Office for
Low Emission
Vehicles

Lessons Learnt from the Plugged-in Places Projects

July 2013

The Office for Low Emission Vehicles (OLEV) is a cross Government, industry-endorsed, team combining policy and funding streams to simplify policy development and delivery for ultra-low emission vehicles. OLEV currently comprises people and funding from the Departments for Transport (DfT), Business, Innovation and Skills (BIS), and Energy and Climate Change (DECC). The core purpose is to support the early market for plug-in and other ultra low emission vehicles (ULEVs). OLEV is based in DfT and this document is published by The Department for Transport.

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Executive Summary

1. **This document distils lessons from the Plugged in Places schemes, drafted in consultation with those who delivered the schemes. It is intended to be useful to any organisation considering installing a plug-in vehicle charging infrastructure scheme. Each section can be read either alone or as part of the whole.**
2. The eight Plugged in Places (PIPs) projects, located across the UK, began three years ago and are currently in their final year. The projects were designed to take different approaches to setting up plug-in vehicle[1] charging schemes, aided by match funding from the Office for Low Emission Vehicles (OLEV). This was intended to explore the effectiveness of different strategies, locations and chargepoint types.
3. There are a range of requirements that need to be considered when setting up a plug-in vehicle charging scheme. From PIP project experience, the following requirements are considered fundamental to the successful operation of a scheme.
    - **Set a clear strategy** – understand why the plug-in vehicle charging scheme is being put in. Determine how and why the scheme will deliver the desired benefits and whether the investment is worthwhile.
    - **Plan how to meet funding requirements** – understand whether any funding requirements necessitate certain technology, design choices and priorities.
    - **Consider the user experience** - understand user/ customer requirements, including how they access chargepoints and other services they receive. Consider what is needed to communicate with potential customers.
    - **Locations for chargepoints –** decide on priority location types and principles e.g. in publicly accessible areas, at workplaces or in households and develop an iterative process for location selection.
    - **Set up or join a back office to support the scheme –** this may include access or payment mechanisms and chargepoint data provision.
    - **Establish a clear installation process -** agree a co-ordinated project management approach with clear roles and responsibilities.

[1] *The term 'plug-in vehicle' is used to describe a wide variety of different technologies that are powered in part or in full, by a battery that can be directly plugged into the mains. For the purpose of this document, the term plug-in vehicle is used as a generic term to describe Battery Electric Vehicles (BEV), Plug-in Hybrid Electric Vehicles (PHEV) and Extended-Range Electric Vehicles (E-REV)*

- **Compliance with standards -** ensure that all charging infrastructure complies with relevant standards e.g. UK wiring and building regulations and the IET code of practice[2]
- **Determine how operations and maintenance costs will be funded –** understand and plan for ongoing costs like electricity, maintenance support and back office support .
- **Agree ownership and governance** – determine who owns the chargepoints and whether operations will be outsourced

4. To help achieve the above requirements, there are four areas which form the framework of this document:
    - **Strategy**
    - **Delivery**
    - **Technology**
    - **External Links**
5. Ensuring that the plug-in vehicle charging **strategy** is clear, concise and linked to wider policy and strategies where necessary is essential to defining the reasons the charging project is being undertaken. The strategy should be flexible to market changes but maintain the focus for the scheme.
6. Robust project processes to ensure successful project **delivery** are essential to any project. Key areas to focus on when setting up a plug-in vehicle charging scheme are the design, planning and co-ordination activities to ensure the chargepoint installations take place effectively.
7. The key **technological** considerations include determining whether the project creates its own back office, how the scheme will meet UK standards and regulations, is interoperable with other schemes and how emerging technologies are taken into account. Being clear on these aspects at the start of the project, within the project strategy, will minimise the risk of technological issues and will help to create a compelling offer to the customer.
8. Finally, to keep abreast of market developments, consider which **external links** are required including research and development studies, market research and industry connections. These links should help to inform the strategy so that it remains valid.
9. Whatever scale and type of plug-in vehicle scheme an organisation is looking to create, this document is aimed at helping to inform key decisions. The document is divided into sections designed to offer stand alone or comprehensive guidance depending on readers' priorities, although not intended to form a complete ‘how to’ guide. References have been included providing more detailed guidance at the end of each section.
10. The PIPs and OLEV are keen to continue sharing knowledge and learning. Contact details for the PIPs and OLEV are included in the External Links references on page 37.

[2] IET code of practice for electric vehicle charging equipment installation

1. Context

1.1 Having adequate infrastructure in place is fundamental to the UK's favourable market position, encouraging car manufacturers to locate vehicle production in the UK and providing new opportunities for associated supply chains. Nissan directly linked the UK's commitment to infrastructure as a key consideration when deciding to locate production of the LEAF and batteries in Sunderland. This plant has around £300 million of supply chain contracts associated with it, providing multiple jobs for each one on the production line.

1.2 The provision and establishment of charging schemes to support plug-in vehicle owners is vital for further market growth and to achieve carbon emissions reduction and climate change targets. 22% of the UK's domestic greenhouse gas emissions are from transport, of which 92% are from road transport[3]. Meeting Carbon plan targets will require almost every new car sold from 2040 onwards to be effectively zero emissions and for the entire fleet to be largely decarbonised by 2050[4].

1.3 Poor air quality reduces life expectancy in the UK by an average of six months, and costs the economy an estimated £16 billion each year[5]. Plug in vehicles[6] produce little or no pollution at point of use and are a long term solution to air quality problems.

1.4 The Office for Low Emission Vehicles (OLEV) was established to develop a flourishing early market for ultra low emission vehicles and take the first steps in supporting the creation of a national infrastructure for plug-in vehicles. In 2010, the Plugged in Places (PIPs) programme was initiated, through which OLEV offered match-funding to consortia of businesses and public sector partners to install plug-in vehicle charge points. Programme partners were encouraged to take different charging scheme approaches to analyse the effectiveness of different strategies, locations and chargepoint types. The PIP Programme is now in its final year with projects focusing on transition. However, investment in infrastructure and charging schemes will continue. The Government has recently announcing another £37 million of funding for infrastructure investment to 2015 and a further £500 million from 2015 to 2021 to support the UK ultra-low emission vehicle industry.

1.5 A mixture of local authorities, employers, consortiums and private sector organisations are developing charging schemes, encouraged by the growth in ULEV sales and a strong pipeline of new ULEV models set to come to market over the next few years. It is expected that the majority of plug-in vehicle

[3] https://www.gov.uk/government/publications/final-uk-emissions-estimates

[4] https://www.gov.uk/government/publications/the-carbon-plan-reducing-greenhouse-gas-emissions--2

[5] https://www.gov.uk/air-quality-economic-analysis

[6] The term 'plug-in vehicle' is used to describe a wide variety of different technologies that are powered in part or in full, by a battery that can be directly plugged into the mains. For the purpose of this document, the term plug-in vehicle is used as a generic term to describe Battery Electric Vehicles (BEV), Plug-in Hybrid Electric Vehicles (PHEV) and Extended-Range Electric Vehicles (E-REV).

owners will continue to charge their cars at home, however, it is recognised that they will also require charging infrastructure away from the home.

1.6 Whatever scale and type of plug-in vehicle scheme an organisation is looking to create, this document is aimed at helping to inform key decisions. The document is divided into sections designed to offer stand alone or comprehensive guidance depending on readers' priorities, although not intended to form a complete 'how to' guide. References have been included providing more detailed guidance at the end of each section.

Plug-in vehicle charging scheme types

1.7 A plug-in vehicle charging scheme is a network of chargepoints and any related back office support infrastructure for a defined set of users to use to charge their vehicles. There are many options for the scale and scope of a plug-in vehicle charging scheme, and it is important to define this early on in the planning.

1.8 Plug-in vehicle charging schemes can be owned, managed and operated in various ways, involving different levels of resource. The following are examples:

- **Full scheme operator and owner** - the lead organisation owns the infrastructure and is responsible for the full operation and maintenance of the charging scheme.
- **Outsourced managed scheme** - the lead organisation outsources the chargepoints/ scheme to an independent company to manage on their behalf while retaining ownership of the assets.
- **Scheme partnership approach** - the initial lead organisation sets up a partnership to deliver the scheme. The ownership may be shared or change over time and each organisation could be responsible for defined aspects.

1.9 As the industry develops, new models of operation are emerging and the above is not an exhaustive list. Scheme ownership and operating responsibilities may also change over time, for example one organisation could set up and run the scheme for a period of time before outsourcing it.

