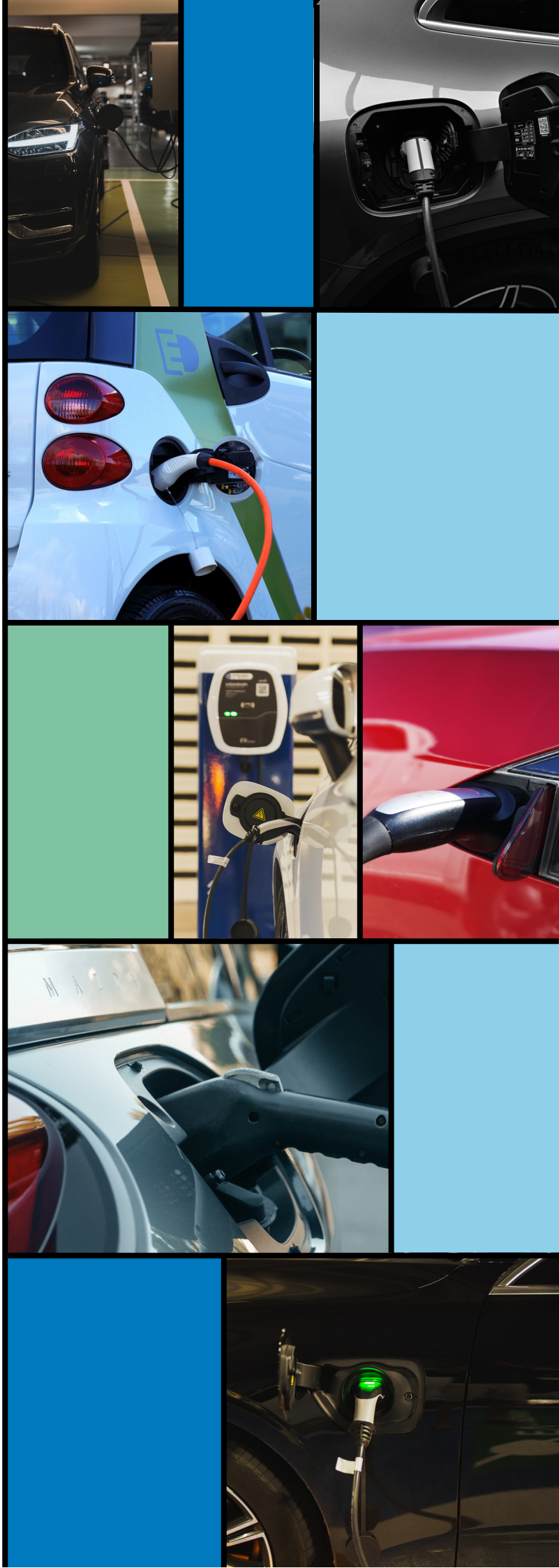

Electric Vehicle Charging Infrastructure Strategy

Strategy and Action Plan

TRANSPORT FOR THE South East

ARCADIS

Transport for the South East Electric Vehicle Charging Infrastructure Strategy

Strategy and Action Plan

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Acronyms and Abbreviations

Acronym	Description
AC	Alternating Current
BEV	Battery Electric Vehicle
BVRLA	British Vehicle Rental and Leasing Association
CPO	Chargepoint Operator
DC	Direct Current
DfT	Department for Transport
DNO	Distribution Network Operator
EV	Electric Vehicle
EVCI	Electric Vehicle Charging Infrastructure
EVCP	Electric Vehicle Charging Point
IEA	International Energy Association
ICE	Internal Combustion Engine
kW	KiloWatt
kWh	KiloWatt Hour
LEVI	Local EV Infrastructure
LTA	Local transport authority
MVA	Megavolt Amp
NCR	National Chargepoint Registry
ORCS	On-Street Residential Charging Scheme
OA	Output Area
OZEV	Office for Zero Emission Vehicles
PHEV	Plug-in Hybrid Electric Vehicle
PIV	Plug-in Vehicle
RCF	Rapid Charging Fund
SERTM2	South East Regional Transport Model, 2nd edition
SMMT	Society of Motor Manufacturers and Traders
SSEN	Scottish and Southern Electricity Network
STB	Sub-national Transport Bodies
T & Cs	Terms and Conditions
TfSE	Transport for the South East
TRO	Traffic Regulation Order
ULEV	Ultra Low Emission Vehicle
UKPN	UK Power Network
WCS	Workplace Charging Scheme

Executive Summary

Introduction

Decarbonisation of transport is one of the key contributors to delivering net-zero ambitions by 2050 for the South East of England and the UK. This is why the UK government brought forward its commitment to ban sales of new diesel and petrol vehicles from 2040 to 2030. Vehicle manufacturers are expanding their EV model ranges[1] increasing the supply and variety of electric vehicles (EVs). As demand for EVs increases, so must the supporting charging infrastructure. The number of public chargepoints in the South East has increased over the last few years, however, a strategy is required for the South East region, to inform and guide further expansion of the Electric Vehicle Charging Infrastructure (EVCI).

This Electric Vehicle Charging Infrastructure Strategy has been commissioned by Transport for the South East (TfSE), the Sub-national Transport Body (STB) for the South East of England, comprising of sixteen constituent local transport authorities, five local enterprise partnerships, forty-six borough and district councils and wider key stakeholders across the South East of the UK. TfSE provides a mechanism for the constituent authorities to speak with 'one voice' on transport interventions and is responsible for developing and implementing strategic investment plans across the region. This strategy is an enabler for achieving TfSE's vision for the region to be a "*leading global region for net-zero carbon.*"

The strategy document has the following sections, each of which is informed by the evidence from corresponding work packages which is captured in separate technical notes:

- Stakeholder Engagement
- Policy Context
- Market Context
- Baseline Context
- Forecasting
- Fleet Electrification
- Action Plan
- Conclusions

Stakeholder Engagement

Extensive stakeholder workshops, meetings and surveys have provided key inputs to this strategy. Stakeholder engagement has enabled the sharing of insights, challenges and best practice. It has also facilitated relationships between local transport authorities (LTAs), transport organisations, distribution network operators (DNOs), charge point operators (CPOs), fleet operators, representative bodies, and wider key stakeholders within the region. This engagement has been key to fostering relationships and partnerships throughout the region and wider which can be developed further going forward. Four key stakeholder engagement groups were established at the start of the project and have provided regular input to the study:

- Strategy Steering Group
- EV Forum
- Fleet Electrification Working Group
- Local Authority Working Group

[1] Heycar, 'Electric car statistics – data and projections' (2023) https://heycar.co.uk/blog/electric-cars-statistics-and-projections

Feedback from these stakeholder groups has been incorporated within this strategy and action plan. This includes insights from working group discussions and questionnaire response data from LTAs, district and borough councils on the challenges and issues for the development of EVCI strategies and EVCI roll-out. The questionnaire responses also identified key requirements for inclusion in the strategy. The following key points were raised:

- Concern over grid capacity as a challenge to the development of an EV strategy.
- Rapidly changing nature of the EV market, presenting new challenges to be addressed.
- Funding and resource limitations within LTAs.
- Concerns over CPOs offering fully funded options with long-term contracts which can be unattractive and risky.
- Consideration of local issues in the regional EV strategy development, rural connectivity and social equity.

Policy Context

National policies create the policy framework within which regional EVCI strategies will operate. Of particular significance to the TfSE EVCI strategy is the UK Government's *Taking Charge: The Electric Vehicle Infrastructure Strategy (2022)* report, which sets out the vision for the rollout of EVCI across the UK and the role that regional strategies can play. The TfSE EVCI strategy is informed by and builds upon the UK strategy and other relevant EVCI national policies and legislation.

LTAs also have a key role to play in the roll-out of EVCI, ranging from advisory and advocacy through to installation, operation and maintenance. As of summer 2022, three LTAs within the TfSE area have published specific EV or ULEV strategies. Of these LTAs, two have included detailed forecasting and commitments to specific, quantified targets.

The TfSE area is covered by two DNOs; UK Power Networks (UKPN) and Scottish and Southern Electricity Networks (SSEN), both of which have published their own EV strategy documents.

Market Context

The current EV market is rapidly evolving with new, more efficient, and more technologically advanced models being released every year. The growth in the rate of EV adoption is linked to increases in EV battery size and range, as well as reductions in battery price and EV sale price. It is expected that Battery Electric Vehicles (BEVs) will become comparatively priced with ICE vehicles[2] between 2025 and 2027, further accelerating the increase in EV uptake.

The cost to charge an EV increases significantly as higher power chargers are used. However, charging an EV is still cheaper than refuelling a petrol or diesel vehicle. Several price comparison calculators are available to quantify the exact savings and research suggests that the average driver could save over £500 per year in fuel costs[3]. An EV owner who charges at home will pay 11p/mile compared to an ICE vehicle costing 17p/mile to fuel. Research shows that 60%[4] of homes in the UK do not have access to a private driveway to park their vehicle overnight. These residents will find it more difficult to install private residential EVCPs and will likely be reliant on on-street, community hub EVCPs, workplace or destination charging.

[2] Smart Transport, 'EVs cheaper to produce than ICE vehicles by 2027' https://www.smarttransport.org.uk/news/latest-news/price-parity-for-electric-cars-and-vans-by-2027
[3] ZapMap, 'Charging on the public network' (2022). https://www.zap-map.com/charging-price-index/
[4] Office for National Statistics, 'Over half of younger drivers likely to switch to electric in next decade' (2021). https://www.ons.gov.uk/economy/environmentalaccounts/articles/overhalfofyoungerdriverslikelytoswitchtoelectricinnextdecade/2021-10-25

In reviewing the market trends and challenges for EV adoption and EVCI, provision of on-street charging presents a key challenge for LTAs. However, many of these challenges can be overcome by selecting the most appropriate type of EVCP from the range of available options for each location.

There are many different types of operating models with a range of roles, responsibilities and risks. An effective operating model clearly sets out the roles and responsibilities of all parties involved in the installation and operation of EVCI. LTAs must carefully select an appropriate model to balance ownership and control of assets, with cost and risk.

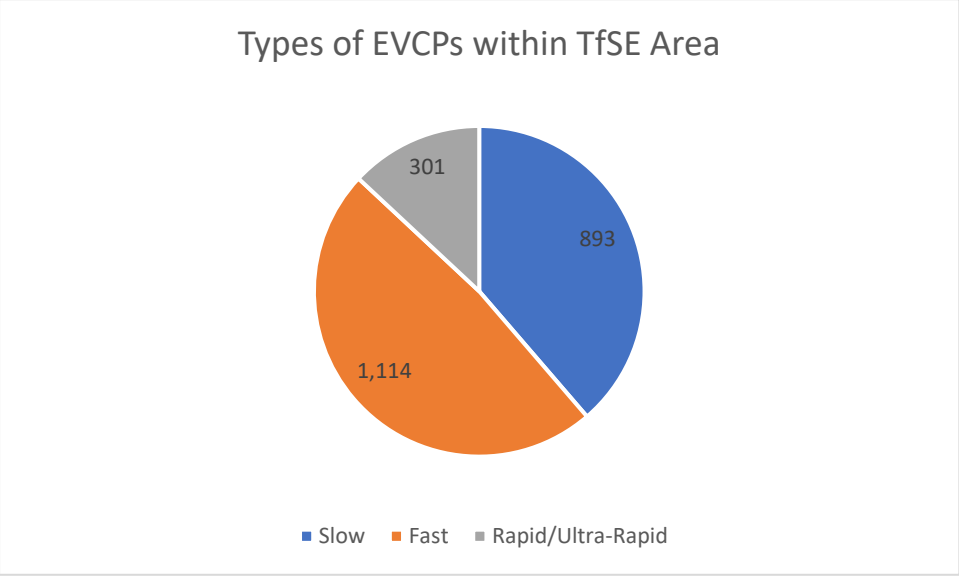
Baseline Context

At the start of 2022, there were over 30,000 BEVs (private cars and vans) registered in the TfSE area, representing 0.7% of total vehicle registrations.

TfSE has the highest percentage of BEVs registered in any UK region outside of London.

There are 2,308 public EVCPs, of which 893 were slow (3.6kW) EVCPs, 1,114 were fast (7-22kW) EVCPs, and 301 were rapid/ultra-rapid (43kW +) EVCPs, as shown in Figure 1. These are shown in Figure 20 with further details on the geographical distribution of the EVCPs is provided in Working Paper 3. The ratio of BEVs:EVCPs for the TfSE area was 16.5:1. The International Energy Association (IEA) has set a recommendation of 10:1 BEVs:EVCPs[5], which highlights the need for increased EVCI provision and long-term planning.

Figure 1: Types of EVCPs within TfSE area.



Assessment of primary substations across the TfSE area revealed that the majority of the region's power network has sufficient capacity to supply additional EVCPs as they are installed, and that there were no large areas where power availability would constrain EVCI deployment immediately. Table 1 shows the number of substations rated red/grey, amber, green based on their capacity.

[5] Virta, 'The state of EV charging infrastructure in Europe by 2030' (2022) https://www.virta.global/blog/ev-charging-infrastructure-development-statistics

Table 1: RAG ratings for primary substations.

Available capacity	RAG Rating	Number of Substations
< 1 MVA	Red/Grey	36
1 – 3 MVA	Amber	64
> 3 MVA	Green	355

Forecasting

The DfT's Road to Zero (2018) uptake scenario values have been used for the forecasting. These are shown in Table 2.

Table 2: Total EV uptake projection scenarios for 2025 and 2030.

Forecast Year	Uptake Scenarios (% of total vehicles registered that are EVs)		
	Low (Business as Usual)	Medium (Good Practice)	High (Exemplar)
2025	15%	20%	30%
2030	40%	50%	70%

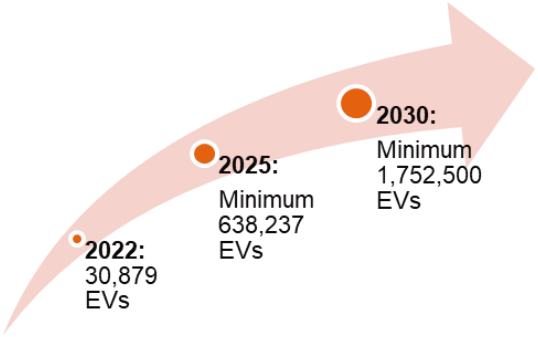
- The Low (Business-as-usual BAU) scenario assumes no policies or incentives are put in place before 2030 to encourage EV adoption.
- The Medium (Good Practice) scenario puts forward the most likely EV uptake projections and is closely aligned with industry projections. This scenario is intended to provide the most likely number of total registered EVs in 2025 and 2030, and the EVCP network that will be required to support it.
- The High (Exemplar) scenario assumes that the perfect conditions exist to enable mass adoption of EVs across the UK between now and 2030. This scenario has been included to provide upper limit EVCP projections, which will inform discussions surrounding future-proofing the EVCP network beyond 2030.

Two forecasting growth scenarios were applied to the DfT vehicle registration data to represent a growth in vehicles registered:

- A mathematical linear extrapolation of growth; and
- A 2% National Highways steady growth factor application.

The forecast EV uptake across the TfSE area is over 1.7million EVs in 2030 (under the low uptake scenario), this is shown in Figure 2. This could result in annual emission savings of up to 15.3 million tonnes CO_2e and up to 79,000 tonnes of N_2O, by 2030 when compared to current values.

Figure 2: Forecast number of EVs registered in TfSE area under the low uptake scenario.

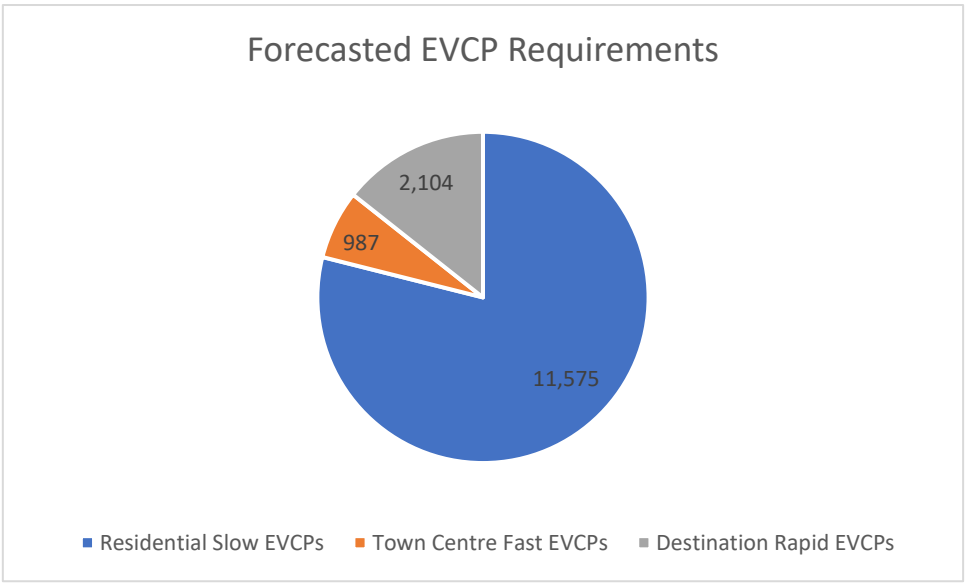


The forecast number of EVCPs are split between three use cases:

- On-street residential, slow (for those charging overnight).
- Public town centre, fast (for those carrying out general domestic trips such as shopping).
- Destination, rapid (for a visitor / business trip to and within the TfSE area).

The forecast number of EVCPs required in 2030 (under the low uptake scenario) is 14,666. Figure 3 shows the split by charger type.

Figure 3: Forecast EVCP requirements in TfSE area in 2030 under the low uptake scenario.



An assessment of the grid network revealed that a significant proportion of substations may require reinforcement to increase capacity to meet future power demand by 2030. Table 3 shows the number of primary substations that may need future upgrades.

Table 3: Assessment of TfSE primary substations based on forecast EV demand in 2030.

Maximum number of EVs that could be charged simultaneously	Number of primary substations	Details
>2,500	123	No upgrades required
1,500 – 2,500	108	No immediate upgrades required
< 1,500	224	Futureproofing upgrades required

Fleet Electrification

This piece of work focuses on private cars and vans and the associated public charging infrastructure. Fleet vehicles will be accounted for in a subsequent stage. Within the region, there is a lot of knowledge about fleet charging requirements from various businesses, representative bodies and LTAs. However, establishing demand is still a challenge given the disparity and disaggregation of data on current and future demand for charging infrastructure for fleets, especially at a regional scale.

This strategy will include a methodology for forecasting fleet demand for EVCI. The methodology is currently in development and will be agreed with the Fleet Electrification Working Group. The forecasts will be created in a subsequent stage of this work.

Action Plan

The action plan, presented in full in Appendix A, outlines a series of actions and recommendations. The fourteen actions are arranged under five themes:

- EV Forum
- Working groups
- Facilitating regional collaboration
- Targeted stakeholder engagement
- Update, adapt and progress

The role of TfSE in implementing the action plan is defined as follows:

- Organise, chair and ensure key members attend the forum and working group meetings.
- Act as a facilitator to disseminate information, best practice, coordinate working sub-groups and engagement with key stakeholders.
- Ensure the strategy, action plan and technical work (e.g. forecasting) are reviewed and up to date.
- Creating a collaborative approach for LTAs by acting as a ‘single voice’ for the TfSE area on future EVCI rollout.
- Provide a platform for targeted engagement and on-going support for LTAs with the development of their EVCI strategies.

LTAs and other key stakeholders also have defined roles to help deliver the action plan. These roles include providing input, insight and information, and sharing knowledge and best practice.

Conclusions

This strategy highlights the need for increased EVCI provision and long-term planning to meet the needs of forecasted increases in EV uptake. Through the EVCI demand forecasting, TfSE can facilitate the continued roll-out of infrastructure in an efficient and cohesive manner. The EVCI Locate App will provide LTAs with guidance for suitable locations to implement the infrastructure.

- Fourteen actions have been developed using the technical evidence base and stakeholder engagement to support the delivery of the aims and objectives of this strategy.
- A common theme of this strategy and action plan is collaboration and engagement. TfSE can act as a facilitator for the LTAs in the development of their own EVCI strategies. This will ensure vital stakeholders are brought together to support each other and share best practice. This will enable a collaborative approach to EVCI rollout and strategy development across the south east.
- The action plan and recommendations show how TfSE can continue to support LTAs and act as a 'single voice' for the TfSE area by strategic direction on future EVCI rollout.
- This strategy will enable the TfSE area to transition to EV vehicles and support LTAs in providing a future proofed EVCI network. This will continue to support a shift to low emission vehicles to contribute to legal commitments to bring all greenhouse gas emissions in the United Kingdom to net zero by 2050[6].

[6] HM Government, 'UK becomes first major economy to pass net zero emission law' (2019). https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law

1 Introduction

1.1.1 Transport for the South East (TfSE) is the sub-national transport body (STB) for the south east of England. As a partnership, TfSE brings together sixteen constituent local transport authorities (LTAs), five local enterprise partnerships, forty-six borough and district authorities and wider key stakeholders. Figure 4 shows a breakdown of the constituent LTAs within the TfSE area.

Figure 4: TfSE area.

1.1.2 TfSE's transport strategy sets out the strategic goals, priorities and principles behind their vision, which is:

"By 2050, the South East of England will be a leading global region for net-zero carbon, sustainable economic growth where integrated transport, digital and energy networks have delivered a step change in connectivity and environmental quality. A high-quality, reliable, safe and accessible transport network will offer seamless door-to-door journeys enabling our businesses to compete and trade more effectively in the global marketplace and giving our residents and visitors the highest quality of life"[7].

[7] TfSE, 'Transport Strategy for the South East', (2020). https://transportforthesoutheast.org.uk/app/uploads/2020/09/TfSE-transport-strategy.pdf

1.1.3 Decarbonisation of transport is one of the key contributors to delivering net zero ambitions for the South East of England and the UK. Therefore, the transition to low emission vehicles is vital in delivering these ambitions. In 2022, new electric vehicle car registrations were 40% higher than the previous year. Battery Electric Vehicles (BEVs) accounted for over 15% of new car sales and outsold all other vehicles apart from petrol. Vehicle manufacturers are expanding their model ranges[8] increasing the supply and variety of electric vehicles (EVs). As demand for EVs increases, so must the supporting charging infrastructure. A large proportion of drivers will charge overnight at home. However, many people cannot access off-street parking and there will be growing demand for on-street solutions. For those travelling longer distances, on-route chargers and destination chargers will also be required. The number of public chargepoints in the South East has increased over the last few years, however, a strategy is required for the South East region, to inform and guide further expansion of the Electric Vehicle Charging Infrastructure (EVCI) network.

1.1.4 Whilst this strategy focuses on the transition to EVs and the significant contribution their adoption can make to reduce exhaust emissions, this is part of a wider strategy to encourage more sustainable modes (walking, wheeling and public transport).

1.1.5 TfSE provides a mechanism for the constituent authorities to speak with one voice on transport interventions within the region. This is reflected within 'Taking Charge: The Electric Vehicle Infrastructure Strategy' (2022), in which funding availability was set out for STBs in 2021-2022 to produce regional assessments to support energy stakeholders and LTAs in planning for charging infrastructure[9]. TfSE was successful in their submission for funding in order to develop a regional Electric Vehicle Charging Infrastructure Strategy.

1.1.6 This study is TfSE's regional response to the following obligations set out in the national policy 'Taking Charge: The Electric Vehicle Infrastructure Strategy' (2022) for STBs:

- Produce scenarios for potential demand for EV charging infrastructure in the region.
- Identify clusters of demand in the region, including bringing together data on current demand and potential future demand from fleets operating in the region.
- Identify different levels of engagement and progress within LTAs in the region and locations where additional support is needed to enable planning of local chargepoints.
- Highlight examples of best practices between LTAs and foster partnerships between authorities to ensure charging infrastructure is delivered in an efficient and cohesive manner.

1.1.7 The Department for Transport (DfT) requirements for EV strategy development by STBs have been used to inform the aim and objectives of this strategy. Figure 5 shows how the aims and objectives of this strategy align with those within Taking Charge: The Electric Vehicle Charging Strategy.

[8] Heycar, 'Electric car statistics – data and projections' (2023). https://heycar.co.uk/blog/electric-cars-statistics-and-projections
[9] HM Government, 'Taking Charge: The Electric Vehicle Infrastructure Strategy (2022). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1065576/taking-charge-the-electric-vehicle-infrastructure-strategy.pdf

Figure 5: Study aim and objectives.

The study aim is to produce a regional EVCI strategy and action plan for the TfSE area to facilitate the continued roll-out of EVCI in an efficient and cohesive manner through better local engagement, leadership and planning.

	National policy 'Taking Charge: the electric vehicle infrastructure strategy' (2022) objectives for STBs
Objective 1: Produce scenarios for potential demand for EV infrastructure in the region.	*"Produce scenarios for potential demand for EV infrastructure in the region."*
Objective 2: Identify spatial clusters of demand for different types of charging infrastructure across the region.	*"Identify clusters of demand in the region..."*
Objective 3: Bring together data on current demand and potential future demand from fleets operating in the region.	*"...including bringing together data on current demand and potential future demand from fleets operating in the region."*
Objective 4: Identify different levels of engagement and progress within local authorities in the region and locations where additional support is needed to enable the development of local EV infrastructure strategies that will facilitate the planning for, and roll out of, local chargepoints.	*"Identify different levels of engagement and progress within local authorities in the region and locations where additional support is needed to enable planning of local chargepoints."*
Objective 5: Highlight examples of best practice between local authorities and other key stakeholders	*"Highlight examples of best practices between local authorities..."*
Objective 6: Foster partnerships between local authorities and other key stakeholders to ensure charging infrastructure is delivered in an efficient and cohesive manner	*"...and foster partnerships between authorities to ensure charging infrastructure is delivered in an efficient and cohesive manner."*

Table 4 shows the structure of this strategy document which has been developed using evidence from a series of technical work packages. The supporting technical work package documents are as follows:

- Work Package 2 – Policy and Operational Context
- Work Package 3 – Baselining
- Work Package 4 – Forecasting

Table 4: Section Headings.

No	Section Heading	Description
2	Stakeholder Engagement	This section describes the stakeholders, meetings and workshops undertaken and outputs.
3	Policy Context	This section explores the national and local policy context.
4	Market Context	The section reviews current EV and EVCP market trends, challenges and technology.
5	Baseline Context	This section reviews the current charging infrastructure within the TfSE area.
6	Forecasting	This section describes the methodology and outputs for forecasting future EV and EVCI demand from private cars and vans.
7	Fleet Electrification	This section describes the process to forecast infrastructure demand from vehicle fleet.
8	Action Plan	This section summarises the actions arising from this strategy.
9	Conclusions	This section summarises the main findings and recommendations.
A	Action Plan	Appendix A includes the full action plan.

