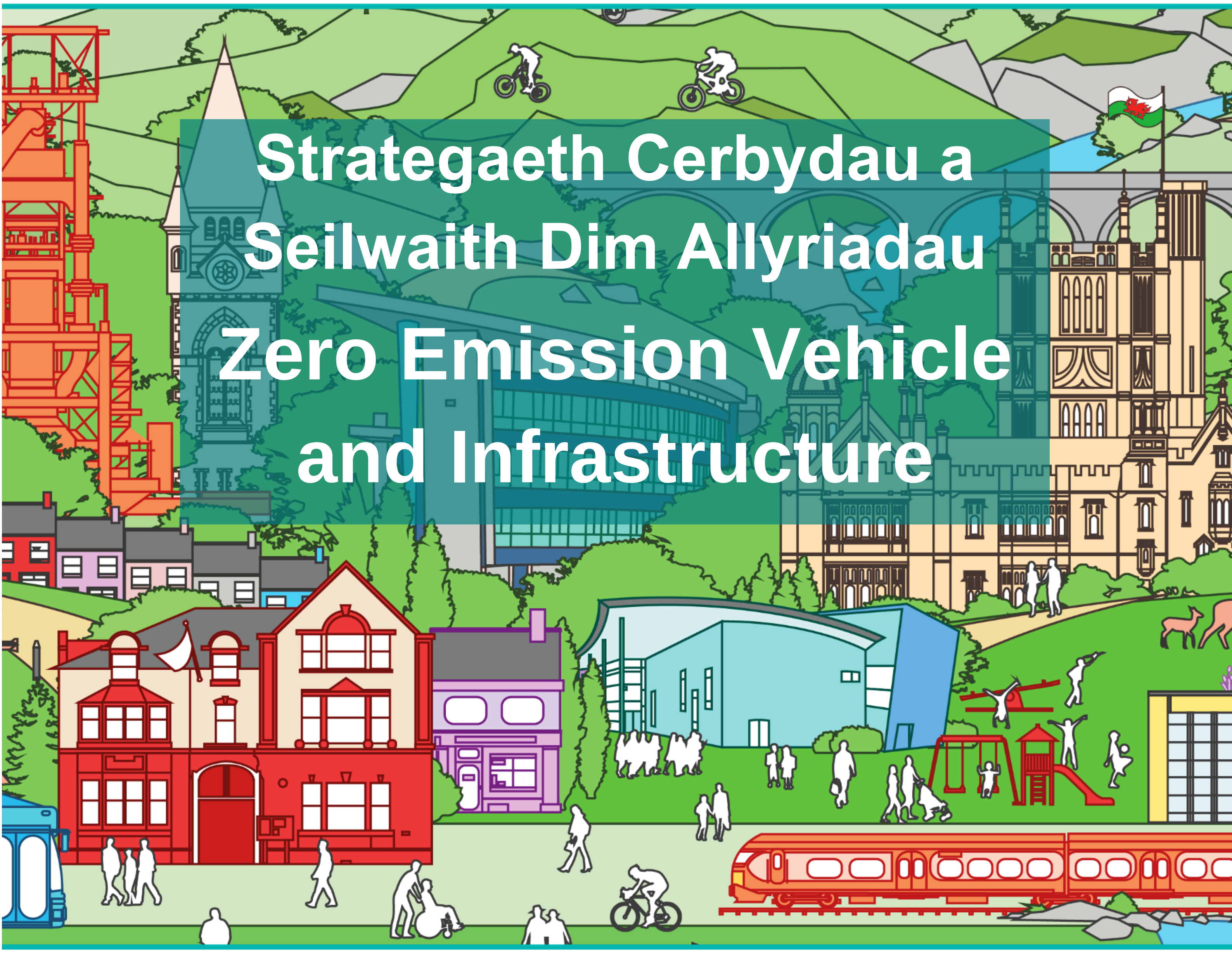
Cyngor Castell-nedd Port Talbot
Neath Port Talbot Council



Strategaeth Cerbydau a Seilwaith Dim Allyriadau

Zero Emission Vehicle and Infrastructure

Strategaeth Cerbydau a Seilwaith Dim Allyriadau
Zero Emission Vehicle and Infrastructure Strategy