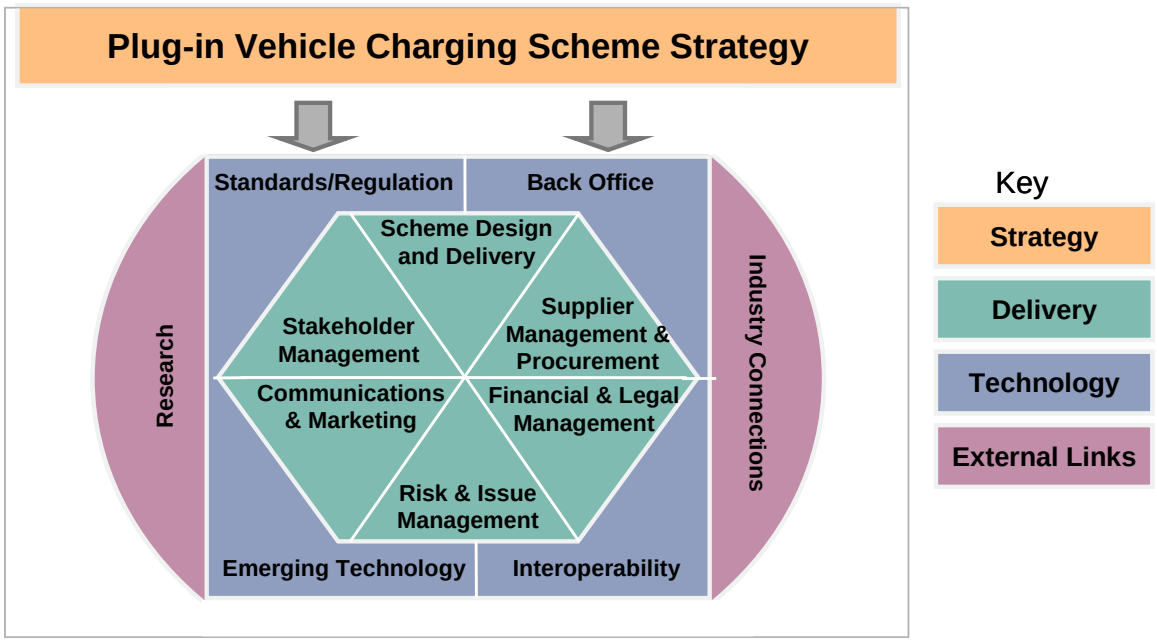
1.10 Many factors influence the decision on scheme type, including the scale of roll out, the intended audience e.g. fleet or public users, the funding and resources available, the outcomes the scheme is intending to achieve and the local appetite for plug-in vehicle take up. Each of the options carries different responsibilities and requires different expertise.

1.11 **The key roles involved in plug-in vehicle charging schemes are defined at the end of this document.**

2. Plug-in Vehicle Charging Scheme Delivery Framework

2.1 The Plugged-in Places projects all undertook activities in each of the areas outlined in the model below. This model outlines a framework that can be used to consider the main aspects of creating and maintaining a charging scheme.

Diagram 1: Plug-in Vehicle Charging Scheme Delivery Framework



Definitions of each area of the plug-in vehicle scheme delivery framework are given in the table on the following page.

Area	Sub Area	Definition
Strategy	Chargepoint Delivery Strategy	The strategy upon which the infrastructure programme is based. This maybe a section or part of a wider strategy, for example, sustainable transport strategy. The payment model, funding mechanisms and business case should all flow from this strategy.
	Payment Model Development	The mechanism to enable payments in return for charging.
	Funding Mechanisms	Identification and gaining of funding towards the scheme.
	Business Case	The case (costs and benefits) for undertaking the plug-in vehicle charging scheme.
Delivery	Scheme Design	Considerations and steps to take when designing a scheme to meet the strategic aims
	Delivery Management	Activities required to install chargepoint infrastructure, including project set-up, planning, scheduling, progress reporting/ project board preparation as well as managing installations and Distribution Network Operator (DNO)[7] relationship management.
	Procurement	Procurement includes the procurement considerations and processes undertaken.
	Supplier Management	Supplier management includes all of the activities to control supplier performance and delivery.
	Financial Management	Financial management covers management of the scheme income and payments, including grants, funding streams and payment of suppliers.
	Legal Management	Legal management includes all of the legal processes and legal documentation associated with the roll out.
	Risk and Issue Management	The risk and issue management processes necessary to manage chargepoint infrastructure roll out effectively, including risk mitigation and issue resolution.
	Communications and Marketing	The communications and marketing approach to communicate with the industry, businesses and consumers to stimulate the plug-in vehicle market and plug-in vehicle infrastructure up take.
	Stakeholder Management	The activities associated with the plug-in vehicle infrastructure project to engage stakeholders effectively.

[7] Electricity distribution network operators (DNOs): carry electricity from the transmission systems and some generators that are connected to the distribution networks to industrial, commercial and domestic users.

Technology	Standards and Regulation	The emerging standards and regulations relating to plug-in vehicle infrastructure roll out and across the scheme.
	Back office	The activities linked to defining, setting up and running a fit for purpose back office and the provision of usage data from the plug-in vehicle charging infrastructure network.
	Interoperability	The technical and practical considerations enabling ease of consumer access to all chargepoints across different charging schemes.
	Emerging Technology	The approach to take emerging technology into account and future proof the scheme
External Links	Industry Connections and Industry Knowledge	The industry connections created to stimulate plug-in vehicle take up and the mechanisms by which PIPs have gained plug-in vehicle and charging knowledge from industry players or across the industry.
	Market Research and Research and Development	Any forms of plug-in vehicle and charging industry market research and R&D projects.

2.2 The sections below outline the best practice considerations for each area of the plug-in vehicle charging scheme delivery framework.

Strategy

2.3 The starting point for setting up a charging scheme is the development of a robust strategy, focused on the uptake of plug-in vehicles alongside the provision of charging infrastructure. Without a clear strategy and specific benefits identified, it can be very hard to gain buy-in from the funding organisation or senior management team and in turn for them to prioritise investment.

2.4 The business case is central to the development of the plug-in vehicle charging scheme. Upfront thought should be put into the payment model and how the project is going to be funded. The goals of the project should be linked to policy development and be long ranging enough to ensure they endure over time.

2.5 Wider political, economic, sociological, technological, legal and environmental factors that impact on plug-in vehicles and charging schemes should be taken into consideration when constructing and reviewing the strategy

2.6 In order to present a plug-in vehicle charging scheme that is sustainable, consideration needs to be given to how operations, maintenance and back office arrangements will be provided on an ongoing basis.

2.7 Communicating the strategy and key benefits to plug-in vehicle users and potential chargepoint hosts is essential to ensure a good level of take up.

Delivery

2.8 There are six main delivery management areas within a plug-in vehicle charging scheme; scheme design and delivery management, supplier management and procurement, financial and legal management, risk and issue management,

communications and marketing and stakeholder management. All of these delivery aspects enable successful delivery of charging infrastructure.

2.9 An organisation should consider how each of these areas is resourced and managed over time. It is unlikely that each will require the same amount of time investment by the organisation and it may be possible to outsource areas to other organisations or specialist departments. A Project Manager is necessary to oversee and coordinate all of these delivery management areas.

2.10 Carrying out each aspect successfully should ensure the following: a clear governance structure and project plan, and agreed scheme design including location plan, a delivery schedule, a clear outline of supplier responsibilities, clear supplier management approaches, designated procurement procedures, accurate project accounting and clear funding steams, appropriate legal agreements, an effective risk and issue management process, a marketing and communications strategy and plan, and a stakeholder management strategy.

2.11 Strong programme and project management discipline is assumed, so the document focuses on the areas that the PIPs found especially important when delivering the charging schemes.

2.12 Organisations with their own project management methodologies should utilise these to aid the development of the plug-in vehicle charging scheme.

Technology

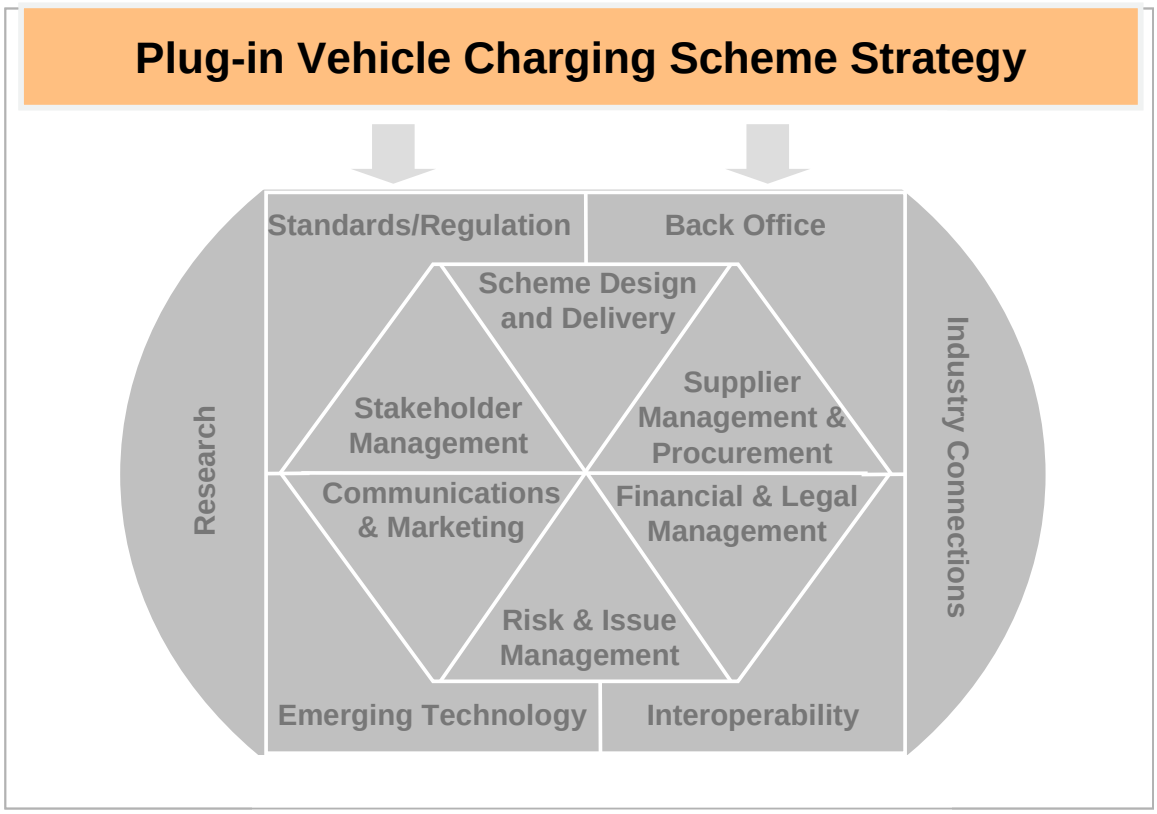
2.13 Technical considerations must also be managed and translated from the strategy. Key technological considerations include determining whether the project creates its own back office, how the scheme will meet UK standards and regulations, is interoperable with other schemes and how emerging technologies are taken into account. Being clear on these aspects at the start of the project, within the project strategy, will minimise the risk of technological issues and will help to create a compelling offer to the customer. These decisions are likely to change over time because the plug-in vehicle market is an emerging and fast paced market.

