rapid chargers⁹.

Modern charging points are generally much more reliable than older infrastructure, which was often installed by site hosts – very often local authorities – where cost rather than consumer experience or reliability was the driving factor when EVs first came to market. If further regulations are introduced around the reliability of public charging points, then there should be specific responsibility placed on the owner of the charge point, not just the operator – as is the case in the existing regulations – which often has very little control over the hardware to ensure reliability and adequate maintenance. If a charge point owner is not incentivised to resolve infrastructure issues, charge point operators may be forced to cease operation of the asset, reducing the network coverage in a specific area.

[✂]

For historic reasons, there remains a public perception (increasingly unfounded) that access to and payment for EV charging is complex. Any difficulties have largely been addressed by the Alternative Fuels Infrastructure Regulations which mandated CPOs to provide ad hoc access to charge points without the need for registration or storage of personal information and/or credit or debit card details. In addition, all new rapid and ultra-fast chargers on the bp pulse network allow contactless bank card payment. bp is also retrofitting its existing rapid chargers with this technology. Whilst further improvements could be made (and inevitably will be made as a result of the upgrade of legacy infrastructure), we consider that any potential issue has now been largely addressed.

3. How do consumers decide which chargepoint services and providers to use? What information do consumers need to make this decision and at what stage in the decision-making process?

⁹ <https://www.york.gov.uk/EVChargingStrategy>

Where they are able to do so, consumers will typically have a charge point at home. There are a large number of providers that offer home charging, such as PodPoint, myenergi, EO and Ohme, as well as a number of aggregators and price comparison sites to aid consumers in their decision-making.

For public charge points, the consumer choice will depend on their behaviour and, in particular, whether they plan their journey in advance or not. Consumers have a number of tools at their disposal, including apps such as Zap-Map or Google Maps, which will inform drivers of the location, availability, charge speed and price of EV charging points, as well as the cars themselves which may have live data. These can be used live as well as to plan a journey in advance.

For those who wish to plan their journey, there are additional tools such as A Better Route Planner, EV Trip Planner, EV Maps and others. Consumers can use these tools to decide which charge points to use based on convenience, price, network preference or other factors. Currently, given that the UK's EV charging network is still in its infancy, consumers may have more limited options for charging in the immediate vicinity, but we expect this to change as the sector develops and for consumers to have more choice based on location, charging speed and price.

Regular public charge point users may decide to subscribe to a particular network, such as that of bp pulse, which offers discounted kWh pricing for a monthly fee, based on price as well as convenience and density of network. If so, they are likely to have a preference for use of the network to which they are subscribed and may seek out a charge point belonging to that network, even if not the most convenient by location.

For those that do not plan, it is likely that they will decide which charge point services to use based mainly on convenience and need, with availability and location likely to be the key factors.

4. Can consumers easily understand and compare charging tariffs in this sector and what barriers, if any, do they face?

Pricing is typically offered on a 'per kWh' basis, which is an understandable and comparable metric. Whilst most providers offer 'per kWh' pricing on a Pay As You Go basis, a number of providers (including bp) also offer subscription services. For a monthly fixed charge, this provides consumers with discounted kWh pricing designed to make tariffs more affordable for frequent users. bp also offers a free membership option, which has no monthly charge but offers a slightly discounted kWh pricing and payment through the app¹⁰. In addition to the larger network providers, there are certain (mainly legacy) individual charge point owners that, whilst belonging to a particular network, continue to set their own tariffs (such as Charge Your Car within the bp network).

Pricing information is available via websites, apps and through aggregators and, in the case of chargers with contactless capability, on the charging post itself. Although providers offer a number of different tariffs, we consider that consumers have access to sufficient information to enable them to make informed decisions.

¹⁰ For completeness, bp has a minimum transaction amount of £1.20 for customers on its free membership and £1.50 for consumers who pay through contactless (pay as you go).

While a clearly comparable metric for 'basic' charging for ad hoc users is important, it is also vital for EVC operators to be able to develop innovative commercial models such as bundles or other deals, where pricing is not merely defined in 'per kWh' terms.

[X]

It is also possible that, in future, there may be more variability in pricing, for example for charging at different times of the day to support greater flexibility across the grid. We consider that these changes would offer consumers more choice as to where and when it is best to charge their EV, taking advantage of the tariff most suitable to their specific needs.

We also think it is necessary to have additional charges to disincentivise 'charge point hogging', in particular with an increase in faster charge points. For example, we currently charge a £10 per hour overstay fee on rapid chargers after 90 minutes of dwell time, given that virtually every electric car on the market is capable of charging to at least 80% in that time. This enables CPOs to maximise the use and efficiency of the network.

Accordingly, given the market's early stage of development, we see significant potential benefits to consumers in allowing the market to evolve and innovate with different charging models.

5. Do particular groups of consumers face additional challenges to interacting with the sector and if so, who and why? How might these be overcome?

