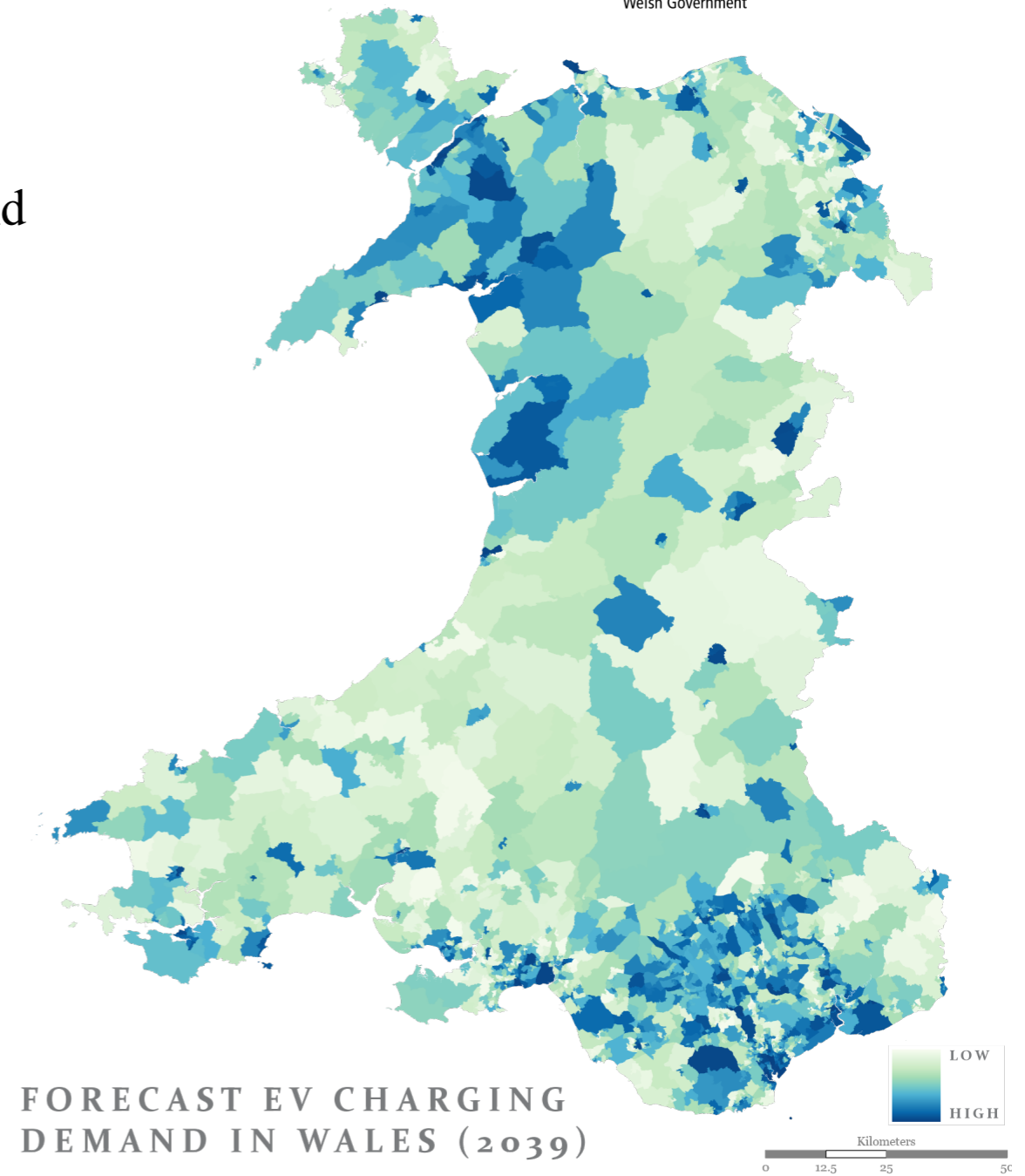


Welsh Government

Electric Vehicle Charging Infrastructure Programme Strategic Outline Business Case: Commercial, Financial and Management Cases

Executive Summary

Final Arup report to the Welsh Government
February 2023



Reliance on Our Advice and Reports

This report is produced to the Strategic Outline Business case (SOBC) level, the scoping stage. At this stage the costs and affordability figures are indicative only.

This report and the capital expenditure (CAPEX) estimate results included in the Financial Case (the Results) has been prepared by Arup specifically for and under the instructions and requirements of Welsh Government in connection with the Electric Vehicle Charging Infrastructure Strategy for Wales, under the Schedule 2b contract dated 28 February 2022.

This report is prepared for use and reliance by our client only. No third party is entitled to rely on this report. We do not in any circumstances accept any duty, responsibility or liability to any third party whatsoever (including retail investors whether by bond issue or otherwise) who has relied on this report. Accordingly, we disclaim all liability of whatever nature (including in negligence) to any third party other than to our client.

In preparing this report we have relied on information provided by others and we do not accept responsibility for the content, including the accuracy and completeness, of such information. In no circumstances do we accept liability in relation to information used by us which has been provided by others.

The Results have been developed using data and assumptions from various sources - including Arup benchmarks and information provided by others. Where possible, Arup has sought to establish the reasonability of the assumptions used and has, where possible, referenced sources. However, we have not tested the reliability of the data or verified the source of information so provided. Accordingly no representation or warranty of any kind (whether express or implied) is given by Arup as to the internal consistency or accuracy of the Results nor any output from them. Moreover the Results do not absolve any recipient from conducting its own audit in order to verify its functionality and/or performance.

