

By email to: EVCharging@cma.gov.uk

5 January 2021

Dear Sir

Electric Vehicle Charging market study – response to Invitation to comment

Introduction:

I am writing on behalf of the Data Communications Company to set out our response to your invitation to comment on the operation of the electric vehicle charging market.

The Data Communications Company (DCC) is a licensed private sector company, regulated by Ofgem, which was established in 2013 to operate the central, standardised data and communications infrastructure for smart metering in Great Britain.

We support the roll-out of second-generation (SMETS2) meters, as well as the migration of c.17 million existing first-generation (SMETS1) meters onto our system, upgrading these devices over the air and enabling them to be fully interoperable meaning consumers can switch with no loss of functionality. We provide the central role and platform to support Ofgem's programme to deliver a faster, simpler central switching service for energy consumers and will play an integral role in the delivery of domestic half-hourly settlement should this go ahead.

In effect the DCC is the secure digital spine of the UK energy system connected to all energy retailers, national grid and regional grid.

You may be aware that BEIS has consulted on the use of the DCC infrastructure to facilitate nationwide EV charging. Consequently, we have invested significant time in considering the functionality which would be of benefit to end-consumers, as well as other market participants such as the Distribution Network Operators (DNOs). Some of that thinking has already been turned into practical functionality as, in response to a BEIS mandate, DCC has implemented a *proportional load control* capability to enable authorised parties to control the charging of EVs remotely, via the DCC network.

Given the Government's commitment to delivering net zero by 2050, as expressed most recently in the Prime Minister's 10-point plan, it is vitally important that the electrification of transport is completed as rapidly as possible. Hence, I welcome the demanding deadline set for phasing out the sale of new petrol and diesel vehicles by 2030. However, meeting this target will be very

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challenging and consumer mass adoption is essential which will require consumer confidence in ease of access, security of supply and consumer choice.

Therefore, I am very supportive of the initiative taken by the CMA in launching this market study. This market is still in its infancy and there is a real opportunity to apply the learning from other markets, such as retail energy supply, and the telecommunications industry's roll-out of high speed broadband, to avoid some of the failings that have proved very time-consuming and expensive to fix once embedded.

As we articulate through this response, the DCC believes that Britain's EV charging network needs to be:

1. A **genuinely competitive market** underpinned by standards that work on behalf of consumers and avoid 'lock-ins' and 'land grabs'
2. **Secure by design** - end to end cyber-security designed in to harden it against manipulation and build consumer confidence
3. Recognised as being part of an **integrated energy system** with asset visibility and load control built in from day 1, together with the appropriate controls
4. **Open, yet secure and privacy protected, data** to facilitate new market entry with innovative solutions and insights
5. A **platform for innovation** – offering a consistent and high-quality experience to consumers wherever they are in Britain, but also providing an environment through which new and innovative services can be developed and deployed.

I trust that this will be of interest and relevance to the CMA and look forward to the opportunity to contribute to this inquiry over the coming months.

Review of context:

It is almost 10 years since the Government published *Making the Connection*¹ - its initial vision for recharging infrastructure in the UK. Over that period, we have seen growth from a few hundred publicly available chargepoints to around 19,500 today, offering c.34,500 connection points.

There are now approaching 400,000 EVs registered in the UK. The Government continues to support the growth of this market through incentives for the purchase of EVs and home chargepoints, whilst also funding bodies such as local authorities through a range of competitive schemes and grant funding.

At first sight, one might say that the market has developed well; however, given that road traffic accounts for around 20% of carbon emissions and EVs are still very much the minority choice, there is still a long way to go. What is more, there are already some unhealthy features to the

¹ <https://www.gov.uk/government/publications/making-the-connection-the-plug-in-vehicle-infrastructure-strategy>

market, such as the proliferation of proprietary solutions locking in consumers, which need to be addressed before they become truly embedded. For example, the cost per KW hour pricing for private driveways v's public chargepoints will yet again see digital divides and penalise those least able to pay higher costs. Whilst EV chargepoint suppliers and retailers need to make a return and should be able to charge a premium for faster charging, for example, consumers must be able to choose which supplier to use and not be artificially locked in. The CMA's decision to expose this sector to in-depth scrutiny while it is still immature is very welcome.

What does success look like?

We believe that there are several key aspects which will need to be got right if the EV charging market is to be successful.

The first is availability of infrastructure – as well as being a practical necessity, this also plays to the need to eliminate range anxiety which is proving to be a consistent drag on mass uptake of EVs. Policy interventions need to deliver the right numbers of the right types of charging infrastructure in the right locations and support their maintenance, upgrade and replacement to guarantee a high-level of availability. Availability means not just the number of chargepoints but a ubiquitous service that informs consumers as to which chargepoints are working, in use and functionality such as fast charging or not. Confidence in supply is a key ingredient in gaining mass consumer confidence.

Furthermore, the CMA correctly identifies at least three major modes of charging: at home, on-street and journey/destination; we would concur that each of these situations needs to be considered separately.

However, perhaps the key consideration is that all these chargepoints act as a de-facto single national network: so that any driver can access any chargepoint, in the same way that today's driver can use any filling station. So, in effect all consumers or users have a right to charge.

The definition of charging infrastructure needs to extend beyond the physical chargepoint itself to include the nationwide communications network which will be required to integrate all these sites and their services. So, for example, care workers or medical staff should be able to use a private chargepoint during a home visit and to have their charge correctly billed to their home or employer.