2.14 Consideration should be given to how the plug-in vehicle charging scheme will set up technological processes to fulfil requirements such as the provision of usage data.

External Links

2.15 Constantly re-informing the strategy through the creation of wider links across the industry and to the latest research developed in the market is important as this is still an emerging market. The PIP projects advocate keeping close to information sources and maintaining a healthy network across the industry and internally to minimise the risk of the network becoming obsolete.

3. Strategy



3.1 Ensuring that the plug-in vehicle charging **strategy** is clear and concise and linked to wider policy and strategies is essential for communicating the reasons the charging project is being undertaken. The strategy should be flexible to market changes but maintain a focus for the scheme.

Chargepoint Strategy

Headline	No	Plugged In Places Lessons Learnt
1. Invest time getting the strategy right from the outset	1.1	Developing a successful, integrated plug-in vehicle and chargepoint strategy needs focused research and endorsement from the highest level within the organisation.
	1.2	Understanding local and national policy is key for both public and private sector organisations. To be most effective the strategy should be clearly linked to, or part of, a wider strategy, for example delivering better transport, better air quality or a reduction in CO2 and health improvements or carbon reduction commitments.
	1.3	A separate strategy may be needed for different groups e.g. the domestic, workplace and publicly accessible chargepoint markets or for public and private sector hosts. Separate funding requirements and mechanisms may also be attached to each of these groups.

	1.4	Use multiple data sources to inform the strategy for example, external research, local environment policies and industry experts.
	1.5	Define the plug-in vehicle scheme principles, e.g. whether to partner with an existing commercial scheme, what types of infrastructure you will install etc
	1.6	Set realistic but ambitious targets (if the project has to be target driven), recognising that many of the preferred locations will not be feasible. When planning the level of installations required, check with local transport departments and agencies to maintain alignment with wider local objectives. These can be used in the support of your scheme and provide you with a realistic check against your planned numbers.
	1.7	Recognise that there is no single 'right' scheme for a region. However, there needs to be a clear strategy and this needs to be evaluated on a regular basis.
2. Look to the future when defining the strategy	2.1	Consider future requirements and mechanisms for long term scheme sustainability, particularly commercial operations, changes in technology and wider long term aspirations. Consider these alongside delivery strategies to maximise potential.
	2.2	Build in flexibility to the strategy to allow for evolving payment / funding mechanisms and models. (See Payment model development 1.1)
	2.3	Consider a potential exit strategy from the outset, e.g. transition to a managed provider if this is part of the long term strategy.

Payment Model Development

Headline	No	Plugged In Places Lessons Learnt
1. Create a flexible payment model	1.1	When developing the payment mechanism, make sure that it is flexible enough to respond to market changes. e.g. if the scheme intends to move from a membership approach to a pay-as-you-go mechanism then analysis of the appropriate infrastructure and technologies to help fulfil this should be put into place from the outset to enable an easy and efficient transition. (See Strategy: 2.2)
	1.2	Weigh up the benefits and costs of providing below cost/ free services to gain early adopters and think ahead about how transition to payment models can be achieved effectively.
2. Define how chargepoint technology links to the payment model	2.1	Understand how the technology composition within your infrastructure network impacts the pricing structure utilised, for example, a 50kw charger could command a higher rate than a 7kw charger.
	2.2	Consider the benefits of a pay-as-you-go scheme; lower barriers to entry for users and ease of interoperability with adjacent charging networks.
3. Understand any legal constraints	3.1	Ensure understanding of any legal constraints that may affect payment models – e.g. consult OFGEM for the latest information on the resale of electricity (see references)

Funding Mechanisms

Headline	No	Plugged In Places Lessons Learnt
1. Secure leadership	1.1	To be successful in securing funding you need; the alignment of political and executive support, the identification and allocation of sufficient capital and operational funds and suitably qualified resources to deliver the project.
2. Clearly understand available funding streams and associated requirements	2.1	Spend time identifying the funding sources/ options at the inception of the project e.g. private sector, Government, EU and partnerships Understand feasibility by evaluating the obligations (short and long term) of the funding arrangements, the timings and any potential conflicts across funding sources. Analyse the costs/ benefits of each match funding option - do the benefits outweigh the costs?
	2.2	When receiving Government funding, the requirements for evidencing value for money via competitive tendering must be understood and followed from the outset. This will involve communication to all related parties.
	2.3	Ensure that the appropriate level of resource is available to gain the funding, e.g. time and expertise needed for bids, grant applications etc.
	2.4	Secure any match funding required as early as possible. Consider contingency plans in case a match funding stream does not materialise.
3. Clearly communicate funding requirements to all parties involved	3.1	Ensure all parties, including customers and other stakeholders know how the funding mechanisms and match funding work from the outset including evidence and payment conditions
4. Nurture relationships with funding providers	4.1	When there is uncertainty on how long individual funding streams will be available, maintain close relations with funding partners and understand the dependencies and restrictions this places on the scheme in terms of budget setting and approvals processes.

Business Case

Headline	No	Plugged In Places Lessons Learnt
1. Create a future proof business case by planning for the future and building in flexibility	1.1	Design the plug-in vehicle charging scheme based on a future, sustainable business model that is without government support. It is important to realistically plan and budget for operational costs and cash flows. This should inform the decisions around the chargepoint network operations, payment models, membership structure, technology selection and locations of chargepoints. Ensure that the business case is flexible enough to accommodate additional payment models and opportunities for private sector investment in the future. Bear in mind the structure of your current payment mechanism may change to reflect consumer needs.
2. Link funding to the business case	2.1	A solid business case, with a compelling need for the support of infrastructure development, in financial and environmental terms, is essential when looking to gain match funding.

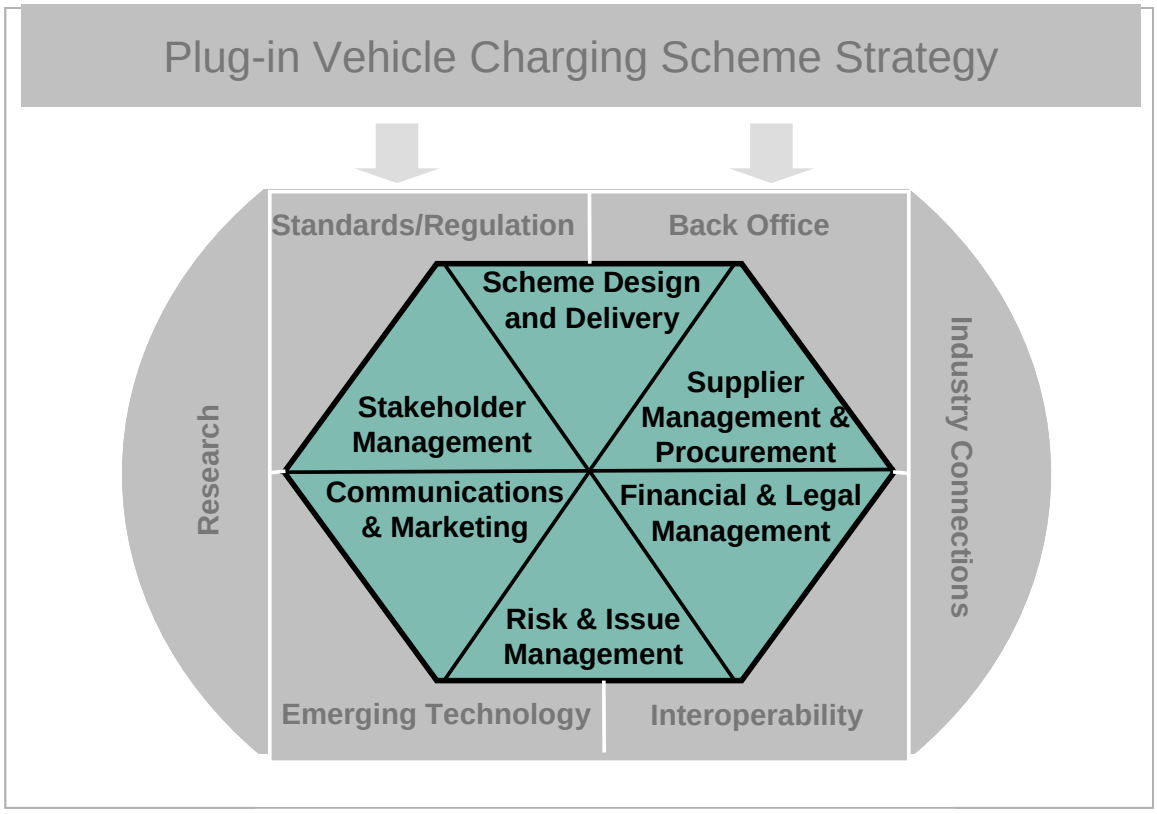
3. Regularly evaluate the business case	3.1	Business case assumptions should be re-evaluated regularly. With a changing market, varying uptake and emerging technology, it is important to be responsive.
4. Fully evaluate the costs and benefits within the business case	4.1	A business case based on a single plug-in vehicle up take assumption is high risk because the market is still developing. Include multiple scenarios for the uptake of plug-in vehicles.
	4.2	Consider ways to initially lower scheme operations and maintenance costs by gaining sponsorship for electricity or back office arrangements.
	4.3	To encourage early take up, consider promotions and factor into the business case e.g. free electricity for a specific period of time, vouchers for members etc