2 Stakeholder Engagement

2.1 Overview

2.1.1 The stakeholder engagement exercises have been integral in helping to shape this strategy by utilising feedback and intelligence from different stakeholder groups. It has also been an opportunity to share insight, challenges and best practice across the LTAs and other stakeholders within the region to understand how TfSE, as a STB, can provide support.

2.1.2 Development of this strategy has helped foster and develop connections between TfSE and key stakeholders throughout the region and beyond. This has been achieved through an extensive programme of stakeholder engagement; fourteen workshops and meetings with over sixty unique stakeholders. This has included engagement with a wider group of stakeholders including:

- Scottish and Southern Electricity Networks (SSEN)
- UK Power Network (UKPN)
- National Health Service and
- Representative bodies for fleet operators (BVRLA (British Vehicle Rental and Leasing Association), SMMT (Society of Motor Manufacturers and Traders), Road Haulage Association, Logistics UK, NHS, Crown Commercial Services, Surrey County Council, Brighton and Hove County Council)

2.1.3 Collaboration between TfSE and the stakeholders has been fundamental to the successful development of this strategy and action plan. The process has highlighted the importance of working together as a region given the fast-moving nature of the market, rapidly developing policies and ever enhancing technology. The relationships which have been created and strengthened through this strategy development process, will benefit LTAs in the future development and implementation of their own EVCI strategies. This will be integral to developing a cohesive and resilient network of EVCPs across the south east.

2.2 Engagement

2.2.1 Four key stakeholder engagement groups were established at the start of the project and have provided regular input to the study. Each of the groups had their own roles and responsibilities for this strategy which were agreed from the project outset.

2.2.2 Table 5 summarises these groups, how they were engaged, and the essential role each played in order to develop the TfSE EVCI Strategy.

Table 5: Overview of stakeholder engagement.

Stakeholder Group	Invited Attendees	Form of engagement	Role of the Group
EV Charging Infrastructure Strategy Steering Group	5 LTA Representatives: West Sussex County Council East Sussex County Council Kent County Council Portsmouth City Council Medway County Council	Monthly online meeting.	Oversee the technical work needed to produce the EV charging strategy. Comment on the tasks and outputs from the core work packages. Help gather information and co-ordinating input from stakeholders. Comment on the draft strategy. Support stakeholder engagement and development of the strategy.
EV Charging Infrastructure Strategy Forum	16 LTAs 5 Representatives on behalf of the 46 district and borough authorities SSEN, UKPN, National Grid Chargepoint Providers Vehicle Fleet Operators[10] Representative Bodies [11]	3 x Online meetings.	Develop / agree aim and objectives of the TfSE EV Charging Infrastructure Strategy. Share information about best practice. Contribute to the development and review the action plan and strategy. Ensure that the working groups are comprised of the correct members for the development of the strategy.
Fleet Electrification Working Group	Vehicle Fleet Operators[12] Representative Bodies [13] SSEN, UKPN, National Grid	3 x Online meetings and online survey	Help shape the fleet forecasting methodology. Share fleet data and best practice examples. Participate in discussions around the EVCI fleet forecasting methodology.
Local Authority EV Infrastructure Strategy Development Working Group	All 16 LTA representatives and 5 borough and district representatives	2 x Online meetings and online survey	Provide advice on the technical work already produced within the LTAs. Provide insight into the technical work needed to produce the EV charging strategy. View tasks and outputs from the core work packages. Gather information within LTAs. Provide insight on challenges and barriers and participate in a questionnaire.

[10] BVRLA, SMMT, Road Haulage Association
[11] Logistics UK, NHS, Crown Commercial Services, Surrey County Council, Brighton and Hove County Council
[12] BVRLA, SMMT, Road Haulage Association
[13] Logistics UK, NHS, Crown Commercial Services, Surrey County Council, Brighton and Hove County Council

2.2.3 The stakeholder engagement groups contributed to the development of the strategy in the following ways:

- **Strategy Steering Group** have been presented with the outputs of key elements of this strategy as they have been produced. They have been extremely active in the development of this work providing thoughts, insights, comment and discussion on every aspect of the study.
- **EV Charging Infrastructure Forum** discussions have focused on the detail of the strategy development, the forecasting process, and the challenges and opportunities local authorities face regarding future EVCI rollout. The group has provided insight on market trends and the advantages and disadvantages of datasets. This group has also enabled discussions between LTAs, CPOs, DNOs and fleet operators.
- **Local Authority Working Group** discussions on the development of this strategy and input to the work packages. This working group have been vital in sharing EV and EVCI Strategy development and knowledge of planned EVCI.
- **Fleet Electrification Working Group** have provided understanding of the current fleet market, fleet data availability and challenges with providing more EVCI. This group has contributed significantly to the development of the methodology for EV infrastructure demand forecasts from fleet vehicles. This group has also created or strengthened relationships with attendees such as the DNOs, SMMT and BVRLA. This is described further in Section 7.

2.2.4 Issues and challenges relating to strategy development and implementation emerged from working group discussions and were also captured via an online survey of LTAs and district and borough authorities. A summary of the challenges and issues is included in Section 2.3.

2.2.5 The extensive stakeholder engagement activity has brought together a wide range of relevant organisations with the common goal of collaborating towards effective EVCI strategy development. The engagement process has created working partnerships between TfSE, LTAs, CPOs and DNOs which will benefit all involved in the future rollout of EVCI across the TfSE region. This has highlighted the value of supporting collaboration beyond the lifecycle of this strategy. This will maximise the level of support that TfSE can facilitate for LTAs to develop their own EVCI strategies and continue the rollout of EVCPs across the area.

2.2.6 Stakeholders stated that they see value in continuing the discussions and sharing best practice. There is a willingness to create sub-working groups in response to emerging issues, reflecting the extent to which they are operating within a rapidly changing market.

2.3 Issues and Challenges

2.3.1 As EV ownership levels have grown across the UK in recent years, so have the EVCI issues and challenges that LTAs and EV drivers face. These include:

- Public charging can be expensive, unreliable and have complex access issues.
- Producing a compelling business case in areas of low utilisation and high connection costs.
- Locations where the distribution network has insufficient capacity and the costs to upgrade are high. It is noted that from April 2023, distribution network reinforcement costs will be recovered through the network chargers that form part of all electricity bills[14].
- LTA challenges such as resources, expertise, planning permission and parking policies.

[14] Premier Energy, 'Electricity Connection Charges – good news from April 2023'. Electricity Connection Charges | Premier Energy

2.3.2 In the context of the wide scale challenges faced across the UK, local stakeholder views have provided essential input to this strategy. Figure 6 highlights the key challenges and issues stakeholders raised during engagement meetings. These meetings included the LTAs, transport organisations, DNOs, CPOs, fleet operator, representative bodies, and wider key stakeholders. From these sessions and the questionnaire, data from LTAs, district, and borough authorities were captured and are analysed in the following sections. The questionnaire was issued to district and borough authorities as well as LTAs therefore, all respondents will be referred to as local authorities (LAs). The following LAs responded:

- Adur & Worthing Councils
- Basingstoke and Deane Borough Council
- Bracknell Forest Council
- Brighton & Hove City Council
- Canterbury City Council
- Dover District Council
- East Sussex County Council
- Isle of Wight Council
- Kent County Council
- Maidstone Borough Council
- Portsmouth City Council
- Rother District Council
- Royal Borough of Windsor and Maidenhead
- Slough Borough Council
- Surrey County Council
- Swale Borough Council
- West Sussex County Council
- Woking Borough Council

Figure 6: Key challenges and issues.

The key challenges and how they arose are explained below.

Grid Connections

2.3.3 Ongoing liaison between LAs and DNO/CPOs was described as a key challenge in the development of EV/EVCI strategies, reflecting limited engagement to date. Concerns that additional grid capacity may be limited were raised regularly in workshop discussions and in response to the questionnaire. Furthermore, upgrading grid connections located on private land was also raised as a high priority concern. The relationships established with the DNOs through the working groups are expected to help address these concerns.

EV Market Trends

2.3.4 Stakeholders were in agreement that forecasting EV uptake and EVCI demand are essential inputs to decision making on the volume and timing of EVCI rollout. They also recognised the challenges that the pace of change in the EV market (e.g., new models, increased range, reduced costs) creates for forecasting and strategy development. Stakeholders emphasised the importance of decision making, which is informed by knowledge of key trends, patterns, technology innovations, EV uptake, lead times and EVCP utilisation.

Funding and Resources

2.3.5 Funding and LA resource limitations was a common them in workshop discussions and questionnaire responses. Some LAs stated that a lack of understanding of government requirements for EV strategies creates a barrier for EVCI rollout. Most LAs who responded considered resources and funding to be a challenge they faced in developing a robust EV strategy and infrastructure plan. LAs reported that there was no dedicated EV officer to manage the EV strategy development within their authorities. LAs reported that internal agreement within local authorities and internal procurement business cases have become increasingly challenging and inconsistent processes within local authorities present a clear barrier to installing EVCI which a regional EVCI strategy must address. The most recent LEVI fund launched[15] also provides capability funding to ensure that local authorities have the staff and capability to plan and deliver EVCI.

2.3.6 Creating opportunities for joint working and collaboration between LAs had the highest response rate, demonstrating that there is appetite to build on the collaborative relationships created between LAs through involvement in the TfSE EVCI strategy working groups.

Operating Models

2.3.7 Within workshops, concerns over CPOs offering fully funded options were highlighted as they generally entail a long-lasting contract which can be unattractive to LAs. Limited communication and understanding between the public and private sector can slow EVCI rollout. Different procurement methods should be discussed and understood to ensure the best choice is made for each LA.

Policy

2.3.8 Rural connectivity and social equity were consistently highlighted as key challenges that need addressing. LAs highlighted areas of high deprivation in their regions and stated that social and geographic equity was a priority. LAs stated that EVCI strategies must achieve equitable coverage and address the fact that CPOs will likely favour EVCI locations that deliver the highest revenues.

2.3.9 High parking demand and narrow footways were all raised as issues to be addressed, with LAs referring to Internal Combustion Engine (ICE) vehicles blocking access to chargepoints. Other challenges highlighted include the availability of space within council car parks and response times from relevant departments within the LA. LAs stated this could be addressed by positioning EVCI rollout as a policy priority in their regions.

2.3.10 In workshop discussions, some LAs stated that there is even a lack of clarity within policy over their responsibility to install EVCI. This presents a clear challenge for those LAs, as the uncertainty can result in a lack of action. Furthermore, LAs have presented an additional challenge regarding their local LTA strategies supporting Quantified Carbon Reduction Targets.

[15] £56 million of public and industry funding electrifies chargepoint plans across the country - GOV.UK (www.gov.uk)

Charging Infrastructure Review

2.3.11 LAs Local authorities highlighted difficulty implementing EV chargers due to narrow streets within the questionnaire. These issues were also raised in the workshops, stressing the importance of appropriate types of EVCI being installed, and the importance of LAs being aware of all best practice options available to them, which this EVCI strategy addresses.

2.4 Priority Focus Areas

2.4.1 Figure 7, Figure 8 and Figure 9 show the stakeholder responses to three key questions on local strategy development, regional strategy development, and EVCI rollout. These responses have informed the priority focus areas for development of the action plan.

Figure 7: Challenges encountered or anticipated in development of local EV/EVCI strategies.

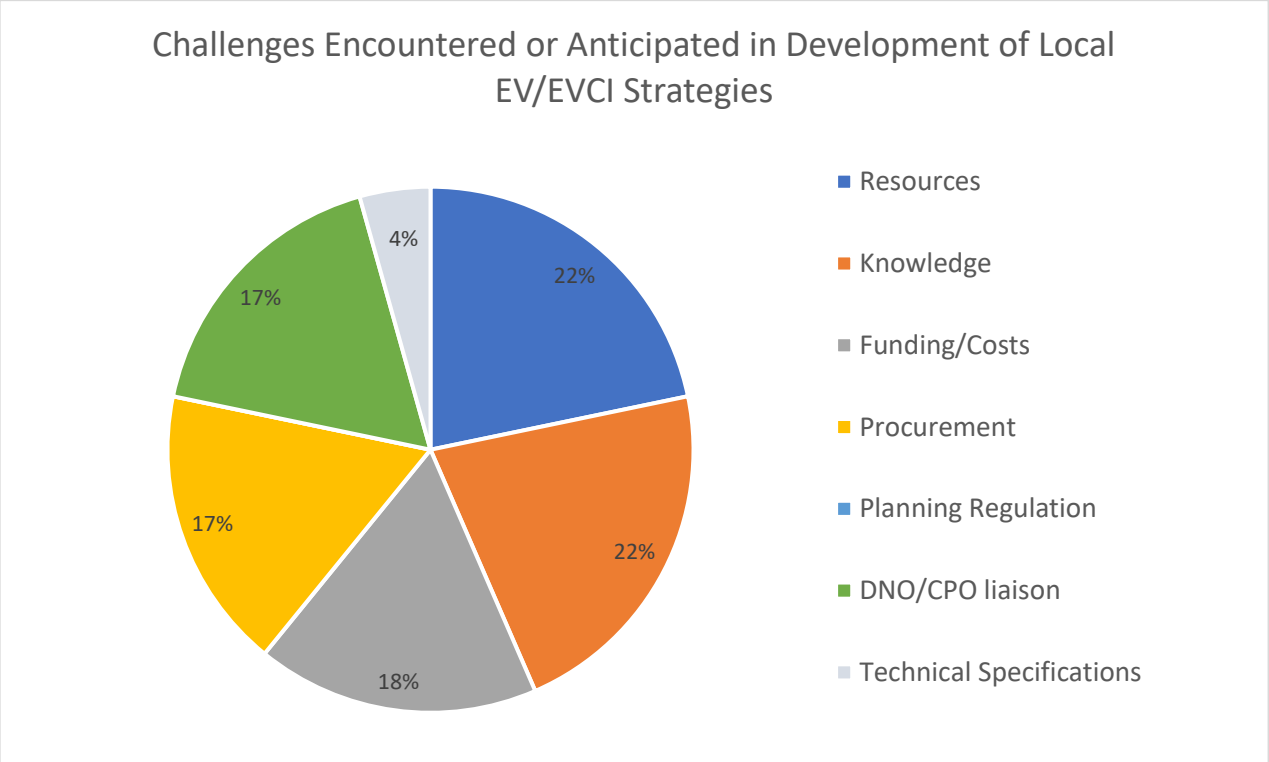


Figure 8: Issues to address in regional EVCI strategy.

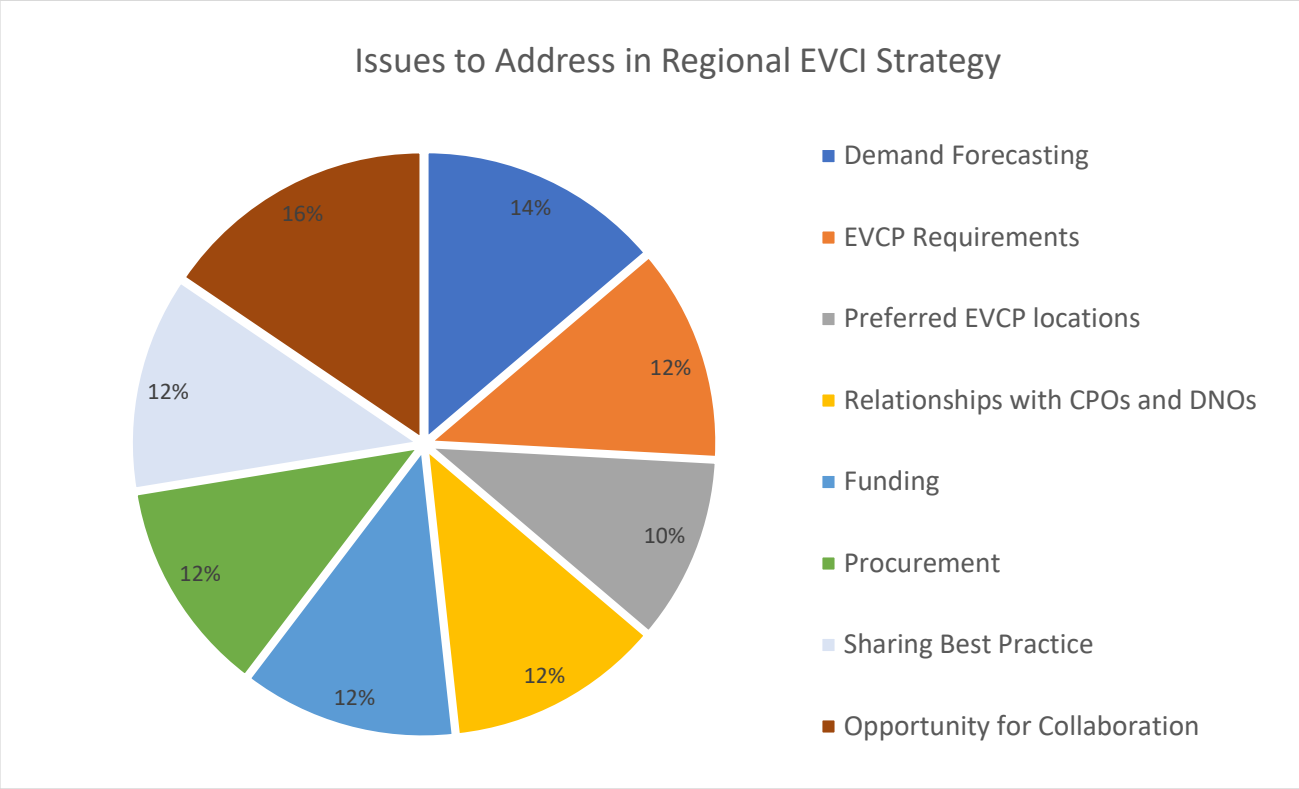
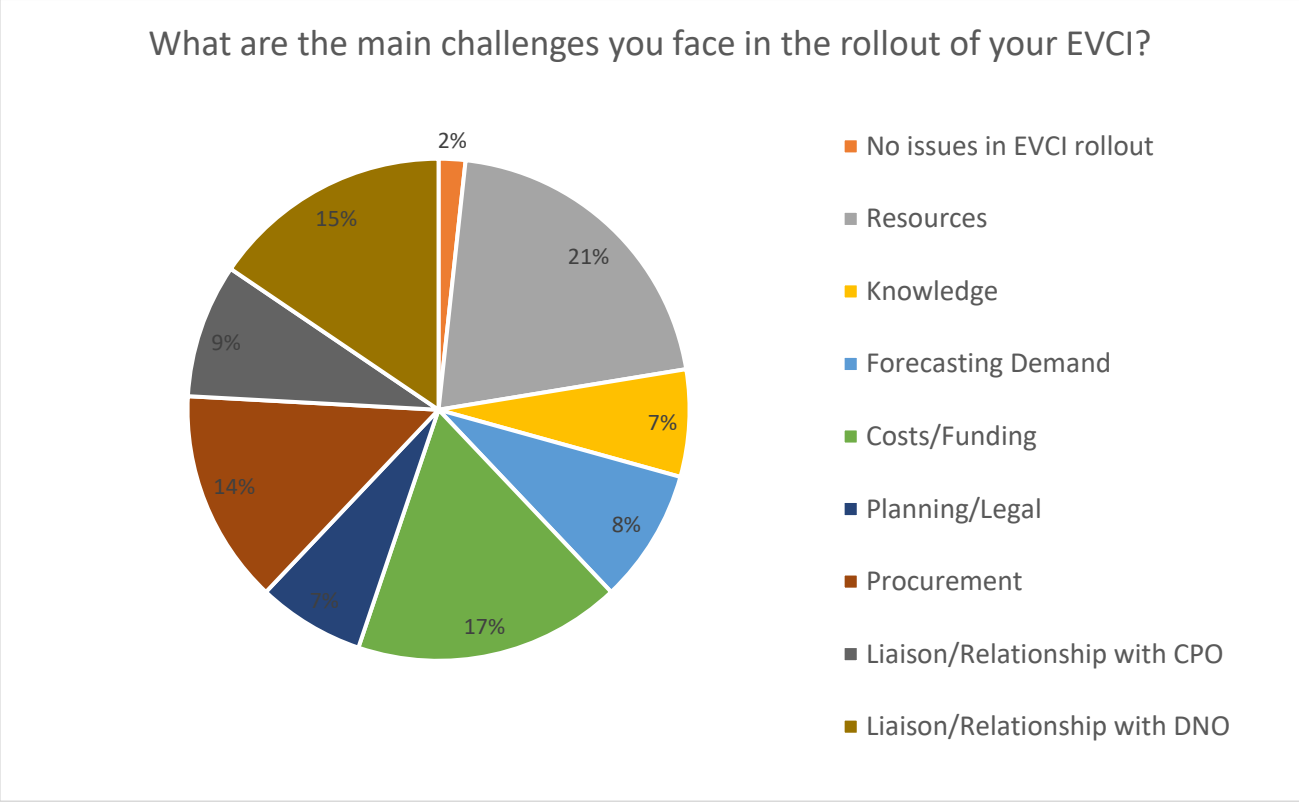


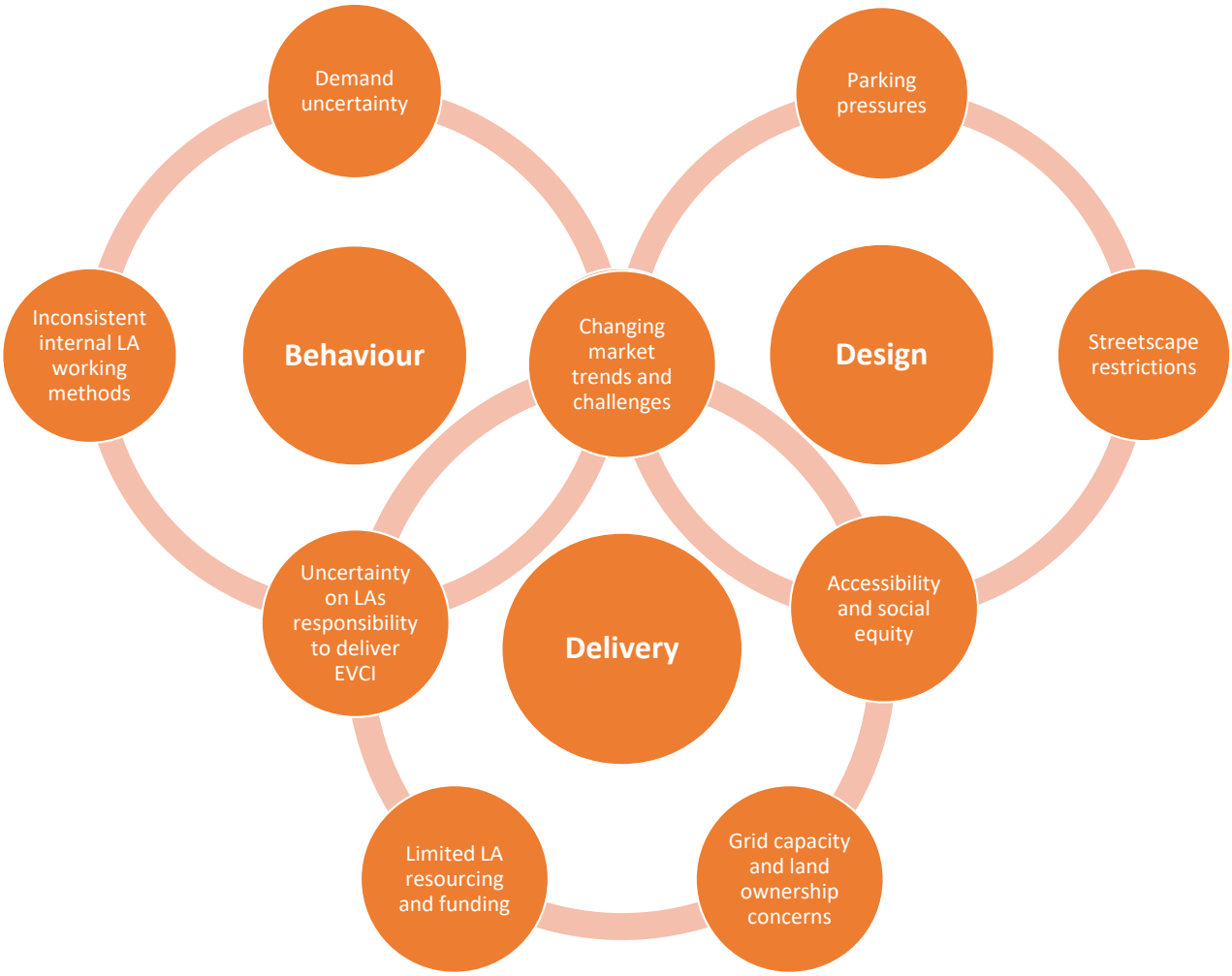
Figure 9: Main challenges LAs face in EVCI rollout.



2.5 Key Findings

2.5.1 The results of the stakeholder workshops and questionnaire form three key themes: Behaviour, Design and Delivery, as shown in Figure 10

Figure 10: Challenges and issues.



2.5.2 Pre-existing **design** issues significantly impact the possibility of implementing EV infrastructure in the region based on a variety of factors, such as pavement characteristics and parking restrictions. Therefore, local differences within the TfSE area have been considered within this strategy and action plan to ensure LTAs have the tools for accessible, inclusive and convenient EVCI rollout.

2.5.3 **Behavioural change** towards the uptake of EVs continues to improve with education around the benefits, improved technology and increased infrastructure. Behavioural change must be prioritised within the region's approach to EVCI rollout to ensure the greatest impact and action towards EV uptake and EVCI provision.

2.5.4 The **delivery** of EV infrastructure is challenging in that there are many external obstacles. Funding through the government in recent years has significantly increased to aid this difficulty. The impact of other delivery challenges such as grid connections and ensuring social equity can be reduced through working strategies to find the most suitable sites.

2.5.5 TfSE can help address these challenges and issues by supporting and working closely with the LTAs throughout the delivery of their EVCI strategies and implementation. This support will be a continuation of the key facilitation role TfSE has had throughout the creation of this strategy. This future facilitation includes:

- Fostering communications and partnerships between the LTAs to ensure best practice and success stories are shared on a continual basis.
- Facilitating discussions between LTAs and stakeholders such as EST, OZEV and DNOs.
- Providing representation on behalf of LTAs for issues, challenges and opportunities in the TfSE area.
- Helping identify areas where further work and knowledge is required.