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ARCADIS

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Acronyms and Abbreviations

Acronym	Meaning
AC	*Alternating Current*
BAU	*Business As Usual*
BESS	*Battery Energy Storage System*
BEV	*Battery Electric Vehicle*
CCS	*Combined Charging System*
CJC	*Corporate Joint Committees*
CO_2	*Carbon Dioxide*
DC	*Direct Current*
DEFRA	*Department for Environment, Food and Rural Affairs*
DfT	*Department for Transport*
DH	*Demand Headroom*
DNO	*Distribution Network Operator*
EV	*Electric Vehicle*
EVCI	*Electric Vehicle Charging Infrastructure*
EVCP	*Electric Vehicle Charging Point*
EVHS	*The Electric Vehicle Home charge Scheme*
FC	*Firm Capacity*
GHG	*Greenhouse Gas*
ICE	*Internal Combustion Engine*
IPCC	*Intergovernmental Panel on Climate Change*
LA	*Local Authority*
LTDS	*Long-Term Development Statement*
N_2O	*Nitrous Oxide*

NPT	*Neath Port Talbot*
NPTC	*Neath Port Talbot Council*
OEM	*Original Equipment Manufacturer*
ORCS	*The On-Street Residential Chargepoint Scheme*
OZEV	*Office for Zero Emission Vehicles*
PAH	*Polyaromatic Hydrocarbons*
PD	*Peak Demand*
PEMD	*Power electronics, Electric Motors, generators, and Drives*
PFA	*Priority Focus Area*
PHV	*Private Hire Vehicles*
PHEV	*Plug-in Hybrid Electric Vehicle*
RBS	*Regenerative Braking System*
SRN	*Strategic Road Network*
SUV	*Sports Utility Vehicle*
SWWITCH	*South West Wales Integrated Consortium*
UK	*United Kingdom*
UKRI	*UK Research & Innovation*
ULEV	*Ultra-Low Emission Vehicle*
ULEVTF	*Ultra-Low Emission Vehicle Transformation Fund*
WAG	*Welsh Assembly Government*
WelTAG	*Welsh Transport Appraisal Guidance*
WCS	*Workplace Charging Scheme*
WG	*Welsh Government*
ZEV	*Zero Emission Vehicle*

Executive Summary

The Neath Port Talbot Zero Emission Vehicle Infrastructure Strategy (NPT ZEVIS) considers Electric Vehicles (EVs), hydrogen fuel cell technology and associated infrastructure among residents, businesses, and the public sector within NPT. As hydrogen fuel cell technology is still developing, this Strategy focusses mainly on EVs as the EV market is more mature and they are available now for wide scale adoption.

As directed by the NPT Council Decarbonisation and Renewable Energy Strategy (DARE), NPTC is committed to supporting ZEV adoption throughout the region to achieve decarbonisation, improve air quality, and protect NPT's natural beauty. This is essential in order to mitigate the global climate crisis and ensure that NPT's tourism sector can continue to grow and prosper. As well as tourist traffic attracted to NPT, the region also experiences significant freight traffic as it is home to the UK's busiest deep-water port and one of the largest steel plants in Europe. Port Talbot is a key site in the recently announced Celtic Seaport which will accelerate significant inward investment in new manufacturing facilities to support the roll-out of floating offshore wind (FLOW) within the Celtic Sea, while providing the backbone for a cleaner future based on the hydrogen economy, sustainable fuels, carbon capture, cleaner steel and low-carbon logistics. Against this backdrop and as UK-wide ZEV adoption continues to rise, NPT can expect to experience a large influx of these vehicles.

NPTC is also committed to supporting local uptake of ZEVs in line with Government targets. Charging infrastructure provision is commonly cited as being one of the greatest barriers to ZEV adoption. Government strategies are focussed on overcoming these challenges with targets, deadlines, and milestones for Electric Vehicle Charge Points (EVCPs). NPT ZEVIS creates an evidence base to support development of a delivery plan with targets that align to national strategies and contribute to the UK's 2030 Net-Zero Agenda.

Although ZEV adoption is growing within NPT, it is still below that of the Welsh and UK averages. There is also currently little provision of public EVCPs, meaning that access to chargers is limited. Furthermore, all public chargers in NPT are currently owned and operated by private organisations with little competition, meaning costs to use these chargers are high. Although NPTC has begun to install EVCPs for fleet vehicles, it is recognised that NPTC must install more public EVCPs.

