

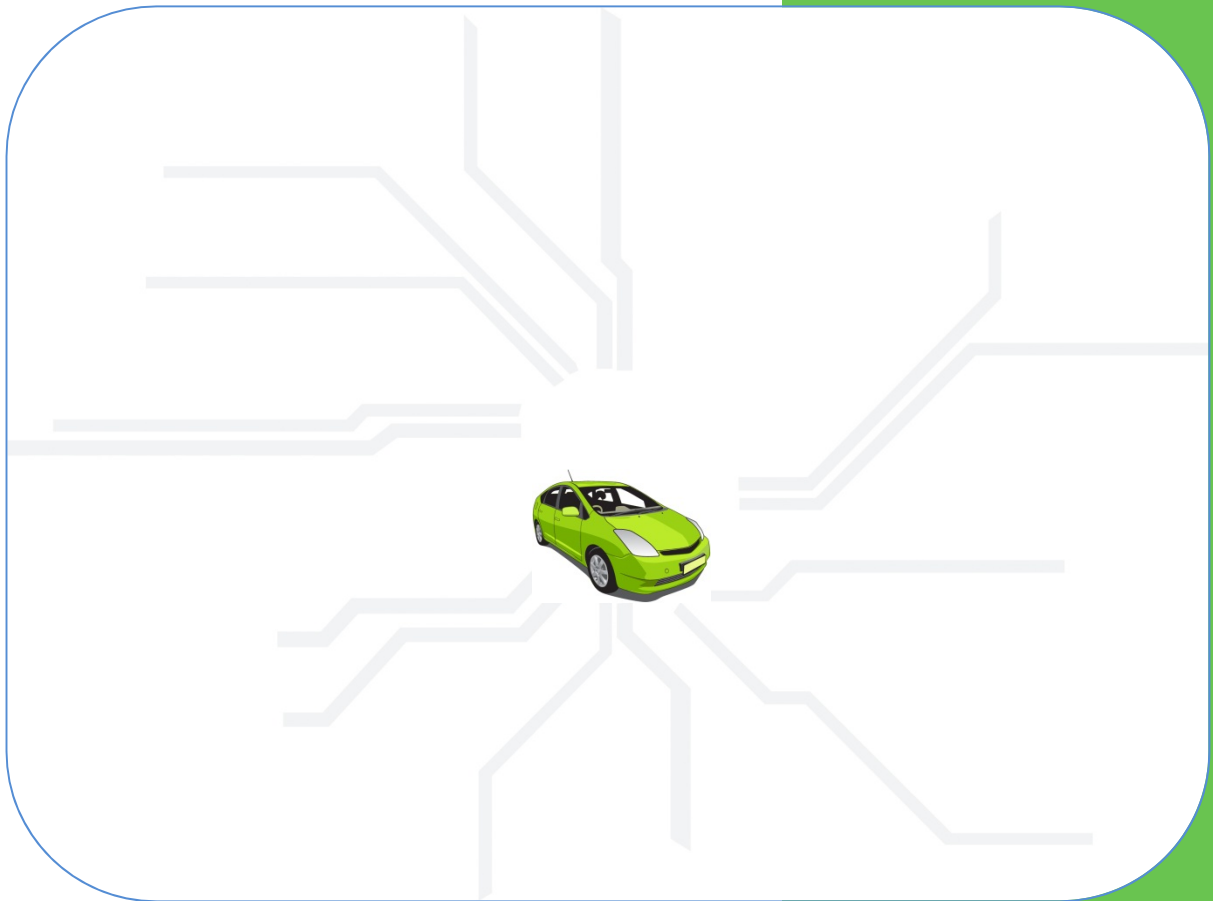
ENEVATE

European Network of Electric Vehicles and Transferring Expertise

Accelerating E-Mobility

ENEVATE

Electric vehicle charging infrastructure tool kit (2) Part I – Outline



Matthew Lumsden
Future Transport Systems Ltd
ENEVATE

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Contact details:
 Matthew Lumsden
 Future Transport Systems Ltd
Matthew.lumsden@futuretransportsystems.co.uk
 0044 7909681334
www.futuretransportsystems.co.uk
www.enevate.eu



3 Forward

Since the end of 2008 the public profile of electric vehicles has become elevated from a virtual unknown to a subject that attracts almost daily media interest throughout much of the world. Most vehicle manufacturers have intentions to launch EVs if they have not already done so and many have several being prepared for launch over the course of the next few years. Indeed 2012 and 13 will be key years with many new EVs due to enter the European market, not least the first plug in hybrid vehicles launched by Vauxhall/Opel and Toyota.