3 Policy Context

3.1 Introduction

3.1.1 According to HM Government's 'Taking Charge – The Electric Vehicle Infrastructure Strategy', LTAs are responsible for publishing their own EV strategies, complete with a commercial and cross-sector approach that integrates into broader transport plans. To establish this approach and develop an EV infrastructure rollout plan, LTAs are supported by capital funding and guidance that is set out by regional and national policy. Regional policies typically offer a comprehensive approach to EV infrastructure rollout and set out specific targets that take into consideration the challenges and opportunities on a regional scale. On a national level, policies aim to remove charging infrastructure as both a perceived, and an actual barrier to the adoption of electric vehicles.

3.1.2 TfSE is responsible for developing and implementing a strategic investment plan for the region and acting as one voice for the South East in order to identify and agree investment priorities with the Secretary of State for Transport[16]. Any EV strategy developed by TfSE should be guided by the commitments of national, regional and local government policies to ensure that the strategic objectives for the South East are aligned with the national agenda, while also informing and guiding on a local level. This section summarises the findings of Working Paper 2 – Policy and Operational Context – which covers a review of relevant EV and EV infrastructure policies, plans, strategies and legislation.

3.2 National Context

3.2.1 The transport sector is a significant contributor to carbon emissions, accounting for 27% of the total UK emissions, of which cars contributed 60%[17], in 2019. EVs are viable alternatives to fossil-fuel powered vehicles. For these reasons, the UK government has brought forward its commitment to ban sales of new diesel and petrol vehicles from 2040 to 2030. National policies have been put in place to support the widescale transition to EVs.

3.2.2 The UK Government has published the Taking Charge: The Electric Vehicle Infrastructure Strategy (2022), which covers the vision for the rollout of EVCI across the UK and role that regional strategies can play.

Taking Charge: The Electric Vehicle Infrastructure Strategy (2022)

3.2.3 The UK government's vision is to have fully removed EVCI provision as being a barrier to EV adoption by 2030. Achieving this will require an estimated minimum 300,000 public EVCPs and a national network that:

- Facilitates effortless on and off-street charging for private and commercial vehicles.
- Is inclusively designed, fairly priced, and available for all.
- Delivers a thriving EV and EVCI private sector.
- Integrates with smart energy system.
- Harnesses innovative EV and EVCI technologies to improves operation and user experience.

[16] TfSE, 'Becoming a statutory body' (2020). https://transportforthesoutheast.org.uk/about-us/becoming-a-statutory-body/
[17] DfT, 'Transport and environment statistics: Autumn 2021' (2021) https://www.gov.uk/government/statistics/transport-and-environment-statistics-autumn-2021/transport-and-environment-statistics-autumn-2021

3.2.4 To achieve this, the government has identified the following five strategic areas that should be prioritised:

1. Focus intervention on two crucial sectors where accelerated rollout is needed and where business cases can be challenging:
   i. high powered chargers on the strategic road network.
   ii. local on-street charging.
2. Allow thriving sectors to thrive and address barriers to private sector rollout.
3. Give people confidence in the public network. We will regulate to ensure chargepoints are reliable and easy to use.
4. Work with Ofgem to ensure chargepoints can seamlessly integrate with the energy system.
5. Support innovation in business models and technology

3.2.5 On the role that regional EVCI strategies can play:

- Providing a mechanism for better local engagement, leadership, and planning.
- Developing localised forecasts to support LAs in developing EVCI roll-out plans.

3.2.6 The strategy includes a series of commitments aimed at removing EVCI availability as a perceived and real barrier to EV adoption:

- Ensuring that each motorway service area has at least 6 high power EVCPs by 2023.
- Continuing to support local authorities through the On Street Residential Chargepoint Scheme.
- Expanding the £10m Local EV Infrastructure funding, piloted in 2022.
- Investing at least a further £500m to support LAs plan and deliver local public EVCI between 2022 and 2025.
- Developing new EVCI standards to ensure sure public EVCI is reliable and easy to use.

3.2.7 The TfSE EVCI strategy has been developed to compliment and respond to the Taking Charge: The Electric Vehicle Infrastructure Strategy (2022) report and other relevant national policies and legislation, listed in Table 6, and summarised in Working Paper 2 – Policy and Operational Context. This will ensure that the long-term plan for the TfSE region contributes to national targets and that proposed schemes can leverage available capital funding.

Table 6: Alignment of the TfSE EVCI Strategy with key national policies.

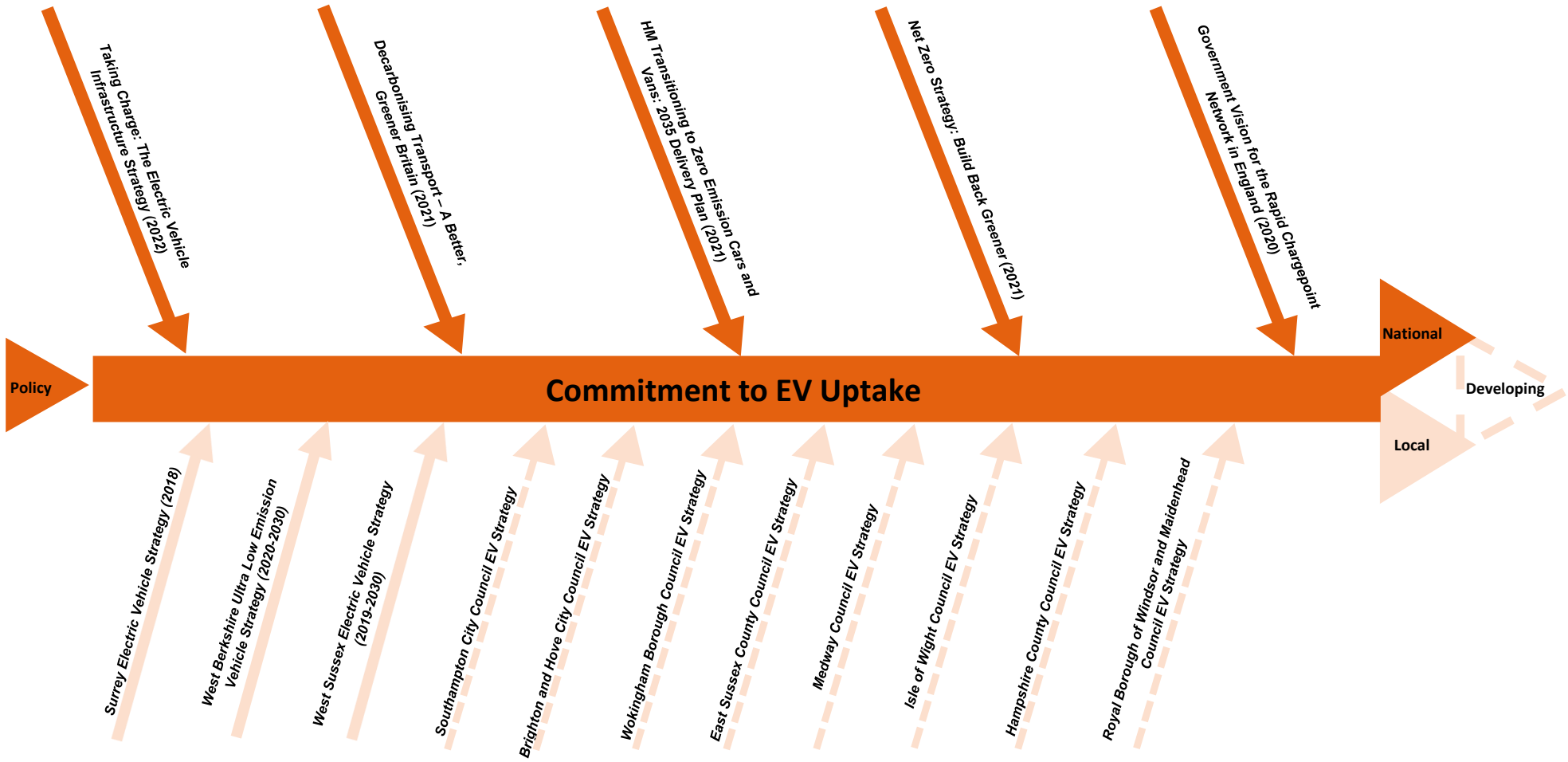
Policy / Legislation	Description	Link to this Strategy
Taking Charge: The Electric Vehicle Infrastructure Strategy (2022) – HM Government	Sets out the government's vision and action plan for the rollout of EV charging infrastructure in the UK to meet key dates, including the end of sale of new petrol and diesel cars by 2030 and ensuring all new cars and vans are fully zero emission by 2035.	This strategy assesses local charging demand across the South East to assist LTAs in developing and delivering infrastructure plans. This strategy will address key barriers surrounding the roll-out of EVCI at a regional scale by facilitating better local engagement, leadership, and planning. The strategy sets out funding and obligations for STBs in 2021-2022 in supporting energy system stakeholders and LTAs in planning charging infrastructure provision. This included forecasting EVCI demand, identifying current clusters of demand, and collaborating with all LTAs within the region, highlighting examples of best practice.
Decarbonising Transport – A Better, Greener Britain (2021) – HM Government	Sets out the government's commitments to decarbonise the UK transport system. It includes the principles and pathway to net zero transport in the UK, as well as the benefits of net zero transport.	This strategy has been developed in line with the published key dates and commitments and presents these in the context of the South East to justify the investment of encouraging regional EV uptake. This strategy also references available funding streams and provides guidance on how each can be used to support projects targeting transport decarbonisation, EV uptake and EVCI rollout across the TfSE area.
HM Transitioning to Zero Emission Cars and Vans: 2035 Delivery Plan (2021) – HM Government	Sets out the significant milestones for the transition of local, regional, and national public sector fleet vehicles to 100% EVs by 2027.	This strategy has been developed following close engagement with public and private-sector fleet operators to capture issues and opportunities regarding forecasting infrastructure demand from vehicle fleet. This strategy includes a focus on fostering relationships between stakeholders across the TfSE area to ensure best practice and lessons learned can be shared effectively. This strategy has identified opportunities to leverage government grants to fund EVCI rollout schemes and how this can support fleet electrification across the TfSE area.

Policy / Legislation	Description	Link to this Strategy
Net Zero Strategy: Build Back Greener (2021)	Sets out policies and proposals for decarbonising all sectors of the UK economy to meet the 2050 net zero target[18].	This strategy forecast period focuses on the 2030 ban on the sale of new petrol and diesel cars. The strategy identifies different funding streams within the UK government's £2.8 billion package for promoting EV uptake and EVCI provision.
Government Vision for the Rapid Chargepoint Network in England (2020)	Sets out the UK's commitment to supporting growth of green, zero emission technologies[19]	This strategy pays particular focus to rapid EVCI, including a review of the technology, and the role it plays in meeting the future demand as EV adoption increases across the South East. Local scale rapid EVCI forecasts have been produced to inform the development of rollout plans and different funding streams have been identified to support their delivery.
Automated and Electric Vehicles Act (2018)	Legislation covering the UK government's requirements and regulations surrounding EV charging infrastructure.[20]	This legislation has been developed to support the provision of high-quality, accessible and convenient EVCI in line with government required standards. This strategy reflects the legislation. This will ensure a continued and cohesive rollout of EVCI, that delivers equal benefits and promotes EV adoption for all across the TfSE area.

3.2.8 Figure 11 lists key national and local policies. This figure represents published EV strategies and data received in response to the local authority questionnaire. EV or ULEV strategies which are in development by LTAs in the TfSE area are shown as dotted arrows.

[18] Gov.uk, 'Net Zero Strategy: Build Back Greener' (2021). https://www.gov.uk/government/publications/net-zero-strategy
[19] Gov.uk, 'Government Vision for the Rapid Chargepoint Network in England' (2020). https://www.gov.uk/government/publications/government-vision-for-the-rapid-chargepoint-network-in-england/government-vision-for-the-rapid-chargepoint-network-in-england
[20] Gov.uk, 'Automated and Electric Vehicles Act 2018 regulatory report' (2021). Automated and Electric Vehicles Act 2018 regulatory report - GOV.UK (www.gov.uk)

Figure 11: Key National and Local policy.



3.3 Local Context

3.3.1 LTAs have a crucial role to play in the rollout of EVCI, which Government guidance[21] outlines as including:

- proactively supporting and delivering the rollout of electric vehicle chargepoints.
- helping to ensure the transition is integrated into wider local transport and community needs.
- through policies and published strategies, local authorities can facilitate and help guide the market to deliver to meet the charging needs of residents, businesses and visitors.
- writing or being part of a wider local EV or EV infrastructure strategy is vital to establishing objectives, ways of working, responsibilities and a pathway to delivery.
- Accessing capital funding and procuring installation, operation and maintenance for EVCI.
- engaging with local business and the public to raise awareness of available EVCI.
- electrifying LTA vehicle fleet.

3.3.2 As of Summer 2022, three LTAs within the TfSE area have published their own EV or Ultra-Low Emission Vehicle (ULEV) strategies. Targets stated in these strategies are summarised in Table 7, with more detail in Working Paper 2 – Policy and Operational Context. As Table 7 shows, the use of targets varies across these strategies.

[21] Gov.uk, 'Electric vehicle charging infrastructure: help for local authorities' (2022). Electric vehicle charging infrastructure: help for local authorities - GOV.UK (www.gov.uk)

Table 7: Summary of targets taken from LTA EV / ULEV strategies within the TfSE area.

Local EV or ULEV Strategy	Year Produced	EV Uptake Forecasts	EV Uptake Targets	EV Car Club Targets	EVCI	EVCI Demand Forecasts	Fleet Electrification	Education
Surrey County Council	2018			50% of available vehicles electric by 2025	General target to expand EVCI network		Encourage adoption of electric vehicles when fleet refreshed	Aims to continue to promote educational information on EVs
West Berkshire Council	2020	25% of residents and drivers moved to ULEV by 2030	10% increase in ULEV uptake by 2023	60% of vehicles to be electric by 2022	50% increase in EVCPs by 2023	33 - Rapid 103 - Destination 1762 - Residential by 2030	25% of West Berkshires Councils car and light duty fleet to be ULEV by 2022	Aims to provide insights into vehicle developments, legislation and policies that may affect future ULEV take up
West Sussex County Council	2019	18,000 by 2025 44,000 by 2030	70% of all new cars to be electric by 2030		Aims to have sufficient charging infrastructure in place to support EVs	3,300 by 2025 7,350 by 2030	Commitment to develop a fleet transition plan	Aims to focus on communication and incentives.

3.3.3 LTAs that haven't published specific EV or ULEV strategies do mention EV and EVCI targets and aspirations within their transport strategy, local transport plan or environmental / air quality policy documents. Examples of these aspirations or commitments are shown in Table 8. A full breakdown is contained in Working Paper 2 - Policy and Operational Context.

Table 8: Key LTA Commitments / Aspirations from supporting documents.

LTA	Key commitment / aspiration
Bracknell Forest Council	• Sustainable Modes Strategy (2018-2026): (1) The Council encourages EV uptake and commercial EV charging operators providing EVCPs in suitable locations and (2) the Council will continue to apply a logical, yet supportive role in facilitating electric vehicle use. • Climate Change Strategy (2020-2024): Pan-Berkshire EV project – The Council will be working with the other 6 Berkshire authorities to implement EVCI.
Brighton and Hove City Council	• 2030 Carbon Neutral Programme (2021-2030): Install hundreds of on-street electric charging points and rapid charging hubs for taxis. • Developing a new Transport Plan for Brighton and Hove (2021): The Council will introduce emissions-based parking charges, expand the Ultra-Low Emission Zone, install more EVCIs, offer financial incentives to switch to electric vehicles, run behaviour change campaigns, electrify the Council fleet, use more electric shared transport vehicles and introduce low emission bus corridors.
East Sussex County Council	• East Sussex Environment Strategy (2020): Develop and implement an EV strategy. • East Sussex County Council's Climate Emergency Plan (2020-2022): Grey fleet review and install EV chargepoints. • East Sussex Local Transport Plan Implementation Plan (2016/17-2020/21): Install EVCPs at key locations
Hampshire County Council	• Hampshire Carbon Mitigation Action Plan (2011-2031): Provision of pilot of on-street residential electric vehicle chargepoints
Isle of Wight Council	• Mission Zero Climate and Environment Strategy (2021-2040): The Council will increase the number of publicly available rapid and fast EVCPs across the island to at least 72 to ensure one EV charger is available per 8 households who don't have off-street parking by 2040.
Kent County Council	• Kent County Council and Medway Council's Energy and Low Emissions Strategy (2020): (1) The Council will reduce greenhouse gas emissions from their own estate and activities, as well as from the whole county, to be net zero by 2030 and (2) Kent County Council is leading a collaborative effort by six councils to install over 600 new charging points over the next 2 years.
Medway Council	• Medway Climate Change Action Plan (2022): Progress the delivery of the EV strategy (2022 -27) and facilitate the installation of EV charging point infrastructure on council land and public highway.
Portsmouth City Council	• Portsmouth Local Transport Plan (2021-2038): The council will continue to provide appropriate charging solutions to meet demand and need, such as those provided in the pioneering On-street Residential Chargepoint Scheme (ORCS) that has seen EVCPs incorporated into lamp columns across the city.
Reading Borough Council	• Reading Climate Emergency Strategy (2020-2025): (1) Decarbonise the Council Vehicle Fleet by increasing EVCPs at Council buildings and (2) Require all taxis and private hire vehicles to be EV or hybrid by 2030.

LTA	Key commitment / aspiration
Royal Borough of Windsor and Maidenhead	• Environmental and Climate Strategy (2020-2025): The Council will identify a partner and funding model and roll-out EVCI to: meet carbon reduction targets; monitor progress through the council's annual monitoring report; and adopt a new parking supplementary planning document (SPD) setting out standards for EV charging in new developments.
Slough Borough Council	• Slough Low Emission Strategy (2018-2025): (1) The Council will develop and implement a Slough Electric Vehicle Plan. (2) The Slough Electric Vehicle Plan will support home, workplace, and on street charging opportunities. The plan will also look to install a network of rapid charging hubs to facilitate a high growth rate in plug-in taxis and the use of smart technology to link taxi operators with EVCI and customers.
Southampton City Council	• Connected Southampton Transport Strategy (2019-2040): (1) The council will seek to deliver a 24 hour publicly accessible network of EVCPs. (2) EVCPs are currently being considered in a first pilot phase in key locations. Subsequent phases will focus on installing charging points in taxi ranks and neighbourhood 'Mobility Hubs'.
Wokingham Borough Council	• Local Transport Plan (2011-2026): By 2026, the Council aim to have developed an EVCP network. The Council will set out a framework for the roll-out of electric charging points.

3.3.4 On a local level, out of the forty-six district and borough authorities, four of them have their own EV or EVCI strategy. These are Swale Borough Council, Horsham District Council, Sevenoaks District Council and Waverley Borough Council. These strategies set out the following EVCI commitments:

- Swale Borough Council Draft Electric Vehicle Strategy (2022-2030) - create and facilitate a network of EVCPs that meets the needs of residents, businesses, and visitors, with sufficient coverage by 2030.
- Horsham District Council Electric Vehicle Chargepoint Strategy (2020) - take part in partnerships for a comprehensive and cohesive EVCP network.
- Waverley Borough Council Draft Electric Vehicle Strategy (2021-2026) – install chargepoints at 30 locations by 2026.
- Sevenoaks District Council Low Emission and Electric Vehicle Strategy - improve the electric vehicle charging network across the district.

3.3.5 The borough and district authority strategies do not generally include EVCI modelling and analysis to inform specific targets and commitments. Working Paper 2 – Policy and Operational Context, includes further detail from the district and borough strategies.

3.3.6 The TfSE EVCI strategy will provide support to each of the LTAs, district and borough authorities to enable them to create or update their own EVCI strategy.

Distribution Network Operators

3.3.7 The TfSE area is covered by two DNOs; UKPN and SSEN, both of which have published their own EV strategy documents, summarised below.

UKPN EV Strategy (2020)

3.3.8 The UKPN EV Strategy (2020)[22] outlines three core objectives:

- Support the production of clear and accessible policies and standards through development of industry leading forecasting tools.
- Continue to capture and share data to improve customer experience and ensure UKPN can satisfy its role in EVCI rollout.
- Develop a future proofed EVCI network through the use of smart solutions and strategic investment.

SSEN EV Strategy (2020)

3.3.9 The SSEN EV Strategy (2020)[23] includes five principles to support the transition to EVs:

- Make data available to anticipate issues, support decision making and make sure power networks are ready for future EV uptake.
- Develop a suite of tools to support widespread EV uptake, fleet electrification and EVCI rollout.
- Use Local Development Plans to inform and establish strategic investment programmes.
- Establish resources to deal with the impacts of increasing EV uptake on the network.
- Support stakeholders' ambitions to decarbonise through active engagement and ensure visibility of network capability.

3.3.10 Both strategies highlight the DNOs' commitment to support the development of local EVCI policies and roll-out plans by sharing data and models to inform decision making. Engagement with the DNOs has been an essential element in the creation of the TfSE EVCI strategy and the relationships that have been established will underpin its successful implementation.

3.4 Key Findings

3.4.1 The development of this TfSE EVCI strategy has been guided by national, regional and local policies related to EVs and EVCI. This ensures alignment with existing commitments across all levels of government and that this strategy can contribute to achieving the targets and milestones already in place.

3.4.2 On a national level, the UK government continues to set ambitious milestones for EV adoption and the roll-out of a high-quality EVCI network across the UK. To facilitate this, the government has committed to providing the following funds and grants to support the public and private sectors to create the required EVCI:

- Rapid Charging Fund
- Local EV Infrastructure Fund
- On-street Residential Chargepoint Scheme
- EV Chargepoint Grant
- Workplace Chargepoint Grant
- Ultra-Low Emission Taxi Infrastructure Scheme
- Driving the Electric Revolution Challenge (UK Research & Innovation)

[22] UK Power Networks, 'Electric Vehicle Strategy' (2019). https://innovation.ukpowernetworks.co.uk/wp-content/uploads/2019/11/UK-Power-Networks-Electric-Vehicle-Strategy-November-19.pdf
[23] Scottish and Southern Electricity Networks, 'Electric Vehicle Strategy' (2020). https://www.ssen.co.uk/globalassets/electric-vehicle/ev-media/ssen-ev-strategy-september-2020.pdf

3.4.3 Local policies in the TfSE region promote the need to enable EV uptake and increase EVCI provision, although there is less consistency with the creation of local EV strategies. Out of sixteen, three LTAs have published specific EV or ULEV strategies and of these, two have included detailed forecasting or commitments to specific, quantified targets.

3.4.4 The differences across the TfSE area highlights the importance of a comprehensive regional EVCI strategy aimed at supporting LTAs to align with national objectives, leverage available public capital funding, and accurately model future EV uptake and EVCI demand. This will ensure they can develop specific and measurable commitments towards planning and delivering a future proofed EVCI network. This strategy also emphasises the need to continue knowledge sharing and support between local authorities that have expertise and those that are still in the early stages of developing their EVCI roll-out plans (Appendix A – Action Plan).

3.4.5 The commitments of both DNOs highlights their willingness and ability to play a crucial role in the roll-out of a regional EVCI network. The process of creating this EVCI strategy has enabled TfSE to strengthen relationships with the DNOs.

3.4.6 Further analysis of national, regional and local policy landscape is included in Working Paper 2 – Policy and Operational Context.

4 Market Context

4.1 Introduction

4.1.1 This section covers a review of current EV market, EVCI technology and the EVCI market which has been used to inform the TfSE EVCI strategy. The purpose of this review is to ensure that LTAs are aware of market risks and opportunities as they develop their local EVCI strategies. Furthermore, it is essential to the EVCI forecasting exercise, covered in later sections of this report, to ensure that modelling builds in future technology and appropriate use cases.

4.2 Market Trends

4.2.1 The current EV market is ever evolving with new, more efficient, and technologically advanced vehicle models being released every year. For instance, Tesla has made frequent changes to its electric vehicles through software updates and hardware changes to add new features, improve performance or reduce production costs[24]. A comparison of different EV models can be found in Working Paper 2.

4.2.2 In 2022, EVs accounted for a fifth of new car sales in the UK[25] and have surpassed diesel sales for the first time. The global market for EVs is estimated at 9.5 million units in 2022 and is projected to reach 80.7 million units by 2030[26]. The rate of EV adoption is linked to increases in EV battery size and range, as well as reductions in battery price and EV sale price.

4.2.3 The 2022 energy crisis has caused EV charging prices to rise, which may in the short-term price-out potential EV adopters[27]. Furthermore, there is uncertainty surrounding the impact of the recent announcement that EV owners will have to pay vehicle excise duty (i.e. road tax) from 2025[28]. Consequently, the EV market is highly volatile and predicting future trends is particularly difficult.

4.2.4 Key market trends are summarised below:

- **Battery Range:** As technological advances in battery size and range continue, the frequency of needing to recharge reduces, increasing the confidence to travel further distances. This also minimises the level of behaviour change for the average driver, as 'range anxiety' is limited. However, this will also increase the demand for high-powered chargers for those that choose to travel longer distances. Despite promises of EVs with a range of 500+ miles, range increases will be limited by battery size, weight and cost.
- **Charging Rate:** The State of Charge (SOC), or percentage of the battery's full charge has a significant effect on the maximum power and hence time to charge. When batteries are nearly empty and have a low SOC, maximum-speed charging are achievable. However, as the SOC increases, the charging-speed reduces. While some newer EVs will be able to charge at much higher power levels, they can only sustain the highest charge rates across a smaller SOC range. Whilst it is expected that battery EV charging capability will further improve in the future, research

[24] Reuters, 'Exclusive: Tesla readies revamp of Model Y codenamed 'Juniper'' (2023). https://www.reuters.com/business/autos-transportation/tesla-readies-revamp-model-y-codenamed-juniper-sources-2023-03-01/
[25] BBC News, 'UK new car sales hit 30-year low but electric vehicle demand soars' (2023). https://www.bbc.co.uk/news/business-64165689
[26] GlobeNewswire, 'Global Electric Vehicles Market Report 2023: Localizing the EV Supply Chain Remains Crucial for Sustainable Growth of EVs' (2023). https://www.globenewswire.com/news-release/2023/02/28/2617465/0/en/Global-Electric-Vehicles-Market-Report-2023-Localizing-the-EV-Supply-Chain-Remains-Crucial-for-Sustainable-Growth-of-EVs.html
[27] WhichEV, 'Public EV charging prices increase 14% since June according to Zap-Map' (2022). https://www.whichev.net/2022/11/14/public-ev-charging-prices-increase-14-since-june-according-to-zap-map/#:~:text=The%20price%20EV%20drivers%20are,charge%20points%20in%20the%20UK.
[28] The Guardian, 'Electric car owners to pay road tax from 2025, Jeremy Hunt announces' (2022). https://www.theguardian.com/uk-news/2022/nov/17/electric-car-owners-to-pay-road-tax-from-2025-jeremy-hunt-autumn-statement

shows that maximum power levels of up to 150kW are likely to be sufficient for most EV cars and light vans.