The scale of installation to achieve a truly national network will require a vigorous and well-coordinated market. We believe that other mass rollouts such as smart metering and fibre broadband give confidence that this can be achieved. However, we must be mindful that there is likely to be competition for the kinds of skilled resources required for the installation of EV charging infrastructure.

Industry, aided by Government, may need to build skills training capacity to ensure a nationwide workforce with the expertise to install and then maintain EV charging infrastructure. Secure remote telemetry will play a vital role in cost-effectively ensuring that EV chargepoints are

working and in providing the consumer with the relevant information to decide where and when to charge.

Utilising a pre-built highly secure network with, at scale, a reach greater than superfast broadband, will enable faster deployment of chargepoints, a platform for innovation and consumer choice. It will also reduce the skills required to install EV chargepoint telemetry with a plug-and-play communications approach to installations.

Ignoring hardware considerations, regulation should be focussed around ensuring good practice in installations and that these installations are undertaken in a co-ordinated manner with other interested parties. In the case of on-street and journey charging, it is likely that the relevant DNO will need to be consulted prior to any connection; this may not be the case in the residential setting, although best practice indicates it should be.

The logical solution to this would be to introduce central asset registration, which is automated, ideally, during the commissioning process. This principle exists within the installation of SMETS2 meters and DCC would be happy to share the benefits of this in more detail.

This will assist the DNOs in managing the additional load on their networks as EVs are rolled out, both in terms of pro-active planning but also in making use of load control capability to ensure day-to-day balancing of the grid. In addition, a central asset register will provide key data for consumer services, such as mapping of available chargepoints.

As a final point on hardware, we believe that competition based on interoperability, recognised global standards and consumer choice is important and that this will drive innovation, so we would not seek to advocate a 'standard' GB chargepoint. However, consumers need the confidence that they can turn up and charge, and that the hardware, supporting services and processes are robust and secure. This leads us to conclude that there is a clear need for there to be a single framework for charging infrastructure based on agreed standards and regulation.

Perhaps the greatest challenge in promoting the take-up of EVs will be to provide charging infrastructure in areas where off-street parking is limited, and streets are heavily parked. Only 35% of properties in London have access to off-street parking, so the provision of adequate on-street charging infrastructure to meet this demand could prove a significant problem and not one that can simply be left to the market to resolve.

This highlights the important role that local authorities must have in ensuring a satisfactory distribution of public infrastructure. They don't have to provide this hardware themselves; but they do need to have technical and commercial know-how to make good contracting decisions with third party providers and to engage with the DNOs effectively. Likewise, we must avoid a situation where there is a lack of co-ordination or where poor planning arises due to local government boundaries – the EV charging infrastructure should be considered and planned for as a national asset.

It would be very easy to imagine a situation where a patchwork of provision emerges, dependent on the capability of each local authority and their willingness to work with those

around then. The impact of this would be to undermine confidence of the public generally as to the robustness of the national network.

The next major issue to consider is the holistic experience of the consumer. The reality, and de facto benchmark, is that consumers are accustomed to the process of 'charging' a petrol/diesel car – a process which takes a matter of minutes.

An ideal transition to EVs would include a charging process which is comparable; however, this is unlikely without huge strides in battery technology. Instead, a different process will have to be devised which offers a similar level of simplicity and standardisation. For home and on-street charging, this may be achievable if the consumer can plug in knowing that their car will be charged when they next require it; but for mid-journey charging, more imagination may be required.

This isn't just about the act of charging. The associated processes need to offer ease of use, and this may be where EV charging could demonstrate advantages such as through payment systems which bill a purchase to a home energy account or mechanisms which enable consumers to switch energy provider rapidly to obtain the best prices.

There is an opportunity to hardwire consumer empowerment into this market, but that will require an architecture which supports choice and competition, and which avoids locking consumers in (whether that is a consequence of their choice of vehicle, energy provider etc). Any notion of consumer choice and competition will be severely constrained if a consumer is required to swap out their charging hardware, potentially at significant expense, in order to contract with a new supplier. Instead, EV charging companies and energy retailers should be incentivised to offer a range of services: for example, a supermarket might offer free EV charging if you spend a certain amount in store; but the consumer should be able to choose a charging option billed by their energy provider at the same chargepoint.

This principle of interoperability is fundamental to a good consumer experience – a consumer should be able to swap between suppliers without a change of hardware and retaining a core set of smart functions. We feel driven to raise this issue given the work which we are now being required to undertake to migrate millions of first-generation smart meters onto the DCC network. These meters were not interoperable, and many have become 'dumb' when a consumer changed supplier – we must avoid the same problem with EV charging hardware, given the time and money required to fix it subsequently.

So how do we measure the efficiency of the transition to EVs? Arguably, we need to deliver this combination of availability in the various settings, with technology and processes which generate confidence – offering consumers an environment which is both secure and easy to use.

In addition, a key part of this equation will be the indirect cost impacts, such as in network reinforcement or additional generation. We need to deliver all of this at the minimum cost given that it will be the wider public, as taxpayers and/or billpayers, who will foot the bill. This suggests that re-use of existing capability is critical - we need to think beyond EV charging and embrace the wider energy system - and that flexibility should be designed in, enabling costs to

be continually optimised as new developments in the energy sector emerge, such as vehicle-to-grid, domestic demand-side response, etc.

Where are we now?

Good progress has been made particularly at the technical level, e.g. in defining hardware standards; however, a coherent EV charging infrastructure requires far more than this, and as a minimum the wider eco-system around EV-charging will need a similar level of focus.