In preparation the UK government, via the Technology Strategy Board (TSB) and the Office of Low Emission Vehicles (OLEV), has co-funded several major initiatives to trial vehicles and pilot the development of charging infrastructure. The TSB initiated the Ultra Low Carbon Vehicle Demonstrator Trials and OLEV the Plugged in Places programme. Both research and development programmes intended to prepare for the mainstream uptake of plug in vehicles.

However, there remain many challenges not least of which is the requirement to share the knowledge and learning that has been developed so far. Similar projects have been developing and creating more opportunities for sharing expertise.

The ENEVATE project, co-funded by the European Interreg Program, was created specifically to facilitate the sharing of E-mobility related knowledge and experience across North West Europe and has a wealth of expertise within its partnership. Its key objectives are listed below with further information in Appendix I – ENEVATE or on the website www.enevate.eu.

The ENEVATE partnership aims to:

- Accelerate the development of "new" supply chains (WP1)
- Accelerate the development of sustainable electric vehicle charging infrastructure (WP2)
- Explore the opportunities for and implications of new E-mobility concepts (WP3)
- Use research into regional pilots projects and supply chains to create an E-mobility roadmap (WP4)
- Accelerate E-mobility innovation by stimulating technology partnerships and establishing transnational co-operation (WP5)

This tool kit is the primary output of Work Package 2 and has been developed in recognition that there is a requirement and a desire for experience and knowledge to be shared, but also in recognition of the fact that failure to achieve a joined up approach to EV infrastructure development runs the risk of wasted investment, fragmented networks and poor EV user experiences. To help avoid these problems, variations of the tool kit are being developed in Ireland, The Netherlands, Belgium, France and Germany as well as the UK. In so doing it is hoped that key experiences will be shared and the pace of development accelerated.

The tool kit has drawn upon real project experience and will continue to do so as it develops through to the middle of 2013.

4 Introduction

Creating a tool kit for the development of electric vehicle infrastructure is challenging because at the time of writing some lessons have been learned but many questions remain. Three currently unanswerable questions that are most concerning are: *How much infrastructure is needed?* *Where is infrastructure needed?* and, *How can the infrastructure be operated on a sustainable basis?* But these are not the only unknowns.

This tool kit does not aim to answer all the questions but presents a thought process based on experience drawn from several pioneering projects being delivered in the UK, Ireland, the Netherlands, Belgium, France and Germany. It aims to help project managers learn from current thinking and avoid some of the potential pitfalls.

Throughout the document there are brief references to ongoing real projects and more detailed case studies are provided on the ENEVATE website www.enevate.eu and will also be provided in Appendix 2 – Case Studies in future draft releases. The case studies on the website have been developed through Workpackage 4 which specifically focuses on assessing pilot projects.

4.1 For whom has the tool kit been developed?

This is intended to be a working reference document for a project manager whom has been given the task of developing an EV infrastructure. It assumes that the user has very little prior knowledge of EV infrastructure but that he or she is capable of working through a process required to deliver a successful project.

The tool kit component documents include a generic project plan, RASIC chart and risk register that should be relative familiar to an experienced project manager.

4.2 Case Studies

A list of active pilot projects which includes an interactive map can be found at on the ENEVATE website, specifically at: <http://www.enevate.eu/database?Edition=en>



Figure 1 - ENEVATE interactive map

In the final release Appendix 2 – Case Studies will include a range of case studies that are primarily drawn from the UK and North West Europe and have been researched by the ENEVATE partnership.

4.3 How is the tool kit structured?

A simple 5 part document structure has been developed to guide the user through an entire process starting with this outline document, followed by the development of a Strategy and Design through to Project Planning, Implementation and finally Operation. These individual sections are in separate manageable documents and Figure 3 - Tool kit structure, provides a detailed structure of their constituent parts.

Throughout the tool kit a selection of project examples and other references have been provided where it was felt to be of benefit.

