

---

<b>Meeting:</b>	Transport for the North Board
<b>Subject:</b>	Electric Vehicle Charging Infrastructure (EVCI) Framework
<b>Author:</b>	Simon McGlone, Senior Major Roads Planning and Strategy Officer
<b>Sponsor:</b>	Peter Molyneux, Major Roads Director
<b>Meeting Date:</b>	Wednesday 30 March 2022

---

## **1. Purpose of the Report:**

- 1.1 To inform the Board of steps taken to build the first comprehensive EV Charging Infrastructure (EVCI) evidence base for the North; and highlight the key capabilities and findings now available to guide investment decisions.

## **2. Recommendations:**

- 2.1 The Board is asked to support:

- The approach taken to build a regional evidence base to support vehicle fleet decarbonisation and local decision making (*Sections 3 – 8*).
- The capabilities and example findings now available to understand and communicate the regions EV charging infrastructure requirements (*Section 9 and Appendix A*).
- Our intended next steps to communicate, apply and advance the EVCI framework in conjunction with our regional EV Steering Group (*Section 10*).

## **3. TfN Scrutiny Committee feedback:**

- 3.1 This paper was presented to TfN Scrutiny Committee on 10<sup>th</sup> March. The Committee made the following key points:

- The report received positive feedback regarding its identification of charging need (what, where and when), and welcomed the clear presentation of priority actions required across all areas of the North.
- The Committee welcomed a well-researched and effective model we can use to shape and speed up delivery. Particularly its capability to identify the likely mix of charging types we will require.
- The Committee noted the importance of having proper maintenance standards. TfN's regional EV Steering Group have noted this with national government during our project, and will continue to support these considerations as part of our collaborations with the National EV Strategy.
- The Committee recognised the importance of EV users being aware of charging availability, particularly in rural areas. There are actions the public sector could take to support this, and TfN will explore possible alignments with its Digital Mobility Strategy as that workstream develops.
- The Committee recognised the benefits of doing similar work with regards to hydrogen re-fuelling infrastructure. This is a separate live TfN workstream and we will be seeking to combine findings during future activities, particularly with regards to freight movements and requirements.

## **4. Background:**

### **4.1 The context of Major Roads:**

With 97% of personal journeys and 88% of freight movements in the North made using our highways, our roads have a vital role in underpinning economic activity, opening up access to jobs, goods and services and in enabling growth in new

employment and housing. However motorised road travel is the largest contributor to transport carbon emissions, with over 50% of emissions generated by cars, 28% by HGV's and 11% from LGVs. TfN is committed to working with partners to support the shift towards low carbon transport to reduce the impact of harmful emissions on the environment, and as by far the largest transport emitter of carbon (23% of UK road emissions; 6% of total UK emissions<sup>1</sup>), TfN recognises that road transport has a critical role in meeting UK targets for decarbonisation. Central to this will be the need for a rapid rollout of EV charging infrastructure.

#### 4.2 **Delivering a priority action from TfN's Decarbonisation Strategy:**

We require a mix of technology, behavioural and place-based solutions to reach our decarbonisation targets. Feedback from public consultation of TfN's Decarbonisation Strategy included support for the development of a regional EV charging infrastructure framework as an urgent priority in the 2020s, to support planning for a comprehensive roll out of the charging points needed to achieve the rapid transition to Electric Vehicles. Respondents also expressed concerns relating to ensuring equitable access to EV charging for all, and potential impacts on those without access to an electric vehicle.

4.3 Electric vehicles represent 1.3% of total cars on UK roads. This means our understanding of user charging behaviours and preferences at this time is very uncertain. However, uptake is rapidly increasing due to national policy and decarbonisation stimulus (demand now accounts for more than one in six new cars in 2021), standard public charging infrastructure has struggled to keep pace. Current data indicating the North West (24 per 100,000 population), Yorkshire and Humber (26 per 100,000) and the North East (36 per 100,000) are all below the UK average charging devices (42 per 100,000)<sup>2</sup>. Our evidence base seeks to add clarity to tackle some of these challenges.

#### 4.4 **EVCi Project Aims:**

A key challenge for local authorities is planning and delivering EV charging infrastructure with confidence, based on suitable evidence and strategies which encourage the right investment which delivers consistency of EV charging solutions across the region. With its regional perspective, partnerships, and modelling capabilities, TfN is ideally positioned to develop an enhanced evidence base that is built 'bottom-up' across the region's road network. Our aim was to ensure any outputs supported local authority partners in the understanding and development of local EV charging infrastructure. For example use of the EVCi evidence base to underpin public sector funding bids and/or negotiation with the private sector.

