Registered Office:
Newington House
237 Southwark Bridge Road
London SE1 6NP

Registered in England and Wales No: 3870728

Company:
UK Power Networks
(Operations) Limited

Andrea Coscelli
Competition and Markets Authority
The Cabot
25 Cabot Square
London
E14 4QZ

By email only to: EVCharging@cma.gov.uk

05 January 2021

Dear Andrea

Electric vehicle charging market study

Thank you for giving us the opportunity to provide input into your electric vehicle (EV) charging market study.

This response is on behalf of UK Power Networks' three distribution licence holding companies: Eastern Power Networks plc, London Power Networks plc, and South Eastern Power Networks plc. We are GB's largest electricity Distribution Network Operator (DNO), dedicated to delivering a safe, secure and sustainable electricity supply to 8.3 million homes and businesses.

As a DNO we are clear on our role in respect of EVs, which is to ensure that the network is ready to enable the rapid electrification of transport whilst keeping the cost and disruption to our customers to a minimum. Already our networks provide power for over 100,000 EVs, or about 30% of the UK's total EV registrations. However, we currently forecast that we may need to cater for up to four million EVs by 2030 following the Government's recently announced Ten Point Plan[1]. In terms of network capacity requirements, this is equivalent to approximately six million new homes.

UK Power Networks agrees with the CMA on the strategic importance of deploying sufficient EV charging infrastructure and the knock on impact this has on consumer confidence. As a result, we have given a great deal of thought to the interventions we and other DNOs could make to help accelerate the rollout of EV infrastructure across the UK to help address range anxiety concerns.

Today, a key blocker to the deployment of EV charging infrastructure is the upfront capital cost involved in connecting to the network. Connection arrangements also create disparity, as the costs faced are significantly higher in some types of location than others, despite the request being the same in terms of network capacity. Under current arrangements when a domestic household with a driveway connects a charge point to the network, any additional reinforcement costs are socialised between all network users. In contrast, a social housing landlord has to pay a significant share of the upfront connection costs to install a public charge point on the street outside the block of flats

[1] https://www.gov.uk/government/news/pm-outlines-his-ten-point-plan-for-a-green-industrial-revolution-for-250000-jobs

they own. With over half of our customers not having their own driveway, this type of structural inequality must be addressed as a matter of priority.

In an economy suffering from the impacts of the COVID-19 pandemic, we recognise that there will be difficult decisions on the size of financial support needed to roll out charging infrastructure and how to distribute associated costs fairly across society. We believe to get these decisions right it is crucial to combine and coordinate funding from government, network price controls and wider investors. For example, the Charging Infrastructure Fund is already providing a way of accessing private finance to help accelerate the deployment of charge points. There is now a great opportunity to build on this with targeted intervention from DNOs, via the RIIO price control process, to address market failures in a way that avoids undue distortion and unnecessary costs.

As part of addressing market failures to EV deployment there are valuable learnings from the Netherlands and California, where interventions have reduced the capital hurdle for well-justified charge point installations. Our Charge Collective initiative[2] is building on such learnings by developing a framework tool that we can use with Local Authorities to characterise the connection cost barrier and thereby act to address it. This involves partnering with Local Authorities to identify where a core network of public charge points is required and to gain an understanding of what private investors are willing to pay to connect these charge points. We will then explore ways of providing financial support to reduce upfront connection costs, where this is deemed necessary to avoid market failures leading to gaps in charge point provision.

We would welcome the opportunity to discuss our Charge Collective initiative with you, as well as the responses we have provided in the appendix below in order to support your objectives.

Yours sincerely

[redacted]

Sul Alli
Director of Customer Services, Strategy & Regulation
UK Power Networks

Copy James Hope, Head of Regulation and Regulatory Finance, UK Power Networks
Paul Measday, Regulatory Returns & Compliance Manager, UK Power Networks
Dan Saker, Distribution Policy Manager, UK Power Networks
Graham Branton, Distribution Policy Analyst, UK Power Networks

[2] https://innovation.ukpowernetworks.co.uk/projects/charge-collective/#:~:text=Charge%20Collective%20is%20a%20collaborative,to%20Net%20Zero%20carbon%20emissions.