- **Price:** Analysts predict a continuation in the progressive trends of EV adoption (43% increase in global EV sales in 20208). Given these projections, it can be reasonably assumed that new EVs will become more affordable, and the second-hand market will expand making EVs a viable choice for a wider range of consumers.

4.3 Market Challenges

4.3.1 Analysis of market trends revealed a range of challenges to LTAs seeking to promote EV uptake and deliver an EVCI network to meet future demand. These challenges are shown in Figure 12.

Figure 12: EV market challenges.[29][30][31][32]

[29] HM Government 'Taking Charge: The Electric Vehicle Infrastructure Strategy' (2022). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1065576/taking-charge-the-electric-vehicle-infrastructure-strategy.pdf

[30] Electrifying.com, 'Why wait? How to beat the queue for a new electric car' (2022)https://www.electrifying.com/blog/article/waiting-times-for-electric-cars

[31] The Guardian, 'Electric car owners to pay road tax from 2025, Jeremy Hunt announces' (2022). https://www.theguardian.com/uk-news/2022/nov/17/electric-car-owners-to-pay-road-tax-from-2025-jeremy-hunt-autumn-statement

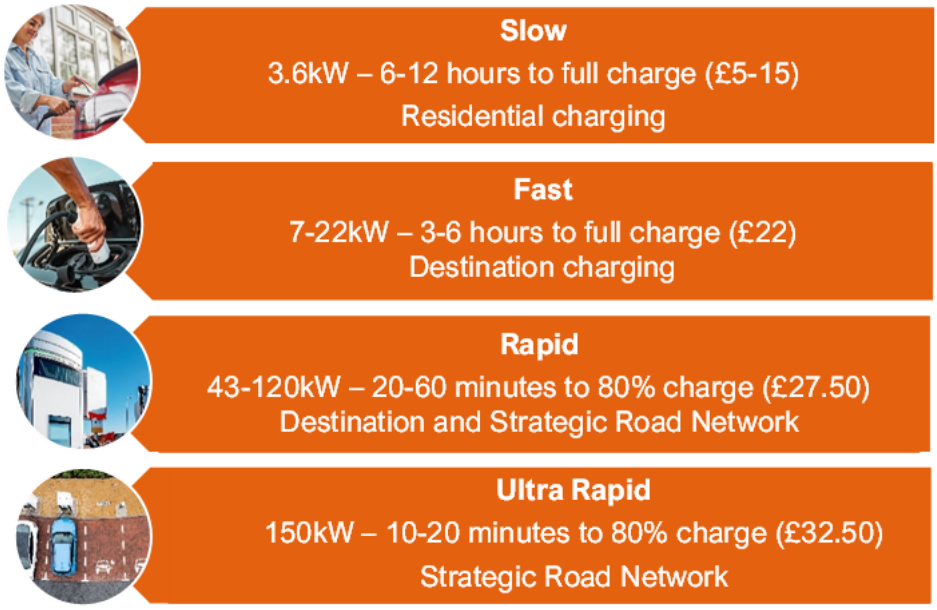
[32] Fleetworld, 'Used EV prices soften but many models outperform market' (2023). Used EV prices soften but many models outperform market (fleetworld.co.uk)

4.4 Current EV Infrastructure

EV Chargepoints and Charging Hubs

4.4.1 EV and EVCI technologies are evolving rapidly. A variety of EV charging technologies are now available on the market to support the different requirements of vehicles, sites, and standards. The main types of EV chargers, their typical charging times, cost of charge[33]and use cases are outlined in Figure 13.

Figure 13: Types of EV chargers.



4.4.2 The cost to an EV driver to charge increases significantly as higher power chargers are used. These costs are highly dependent on energy costs and have increased due to the current energy crisis. Some public CPOs briefly charged £1 per kWh in 2022 for a rapid charger[34], before public pressure reversed this rise. Despite this, charging an EV is still cheaper than refuelling a petrol or diesel vehicle. Several price comparison calculators are available to quantify this exact savings and research suggests that the average driver could save over £500 per year in fuel costs[35]. This fuel saving is for an EV owner who charges at home, they will pay 11p / mile compared to an ICE vehicle costing 17p/mile[36].

4.4.3 Figure 14 shows the differences between a chargepoint unit and a chargepoint station (also called a hub). A chargepoint unit is for a single car use. A chargepoint station provides charging access for multiple EVs simultaneously.

[33] PodPoint, 'Cost of Charging an EV' (2022). https://pod-point.com/guides/driver/cost-of-charging-electric-car
[34] FleetNews, 'Energy cost rise increases rapid charging rate by 50%'(2022). https://www.fleetnews.co.uk/news/latest-fleet-news/electric-fleet-news/2022/09/15/energy-cost-rise-increases-rapid-charging-to-1-per-kwh
[35] ZapMap, 'Charging on the public network' (2022). https://www.zap-map.com/charging-price-index/
[36] ZapMap, 'Charging on the public network' (2022). https://www.zap-map.com/charging-price-index/

Figure 14: Types of charging station.

4.4.4 Dedicated EVCPs can have different charging speeds, sockets and power supplies. A suitable location for an EVCP is determined by many things, including its power rating, which dictates the speed of charge. Specifications of EVCPs available in the marketplace are also differentiated by their communication protocol, type, and number of charging outlets, as well as aesthetics.

4.4.5 The cost of the EVCP hardware is one element of the total EVCI installation costs. Electrical infrastructure, planning and design, construction, and DNO connections all contribute to the total cost of installation. EVCI with higher power requirements will typically cost more and take longer to deliver. This is because more electrical infrastructure (e.g., transformers, substations), design work, and DNO support (e.g., to supply power to the site) is required. Table 9 presents guidance produced by UKPN[37] with indicative DNO connection costs for different EVCI installations.

Table 9: UKPN guidance for different types of chargepoints.

Scenario	DNO connection cost	Time to Deliver	Space Requirements
Installing a charger to an existing streetlight	N/A	Quick	Minimal
Installing an on-street charger	£5k - £10k	8-12 weeks	Small
Installing a charger at a car park	£10k+	8-12 weeks	Medium (2m x1m)
Installing multiple 150KW rapid chargers	£100k+	12-16 weeks	Large (minimum 5mx4m)
Installing 10 x 150kW rapid charger (1.5 – 2MVA)	£150k	16 weeks+	Large (x2) (minimum (x2) 5mx4m)
Installing 15+ 150kW rapid chargers (2 – 5 MVA)	£400k	20 weeks+	Large (x2) (minimum (x2) 5mx4m)

[37] UK Power Networks, 'Electric Vehicle Scenario Guide', (2020). https://media.umbraco.io/uk-power-networks/xqbp5u1p/ev-scenarios-may-2020.pdf

Residential EV Charging

4.4.6 Research carried out by Element Energy showed that approximately 75% of all charging events occur overnight at home[38]. This highlights the importance of charging provision at residential locations. However, 60%[39] of homes in the UK do not have access to a private driveway to park their vehicle overnight (e.g terraced housing, tower block flats, apartment buildings). In these situations, EV users would find it more difficult to install private residential EVCPs and would instead be more reliant on on-street or community hub EVCPs, or workplace / destination charging.

4.4.7 Research shows that on-street EVCPs could facilitate approximately 48%[40] of all private EV charging events. Furthermore, using residential EVCPs was shown in Figure 13 to be the cheapest method for charging an EV on the public EVCI network. For these reasons, establishing an extensive residential EVCI network in the TfSE area will be essential to ensure inclusive access to EVCI and supply future demand across the region. It will provide potential EV users with confidence in the availability of EVCI, which in turn will promote EV adoption. The tables below, cover the advantages and disadvantages of different types of on-street EVCPs that are currently available.

Table 10: Residential Charging - Lamppost Mounted EVCPs.

Lamppost Mounted EVCPs	Advantages	Disadvantages
	Utilises existing physical and electrical infrastructure. Avoids issues surrounding accessibility and street clutter. Quick installation - can be completed in a matter of days. Low capital costs, further reduced through government funding (e.g., ORCS) and private operator agreements.	Often discreet with minimal signage, there is an increased risk that parking bays may be taken by non-EVs, blocking access to the EVCP. Long time to charge. Constrained by existing power supply to the lamppost which is often less than a slow (3.6kW) EVCP. Lampposts situated at the back of the footway can create a trailing cable trip hazard.

[38] Element Energy, 'EV Charging Behaviour Study' (2019). http://www.element-energy.co.uk/wordpress/wpcontent/uploads/2019/04/20190329-NG-EV-CHARGING-BEHAVIOUR-STUDY-FINAL-REPORT-V1-EXTERNAL.pdf

[39] Office for National Statistics, 'Over half of younger drivers likely to switch to electric in next decade' (2021). https://www.ons.gov.uk/economy/environmentalaccounts/articles/overhalfofyoungerdriverslikelytoswitchtoelectricinnextdecade/2021-10-25

[40] The Energy Saving Trust, 'Charging Electric Vehicles' (2019). https://energysavingtrust.org.uk/sites/default/files/23465-EST%2BDFT-Charging%20Electric%20Vehicles%20-%20Best%20Practice%20Guide-WEB.pdf

Table 11: Residential Charging - Bespoke EVCPs.

Bespoke EVCPs

Advantages	Disadvantages
Ability to use recycled street furniture, such as bollards and signposts, which reduces costs, street clutter, and the embodied carbon. Have low power requirements and can be connected to existing infrastructure with minimal power reinforcement. Quick installation - can be completed in a matter of days. Low capital costs, further reduced through government funding (e.g., ORCS) and private operator agreements.	May require new physical infrastructure to house the electronics. Requires new electrical connections. Additional civils work to install. Reduces width of footway and accessibility.

Table 12: Residential Charging - Pop Up Columns.

Pop Up Columns

Advantages	Disadvantages
When not in use, has minimal visual impact and no reduction in footway width. Can be future proofed by providing excess capacity to supply additional or higher power EVCPs.	New electrical connections will be required. Requires additional civils. Can be difficult to locate. Reduces width of footway when in use, reducing accessibility.

Table 13: Residential Charging - Standard Chargepoints Installed on a Build Out.

Standard Chargepoints Installed on a Build Out

Advantages	Disadvantages
Does not impact accessibility as the buildout doesn't reduce the size of the footway. Newly installed power connections can ensure that EVCPs supply multiple charging sockets. Can be future proofed to provide excess capacity to later supply additional or higher power EVCPs.	New electrical connections will be required. Increased civils required to install into the carriageway. Reduces parking availability.

Table 14: Residential Charging - Wireless Charging.

Wireless Charging

Advantages	Disadvantages
Automated and hands-free – providing the highest levels of safety, convenience and accessibility. Operational through rain, snow, ice, mud, and leaves with no loss in efficiency. Minimal additional street furniture and impact on accessibility.	Costly installation and high procurement costs for the hardware. Current vehicle technology does not enable wireless charging without adaptation and there is uncertainty over the ability to retrofit. Certain vehicles would require major redesign to ensure ground clearance.

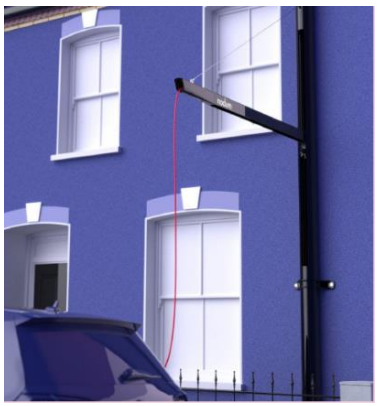
Table 15: Residential Charging – Bollard Chargers.

Bollard Chargers

Advantages	Disadvantages
Maximum protection against damage and vehicle collisions. Newly installed power connections can ensure that EVCPs can supply multiple charging sockets. Can be future proofed by providing excess capacity to later supply additional or higher power EVCPs for future demand.	New electrical connections will be required, increasing installation costs and time. Requires additional civils to install such as trenching, feeder pillars and associated traffic management. Additional street clutter.

Table 16: Residential Charging – Chargebridge.

Chargebridge



Advantages	Disadvantages
An innovative on-street solution that avoids EV charging cables obstructing footways entirely. The system can be installed on dense terraced streets using existing lampposts or being connected to properties. Home, on-street, residential, and workplace charging applications.	The system is in early stages of development and not yet available for commercial roll-out. The solution is currently untested on a large scale. May not be suitable for areas with high parking demand due to difficulties accessing the charger.

4.4.8 Unlike off-street, installation of EVCI on-street presents the following additional challenges and considerations:

- Residents will be particularly impacted by EVCI installed outside their homes, therefore public consultation is especially important to avoid potential push back and potential reputational damage.

- There should be minimal additional street furniture – so called 'street clutter' has been shown to be unpopular among residents.
- Pavements must be wide-enough (at least 1.2 meters) so that infrastructure can be installed without impacting accessibility (e.g., wheelchair users).
- Usage and payment accessibility must be considered for all user groups.
- Infrastructure must be robust against vandalism and accidental damage (e.g. bollards).
- EVCPs should be located within a 3-minute walk from EV users' homes' to be used regularly.
- Street work licenses and traffic regulation orders must be considered as they can result in overall time and cost implications.
- The physical environment, hardware and user experience must also reflect the new PAS 1899:2022 accessibility standard[41].
- LTAs may need to consider the development of kerbside strategies to avoid ICE vehicles parking in EV bays which would otherwise block access to chargepoints for EV drivers wishing to charge.

4.4.9 It is important to understand the advantages and disadvantages of different types of EVCP, as different options may be better suited for a particular location. Streetscape, restrictions on parking bays, and other environmental factors must be considered to ensure the most accessible and convenient EVCP is installed. Time and cost are other factors to consider which may vary between each local authority.

4.4.10 It is important to engage with the two DNOs, UKPN and SSEN, that operate within the TfSE region in order to understand power availability at potential EVCI sites and ensure the works avoid unnecessary and unexpected complications, delays and costs. Both DNOs have committed in their EV strategies, covered in Section 3.3, to support local authorities to achieve plan and deliver on their EVCI ambitions.

4.4.11 Although TfSE will not be responsible for delivering on-street EVCI, clear and consistent guidance will play a valuable role in supporting LTAs develop a long-term EVCI rollout plan. This may include:

- Providing a platform for communicating lessons learned and best practice across the LTAs.
- Developing a framework to identify and prioritise different locations for EVCI installation, based on specific data from the site and local authority.
- Connecting LTAs with key stakeholders, including DNOs, CPOs, and EVCI specialists.
- Identifying new and available capital funding opportunities through central government and private organisations to alleviate financial commitment on the LTAs.
- Supporting local authorities select an appropriate EVCI operating models, covered in Section 4.4, based on fund availability and risk appetite.

4.4.12 Due to each type of EVCP having challenges to their implementation and use, it unlikely that a single model or type of can be applied across the entire TfSE area. Figure 15 below, presents case studies on the approach taken by two LTAs in the TfSE area.

[41] Urban Foresight, 'Guidance On Improving Electric Vehicle Charging Infrastructure', (2021). Plymouth-Accessibility_v3.pdf (urbanforesight.org)

Figure 15: Case studies.[42]

Brighton and Hove City Council

Brighton and Hove City Council have taken a lead in EV infrastructure rollout in the TfSE region. Over 350 chargepoints have been installed with funding provided by OZEV, and investment from Electric Blue who were chosen to install, maintain and manage the chargepoints. This is to align with obligations set out in the Oxford's City Council's Charter for cleaner air, which Brighton and Hove Council have signed to call on the UK Government to put air quality as a priority. The Charter also results in the chargepoint operator, Electric Blue, using 100% renewable electricity tariffs. Residents and visitors can find the nearest chargepoints on the Electric Blue app. Charging costs 39p per kWh, with the council receiving 1p per kWh in year one, rising to 4p per kWh in year four. All chargepoints are fed by 100% renewable energy. Brighton and Hove have implemented parking restrictions to promote EV uptake. The council offers a 50% discount for resident parking permits for eligible low emission vehicles and 18 mandatory rapid EV vehicle recharging parking bays have been marked across the city. Brighton and Hove have also taken into consideration taxi driver EV uptake, offering three rapid taxi charging hubs. To increase inclusivity in EV uptake, Brighton and Hove City Council have also started a new project to soon trial EVCPs designed to be accessible for disabled people, working with Electric Blue, and Disabled Motoring UK.

This case study came from the Parking Strategy and Contracts Manager at Brighton and Hove City Council.

Bracknell Forest Council

In partnership with EV charging infrastructure designers and installers Joju Charging, and their funding partner and EVCP operator Mer UK, the council is installing 32 charging points in 11 car parks. The 22kW chargers are open for all to use, including residents without off-street car parking living nearby. The type 2 chargers cost EV drivers 39p per kWh to use, and payment can be made via the Mer UK app, or by following the instructions on the charge point.

The source for this case study is https://www.bracknell-forest.gov.uk/news. References to prices per kWh were correct at the time the article was written.

Operating models

4.4.13 This section describes the business operating models, which include the procurement, installation, operation and maintenance of charging points. These operational models can be complex and due to the on-going technology development, there are several different bespoke methods and models available. The typical public / private operating models are shown in Table 17 and the key elements of each outlined in Table 18.

[42] Brighton and Hove City Council, 'Over 200 electric vehicle charging points for Brighton and Hove' (2020). https://www.brighton-hove.gov.uk/news/2020/over-200-electric-vehicle-charging-points-brighton-hove#:~:text=Electric%20vehicle%20owners%20looking%20to,in%20the%20next%20few%20weeks.

Table 17: Types of operating models.

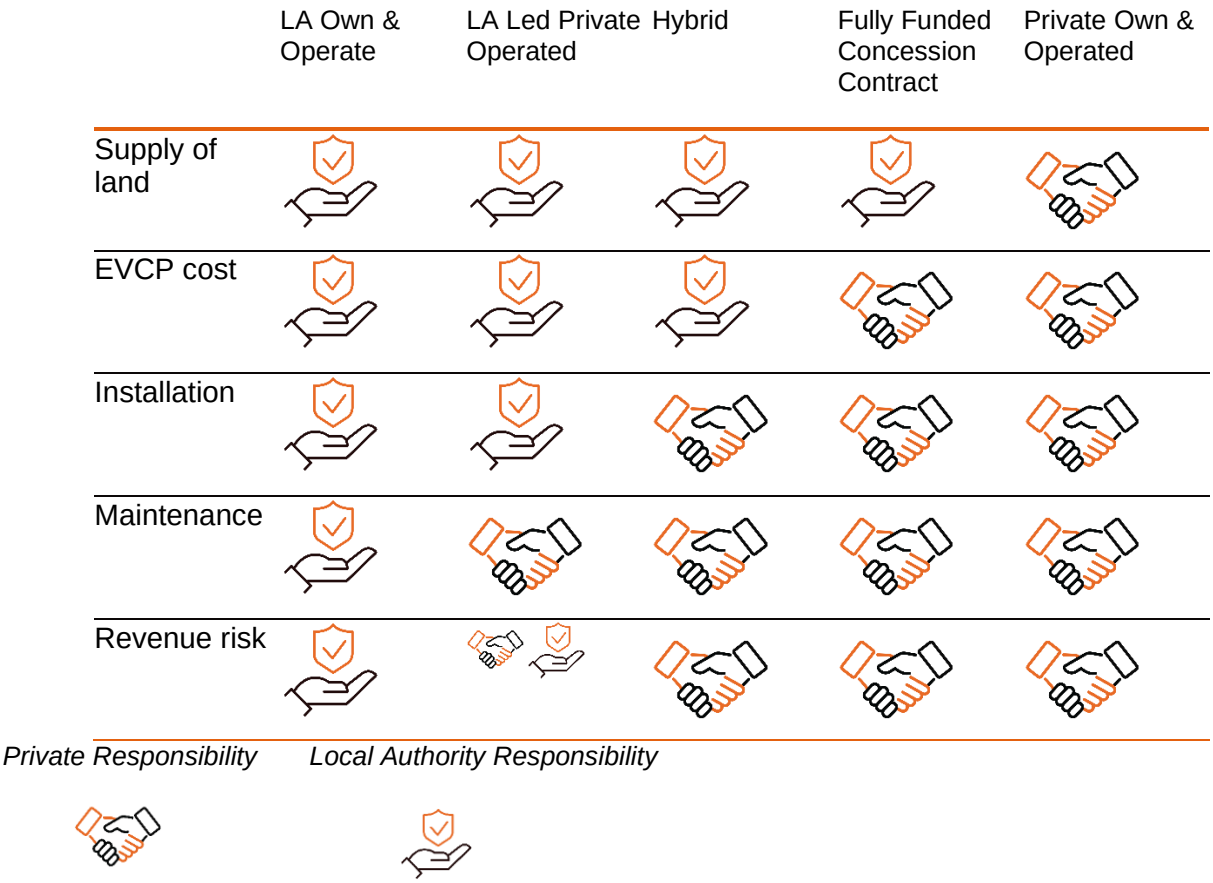


Table 18: Operating models.

Model type	Advantages	Disadvantages
LA Own & Operate	• Charging infrastructure assets owned and operated by LA. • LAs have control over EVCPs e.g., location and pricing. • LAs receive all revenue generated.	• This can be a higher-risk and higher-cost option for LAs due to taking on the responsibility for ongoing maintenance. • This may require helpline support for the chargers.
LA Led & Private Operated	• LA only has to cover capital costs of installation, which can be heavily subsidised through government capital funding. • LA retains ownership of the assets while passing operational risks to the private organisation. • Revenue sharing can be built into contracts with the operator.	• LA must pay a fee or agree revenue share with the private company operator. • LA will still be responsible for covering any major upgrades or network costs. • Convenience of outsourcing responsibilities comes at a cost higher than it would if the EVCP was LA operated.
Fully Funded Concession Contract / Hybrid	• Private operators cover all the capital and operating costs of the project and taking on the operating risks. • Low upfront costs for LAs while keeping a degree of control over operation.	• The LA has limited ownership of the assets. • LA must be willing to hand over public land to private organisations.

Model type	Advantages	Disadvantages
Private Own & Operated	• EVCPs installed and operated at minimal upfront costs to the LA. • No operational risk to the LA.	• LA has limited control over EVCP which could lead to issues surrounding inflated charging costs and maintenance issues.

4.4.14 TfSE can support LTAs in selecting an operating model that appropriately balances the risks and rewards of EVCI. This can include developing a framework that will provide guidance on each model and when they are most appropriate.

4.4.15 Private sector funded operating models can be secured via the development process. Planning and related policies can be developed and used by LTAs to ensure that EVCPs are integrated within new developments from the design stage. This ensures that chargepoints are conveniently placed and are less expensive and disruptive than installing chargepoints at a later date[43].

Capital Funding

4.4.16 Government grants, end user charges and private funding are all options that can be explored to either fund or recover capital costs for installing EVCI. The private sector CPOs have also invested in the UK's EV charging infrastructure with a business model focused on revenue returns through charged usage.

4.4.17 The Office for Zero Emission Vehicles (OZEV) offers a range of grants, incentives, assistance, and funding to help people make a switch to EVs. LTAs can also seek funding from OZEV. Table 19 sets out the current funding available.

[43] Energy Saving Trust, 'Incorporating EV chargepoints into local planning policies for new developments' (2020). https://energysavingtrust.org.uk/wp-content/uploads/2020/10/EST0013-Local-Authority-Guidance-Document-Incorporating-chargepoints-into-local-planning-policies-WEB.pdf

Table 19: Capital Funding Opportunities.

Funding	Description
Rapid Charging Fund (RCF)[44]	• Part of a £950 million fund to future-proof electrical capacity at motorway and major A road service areas. • Available to fund a portion of costs at strategic sites in cities and rural areas across the strategic road network where the costs of upgrading sites to meet future charging demand is not commercially viable. • To help businesses with the costs of connecting high-powered chargepoints to the electricity grid, where those costs would prevent private sector investment.
Local EV Infrastructure Fund (LEVI)[45]	• The £450 million fund has been launched to help LTAs leverage private sector investment into their public charging networks and roll-out long-term, sustainable EVCI. • Nearly £20 million from government and industry funding for pilot schemes and a further £10 million for existing chargepoint schemes. • Kent County Council and West Sussex have each secured funding from the first and second tranches of pilot funding.
On-Street Residential Chargepoint Scheme (ORCS)[46]	• This fund provides LTAs access to grant funding that can be used to part-fund the procurement and installation of on-street EV chargepoint infrastructure. • The new LEVI fund builds on the success of the On-Street Residential Chargepoint Scheme (ORCS) and growing demand from LTAs, with a further £10 million in funding brought forward for this year, bringing this year's ORCS funding to £30 million. • Amendments have been made to the scheme to ensure more LTAs benefit from the funding, improve the consumer experience of charging and allow for chargepoint installations on more types of suitable land. • Over 1,000 on-street chargepoint applications have been approved in the South East region[47]
EV Chargepoint Grant[48]	• From April 2022, as part of the replaced Electric Vehicle Homecharge Scheme (EVHS), the government offered an EV chargepoint grant to landlords for single use, multi-use and commercially let properties that have parking dedicated for staff use or fleet use of the tenant or prospective tenant. • This funds 75% of the total cost of buying and installing an OZEV approved chargepoint, up to a maximum of £350 per socket installed. This grant is also open to people who live in rental accommodation or own a flat. • Over 50,000 chargepoints have been installed in the South East region from the grant.49
The Workplace Charging Scheme (WCS)[50]	• Funding towards the cost of the purchase and installation of EVCPs at workplaces. The scheme can be applied for by any eligible business, charity or public sector organisation. • The Government is expected to continue to fund the WCS until at least 2024/25.