4.5 With close to 70% of all vehicle kilometres on the Major Road Network, our aim was to create a fuller integrated assessment, accounting for the large proportion of trips which are 'trans-boundary' (origins and destinations that go beyond local or combined authority boundaries) to ensure our networks cater for the full range of journeys being made to, from and within our region.

### 5. **TfN regional EV Steering Group**

5.1 The EV Steering Group was established (in Summer 2021) to drive forward the need to accelerate the investment in EV infrastructure. The group plays a key role in shaping evidence development; sharing knowledge and skills across the region; and supporting clarity and consistency through the collective focus of its members. Coordinated by TfN, participants include Local Authority and LEP lead officers, the Government Office for Zero Emission Vehicles (OZEV), northern electricity

---

<sup>1</sup> TfN Decarbonisation Strategy, December 2021

<sup>2</sup> UK Government electric vehicle charging device statistics

distribution network operators (DNOs), National Grid, Network Rail, National Highways, and the Energy Saving Trust.

## 6. How our bespoke regional EVCI evidence makes a difference

- **A state of the art regional evidence base** - Built to apply and integrate with TfN's Analytical Framework, our work takes advantage of one of the richest data sets available to build a regional EVCI evidence base. This data driven approach enables us to go further than similar forecasting to date, in a 'bottom up' manner that provides additional capacity and capability for TfN and Local Authorities, as well as engagement with other partners.
- **A systems approach** - Built up from Middle Super Output Area (MSOA<sup>3</sup>) level, the tool translates TfN and partners regional travel demand (for car, van and HGV fleet demand) and land-use estimates (travel patterns, car population, socio-demographics, household types etc) to quantify the requirement for chargepoints covering the full range of journeys being made to, from and within our region. From this we can also identify the impact of EV charging on the electricity distribution network, and work with the energy sector to seek a collective whole systems and holistic approach to EV infrastructure. (See Table 1).
- **Informing strategic outcomes** - It provides TfN and partners with robust temporal and spatial route maps, to inform value for money, resilient and integrated decisions. This also provides additional evidence that chargepoint operators and energy sector don't currently have. With a view to supporting outcomes across the North which provide coverage of chargepoints to meet our decarbonisation ambitions; identify the right infrastructure needs in the right place, at the right time; but also provide a means to assess social and spatial considerations associated with EV charging infrastructure.
- **An enabler of accelerated delivery** - It provides a framework with which to create an attractive investment environment for all area types across the region. Providing both public and private sectors with evidence which can help de-risk investment decisions and ensure we target EV infrastructure that provides for a rapid and consistent transition to EV which is accessible right across the North.
- **Navigating uncertainty to support delivery** - Our evidence supports a rapid rollout of EV charging infrastructure, but also allows decision makers to plan and act responsively in the face of uncertainty. Human behaviours (both travel and charging) and technology advances will have a major impact on the demand for EV charging infrastructure (both amount and type). By applying TfN's Future Travel Scenarios<sup>4</sup>, we can understand different delivery models suited to potential future user travel patterns and choices. Our evidence also supports an understanding of impacts resulting from different charging behaviour preferences (i.e. at home / on-street, destination or en-route).
- **A trusted centre of excellence** - The EVCI model is designed to provide outputs as open data. The Intellectual Property (IP) sits with TfN and will therefore be integrated into TfN's Analytical Framework, allowing TfN to maintain and share freely with our local authority partners. We are also developing communicative tools to enable evidence sharing with a wider range of stakeholders. (See section 10).

## 7. Building our EVCI evidence capabilities

- 7.1 TfN has established in-house modelling and analytical capabilities that provide a wide range of regional travel demand and land-use estimates on a regional scale.

---

<sup>3</sup> Middle Layer Super Output Areas (MSOA) are a geographic hierarchy designed to improve the reporting of small area statistics in England and Wales. The minimum population is 5000 and the mean is 7200.

<sup>4</sup> <https://transportforthenorth.com/future-travel-scenarios/>

These can be used to present powerful spatial, social and sustainability evidence; and an understanding of what this means for current and future movements on the region’s road network and associated EV infrastructure requirements. The inputs to the model are shown in Table 1.