Appendix: CMA Market Study themes and key questions

Set out below we have answered questions that are relevant to our sector and where we have evidence to provide.

Theme one: developing competition while incentivising investment

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

In line with the CMA's findings in the consultation document, we have seen the residential off-street charging segment growing at the fastest rate. In contrast, deployment has been slower in segments where investors face a significant capital hurdle.

As Table 1 shows, public charge point infrastructure in Europe is concentrated in five countries, namely the Netherlands, Germany, France, the UK and Norway[3], which account for 74% of public charge points in Europe. Of these countries, the UK alongside Norway has an EV to charge point ratio higher than the average, while the ratios for the Netherlands, France and Germany are 3.8, 6.9, and 8.4 respectively. Furthermore, the European average EV to public charge point ratio is 8.5, which means that the UK's current ratio of 11.2 suggests that charge point provision is a potential issue.

Table 1: How the UK compares to other countries in terms of its charge point provision

Country	Public charge points	Electric Vehicles	EV to public charge point ratio	Fast charge points per 100km of highway	% of registered new cars that are EVs
Netherlands	55,739	213,701	4	36	12%
Germany	40,412	340,804	8	35	8%
France	38,099	262,815	7	25	10%
United Kingdom	27,236	304,968	11	133	7%
Norway	16,386	350,861	21	595	70%
Italy	11,778	48,090	4	12	3%
Austria	7,885	40,898	5	48	7%
Sweden	7,570	135,068	18	243	27%
Belgium	7,451	62,197	8	20	6%
Switzerland	6,520	56,525	9	57	10%
Spain	5,550	53,191	10	5	3%
Denmark	2,663	28,875	11	44	9%
Finland	2,373	24,312	10	40	16%
Portugal	1,739	33,967	20	10	11%
Ireland	1,021	12,904	13	21	6%
Europe Total (EU+EFTA+Turkey)	*239,532*	*2,027,855*	*8*	-	*7%*

[3] Source: European Alternative Fuels Observatory (EAFO). EAFO figures for EV count and charge points are from April 2020. EAFO figures have been used for consistency of sources between countries.

To recognise the specific charging needs of our 8.3 million customers across the transport sector, we have characterised five main charging segments in collaboration with our stakeholders. We have conducted modelling to understand the proportion of charging events across each segment and the associated charging infrastructure required to serve these customers.

Table 2: A summary of the challenges facing the five different charging segments

At Home Off-street	We expect over a quarter of homes we serve will require a fuse upgrade to ensure their electricity supply is sufficiently rated to accommodate a home charge point. Of those, a significant proportion will also require a service upgrade, which could impact the time to connect if customers are not made aware of this ahead of the EV arriving. Unless it continues to be socialised, the cost of this work could become a further barrier to uptake, particularly for consumer groups such as renters. Clear guidance and a scalable connections process will be required to manage the ramp in this volume of work.
At Home On-street	Around half of our customers do not have access to off-street parking and will rely on affordable on-street charging infrastructure. Market failures, policy and regulatory uncertainties could lead to an under-provision of on-street chargers. This puts communities at risk of being left behind where it is uneconomic for the market to invest. Intervention is required to avoid a piecemeal approach to deployment that results in inefficient infrastructure upgrades or chargers installed in suboptimal locations.
At Work	58% of new vehicles are registered by businesses, which will increasingly be electric. Currently businesses are eroding existing contracted capacity headroom and interest in smart solutions and flexibility services will increase to mitigate the upfront capital cost of triggering reinforcement. Providing access to these services efficiently will require the development of a new connection toolkit, alongside channels to make data and insights accessible to our customers. Where there is a need for greater capacity, coordination is required to ensure investment in network infrastructure is delivered efficiently. Smaller businesses with connections up to 100A face challenges akin to those at home off-street.
Destination	Destination charging plays an important role in ensuring everyone has access to charging infrastructure, independently from car ownership and parking space. Although the capital cost can be a hurdle to destination charging, this also encourages commercial businesses who profit from charging infrastructure to optimise the location and capacity of this infrastructure. To facilitate this, greater access to network data, smart connection solutions and the coordination of capacity provision is required.
En-route	Due to the large power requirement of en-route charging infrastructure, upfront connections costs can be a barrier to investment. Rapid charging infrastructure is perceived as a key enabler for EV ownership by many people to address range anxiety. Cheaper and faster connections solutions are required to support deployment of sufficient en-route charging infrastructure and build range confidence.