[44] Gov.uk, 'Rapid charging fund' (2021). https://www.gov.uk/guidance/rapid-charging-fund
[45] Gov.uk, 'Apply for local electric vehicle infrastructure (LEVI) pilot funding' (2022). https://www.gov.uk/government/news/drivers-to-benefit-from-20-million-ev-chargepoint-boost
[46] Gov.uk, 'On-Street Residential Chargepoint Scheme guidance for local authorities' (2022). https://www.gov.uk/government/publications/grants-for-local-authorities-to-provide-residential-on-street-chargepoints/grants-to-provide-residential-on-street-chargepoints-for-plug-in-electric-vehicles-guidance-for-local-authorities
[47] Gov.uk, 'Electric vehicle charging device grant scheme statistics: October 2022' (2022). https://www.gov.uk/government/statistics/electric-vehicle-charging-device-grant-scheme-statistics-october-2022
[48] Gov.uk, 'Grant schemes for electric vehicle charging infrastructure' (2022). https://www.gov.uk/government/collections/government-grants-for-low-emission-vehicles
[49] Gov.uk, 'Electric vehicle charging device grant scheme statistics: October 2022' (2022). https://www.gov.uk/government/statistics/electric-vehicle-charging-device-grant-scheme-statistics-october-2022
[50] Gov.uk, 'Workplace Charging Scheme: guidance for applicants' (2022). https://www.gov.uk/guidance/workplace-charging-scheme-guidance-for-applicants

4.4.18 TfSE will support LTAs access this capital funding by:

- Providing a platform for lessons learned and best practice regarding funding applications to be shared and discussed across the local authorities.
- Liaison with EST regarding their support to LTAs in developing funding applications.
- Providing visibility to available and upcoming capital funding opportunities where it is not already provided.
- Connecting authorities with key stakeholders including, DNOs, CPOs, and EVCI specialists to inform capital funding submissions.

4.5 Key Findings

4.5.1 In reviewing the market trends and challenges for EV adoption and EVCI, on-street charging provision presents a key challenge for LTAs. To overcome these challenges, there is a variety of EVCP types that LTAs can consider for installation at particular locations. For some, lamppost mounted EVCPs may be most suitable as they can use existing power connections and be quickly installed into retrofitted lampposts. However, in cases where new power connections are required or lampposts are poorly positioned on the footway, an alternative EVCP type would be better suited. On-street charging is a common problem globally, although innovations and new solutions will continue to appear on the market over the years ahead to address this challenge.

4.5.2 To balance the benefits and challenges of each operating model, TfSE should work in conjunction with LTAs to develop a guidance framework for authorities wishing to procure or contract a third party to do so.

4.5.3 An effective operating model clearly sets out the roles and responsibilities of all parties involved in the installation and operation of EVCI. LTAs must carefully select an appropriate model to balance ownership and control of assets, with costs and risks. This balance will differ depending on the availability of resources, the commercial attractiveness of the EVCI, and the appetite of the local authority to take on additional risk. Models also exist that offer agreements to share costs, revenue and risks between the LTAs and a private organisation.

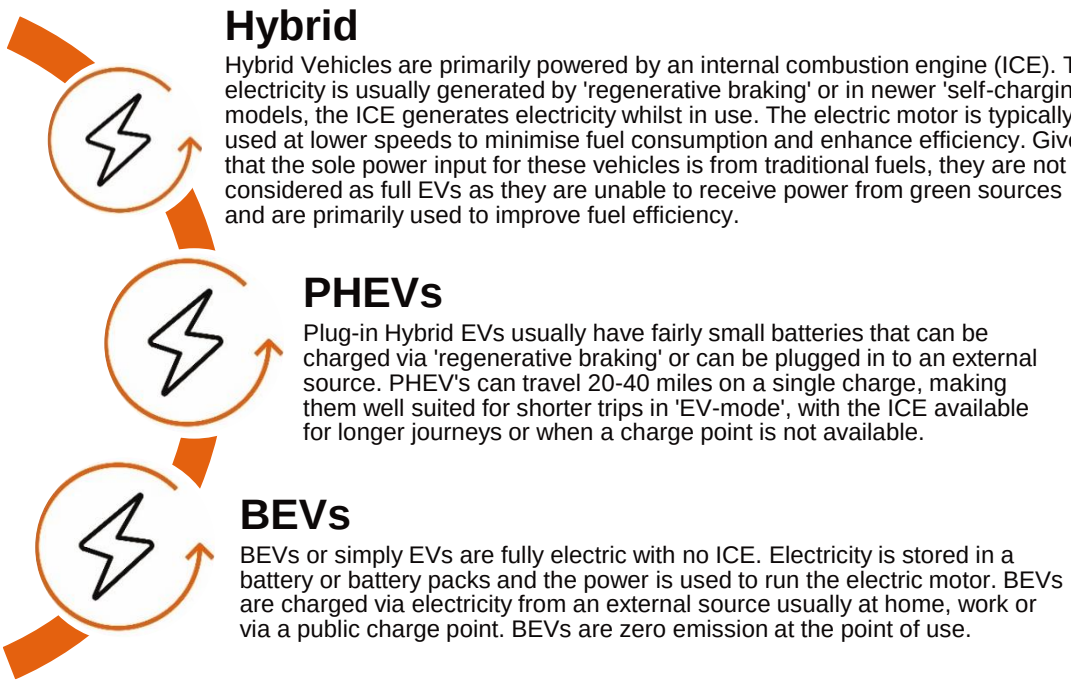
4.5.4 TfSE can guide LTAs to select appropriate operating models for their EVCI deployments, using lessons learned and knowledge of best practice from similar projects. TfSE will also facilitate a platform for local authorities to share their experiences and support each other in selecting the best model.

5 Baseline Context

5.1 Introduction

5.1.1 Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs) currently account for the majority of Ultra Low Emission Vehicles (ULEVs). Alternative fuels such as hydrogen and biofuels are currently at very early stages in terms of rollout and therefore have not been analysed in detail. Figure 16 describes the different types of EVs.

Figure 16: Types of ULEVs.



5.2 Process and Assumptions

5.2.1 DfT ULEV registration data from the sixteen LTAs has been analysed to establish a regional baseline position. Each dataset used, shown in Table 20, is publicly available and can be accessed through the DfT website[51].

[51] Gov.uk, 'Vehicle licensing statistics data tables' (2022). https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01

Table 20: DfT datasets used to establish the baseline.

Data Set	Description
VEH0132	Licensed ULEVs at the end of the quarter by fuel type, keepership (private and company) and upper and lower tier local authority: United Kingdom
VEH0105	Licensed vehicles at the end of the quarter by body type, fuel type, keepership (private and company) and upper and lower tier local authority: Great Britain and United Kingdom
VEH0134	ULEVs licensed at the end of the quarter by postcode district: Great Britain and United Kingdom

5.2.2 ULEV registration data can be broken down into BEV and PHEV registrations and was published between 2011 Q4 to 2022 Q1, the most recent published dataset at the time of analysis.

5.2.3 Company owned car and van registrations have been omitted from the baseline analysis, as these vehicles are predominantly parked for extended periods of time at offices and depots and would therefore have an opportunity to utilise workplace EVCI. The provision of workplace EVCI falls under the ownership of private companies and would not be the responsibility of LTAs. Therefore, ULEV registrations for the following vehicle types have been included to inform public EVCI forecasts with each LTA:

- Privately registered Cars
- Privately registered LGVs

5.2.4 Further detail on the process has been covered in Working Paper 3 – Baselining.

5.3 Headline Results

BEV Uptake

5.3.1 Year-end BEV and vehicle registration data from each LTA over the last full 5 years of data (2017 Q4 – 2021 Q4) is presented in Table 21, below. A comparison of growth in BEVs and population in each LTA can be found in Working Paper 3.

Table 21: LTA BEV registrations in the TfSE area.

LTA	2017	2018	2019	2020	2021	Increase 2017-21	BEV/Total Veh. Reg.
Bracknell Forest	58	94	138	233	456	686%	0.64%
Brighton and Hove	112	139	246	389	663	492%	0.68%
East Sussex	362	461	657	1,027	1,782	392%	0.58%
Hampshire	914	1,335	2,100	3,238	5,599	513%	0.67%
Isle of Wight	80	114	155	248	442	453%	0.55%
Kent	894	1,160	1,634	2,544	4,508	404%	0.54%
Medway	92	122	166	248	477	418%	0.34%
Portsmouth	34	55	96	155	276	712%	0.33%
Reading	67	98	155	230	369	451%	0.55%
Slough	48	59	85	135	246	413%	0.38%
Southampton	45	73	141	202	369	720%	0.36%

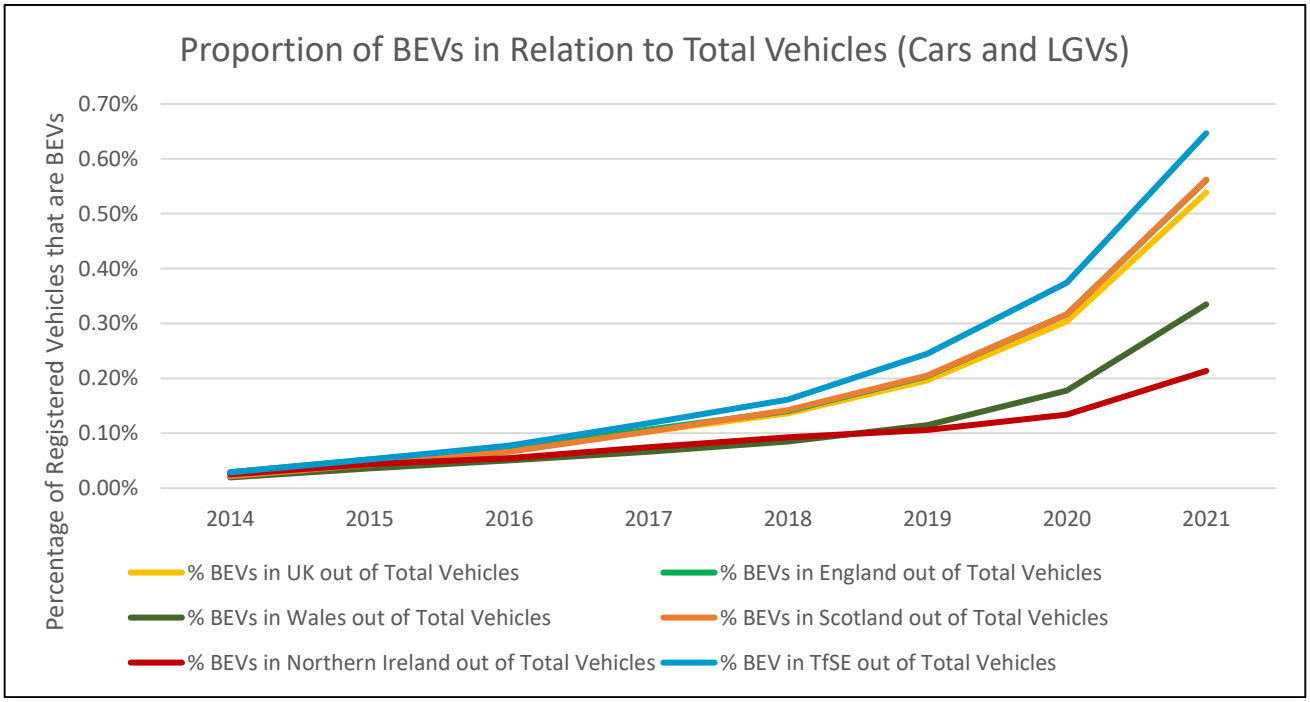
LTA	2017	2018	2019	2020	2021	Increase 2017-21	BEV/Total Veh. Reg.
Surrey	1,078	1,534	2,430	3,638	6,044	461%	0.88%
West Berkshire	139	188	318	443	762	448%	0.79%
West Sussex	541	739	1,112	1,726	3,089	471%	0.62%
Windsor and Maidenhead	154	200	305	433	782	408%	0.91%
Wokingham	143	216	369	567	996	597%	0.96%
TfSE area	**4,761**	**6,587**	**10,107**	**15,456**	**26,860**	**-**	**0.65%**

5.3.2 From Table 21, the following key observations for Q4 2021 data are:

- Highest number of BEVs registered – Surrey: 6,044 BEVs
- Least number of registered BEVs – Slough: 246
- Highest % BEV registrations of total vehicles registration – Wokingham 0.96%
- Lowest % BEV registrations of total vehicles registration – Portsmouth 0.33%

5.3.3 By 2021, BEVs accounted for 0.65% of total vehicles registered within the TfSE study area. Figure 17 shows this at the TfSE study area level alongside national values for the last 8 full years of data (2014 – 2021).

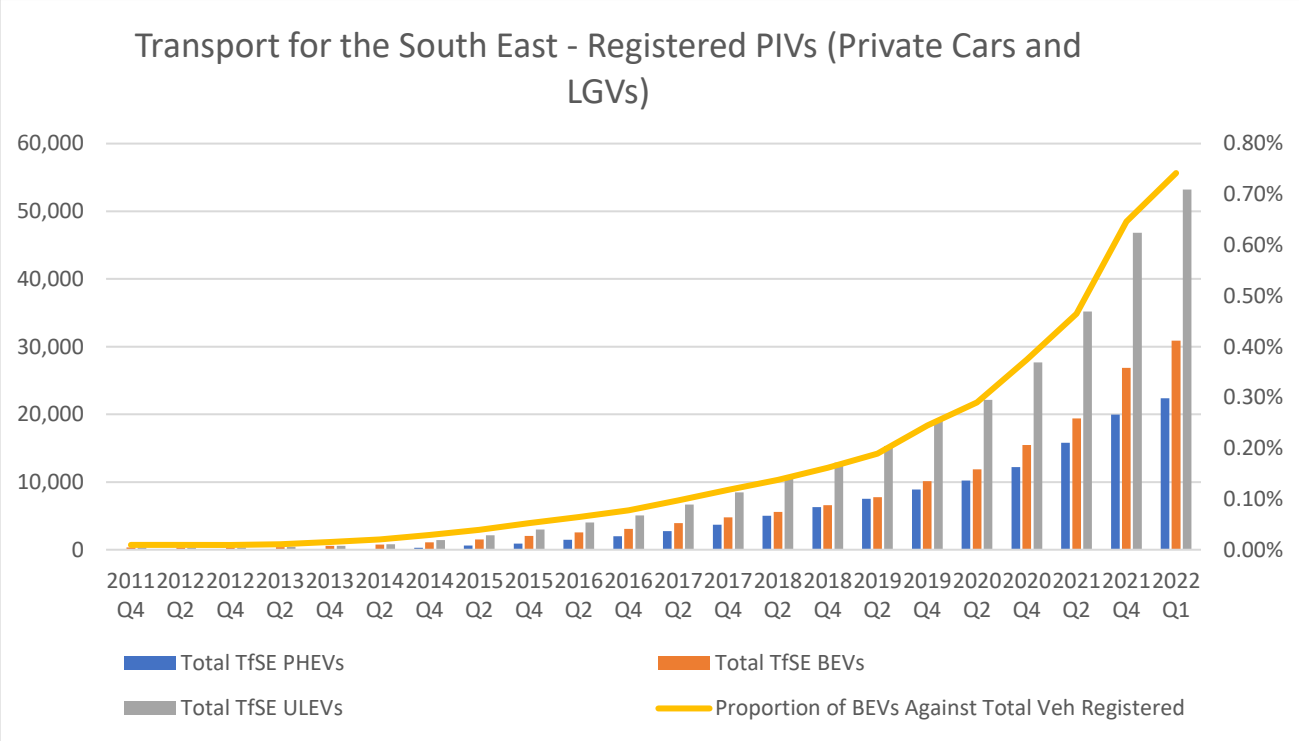
Figure 17: Registered BEVs for private cars and LGVs by nation and TfSE study area in the last 8 years.



5.3.4 BEV adoption has been increasing year-on year since 2014 across all countries in the UK, with Scotland and England leading the way. Since 2018, this increase has been accelerating and appears to be exhibiting exponential growth. BEV adoption across the TfSE study area has been higher than the home nations since 2017, and the gap appears to be growing.

5.3.5 Figure 18 below shows the total adoption of ULEVs, BEVs, and PHEVs for the TfSE region.

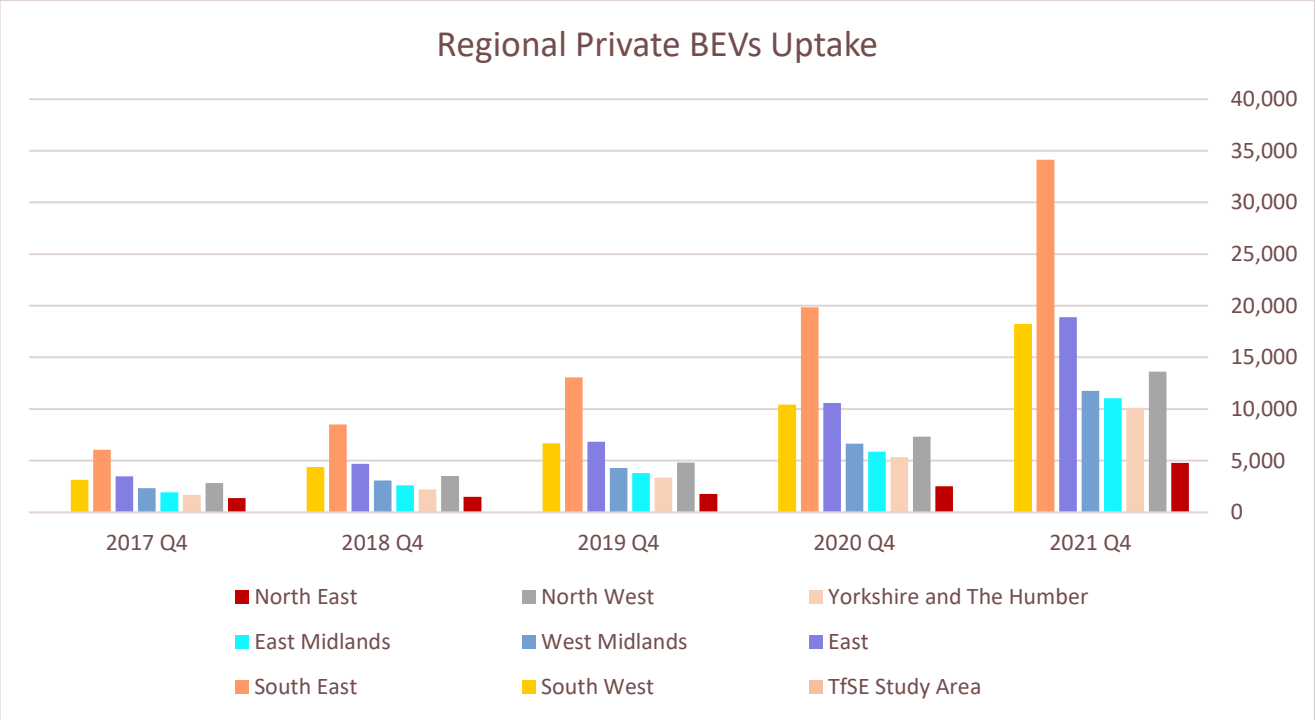
Figure 18: Registered Plug in Vehicles (PIVs) for private cars and LGVs and the proportion of BEVs against total registered vehicles.



5.3.6 This figure shows that BEV registrations are increasing rapidly in the TfSE study area (by approximately 9,000% since 2011 Q4) and that 30,879 BEVs were registered by 2022 Q1, representing 0.74% of all registered vehicles.

5.3.7 Regional BEV registrations are shown Figure 19. It should be noted that London has been excluded as an outlier, due to the impact that the Low Emission Zone has had on EV take-up. The South East region in Figure 19 is not identical to the TfSE region, as it includes data for Oxfordshire and Buckinghamshire which are not part of the TfSE area.

Figure 19 BEV registrations for private cars and vans by region in the UK.



5.3.8 Approximately 34,000 BEVs have been registered in the South East, higher than that of any other region in the UK. The South East has also experienced the greatest growth in BEV registrations in the UK, increasing by 463% since 2017.

Current and Planned EVCP Network

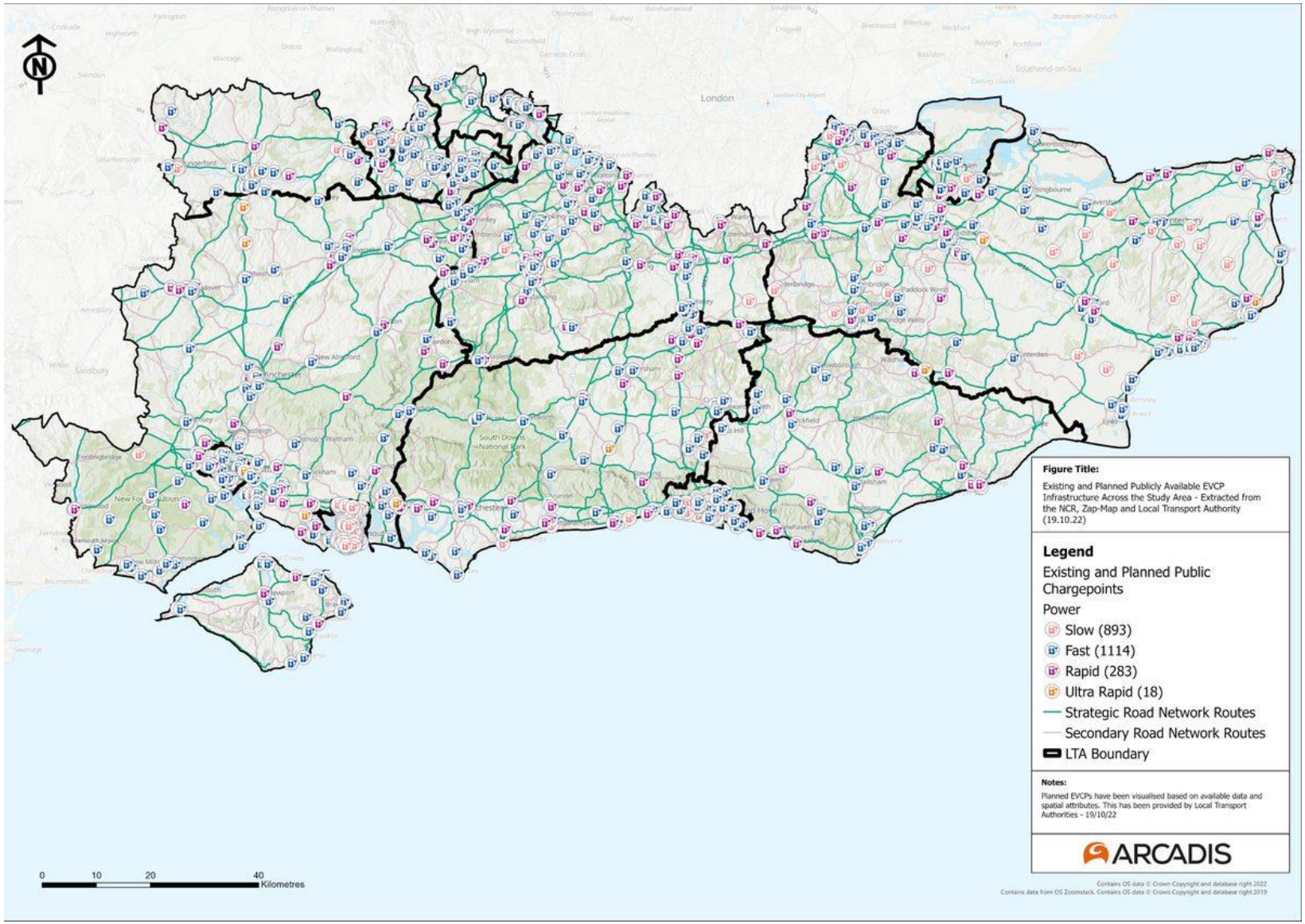
5.3.9 A baseline assessment of current public EVCI in the TfSE area has been conducted using open-source data, from the National Chargepoint Registry[52] and Zap-map's online tool[53]. This has also been validated and modified using data provided by LTAs. Details of planned EVCI has been provided by some LTAs. A list of LTAs that provided planned EVCP data is provided in Working Paper 3. The planned data includes EVCI with anticipated installation dates up to February 2023, corresponding with the date of completion for the TfSE EVCI strategy. The findings of this assessment are shown in Table 22 and Figure 20, below. Appendix B of Working Paper 3 includes a map for each LTA showing existing and planned EVCPs including those located on the SRN.

[52] National Chargepoint Registry https://chargepoints.dft.gov.uk/
[53] Zap-Map, 'EV Charging Statistics 2023' https://www.zap-map.com/statistics/#points

Table 22: Existing and planned chargepoints.

Type of EVCP	Existing EVCPs	Planned EVCPs	Existing & Planned EVCPs
Rapid/Ultra-Rapid	294	7	301
Fast	1,050	64	1,114
Slow	526	367	893
Total	**1,870**	**438**	**2,308**

Figure 20: Existing and planned publicly available EVCPs across the TfSE area (October 2022).



5.3.10 Figure 20 shows that the existing and planned EVCPs are concentrated around the outskirts of London, and other large cities in the TfSE area, such as Brighton and Hove, Southampton and Portsmouth. In more rural areas, Kent has a high proportion of ultra rapid EVCPs, while other rural areas in TfSE have fast or rapid EVCPs. The more rural chargers are located on the Strategic Road Network.

Table 23 Privately Registered BEVs and public EVCPs in the LTAs (October 2022).

LTA	Privately registered BEVs	Existing EVCPs	Planned EVCPs	BEVs:Existing	BEVs:Existing & Planned*
Bracknell Forest	524	48	-	11:1	11:1
Brighton and Hove	744	251	69	3:1	2:1
East Sussex	2,032	102	-	20:1	20:1
Hampshire	6,443	308	-	21:1	21:1
Isle of Wight	485	26	-	19:1	19:1
Kent	5,234	286	31	18:1	17:1
Medway	537	43	-	12:1	12:1
Portsmouth	316	175	300	2:1	1:1
Reading	415	33	-	13:1	13:1
Slough	278	13	-	21:1	21:1
Southampton	423	68	-	6:1	6:1
Surrey	6,968	204	-	34:1	34:1
West Berkshire	856	83	-	10:1	10:1
West Sussex	3,554	174	-	20:1	20:1
Windsor and Maidenhead	920	28	-	33:1	33:1
Wokingham	1,150	27	38	43:1	18:1
Total	**30,879**	**1,870**	**438**	**16.5:1**	**13:1**

**Ratios have been calculated including current and planned public EVCPs within the LTA*

5.3.1 As BEVs are wholly dependent on EVCI (as opposed to PHEV having petrol / diesel backup) the number of BEVs have been presented initially. The ratio for the number of BEVs per public EVCP for each of the sixteen LTAs is presented in Table 23. This uses the latest available data for the number of BEVs registered by 2022 Q1 against the total number of public chargepoints, both existing and planned, as of October 2022. This has been captured as the ratio at a singular point in time and needs to be treated with caution given the rapid increase in the number of BEVs registered and EVCPs being installed. The planned EVCP data was sourced from LTAs via an information request early in the development of the strategy.

5.3.2 The existing EVCP data shows the ratios range from 34:1 in Surrey to 2:1 in Portsmouth. If including the 300 planned EVCPs, the data shows that Portsmouth will have a ratio of 1:1 BEVs to EVCPs. It is important to note that this data only includes privately registered BEVs. Therefore, when including company registered BEVs the ratios may increase significantly, but additional EVCI will be available from company fleet operators so it is assumed to have no net change to the BEV:EVCP ratio.