Future ZEV uptake in NPT will be essential achieve NPTC's long-term decarbonisation targets and could lead to reductions in greenhouse gas emissions of 34,000 tonnes each year. However, to achieve this will require 10,545 fossil-fuelled vehicles to be replaced with EVs, a vast increase from the 505 EVs currently in operation.

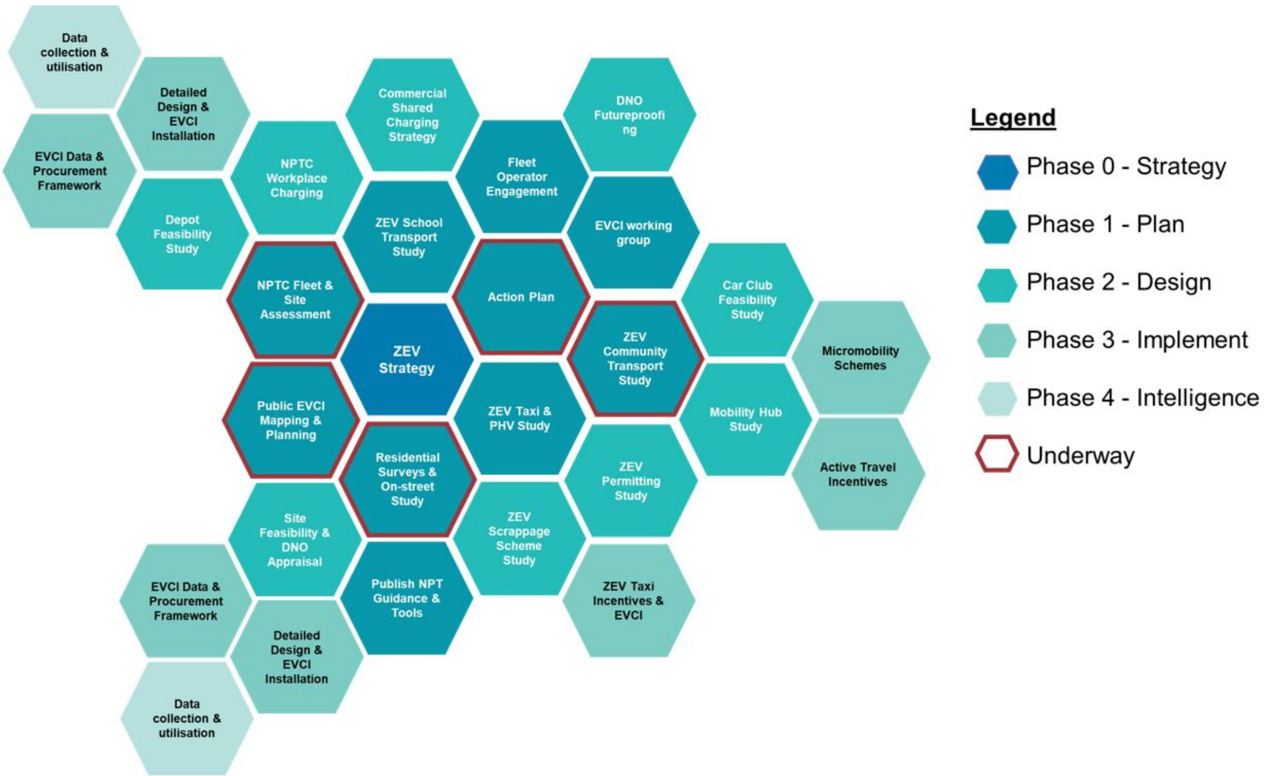
Strategic objectives and aims have been developed for this Strategy to ensure alignment with the commitments of NPTC and designed to create long-term social, environmental and economic benefits for NPT. These are:

Objectives	Aims
1. Decarbonise transport	*1. Establish an implementation plan*
2. Improve air quality for all	*2. Prioritise work areas*
3. Increase inward investment in NPT	*3. Highlight resources required*
4. Create commercial opportunities	*4. Establish a delivery plan*
5. Raise awareness / engagement with climate emergency	*5. Track technological and social change influences*

To support projected EV uptake in NPT as well that of tourists, analysis revealed that a network of 289 Fast (7-22kW) and 21 Rapid (50kW+) EVCPs will be required by 2025. This highlights the significant investment and planning required to ensure an extensive and diverse EVCP network to serve NPT residents, businesses and visitors. An assessment of the power grid revealed that in order to accommodate increasing EV uptake, several areas of NPT are at risk of reaching capacity and will require close collaboration with National Grid to ensure the network can be reinforced.