The impact of interoperability and smart charging

We fully support the drive towards interoperability and smart charging and believe development of these areas needs to be prioritised, as they are essential to achieving an accelerated EV roll out. They will also help to increase competition both in terms of in the deployment of charge points and in the delivery of network capacity. Smart charging demonstrably helps to avoid or defer network upgrades, resulting in reduced costs and disruption. Through our Project 'Shift'[4], we are co-designing smart charging products with industry partners to develop, enable and trial attractive propositions that work for customers, flexibility providers and networks. Market engagement with residents and charge point operators is a key part of our work on public EV charge points.

With regards to the provision of network capacity we do not envisage a 'silver bullet'. Instead we see a blend of using smart grid solutions (e.g. monitoring and control), market based flexibility (e.g. smart charging) and also taking a more anticipatory approach to reinforcing the networks where data and modelling signal this is likely to be required in the future, even if the increased demand needs are not imminent. It is clear that as part of a mass scale rollout to keep the costs down, we need to both maximise the benefits of flexibility but also invest appropriately in the networks where data and modelling point to this being the ultimate solution.

The majority of the total cost of upgrading the low voltage networks is in the cost of excavation, therefore significant future benefits can be had by installing the largest cable size at the time of doing the works. This coordinated approach to connection could save up to half in reinforcement costs against the counterfactual. Such coordination aligns to recommendations from the National Infrastructure Committee and the Committee on Climate Change, who have both called for the futureproofing of network reinforcement to cater for future demand growth[5].

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

We have identified a number of barriers to investment in public charge points that has resulted in market failure in this area. These include coordination failures, externalities and high upfront connection costs. This has led to a first mover disadvantage that risks suppressing the uptake of EVs for those reliant on public charging.

We believe that the most straightforward way to tackle these market failures is to reduce the upfront capital cost involved in connecting charge points to the network. This will remove a key obstacle to the deployment of charge points to ease consumer concerns. For example, we have examples in our regions such as Clacket Lane where investment into charge points at motorway service areas did not go ahead because of the upfront capital costs. Whilst the capital cost of establishing a connection to the electricity network will involve some cost in all locations, the cost can escalate dramatically when a new connection triggers network reinforcement or when the connection point is not close to the current network i.e. long extension (sole use) network assets are required.

High upfront capital costs may be difficult for commercial charge point operators to pass on, as consumers do not expect the cost of electricity to vary sharply from one charging location to another. The risks of inaction are therefore twofold:

[4] https://innovation.ukpowernetworks.co.uk/projects/shift/
[5] https://www.theccc.org.uk/publication/sixth-carbon-budget and https://nic.org.uk/app/uploads/CCS001_CCS0618917350-001_NIC-NIA_Accessible-1.pdf

- the first is the ongoing threat to consumer confidence by the lack of ubiquity of charging opportunity; and
- the second is the loss of consumer confidence caused by high prices if the costs of charging are adjusted in each location to reflect significantly varying capital costs.