Our view would be that there are key deficiencies or issues in certain important aspects of provision:

- There is a risk that over-prescription of rules and regulations early in the life of a product or market can stifle development; but equally, a market which is absent of those rules or basic standards can produce uncompetitive practices with players attempting to extract as much profit as possible before the authorities catch up.
- The lack of a competitive framework has arguably already led to the emergence of practices which are not to the benefit of consumers, such as the development of proprietary models, unreasonable contracts which lock consumers into a single supplier. There is evidence that the largest players might seek to use their dominance to exploit both consumers and other stakeholders such as local authorities.
- A market which is fragmented, inconsistent in its provision and in the distribution of dependable infrastructure, will undermine consumer confidence and jeopardise adoption.
- Disparate government initiatives and incentives do not contribute to the development of a coherent market which consumers will be confident to embrace. Such an approach would drive the development of patchy provision with, for example, those local authorities with the know-how or the resources being able to access funding or to succeed in competitions, while others are left with the bare minimum.
- It is important to bear in mind that consumers cannot be forced to purchase electric vehicles, if they do not have confidence in making the transition. People may simply hang on to their petrol/diesel car for as long as they are able and will be reluctant to make the change. Whilst Government could use other levers, such as low-emission zones, EV-only parking etc, these would be likely to punish those in society least able to afford to buy a new vehicle.

All the above points emphasise the need for a coherent national network, underpinned by common standards. We must avoid a situation arising where consumers are locked-in to proprietary solutions, in effect repeating many of the failures that were present in the retail energy supply market and which then took many years to eliminate. This is a context which DCC is very familiar with operating within. Hard work is required to get those standards and regulations in place, but equally the experience of having to unwind the first-generation arrangement for smart meters and integrate them into our network shows that the costs incurred are far greater if undertaken as a fix to the market at a later date.

A vision for 2030:

Having highlighted some of our concerns but also some of the successes that have been achieved over the last decade, the following section outlines DCC's view regarding some of the characteristics which we would expect to see in an effective market for EVs.

Firstly, a market which demonstrates real benefit to consumers and in which they have confidence, but also a market which attracts investors keen to participate:

- It is unlikely that a *laissez-faire* approach will deliver what is required; rather, that some form of overall architecture or guiding mind will be required, to ensure that all the building blocks are delivered and fit neatly into place. This will need to be combined with light-touch regulation to ensure standards in terms of functionality and ease of use.
- We should aim to emulate the same ease of use and choice inherent in the petrol/diesel world, so that any vehicle can access any filling station to "recharge", with a consistent experience around the country for consumers.
- There will need to be planning of provision and potentially government support to build a truly nationwide network and to avoid the failures of 4G roll-out and rural broadband – there must be no 'not-spots' for EV charging.
- Consumer protections will be required to enable easy switching between electricity suppliers but also to allow fair and innovative tie-ins by suppliers or car manufacturers, to aid the supply of home chargers. Interoperability should be a basic requirement of any consumer-facing hardware or systems.
- Asset-backed funding mechanisms will attract capital into the sector, if they provide reasonable, but guaranteed returns to investors.

Secondly, the installation of EV charging must take account of its impact on the wider energy system and specifically the potential for impact on our energy networks and generation capacity:

- The costs of rolling out and operating EV charging infrastructure cannot be considered in isolation. They need to be thought of as part of a wider "whole energy system" cost which encompasses any consequential costs, such as the requirement for network investment.
- A free-for-all in the roll-out of charging infrastructure will only result in pressure on network capacity, leading to significant network reinforcement and the provision of additional generation. Given the associated additional costs, which would need to be borne by all consumers, planning of provision is critical, and potentially this should also extend to other technologies such as heat pumps. In addition, load control capability will be required given the need to manage this additional demand dynamically.
- Efficient network planning and operation requires a robust and reliable registry of assets. The creation of such a register should be made integral to the installation and commissioning of any EV-related asset to ensure completeness of records at the minimum cost.
- Given that the use of load control of EV charging to ensure system balancing will be necessary, it must not be underestimated what a complex process this will be, to operate on a nationwide scale. So, it would surely make sense to operate a single national system for load control,

whether undertaken by the Electricity System Operator (National Grid ESO), the DNOs or even a new participant offering demand-side services, rather than attempt to interface to a myriad of discrete, proprietary charging systems.

Thirdly, in considering the whole system cost, we should be mindful of the scope for re-use of existing national capability and assets to meet the needs of EV charging. Without seeking to make this response a sales pitch, it is a fact that the existing DCC infrastructure can provide the backbone of an enduring EV charging network for Britain.

We already provide a truly nationwide communications infrastructure of the kind which will be required to link all EV-related assets. This has been built to the highest levels of security with the involvement of the relevant security services. It provides core capability such as a central asset register and proportional load control, such that EV assets can be integrated into the operation of the wider energy system. Critics of the DCC network would have to explain why it makes sense to spend many millions, if not billions, to replicate these capabilities for the purposes of EVs.

Likewise, we need to look for re-use opportunities in other aspects of the supporting infrastructure, such as in payment systems, asset management, customer information systems etc.

“Sweating the assets” should be the default position for a national economy in which there are already very significant demands for infrastructure investment over the coming years.