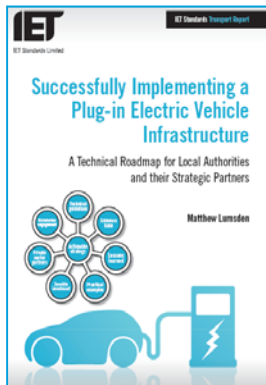
4.4 Language

The language and acronyms of plug in vehicle charging is evolving along with the subject matter. Glossaries of terms used can be found in each section of the tool kit.

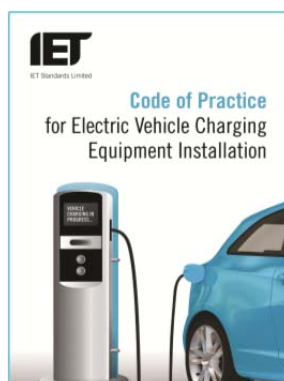
5 Links with other guidance

5.1 UK

In the UK the Institute of Engineering and Technology (IET) has funded the development of 2 important documents and to some extent this tool kit has been developed to compliment them.



Successfully Implementing Plug-in Electric Vehicle Infrastructure – A Technical Roadmap for Local Authorities and their Strategic Partners has been developed to provide a background of definitive technical guidance as well as outlining some of the key project development considerations. It is designed to provide an “all you need to know” type summary of information for those setting out to develop EV infrastructure.



The Code of Practice for Electric Vehicle Charging Equipment Installation has been developed to provide electrical engineers and others with detailed information about how to safely install charge points.



5.2 France

Following the 2009 EV and HEV Development National Plan, and the commitment in 2010 of 14 pilot local authorities to promote electric mobility through the signature of a charter, the official guidance for the implementation of charging infrastructure is translated in the “*Green Paper on low-emission vehicle charging infrastructure open to the public*”, which was issued in April 2011.

As a Green Paper, this consultation document remains open for debate and discussion. However it is considered as the official framework because this is the only document released by the State at the present time. The document is expected to form the basis for a more comprehensive guidebook in the near future following feedback from early EV pilots.

The Green Paper is primarily addressed to local authorities, on which is the onus of rolling-out the infrastructure since July 2010. Indeed, it is expected that the public sector will have a leadership position to initiate the national network of EV charging stations, when privately investing in profitable conditions remains uncertain. By leading by example, and by opening up a brand new market, the French State along with the local authorities aims at setting up a ‘snowball effect’ required to foster the development of electric mobility.

The Green Paper deals with equipment specifications, infrastructure management, recommended use of charging points as well as business models for the public sector.

The scope of the guidance is limited to charging points available for the general public (mostly installed in public spaces). An additional national guidance is expected in 2013 more specifically in relation to charging infrastructure in the private sector, e.g. at the workplace or at home.

Other recommendations issued by specialist private companies can be considered. They have been playing an important role in advising public administrations and private companies in setting up the first EV demonstration sites.

The present tool kit includes the main highlights of the above-mentioned Green Paper. In return the European perspective offered by this deliverable is of high interest for the French administration and related organisations, and it will probably have an impact on the further developments of the national guidelines.

5.3 Germany

In Germany the “*Nationale Plattform Elektromobilität*” developed a comprehensive tool kit for the implementation of EV-charging infrastructure projects on the basis of the experience gained in the projects of the “*Modellregionen Elektromobilität*”.



The e-mobil Baden Württemberg GmbH published “*Neue Wege für Kommunen. Elektromobilität als Baustein zukunftsfähiger kommunaler Entwicklung in Baden-Württemberg*“, a comprehensive overview about the pros and cons on e-mobility for local authorities, which might be helpful also for local authorities in other federal states or countries.



5.4 Ireland, The Netherlands, Belgium

This section will be updated in further draft releases of the tool kit.

6 Electric vehicles – key issues for north-west European regions

This document frequently refers to some of the key UK and European projects that have developed over the course of the last 3 years. However the various regions face some different challenges that are quite distinct from those being experienced in others so the differences are explained when appropriate.

Countries such as Ireland have progressed rapidly in developing their infrastructure; their distinction is that they have single utilities that have a virtual monopoly over the electricity supply sector. In the case of Ireland, ESB own and operate the key electricity transmission and distribution assets as well as dominating the energy supply market. This status has resulted in them being given the remit and budget to develop a commercially sustainable national charging infrastructure, to date with no competition.