*Table 1: Overview of relevant TfN input data*

<b>Data</b>	<b>Segmentation (every year to 2050, and at MSOA geography)</b>
<b>Population and households</b>	Socio-economic group; Occupation and traveller type; Car availability; Household size
<b>Housing</b>	Flat, Terraced, Semi-Detached, Detached
<b>Employment and jobs</b>	Skill level; Employment status; Income segmentation
<b>Travel demand</b>	<ul style="list-style-type: none"> <li>• The origin and destination of user movements across the region;</li> <li>• mode (car, rail, bus, walk, cycle);</li> <li>• user class (commute, business, non-work);</li> <li>• purpose (user class + detail in other e.g. education, shopping, leisure etc);</li> <li>• time period (AM, inter-peak, PM).</li> <li>• seasonal variation</li> </ul>
<b>Vehicle flows on roads and electric vehicle uptake</b>	<ul style="list-style-type: none"> <li>• Regional highways model providing a whole network view.</li> <li>• For Car, Van, HGV movements.</li> <li>• EV uptake across the fleet for different decarbonisation pathways.</li> </ul>
<b>TfN Future Travel Scenarios</b>	The travel matrices for the four TfN travel scenarios cover the agreed set of forecast years, time periods, fleet make-up and emissions

7.2 These inputs are applied through our EVCI modelling to generate EVCI requirements for the region, at a geographical level that provides comprehensive outputs for local authorities to use towards local decisions and delivery. Figure 1 summarises the processing steps and outputs generated at each stage of our approach, providing the capability to understand:

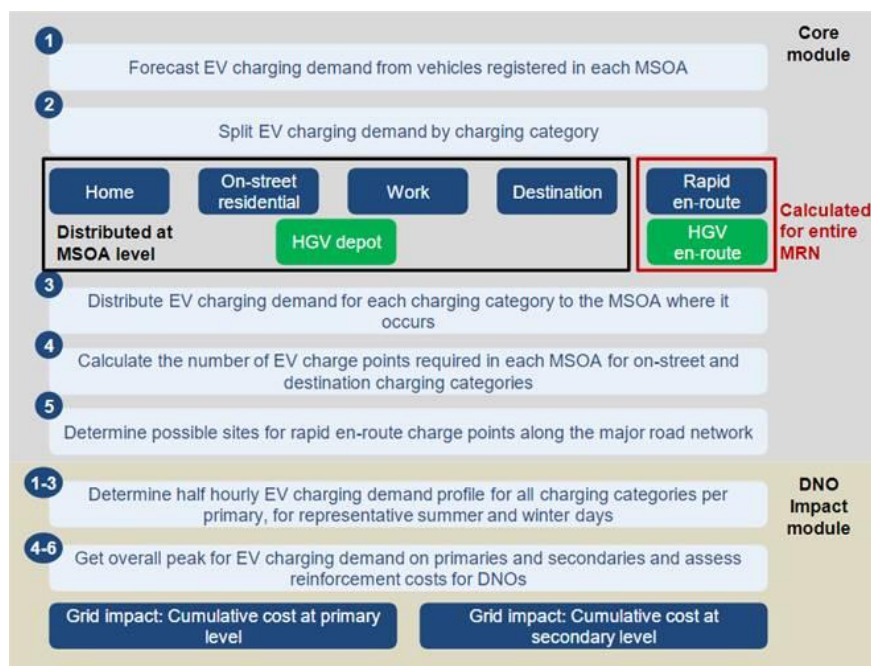
- What and where: the need for different chargepoint types and required coverage to support car, vans and HGVs.
- When: outputs in 5 year increments, starting at 2020 and running to 2050 (i.e. 2020, 2025, 2030 and so on).
- How these requirements may differ across different future travel demand scenarios<sup>5</sup>, with the user able to select different projections of future travel attributes (e.g. EV stock, vehicle kilometres travelled, number of trips on the road network, etc) to understand associated impacts on charging needs.
- How these requirements may be impacted by different charging behaviours<sup>6</sup>.
- Indicative locations for rapid en-route charging on the Major Roads Network (MRN) and Strategic Roads Network (SRN).
- An indication of the impact of EV charging on the electricity distribution network and how these might vary dependent upon rate of EV uptake<sup>7</sup>.