Finally, and most fundamentally, we must deliver a consistently high-quality and secure experience for consumers which makes the transition to an electric vehicle the natural choice and provides them with a range of innovative services over and above what has been available previously:

- Confidence in supply means EV chargepoints that work and are highly secure to prevent cyber and criminal activity.
- It must be acknowledged that for a generation of motorists accustomed to a re-fuelling stop lasting just a few minutes at a petrol station, EV charging will be a major adjustment, particularly in charging mid-journey.
- This makes it even more important that the hardware and its functionality is well-designed with due premium placed on ease of use, irrespective of how tech-savvy the consumer is.
- Furthermore, innovative chargepoint operators could use a minimum 30-minute stop to recharge an EV as an opportunity to provide other services to consumers, to maximise the time productively or by way of downtime which might be welcomed on a long journey.
- The confidence of consumers is key, so certain hygiene factors must be addressed early:
 - Care must be taken in the handling of all forms of personal data – identities should be protected, payments handled securely and opportunities for fraud minimised.
 - The wider system must be built to be secure and resistant to hostile attacks by malevolent parties and rogue states.
 - Chargepoints need to be widely distributed, easy to find, reliable and well-maintained - eliminating range anxiety. Consumers should be able to use any chargepoint, in the same

way that today they can withdraw cash from any cashpoint, irrespective of whom they bank with.

- There needs to be a clear understanding of how load control is used, particularly in relation to in-home charging. Consumers should understand the benefits that are obtained in reducing investment in networks and generation; ideally, they need to become accustomed to charging outside peak periods, thus reducing the need for load control.
- Enough regulation should be introduced to ensure consistency and standardisation in the operation of the market, but without constraining innovation. Consumers can benefit from a managed approach to the development of the market which removes or minimises incoherence and inconsistency, and which fosters fair competition.

Conclusion:

To summarise, the key outcomes which DCC believes the market needs to deliver and that the Government and/or Regulator should seek to incentivise, are as follows:

1. A genuinely competitive market which works on behalf of consumers:

The retail energy sector has a chequered history of serving its customers. It has been characterised by anti-competitive practices and poor customer service exercised by an oligopoly of large organisations. Smaller competitors and innovation have often been impeded or snuffed out through the high barriers to entry.

It was only through decisive action by Government and the regulator, supported by the CMA, that this stranglehold was broken and that there has since been a genuine flowering of competition and the emergence of innovative players offering new and imaginative propositions to the public.

We can already see the emergence of poor customer service in relation to EV charging through, for example, the numbers of chargepoints which are found to be routinely out of commission, 'landgrabs' by operators, use of proprietary systems and contracts which lock-in consumers to a single provider. These practices must not be allowed to develop in the EV charging market: having to unwind them later would be time-consuming, difficult and expensive.

The operation of the market should be designed from the consumer perspective and focus on:

- Ease of use which, as far as possible, enables any consumer to turn up and use any chargepoint.
- The option that electricity supply and billing can form an extension of a domestic contract, with the electricity being billed at a known price and presented through one household bill for a consumer, when so desired.
- Interoperability – there needs to be simple and rapid switching between electricity suppliers without loss of core functionality. Ideally, a consumer should never have to contemplate a change in charging hardware in order to switch between suppliers.

- Tie-in agreements that are fair to both the provider and consumer - for example, to subsidise the cost of a home chargepoint.

2. End-to-end cyber-security designed in:

Our EV charging infrastructure needs to be considered, if not designated, as Critical National Infrastructure and, recognised as an integral part of the wider energy system. Like the DCC network, the security of the EV charging infrastructure will need to meet the requirements set forth by the NCSC ensuring its capability to defend against a range of current and future cyber threats and threat actor sophistications and motivations.

Any requirement to retrofit the security of a heterogeneous EV charging infrastructure at scale would be costly and time consuming, which given the 2030 target, could undermine the Government's policy intentions. Hence, we would recommend strongly that cyber-security is an early and enduring priority.

It is crucial to remember that this not just about EV charging – it extends into the ability for the DNOs or the System Operator to mobilise demand-side response through smart grids, and over time it will become part of wider domestic energy management systems including vehicle-to-grid, storage and home generation. So, EV charging infrastructure must not be allowed to become the weak link which enables criminals or hostile forces/states to attack our energy and payment systems.

The former CEO of the National Cyber Security Centre (NCSC), has described the DCC network as a security exemplar. I am proud to say that the DCC infrastructure can address all these security-related concerns today. We would be delighted to talk in more detail with the CMA about the potential implications of this level of security in the implementation of a nationwide network.

3. EV charging infrastructure as part of a holistic energy system

It is well understood that the adoption of electric vehicles has the potential to put considerable strain on both the electricity networks and generation capacity. Reinforcing the local distribution networks and building new generation will come at a significant cost which will need to be picked up by the consumer: minimising any such investment should therefore be an important consideration when designing a nationwide EV charging infrastructure and its regulation.

There are several elements to this, including:

- Asset visibility – to be effective as local system operators, the DNOs must be involved in decisions over where new load, such as EV chargepoints, is connected; they must then have access to reliable, near real-time information on the behaviour of that load and the knock-on effects on the surrounding network.
- Load control – those with responsibility for system operation, whether the DNOs or the System Operator (NGESO), will require the capability to intervene to manage EV charging to reduce peaks of demand. This will require a framework of regulation which has consumer need as a fundamental concern – the public will only cede control over the pace or timing of charging if people have confidence that their vehicle will be ready when they next need to use it.

- An appropriate set of consumer incentives needs to be devised which bring benefits to them individually and also to wider society via the energy system. The most obvious, initially, is to encourage engagement with load control; however, over time, these incentives should extend to embrace the use of vehicle-to-grid technology or home generation as a source of power for charging.
- Any such holistic interventions may require new industry roles to be created or expanded. Most obviously, aggregation would become essential if widespread demand-side response is to become a reality both for consumers and the networks.