The Netherlands is another example where a national approach has been taken in that e-laad, who are leading the program of development, have dictated the communication protocols and have opted for Open Charge Point Protocol which ensures not only that any separate networks can communicate but also that any network can communicate with any charge point. These channels of communication are one of the greatest challenges currently being faced by the UK. This national approach contrasts with that of the UK where Plugged in Places created a competition to begin the infrastructure development process with the view of using a research process to identify the most appropriate technical and commercial models. There is no doubt that this approach has engendered a rapid R&D process but it has also created the additional challenge that we now face, one of which is how to join up several discrete networks.

In the UK the regulatory framework of the electricity sector means that there is no natural home for EV charge points in the distribution network operators’ regulated asset base. Also there is no

incentive for electricity suppliers to install charge points because there is no guarantee that they will be able to use them to sell their own electricity for more than 21 days.

Another issue is the UK's position as one of the early adopters for electric vehicles. The relatively short distances between and within urban conurbations, the availability of off street personal parking and the positive attitude communicated by various government agencies has placed the UK in the first wave of European markets being developed by Nissan, GM Vauxhall and Toyota, amongst others. For this reason the UK has had to accept its role as a test bed and with it the acceptance that mistakes will be made.

A national and public approach has been devised in France too, where the local authorities have been asked to more proactively build up the EV charging network at their own levels.

The 2009 EV and HEV Development National Plan is the government's action plan to address both fast-changing business models and societal demands for the automotive sector, in the global context of energy crisis, reliance on imported oil, greenhouse gas emissions and economic crisis.

The development of EV and HRV is seen as a great opportunity to tackle climate change issues and to help the restructuring the whole sector, fostering innovation for green growth that creates jobs and achieves sustainability.

When the document was issued in 2009 it was officially expected that low-emission vehicles will stand for 27% of new car sales in France by 2025 (4 million cars). However in regard to today's national electric car sales the take-up of electric mobility will be realistically slower than planned.

There are at least three distinctions that must be highlighted in France.

- The energy market in France is highly concentrated and is dominated by two incumbent suppliers, which were the two former government corporations for electricity and gas: EDF and GDF Suez. EDF (94% of the national electricity market in 2011) is deeply involved in the promotion of electric mobility. Competition from alternative suppliers has been slowly increasing in recent years.
- Most electricity customers are subject to regulated tariffs, which are below the EU averages. This makes the cost for EV charging even more attractive.
- The nuclear power as the primary source of electric power in France is seen by people and officials as a major asset to promote e-mobility (a low carbon source and therefore positive for climate change concerns). From a technical view the existing electricity system can support the take-up of several thousands of electric vehicles with minor impacts on greenhouse gas emissions, excluding EV battery making and recycling.

The automotive industry is an important and traditional sector in France, in term of employment, research and political sponsors. The two main national carmakers (PSA Peugeot and Renault) are seen as frontrunners in the electric car market. Both of them are developing and launching various hybrid and electric car models currently.

Germany, as a preeminent car making country, started government programs and incentives as well as intensive R&D very late, especially compared to different Asian countries which are also home to strong automotive sectors. Currently the German government incentives are below the international average and the policies are discussed as ineffective. These all might be striking reasons

why the sale of EVs in Germany started slowly. But thanks to the immense R&D resources of the leading German automobile manufacturers, which have been used to a greater extent in the last years, it seems that Germany might be able to defend its position as leading automotive country. E-mobility has been accepted lately by the German automobile manufacturers as an important future mobility-concept, but thanks to the initiative of the political sector it seems as it was just in time.

R&D for infrastructure started very early in terms of connectors, one of the leading manufacturers for EV-plugs is located in Germany, while the standardization of shared protocols etc. can be compared to the development of the R&D for EV. The leading electricity supplier, electrical engineering companies and automotive manufacturers became interested in this topic very late but today different projects by most important German companies are running, with promising results.

This section will list some of the distinctions of other North West European states in future draft releases of the tool kit.

7 The challenges – an illustration

The objective of this tool kit is to raise the issues that need to be considered in developing an intelligently designed EV charging infrastructure, and to provide guidance in answering those questions relative to the project in mind.