We emphasise that the forward-looking projections, forecasts, or estimates are based upon interpretations or assessments of available information at the time of writing. The realisation of the prospective financial information is dependent upon the continued validity of the assumptions on which it is based. Actual events frequently do not occur as expected, and the differences may be material. For this reason, we

accept no responsibility for the realisation of any projection, forecast, opinion or estimate.

Arup accepts no duty of care to any person for the development of these model Results, their use, nor in respect of any output from them. Accordingly, regardless of the form of action, whether in contract, tort or otherwise, and to the extent permitted by applicable law, Arup accepts no liability of any kind and disclaims all responsibility for the consequences of any person acting or refraining from acting in reliance on the Results and/or outputs for any decisions made or not made which are based upon such Results and/or output.

Findings are time-sensitive and relevant only to current conditions at the time of writing. We will not be under any obligation to update the report to address changes in facts or circumstances that occur after the date of our report that might materially affect the contents of the report or any of the conclusions set forth therein.

No person other than our client and any party to who reliance has been expressly permitted by us may copy (in whole or in part), use the contents of this report without our prior written permission. Any copying or use of this report (in whole or in part) by any party whatsoever shall be accompanied by or incorporate this notice at all times.

We accept no responsibility for, and have not authorised, the contents of any report, prospectus, supplementary prospectus, listing particulars, supplementary listing particulars, presentation or other document or communication in respect of the sale, acquisition, offering or transfer of any shares or securities or interest in them, whether on the primary or secondary market or otherwise, which uses, includes or incorporates any report, deliverable or information, or any element thereof, prepared by us under or in connection with this agreement.

Glossary of terms

AIE	The European Association of Electrical Contractors	TfW	Transport for Wales
CE	Consumer Efficiency (demand scenario)	Tx	Transformation
CP	Chargepoint	ULEVs	Ultra Low Emission Vehicles
CPO	Charge point operator	WelTAG	Welsh Transport Appraisal Guidance
DfT	Department for Transport	WG	Welsh Government
DNOs	Distribution Network Operators	WLGA	Welsh Local Government Association
ESG	Environmental, Social, and Governance		
EVCi	Electric Vehicle Charging Infrastructure		
EV	Electric Vehicle		
GS	Government on-Street (demand scenario)		
LA	Local Authority		
LSOAs	Lower Super Output Areas		
MSOAs	Middle Super Output Areas		
OEM	Original Equipment Manufacturer		
RD	Rapid Dominant (demand scenario)		
SOBC	Strategic Outline Business Case		
TfL	Transport for London		

Executive summary

Introduction and context

Executive summary

Introduction

Purpose of this document

The purpose of this report is to explore how the Electric Vehicle Charging Infrastructure Strategy for Wales and accompanying Action Plan will be delivered in practice, to be referred to as the Electric Vehicle Charging Infrastructure Programme, as WG sets out to accelerate the roll-out of electric vehicle charging infrastructure across Wales. This report has been prepared for Welsh Government.

In 2021, Welsh Government launched the Electric Vehicle Charging Strategy for Wales (the Strategy), which sets out the vision for electric vehicle charging in Wales, outlining the current context, future charging needs, and how these can be met.

Welsh Government (WG) commissioned Arup to produce the three cases relevant to the deliverability of the Strategy to the Strategic Outline Business Case (SOBC) level, for the Electric Vehicle Charging Infrastructure (EVCI) Programme for Wales:

- **The commercial case** introduces key aspects of the charging market – including the EV charging value chain and a spectrum of potential business models. The case presents the results of a capability and capacity assessment of the public sector, capturing: existing and aspirational capability to deliver the Strategy, the roles to be played by different bodies in that delivery, barriers to strategy roll-out and interventions to overcome, and plans for engagement with the private sector.
- **The financial case** focuses on the total capital costs of the EV charging infrastructure roll-out required to meet future EV demand projections. The financial case presents a high-level estimate of the range of total capital cost of installing all on-route and destination charging infrastructure in Wales, agnostic of which body (whether public or private sector) is taking financial responsibility.
- **The management case** explores how the programme will be overseen, managed and delivered in the next phase, and subsequently. By defining and putting in the place the necessary management plans in place, such as programme management and risks management, this provides the reassurances the programme is achievable and that WG, Transport for Wales (TfW) and other delivery partners have the capacity to deliver the programme, which in this case, is the EV Charging Infrastructure for Wales Strategy.

The development of the three cases above are aligned with HM Treasury’s Green Book and the Welsh Transport Appraisal Guidance (WelTAG).



Figure 1: Electric Vehicle Charging Infrastructure Strategy for Wales

Source: Welsh Government, 2021

Executive summary

The EV market today

Wales currently has fewer EVs, and fewer chargepoints than other parts of the UK

Wales currently has a relatively low level of EV uptake per capita, compared to other regions of the UK. Installed charging infrastructure is also low, especially for On-Route rapid and ultra-rapid charging, creating gaps in the minimum viable network of charging required for longer trips.

There are 1,310 public CPs installed in Wales, with eight battery electric vehicles (BEVs) or thirteen plug-in vehicles (BEVs, plug-in hybrids, other) per CP. 3.7% of public UK CPs are installed in Wales, where 2.2% of BEVs and 2.1% of all EVs are licensed.