4. The potential of data

Many sectors are now looking at how the data which is the by-product of many business processes can be used to deliver additional value, whether that is through the insights it provides or the scope to create new services providing further value.

However, the manner in which markets and their supporting processes and systems have evolved can make exposing that data difficult both from a technical perspective, and even more so at the data level, due to inconsistent data definitions, the absence of unique IDs for individuals, etc.

There is a real opportunity to design in mechanisms which will enable the easy release of data, be that in the way it is held, or through the creation of suitable tools which assist in the manipulation of data to provide insights. Given the nascent nature of this sector, there is scope to review existing systems and processes, as they move to meet new standards and regulations, so that we create an EV system which is genuinely open from a data perspective.

As far as possible, and within the constraints of data privacy, it is DCC's view that the EV charging infrastructure should see the openness of data as a core requirement. Creative use of the data generated undoubtedly has the potential to offer a range of value-added services which will further enhance the business case and acceptability of this transition for consumers.

5. A platform for innovation

Whilst the DCC is a national monopoly, it has been designed to support innovation and re-use. Our EV charging infrastructure needs to display the same characteristics – a standards-based approach that gives assurance of a consistent experience for consumers, but one that also promotes choice and innovation. This network needs to be truly nationwide and scalable to meet extra demand, so that all consumers can benefit from these new services. We firmly believe that making use of a pre-built asset, in the form of the DCC network which has unrivalled connectivity, can enable this in a highly cost-effective manner.

In conclusion, I hope that DCC's views provide food for thought for the CMA. I would like to repeat our availability and desire to participate in further conversations as the CMA continues this important market study.

Our work with BEIS, OLEV and other stakeholders has afforded us the opportunity to explore many of the core capabilities which will be required of a fit-for-purpose secure, nationwide EV charging infrastructure. We have developed demonstration models and proofs of concept to facilitate those discussions, and we would welcome the opportunity to share these with the CMA team.

In addition, we have accumulated considerable learning from our central role in the delivery of smart metering infrastructure which, at time of writing, supports more than 9 million interoperable smart meters. We would be delighted to reflect on that huge undertaking to help harvest the lessons which can greatly assist Britain's planning for a truly nationwide EV charging infrastructure.

Regards,

Angus Flett
CEO
[redacted]

Appendix A – Response to detailed questions:

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?

Firstly, the CMA is correct to consider the different settings for Charging separately: home, on-street etc, journey

- Home – There is lots of competition for driveway chargers, but these are often paired with proprietary private cloud services to enable the smart features. This means no interoperability, no protection against failing operator or switching of service. It is crucial that consumers can switch suppliers without having to contemplate changing their charger, which could cost hundreds of pounds – so-called interoperability is key. Without interoperability there will be no functioning consumer market.
- On-street – This is particularly an issue in urban areas with limited private parking. Funding is available but differences in councils' knowledge and ability to deploy means provision is patchy. This area needs significantly more support and regulation before people can have confidence to invest in EV. There is the risk of two-tier provision emerging – home vs on-street – which could be a brake on adoption.
- Journey/destination - also mixed. Some interoperability is emerging facilitated by services such as ZapMap and REA introducing EV roam asset register. However, more regulation is needed particularly around price transparency combined with easy access to payment systems either through contactless or QR reader.

Secondly, security needs to be designed in to the EV charging network and to GCHQ standards. The introduction of smart functionality and need for interoperability could make EV infrastructure easy to attack and this could be hugely damaging to public confidence. Furthermore, given the way in which control of EVs load will increasingly be seen as part of the wider energy system, any vulnerabilities in the charging infrastructure could be seen as a backdoor posing an even greater security threat.

There is a risk that participants will resist regulation and brand it as a barrier to innovation and competition, however secure operation is so important that these arguments should not be allowed to win the day.

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)?

In our answer to question 1, we described our perception of the current states of home, on-street and journey/destination charging. Our immediate concern is that, whilst some companies are attempting to align with open standards, these standards must be designed to require interoperability which is not the case at present.

There are many others, including prominent players, such as Tesla, who are developing and promoting proprietary technologies. Given the implications of this in terms of restricting real competition, and the complexity that will be introduced through a lack of interoperability, one has to question the true value for money of bundling chargers and car purchases – initially convenient for the consumer perhaps, but the costs to the wider system may be significant. Equally it is clear that this will constrain the ability of the consumer to switch at a later date.

In some parts of the world, such as the Benelux countries, adherence to standards is required and we believe the UK needs to take a similar path.

DCC has direct experience of what can happen when standardisation of functionality and interoperability are retrofitted, given the c.17 million first-generation smart meters which we are currently migrating into the DCC

infrastructure. Designing and developing the necessary technologies to make this possible has taken years of work with an 8-figure cost, given the many permutations of manufacturers, designs, variants etc that this complex migration process has had to accommodate.

The EV charging market has the opportunity to avoid a similar outcome by building in standardisation and interoperability from the outset.

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?

In the Home setting, we are seeing consumers being locked into the vendor of the chargepoint and their package of services. DCC very strongly believes that we need to break this link, moving to an interoperable hub with standards for EVSE hardware, software and communications. This will enable flexible financing models for the assets and their installation whilst supporting easy switching between chargepoint operators.