References

Additional Information Source	Description of Information Source	Location of Information Source
Annex A1 - ARUP Plug-in vehicle recharging infrastructure guidance summary	Review of available guidance for installation of vehicle charging infrastructure	See Annex 1 - Published alongside this document on the OLEV website
Global EV Outlook	Electric Vehicle Landscape to 2020	http://www.iea.org/topics/transport/electricvehiclesinitiative/EVI_GEO_2013_FullReport.pdf
International Projects	City Case Studies	http://www.iea.org/evi/evcitycasebook.pdf
RAC guide	RAC guide - Going Green. How local authorities can encourage the take-up of lower-carbon vehicles	http://www.racfoundation.org/research/environment/going-green-report
SMMT Electric Car Guide	Society of Motor Manufacturers guide to electric cars	http://www.smmt.co.uk/2011/06/smmt-publishes-new-2011-electric-car-guide
Whitepaper sustainable local transport	2011 White Paper “Creating Growth, Cutting Carbon: Making Sustainable transport Happen”	http://assets.dft.gov.uk/publications/making-sustainable-local-transport-happen/making-sustainable-local-transport-happen-whitepaper.pdf
Chargepoint strategy elements	CE Delft Website	http://www.cedelft.eu/publicatie/impact_of_electric_vehicles/1153
National planning policy	National Planning Policy Framework , DCLG	http://www.communities.gov.uk/documents/planningandbuilding/pdf/2116950.pdf (paragraph 35)
Business Strategy Analysis	Business strategy analysis	http://www.ey.com/GL/en/Industries/Power---Utilities/Plug-in---Charging-electric-cars

Automotove Council Roadmap	Automotive Council's New Automotive Innovation and Growth Team's product development roadmap	http://www.automotivecouncil.co.uk/wp-content/uploads/2011/12/Tech-Road-Maps-RD-Capability-Final.pdf
European roadmap	European Roadmap Electrification of Road Transport	http://www.green-cars-initiative.eu/public/documents/Roadmap%20Electrification.pdf/view
Market impact analysis	Impact analysis for market uptake scenarios and policy implications	http://ec.europa.eu/clima/policies/transport/vehicles/docs/d5_en.pdf
Ofgem	Ofgem - The resale of gas and electricity: the Maximum Resale Price Provisions	http://www.ofgem.gov.uk/domestic-consumers/Pages/Resaleofgasandelectricity.aspx
UK Government: Carbon Reduction Commitment	CRC Energy Efficiency Scheme information for large organisations	http://www.decc.gov.uk/en/content/cms/emissions/crc_efficiency/crc_efficiency.aspx
UK Government: Office for Low Emission Vehicles	Government policy and strategy on low emission vehicles	https://www.gov.uk/olev
UK Government: Plug in Infrastructure strategy	Office for Low Emission Vehicles: Making the connection: The Plug-In Vehicle Infrastructure Strategy (2011)	http://assets.dft.gov.uk/publications/making-the-connection-the-plug-in-vehicle-infrastructure-strategy/plug-in-vehicle-infrastructure-strategy.pdf
UK Government: Office for Low Emission Vehicles infrastructure grant schemes	UK infrastructure grant schemes	https://www.gov.uk/government/news/new-measures-announced-to-support-the-uptake-of-plug-in-vehicles

4. Delivery



4.1 Having robust project processes in place to ensure successful project **delivery** is essential to any project. Key areas to focus on when setting up a plug-in vehicle charging scheme are the design, planning and co-ordination activities to ensure the chargepoint installations take place effectively.

4.2 Strong programme and project management discipline is assumed, so the document focuses on the areas that the PIPs found especially important when delivering the charging schemes.

Scheme Design

Headline	No	Plugged In Places Lessons Learnt
1. Ensure the scheme design meets user requirements	1.1	Conduct user requirements analysis to ensure that the scheme design meets the needs of the targeted user groups and the aims of the strategy. This includes the number of chargepoints, the chargepoint technical specifications, access and payment mechanisms and user information channels.
	1.2	Plan the back office and any user information channels such as websites or smartphone applications from the beginning of the project. The information could include chargepoint locations, connector types and power ratings as well as access and payment instructions.

2. Use a wide variety of evidence to assess the number of chargepoints required	2.1	When planning the level of installations required, check with local transport departments and agencies to align with wider local objectives. These can be used in the support of your scheme and provide you with a realistic check against your planned numbers. Balance current requirements against long term utilisation of assets.
3. Use an iterative process for location selection	3.1	Ensure that there is a robust, iterative process for chargepoint site selection and set out agreed criteria or tolerances e.g. less than 30m from the main supply and has a GPS signal.
	3.2	The project team might shortlist sites based on analysis of the target markets, parking patterns and customer dwell times and then conduct feasibility analysis of the grid network capacity and installation requirements. These considerations would need to be balanced before a site is agreed.
	3.3	An on-site documentation visit between the supplier, DNO and Project Manager is advised to sign off the site. The creation of a robust sign off process will help to mitigate the risk of investment in unfeasible sites and limit installation costs linked to new connections to the grid. Time spent up-front to identify the right sites will prevent large site drop out rates.
	3.4	Consider dwell times: Rapid 50kw chargepoints might be best suited to locations with shorter dwell times such as motorway service stations, whereas a 7kw chargepoint might be suitable for a location such as a park and ride or restaurant car park where longer dwell times are typical.
	3.5	Assess signal strength of GPRS signals as this could limit the provision of data to a back office and enabling of PAYG access.
	3.6	Consider safety and proximity to CCTV, especially where the chargepoint can be used at night
	3.7	Consider the effects of any works on neighbouring businesses and maintain knowledge of any significant development plans in the area that could render locations impractical in the future.
	3.8	Working closely with the DNO on grid capability can be a major benefit. There can be a huge variation in costs for installation of chargepoints. Working with energy providers and utilising grid maps can be effective in short listing locations and identifying the most cost effective sites. This is more evident for rapid chargers or where multiple chargers are located together.
4. Position chargepoints carefully	4.1	Position chargepoints to minimise any risks to road users and pedestrians tripping over the cables. Provide guidance for users to place the cables as intended.
	4.2	Ensure chargepoints are protected from accidental damage from vehicle collisions with the use of curbs, bollards or barriers as required.
5. Consider consumer information for ease of use	5.1	Consider appropriate labelling and signage, including customer information phone numbers, websites and chargepoint technical user information.

6. Ensure compliance with relevant regulations	6.1	Ensure that you have considered the appropriate regulations e.g. the IET code of practice, British standards, wiring regulations, Meter Operation Code Of Practice Agreement guidelines, the Equality Act, traffic signs and regulations etc

Project Delivery Management

Headline	No	Plugged In Places Lessons Learnt
1. Align the strategy to a robust project initiation approach	1.1	Ensure solid scheme principles are agreed prior to planning and all stakeholders are agreed on these. E.g. chargepoint types to be used, payment mechanisms etc
2. Conduct extensive project initiation activities to ensure successful delivery	2.1	Define the governance structure for the project from the beginning and gain buy-in from all of the key stakeholders. Establish mechanisms for regular, open, honest communications amongst key project stakeholders.
	2.2	Conduct a preliminary risk analysis during project initiation to understand the strategic risks and plan how these are to be mitigated.
	2.3	Define roles and responsibilities, including which organisations will procure, install, own, host and maintain the chargepoints.
	2.4	Document and communicate the following to all parties in the project, as part of project initiation: project objectives; delivery targets; the delivery process and responsibilities; resource requirements, key stakeholder groups.
	2.5	Engage with the DNO from the outset. This is recommended to include consultation of grid network maps and supply capacities. Planning and delivery can be greatly affected by the quality of the DNO relationship.
3. Ensure all project members are equipped at the outset	3.1	Consider training the organisations involved with the project if they have limited experience in plug-in vehicle charging infrastructure installations
4. Create a robust delivery plan which accounts for potential dependencies and constraints relating to plug-in vehicle infrastructure delivery	4.1	Set out a pragmatic roll out plan to support the realisation of the strategy, aligned with available funding streams, realistic assumptions for delivery timescales and proposed location feasibility. Conduct regular reviews of the plan and update as required
	4.2	Be aware there may be long lead times for certain stages including: receiving survey and commissioning documents, signing up chargepoint hosts to any terms and conditions, putting legal agreements in place; chargepoint manufacturer delivery, Traffic Regulation Orders, and connection works by energy providers. Planning should factor in enough time for this.
	4.3	Understand the constraints that might exist for external companies/ partners. These companies will have their own priorities and timeframes and their delivery plans will not always align with the project delivery timeline. Understand these constraints from the outset of the project if possible.