Among UK regions, Wales ranks 10th in number of installed CPs, 2nd in CPs per licensed BEV, 3rd in CPs per licensed EV (BEVs and others), 6th in CPs per capita, and 10th in EVs per capita (out of 12 major UK regions). Lower levels of public charging infrastructure can have a dampening effect on EV uptake.

	# CPs	# BEVs /CP	# EVs /CP	# People /CP	# People /EV
Greater London	11,272	5	9	799	91
South East	4,606	24	40	2,001	50
Scotland	3,562	8	14	1,535	110
West Midlands	2,617	14	22	2,278	105
South West	2,438	30	46	2,321	50
East of England	2,303	17	35	2,722	77
North West	2,253	24	46	3,270	71
Yorkshire and the Humber	1,952	18	32	2,831	89
East Midlands	1,847	13	23	2,634	112
Wales	1,310	8	13	2,420	183
North East	1,069	8	12	2,508	203
Northern Ireland	352	17	29	5,385	184

KEY: Less infrastructure More Infrastructure

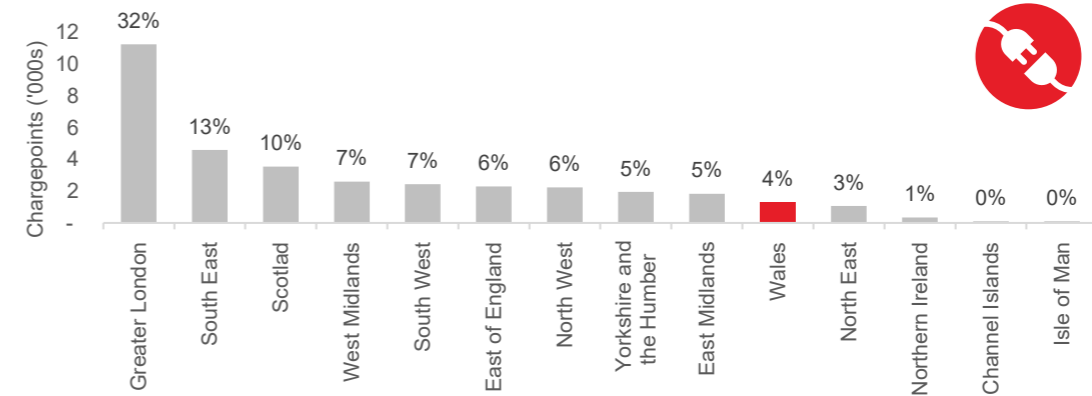


Figure 2: UK public chargepoints by region

Source: ZapMap August 2022

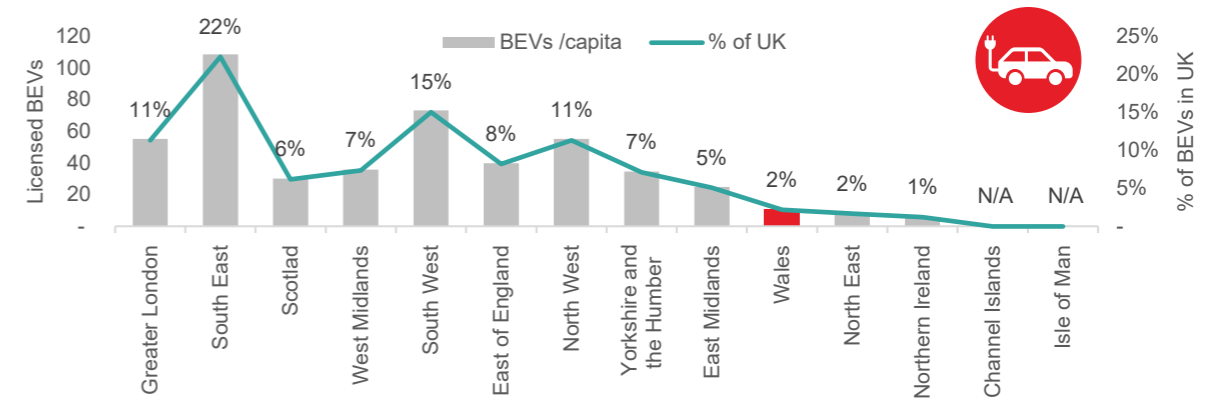


Figure 3: UK battery electric vehicles (BEVs) by region

Source: DfT, 2022

Executive summary

The EV market: future development and challenges

The current pace of EV charging roll-out in Wales is too slow and government intervention is needed to achieve the aims of the Strategy

Based on Arup modelling, to fulfil demand, the projected number of fast chargers needed across Wales will reach around 34,000 chargers by 2030. As of August 2022, Wales currently has 1.2% of this total installed. Furthermore, around 4,000 rapid chargers are projected to be needed by 2030, with 1.7% of this total installed so far.

DfT statistics currently show the growth of the number of licensed EVs in Wales is outpacing the growth of publicly-available chargers by a factor of almost three. Between October 2019 and July 2022, the number of licensed EVs increased by 305%, yet the number of publicly-owned chargers increased by 125%.

Key strategy elements include encouraging transport decarbonisation, delivering at high standards, and equality of coverage and access.

Given the impending 2030 ban on new wholly diesel and petrol car sales, the pace of delivery will need to accelerate significantly if the WG is to deliver sufficient and equitable accessibility to a CP across Wales, as per the Strategy.