On-street: interoperability and ease of use must be the key requirements. Local authorities and other commissioning bodies need to have the know-how to be intelligent customers of the chargepoint operators and this would be made much easier with a standards-based approach

Journey / Destination: all chargepoint operators should be required to become part of EV roam, meaning e-mobility service providers can enter the market and level the playing field. Open access to all charging infrastructure will be key to building consumer confidence and this will require proprietary standards to be challenged.

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

The installation of EV charging infrastructure has two main dependencies which any charging provider will need to manage and have the potential to limit new entrants.

Firstly, access to power brings with it several considerations:

- There is a cost and a lead time associated with making a connection to the local electricity network, as well as associated administrative processes to be followed. If you are a chargepoint operator of any scale, you might be attempting to manage many such connection requests, across multiple DNOs at the same time. This will inevitably result in a sizeable back office capability which needs to be resourced and funded.
- If there is insufficient capacity within the local network to supply the power required for a specific connection, this will then result in an even more in-depth interaction with the DNO, to establish whether an alternative connection point is available or to assess the affordability of any reinforcement and the likely timescales
- Timescales can be further elongated by the need to obtain consents such as planning or for streetworks.
- At every step, a chargepoint operator is expending time and money without any income to support this activity.

Secondly, and similar to the challenges of accessing electricity, is the need for robust communications to support the operation of the chargepoint.

Despite considerable political will, there are still significant areas of Britain where mobile or broadband coverage is poor. In the context of EV charging, this will need to be resolved as it will not be acceptable for rural areas in particular

to lack the necessary charging infrastructure, both for local residents to use but also in addressing the range anxiety question for the wider population.

The DCC's experience in building a truly nationwide, secure network may be of interest to the CMA and we would be happy to share some of the experiences we have had in working with our Communications Service Providers to achieve this.

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?

As we indicated in the main response, getting the right numbers/types of chargepoints in the right place is a critical calculation; what will make this a success or otherwise is access to data.

Knowing where EVs are, their associated charging behaviour, demography and population statistics, chargepoint locations, travel patterns etc will all contribute to an understanding of what an efficient charging infrastructure looks like.

Furthermore, this information can then be overlaid onto the electricity network to aid network planning and development in the wider energy system, such as siting of renewable power assets.

Use of data doesn't stop at the construction of the network; it is important that while we seek to maximise utilisation, we do so in a way that still allows a typical user to access a chargepoint as and when required. So, having real-time reporting of chargepoint status (working/not working) and usage, whilst making this information available to drivers will be critical.

Affordability will also be a key consideration, particularly as Government seeks to accelerate the transition away from petrol/diesel vehicles. Hence in the early years it may be wise for the Industry to be incentivised to focus on getting the basics right, i.e. core principles, such as interoperability being established, alongside a base set of consumer-focussed functionality which can then be built on over time.

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?

Government has intervened in the EV market generally over a number of years, for example, by offering a subsidy on the purchase of an electric vehicle and a home charger, however at a domestic level, this has been more concerned with incentivising purchase rather than in developing public infrastructure.

Incentives need to be part of the solution if private companies or individuals are to install EV charging infrastructure. If the market does not provide the incentive or incentivises the wrong behaviours, then it may be appropriate for the public sector to create the incentive.

To date, the Government has encouraged charging infrastructure through well-understood mechanisms, such as grants, subsidies and funding competitions, which provide upfront or ex-ante funding to private companies. This will inevitably have to continue.

Anecdotal evidence suggests that the market currently incentivises private companies to develop proprietary solutions. Our understanding is that the two largest Chargepoint Operators (CPOs) only install chargepoints which lock their customers into long term deals. These proprietary solutions provide guaranteed rent to the CPOs, however, the inability to switch provider is likely to lead to poorer choices and outcomes for consumers.

This is a nascent market and incentives will likely have to evolve with the market. To develop greater competition in the market, CPOs should be incentivised to install interoperable chargepoints which will enable consumers to switch providers.

In the retail energy sector, Government had to legislate to ensure that the second generation of smart meters was interoperable. We expect that if left to their own devices, CPOs will continue to install chargepoints which restrict competition. We would recommend that publicly funded incentives for charging infrastructure should follow principles of consumer protection, competition and interoperability.

Looking beyond this, Government needs to consider how it introduces more private sector financing into the sector, such as through the issue of green bonds or asset-backed vehicles with guaranteed returns, which may encourage the likes of pension funds etc to invest. With the right regulation, requiring geographic coverage and high service levels, this may well prove preferable to direct incentives.

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?

When designed correctly, public subsidies can complement and even enhance private investment. As we outlined in our answer to question six, we believe that private companies are mostly incentivised to develop proprietary charging solutions. Public support should incentivise interoperable charging solutions.

In addition to this, we have observed that the roll-out of charging infrastructure is patchy in heavily urbanised areas where there is limited off-street parking, and yet these are areas which should be most suited to the use of EVs, given that journeys are typically short. Here, bespoke kerbside solutions are starting to emerge, but these may well need to be further incentivised if the required levels of penetration are to be reached.

It is noteworthy that in Scotland there is a greater emphasis on 'free charging'. It remains to be seen whether this is sustainable on a truly national scale, but it may be important in ensuring adequate coverage in the more remote areas of the country, rather in the way that petrol is subsidised in parts of the North of Scotland.

From a consumer perspective, it is important that they can take advantage of any such offers and hence the need for a nationwide network and standards which allows interoperability across all chargepoints.

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

As has been stated in previous answers, Government support will need to be provided if Britain is to achieve truly nationwide coverage of chargepoints; we would suggest that it cannot be the right approach only to intervene when it is clear that the private sector will not provide - if we are serious about meeting the 2030 deadline.