5.3.3 According to the Society of Motor Manufacturers and Traders (SMMT), Britain's ratio of BEVs:EVCPs is one of the lowest among the top 10 global EV markets[54]. In 2020, Britain's ratio was 16:1, dropping from 11:1 in 2019. The International Energy Agency (IEA)[55] has set a recommended level of 10:1 BEVs:EVCPs which should be considered a best-in-class aspiration for the TfSE area to reach. Table 24 shows the ratio for the TfSE area in 2022 which is similar to Britain's ratio in 2020. These ratios should be treated with caution as they are a snapshot in time and only include privately registered electric vehicles for the TfSE area.

Table 24: ZapMap figures for EVCP and BEVs in the TfSE area and the UK in 2022.

	BEVs registered by Q1 2022	Public EVCP in use (as of Oct 2022)	Ratio of BEVs:EVCPs
TfSE Study Area	30,879	1,870	16.5:1
UK	620,000	37,851	16.4:1

Substation Capacity

5.3.4 The power availability at potential EV charging locations is often the limiting factor in the design of an EV charging network. Costs of new Distribution Network Operator (DNO) connections can be expensive depending upon the location, power requirements and condition of existing grid infrastructure. Therefore, careful network planning and consideration of grid capacity is required to ensure that new EV infrastructure implementation is cost efficient.

5.3.5 UKPN and SSEN are the two DNOs that operate within the TfSE study area. The use of the most up to date data sources was used to inform the baseline assessment of existing grid capacity. However, it is noted that other demands may reduce available capacity in the interim, such as strategic development sites, and therefore future grid capacity is difficult to predict with any great confidence.

[54] SMMT, 'Car charging point numbers fall behind as plug in vehicles surge' (2021). Car charging point numbers fall behind as plug-in vehicles surge - SMMT

55 EV Adoption, 'What is the 'minimum acceptable' ratio of EVs to charging stations?' (2019). https://evadoption.com/what-is-the-ideal-ratio-of-evs-to-charging-stations/

5.3.6 A red-amber-green (RAG) classification based on a primary substations' current capacity was developed to identify which substations hypothetically need upgrading using a test case of flat level uptake in EV charging against each primary substation. Having assessed and rated the available capacity for all the primary substations across the TfSE study area, approximately 78% of the substations have been RAG rated as 'green' showing capacity above 3 Mega Volt Amp (MVA). There are 8% (38) of primary substations deemed to be rated as either 'red' or 'grey' indicating capacity between '0 and 1 (MVA)' and 'negative headroom capacity', respectively. The RAG ratings are summarised in Table 25, and shown in the map (Figure 22).

Table 25: RAG ratings of primary substations.

Available capacity	RAG Rating	Number of Substations
< 1 MVA	Red/Grey	36
1 – 3 MVA	Amber	64
> 3 MVA	Green	355

5.3.7 Figure 21 provides an illustration of how many chargepoints 1 MVA and 3 MVA can support in simultaneous use. For example, 1 MVA of capacity would only be sufficient to simultaneously power 14 rapid chargers and 2 ultra-rapid chargers.

Figure 21: Chargepoint power equivalent of MVA.

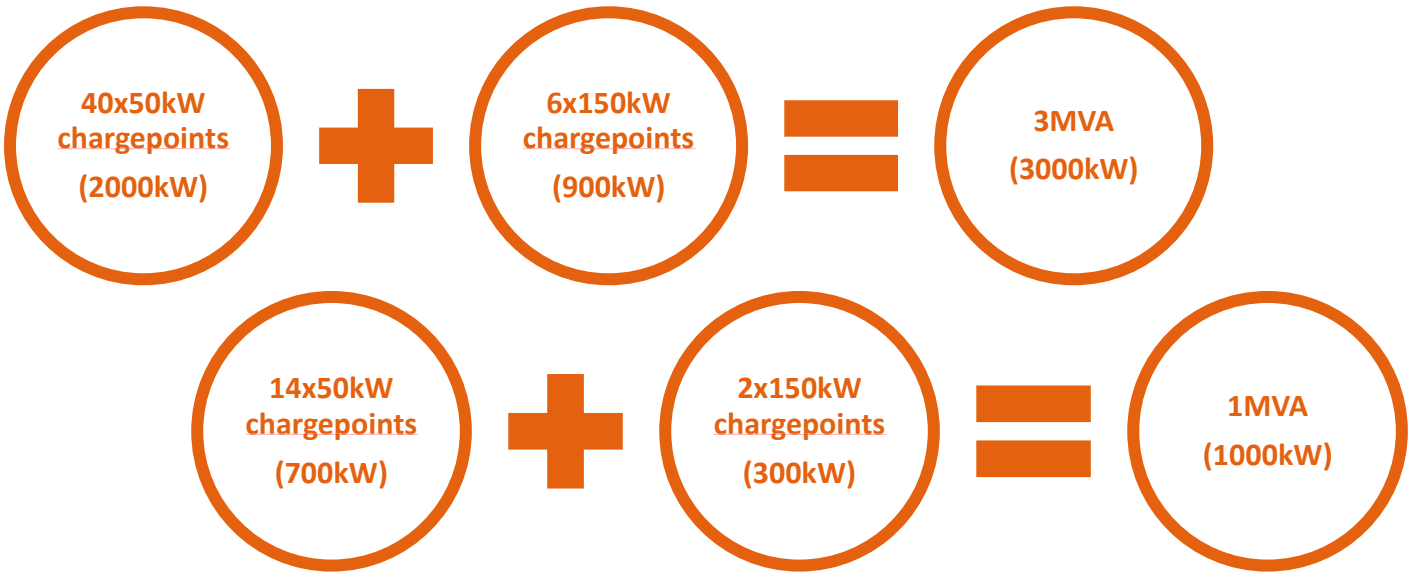
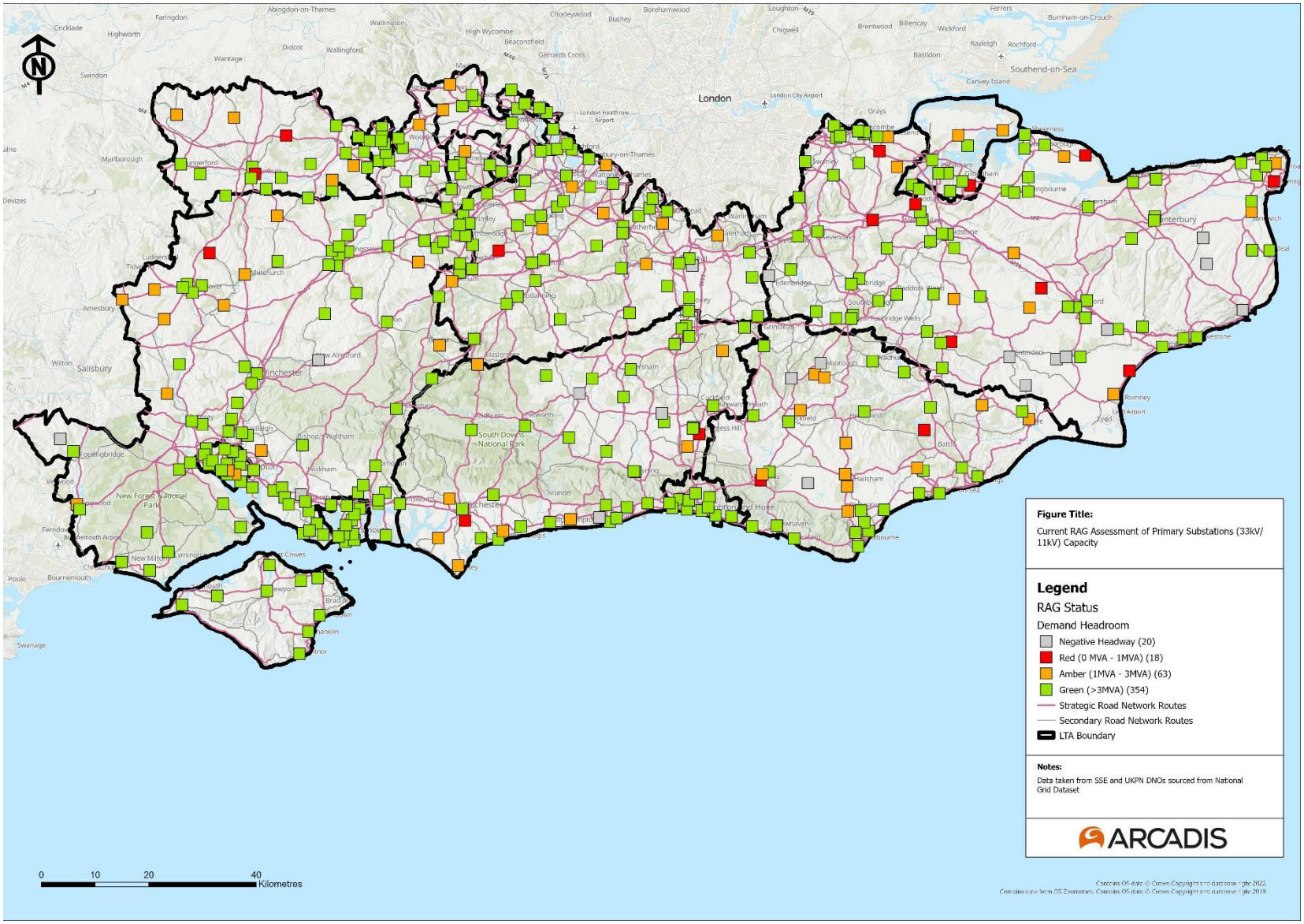


Figure 22: Current RAG assessment of primary substations within TfSE area.



5.4 Key Findings

5.4.1 At the start of 2022, there were just over 30,000 BEV registered private cars and vans within the TfSE area, which has increased by over 9,000% since 2011. BEV registrations in the TfSE area are exhibiting exponential growth and now make up 0.74% of total vehicle registrations in the region. The TfSE area and the South East region as a whole has the highest percentage of BEVs per vehicles registered of any region outside of London in the UK.

5.4.2 Data from the NCR, Zap-Map, and the LTAs was used to review existing and planned EVCPs within the TfSE study area. At the time of our analysis, there were a total of 2,308 public EVCPs, of which there were:

- 893 slow chargepoints.
- 1,114 fast chargepoints.
- 301 rapid/ultra-rapid chargepoints.

5.4.3 Using data based on BEVs registered by 2022 Q1 and the total number of public chargepoints as of October 2022, the total ratio of BEVs:EVCPs across the TfSE area was 16.5:1.

5.4.4 Given the accelerating growth in BEV uptake, this highlights the need for rapidly increased EVCI provision and long-term planning in order to ensure this ratio can be maintained, or preferably, reduced to meet the IEA target of 10:1 BEVs:EVCPs.

5.4.5 Assessment of the primary substation capacity across the TfSE area, revealed that approximately 78% of these substations have a capacity above 3MVA (and were rated ‘green’), 14% between 3MVA and 1MVA (rated ‘amber’), and 8% have less than 1 MVA (rated ‘red’). These are promising results, as it shows the majority of the TfSE power network has significant capacity to supply additional EVCI as it is installed. Furthermore, there were no large critical areas within the TfSE area where all primary substations were rated poorly.

5.4.6 This section has highlighted the rapidly increasing number of EVs within the TfSE area and the relatively high ratio of EVs to EVCPs at a local scale. By understanding the baseline context, guidance can be provided for LTAs to plan EVCI provision to meet future EV uptake.

6 Forecasting

6.1 Introduction

6.1.1 Forecasting EVs and EVCP demand provides a crucial input to the development of future EVCI requirements. This section provides an overview of the following for EVs and EVCPs across the TfSE area:

- Forecasting process and assumptions
- Outputs by LTA and TfSE area
- Impact on grid capacity

6.1.2 It is acknowledged that there is an inherent uncertainty in forecasting future EV uptake. Section 4.2 summarises the EV market uncertainties that contribute to this forecasting challenge. A validation exercise has confirmed that the forecast process and outputs align with other recognised EV forecasts. The full details of the process, assumptions and outputs are presented within Working Paper 4 – Forecasting.

6.2 Process and Assumptions

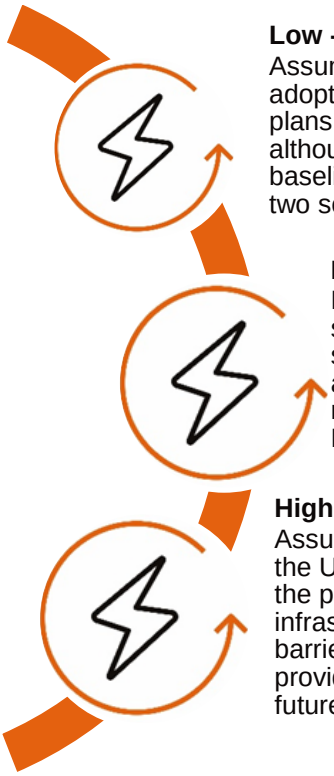
Scenario Development

6.2.1 To align with industry projections, the analysis has drawn on EV uptake values to 2030 published in the DfT's Road to Zero (2018) report[56]. In order to develop forecasts in line with these assumptions, and with a view to being aspirational, the forecasts have not been linked to current uptake numbers for each LTA – predominantly as there is a time lag from when this data becomes publicly available. It should also be noted, there is a level of uncertainty with all EV and EVCI forecasts and modelling given the fast-moving environment. The forecasting assumptions made in this section are comparative with those for other industry projections. This includes the 'potential pathways' from DfT's "Transitioning to zero emission cars and vans: 2035 delivery plan" (2022).

6.2.2 The Road to Zero EV uptake scenario values have been used as they provide an extensive range of possible total EV registrations by 2025 and 2030. Figure 23 and Table 26 display the three scenarios developed from the Road to Zero report.

[56] HM Government, 'DfT: The Road to Zero' (2018).
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739460/road-to-zero.pdf

Figure 23: Scenarios.



Low - Business-as-usual (BAU)
Assumes no policies or incentives are put in place before 2030 to encourage EV adoption. This goes against the accelerating growth in EV uptake and the political plans towards investing in EV technologies and adoption. Therefore, this scenario, although likely to underestimate the future number of EV registrations, offers a good baseline to illustrate the scale of change that will be required to achieve the remaining two scenarios.

Medium - Good practice
Developed following extensive desktop research on EV projections from similar studies published by private and public sector organisations. This scenario puts forward the most likely EV uptake projections and is closely aligned with industry projections. This scenario is intended to provide the most likely number of total registered EVs in 2025 and 2030, and the EVCP network that will be required to supply it.

High - Exemplar
Assumes that the perfect conditions exist to enable mass adoption of EVs across the UK between now and 2030. This would require substantial investment from the private and public sector to remove the real (economic, supply chain, lack of infrastructure, energy) and perceived (range anxiety, mistrust of the technology) barriers that currently limit EV adoption. This scenario has been included to provide upper limit EVCP projections, which will inform discussions surrounding future-proofing the EVCP network beyond 2030.

6.2.3 Table 26 describes the percentages that have been used to calculate the total EVs registered in 2025 and 2030 for the uptake scenarios described in Figure 23.

Table 26: Total EV uptake projection scenarios for 2025 and 2030.

Forecast Year	Uptake Scenarios (% of total vehicles registered that are EVs)		
	Low (Business as Usual)	Medium (Good Practice)	High (Exemplar)
2025	15%	20%	30%
2030	40%	50%	70%

6.2.4 Two forecasting growth models were applied to the DfT vehicle registration data to represent a growth in vehicles registered:

- A mathematical linear extrapolation of growth; and
- A 2% National Highways steady growth factor application.

6.2.5 Each projection model has its strengths and weaknesses as outlined in Table 27.

Table 27: National Highways 2% Growth vs Linear Extrapolation.

National Highways 2% Steady Growth		Linear Extrapolation	
Advantages	Disadvantages	Advantages	Disadvantages
Consistent, predictable growth rate.	Does not account for sudden shifts in technology which impacts uptake (although the extent to which this can be forecast is questionable).	Accounts for current trends to project similar uptake.	Does not account for sudden shifts in technology which impacts uptake (although the extent to which this can be forecast is questionable).
Provides a consistent change that is not impacted by outliers in data.	Does not account for localised differences in uptake of vehicles.	Accounts for localised differences in uptake of vehicles.	Is impacted by outliers in data such as COVID-19 impacts.
Gives a much more accurate representation of an average change in vehicle uptake across the UK over several years.	Does not take account of the varied changes in uptake each year such as slumps in car sales.	Takes account of the varied changes in uptake each year such as slumps in car sales.	Difficulties establishing vehicle uptake across the UK over several years.
Provides a representation across multiple areas that averages out potential variances between LTAs.		Provides a lower growth rate in vehicles compared to the 2% projection to ensure a range of scenarios have been captured.	Provides a representation across multiple areas that does not average out potential variances between LTAs.

6.2.6 Both projections have been used to show the average changes in the total number of vehicles registered as well as the local and yearly variances in data. The actual number of vehicles registered in the future is likely to be somewhere between the two projections. The linear extrapolation method includes a vehicle growth of approximately 0.6% per year which is slightly lower than other forecasts, including the DfT Road Traffic Forecasts[57]. The 2% growth assumption is at the higher end of vehicle growth forecasts and is therefore, based on a 'worst-case' scenario whereby demand for private vehicles continues to grow rather than diminish in favour of more sustainable transport modes. This will likely be an overestimate of future vehicle registrations.

Assumptions

6.2.7 To forecast the number of registered EVs and the total distance travelled in EVs across the TfSE area, several assumptions have been incorporated into the analysis. These are as follows:

- EVs are defined as BEVs, PHEVs and fuel cell electric vehicles.
- ICE vehicles are defined as petrol and diesel engine cars.
- Forecasts consider EV registrations for Private Cars and Private LGVs.
- HGVs have not been considered.
- There is no net effect in EVs entering or leaving the TfSE area because of residential or business relocations.
- The Low BAU scenario will be achievable and EV uptake will continue to increase within the TfSE area.

[57] DfT, 'National Road Traffic Projections' (2022). https://www.gov.uk/government/publications/national-road-traffic-projections

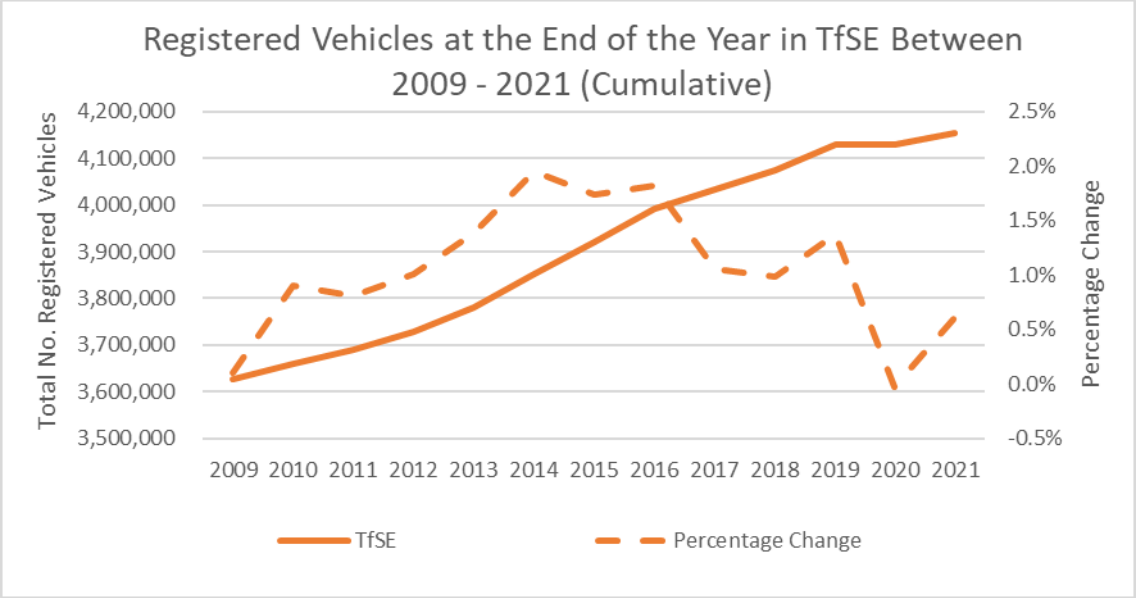
- Current vehicle usage is projected following the same growth model applied to total vehicle registrations (linear extrapolation or National Highways 2% Steady Growth) to forecast future vehicle usage for different scenarios.
- As SERTM2 does not distinguish between private and company owned LGV trips in a district or borough, it is assumed that this split is equivalent to the split of private and company owned vehicle registrations for that district or borough (available from DfT registration data).
- 2030 EVCP forecasts have been calculated using projected 2030 EV performance specifications (e.g., battery size, efficiency).
- Full details of assumption within the forecasting element are provided within Working Paper 4 – Forecasting.

6.3 EV Forecasting

Forecasted Vehicles

6.3.1 Figure 24 shows the total number of registered vehicles and the growth in vehicles at the end of each year between 2009 and 2021 within the TfSE area.

Figure 24: Registered vehicles across the TfSE area between 2009 and 2021.



6.3.2 The TfSE area has seen significant growth in vehicle registrations over the twelve-year period, reaching a total of over 4,150,000 by 2021.

6.3.3 Table 28 shows the total numbers of vehicles expected to be registered, within the TfSE area, by the end of 2025 and 2030 for both the National Highways 2% Steady Growth and Linear Extrapolation projections. These forecasts have been developed by applying the National Highways 2% growth to the 2021 Q4 DfT licensed vehicles and the applying the linear extrapolation method to 2020 and 2021 Q4 data.

Table 28: Forecasted licensed vehicles in the TfSE area at the end of 2025 and 2030.

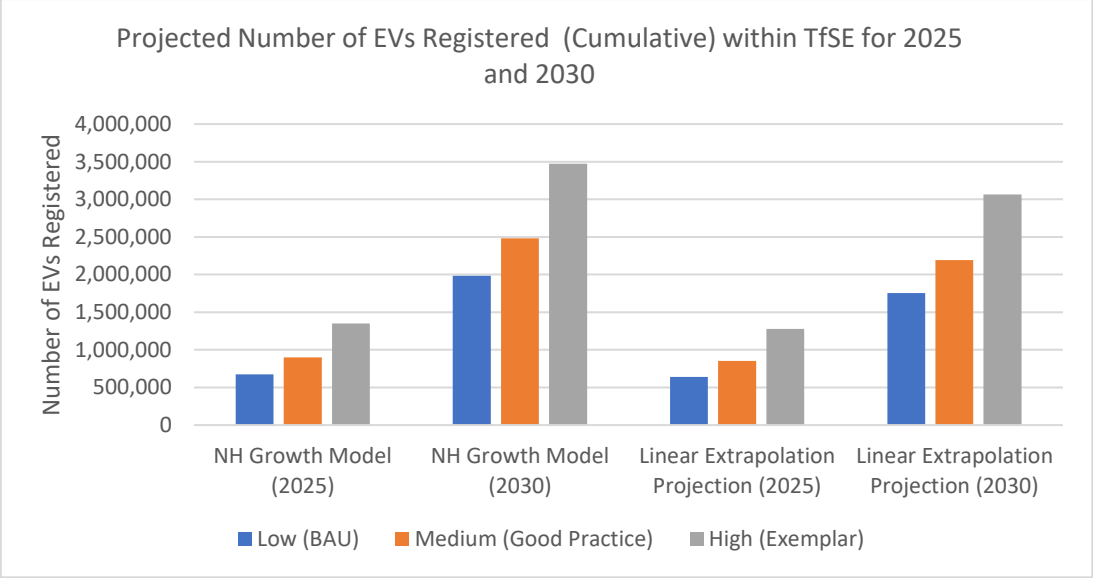
Forecast Year	National Highways 2% Steady Growth	Linear Extrapolation
2025	4,496,193	4,254,913
2030	4,964,003	4,381,250

6.3.4 From Table 28, the variation between the two projection methods are approximately 240,000 (5.6%) registered vehicles in 2025 and 580,000 (11.7%) in 2030. Given the inherent uncertainty of vehicle forecasting, a difference in projections is acceptable and is used to form upper and lower limits during the analysis covered in later sections of this report.

Forecasted Electric Vehicles

6.3.5 Using the forecasts for total vehicle registrations, Figure 25 was developed to visualise the different EV registration forecasts for 2025 and 2030. This shows data for the Low, Medium and High scenarios, using both projection methodologies.

Figure 25: Forecast number of EVs in the TfSE area at the end of 2025 and 2030.



6.3.6 EV forecasts for each LTA are presented in Table 29**.** Forecasts are presented as a range between lowest (low scenario, linear extrapolation projection) and highest (high scenario, national highways projection) for the years 2025 and 2030. Full outputs of EV forecasts by scenario and projection method, at district and borough authority level, are provided in Working Paper 4 – Forecasting and in the Power BI dashboards.

Table 29: Forecast EVs by LTA 2025 and 2030.