Below we have summarised our view of the market failures that exist:

- **Coordination failure**
  - A more coordinated approach to EV charging infrastructure may lead to lower costs to investors and consumers and result in more EV charge point investment

- **Externalities**
  - There is an imperfect price on clean air – EV users in polluted areas cannot privatise benefits they create
  - The market will not deliver ahead of need because EVs induced in the market can use other charge points in a mature market

- **High upfront connection costs** to investors of EV charge points can:
  - magnify impact on investment from market failures and any policy uncertainty
  - result in an additional market failure, if there are capital market failures

To tackle these market failures we believe the full range of costs and benefits associated with installing charge points needs to be factored so that regulatory mechanisms stimulate deployment whilst ensuring investors face a level playing field. This could also look at how connection costs are deferred so that current and future users pay their fair share.

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

Building on our response to question four, we think it is useful to consider the supply of charge points needed for EV users 'at home' and then 'away from home', which includes workplace destination and en-route segments. Unlike ICE vehicles, EVs can get most of their charge next to the user's home, whether this on-street or on a driveway. Both of these options offer significant opportunity in terms of harnessing the benefits of smart charging, as the EV will be idle for long periods. Already many EV users with driveways are benefitting from off-peak tariffs that enable them to charge for a low cost. More effort is now needed to ramp up the deployment of on-street charging infrastructure to enable those without driveways to receive similar benefits.

With respect to the away from home segments more effort is needed to reduce the barriers facing investors of rapid charging hubs. For example, a spatial planning approach backed up by government targets would help DNOs to prioritise infrastructural upgrades in those areas most likely to be problematic. This would build on the approach that government took recently in setting a target for motorway service areas to have at least 6,000 rapid charge points by 2035.

<u>Learning lessons from outside the UK</u>

Set out below we have summarised key learnings from international case studies that we believe can provide valuable lessons for the UK:

- **California**[6]
  Network company Southern California Edison (SCE) has developed a 'Charge Ready Transport Programme' that was approved by its regulator in early 2019. The program provides an opportunity for electrical infrastructure to be installed to support charge points for non-residential EV fleets with no costs to applicants. SCE also offers rebates to certain applicants e.g. school bus operators to discount the cost of the charge points. With a budget of c.£290m SCE will fund 870 commercial sites over five-years that will support at least 8,400 EVs. To ensure this SCE stipulates that applicants must provide evidence that at least two EVs are purchased.

- **New York**
  In 2020 the mayor of New York announced a 'make-ready' programme for EVs to accelerate uptake. The action plan has focused on conducting public outreach, increasing access to charging infrastructure and improving the economics of EVs. A crucial policy intervention as part of this is that up to 90% of connection related costs are discounted for charge points and network operators have an incentive to site charge points in locations that meet customers' needs and make use of existing network capacity. An assessment of the merits of their programme has estimated that it will provide New York residents with $2.6bn in net benefits[7].

- **Oregon**[8]
  Network company Portland General Electric (PGE) developed an electrification plan in 2017 with two key objectives:

  1. Increase customer acquisition of EVs and other electric transportation options in their service area; and
  2. To begin efficiently integrating EVs into the electricity system.

  This included the development of a standard model to market test solutions to ensure maximum customer value is realised through fostering competition. Notably PGE defined a tool to assess the social and environmental outcomes of the decision making process. For example, their selection criteria included geographic diversity, proximity to existing chargers, PGE capacity headroom and the availability of land amongst other factors. As part of their CBA methodology, PGE looked at a variety of metrics including CO_2 emissions from both a customer, network and societal perspective.

- **The Netherlands**[9]
  Despite the fact that there are no direct national subsidies on EV purchases in The Netherlands it has the most EV charge points of any European country. The Netherlands provides a range of tax benefits in purchase tax, ownership tax, and company tax in order to make EV ownership cost the same as owning a diesel or petrol vehicle. It also offers tax-deductible investments for ultra-low emission vehicles, as well as EV charge points. At the municipal level subsidies for EVs are often available and in Amsterdam €500 is available for anyone scrapping an old diesel car. Furthermore, its municipal charging point system ensures EV owners can request to have a charge point installed on their street without paying any installation fee. The Netherlands has also focused on a model that charges EV

[6] https://www.sce.com/business/electric-cars/charge-ready-transport
[7] https://cleancities.energy.gov/files/u/projects_and_partnerships/project_material/supporting_material/232/nyc_readiness_plan.pdf
[8] https://www.portlandgeneral.com/corporate-responsibility/environmental-stewardship/air-quality-emissions/oregon-clean-electricity-plan
[9] https://wallbox.com/en_catalog/netherlands-ev-incentives#PublicEVChargingIncentives

users at charge points for the electricity they consume, which aims to ensure that consumers are protected from being overcharged through other tariff structures e.g. membership fees.