	4.4	Build in time for the customer/ host to confirm where their energy supply is and who their energy provider is. Do not expect the energy provider to remain constant.
5. Create robust project delivery processes,	5.1	Agree and communicate the documentation required at hand offs between each activity, particularly where different organisations are carrying out each stage of work. This audit trail is essential to minimise safety and quality issues and accidental errors.
	5.2	Work with the installers to agree the acceptance process. This may include commissioning certificates and testing of charging capability, payment mechanism and data transmission.
	5.3	Plan appropriate resource to manage administrative tasks to assist in the installation and funding processes e.g. invoicing/claims, survey and commissioning documentation, assisting with DNO applications etc
	5.4	Create a database of chargepoints, i.e. an asset register, with consistent information including: serial numbers, location information, supplier details and technical details.
6. Ensure that the right governance, roles and responsibilities exist within the project	6.1	Regular Project Board meetings are recommended to ensure a structured approach to providing progress updates and resolving escalated issues. Include representatives from key stakeholders, including the DNO.
	6.2	Plan and coordinate installations as a complete end to end project team, including suppliers, Local Authorities, energy providers, Distribution Network Operators and customers/ hosts.
	6.3	Using one supplier with existing regional experience and contacts or alternatively, allowing hosts to use their own nominated contractors if suitability qualified can be beneficial.
	6.4	Ensure there is a responsible owner in all partner organisations for chargepoint installations. This person should act as the key contact for communications and issue resolution.
	6.5	Regional traffic signals knowledge, support and contacts can be helpful as there are synergies with plug-in vehicle charging equipment.
	6.6	Ensure resources are in place for all aspects of the project including stakeholder engagement, legal, finance, administration
7. Ensure effective communications with the delivery network throughout the entire project	7.1	Continual stakeholder engagement with delivery partners supports full visibility of the delivery process for planning purposes. This aids accurate and realistic delivery strategy refinement while also creating buy in from each key stakeholder partner in the process (supplier, DNO, metering agency, hosts etc).
	7.2	Have regular check point meetings with delivery suppliers to stay up to date on progress.

8. Employ effective DNO stakeholder management	8.1	A close DNO relationship allows for better integration into the location planning process. When identifying locations, the DNO should be included in the first phase of evaluation, providing a grid feasibility study at proposed locations and an opinion on suitability. This also gives the DNO visibility of the planning process and locations for installation preparations. A close DNO relationship should also be supported by close relationships with energy brokers and metering companies, which are both vital for on-street installations. Holding an initial workshop with the DNO, energy broker and metering company highlights risks and allows for the buy-in from all stakeholders to minimise installation delays.
	8.2	Explain your installation process to the DNO and be prepared to adapt as necessary. Aim to create a learning partnership with the DNO. Many DNOs are working on initiatives that could support or impact plug-in vehicle infrastructure in the future.
	8.3	Having the DNO as a Project Board Member or consortium member greatly aids the installation process. Seek senior level DNO support where possible.
	8.4	Understand the structure of the DNO as soon as possible as it can be different between operators. Where possible, ensure a single point of contact (across the scheme) with the DNO to streamline the application process.
	8.5	Understand how you will manage the process for payments to DNOs, including whether they will need to be made up-front and how the work is scheduled. Plan ahead and schedule enough time in for this process.
9. Plan ongoing maintenance and operations policies and responsibilities early	9.1	Before installing any chargepoints, define and agree roles, responsibilities and processes to identify when chargepoints are out of operation and for repairing them. These may be included in the host agreement or in the maintenance contract terms and conditions and SLAs.
	9.2	If a chargepost is vandalised or damaged, the post should only be replaced if the threat to further damage/ vandalism is low or the risk has been otherwise mitigated. Otherwise the post will need to be repositioned or decommissioned.

Procurement

Headline	No	Plugged In Places Lessons Learnt
1. Utilise frameworks and build in flexibility for market changes	1.1	Utilise existing procurement frameworks for chargepoint purchase where appropriate to save time and effort. Existing frameworks can be useful for benchmark pricing, but may not include the latest technologies.
	1.2	Consider how to keep frameworks "up to date" in a fast developing market e.g. supplier development roadmaps could be reviewed in order to inform procurement decisions.

2. Understand the procurement processes and plan ahead	2.1	Procurement requirements may include OJEU[8], Government grant conditions, and organisation specific defined procurement procedures. Understanding these requirements and how they will be fulfilled early in the programme is essential to successful delivery.
	2.2	Procurement timescales may require the procurement to be undertaken alongside the early development of a business model.
	2.3	Procurement should be supported by regular reporting, project management and strict governance procedures.
	2.5	The procurement process could be more efficient if an integrated service is procured to provide, install and commission infrastructure.
	2.6	Utilise two or more procurement phases if undertaking installations of different chargepoint types, for example, rapid and standard charger procurement. This spreads the risks associated with delivery for example, tender disputes and supply issues.
	2.7	Buying all the chargepoints up front can enable a good price and a more controllable delivery/ installation process. Buying too far in advance could limit options for taking advantage of technological advancements.
3. Follow best practice tendering arrangements	3.1	Record all aspects of the tender process and have a robust evaluation process to assist if tender disputes arise.
	3.2	Tender responses come in varying qualities. Tender review procedures should be robust to ensure that potential suppliers are able to demonstrate their capabilities. Equipment demos and the use of trials could become part of the tender responses to ensure that suppliers are capable of fulfilling their contractual obligations.
	3.3	Time and resource needs to be factored into planning and budgets for procurement, especially if using in-house procurement experts/ teams.
4. Set up mutually beneficial contract arrangements	4.1	Ensure that the contract established to support the scheme is robust enough to cover initial and future requirements.
5. Use local suppliers	5.1	Where possible, use local resource to encourage local green employment and the building of local skills and knowledge.

Supplier Management

Headline	No	Plugged In Places Lessons Learnt
1. Set up essential supplier management information sources	1.1	Maintain a list of chargepoint suppliers/ installers that meet the required specifications, qualifications and accreditations. This information can be useful to hosts looking for competitive quotes. Review this information regularly to add to it as the market is constantly changing. Check the validity of accreditations regularly.

[8] Official Journal of the European Union

2. Be clear on all supplier roles and responsibilities	2.1	Design the installation process so it is clear which suppliers are conducting each activity. Understand your supplier network and map this out clearly.
3. Employ supplier management techniques to ensure quality delivery	3.1	Use detailed purchase orders to fully list out requirements and create an acceptance process to gain evidence of every component having been delivered. Make payment when there is confirmation that the required work is complete and meets defined requirements.
	3.2	Supplier service level agreements (SLAs) can help to clarify expectations and aid contractual discussions.
4. Tailor supplier management over time and to supplier groups	4.1	Collaborative working is required with suppliers as the plug-in vehicle market is an emerging market and requirements are evolving.
	4.2	Supplier management should be tailored to focus on the specific suppliers e.g. hardware and software providers and civil engineers.
	4.3	Hardware providers e.g. infrastructure providers: Manage the hardware providers through 3 key delivery stages - planning, infrastructure delivery and support and maintenance of infrastructure. Understand the structure of each supplier and understand how this structure links to each of the delivery stages.
	4.4	Software suppliers e.g. back office providers: Build payment processes on interim deliverables to ensure that the software delivered meets requirements. Ensure that data back up policies, service level agreements, location of data storage and Data Protection Act compliance are defined and agreed with software providers.
	4.5	Civil engineers/ installers: Utilise existing civil engineer frameworks where appropriate. Provide advice to hosts on key aspects of the contracts with installers to enable effective selection of civil engineers/ installers. Specify the requirements which need to be followed throughout the installations process e.g. IET code of practice and ensure that installers understand these.

Financial Management

Headline	No	Plugged In Places Lessons Learnt
1. Strong financial management is essential	1.1	Ensure the plug-in vehicle installation project has clear financial processes for management of funding streams, accounts and payment processes to ensure an effective audit trail and available information for performance analysis.

Legal Management

Headline	No	Plugged In Places Lessons Learnt
1. Plan ahead as legal drafting and agreement can be time consuming	1.1	Plan in enough contingency time for legal drafting and agreement.
	1.2	Do not underestimate the number of legal teams that can be required to review a single document (property, procurement, etc).
	1.3	Utilise support of an in-house legal team if suitable, in order to reduce costs.
	1.4	If using host agreements, account for factors like: reimbursement of electricity costs when using a host's electricity supply, offsets to parking charges etc. These can be a major barrier to legal agreements and implementation. Too much complexity can also make the agreement process protracted and partners less likely to sign up.
2. Keep legal agreements simple and utilise existing frameworks where possible	2.1	Work with the legal team to make the legal agreements clear and concise. Review legal agreements on receipt from the legal teams to ensure they are as simple as possible.
	2.2	Utilise existing agreements where possible and work with partners to ensure they can fulfil the requirements.
	2.3	The agreements might cover: ownership of the asset, any necessary provision of data, post maintenance and any other funding or scheme operational requirements. Utilise single agreements to cover several sites where possible, to save time and effort.
3. Gain buy-in from across the business	3.1	Ensure a top-down approach is taken with legal agreements. Give visibility to the programme to ensure buy-in.

Risk and Issue Management

Headline	No	Plugged In Places Lessons Learnt
1. Employ best practice processes	1.1	As this is an emerging market and involves complex installation processes with a wide number of stakeholders, robust risk and issue management is vital. Follow best practice risk and issue management processes e.g. PRINCE 2 methodology.
	1.2	Risk and Issue management should take place at every level of the project to ensure full visibility of all risks and issues. Include host and partner issue management where required.
	1.3	Manage media, negative press and reputational risks as well as delivery risks.
2. Secure resources for risk and issue management	2.1	Large complicated projects require detailed risk and issue logging and regular monitoring. This can be time intensive, and appropriate resource should be planned at the beginning of the project. A technical lead may be required to manage technical risks and issues.