<sup>5</sup> Other scenarios can be applied by the user, although it should be noted that the TfN FTS cover the anticipated range of EV uptake and plausible travel patterns across the region to provide a full assessment of potential requirements.

<sup>6</sup> The model has capability to add further sensitivities and behavioural parameters should it be deemed useful when considering EVCI requirements.

<sup>7</sup> It is outside of project scope to model non-EV customer demand and to consider overall demand on individual substations. However, our analysis provides the DNOs with data on EV requirements they can use to support planning for a resilient distribution network. is sufficient to give an indication of likely network costs.

Figure 1: Steps taken to build our EVCI regional evidence base



## 8. Academic review and assurance

8.1 Professor Greg Marsden (Institute of Transport Studies at the University of Leeds and Decarbon8) has undertaken an external review and assurance of current and proposed future work. This review found our EVCI Framework to be:

- A very high standard work, and a nationally leading and important international example.
- An innovative, technically rigorous and highly policy relevant piece of work, which builds on the strong knowledge base developed by TfN through its work on regional modelling and appraisal.
- High value for money in terms of the strategic insight role it performs, its potential utility to local authorities and as a guide to more detailed local assessment and actions.

## 9. The key capabilities and findings developed

9.1 Electrification of road transport will need to proceed at a rapid rate – with more certainty in this now following the introduction of national policy to ban use of combustion engines (cars and vans sales from 2030, HGVs from 2035). There are no National targets currently set for the roll out of EVCI. However, by developing robust evidence we can support decision making and help manage the many uncertainties around EVCI deployment, to accelerate delivery across the region with confidence. **Appendix A** provides a summary of the evidence base developed, and some of the key messages and capabilities available.

9.2 Our evidence provides additional clarity on the scale and pace of change required across our region to support a transition to electric vehicles. Between 27,600 and 48,000 publicly available non-rapid<sup>8</sup> EV chargepoints; and between 12,000 and 26,000 rapid<sup>9</sup> chargepoints will be required across the North by 2025<sup>10</sup> to support

<sup>8</sup> On-street, work, destination, HGV depot (slow to fast charging between 7kw and 22kw; averaging 1 – 8 hours charging currently)

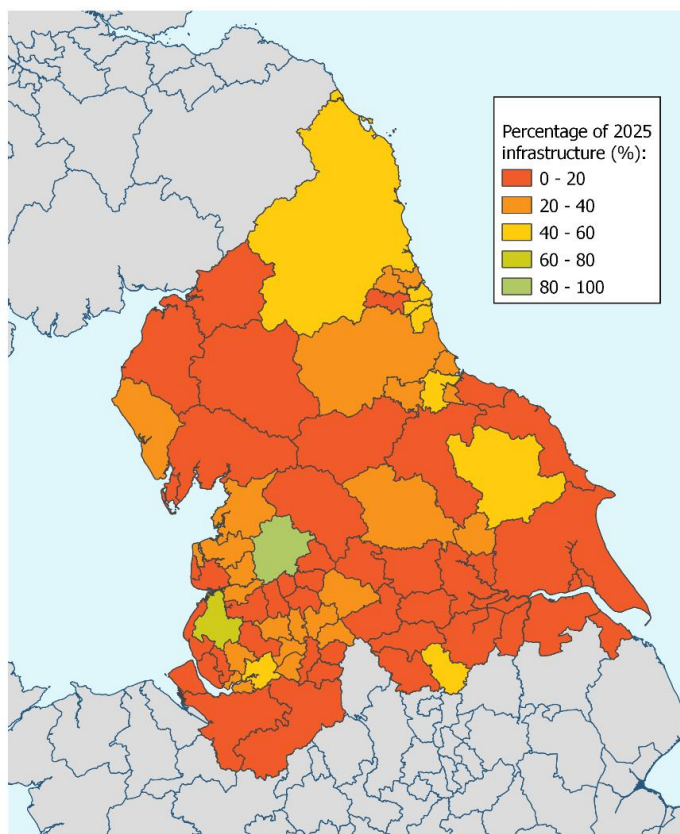
<sup>9</sup> Rapid on the move charging (50kw and above, averaging 1 hour or less charging currently)

<sup>10</sup> Outputs have been developed across different future travel scenarios and charging behaviours to understand the range of possible requirements.

our regional decarbonisation trajectory and target. This demand forecast rises throughout the 5-year increments, but it is the 2020s that sees the most significant demand growth to support rapid decarbonisation of the fleet.