- What are the objectives of the infrastructure?
- What charge point locations best meet your objectives?
- How do you work with partners to achieve results?
- How do you fund the project?
- What is the best technology fit?
- Where would rapid chargers be best located?
- How do you manage the grid connection and installation process?
- How do you link all these charge points up?
- How do you link up with other networks?
- What commercial issues need to be considered?
- How do you deliver and operate this network?
- How do you future proof the system?

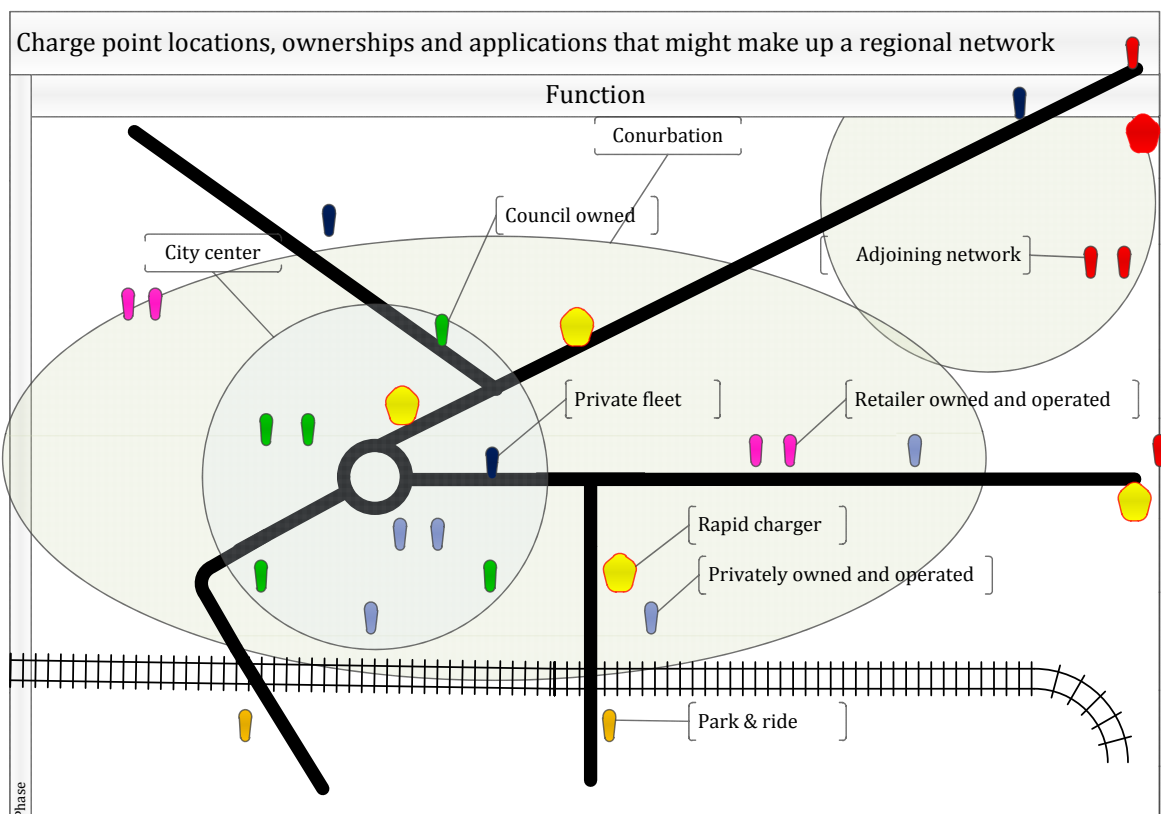


Figure 2 - A conceptual charging network

8 Process overview & tool kit structure

The tool kit guides the user through a process whereby the project foundations are set and then built upon in the following sections. The points below provide a brief summary of what each document section aims to achieve.

More detail is provided in Figure 3 - Tool kit structure. The tool kit is structured in 4 further document packs available electronically from Future Transport Systems:

Part 2 - Project strategy & design

- Project strategy & design describes the initial phase of the project that defines its objectives, scope and high level infrastructure development/operating model.
- It describes how objectives and scope will be influenced by policies, funding requirements and longer term aspirations.
- This phase also considers of the relationships between the project lead and any strategic partners since these relationships will influence the delivery and operating models.