Communications and Marketing

Headline	No	Plugged In Places Lessons Learnt
1. Establish marketing and communication strategies at project outset	1.1	Consider the scheme branding from the outset. Decide whether it is part of an existing brand or stand alone. If possible, test your branding on key stakeholders and potential customers.
	1.2	Define the marketing and communications plan as early as possible. This will help to mitigate delays in signing off the branding and marketing strategy. Define your communications objectives. Determine your audiences and key stakeholders Ensure that your planned communications activity clearly aligns with your business objectives. Set Key Performance Indicators and how you will measure these. Consider the marketing and communications opportunities, risks and mitigating actions. Be attentive to both positive and negative press. Consider the cost and procurement routes for your activity to ensure value for money and timely, effective purchasing.
	1.3	Consider the need to vary the marketing budget and resources as the project progresses and work out the options for funding this
	1.4	Understand your audience. To stimulate larger volumes of take up, communications could focus initially on the early adopters and businesses. It is worth looking into any available research on your audience's attitudes, behaviour and media consumption to see how you can best target them.
	1.5	Ensure that contingency time is built in for marketing and communication processes, as approvals and reviews can take longer than expected.
	1.6	If you are contracting out the marketing, ensure that any external agency or partners fully understand your programme. Take the time to involve them as key members of your core team.
	1.7	Scope out potential partners who are actively delivering plug-in vehicle related communication and marketing activities and agree roles, key audiences and messages. Consider forming positive alliances with the partners and their PR activity, there may be opportunities to utilise existing marketing activities at little to no cost.
2. Employ a strategy to ensure effective PR/ media relations	2.1	Minimise the marketing and media for the project until after the chargepoints are installed.
	2.2	Ensure that the programme delivers consistent messages to the press, has an ambassador to the public and mitigation plans for negative press.
	2.3	Be proactive in generating press releases based on the success of the scheme. Be aware that such stories may only be picked up by niche press outlets, so resource appropriately.

	2.4	PR support helps to raise awareness but it needs to be targeted with specific objectives from the beginning. Create a set of core messages for your programme and develop the 'story' that you want to tell. This can include research findings, new figures, events and a variety of other ways to create hooks. Look for innovative ways to make the most of press opportunities. Spend time thinking of new angles as some topics ('another charge point installed') can get a bit repetitive. Messages are often more convincing to audiences if they are carried by trusted third parties. Develop press opportunities whenever possible with stakeholders e.g. utilities/ vehicle manufacturers/ local authorities/ local businesses to help reinforce what you are saying.
3. Where possible, undertake a multi-channel approach	3.1	Consider opportunities for using a variety of different media to convey your messages. Plan exactly what you want to say and make it consistent and targeted across all your media activity. If possible, measure and evaluate the different media so that you have a clear picture of what works to inform your next promotional push. Consider holding flagship promotion events, e.g. conferences, educational programmes, public pop up showrooms, receptions for businesses and stakeholders.
	3.2	Consider creating a website to support the project and to increase engagement with the local community with educational information for consumers, e.g. chargepoint locations and a plug-in vehicle saving calculator. Ensure that any web resource that you produce is regularly maintained and updated to bring audiences back.
	3.3	Consider using a newsletter as a primary tool to stimulate regular engagement with key stakeholders, to raise the profile of the programme and promote new initiatives. Techniques to increase readership might include use of guest editors and representation of multi-themed issues.
	3.4	Loaning of plug-in vehicles to prospective hosts has proved to be successful and has supported take up of infrastructure.
	3.5	Local car dealerships are the main point of contact with the plug-in vehicle customer and are essential for communicating information about the chargepoint infrastructure, particularly domestic chargers. Consider setting up regular meetings with each of the dealerships and give them updates as the project progresses.

Stakeholder Management

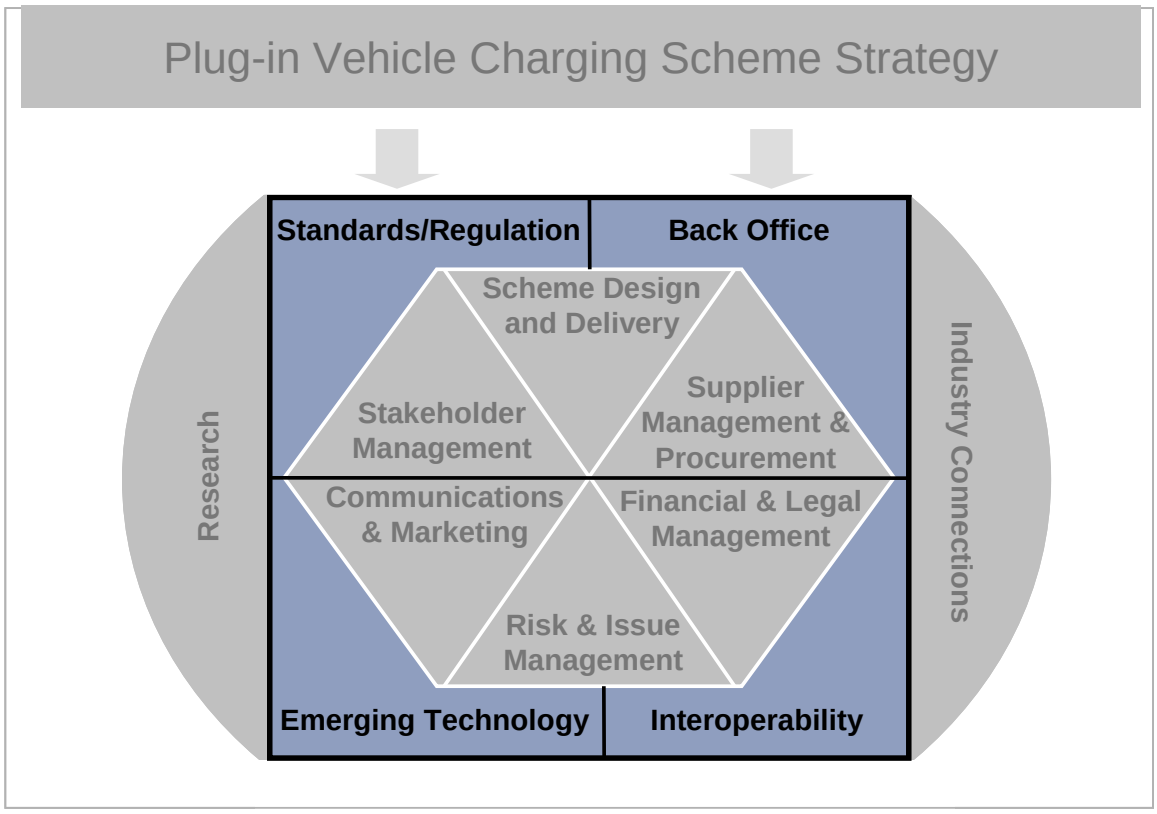
Headline	No	Plugged In Places Lessons Learnt
1. Set up robust stakeholder management	1.1	Understand stakeholder management responsibilities early on in the project and be clear on who is responsible for managing each stakeholder group. If the project covers a large area, split into regions with dedicated responsibilities.
	1.2	Thorough definition of the audiences the strategy aims to reach will help enable early and ongoing engagement. Consider focusing on building communities of drivers/ hosts etc.
	1.3	Close stakeholder management is crucial at the host agreement stage

		as the legal documentation can take a long time to process and many organisations may be put off by the process and the responsibilities.
	1.4	Create and maintain a good stakeholder database to save time and support stakeholder management activities.
	1.5	Work top down rather than bottom up when dealing with organisations. This allows for secure buy-in and support of senior management to get tasks done quickly.
	1.6	New stakeholders arrive in the process at various times. Managing stakeholder expectations is important to create a trusting relationship
	1.7	Ensure you get local government buy-in and support in raising public awareness.
3. Consider the best approach to stakeholder management with Local Authorities	3.1	Have a single point of contact and engage all relevant stakeholders in each local authority (parking, finance, legal, etc) to create consistent communication.
	3.2	Consider holding a joint launch workshop with any local authority stakeholders and suppliers to provide key information in a single forum.
4. Create regular communication channels with key stakeholders	4.1	Update consortium members/ partners on progress and issues via a regular forum. Additional engagement techniques could include; holding regular stakeholder meetings; promoting regional case studies and success stories; plug-in vehicle / low carbon information events or training/ knowledge sessions. (See also section 3 in communications and marketing - where possible, undertake a multi-channel approach)

References

Additional Information Source	Description of Information Source	Location of Information Source
Annex A1 - ARUP Plug-in vehicle recharging infrastructure guidance summary	Review of available guidance for installation of vehicle charging infrastructure	See Annex 1 - Published alongside this document on the OLEV website
Annex A2 – Recharging point signage	Recharging point signage - extract from draft revision to TSRG Manual Chapter 3	See Annex 2 - Published alongside this document on the OLEV website
Annex A3 - National Chargepoint Registry	Description of the national chargepoint registry	See Annex 3 - Published alongside this document on the OLEV website
IET guide	IET - successfully implementing a plug-in electric vehicle infrastructure	http://www.theiet.org/resources/standards/ev-report.cfm
BEAMA Guide	Guide to electric vehicle infrastructure	http://www.beama.org.uk/en/publications
TfL infrastructure guide	TfL: guidance for implementation of electric vehicle charging infrastructure	http://www.newride.org.uk/downloads/EVCP-Guidance-Apr10.pdf
ENEVATE Guide	ENEVATE: Electric vehicle charging infrastructure toolkit	By request: mailto:matthew.lumsden@futuretransportsystems.co.uk
Prince 2	Risk and issue templates	http://www.prince-officialsite.com/Resources/Resources.aspx
ECar Northern Ireland event	Ecar Northern Ireland plug in vehicle promotion event information	http://www.ecarni.com/edrive-event-success

5. Technology



11. The key **technological** considerations include determining whether the project creates its own back office, how the scheme will meet UK standards and regulations, is interoperable with other schemes and how emerging technologies are taken into account. Being clear on these aspects at the start of the project will minimise the risk of technological issues and will help to create a compelling offer to the customer.