As such, continuing with current trends and levels of intervention is highly unlikely to be enough to deliver the charging infrastructure needed to meet current and future demand.

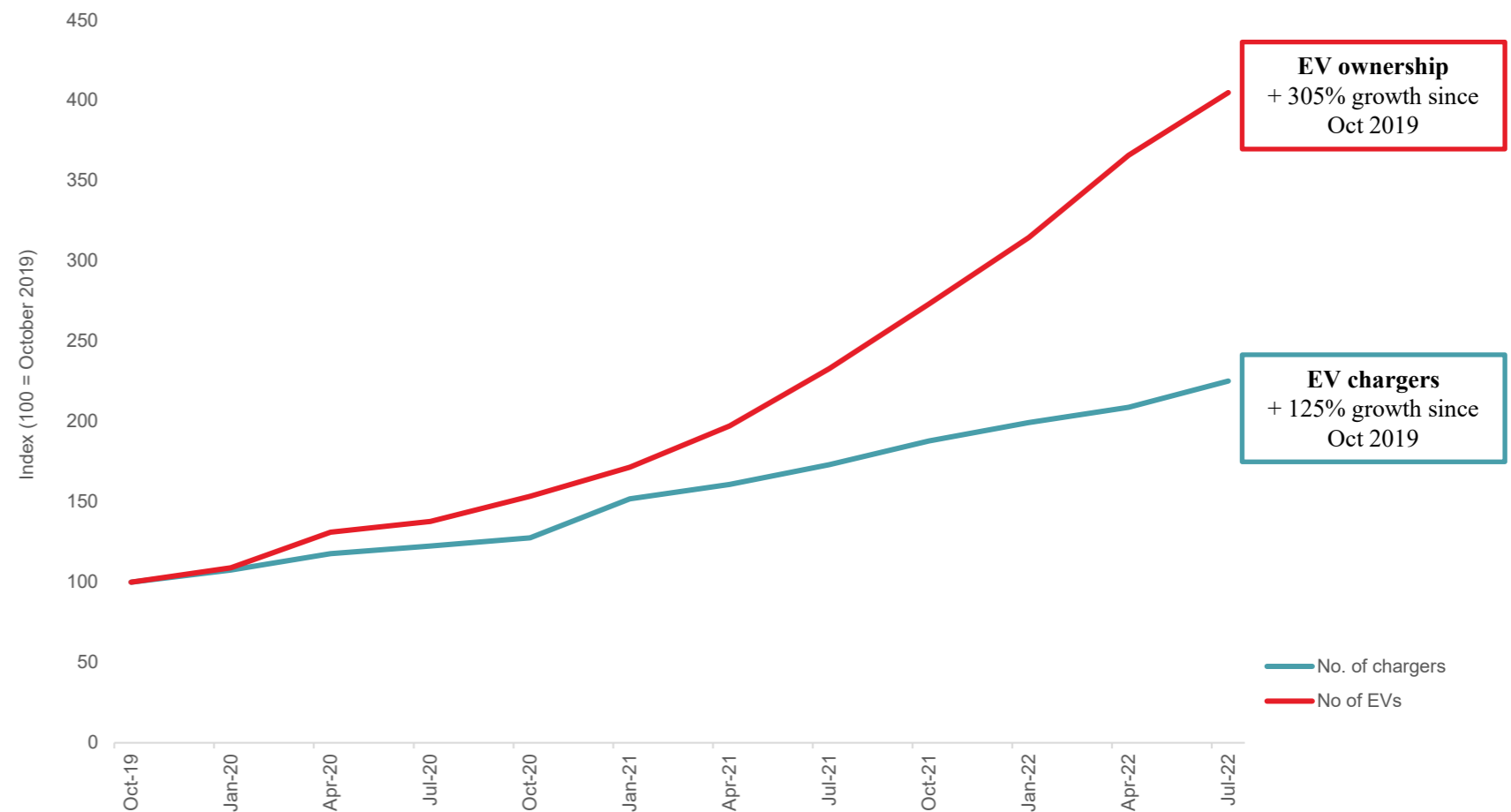


Figure 4: No. of EV chargers vs no. of licensed EVs in Wales (base index = 2019)

Source: DfT, as of October 2022

Key findings of the commercial, financial and management cases

Executive summary

Key findings of the Strategic Outline Business Case: commercial, financial and management cases

Commercial case [1/2]

Arup expects that the majority of charging will be delivered and funded by the private sector; however, where private sector roll-out would lead to opportunity gaps in the WG strategy, Arup recommends considering intervention through policy, selected subsidies, plans and developments. WG has a choice about the areas of the value chain in which to intervene, the role it will play and the funding or benefits funding it will provide – these should be considered on a case-by-case basis.

