This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number    214199-00
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1 Introduction

The scope of this study is to undertake a gap analysis of the current guides and information available to assist local authorities in installing plug-in vehicle recharging infrastructure, with the purpose of identifying any missing areas.

The overall objective is to establish if the relevant guidance is available to local authorities who are looking to implement recharging infrastructure for plug-in vehicles.

Specifically, this report assesses whether the following areas are covered in existing documents and guidance:

1. High level explanations of key areas for people new to plug-in vehicle recharging. This includes types of recharging technology and supporting infrastructure (i.e. back office, communication protocols, RFID options etc) with directions to more detailed guidance.

2. The key stages of chargepoint installation, with key actions/decisions at each stage. Also assessed with this is which stakeholders should be involved in the process, both internal to the local authority and from external organisations.

3. A template project plan with suggested timescales for each stage.

4. The necessary national and local regulation requirements (such as relevant planning regulations). It was not expected that these would be reproduced, but that the guidance should include a short summary, any relevant short extracts and pointers to detailed guidance/regulations required.

5. A list of existing technological standards and those in development.

6. Available procurement frameworks and associated material available for general local authority use.

7. PIP case studies and lessons learned.

8. Information on business models including monitoring.

9. Cost information and funding options.

10. Location and layout of chargepoints.

As well as the topics listed above, section 4.4 comments on other topics raised in the guidance.

The study also set out to identify whether further areas should be produced as part of the PIP (Plugged-In Places) learning and closure activities and to create a high level scope description for each additional piece required.

Although a range of guidance documents is available on plug-in vehicles, this study focuses on the guidance which would assist local authority officers in implementing plug-in vehicle recharging infrastructure.
2 Methodology

A number of guidance documents was already known about prior to the study, and these are listed below. Throughout this report, the documents are referred to by the wording in italics.

- IET: Successfully Implementing a Plug-in Electric Vehicle Infrastructure: A Technical Roadmap for Local Authorities and their Strategic Partners
  *IET: roadmap (1)*

- BEAMA: Guide to Electric Vehicle Infrastructure
  *BEAMA (2)*

- IET Code of Practice for Electric Vehicle Charging Equipment Installation
  *IET: CoP (3)*

- RAC: Foundation: Going Green
  *RAC (4)*

- SMMT Electric Car Guide
  *SMMT (5)*

- Green Book on publicly accessible charging infrastructures for “low-carbon” vehicles
  *Green Book (6)*

- TfL: Guidance for implementation of electric vehicle charging infrastructure
  *TfL (7)*

- ENEVATE Electric vehicle charging infrastructure tool kit
  *ENEVATE toolkit (8)*

- EV City Casebook
  *City casebook (9)*

The eight UK Plugged-In Places and selected local authorities were contacted to ask if they were aware of any other guidance documents. Any other documents identified throughout the study or raised by the PIPs are listed in sections 3.3 and 3.4.

The guidance documents were reviewed against the ten criteria set out in section 1 to assess if these areas were sufficiently covered. The available guidance was also reviewed to assess whether the information available in OLEV’s factsheets was sufficiently covered.
3 Existing Guidance

The available documents come from a variety of authors and cover a range of different subjects. Although most documents are available free of charge, some documents have to be purchased. Tables 3.1 and 3.2 summarise the details and coverage for each of the available documents. [Additional documents identified are listed in Tables 3.3 and 3.4.]

3.1 Guidance documents

Below is a short description of each guidance document. The documents are listed in chronological order, starting with the most recent.

*IET: roadmap (1)* provides comprehensive coverage of many topics. The document is written for local authority officers although the cost (£750) may be prohibitively high for local authorities.

At the implementation phase, existing technical standards (charging modes, plugs and sockets) are covered in the most detail in *BEAMA (2)*.

*IET: CoP (3)* is targeted at electricians installing recharging infrastructure. This document provides the most detailed coverage of the standards of installation required for domestic, on-street and commercial installations.

*RAC (4)* provides the best explanation of the powers and policy levers available to local authorities. It also provides survey-gathered data from local authorities who have put these levers into practice.

*SMMT (5)* serves as a starting place for someone with no technical knowledge or background in plug-in vehicles. It is structured as a list of questions and answers.

*Green Book (6)* covers a range of topics, from the technical aspects of plug-in vehicles, costs of infrastructure and business models.

*TfL (7)* has good coverage of a range of documents and is written for borough officers. The document is one of the older pieces of guidance (published 2010) and may therefore be out of date on certain topics (signage etc).

The *ENEVATE toolkit (8)* is yet to be finalised. The toolkit is an extensive project management tool with the best coverage of lessons learnt from the Plugged-In Places scheme and a valuable work-package breakdown.