LTA	2025		2030	
	Low	High	Low	High
Bracknell Forest	11,079	23,095	30,910	59,495
Brighton and Hove	14,746	31,865	39,409	82,089
East Sussex	47,971	99,728	134,256	256,915
Hampshire	120,863	253,622	334,645	653,370
Isle of Wight	12,456	25,883	34,882	66,680
Kent	129,815	272,547	359,235	702,121
Medway	20,723	44,976	55,088	115,866
Portsmouth	13,026	26,891	36,752	69,275
Reading	10,276	21,904	27,928	56,429
Slough	9,422	20,967	24,246	54,014
Southampton	15,685	33,032	43,248	85,095
Surrey	110,959	239,844	296,441	617,870
West Berkshire	14,828	31,491	40,478	81,126
West Sussex	77,584	161,560	216,737	416,201
Windsor and Maidenhead	12,701	27,787	33,421	71,583
Wokingham	16,103	33,636	44,824	86,652
Total	**638,237**	**1,348,828**	**1,752,500**	**3,474,781**

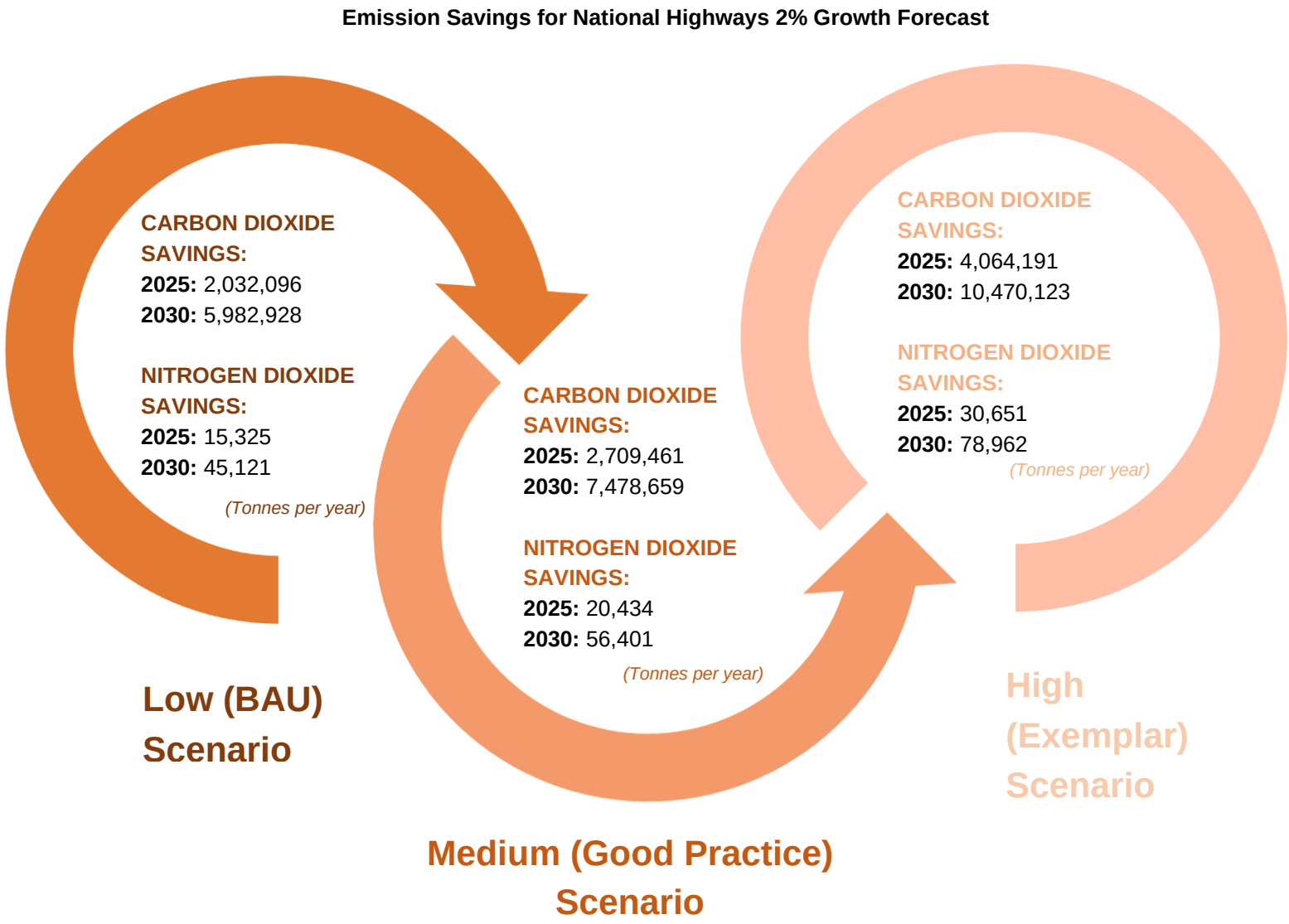
Environmental Impact

6.3.7 To assess the environmental impact of EV uptake, the Department for Environment, Food and Rural Affairs (DEFRA) 2022 emissions factors[58] for CO_2e (carbon dioxide equivalent) and N_2O (Nitrous Oxide) were applied. Emission factors also take into account stream emissions, including grid emissions from the generation of electricity by the UK power grid in order to charge EVs.

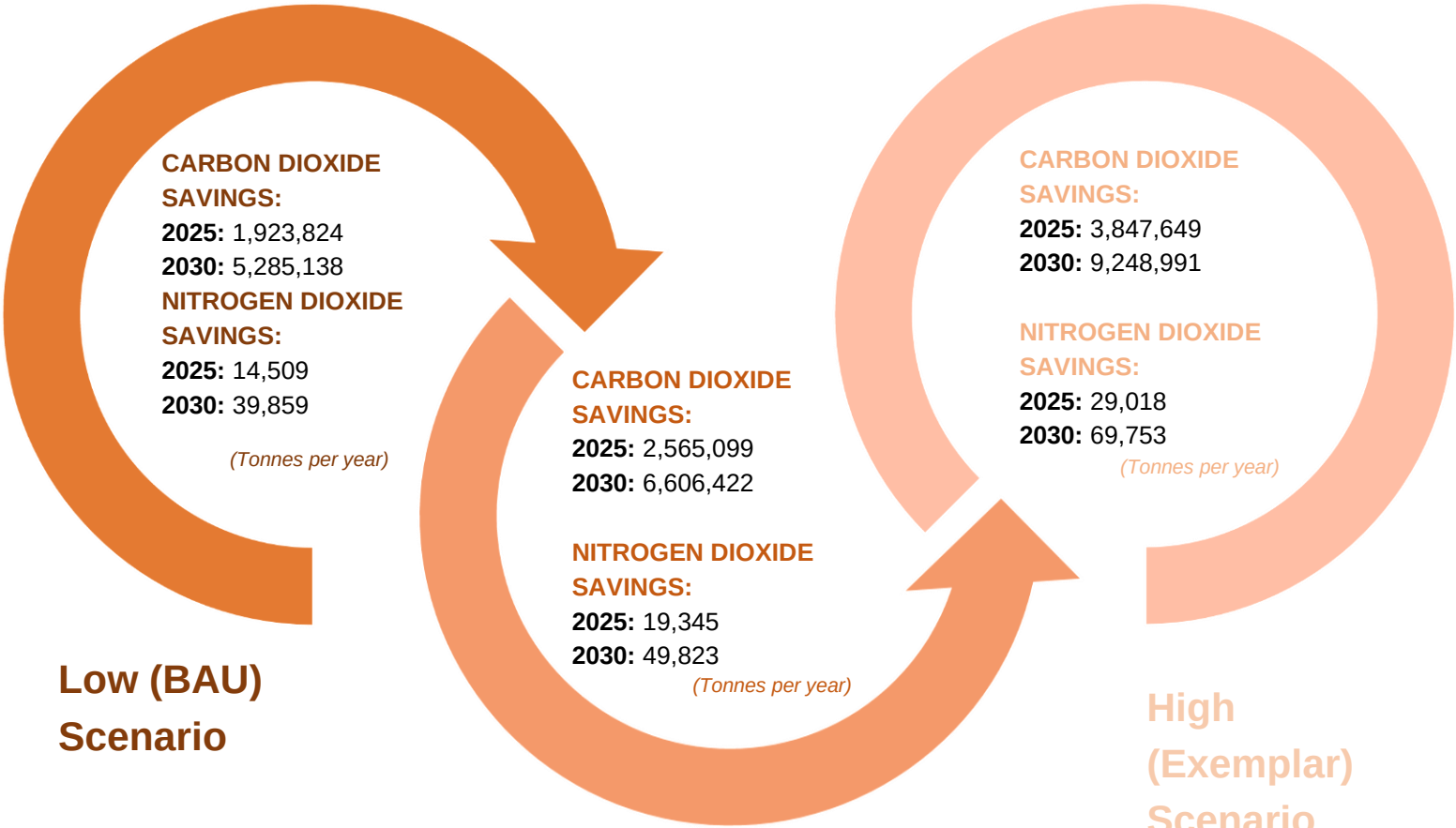
6.3.8 Projected total emissions were then calculated for each EV uptake scenario for both the National Highways 2% and Linear Extrapolation growth models. The results of this analysis are presented in Figure 26, shown as savings relative to estimated 2022 emissions.

[58] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022

Figure 26: The potential emission savings for each growth forecast method.



Emission Savings for Linear Extrapolation Forecast



6.3.9 The range of potential savings is between 1,923,824 and 4,064,191 tonnes of CO_2e per year by 2025. By 2030, these savings would increase to 5,285,138 and 10,470,123 tonnes. There is also the potential to save anywhere between 14,509 and 30,651 tonnes of N_2O per year by 2025. By 2030, these savings could increase to between 39,859 and 78,962 tonnes because of increased EV uptake. To put these figures into perspective, one tonne of CO_2 emissions is the equivalent of the average emissions of one passenger on a return flight from Paris to New York[59].

6.3.10 The potential for accelerated and widespread adoption of EVs to deliver such significant savings in CO_2e and N_2O emissions provides a strong case to support EV uptake and provide appropriate EVCI.

6.4 EVCP Forecasting

EVCP Use Cases

6.4.1 The next stage of analysis forecasts the future demand for EVCPs in 2025 and 2030, based on overall vehicle trip lengths extracted from SERTM2 and visitor data. To do this, three typical use cases were considered for which three different EVCP types would be best suited. These are presented in Figure 27, below.

Figure 27: Different EVCP use cases.

Sofia drives to work so requires overnight charging.

She has no driveway and relies on on-street residential EVCPs.

On Street Residential EVCP Usage

Public Town Centre EVCP Usage

Karen is parking in town for a few hours.

She requires a fairly quick charge but does not need a high power output.

Tim is on holiday and has travelled a long distance.

He only plans to stay for a few hours before setting off on another long journey.

Rapid Destination EVCP Usage

[59] https://www.crownoil.co.uk/news/1-tonne-of-co2-what-does-it-look-like/

6.4.2 Figure 28 shows the different types of EVCPs, their power ratings, and typical use cases. Given the power supply and the typical use case, the maximum power output has been estimated for a single on-street EVCP, a single public town centre fast EVCP and a single rapid destination EVCP.

6.4.3 The assumed daily utilisation has been estimated based on findings from Element Energy's EV Charging Behaviour Study[60], which sets out when peak charging occurs during the day for residential and public charging locations.

[60] Element Energy, EV Charging Behaviour Study (2019). https://www.element-energy.co.uk/wordpress/wp-content/uploads/2019/04/20190329-NG-EV-CHARGING-BEHAVIOUR-STUDY-FINAL-REPORT-V1-EXTERNAL.pdf

Figure 28: EVCP use cases.

On Street Residential EVCPs

Power Output: 7kW

Daily Max Power Output: 91 kWh

Assumed Daily Utilisation: 13 hours

Research has shown that 75% of all charging events occur at home. Of these events, it is estimated that currently 40% rely on on-street parking (i.e., there is no private driveway avaialable). On-street residential chargers are low powered (up to 7kW) and can provide a full charge (0% to 100%) in around 7 to 13 hours depending on charging speed and battery size. For this reason, they are best suited for EV commuters as they can plug in their vehicle when they return in the evening, charge overnight and it will be fully charged for the next day. It is important to note, given the long duration of charging sessions required, it is likely only a single user will be able to change their EV per EVCP each day.

Public Town Centre EVCPs

Power Output: 22 kW

Daily Max Power Output: 242 kWh

Assumed Daily Utilisation: 11 hours

Public town centre EVCPs are of a higher power and are typically used to provide small 'top-ups' in charge between the longer residential charging session. They are typically aimed at EV users who go into town for shopping or leisure purposes and are only away from their vehicles for a few hours at a time. These EVCPs are typically used during the day and may be used by multiple users in a single day.

Rapid Destination EVCPs

Power Output: 50 kW

Daily Max Power Output: 750 kWh

Assumed Daily Utilisation: 15 hours

Rapid destination EVCPs are of high power and can provide a significant charge (0% to 80%) over very short periods of time. These EVCPs are typically located at visitor destinations and petrol stations, facilitating long-haul EV journeys with minimal added time required for charging.

6.4.4 Travel and visitor[61] data, in the TfSE area, was used to calculate the total daily mileage for the above use cases which was used to calculate EVCP demand. These calculations are summarised in Table 30.

Table 30: Total mileage of each use case.

EVCP	Calculations	Total Daily Mileage	Assumptions
On Street Residential	Trip purpose and trip length data area extracted from SERTM2 for each LTA in the TfSE area.	66.52 million km.	Forecasted vehicle trip lengths will grow at the same rate as vehicle registration.
Public Town Centre		75.37 million km.	
Rapid Destination	Visitor travel data has been obtained from The Great Britain Day Visitor 2019 Annual Report[62]. 2019 National Transport Survey data for the South East region was then used to find the modal share of Car & Van Driver trips. The visitor data includes holidays, visiting family and business trips.	469,610 average daily trips. 42 miles average trip length.	Visitors are assumed to be constant into the future.

Charging Behaviour

6.4.5 Modelling by Element Energy estimates that 75%[63] of charging activity is residential overnight charging. Residential charging is split into off-street and on-street charging. Homes without off-street parking needing to charge (e.g., terrace houses and flats) account for 40% of residential overnight charging. Fast public EVCPs account for 6% of daily charging demand, with the remainder being workplace charging, which are typically privately procured, owned, and operated. It should be noted that Workplace EVCPs will play a part in providing the charging infrastructure to meet forecast demand. However, this is privately procured and as such it is inherently difficult to predict where and when, especially when chargepoints would not be publicly accessible. This is because generally the chargepoints are only available to those who work there.

6.4.6 It is assumed that visitors who travel within and to the TfSE area have a preference for destination EVCPs to supply their 'on the go' daily activity. For overnight trips, it is expected visitors would prefer the convenience of overnight charging with low power EVCPs. However, given the current low availability of overnight charging provision for visitors, it is assumed that 100% of visitor trips will fall within the rapid destination use-case.

[61] Visit Britain, 'The Great Britain Day Visitor 2019 Annual Report' (2019). https://www.visitbritain.org/sites/default/files/vb-corporate/gbdvs_2019_annual_report_-_a.pdf
[62] Visit Britain, 'The Great Britain Day Visitor 2019 Annual Report' (2019). https://www.visitbritain.org/sites/default/files/vb-corporate/gbdvs_2019_annual_report_-_a.pdf
[63] Element Energy, 'EV Charging Behaviour Study' (2019). http://www.element-energy.co.uk/wordpress/wp-content/uploads/2019/04/20190329-NG-EV-CHARGING-BEHAVIOUR-STUDY-FINAL-REPORT-V1-EXTERNAL.pdf

EVCI Requirements

6.4.7 Using the forecasted daily EV mileage for each use case, projections were made on the number of EVCPs required across the TfSE area to supply future EV demand. The results are summarised in Table 31.

Table 31: Forecasted future EVCP demand across the TfSE area.

Use Case for EVCPs		EVCPs in Low Uptake Scenario	Percentage Increase Required against Baseline Scenario*	EVCPs in High Uptake Scenario	Percentage Increase Required against Baseline Scenario
On Street Residential EVCPs (7kW)	2025	5,618	447% in 7/22kW chargepoints	11,869	1,056% in 7/22kW chargepoints
	2030	11,575	1,028% in 7/22kW chargepoints	22,933	2,134% in 7/22kW chargepoints
Public Town Centre EVCPs (22kW)	2025	479	447% in 7/22kW chargepoints	1,012	1,056% in 7/22kW chargepoints
	2030	987	1,028% in 7/22kW chargepoints	1,955	2,134% in 7/22kW chargepoints
Rapid Destination EVCPs (50 kW)	2025	1,052	250% in 50 kW chargepoints	2,104	599% in 50 kW chargepoints
	2030	2,104	599% in 50 kW chargepoints	3,682	1,123% in 50 kW chargepoints

* *The % increase for the On-street and Town Centre use cases are identical as they represent the total number of additional fast (7kW – 22kW) EVCPs required across the TfSE area. This is because baseline EVCP data only presents a total value and is not split by use case.*

6.4.8 From the data presented in Table 31, the forecasted demand for residential and town centre EVCPs across the TfSE area will require an increase from the current network of fast (7-22kW) EVCPs by over 447% in 2025 and 1028% in 2030. Similarly, the current network of rapid (50kW) EVCPs will need to expand by over 250% and 599% in 2025 and 2030 respectively, to accommodate projected demand for destination EVCPs. These figures highlight the significant expansion of the EVCP network in the TfSE area that will be required to satisfy even the Low EV uptake scenario by 2025 and 2030.

6.4.9 It should also be noted that these calculations assume zero redundancy across the EVCP network and that each EVCP achieves 100% daily utilisation. In practice, a degree of redundancy should be incorporated to account for scenarios that would prevent charging such as, maintenance issues or EVCPs being blocked by vehicles not using the bay to charge. It is recommended that further discussions with stakeholders in the TfSE area take place to develop appropriate 'factors of safety' to account for redundancy and utilisation and apply these to the values presented in Table 31. These factors will be highly dependent upon risk appetite and budgetary constraints which will be unique to each individual LTA.

Future Grid Analysis

6.4.10 The grid capacity assessment measures the impact of EV charging on the grid network by 2025. UKPN[64] and SSEN[65] have both developed their own EV strategy documents, outlining ambitious plans to reinforce and expand their power supplies to accommodate future EV uptake by 2030. For this reason, only forecasts up to 2025 have been carried, as it is envisaged that the network will have changed significantly by 2030.

6.4.11 Future substation capacity has been assessed against the number of EVs that can be charged simultaneously, based on projected daily power demand. These findings have been presented in Table 32.

Table 32: Assessment of TfSE primary substations based on future EV demand.

Maximum number of EVs that could be charged simultaneously	Number of primary substations	Details
>2,500	123	No Upgrades Required
1,500 – 2,500	108	No Immediate Upgrades Required
< 1,500	224	Futureproofing Upgrades Required

6.4.12 From this analysis, it is projected that approximately 72% of primary substations in the TfSE area may require grid capacity upgrades to cater for the expected EV uptake by 2025.

6.4.13 Costs associated with reinforcing the power grid to increase capacity at a single location can range from £75,000-£2 million and take over 6 months to plan, design, and carry out the required works. Additionally, even sites with adequate supply, may require DNO intervention to create a new connection and install the required electrical infrastructure (e.g., high voltage cables and transformers). This can take up to 12 weeks and can cost up to £75,000 per site. These costs and timeframes must be accounted for within budgets and programmes by any LTA planning to install new EVCPs. For this reason, it is essential that LTAs within the TfSE area work close in collaboration with UKPN and SSEN to assess future demand and map areas where power upgrades should be focussed to accommodate planned EVCP installation.

6.4.14 While it may seem arbitrary to measure power capacity in terms of simultaneous EV charging, research into charging behaviour statistics has shown that up to 75% of all EV charging events may occur overnight. It is therefore highly likely that the grid will have to accommodate a significant number of EVs being charged simultaneously.

[64] UK Power Networks, 'Electric Vehicle Strategy' (2019). https://innovation.ukpowernetworks.co.uk/wp-content/uploads/2019/11/UK-Power-Networks-Electric-Vehicle-Strategy-November-19.pdf
[65] Scottish and Southern Electricity Networks, 'Electric Vehicle Strategy' (2020) https://www.ssen.co.uk/globalassets/electric-vehicle/ev-media/ssen-ev-strategy-september-2020.pdf

6.4.15 By establishing the grid capacity to support the future EV uptake, TfSE can facilitate engagement with DNOs to ensure appropriate connections are in place to support future demand for local transport authorities. Furthermore, TfSE can facilitate conversations through the forum to discuss ways to mitigate impact on the grid in the area, such as encouraging off peak charging, smart charging or 'Vehicle to Grid'.

6.5 EVCI Locate App

6.5.1 This section provides an overview of the EVCI Locate app which will be available to LTAs within the TfSE area. EVCI Locate provides opportunities for public and private sector investment in the installation of EVCI at an LTA level and provides a strategic view of the current and future demand for charging.

6.5.2 The EVCI Locate App is a web-based GIS tool, that has been developed to identify and select priority locations for EVCI installation using suitability analysis. The suitability analysis is based on proximity/distance to the features in the layers listed below. The layers are assessed with a score between 1 (low) and 5 (high). Each analysed layer is broken down into a 5m-by-5m cell which is attributed a score based on distance from the cells in each of the layers. The analysis takes an average of all the scored cells attributed to each analysed layer and generates a final heat map highlighting high and low priority sites within the TfSE region.

6.5.3 The EVCI Locate App is hosted on ArcGIS Enterprise and will enable LTAs to identify and select prioritised sites. It can also be used as a stakeholder engagement tool to map out future EVCP network with key stakeholders present.

6.5.4 Further details on the calculations within this assessment is included within Working Paper 4 – Forecasting.

6.5.5 The following spatial data were assessed to identify gaps across the existing EVCP network and determine suitable locations for the installations of EVCPs:

- Existing and planned EVCPs
- LA assets (Council owned car parks)
- Substation capacity
- Railway stations
- Highway Network: A Roads, B Roads, all undefined roads
- Air Quality Management areas
- Retail Centres
- Land use and amenities
- Flooding (river and sea, and surface water)

6.5.6 The following supporting layers for each LTA, where data was available, have been included within the EVCI Locate app alongside the visualisation of forecasts outputs:

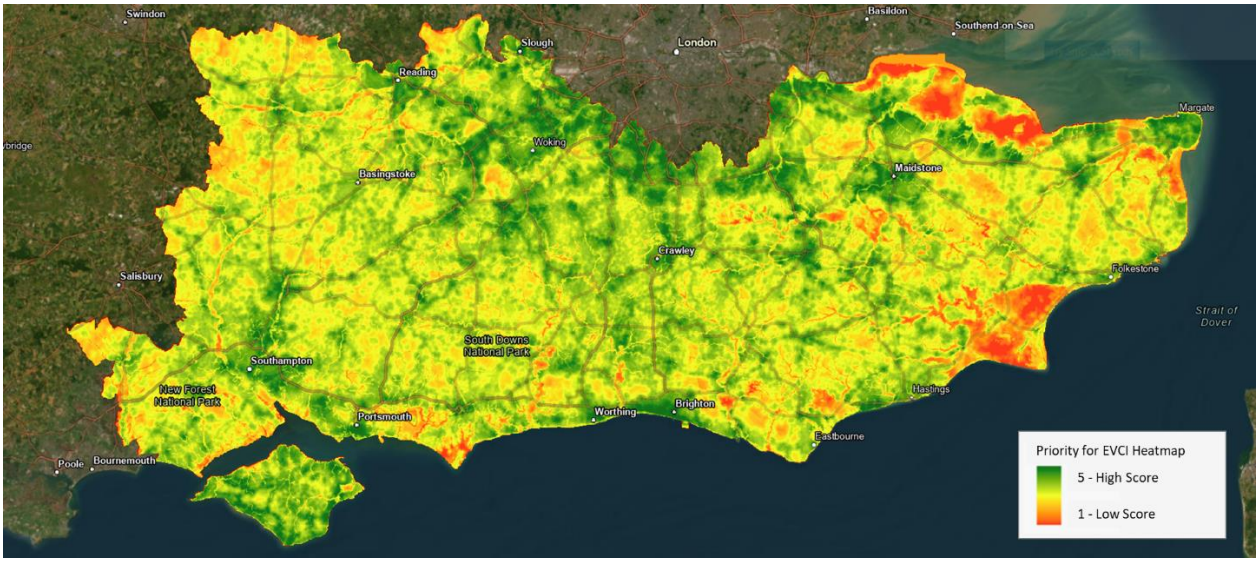
- Highway adoption
- Parking restrictions
- Street lighting
- Terraced housing
- Deprivation
- Car ownership
- Visualisation of forecasted EV uptake at an output area (OA) level
- Visualisation of forecasted EVCI demand at an OA level

6.5.7 The EVCI Locate app will provide the following to LTAs:

- Existing EVCP network
- Assessed grid capacity
- A heat map of EV demand by OA
- The number of residential, town centre and rapid destination EVCPs forecast by OA
- A suitability assessment for determining priority locations for EVCI
- An ability to place new and committed chargepoints on the map
- Supporting layers which can be overlayed such car ownership, deprivation, terrace housing
- A PDF report highlighting the characteristics of a user defined area e.g. the number of amenities, any flood zone hazards, AQMAs

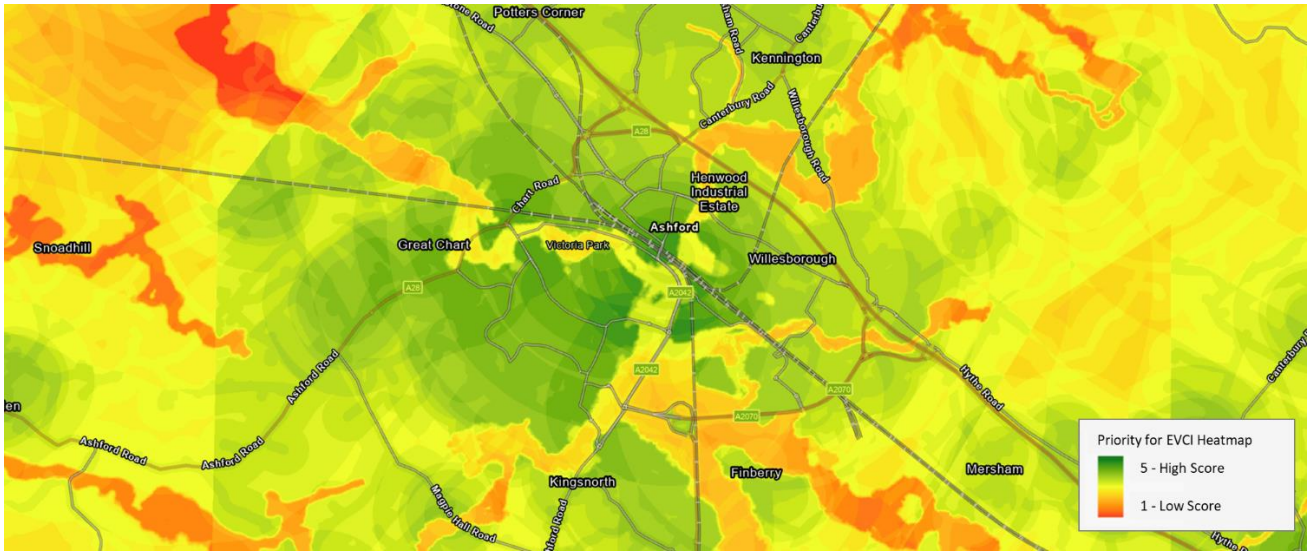
6.5.8 The suitability analysis heat map, alongside the supporting spatial data have been presented in the bespoke web application to identify and plot proposed EVCP locations across the TfSE study area. Figure 29 is a screen capture of the application. Areas in dark green are deemed as most suitable and should be prioritised, whereas areas in red are considered a lower priority.

Figure 29: Snapshot of EVCI Locate App for TfSE area.



6.5.9 Figure 30 highlights an example of the EVCI Locate App suitability assessment at a town level. This illustrates the ability of the tool to drill down into a more focussed view for respective LTAs and district and borough authorities within the TfSE area. This snapshot of Ashford in Kent shows red areas around the periphery of the town centre; within these areas, the tool has identified flood zones, a lack of land use amenities, a distance away from strategic highway network, and low headroom capacity on the grid (evidenced for the large red area to the northwest of Ashford).