One option might be to consider defining 'franchise areas' where private companies, such as other regulated utilities, could commit to provide the necessary infrastructure. This would also enable alternative funding to be accessed, for example, a water company or DNO could fund the infrastructure through borrowing against its Regulatory Asset Base, thus spreading the cost over a number of years and across all consumers in that geography.

In relation to street charging, one could take the view that this is not dissimilar from the provision of other universal services such as streetlighting etc and that local authorities should be appropriately funded to deliver this.

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 will have a pivotal role in the delivery of a comprehensive charging infrastructure and hence it is crucial that they are suitably supported and equipped to do so. However, this need not be at the expense of a competitive market for the provision and installation of equipment.

Given the pace at which this roll-out will need to occur and its nationwide scope, it is probable that the technical expertise to engage with providers, DNOs etc, could be in short supply. Having technical standards or defined products which can be selected from a catalogue could address some of these issues. Likewise, the DNOs (many of which already have good working relationships with local authorities) could be encouraged to establish dedicated helplines/support functions which could be readily accessed by councils.

Finally, a framework arrangement of infrastructure providers, operating to guaranteed service levels, pricing etc, would also be of assistance. The use of a framework or call-off arrangement could also prove a powerful vehicle to encourage chargepoint providers to adopt certain standards: for example, interoperability of equipment might be a mandatory requirement; likewise satisfying high security standards.

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

Others may be better qualified to comment on this.

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?

The current prevalence of fuel stations combined with the range provided by combustion engines means that planning for fuel stops is not generally a consideration for conventional fuel users.

Range anxiety caused by the uncertainty of being able to charge a vehicle is therefore a significant barrier and one that can ultimately be overcome by ensuring sufficient coverage of chargepoints.

Beyond day-to-day usage, other challenges include:

- Levels of technological capability needed to interact with charging services – both primary (i.e. use of the chargepoint) and secondary (to capitalise on dynamic tariffs and demand side services)
- Cost and purchasing decisions and concerns over long-term 'lock-in' to a domestic chargepoint service
- Property ownership and or lack of off-street parking space for chargepoint installation.

Potential routes to overcome these include:

- Greater competition - broader variation in propositions and business models – including those that are tailored carefully at differing consumer segments.
- Ensuring interoperability between chargepoints to ensure consumers can switch chargepoint services without the need to install new hardware.
- New financing models that enable EV chargepoints to be leased to service providers and energy suppliers – pushing substantial up-front investment or long-term lock in away from the consumer.
- A network of public chargepoints (on-street) that meets demand.

All the above can be enabled through re-use of the smart meter system as a secure, central solution for EV smart charging.

It is also worth emphasising our view that certain basic principles, such as interoperability, no lock-ins/easy switching etc need to be integral to smart charging hardware so that a positive consumer experience can be delivered from day one. This will aid the overall transition through positive word-of-mouth.

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

In relation to chargepoints, until they become ubiquitous, a key challenge for consumers is the availability of information needed to establish charging options available on a given route.

Whilst some mapping services do already provide some of this information, online information is user-generated in a high proportion of cases. Centralised co-ordination of chargepoint connectivity would enable a more complete dataset, greater visibility and better experience for the end consumer.

Key shortfalls for the consumer at present include:

- **Location:** whether there are chargepoints located on or near the route (and does the location have a robust cellular network to register for the service if needed).
- **Service and suitability:** lack of interoperability with chargepoints (both physical, in terms of connector compatibility) and technological, in terms of registration with service provider and access to supporting apps.
- **Availability and status:** inability to identify whether those chargepoints are operational, in use, the charging speed and any queues for usage.
- **Price:** how much the charging session costs and whether that represents value for money.

The inability to find an appropriate chargepoint extends journey times and may increase cost – issues that will worsen if demand outstrips supply as more consumers move to EVs.

In relation to domestic chargepoints, the inability for consumers to switch between providers through 'lock-in' to proprietary hardware is likely to become an increasing frustration as new and better value propositions come to the market. The risk of this needs to be minimised by an insistence on interoperability, underpinned by regulation, at the earliest opportunity.

Over time, key trends expected to have a positive impact on the sector include:

- Battery technology improvements (and cost reduction) leading to increased range of vehicles
- Peer-to-peer leasing of domestic chargepoints resulting in larger network of chargepoints
- 'Portable' energy tariffs that would allow consumers to bill back usage to their energy supplier seamlessly from any chargepoint. Combining this technology with automatic number plate recognition would allow payment for charging to be allocated both to home energy bills and to an employer for fleet vehicles.
- Expansion of car-clubs and other mobility services may shift the responsibility for charging away from the consumer (including - longer term - autonomous vehicles with the ability to find their own chargepoint).

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?

For many consumers, chargepoint services will be tied into the vehicle sale – in some cases as part of a long term bundled service with an energy supply offer, providing a free quota of electricity to cover the cost of charging. As described previously, the inability to switch provider without change of hardware may restrict consumer options from this point onward. This lack of interoperability must be avoided.

When seeking to charge their vehicle at a non-domestic location, consumers need to assess a range of variables to establish the viability. These include the location, subscription, physical ability to connect, whether the chargepoint is in use, operational, the length of time to charge and the cost associated.

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

No. It is difficult to compare prices and competition is not fierce enough to level the playing field.

In comparison with the simple cost per litre provided for conventional fuels however, comprehension of EV charging cannot be regarded as straightforward.