Accessibility of public charge points, particularly for those with additional needs, such as wheelchair users, has been identified as a potential area for improvement. bp already have accessible charging bays on bp forecourts, designed to accessible parking bay standards, but it is worth noting that there is no standard for an accessible charging bay design. bp is keen to engage with relevant parties to develop thinking in this area.

As stated above (see Q8 in theme one), the 30-40% of homes without off-street parking also face difficulty in their ability to enjoy EVs. This is likely disproportionately to include areas with social housing. Given the cheaper tariffs available for home charging over public charging, this is a real social equity issue.

6. Are there any technological developments or tools that could support consumers to navigate the sector, for example by helping to make more informed choices?

We see education and awareness as largely the key to engaging with consumers on the transition to EVs (see Q1, theme 2). The EV Experience Centre in Milton Keynes mentioned above is a good example of a physical space that consumers can use in confidence and ask a range of questions on charging and experiencing an EV. Unfortunately, we have received feedback from existing and prospective EV drivers that their experience of education and information at car dealerships has not been as good as expected, with many dealers having poor levels of knowledge at best, and some proactively discouraging EV adoption.

There are already a significant number of aggregator and comparison tools across both the public charging and home charging segments, most notably Zap-Map and RightCharge (see Q3) that allow consumers to check the locations of public charge points, compare pricing, and check user reviews, as well as to compare the features and prices of home charging points. bp pulse provides data, predominantly via APIs, to several third parties, including charge point information aggregators and

mapping services (e.g. Zap-Map, Google Maps and a number of in-car navigation systems). This can include both static information (charge point type, location, payment information and pricing) and dynamic information (live charge point availability updated every 5 minutes). For example, ZapMap claims to have more than 95% of public charge points mapped and dynamic data for close to 70% of all public charge points¹¹. New points are added as soon as they go live and users can see whether a charge point is available, in use, or out of service.

We understand that one of the Government's proposals in its upcoming consultation into the consumer experience of EV charging will cover the sharing of static data providing up to date information; if this could be used as a source of information by car manufacturers (that often include outdated information), that would be beneficial for consumers.

There are also a number of new consumer-focused websites that are helping to educate around and explain EVs, such as Electrifying.com, with whom bp have just entered into a partnership. Through this partnership, bp will use content provided by Electrifying.com to educate bp customers whilst Electrifying.com will use bp as a voice to educate their wider audience on the topic of EV charging.

7. Are existing protections offered by consumer law and other measures (such as sector regulations) sufficient?

The Office for Product Safety and Standards is the regulator for public charging, and we believe they do offer sufficient protections to consumers. However, consumer awareness of the sector and the current regulations is poor and could be better publicised. This may go some way to addressing any historic misconceptions, such as the need for registration with a CPO prior to use, despite the opposite being mandated in 2017.

8. What, if any, open data measures are needed to support consumer interaction, such as through the growth of comparison sites and apps?

As mentioned above (see Q6, theme 2), we provide data, predominantly via APIs, to several third parties, including charge point information aggregators and mapping services (e.g. Zap-Map, Google Maps).

We believe that all CPOs have every incentive to share their data in this way to encourage usage of their own infrastructure and thereby to increase utilisation. We therefore do not believe that open data measures are required.

We note that the Alternative Fuel Infrastructure Regulations already require chargepoints operators to make geographic location data accessible to the public on an open and non-discriminatory basis. bp is also fully engaged with the Office for Zero Emission Vehicles' Open Public Chargepoint Data (OPCD) project, which is seeking to create an up-to-date national database of all public charge points that could be used by third parties. This effectively replaces the old National Chargepoint Registry (NCR), which was designed to capture information about publicly funded charge points but has become very out of date in recent years, due to the majority of the expansion of public charging being privately-funded.

¹¹ <https://www.zap-map.com/home/about-us/>

9. What else is required to help ensure that the EV charging sector develops in a way that is responsive to consumer needs?

As the market grows, we consider that the EV charging sector will grow to meet consumer need. Charging need will increase together with the potential customer base and utilisation. This is likely to lead to better business cases for investment in infrastructure, producing a virtuous circle of increased utilisation and investment. Currently, the network is underutilised, with more than 50% availability across the network at any one time. We therefore welcome the Government's decision to bring forward the phase out of the sale of new petrol and diesel cars to 2030 and would also welcome more certainty in the market in relation to plug-in hybrids, given the more limited charging capabilities that these cars have.

We believe that consumers will rightly demand access to fast, convenient and reliable charging in key strategic locations (see Q1-2, theme 2 above), and that private investment can lead the deployment of the majority of this infrastructure.

Nevertheless, as discussed above, significant barriers remain, namely:

- Access to land, including for development of fast-charging hubs and on the strategic road network and, in particular, motorway service station amenity areas.
- The time required, the high costs and the lack of transparency of DNO grid connection, especially for high-powered chargers.

At the same time, given the significant private capital investment required to rollout ultra-fast public charging infrastructure and the important ongoing risks as to demand forecasts, utilisation levels and the future regulatory environment, it is imperative that investment incentives are not undermined.