Part 3 - Project planning

- Project planning is the phase of the tool kit that adds the detail and forms the bridge between strategy and implementation.
- A key element of the planning stage is the identification of all the factors that will need to be managed through the delivery phase with guidance provided in relation to structuring work packages, timing and budgeting.

Part 4 - Project implementation

- The Project implementation document deals with the detail and practicalities of delivering the project, including examples of process maps, timing plans and contractual documentation based on previous projects.

Part 5 - Project operation

- Project operation highlights the issues associated with managing the infrastructure as it is installed and in the longer term.
- This section aims to highlight some of the potential liabilities and challenges that need to be anticipated and managed.

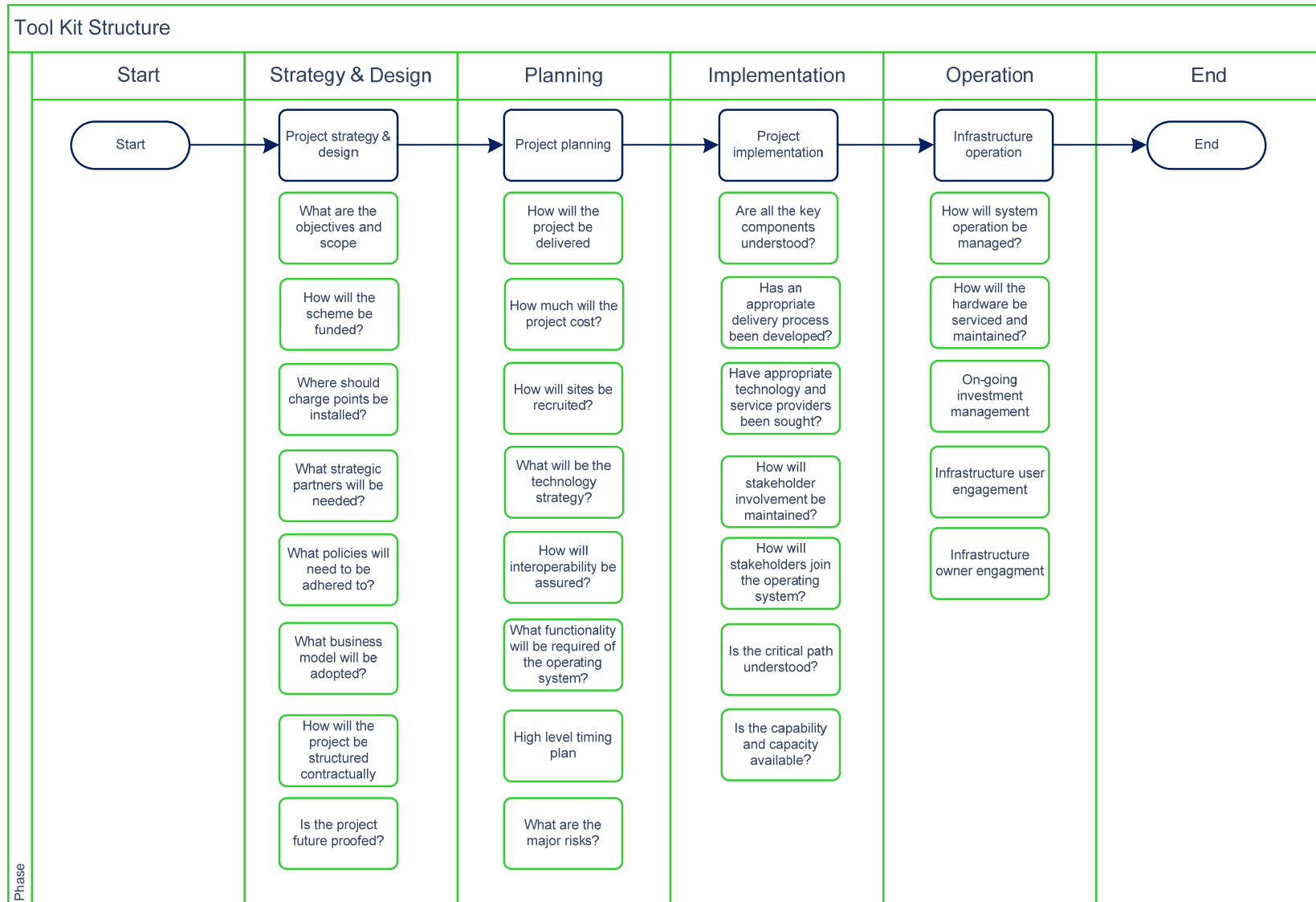


Figure 3 - Tool kit structure

9 Appendix I – ENEVATE

What is ENEVATE?