- Emerging recommendation
- Potential pathway
- Not recommended
- Not applicable

Opportunity Type:	Key Take-Aways	Sites Developed on Private Land by Private CPOs	Sites Developed in PPP on Private Land	Sites Developed on Public Land by Private CPOs	Sites Developed in PPP on Public Land	Sites Developed on Public Land by Public Sector
*	Policy Intervention The Welsh Government's main role across all opportunities lies in policy-based interventions that remove barriers, promote decarbonisation, and incentivise investment. These policy interventions can support both the private sector and other public sector bodies.	●	●	●	●	●
A	Subsidy / auction / franchise Out of all Welsh public sector bodies, the Welsh Government has the most capacity – skill and resource – to financially intervene. This should be considered on a case-by case basis, with specific and targeted beneficiaries, with a special focus on closing equality gaps.	<i>Consider on a case-by-case basis where equality gaps emerge – all financial intervention should be targeted (specific sites, capex types, or areas) and balanced against other public needs.</i>			<i>Access to grants can help Local Authorities capture local opportunities.</i>	
A	Plan and lease / licence On publicly-owned land that is well suited to EV charging, public sector delivery entities (TfW and Local Authorities) could plan sites and lease them out to private CPOs. The public sector could also offer planning support to private investors to help de-risk and incentivise.	<i>Planning support can be offered by the public sector to help de-risk private investment</i>		●	●	●
A	Develop and lease / licence On publicly-owned land that is well suited to EV charging, public sector delivery entities (TfW and Local Authorities) could plan sites and develop sites, then lease them out to private CPOs. This option is more capital intensive, with not much public sector capability.	●	●	●	●	●
B	Low-control JV In a low-control JV, public sector delivery entities could have a degree of control over charging outcomes at the site, without taking on the full investment risk (however, still facing demand risk). Operations should largely be outsourced to private CPOs.	●	●	●	●	●
B	High-control JV In a high-control JV, a private sector partner would likely expect significant public sector investment, and the public sector would face demand risk. Operations should largely be outsourced to private CPOs, but the public sector could offer support (e.g., user experience).	●	●	●	●	●
C	Own and appoint operator The private sector could retain full ownership of a charging site on suitable public land and outsourcing site operations to a private sector CPO. This would require significant capital investment and full exposure to demand risk.	●	●	●	●	●
C	Own and operate Arup does not recommend this option to be deployed on a wide-scale basis, as it is in conflict with the Welsh Government's low appetite for operational risk. Select opportunities – especially in the On-Route network could be owned and operated by TfW.	●	●	●	●	●

Executive summary

Key findings of the Strategic Outline Business Case: commercial, financial and management cases

Commercial case [2/2]

Next steps should include socialising the EV charging strategy, engaging with the private sector and tailoring the approach to intervention.

Capability of the public sector

Public sector capability is strongest in planning, finance, power supply, and contract management activities. Significant gaps exist in public sector site design, CP installation and civils, operation, and maintenance capability.

Next Steps:

1. Roles across the Public Sector

Roles of the public sector should include:

- **Welsh Government** – oversight and socialisation of the EV charging strategy, setting standards, monitoring strategy progress, policy intervention, and financial intervention.
- **Transport for Wales** – delivering and monitoring the strategy at On-Route sites and rail station car parks, and providing delivery support to LAs and Welsh Government.
- **Local Authorities** – delivering and monitoring the strategy locally, at destinations and on-street, with support from TfW.

2. Engagement with the private sector

To understand the size and scope required public sector intervention, further engagement with the private sector is required. How much infrastructure will the public sector roll out? Where will this be located and who will it serve?

3. Prioritisation of Delivery

Arup recommends that two elements of the delivery strategy be prioritised first (before moving on to others): the **on-route network** and **destination /on-street charging in built-up areas**. These elements will have the most short-term benefit for users in Wales, providing a strong cross-national network and catering to users who have a greater need for public charging.

4. Approach to Intervention

There is no “one size fits all” business model or approach to public sector intervention. Different locations, modes, and sites will require different amounts and types of intervention. The table opposite outlines key take-aways from Arup’s emerging recommendations around business models to be employed on a targeted basis. Arup recommends that procurement take into account steps to mitigate identified barriers to strategy implementation – including flexible procurement, and larger opportunities and longer contractual terms that reflect the appetite of the private sector.

Executive summary

Key findings of the Strategic Outline Business Case: commercial, financial and management cases

Financial case

The financial case suggests a total capex cost of between £351 to £1,550m for On-Route and Destination charging by 2040. This analysis is agnostic of which body is taking financial responsibility.

Financial case modelling

The financial case presents a high-level estimate of the cost of installing all On-Route and Destination charging infrastructure in Wales, agnostic of what body is taking financial responsibility. The case includes on On-Route and Destination charging only. Capital costs include grid connection and substation costs, equipment supply and installation, planning, and civils. The range of results is wide because of uncertainties inherent to the development of the EV charging market – in terms of EV uptake, total demand, user behaviour, and both location and speed of charging

From the minimum to maximum range across all scenarios and sensitivities, capex reaches **£351 to 1,550 million by 2040**, with no growth after that point, with £114 to 689 million spent on On-Route charging and £236 to 861 million on Destination charging. By this point On-Route chargepoints number 1.1 to 6.5 thousand and Destination 6.4 to 61.8 thousand, with a total of **7.4 to 68.4 thousand**. Charging capacity reaches 141 to 1,165 MW, spread across 968 to 23,500 sites.

Legend:

- Central case results
- Range of min to max results (sensitivities applied to *Central Case* demand)
- Range of min to max results (sensitivities applied to all demand scenarios)

Next Steps

We recommend the following next steps:

1. **Refine the range of results:** consider location-specific costs, like grid connection; excluded costs, like land and opex; and evaluate LSOA-level demand and indicative costs.
2. **Engage with the private sector to understand plans:** form a view of private sector roll-out that will happen without intervention to identify gaps; collaborate with the private sector to align investment to the preferred network.
3. **Determine the phasing of roll-out:** prioritise intervention in the on-route network and public local charging in built up areas; evaluate the effects of roll-out phasing on public and private financial investment into public charging.
4. **Determine the size & scope of the funding envelope:** once the range of results, private sector engagement, and phasing have been considered, determine the size of the government funding envelope – how much is the public sector willing to invest? What non-financial actions could be taken to reduce the need for financial intervention? In what aspects of the public charging value chain is the government willing to invest?
5. **Explore options for financing:** once the public funding envelope has been determined, explore the means for financing and detailed commercial approach – this might include bundling sites and using Financial Transaction Reserve.