As demonstrated in these international examples, it is crucial that the provision of network capacity is seen as a top priority by government as part of achieving a mass rollout of EVs.

A potential framework for addressing market failures in the UK

Many installed and forthcoming EV charge points are publically funded and in some cases, this includes covering network related costs. We believe more thought is required around getting an appropriate mix of funding, which distributes the costs and benefits between network users, EV users and taxpayers fairly. For example, by DNOs working closely with government and Ofgem we believe there is a significant opportunity to maximise the benefit of smart solutions alongside existing network capacity, whilst investing in network solutions where they provide the highest societal benefit.

In Figure 1, we have a representation of the capital cost barrier to deploying charge points in many of the locations where they are required to provide consumer confidence. This has defined a threshold around what is deemed in the 'free market' i.e. does not require any additional support, compared to situations where the installer is unwilling to pay because the expected utilisation revenues will not compensate enough for the initial capital costs. Addressing this requires a way of discounting capital costs in a way that is proportionate to the social benefits the new charge points will provide and be in line with what investors are willing to pay.

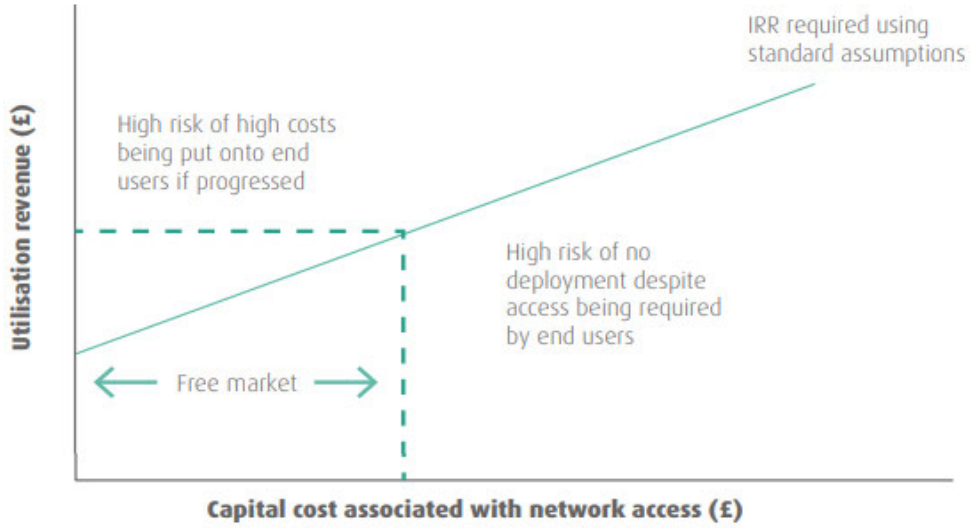

Figure 1: The interaction between capital costs and utilisation risk and how this affects investment decisions in the private market

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

EV charging infrastructure should start to be seen as an essential service in the same way that rural electrification and broadband is. This would mean defining a minimum level of coverage for all of society and then agreeing an action plan to deliver this. As discussed in question five to do this in a way that promotes markets and avoids creating distortions, criteria could be put in place so

that installers do not have to pay connection costs above a certain threshold – with a maximum discount protecting wider consumers. The current developments by Ofgem around Distribution System Operation lend themselves to being able to facilitate an approach that ensures network capacity is provided for charge points using market-based solutions. This would then enable, where applicable, local government to tender out responsibility for installing and operating the charge points required.