European Network of Electric Vehicles and Transferring Expertise

Europe's 2020 vision is for a minimum 20% reduction from 1990 in total greenhouse gas emissions to be achieved through a package of measures including in transportation. Member States however face challenges of growth in user and energy demand and high dependency on fossil fuel sources for transport, contributing to an upward emissions trend. The consensus on fossil fuels as finite means many low carbon energy alternatives now exist but short-term, electricity or e-mobility provides the only viable solution.

The rate at which electric mobility develops and is taken up as a transport mode depends in part on our ability to engage and learn from initiatives and on the extent of cooperation between various stakeholders. Inefficiencies of weak coordination and dispersed, ad hoc activity mean potential has not been fulfilled. This applies within North-West Europe (NWE), individual States and also at a global level.

It is in recognition of this situation, the need to avoid further duplication and resource waste that the ENEVATE consortium formed. Consisting of 14 partners from NWE, the European Network of Electric Vehicles and Transferring Expertise will work together to provide tested, evidence-based solutions.

Vision

ENEVATE aims to facilitate and to support an accelerated and well informed introduction of electric mobility in Northwest Europe through structured transnational cooperation between public authorities and business representatives.

In doing so the project aims to boost innovation and competitiveness of the rapidly developing electric vehicle sector in NWE and at the same time contribute to the urgent environmental challenge of reducing CO₂ emissions.

Expertise, technologies and implementation of local actions will both reduce carbon emissions and improve infrastructure long-term.

ENEVATE targets electric road vehicles, energy infrastructure, integrated mobility concepts, and demonstrates the potentials through pilot actions and enables other actors, too.

This three year INTERREG project will take place between January 2010 and June 2013.

ENEVATE Activities

Electric Vehicle Technology

- Supply chain analysis
- Instruments to develop strong supply chain

Sustainable Energy Supply Infrastructure

- Knowledge building
- Transnational consultation and research
- Tool kit development and evaluation

Market Drivers and E-Mobility Concepts

- Define integrated sustainable E-Mobility concepts
- Market analysis of user acceptance
- Scenario building
- Developing support instruments

Pilots

- Analysis of EV Pilots in NWE
- Implementation of ENEVATE findings in regional pilots
- Finalising guidelines and lessons learned

Enabling / Innovation Accelerator

- Creation of E-Mobility road map and policy recommendations
- Stimulation and active coaching of EV supply chain
- Facilitate acceleration of E-Mobility innovation
- Implementation of training programs

10 Appendix 2 – Case Studies

This appendix will be fully populated in future draft releases of the tool kit. Latest case studies can be found on the ENEVATE website (www.enevate.eu).

Case studies will include:

- Newcastle City Council Pilot
- Charge Your Car – PiP North East
- Source East – Pip North East
- Source London – PiP London
- Manchester – PiP
- Bristol – Commuter Project
- Amsterdam
- Barcelona
- Hong Kong
- Berlin
- Japan

11 Appendix 3 – References

RAC (2011). Going Green: How local authorities can encourage the take up of low-carbon vehicles. Retrieved 14 November 2011 from <http://www.racfoundation.org/research/environment/going-green-report>.

Transport for London, Guidance for implementation of electric vehicle charging infrastructure, First edition April 2010. Retrieved 14 November 2011 from <http://www.newride.org.uk/downloads/EVCP-Guidance-Apr10.pdf>

Green Paper on low-emission vehicle charging infrastructure open to the public

Livre Vert sur les infrastructures de recharge ouvertes au public pour les véhicules « décarbonés»

<http://www.ladocumentationfrancaise.fr/rapports-publics/114000233/index.shtml>

EV and HEV Development National Plan

Plan national pour le développement des véhicules électriques et hybrides rechargeables

<http://www.developpement-durable.gouv.fr/Le-plan-vehicules-electriques-et,26806.html>