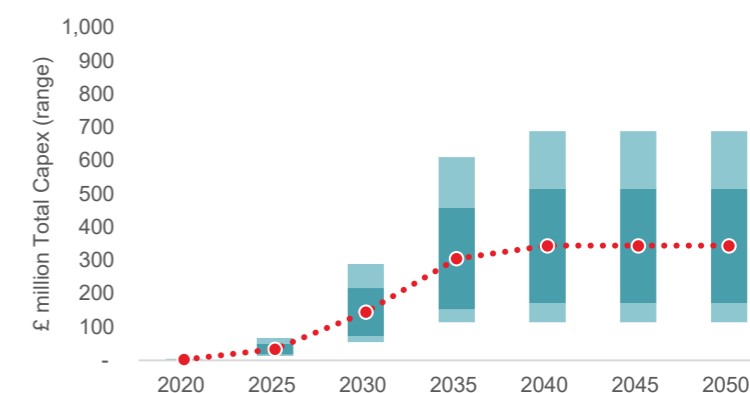


Figure 5: Total capex (£ million, range of results): on-route

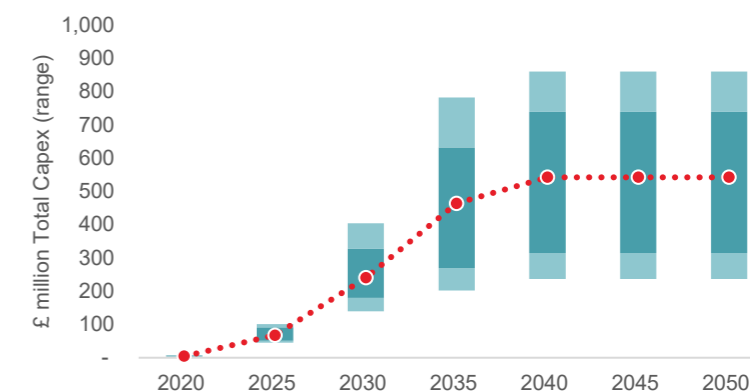


Figure 6: Total capex (£ million, range of results): destination

Executive summary

Key findings of the Strategic Outline Business Case: commercial, financial and management Cases

Management case

The management case outlines the key considerations when delivering and managing the programme of interventions needed to facilitate and deliver the preferred network.

The scale and complexity of delivering the EVCI programme necessitates a strong and effective management structure which determines how WG and delivery partners will deliver and manage the EVCI programme. This is a significant step-up from the WG resources that are devoted today. Key findings includes:

- The **need for a PMO** to manage and deliver the EVCI programme is imperative to delivering the preferred network in line with policy objectives. Furthermore, portfolios and projects will need to be identified - Figure 7 sets out an illustrative example of a proposed EVCI portfolio structure.
- **Governance arrangements needs to be in place** to oversee and be clear on accountability for the programme, An assurance framework will need to be created to provide independent assurance that the programme is meeting the intended outcomes, and that programme risks and control issues are managed effectively.
- **Monitoring and Evaluation** is critical in understanding the progress of the EV charging roll-out, and whether policy objectives and KPIs are met.
- A programme **risk register and management plan** needs to be developed within the next six months, identifying key risks as early as possible and identify mitigation measures, minimising disruptive impact on the programme.
- A **communications and stakeholder engagement plan** should be developed jointly by WG and TfW, ensuring engagement and messaging is streamlined with the private sector and the public, avoiding duplication of efforts between different parties, as well as raising public awareness of progress and EV charging infrastructure in Wales.