- 9.3 Comparison of the National Chargepoint Registry<sup>11</sup> statistics for early 2022, indicates that the North's supporting publicly available infrastructure currently provides for between 10-17% of non-rapid (see Figure 2 provided as example), and between 5-11% of the rapid, charging demand forecasted by 2025 to support our ambitions for decarbonisation.

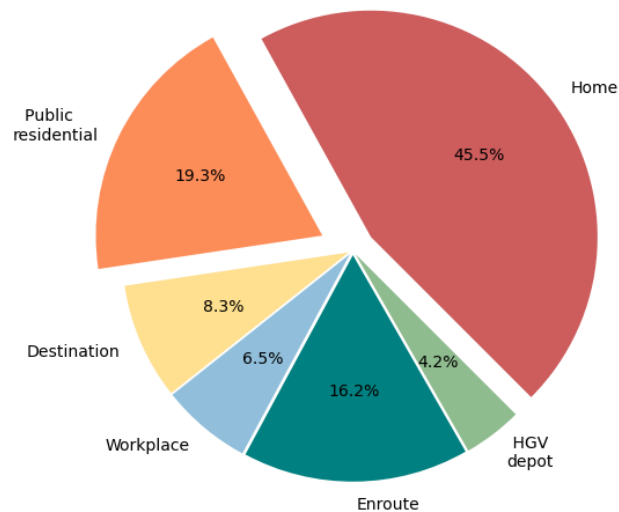
*Figure 2: % of public non-rapid charging required by 2025 (to support the regional decarbonisation trajectory) that is available in 2022 (comparison with National Chargepoint Registry).*



- 9.4 There are large differences in EVCI needs between regions, with EVCI density expected to be highest in urban areas (due to high populations, higher number of second-hand vehicles, higher levels of destination charging). However, our evidence identifies charge point requirements to meet the needs of all place types across the North. This includes strengthening our ability to make the case for rural area requirements and also understanding visitor economy demands (average day vs. peak seasonal day). This can inform our understanding of suitable business cases for different locations, to deliver a comprehensive whole network solution.
- 9.5 By applying our transport understanding and modelling capabilities we can identify the amount and type of charging needed to support anticipated travel movements. Our evidence suggests the majority of publicly available EVCPs will be required in public residential areas (e.g. on-street, in public car parks, local charging hubs) to supplement at home charging, compared to lower needs of destination (e.g. supermarkets, gyms, etc.) and en-route rapid charging.

<sup>11</sup> National Chargepoint Register statistics as of January 2022. Some under-representation is likely due to registration update gaps.

Figure 3: 2025 charger demand by charging type



- 9.6 En-route rapid is likely to be regularly used by high mileage drivers, and only occasionally by majority of other drivers. However, all drivers will want confidence that rapid chargers will be accessible when needed. Applying the evidence developed, we have been able to identify potential locations for en-route rapid charging across the Major Roads Network (MRN) and Strategic Roads Network (SRN).
- 9.7 However, people’s charging behaviour and preference are currently not well understood, and charging behaviour represents the greatest uncertainty for EV infrastructure decisions. This may have implications on EV infrastructure planning, but also major spatial impacts with regards to place making and electricity grid requirements. Our EVCI model outputs are very sensitive to changes in future charging preferences, allowing us to explore impacts on infrastructure needs and inform ‘no regrets’ charging infrastructure planning and delivery.
- 9.8 There are several evolving delivery models for EVCI deployment, with growing interest and investment from the private sector. Private sector interest is often focused around the most commercially attractive sites, meaning some areas are likely to be left behind without public sector intervention, or new delivery models which de-risk private sector investment. TfN’s EVCI evidence can support further work to identify the best delivery solution within different local areas.

## 10. Next Steps to communicate and apply evidence

- 10.1 **Communicating our framework capabilities and findings** - Our work on EV charging infrastructure is at the cutting edge of strategic planning, and can help to inform local, regional and national actions with regards to EV charging infrastructure. We plan to publish our Framework with the launch of an interactive visualisation platform, and a supporting position paper, to communicate the key EVCI findings developed. This report outlines the key messages that we will communicate in this publication.
- 10.2 **Sharing of outputs with Local Authorities** - All outputs have been developed to be available for local authority partners, to maximise value for money and capture consistency benefits. We have received a number of requests from partners (as well as private sector interest) to share project outputs to support active projects across the North. This is an important step both in terms of actively using this evidence base, but also as a feedback loop to inform any future TfN activities. We are finalising specialist legal advice regarding data sharing protocols and processes required to do this. Our aim to share key outputs with local authority partners as

soon as possible, to interpret and extract local evidence with a view to supporting the undertaking of specific localised and place based activities.