Standards and Regulation

Headline	No	Plugged In Places Lessons Learnt
1.Understand the industry requirements at the outset of the project	1.1	Consult the IET Code of Practice to understand the basic requirements relating to chargepoints and chargepoint installations. Ensure that you have considered the appropriate wider regulations e.g. British standards, wiring regulations, buildings regulations, Meter Operation Code Of Practice Agreement guidelines, the Equality Act, Traffic Signs, Planning permission
2. Engage with industry to keep track	2.1	Ongoing engagement with industry will help inform discussions regarding standards. Any emerging technology may have new competing standards. E.g rapid charger types and compatibility

of industry developments	2.2	Keep track of charging equipment and vehicle manufacturer charging solution offerings. For example, which vehicles are compatible with each type of rapid charger.
	2.4	Consider engaging with the relevant standards bodies or industry stakeholder groups.
3. Be mindful of emerging standards	3.1	Emerging standards can present opportunities and challenges, for example, the Open Charge Point Protocol (OCPP) will help interoperability between chargepoints and back offices, but the standard is still evolving. The challenge is in managing upgrades to existing chargepoint networks while minimising the impacts on users and the business models.
	3.2	As the market is emerging, and it is difficult to predict which standards will survive, a more outcome based approach can sometimes prove to be successful; defining the required outcomes for each different type of installation in some detail, and then qualifying that suppliers are able to meet this specification.
4. Have a technical expert that fully understands standards	4.1	Consider having a technical lead role within the project to liaise with technical industry groups to ensure that the direction is clear, adaptable etc.

Back office

Headline	No	Plugged In Places Lessons Learnt
1. Be fully aware of legal requirements	1.1	Careful consideration needs to be given to the protection of cardholder data, Payment Card Industry Data Security Standard (PCI DSS) compliance and Data Protection Act compliance. Include the supplier in the PCI DSS compliance programme with annual reviews and attestations of compliance.
2. Ensure roles are clear and communicated	2.1	Define the roles and responsibilities associated with data back up policies, location of data storage, data provision and collation so all parties are clear. See also Supplier Management Section 4.
3. Consider the key technical requirements	3.1	Consider the cost/ benefits of having a joint back office; utilising chargepoint manufacturers back offices; creating a bespoke back office or having no back office. Consider the level of control which the project has over the charge point management system (CPMS) contract and whether the benefits of having a bespoke CPMS outweigh the management overhead.
	3.2	Ensure that you provide drivers with information about the chargepoints, their locations, the connector types etc. This could be by putting the chargepoints on the National Chargepoint Registry, through your own website, phone applications etc
	3.3	Consideration should be given to how the plug-in vehicle charging scheme will set up technological processes to fulfil business or funding requirements e.g. Pay As You Go or the provision of usage data.

	3.4	Consider what data the post needs to provide from the outset and ensure that the back office and related is fit for purpose to meet these requirements (e.g. usage data, status information etc). It is essential to gain an understanding of the cost associated with providing this data. Communicate any requirements for data/ smart metering to suppliers and hosts so they fully understand these from the outset. Metering companies may be able to help develop a data collection solution for charge point suppliers that do not have a back office.
	3.5	Consider whether there is a need to have communications with applications in vehicles or mobile phones or satellite navigation systems through the back office.
4. Future proof the back office	4.1	Build in flexibility in the back office to enable cost and time effective upgrades.
	4.2	Consider how the back office might be integrated with existing systems such as smart ticketing and smart grids.
	4.3	Consider whether the back office can be utilised to help to identify chargepoint availability, and whether you wish to provide booking and new payment systems now or in the future.

Interoperability

Headline	No	Plugged In Places Lessons Learnt
1. Define a clear interoperability strategy	1.1	From the outset, consider whether and how the scheme will be interoperable with adjoining schemes.
	1.2	Have clear technological requirements for chargepoints which are based around consumer access needs e.g. PAYG via mobile phone applications.

Emerging Technology

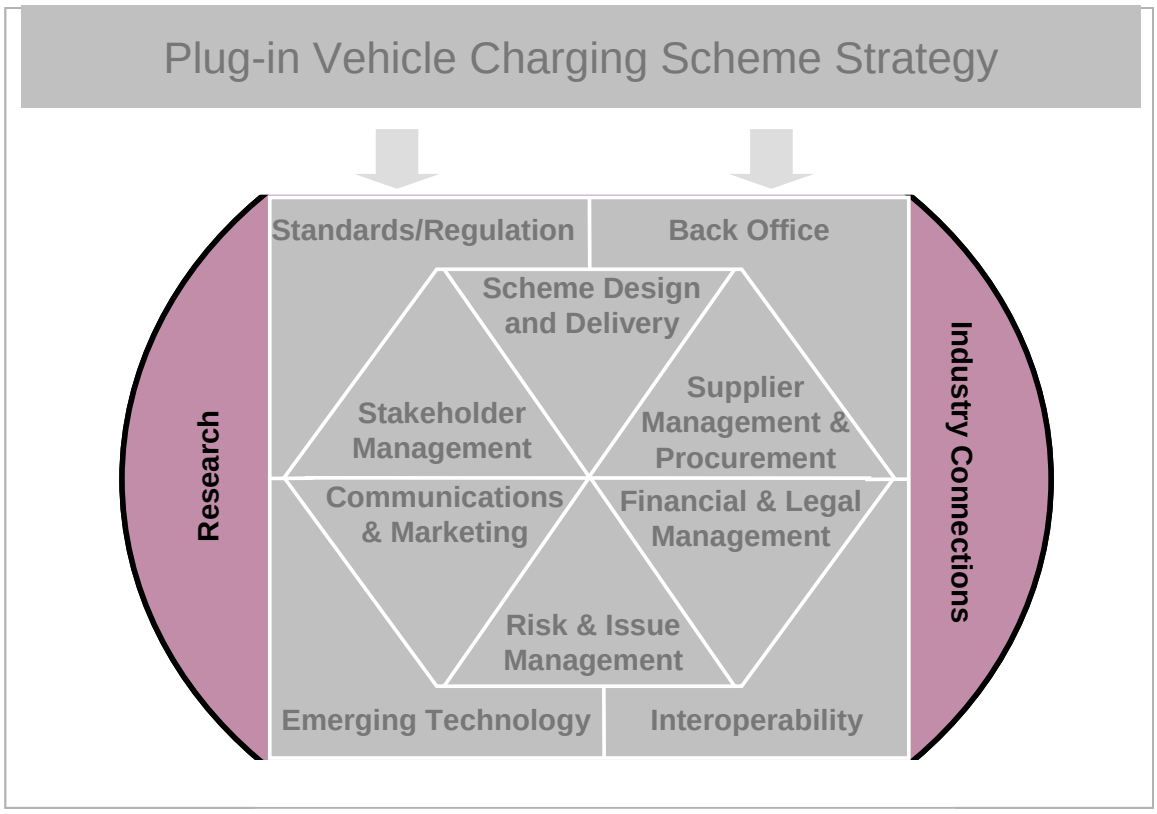
Headline	No	Plugged In Places Lessons Learnt
1. Develop a clear strategy for emerging technology	1.1	Consider the balance of installing a 'tried and tested' network whilst taking account of new technologies. More immature technology can be harder to integrate but older items may become obsolete more quickly.
	1.2	It can be important to have a spread of technology within a charging network to accommodate different requirements. Consider having a process in place with suppliers /procurement that has in-built flexibility to update or change technology as the market develops.
	1.3	Procuring chargeposts from a variety of suppliers can help to minimise the risk of legacy network issues but may lead to back office compatibility challenges and reduce opportunity for cost savings.
	1.4	Budget for future upgrades as technology moves forward, for example for new types of connectors or access mechanisms.
	1.5	Understand the aims of the scheme e.g. for environmental research; to install infrastructure to meet current demand; or to create a test bed for new technologies to understand real-world usage.

	1.6	Any trials need to be managed carefully to deliver the intended benefits. Include stage gate reviews to evaluate and determine whether to expand or exploit. The evaluation should include potential savings (environmental and financial) and the commercial case for the technology.
	1.7	Understand whether any funding sources are linked to intellectual property rights and if this restricts the ability to use this funding.
2. Tie in technological upgrades in with supplier management and contracts	2.1	Ensure that the right agreements relating to chargepoint maintenance and/or upgrades are in place.
	2.2	Put checks in place to evaluate the viability/ feasibility of any emerging technology and assess whether suppliers are able to deliver in the time required. If the market allows, request demonstrations of capability as part of procurement process.
3. Learn from other projects and past examples	3.1	Use the lessons learnt from other schemes. This information is valuable in creating a scheme that will be compatible with vehicles and customer needs. It is also important to understand the market dynamics and how technological changes can influence this.
4. Monitor industry developments	4.1	Maintain a watching brief for emerging technology and balance this with monitoring customer confidence with the existing network/ technologies.