The *City casebook (9)* provides a range of case-studies but does not include detailed guidance for local authorities on implementing recharging infrastructure. For this reason it has been omitted from Table 3.2.
### 3.2 Summary tables of existing guidance documents

Tables 3.1 and 3.2 summarise the availability and coverage of the guidance documents against the criteria set out in section 1. The documents are arranged in chronological order by the most recent publishing date (apart from the ENEVATE toolkit (8) which is listed last as it is yet to be finalised).

Table 3.2 is colour coded to indicate the level of coverage provided.

<table>
<thead>
<tr>
<th>Extensive</th>
<th>Overview</th>
<th>Introductory</th>
<th>Does not feature</th>
</tr>
</thead>
</table>

Page numbers and references to relevant sections are provided, with references in bold indicating sections of greater relevance.
<table>
<thead>
<tr>
<th>#</th>
<th>Document</th>
<th>Author</th>
<th>Latest Published</th>
<th>Availability</th>
<th>Cost</th>
<th>Target audience</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>BEAMA: Guide to Electric Vehicle Infrastructure</td>
<td>The British Electrotechnical and Allied Manufacturers Association</td>
<td>May 2012</td>
<td><a href="http://www.beama.org.uk/en/publications">http://www.beama.org.uk/en/publications</a></td>
<td>Free</td>
<td>“Organisations providing advice and guidance to consumers on the day-to-day use of electric vehicle infrastructure”</td>
<td>44 pages</td>
</tr>
<tr>
<td>3</td>
<td>IET Code of Practice for Electric Vehicle Charging Equipment Installation</td>
<td>IET Standards LTD (Institution of Engineering and Technology)</td>
<td>January 2012</td>
<td>Paperback and <a href="http://electrical.theiet.org/books/e-books/ev-charging-cop-digital.cfm">http://electrical.theiet.org/books/e-books/ev-charging-cop-digital.cfm</a></td>
<td>£50. £35.75 for IET members</td>
<td>“experienced electricians” Installing on behalf of a client</td>
<td>92 pages</td>
</tr>
<tr>
<td>7</td>
<td>TFL: Guidance for implementation of electric vehicle charging infrastructure</td>
<td>Transport for London</td>
<td>April 2010</td>
<td><a href="http://www.newride.org.uk/downloads/EVCP-Guidance-Apr10.pdf">www.newride.org.uk/downloads/EVCP-Guidance-Apr10.pdf</a></td>
<td>Free</td>
<td>“borough officers who are responsible for the procurement, design, installation and operation of electric vehicle charging points (EVCPs) on public highways and in public car parks.”</td>
<td>80 pages</td>
</tr>
<tr>
<td>8</td>
<td>ENEVATE Electric vehicle charging infrastructure tool kit</td>
<td>European Network of Electric Vehicles and Transferring Expertise</td>
<td>To be published</td>
<td>By request: <a href="mailto:matthew.lumsden@futuretransportsystems.co.uk">matthew.lumsden@futuretransportsystems.co.uk</a></td>
<td>Free</td>
<td>“project manager [with little prior knowledge of EV infrastructure] whom has been given the task of developing an EV infrastructure”</td>
<td>156 pages</td>
</tr>
</tbody>
</table>

Table 3.1. Details of the available guidance documents.
### Policy documents

There is a number of policy documents that refer to plug-in vehicles and these are listed below for context and completeness.

<table>
<thead>
<tr>
<th>Document</th>
<th>Published date</th>
<th>Available</th>
<th>Notes</th>
</tr>
</thead>
</table>

Table 3.3: Relevant planning documents
3.4 Other documents and sources of information

Several documents were identified by liaising with the eight UK PIPs and local authorities. These documents are listed below for reference, however these were not considered to be specific guidance documents for local authorities wishing to install recharging infrastructure. The City casebook (9) is listed in this table as it does not sufficiently cover the criteria set out in section 1.

<table>
<thead>
<tr>
<th>Document</th>
<th>Available</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive Council’s New Automotive Innovation and Growth Team’s product</td>
<td><a href="http://www.bis.gov.uk/file51511.pdf">www.bis.gov.uk/file51511.pdf</a></td>
<td>High level macro view of EV technology and the future of EVs</td>
</tr>
<tr>
<td>development roadmap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material from suppliers</td>
<td>Available from various supplier websites</td>
<td>Chargepoint manufactures, have technical information available from their respective websites.</td>
</tr>
<tr>
<td>TfL tender document from source London</td>
<td>Available from TfL</td>
<td></td>
</tr>
<tr>
<td>EV City Casebook</td>
<td><a href="http://www.iea.org/evi/EVCityCasebook.pdf">http://www.iea.org/evi/EVCityCasebook.pdf</a></td>
<td>Good coverage of case studies.</td>
</tr>
</tbody>
</table>

Table 3.4: Other relevant documents
4 Commentary

4.1 Introduction

The previous section indicated the coverage of the available guidance documents. This section summarises the coverage of each criteria, explores the gaps in the available guidance and comments on other useful topics presented in the guidance.