### 10.3 **Supporting local activities within a 'systems focused' regional framework** -

This evidence puts the North in a strong position to respond to, and access, public funding and delivery mechanisms. The partnership that underpins our EV Steering Group offers the opportunity to work collaboratively in resolving issues of policy, legislation and guidance more generally that will be important to achieving our shared ambitions. This includes informing national Government decisions, and working with National Highways and Network Rail to seek integrated evidence based outcomes on the Major Roads and Strategic Roads Network, and the National rail network. Thereby supporting policy agendas including decarbonisation, levelling up, as well as turning focus towards associated spatial planning and social inclusivity considerations.

### 10.4 **Keeping the North at the forefront of EVCI planning and strategy** – In addition to the above, we are developing plans for additional activities which target key areas of priority and challenge identified by partners and feedback from academic reviews. This may include:

- Using our evidence to date to develop a more rounded view of how unequal the transition to EVs could be, and identify possible solutions to manage both high and low uptake areas.
- Utilisation strategies to support local authorities in identifying effective, efficient and commercially viable delivery models.
- Taking our scenarios approach further to identify a 'no regrets' requirement across the region to build further confidence in decision making.
- Seek to develop a richer strategic view with regards to freight, warehousing and charging clustering recognising recent developments pointing to LGVs being more likely powered by electric drivetrains.
- Apply this intelligence to support public - private sector engagements and delivery model discussions.
- Look to further consolidate and align our systems thinking with energy network and regulatory partners, including linking up with our Hydrogen workstream and consideration towards making the most of smart charging opportunities.

We will ensure any future activities continue to provide a regional overview in a manner which supports local decision making, but also informs national decision making. All activities will be developed to support TfN in delivering it's 2022/23 business plan commitments.

## **11. Corporate Considerations**

### 11.1 ***Financial Implications***

The financial implications of work to date and the costs of Phase 3 are captured in Budget Revision 3, the latter having been contingent on incremental grant allocation from DfT. Additional funding has been secured from DfT (in principle) for further activities on this project. Future phases will be considered as part of the 2022/23 business planning process.

### 11.2 ***Resource Implications***

TfN HR Team has confirmed there are no direct resource implications, noting that phase 3 EVCI work and beyond will be considered as part of TfN's business/resourcing planning for FY2022/23.



### 11.3 **Legal Implications**

There are no apparent new legal implications as a result of this report.

### 11.4 **Risk Management and Key Issues**

A risk assessment has not been carried out at this stage. However project risks and opportunities are actively reviewed and managed.

### 11.5 **Environmental Implications**

This report does not constitute or influence a plan or programme which sets the framework for future development consents of projects listed in the EIA Directive and therefore does not stimulate the need for SEA or EIA. All proposed Electric Vehicle Charging Infrastructure developments will be subject to screening for the need for EIA by the relevant development authority as part of the design development and consenting process.

The development of an effective and comprehensive EVCI network across the North that works for all those who need to use it, is a fundamental requirement to achieve TfN's Decarbonisation Pathway (particularly zero emission vehicle sales share targets).

### 11.6 **Equality and Diversity**

A full Impact assessment has not been carried out because this report seeks endorsement for the development of an EV Infrastructure framework.

### 11.7 **Consultations**

Consultation has been carried with TfN partners and the results are included in the report.

## 12. **Appendices**

### 12.1 Appendix A: Electric Vehicle Charging Infrastructure Framework – Summary slides

#### **Glossary of terms, abbreviations and acronyms used (if applicable)**

*Please include any technical abbreviations and acronyms used in the report in this section. (Please see examples below.) This will provide an easy reference point for the reader for any abbreviations and acronyms that are used in the report.*

a) EVCI	Electric Vehicle Charging Infrastructure
b) EV	Electric Vehicle
c) MSOA	Middle Super Output Area
d) LA	Local Authority
e) OZEV	Office for Zero Emission Vehicles
f) DfT	Department for Transport
g) HGV	Heavy Goods Vehicle
h) MRN	Major Roads Network
i) SRN	Strategic Roads Network