Figure 30: Snapshot of the EVCI Locate App – Ashford, Kent.



6.5.10 Using this tool, LTAs can monitor EVCI implementation and continue their development of EVCI strategies and delivery of suitable infrastructure. TfSE can provide LTAs with access to similar views of their own regions.

6.6 Key Findings

6.6.1 The forecasting provides a strong evidence base to inform TfSE's EVCI strategy to reach its objectives by establishing future EV adoption figures based on different uptake scenarios. Projected EV adoption has then fed into models to quantify:

- Forecasted emission savings as a result of EV uptake
- The required level of residential, public, and destination EVCP to support forecasted demand
- The forecasted impact EV uptake on the region's power network

6.6.2 By providing LTAs with a dataset to consider forecasted numbers on EV uptake and EVCP requirements, TfSE can facilitate 'the continued rollout of infrastructure in an efficient and cohesive manner', as set out in the study's aim.

6.6.3 Based on the three use cases referred to above, travel data, and statistics on charging behaviour, this level of EV uptake would require a regional EVCI network, by 2030, consisting of a minimum of:

- 11,575 On-street Residential EVCPs
- 987 Public Town Centre EVCPs
- 2,104 Rapid Destination EVCPs

6.6.4 To achieve this size of network, this will require increasing the current provision of Fast (7-22kW) and Rapid (50kW) EVCPs within the TfSE by 1,028% and 599%, respectively.

The EVCI forecasting and requirements enables accurate targets to be set which will cater for future demand and align with this study's aim to 'facilitate the continued roll out of infrastructure in an efficient and cohesive manner'.

Future Grid Analysis

6.6.5 Forecast capacity analysis of the power network across the TfSE area in 2025 has been carried out based on primary substation data (obtained from UKPN and SSEN). This assessment shows approximately 72% of substations could require reinforcement to supply the projected EV uptake. This highlights the importance of close collaboration between TfSE, LTAs, UKPN and SSEN to assess future demand and engage in proactive planning to ensure ample power is available to accommodate planned EVCI installations.

By establishing the grid capacity to support the future EV uptake, local transport authorities can act accordingly to engage with DNOs to ensure appropriate connections are in place to support future demand.

Identification of suitable locations for EVCI

6.6.6 The EVCI Locate App and suitability heat map will support LTAs to identify and prioritise high-quality locations to expand their EVCI networks. The supplementary layers such as deprivation, terraced housing, parking restrictions and EV uptake provide a more holistic consideration when selecting sites beyond physical constraints. The assessment has been designed to assess each of the 16 LTAs independently, to provide an opportunity to update the app and heatmap in line with data available from each local transport authority in the future.

Through the EVCI locate tool, local transport authorities can accurately plan the distribution of EVCP implementation to meet current and future charging demand and align with this study's aim to 'facilitate the continued roll out of infrastructure in an efficient and cohesive manner'.

7 Fleet Electrification

7.1 Introduction

7.1.1 The UK Electric Vehicle Charging Infrastructure Strategy sets out the requirement for forecasting charging infrastructure demand from fleet vehicles.

> ***'Identify clusters of demand in the region, including bringing together data in current demand and potential future demand from fleets operating in the region (where possible, this should include demand from buses and other heavy vehicles as well as cars and vans). This should identify charging demand in areas without off-street parking, and at sites such as depots where many vehicles may be charging overnight. This will help electricity network operators to plan their networks to meet this expected demand.'***

7.1.2 The forecasting work completed to date (outlined in Section 6) is focussed on private car and vans. Further work is required to forecast the future demand from fleets operating within the TfSE area.

7.1.3 Within the TfSE area, there is extensive knowledge about fleet operating charging requirements. However, the disaggregation of data on current and future demand of charging infrastructure for fleets, especially at a regional scale, provides a significant challenge to developing forecasts. There is also no general consensus in the industry on the type of fuel that will be adopted by freight (e.g. electric, hydrogen or hybrid). Therefore, further work and engagement needs to be undertaken to understand this.

7.1.4 This strategy will include a methodology for forecasting fleet demand for EVCI. The methodology is currently in development and will be agreed with the Fleet Electrification Working Group. The forecasts will be created in a subsequent stage of this work.

7.2 Progress

7.2.1 This workstream started with the creation of the Fleet Electrification Working Group. The working group membership covers sectors including fleet operators, businesses, freight organisations and LTA fleet representatives. Organisations such as the British Vehicle Rental and Leasing Association (BVRLA), Crown Commercial Services, Logistics UK, Road Haulage Association (RHA) and the National Health Service (NHS).

7.2.2 A key outcome of this engagement was to understand the type of data public and private fleet operators hold and explore publicly available datasets. A collaborative approach with the working group has enabled discussions about the type of data needed to inform forecasts. This includes:

- Number of fleet vehicles and fuel type
- Location where fleet vehicles are stored (e.g. depot or home based)
- Movements within the TfSE area
- Fleet EV transition plans

7.2.3 The discussions with the stakeholders also identified key challenges, issues and opportunities for fleet operators. The working group highlighted the following to be considered:

- The availability of data e.g., chargepoint utilisation, behaviour and the availability of commercial spaces for charging.
- Data sharing and commercial sensitivities.
- The availability of infrastructure for fleet vehicles taken home to charge.
- Public charging infrastructure for fleets travelling through the TfSE area.
- Grid capacity for introducing infrastructure at depots.
- Accessibility for fleet vehicles to charging infrastructure on the public network.
- Businesses collaboration and sharing of charging provision.

7.3 Further work

7.3.1 Further work is being undertaken to develop this methodology prior to seeking agreement with the Fleet Electrification Working Group. Two successful workshops have already been undertaken to discuss the methodology with key elements highlighted for consideration within the forecasting of fleet electrification infrastructure demand:

- Gaining an understanding of how and why fleet operators travel within, to and from the TfSE area.
- Ensuring vehicle fleets passing through the region are accounted for.
- Developing a map to understand key gateways, depots, and Clean Air Zones within the region.
- Limitations with regional specific data in national organisations.
- Specialist charging infrastructure for vehicle fleets e.g. Buses, HGVs.
- Giving further consideration to water vessels and water transport given the coastal area covered by the TfSE area. Zero Emission Vessel and Infrastructure (ZEVI) funding is available in 2023 from the DfT for UK businesses to develop, deploy and operate clean maritime solutions.

7.3.2 The working group identified to the need to better understand the type and quantity of data held by various fleet operators in the region. It has been agreed that a survey will be issued to fleet operators in the region to establish what data exists. The survey will also provide information on fleet operations within the TfSE area and how well developed the operators' fleet electrification plans are. This will help highlight available datasets and gather views from a wider network of operators that haven't been involved in the workshops to date. This will also identify where further work is required in advance of developing fleet electrification infrastructure forecasts.

7.3.3 Following the results of the survey and agreement with the working group, the methodology will be produced for the creation of forecasts of demand for EVCI for fleets (depot and public charging) at a TfSE area level. This will use the evidence and data from the workshops, survey, desktop research and existing knowledge to consolidate findings. Work is being undertaken to split vehicle fleet into categories based on type and use. The type of categories raised within the workshops which are being considered, but are not limited to, include:

- Car Clubs
- Light Goods Vehicles (LGVs) both home based and depot based
- Heavy Goods Vehicles
- Taxis
- Buses
- Emergency services
- Local Authority Fleets

7.3.4 It is recommended that TfSE facilitate the Fleet Electrification Working Group beyond this study to support and provide fundamental input into the fleet infrastructure demand forecasts. This will ensure there is an opportunity for fleet operators, representative bodies, LTA fleet representatives and others to share available data, best practice and technological advances within the region. It will also help TfSE build comprehensive understanding of the vehicle fleet use within the region and progress the forecasts of EV infrastructure demand from vehicle fleets for depot and public charging infrastructure. Every effort should be made to try and expand the working group to include representatives from wider groups of fleet operators.

8 Action Plan

8.1 Introduction

8.1.1 The final section of this report covers the TfSE action plan which outlines a series of actions and recommendations which have emerged from the development of this strategy. The actions are informed by the evidence base of this strategy work which includes technical work and stakeholder engagement. The successful stakeholder engagement has been fundamental to the development of this strategy and the outputs of this work. As described in Section 2, the positive and wide-ranging engagement, with a variety of stakeholders, has helped provide a platform for the action plan to build upon and ensure TfSE can continue to act as a highly effective facilitator for the area.

8.1.2 The full action plan is in Appendix A, and summarised in this section. The action plan sets out:

- The actions
- The role of TfSE as a facilitator to support LTAs
- Key stakeholders
- Funding opportunities

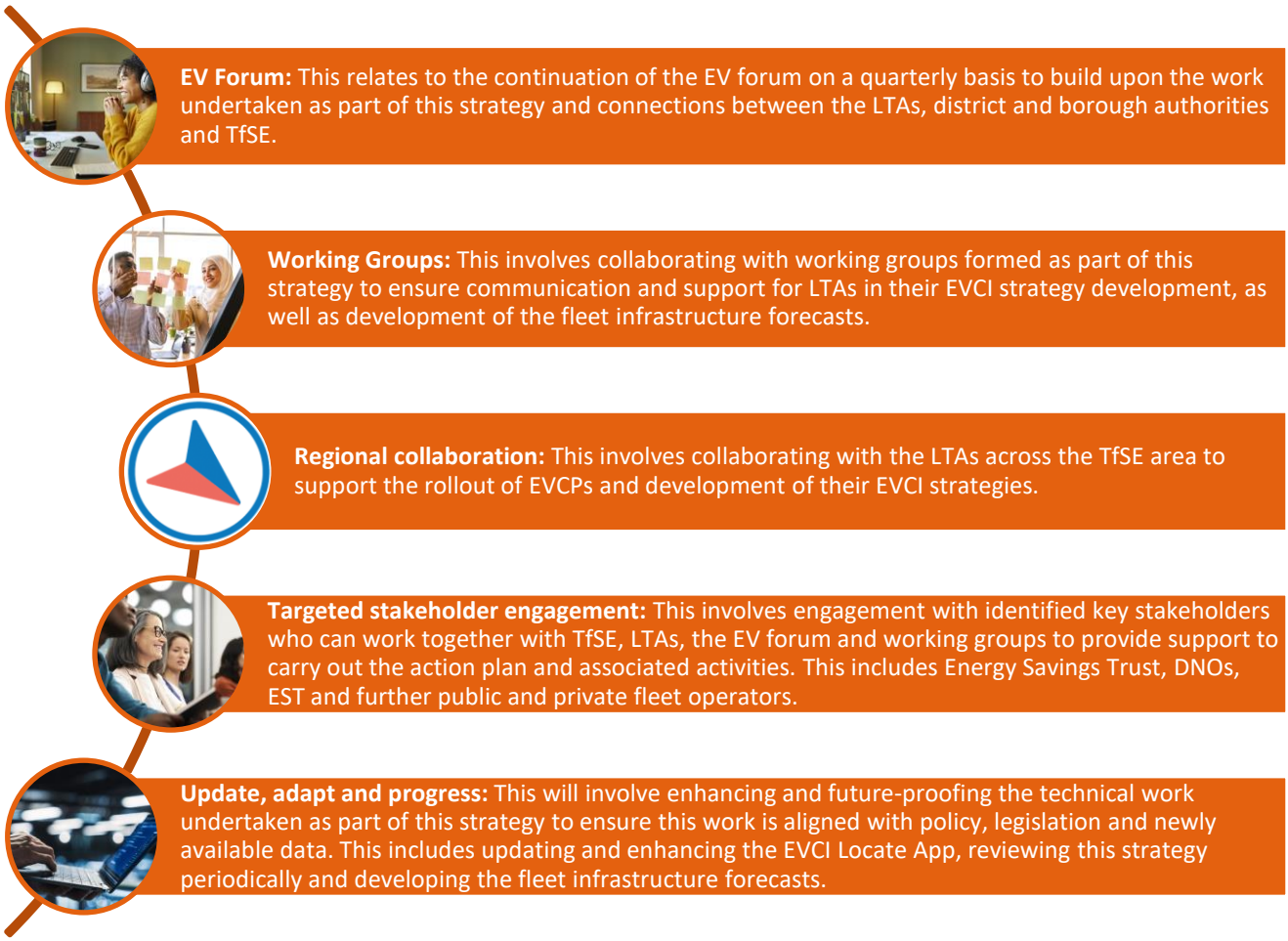
8.2 Key Actions

8.2.1 The action plan consists of fourteen actions which aim to:

- Support the development of LTA EVCI strategies
- Support LTAs with the rollout of EVCPs within their regions
- Encourage sharing of data, best practice, updates and challenges
- Utilise and build upon information, feedback and data gained within the fleet electrification working groups to develop forecasts for vehicle fleet infrastructure demand

8.2.2 The key actions form overarching themes, as displayed in Figure 31.

Figure 31: Action plan themes.



Implementation

8.2.3 It is expected that the implementation of this action plan will be explored following engagement within TfSE and with key stakeholders across the region. Prioritisation of the actions, outlined in Appendix A, will strike a balance between developing quick wins and establishing strong foundations to support long-term strategic development.

Roles and Responsibilities

8.2.4 This section covers the roles and responsibilities of different key stakeholder groups that operate within the TfSE area, and whose input will be required in order to implement the TfSE EVCI strategy action plan successfully.

TfSE

8.2.5 The role of TfSE in implementing the action plan is as follows:

- To organise, chair and invite key members to attend the forum and working group meetings.
- Act as a facilitator to disseminate information, best practice, coordinate working sub-groups and engagement with key stakeholders.

- To ensure the strategy, action plan and technical work (e.g., forecasting) are reviewed and up to date.
- Act as a 'single voice' for the TfSE area; to engage, understand and disseminate key learning, challenges, issues and opportunities for local EVCI strategies and chargepoint implementation.
- Provide a platform for targeted engagement and on-going support for LTAs with the development of their EVCI strategies.

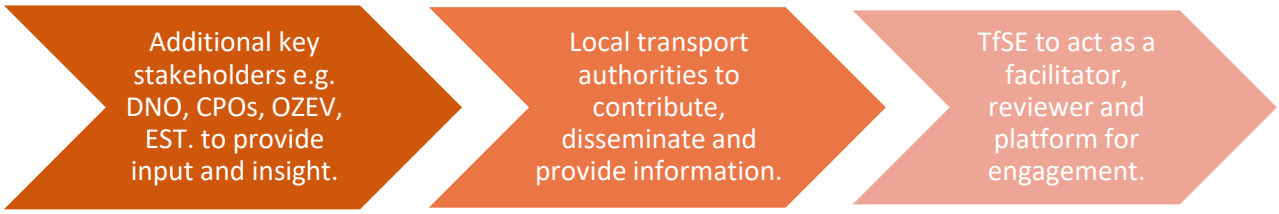
Local Transport Authorities (LTAs)

- To support implementation of the TfSE action plan, the LTAs will be required to:
- Contribute to relevant working groups and the forum.
- Disseminate information within the LTAs and to constituent district and borough authorities.
- Provide up-to-date information on progress and development of their EVCI strategies.
- Work with TfSE to engage with key stakeholders in the strategy.

Additional Key Stakeholders

8.2.6 Other key stakeholders in the action plan such as DNOs, CPOs, OZEV and EST have roles and responsibilities defined to provide input and insight into working groups or targeted engagement. This will enable TfSE to act in a facilitator role to implement the action plan and support the local transport authorities in developing their own EVCI strategies. Public and private fleet operators and LTA fleet representatives also have a role to work with the fleet electrification working group to ensure progress is made in the region in line with government objectives.

Figure 32: Level of involvement in Action Plan of stakeholders.



8.3 Recommendations

8.3.1 As stated above, it is recommended that TfSE continue to develop each action in close collaboration with their stakeholders. This is important to capture:

- Appetite of key stakeholders for pursing actions and taking ownership of responsibilities.
- Resource availability and knowledge of specific public and private capital funding opportunities that can be leveraged.
- Best practice and lessons learned expertise from stakeholders regarding timeline, cost, and complexity of proposed actions.

8.3.2 When prioritising actions, it is recommended that quick wins are balanced with actions that may not necessarily amount to immediate impacts but are essential to achieve long term strategic objectives. This will help inform prioritisation, identify potential resource constraints, and ensure impacts are aligned with the commitments of key stakeholders.

8.3.3 In order to implement this action plan TfSE has a key facilitation role to play, building on the highly effective stakeholder networks that have been essential to the creation of the strategy.

9 Conclusions

9.1.1 The TfSE area is a diverse region which covers densely urban to very rural areas from the sixteen constituent LTAs and forty-six district and borough authorities. Evidence from the extensive stakeholder engagement shows that LTAs face challenges with the development of their local EVCI strategies and installation of EVCPs. A key issue is providing an inclusive network that is accessible to a diverse demographic.

9.1.2 Key challenges associated with EVCI were highlighted by the LTAs, including resources, costs, funding and relationships with the DNOs. Most LTAs considered resources, funding and knowledge as a challenge faced in the development of an EVCI strategy. LTAs also highlighted that joint working, collaboration and demand forecasting could be part of this regional strategy to help address their challenges.

9.1.3 The TfSE EVCI strategy and action plan aims to facilitate the continued roll-out of infrastructure in an efficient and cohesive manner through better local engagement, leadership and planning. It will provide clear strategic direction and create a platform for LTAs to discuss and develop their own EV/EVCI priorities and strategy.

9.1.4 This strategy and action plan has determined the baseline position of the TfSE area, indicating the difference in levels of EVCPs to BEVs between the sixteen local transport authorities. The TfSE area has one chargepoint for every 16.5 EVs which is currently comparable to UK average, and below the aspirational IEA level of 10:1. This highlights the need for rapidly increased EVCI provision and long-term planning in order to ensure the region can meet the government target.

9.1.5 A forecasting exercise has been carried out to show the level of infrastructure needed within the TfSE area. This provides an evidence base to consider forecasted EV uptake and the resulting extent of EVCI required. The provision of the EVCI Locate App will help provide LTAs with guidance for selecting suitable locations to install the necessary infrastructure.

9.1.6 Fourteen actions have designed to:

- Support the development of LTA EVCI strategies.
- Support LTAs with the rollout of EVCPs within their regions.
- Encourage sharing of data, best practice, updates and challenges.
- Utilise and build upon information, feedback and data gained within the fleet electrification working groups to develop forecasts for vehicle fleet infrastructure demand.

9.1.7 These actions will respond to the challenges faced in the development of LTA EVCI strategies and help provide a resilient network of EVCPs across the TfSE area. Collaboration is a cross-cutting theme for the action plan. TfSE has a key role to play as a facilitator for cross collaboration between the constituent LTAs and wider organisations, such as OZEV and the EST.

9.1.8 Implementing the action plan will enable TfSE to act with ‘one voice’, setting strategic direction for the region. This will help promote the transition to EV vehicles by supporting the LTAs to provide sufficient infrastructure for a future proofed EVCI network. This will continue to support a shift to low emission vehicles to contribute to the UK’s commitments to achieve net zero by 2050.[66]

[66] Gov.uk, ‘UK becomes first major economy to pass net zero emissions law’ (2019). https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law

Appendix A– Action Plan

Theme	#	Description	TfSE's Role	Stakeholders	Funding Options
EV Forum	1	TfSE will facilitate ongoing engagement with the regional EV forum for the South East. The forum will meet on a quarterly basis and will continue to bring together key public and private sector colleagues from across the area. The overarching aim of the forum will be to • Share best practice and disseminate updates regarding EVCI rollout from across the TfSE area. • Provide a platform for stakeholders to highlight challenges and issues faced across the region. • Agree actions regarding EVCP forecasting. • Contribute to the achieving the action plan. • Define working groups made up of forum representatives to look into specific EVCI related issues as and when they arise. • Explore the creation of sub-groups (e.g CPOs / DNOs) to build connections and host knowledge share events. • Secure engagement with OZEV, acting as a 'single voice' for the region. • Develop a future-proofed EVCP roll-out plan that utilises innovative technology. • Help produce guidance on best use cases for installing different types of EVCPs. • Explore options for EVCPs to help mitigate impact on the grid.	TfSE to organise and chair these meetings, and ensure all key members can attend	Local transport authorities Representative district and borough authorities DNOs CPOs DfT OZEV Fleet Operators Department for Transport	Government funding Funding from local transport authorities
Working Groups	2	TfSE to facilitate ongoing engagement with the Local Authority Working Group. These meetings will be hosted quarterly and staggered with the ongoing Electric Vehicle forum meetings (Action 1). The group will: • Share and disseminate issues, challenges and best practice within the region. • Create necessary sub-groups to tackle specific issues. • Create joint EVCI guidance for the region.	TfSE to organise, chair these meetings and ensure all key members can attend	Local transport authorities Representative district and borough authorities	Government funding Funding from local transport authorities

Theme	#	Description	TfSE's Role	Stakeholders	Funding Options
		• Assist with developing local EVCI strategies and setting SMART (Specific, Measurable, Achievable, and Time-bound) objectives.			
Working Groups	3	TfSE to continue engagement with the fleet electrification working group. This will help facilitate the forecasting of future charging infrastructure for fleets. This will include, but not be limited to: • Analysing how public EVCPs can be incorporated into fleet charging. • Continuing to map how and where these fleets operate and the suitability of depots for EVCP installation. • Collate available data and emerging technology. • Assist with the development of forecasts for fleet charging infrastructure.	TfSE to organise and chair these meetings, and ensure all key members are able to attend	Local transport authorities Representative bodies Fleet Operators Local transport authority fleet managers	Government funding
Regional Collaboration	4	TfSE to bring local transport authorities together to explore the development of a common approach / procurement framework. This will support them to select appropriate: • EVCI operating models. • EVCI hardware. • Back-end operating systems. • Suppliers to install and manage EVCI.	TfSE to facilitate discussions between the local transport authorities and provide guidance in developing a common approach	Local transport authorities Representative district and borough authorities	Funding from local transport authorities Government funding
	5	TfSE to carry out more detailed engagement with local transport authorities. This will help LTAs identify: • Best-practice and lessons learned between local transport authorities at different stages. • Map where authorities currently sit and what support is needed to progress with their EVCI strategies. • Identify local transport authorities where further support is required.	TfSE to lead the engagement.	Local transport authorities Representative district and borough authorities	Government funding Funding from local transport authorities

Theme	#	Description	TfSE's Role	Stakeholders	Funding Options
Targeted Engagement	6	TfSE to establish regular liaison with OZEV. This will create a mechanism for effective communication on behalf of local transport authorities within the TfSE area to: • Explore EVCI funding opportunities. • Influence the development of national policies and funds. • Act as a conduit for local transport authorities within the TfSE area to raise issues and questions to OZEV.	TfSE to establish regular communication with OZEV and create a platform for local transport authorities to communicate	Local transport authorities Representative district and borough authorities OZEV	Government funding Funding from local transport authorities
	7	TfSE to stablish regular engagement with the Energy Savings Trust (EST). This will identify ongoing support to local transport authorities within the TfSE area with the rollout of the EVCI and the development of their EVCI strategies.	TfSE to act as a conduit to engage with EST on behalf of local transport authorities	Local transport authorities Energy Saving Trust	Government funding Funding from local transport authorities
	8	TfSE to maintain ongoing relationships with the two DNOs operating within the TfSE area (Southern and Scottish Electricity and UK Power Networks). This will ensure support for local transport authorities with the early identification of grid capacity constraints and development of mitigation options in their EVCI Strategies. Engagement and proactive planning between LTAs, TfSE and DNOs will ensure ample power is available to accommodate planned EVCI installations.	TfSE to engage with the DNOs and host engagement opportunities between local transport authorities and the DNOs	Local transport authorities Representative district and borough authorities DNOs	Government funding Funding from local transport authorities
	9	TfSE to further engage with public and private fleet operators within the TfSE area. This will identify key barriers to EV adoption, identify available data and help shape the forecasts of EV infrastructure demand from vehicle fleets going forward.	TfSE to facilitate engagement between private and public fleet operators and ensure all key members are able to	Private fleet operators Representative bodies	Government funding

Theme	#	Description	TfSE's Role	Stakeholders	Funding Options
			attend the Fleet Electrification Working Group	International gateways	
	10	TfSE to continue to liaise with National Highways about the rollout of charging infrastructure on the SRN. This will ensure the EV/EVCI strategies and implementation are aligned to NH priorities on the SRN. Key discussion items to include: • Gaps in EVCP networks on the SRN in the TfSE area. • Impact of SRN EVCPs on the future grid capacity. • Demand on infrastructure from fleets on the SRN.	TfSE to liaise National Highways and facilitate conversations with LTAs where necessary	National Highways LTAs	Government funding
Update, Adapt and Progress	11	TfSE to update this TfSE EVCI Strategy and action plan at a minimum of 5-year intervals. Regular reviews to be undertaken given the fast-moving environment surrounding EV and EVCI legislation, this timeframe may be reduced following publication of new guidance.	TfSE will oversee the update to the EVCI Strategy and ensure local transport authorities are given the opportunity to input data and influence its development	Local transport authorities Representative district and boroughs DNOs	Government Funding Funding from Local transport authorities
	12	TfSE to develop forecasts of EV infrastructure demand from vehicle fleets for the TfSE area.	TfSE to lead the development of the forecasts based on information gained through the stakeholder engagement.	DNOs CPOs Fleet operators Local transport authority fleet managers	Government funding

Theme	#	Description	TfSE's Role	Stakeholders	Funding Options
	13	TfSE to continue to develop and update the EVCI Locate App. This will enable local transport authorities to identify optimal locations for EVCI installation at a local level. • Adapt the tool from feedback provided by the LTAs. • Update the tool with new or updated data. • Add new features to the tool.	TfSE to provide a platform for local transport authorities to share best practice and lessons learned when implementing improving the EVCI Locate App. TfSE to facilitate the collection of data from the local transport authorities to update the app.	Local transport authorities Representative district and boroughs	Government funding Funding from local transport authorities
	14	TfSE to explore the possibility of developing a centralised data hub for EVs and EVCPs. The hub would allow authorities to store and access data from across the region. This would enable LTAs to understand the scale of EVCI implementation across the region, progress to date and gaps in the network. This tool would either need to be updated continually to ensure it held the most up-to-date data. Example data sets would include: • EVCP Utilisation data. • Existing & planned EVCP network. • CPO data. • DNO data. • Survey / consultation results.	TfSE to facilitate the shared data source, by working with local transport authorities to collect and store their data. TfSE to be the point of contact for local transport authorities to access this shared data.	Local transport authorities Representative district and borough authorities DNOs CPOs	Funding from local transport authorities Government funding

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