Several variables can obfuscate EV charging costs. These include:

- Pricing variations based on charger power and length of charger
- Variations in energy supply tariff (e.g. cost per Kwh, off-peak charges, dynamic pricing including half-hourly tariffs)
- Inclusion of EV charging within or standalone from total domestic energy consumption
- Monthly and annual subscription fees for specific network services
- Discounts provided through partnership arrangements with vehicle manufacturer or energy supplier

These factors, combined with relatively low levels of competition, result in high variability in pricing. Simplification, perhaps on a cost-per-minute to charge could help to create greater understanding.

At the charging station itself, there needs to be clear display of pricing, dependent on charging speed, and a range of payment methods, which should include allowing the consumer to bill the electricity to a personal energy account.

Integration of EV charging with the smart metering system would ensure the ability for consumers to interact with energy supply pricing, the impact of EV charging (and any dynamic tariffs) being shown clearly to the consumer via mandatory installed hardware including in-home displays and consumer access devices (which enable data to be transmitted onward to smart phone apps).

New comparison services for EV tariffs are emerging – Right Charge and Smart Home Charge for example - which are helping consumers to evaluate costs, and these should be encouraged.

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?

The ability to understand and interact with the EV sector will undoubtedly vary across different consumer segments.

Specific groups that may face challenges include:

Those without access to a chargepoint at home. The disparity between the cost of public charging and domestic charging is significant and may unfairly disadvantage those living in flats, properties without a driveway and or living in rented accommodation.

This may require government intervention to avoid the creation of a two-tier system – the disparity of a full charge of £7 on average at home compared to ~£20 is not insignificant. Deployment of EV Smart charging via a centralised system could enable a price regime that is balanced with costs shared across public and private users.

Low income households. For those households that are unable to afford an electric vehicle the disparity between a conventional tank of fuel and a full battery charge at home is even more significant. In addition, the lower cost of car tax and increasing prevalence of low-emission zones create a financial disadvantage for those unable to afford the transition to an electric vehicle.

Over time, the emergence of a second-hand market for EVs may help to improve affordability, but an imbalance seems likely without further intervention.

Low technological capability. Although the situation is improving, the ability to interact with the EV sector is reliant on a degree of technology capability. This applies both to use of public EV smart charging networks (which often require smart phone and app use), but also to access low cost tariffs and potentially returns from flexibility and demand side services.

Low technology capability is at best likely to lead to a higher cost of use and at worst, will inhibit this group from participating. Greater competition and a broader range of propositions will help to ensure services that are tailored at all consumer segments.

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?

Automation that builds driver preferences and vehicle characteristics into smartphone apps and on-board satellite navigation system could reduce much of the decision making and manual investigation required to identify suitable public chargepoints. This would require much more comprehensive data flows across the sector and would be best supported through a centralised system and asset register.

As discussed previously, comparison sites for EV tariffs are appearing which provide consumers with the ability to assess the annual costs of tariffs side by side. Further information will be needed to allow comparison across the range of new business models and services expected to appear, such as third-party charge management and vehicle-to-grid services.

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

This is perhaps hard to judge at this point, but it is easy to make the case that certain protections which exist in other sectors might be appropriate. One obvious example is in pricing, so the requirement to display a standardised comparable price so that consumers can shop around where possible.

Likewise, through the introduction of standards governing availability or functionality, consumers may be assured of levels of service whether in the centre of a city or in a very remote location.

However, it is questionable whether current standards are either ambitious enough or sufficiently detailed to ensure that the consumer is at the centre of the design of our EV charging infrastructure. Government doesn't have powers to put in place system wide requirements i.e. it can require that a charger is 'smart', but not that it is, for example, Wi-Fi enabled. There is a need to be able to regulate at a system and interface level to ensure real interoperability and to protect against cyber security risks.

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

Utilising and protecting data for better consumer outcomes is a key theme of the Government-sponsored EV Energy Taskforce. The theme is underpinned by proposals to establish industry-wide data sharing arrangements, to facilitate the creation of public chargepoint information apps and to introduce a data access and privacy framework for the EV sector.

Much of the activity proposed will align and interact with the work of the Energy Data Taskforce (EDTF) – convened to steer the industry toward improved data availability, quality and transparency. A key recommendation from the EDTF is that energy system data should be ‘presumed open’ and that Government and Ofgem should use their range of existing legislative and regulatory measures to ensure that data is ‘discoverable, searchable, understandable’, with common ‘structures, interfaces and standards’ and that it is ‘secure and resilient’.

DCC already follows these principles both in relation to smart meter system data and any additional EV charging data. This will help to ensure that access can be made available at a local and national level, to allow innovation, planning, investment and operational decisions around EV load and infrastructure system optimisation by the appropriate parties. Our proposals to operate a data exchange, providing controlled secure access via APIs¹ will help to enable this.

In relation to comparison sites, it is worth noting the Smarter Tariffs - Smarter Comparisons project led by Vital Energy and funded by BEIS. This project is undertaking exploratory research, user testing, data modelling and software development to identify and test innovative solutions to compare smart tariffs, such as time-of-use tariffs, export and electric vehicle tariffs. The project is due to conclude in Spring 2021.

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

We would further emphasise the points made in the main body of our response, namely:

- High-grade security at the core of the EV infrastructure.
- A set of standards and regulation which guarantee interoperability and ease of use but without stifling innovation.
- A central asset register to underpin the operation of the EV charging network and support consumer information services.
- Integration with the wider energy system through load control initially but extending to encompass new technologies such as vehicle-to-grid.

¹ Application Programming Interface