Under Ofgem's Significant Code Review (SCR) on Network Access[10], reforms are being tabled that may change how and when costs are recovered by DNOs for what are currently defined as "shared" network assets. However, much of the upfront capital hurdle that charge point installers face is typically for what are deemed "sole use" extension network assets; therefore further intervention to address this barrier may be required.

For those with off-street parking installing their own charge points, costs of fuse upgrades and service alterations, when necessary, are socialised between all network users and the EV Homecharge Scheme provides a grant for 75% of the rest of the upfront capital costs.

Those without access to off-street parking must rely on the landlord, local authority or another party to supply a proximate public charging facility. These third parties will usually have to pay the capital costs up front and in full (and may be unwilling to do so) and they have to consider knock-on impacts on supply of parking for other residents and space for other road users. Customers unable to charge their EVs "at home" may be discouraged from buying one at all and if they do, will probably pay more to charge only at commercial charge points. A new class of "vulnerable consumer" may be in the process of being created.

This is not a marginal problem. In many of the London council areas we serve, more than four in five customers (including those not owning a car) have no access to off-street parking. These customers currently only have access to a small number of charge points that can be expensive to use. Our analysis estimates that just over half of our residential customers across our three networks do not have access to off-street parking; higher than the national figure of around 35%.

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

We are aware that the On-street Residential Charge Point Scheme (ORCS) run by OZEV provides funding for local authorities towards establishing on-street infrastructure. However, we do not believe this is leading to a cost efficient deployment of charge points, nor do we believe it is able to provide the necessary coverage required going forward. This is partly due to the gaps in expertise and funding that local authorities typically have. There is also the challenge of coordination and there needs to be consistency and economies of scale between the different local authority boundaries.

One option is for DNOs to work with local authorities to reinforce selected sections of networks in advance of need, based on having a high confidence around expectations of future EV demand (following a joint planning exercise). Any connecting party then pays only for the connection to the new infrastructure, with the DNO absorbing the costs of the infrastructural upgrade and socialising them under its broader regulatory arrangements.

[10] https://www.ofgem.gov.uk/electricity/transmission-networks/charging/reform-network-access-and-forward-looking-charges

In order to ensure that any socialisation provides value for money, we plan to run with local authorities a price discovery process to find out how much charge point operators are prepared to pay to install and operate charge points in particular locations where charge points are required. As described earlier our Charge Collective initiative will help us to find out where these key areas of market failures are and quantify how large the market failure is. We plan to share the findings with Ofgem, Government and wider stakeholders to explore ways of appropriately socialising and/or deferring connection costs to address these market failures.

Alongside our Charge Collective initiative we are also working with Ofgem and the other DNOs as part of a Green Recovery scheme, which aims to accelerate measures that bring net benefits to consumers through decarbonisation of the electricity networks. Through this DNOs have collectively accelerated over £80m of projects so that they started in 2020 and green recovery work is set to ramp up significantly in 2021 and 2022. This will focus on low regrets network investments that will reduce barriers for EV deployment as well as other low carbon technologies. We therefore believe that there is an opportunity for the green recovery work to help resolve the issues flagged by the CMA.

Theme two: effective consumer interaction with the sector

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

As described in question one, consumers will not switch to EVs unless they have confidence there is sufficient charging coverage. In 2020, McKinsey[11] reported that lack of access to efficient charging stations is the third most serious barrier to EV purchasing, after price and driving range. With these two factors improving rapidly, lack of infrastructure may become the biggest barrier.

Table 3: Key barriers to EV deployment and the role of DNOs

Barrier	What can the market deliver	A role for DNOs
Vehicle supply and cost	Greater choice	No
Range anxiety	Longer range vehicles Visible charge points	Yes – can work with government to ensure the electricity network is ready for mass deployment
Accessible infrastructure	Charge points in commercially viable locations	Yes – can help coordinate charge point infrastructure deployment cost efficiently
Interoperability	Industry standards and collaboration	Yes – can partner with third parties to ensure user accessibility

Insufficient provision of charging infrastructure in the UK is widely seen as one of the main barriers to growth of the domestic EV market. In a UK Power Networks survey conducted in 2019, 88% of customers believed the government and the regulator need to develop mechanisms to address the connection cost barrier.