References

Additional Information Source	Description of Information Source	Location of Information Source
1. IET code of practice	IET code of practice for electric vehicle charging equipment installation	http://electrical.theiet.org/books/e-books/ev-charging-cop-digital.cfm
2. Permitted Development Rights (PDRs) and Charging Points	Legislation on Permitted development rights for charging points	http://www.legislation.gov.uk/uksi/2011/2056/made http://www.legislation.gov.uk/uksi/2011/2057/made
3. The Equality Act 2010	Inclusive Mobility - a guide to best practice on access to pedestrian and transport infrastructure (Dec 2005) BS 8300:2009 +A1:2010 Design of buildings and their approaches to meet the needs of disabled people	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/3695/inclusive-mobility.pdf (3.7 and 5.5) http://shop.bsigroup.com/en/ProductDetail/?pid=000000000030217421
4. Metering Guidelines	Meter Operation Code of Practice Agreement	http://www.mocopa.org.uk/assets/documents/MOCOPA%20v3.1.pdf
6. Traffic Signs Manual	Charging point signage - extract from Draft Chapter 3 Traffic Signs Manual	See Appendix A2
7. NCR	National Chargepoint Registry	See Appendix A3

6. External Links



6.1 To keep abreast of market developments consider which **external links** are required including research and development studies, market research and industry connections. These links should help to inform the strategy so that it remains valid.

Industry Connections and Industry Knowledge

Headline	No	Plugged In Places Lessons Learnt
1. Maintain essential industry connections	1.1	Utilise networks with electricity providers, car manufacturers and chargepoint manufacturers to gain visibility of market developments. This will allow you to prepare for changes and act in a responsive manner. Maintain the relationship with a flow of information in both directions and involvement in decisions where appropriate.
	1.2	Maintain a database of all dealerships in the region that sell plug-in vehicles and models. Form relationships with local dealerships to inform them of the details of the scheme, so they can then pass this onto their customers. This could involve dealership training events.

	1.3	All industry players will have their own views. It is recommended that , consultations take place with as many as possible to gain a variety of viewpoints to inform and update the strategy.
2. Utilise existing knowledge sources where available	2.1	Utilise other plug-in vehicle infrastructure projects in adjoining regions as a sounding board.
	2.2	Where possible, undertake benchmarking and fact finding visits, attend seminars/ workshops/ conferences to gain background knowledge and establish contact networks.
	2.3	Work with other national schemes and projects e.g. Ireland, Amsterdam, Germany, Estonia, California, Green eMotion and SmartCEM. However be mindful that they may have different motivations and circumstances.
	2.4	When applying knowledge from foreign markets, be sure to understand the characteristics and influences that have led to a particular outcome. There are a number of different characteristics that impact other schemes, e.g. government funding, political initiatives, joint-ventures and public perception.

Market Research

Headline	No	Plugged In Places Lessons Learnt
1. Establish effective information sources for future analysis and strategy review	1.1	Build in optional/ mandatory follow up data collection in any user/ customer contracts, so that in addition to usage data collection, more subjective research can be carried out.
	1.2	Market research, including analysis of demographic data helps to identify 'hot spots' most likely to adopt the technology and require charging infrastructure. Track plug-in vehicle uptake alongside this and re-evaluate research where necessary to help inform strategy development.
2. Utilise existing secondary research	2.1	Make extensive use of market reports as the basis for the assumptions within the business case. This validation is important when communicating with stakeholders including investors and new hosts.
	2.2	Use Local Authority knowledge of the area to better understand the market.

Research and Development

Headline	No	Plugged In Places Lessons Learnt
1. Establish links to research bodies and sources	1.1	Consider engaging with local and international research organisations and projects to understand where developments in the industry are taking place that may impact on strategic decisions e.g. research on batteries, behavioural aspects of plug-in vehicle driving.
	1.2	Consider creating a Research and Innovation Working Group to share and apply learning.

2. Design robust selection criteria	2.1	Ensure that the selection criteria for plug-in vehicle research and development projects are robust and consider the following: - Alignment of research objectives and the scheme strategy - Business case and intended benefits - Funding criteria and available funding streams - Opportunity for commercialisation

References

Additional Information Source	Description of Information Source	Location of Information Source
PIP Contact details		
Source East	East of England PIP	keith.bevis@evalu8-ti.org.uk
Source London	London PIP	FraserMacDonald@tfl.gov.uk
Greater Manchester EV Scheme (GMEV)	Greater Manchester PIP	David.Hytch@tfgm.com
Plugged in Midlands	Midlands PIP	Adrian.Vinsome@cenex.co.uk
Milton Keynes	Milton Keynes PIP	Sara.Bailey@Milton-keynes.gov.uk
Charge Your Car	North East PIP	josey.wardle@gateshead.ac.uk
eCar	Northern Ireland PIP	Irene.Breen@drdni.gsi.gov.uk
Chargepoint Scotland	Scotland PIP	michael.foster@transportscotland.gsi.gov.uk
Wider Contacts		
The Office for Low Emission Vehicles (OLEV)	Cross government team to support the early market for ultra-low emission vehicles (ULEV).	https://www.gov.uk/government/organisations/office-for-low-emission-vehicles
The Society of Motor Manufacturers and Traders (SMMT) EV Group	Supports the UK's emergent EV industry to enable rapid and sustainable growth and to ensure the UK can compete with international markets	https://www.smmt.co.uk/members-lounge/sections-committees/electric-vehicle-group/#
UKEVSE (United Kingdom Electric Vehicle Supply Equipment)	Association of UK companies that provide electric vehicle supply equipment	http://www.cenex.co.uk/
The Institute of Engineering and Technology (IET)	Authors of the IET Code of Practice for Electric Vehicle Charging Equipment Installation	http://electrical.theiet.org/books/e-books/ev-charging-cop-digital.cfm
The British Electrotechnical and Allied Manufacturers' Association (BEAMA)	BEAMA is the independent expert knowledge base and forum for the electrotechnical industry for the UK and across Europe.	http://www.beama.org.uk/

The CHAdeMO Association	The DC fast charging standard designed for Electric Vehicles	http://www.chademo.com/
SAE International	A global association of engineers and related technical experts in the aerospace, automotive and commercial-vehicle industries.	http://www.sae.org/
British Standards Institute (BSI/ BSI CABS)	Helps organisations and shows businesses how to improve performance, reduce risk and achieve sustainable growth	http://www.bsigroup.com/en-GB/
The European Committee for Standardisation (CEN)	Major provider of European Standards and technical specifications.	http://www.cen.eu/cen/pages/default.aspx
The European Committee for Electrotechnical Standardisation (CENELEC)	CENELEC is responsible for standardisation in the electrotechnical engineering field.	http://www.cenelec.eu/index.html
International Organisation for Standardisation (ISO)	ISO (International Organization for Standardization) is the world's largest developer of voluntary International Standards.	http://www.iso.org/iso/home.html
The National Inspection Council for Electrical Installation Contracting (NICEIC)	NICEIC is the UK's leading voluntary regulatory body for the electrical contracting industry	http://www.niceic.com/
The Department for Transport (DfT)	DFT works with agencies and partners to support the transport network	https://www.gov.uk/government/organisations/department-for-transport
The Department for Communities and Local Development (DCLG)	Works to move decision-making power from central government to local councils	https://www.gov.uk/government/organisations/department-for-communities-and-local-government
The British Parking Association	Recognised authority on parking.	http://www.britishparking.co.uk/
The Office of Gas and Electricity Markets (OFGEM)	OFGEM protects all energy consumers	http://www.ofgem.gov.uk/Pages/OfgemHome.aspx
Energy UK	Energy UK is the trade association for the energy industry.	http://www.energy-uk.org.uk/
Energy Networks Association (ENA)	Represents UK and Ireland gas and electricity network operators.	http://www.energynetworks.org/

7. Key roles

- **Chargepoint user** – the person using the chargepoint to charge a vehicle
- **Host** – the person or organisation providing a location for the chargepoint to be installed. For example, a Local Authority scheme may work with a private car park with available parking spaces for plug-in vehicles to provide chargepoints
- **Charging equipment supplier** – the supplier of the chargepost and any related **hardware**
- **Back office supplier/ operator** – the supplier of the software to control and monitor the chargeposts
- **Installer** – the agency/ agencies responsible for the installation of the chargepoint, including any groundworks and testing
- **Operator** – the organisation that manages the operation of the chargepoints. This may include maintenance and repairs, as well as provision of user information and phone or web support for chargepoints users
- **Electricity generators** - responsible for generating the energy. Generated electricity flows into the National Transmission network and through to the regional Distribution networks
- **Electricity suppliers:** are the companies who supply and sell electricity to the consumer. The suppliers are the first point of contact when arranging an electricity supply to domestic, commercial and smaller industrial premises.
- **Electricity distribution network operators (DNOs):** carry electricity from the transmission systems and some generators that are connected to the distribution networks to industrial, commercial and domestic users. There are 14 licensed distribution network operators (DNOs) each responsible for a distribution services area. The 14 DNOs are owned by six different groups. There are also four independent network operators who own and run smaller networks embedded in the DNO networks.
- **Metering agencies:** Provide metering and data services to other parts of the electricity industry