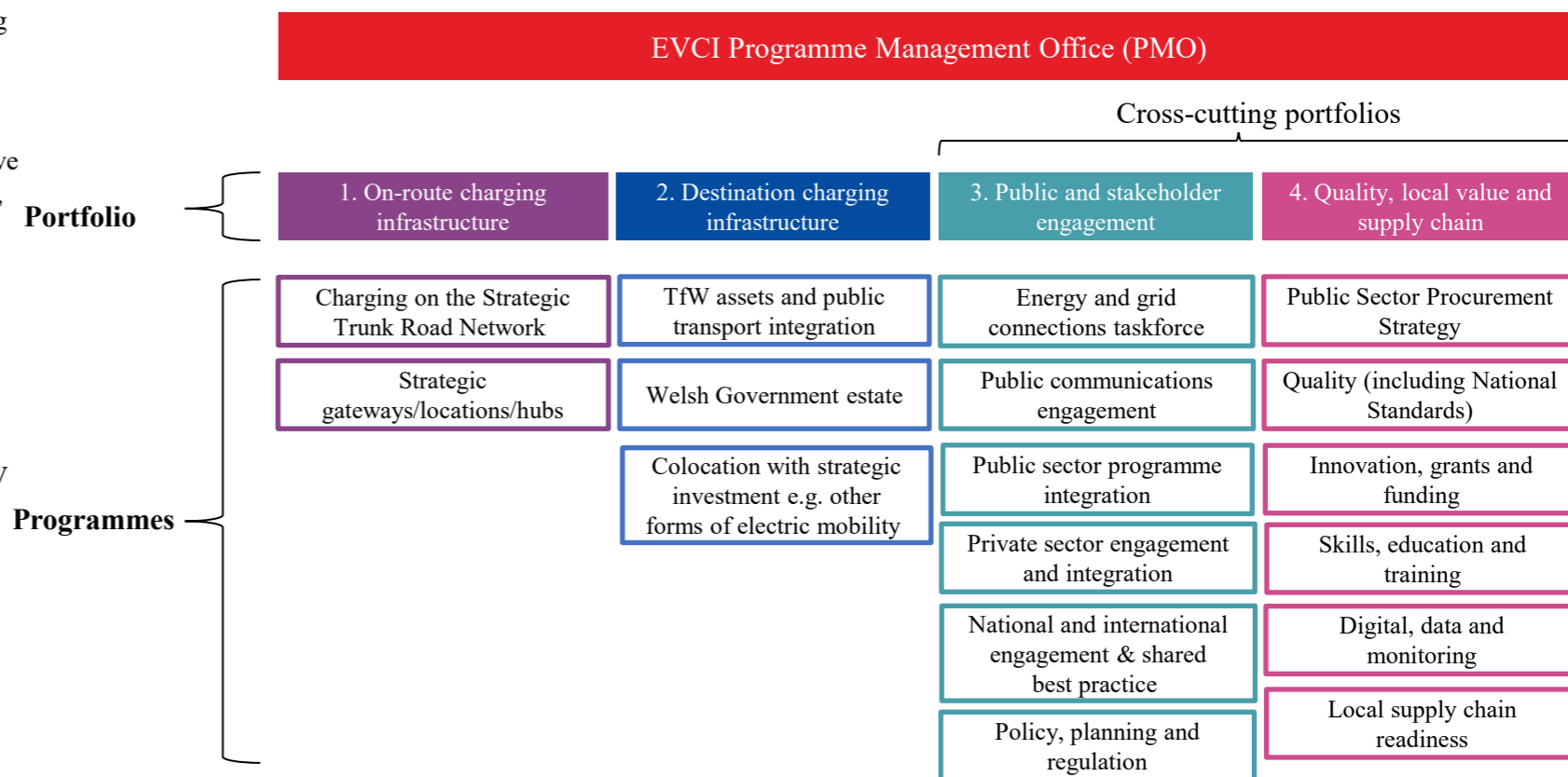


Figure 7: Illustrative example of the proposed EVCI portfolio structure

Roadmap for accelerating the roll-out of EV charging infrastructure in Wales

Executive summary

Roadmap for accelerating the roll-out of EV charging infrastructure in Wales

Next steps: priorities for Welsh Government and delivery partners

The findings of this report suggests that more work and development is needed to implement the EVCI programme in the next phase, harnessing the work done to date (e.g. National Standards, early market engagement). To achieve this, a programme-level roadmap has been developed, setting out actions across five key priorities for WG and delivery partners for the next 3-5 years, to deliver successful acceleration of EV charging infrastructure across Wales, and meet the defined KPIs set by the Strategy. The roles and responsibility of WG, TFW, local authorities and the private sector are summarised on the right.

Roadmap: 5 key priorities



1. Establish a PMO to govern delivery arrangements, set standards and monitor progress



2. Provide support and guidance to enable local authorities (and private sector) to deliver the preferred network



3. Engagement with the private sector to ensure we optimise the delivery of the preferred network and foster public-private sector collaboration



4. Develop the mechanisms, knowledge and tools to deliver the preferred network



5. Leverage the resource and mechanisms necessary to rapidly deliver the network in line with policy objectives

Role and responsibility

Delivering the preferred network within the required timescales will depend on the joint effort of the public and private sector, with the following key players:



Welsh Government – Strategic Oversight and Policy

Oversight of the EV Charging Infrastructure Strategy, setting standards, monitoring strategy progress, policy intervention and financial intervention.



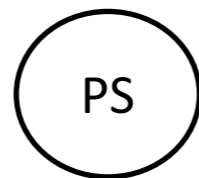
Transport for Wales– Delivery Partner

Delivery and monitoring the strategy at the on-route network, providing delivery support to local authorities and Welsh Government.



Local Authorities – Delivery Partner

Delivery and monitoring the strategy locally, at destinations and on-street sites, with support from Transport for Wales.