4.2 Discussion of available guidance

Several topics are sufficiently covered in many of the guidance documents, such as the existing technological standards and introductory content for readers who are new to plug-in vehicle recharging infrastructure.

Other topics, including the relevant planning regulations and costs of installation are covered sufficiently only in selected documents (TfL (7)). Likewise, sufficient information on business models is only available in the Green Book (6) and ENEVATE toolkit (8). Coverage of these topics is therefore spread across several documents.

Below is a summary of how sufficiently each of the criteria set out in section 1 has been covered.

**High level explanations of key areas for people new to plug-in vehicle recharging** - this is well covered in a number of documents. The SMMT (5) guide provides a good overview for a reader who is new to electric vehicles. The BEAMA (2) document provides a more technical introduction which includes modes of charging, plugs/sockets and charging applications.

**The key stages of chargepoint installation and key actions and decisions at each stage, including internal and external stakeholder involvement** - this is well covered, but only in selected documents. The ENEVATE toolkit (8) provides a valuable work package breakdown (section 12.1. Pg.95). The TfL (7) document also details the responsibilities of each stakeholder, at each stage in the process.

**A template project plan with suggested timescales for each stage** - IET: roadmap (1), TfL (7) and ENEVATE toolkit (8) documents all give indications of the timescales for installation. However the available guidance does not provide a detailed breakdown of the timescales within the ‘installation’ stage.

**The necessary national and local regulation requirements (such as relevant planning regulations)** - this is covered extensively in TfL (7) including Traffic Management Orders and planning legislation. For coverage on local policy levers see section 4.4.1.

**List of existing and development technological standards** - this is extensively covered in several documents. The greatest level of detail is provided in the IET: CoP (3) document.

**Available procurement frameworks for Local Authorities** - although some of the available guidance covers procurement, there is not a comprehensive list of the
frameworks available to local authorities. The OLEV procurement factsheet provides more information on this.

**PIP case studies and lessons learned** - the *ENEVATE toolkit (8)* provides the greatest available selection of lessons learnt from the PIP scheme. However this could be usefully collated into a single document, particularly at the end of the programme to summarise the experience and the lessons learned.

**Information on business models, including monitoring** - although the *Green Book (6)* and *ENEVATE toolkit (8)* both provide critiques of various commercial arrangements (e.g. SPVs, PPPs, Concession arrangements) the guidance does not sufficiently cover the commercial implications of membership charging arrangements.

**Cost information and funding sources** - a detailed cost breakdown is provided in the *TfL (7)* document, also covered in the same document are potential funding streams. Capital and operational costs associate with chargepoints is also covered in *IET: roadmap (1)*.

**Locations and layout of charge-points** – a location (selection of sites) and layout (arrangement and set-up of charging posts) are both covered in a number of the available documents. *IET: roadmap (1)* and *ENEVATE toolkit (8)* documents provide good coverage of factors to consider when locating chargepoints. *TfL (7)* also provides guidance on the layout of chargepoints.
4.3 OLEV Factsheets

OLEV has produced a selection of factsheets which cover a range of topics:

**Traffic signs** - the factsheet provides guidance on the regulations and recommended presentation of signage for electric vehicle chargepoints. *IET: roadmap (1)* document also covers this topic and refers to the DfT website for further details. The *TfL (7)* document also provides examples on pg.30. Several documents provide further guidance on signage including the *Traffic Sign Manual 2008* and *The Traffic Signs (Amendment) (No.2) Regulations and General Directions 2011* both available from the DfT website.

**Permitted Development Rights** - this factsheet explains the Government’s decision to introduce Permitted Development Rights for chargepoints. The *IET: roadmap (1)* document states that planning permission is not required for chargepoints.

**Planning** - extract from the *National Planning Policy Framework*, this document is freely available (see section 3.3).

**Equality Act** and **Height of charge posts** - two factsheets detailing the height of chargepoint requirements for disabled users. The factsheets refer to the Equality Act 2010 and the inclusive mobility guidance document available from the DfT. The *TfL (7)* document briefly covers the angle and height of chargeposts for disabled users (Section 4.5.3, pg. 33). *IET: roadmap (1)* (section 5.16, pg.87) also states the recommended height for operating sockets and controls.

**National Chargepoint Registry** - *IET: roadmap (1)* and the *RAC (4)* report both make mention of the National Chargepoint Registry, however the factsheet provides a greater level of detail.

**Procurement** - although this factsheet has been written specifically for the PIPs, it does set out the available frameworks for purchasing charging posts. This is not collated in any of the other available guidance documents.