[11] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/charging-ahead-electric-vehicle-infrastructure-demand

Question 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?

Yes, as described in question one some consumer groups do not have sufficient access to charging infrastructure and they are dependent on a combination of public and private investment to address this. In order to move the EV market from early adopters to mass appeal this is a critical issue. We have concerns that a new form of vulnerability will be created due to the challenges associated with accessing affordable charging infrastructure. This could be exacerbated if affluent consumers are able to make the most use of smart charging via off-street charge points, whereas other customer groups do not have this choice. We agree with the Committee on Climate Change that issues of fairness need greater consideration to ensure that any adverse distributional impacts are dealt with accordingly[12].

Despite 80% of EV owners having their own domestic wall box chargers, 35% of UK homeowners (60% for those living in town and city centres[13]) are unable to install a charge point as they do not own a driveway or garage. As a result, a large proportion of drivers are dependent on publically available charging infrastructure. Accordingly, this has led to a focus on providing policy support for new charging infrastructure, which can either come from central government via general taxation (e.g. the £500m Rapid Charging Fund announced by HMT) or through consumer bills (e.g. in parts of the United States some charge point installs are discounted and recovered through electricity tariffs). As described in our response to question eight, more effort is required to ensure that all potential users have fair access to charging infrastructure.

Question 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?

Due to our role as a DNO, we are chiefly focused with making the process to connect charge points affordable, quick and convenient. To this end, we have made significant progress. For example, to facilitate faster adoption of EVs we process residential EV charger applications in two days, compared to the industry average of eight days and our average customer satisfaction for EV service upgrades is now over 94%.

Figure 2: Our EV strategy has three key objectives

[12] https://www.theccc.org.uk/publication/sixth-carbon-budget/
[13] In inner London this is even more pronounced as 80% of residents do not have off-street parking

A key element of our EV strategy is to inform and educate our customers and stakeholders about our network. We achieve this through several channels:

a) **EV Website**[14] – Our website is one of the key ports of call for our customers. It provides step by step guidance on how to ask for a connection and gives orientation to our different type of EV customers. This includes charge point installers, end consumers, local authorities that want to install charge points in different locations. We believe that enabling a simple and up to date connection process for our customers through our online platform is key to providing great customer service.

b) **Heat maps** – We have created publically available network capacity maps, with the purpose of helping customers make more informed decisions. These maps indicate available capacity on our network and are useful tools for customers who want to know where the best location for their charging infrastructure may be. Such geographic information can indicate areas of constraint, and therefore locations where connections could be more costly. This information is based on forecasts and should be treated as such. However, constrained areas do not prevent a connection – but involve the opportunity to use smart and flexible connections before reinforcing the network for the increased load.

   We have also published a map[15] covering our London distribution area that identifies areas likely to be network constrained and therefore where the deployment of smart charging could help to defer network upgrades.

c) **EV Guides**[16] – We have published an EV charging guide for Local Authorities, fleets and taxis, which we regularly update. These guides have been called out as best practice, including by Citizens Advice and have been replicated by our DNO colleagues.

d) **Connection Forums** – In 2019 we held our first EV Forum for Local Authorities. Having events for such audiences, which could also include fleet operators and housing developers, addresses specific customer group needs and allow us a venue to target specific information.

e) **EV Newsletter** – Due to the high level of activity in this sector, we developed an internal newsletter called ‘EV-e-shot’ to ensure that our stakeholders can keep up to date with developments on our network and can provide us feedback to help us improve.

[14] https://www.ukpowernetworks.co.uk/electricity/electric-vehicle-charging-point
[15] https://innovation.ukpowernetworks.co.uk/2019/06/10/ev-network-impact/
[16] https://www.ukpowernetworks.co.uk/electricity/electric-vehicle-charging-point