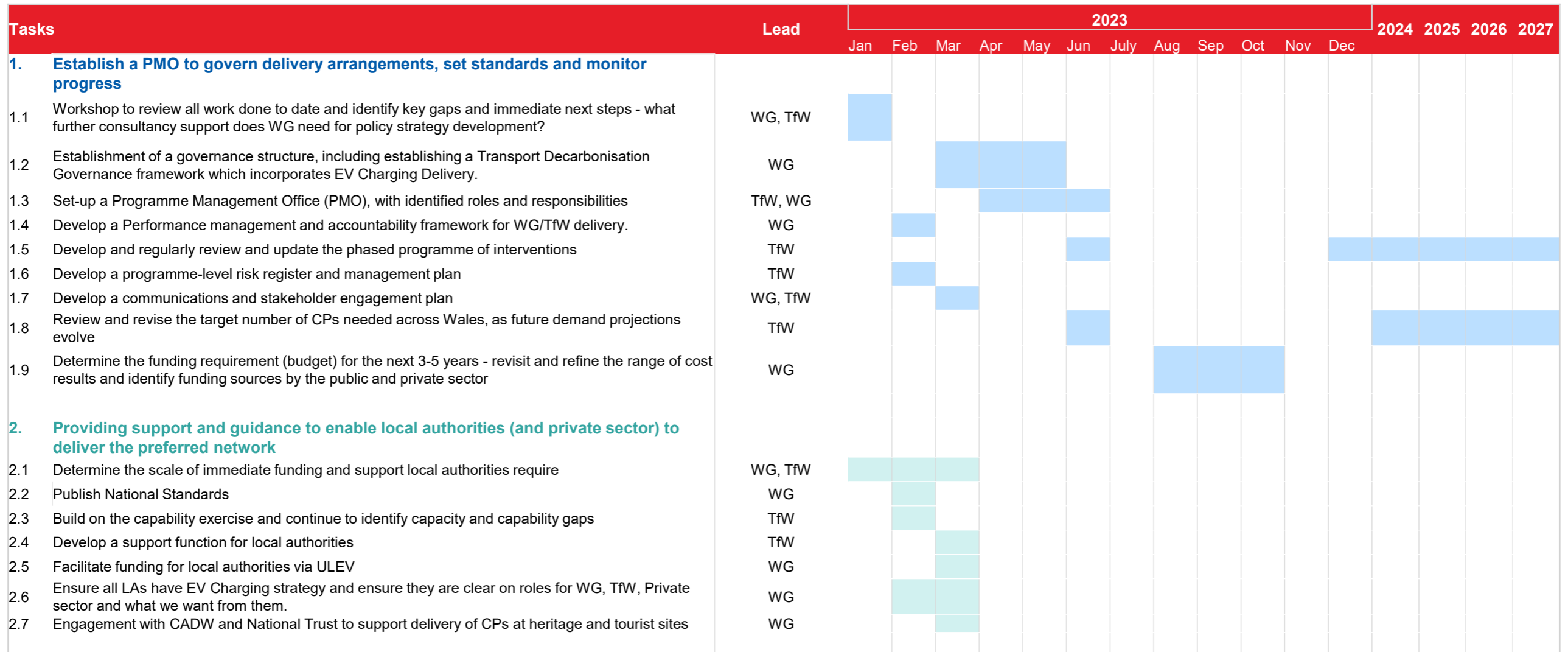


Private Sector– Delivery of the Preferred Network

The private sector will largely install and operate the preferred network, public sector intervention is targeted where market failure has been identified (e.g. TFW delivering charge-points at commercially unviable on-route sites).

Executive summary

Roadmap for accelerating the roll-out of EV charging infrastructure in Wales



Executive summary

Roadmap for accelerating the roll-out of EV charging infrastructure in Wales

Tasks	Lead	2023												2024	2025	2026	2027
		Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec				
3. Engagement with the private sector to ensure we optimise the delivery of the preferred network and foster public-private sector collaboration																	
3.1 Market engagement with CPOs to understand the private sector's plans and priorities for future investment	TfW	█	█	█													
3.2 Establish a cross interest public and private CP Task & Finish Group	WG		█	█													
3.3 Develop engagement and comms capability with Private Sector.	TfW			█	█												
3.4 Set target for PS delivery, and identify required public sector intervention to complement PS delivery	TfW				█												
3.5 Create open access to Datamap Wales to allow private sector to utilise data for infrastructure roll-out	WG											█	█	█			
3.6 Undertake a supply chain and opportunities review	WG				█	█	█	█									
4. Developing the mechanisms, knowledge and tools to deliver the preferred network																	
4.1 WG to review and establish policy levers and remove barriers to EVCI installation and operations. This includes review of regulations to support the provision of home and workplace charging in new builds and refurbishments	WG					█	█	█									
4.2 Develop funding and financing options, including FTR options	WG	█	█														
4.3 Establish Commercial Procurement Framework - design and delivery	WG																
4.4 Explore alternative procurement solutions, such as procuring a consortium of private sector partners to deliver the preferred network over the next 2-5 years. This could be structured as a Challenge Fund.	WG			█	█	█	█										
4.5 Future proofing the grid network - regular engagement with DNOs to ensure current infrastructure can serve the preferred network	TfW				█					█				█	█	█	█
4.6 Develop and implement communications campaign (target audience: end users, the public), linked to Behaviour Change work, to raise awareness of EVs and CP rollout.	WG							█									
4.7 Identify locations suitable for renewable generation and energy storage, assisting power provision for the charging network	WG				█					█			█	█	█	█	█

Executive summary

Roadmap for accelerating the roll-out of EV charging infrastructure in Wales

Tasks	Lead	2023												2024	2025	2026	2027	
		Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec					
5. Leverage the resource and mechanisms necessary to rapidly deliver the network in line with policy objectives																		
5.1 Delivery of the on-route network, with TfW supporting where required (e.g. providing planning support and coordination or delivering CPs in commercially unviable sites)	Private Sector, TfW																	
5.2 Delivery of destination and on-street charging in built-up areas, with local authorities supporting where required	Private sector, LAs																	
5.3 Monitor progress of the EV charging infrastructure roll-out	WG																	
5.4 Knowledge sharing and applying lessons learnt through regular public-private group engagement	WG, TfW																	

ARUP