Overall, the factsheet topics are generally covered in the range of guidance documents, although not always to the same level of detail. The factsheets are much easier to update, and it is suggested that the factsheets should be readily available (e.g. on the OLEV website) as an up to date source of information for key topics.
4.4 **Other topics**

Several topics which have not been assessed in Table 3.2 were identified through the study. Although not one of the eight criteria against which the documents were reviewed, these topics may be of use to local authorities who are looking to install charging infrastructure and so these are set out below.

4.4.1 **Local Authority levers**

*RAC (4)* has the most detail on local authority statutory powers and regulations:

- Environmental and planning powers - Section 1.
- Transport powers - Section 1.3.
- Air quality - Section 1.4.
- Provides information on existing chargepoint installations - Section 2.3.3.
- Summary -Table 3.3.

Much of this is reiterated in the *ENEVATE toolkit (8)* (section 10.7, pg.47) and *IET: roadmap (1)* document (section 3.5).

4.4.2 **Interoperability**

Interoperability is one of the key issues raised throughout most of the available guidance. Local authorities can have a role to play in ensuring interoperability, both in the selection of connectors and payment methods.

Enforcing the adoption of standards is one aspect of ensuring interoperability, this is sufficiently covered in several documents.

Case study 3 of *IET: roadmap (1)* document (section 3.6) has good coverage of solutions to technical, commercial and other issues. Also raised is the Manchester Electric Car Company and their proposed contactless payment method.

The Open Charge Point Protocol is covered both in the *IET: roadmap (1)* document (section 3.6) and the *ENEVATE toolkit (8)* (section 11.7, pg. 78).

4.4.3 **Integration with other transport modes**

*IET: roadmap (1)* Case study 6 and Section 3.7 provides the best information on modal integration. Section 3.8 of the same document also discusses car clubs.

4.4.4 **Electric cycles/scooters**

There is relatively little coverage throughout the available documentation specifically aimed at electric cycles and scooters. *BEAMA (2)* section B: Charging Systems for Electric Motorcycles and *IET: roadmap (1)* (section 3.9) does provide some guidance.
4.4.5 Administration and marketing

The TfL (7) document has good coverage of the administration (Section 7) and considerations of marketing/branding (Section 6). The TfL guidance on administration covers the arrangement between a borough and chargepoint supplier (the Service Level Agreement), it also covers administration of the end users (application to a scheme and issuing of cables, tags, etc.).

Section 13 of the ENEVATE toolkit (8) gives guidance on back office operation and management. Sections 11 & 12.3 of the same document give guidance on useful project team members.

4.4.6 Case studies

City casebook (9) (section 0) provides a good overall look at plug-in vehicles in the global market. The ENEVATE toolkit (8) provides useful case studies in context, and the best coverage of lessons learnt from the Plugged-In Places programme.

4.4.7 Other useful information

Several available documents also provide checklists, forms and step-by-step guides, which could be useful to local authorities:

IET: roadmap (1) (section 3.14 pg. 56: Implementation dos, don’ts and risks) - this provides three pages of useful overall advice to local authorities in implementing recharging infrastructure.

Green Book (6):

- Figure 14 (pg. 356) gives a useful ‘load curve’
- Table 6 pg. 98 - example risk register for project
- Appendix 2 provides example contracts, Appendix 4 a site inspection form, Appendix 5 a chargepost specification
- Section 12.1 - work package breakdown (a step-by-step guide)

IET: CoP (3): extensive, well-structured and contains checklists, aimed at electricians. Annexes C to E also contain useful checklists and risk assessments which a local authority may wish to ask their installer to fill out.
5 Conclusion

This report has provided a gap analysis of existing guides and information available to assist local authorities in installing electric vehicle recharging infrastructure. The report has reviewed nine pieces of guidance from various authors.

The overall conclusion is that most subjects that a local authority would need to know about when considering the installation of plug-in vehicle recharging infrastructure are covered by the guidance that is currently available, albeit some of it at a relatively high cost. Also, no one document covers all aspects, and so a number of documents is likely to be relevant. Perhaps the bigger question is how interested parties know that such guidance is available? And how do they know which guidance provides the most up to date information in the rapidly changing world of plug-in vehicles?

Making the review of the guidance in this report available to local authorities would help to point them in the right direction. It is suggested that this analysis should be reviewed on a regular basis to ensure that it is kept up to date by including new documents that are produced, as well as changes in standards and regulations and technological changes (e.g. new connectors, induction charging etc).

In the coming months, the document likely to be of most interest to local authorities would be one summarising the PIP programme experience and the lessons learnt. This should report on the whole PIP programme, what was anticipated at the start, what actually happened, why things changed, what have been the most positive outcomes, what would be done differently, and most importantly, what are the learnings for local authorities.

Such a document on the PIP programme, together with this review of the guidance and the PIP factsheets (all being publicly available on the OLEV website) would provide local authorities with the guidance that they need for installing plug-in vehicle recharging infrastructure.