As the EV market continues to mature, ZEV uptake is expected to continue increasing as performance and cost reach parity with ICE vehicles. A diverse charging network will be required to ensure ZEV users have the ability and confidence to charge their vehicles. On-street residential EVCPs will be vital for this, however they present particular challenges which must be addressed. To overcome these, this Strategy explores a variety of different EVCP types to meet differing user needs and location constraints.

Priority Focus Areas (PFAs) have been developed to meet the objectives of this NPT ZEV Strategy. These PFAs fall into six themes: 1. Public infrastructure, 2. NPTC fleet, 3. Commercial Charging, 4. Taxis and Private Hire Vehicles, 5. Alternative Transport, and 6. Community Engagements. PFAs are intended to be delivered in phases from planning through to installation and management, as seen in the diagram below.



PFAs will be explored in greater detail and in collaboration with key stakeholders to ensure that they align with relevant projects in the areas bordering NPT and make best use of council funding.

1 Introduction

1.1 Strategy Purpose and Scope

1.1.1 As directed by the NPTC DARE Strategy NPTC is committed to becoming a net-zero local authority by 2030, in line with declarations by the Welsh Government (WG) for a net-zero public sector by 2030 and UK legislative commitments to becoming net zero carbon by 2050[1]. NPT ZEVIS aims to provide a technical evidence base that supports the transition to ZEVs for residents, businesses, and visitors alike. It comprises elements of Stage 1 Welsh Transport Appraisal Guidance (WelTAG) appraisal reports.

1.1.2 NPT ZEVIS considers both Electric Vehicle (EV) and hydrogen fuel cell technology, along with their associated infrastructure requirements. Given commitments to ban the sale of new petrol and diesel vehicles by 2030 in the UK[2], the Strategy's holistic approach attempts to ensure infrastructure fulfils future demand and the transition is in line with committed timescales.

1.1.3 The Priority Focus Areas (PFAs) component of the Strategy includes a range of ZEV use cases, including, but not limited to, public charging, residential charging, staff and fleet charging, and commercial charging. It also considers the benefits of facilitating EV uptake by Taxi and Private Hire Vehicles (PHVs) and promoting EV car share schemes in the local communities.

1.2 Study Area

1.1.4 Figure 1 shows the location of NPT within South West Wales. The County Borough of Neath Port Talbot is located on the coast between the City & County of Swansea to the west and the County Borough of Bridgend to the east. NPT also shares boundaries with Carmarthenshire, Powys, Rhondda Cynon Taf and the Brecon Beacons National Park.

Figure 1: Study Area[3]

[1] HM Government, News Story: 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

[2] HM Government, News Story: Government takes historic step towards net-zero with end of sale of new petrol and diesel cars by 2030 (2020). https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030

[3] Wikipedia, Wales Neath Port Talbot Locater Map https://en.wikipedia.org/wiki/File:Wales_Neath_Port_Talbot_locator_map.svg

1.2.1 NPT has a strong tourism industry owing to its local port services, wildlife, beaches and natural landscapes. The tourism market is continuing to grow with plans for the new £250 million Afan Valley adventure resort, which will begin Spring 2023, including a 50-bed hotel and spa and new biking and walking trails[4].

1.2.2 NPT also attracts tourist through its bike trails. Cognation MTB trails South Wales has invested in mountain biking across South Wales over the past few years. The initiative is led by NPTC, on behalf of partners across South Wales including Natural Resources Wales, Merthyr Tydfil CBC and Caerphilly CBC. The project has invested in new mountain bike trails and visitor centre improvements in Afan Forest Park and a new mountain biking event trail and events area in Margam Country Park[5]. The bike trails offer a unique opportunity to promote ZEV uptake, with Afan Forest Park Visitor Centre being ahead of the curve, providing EV charging points to visitors[6]. A map of tourist attractions in NPT and across the Swansea Bay Waterfront is shown in Figure 2.

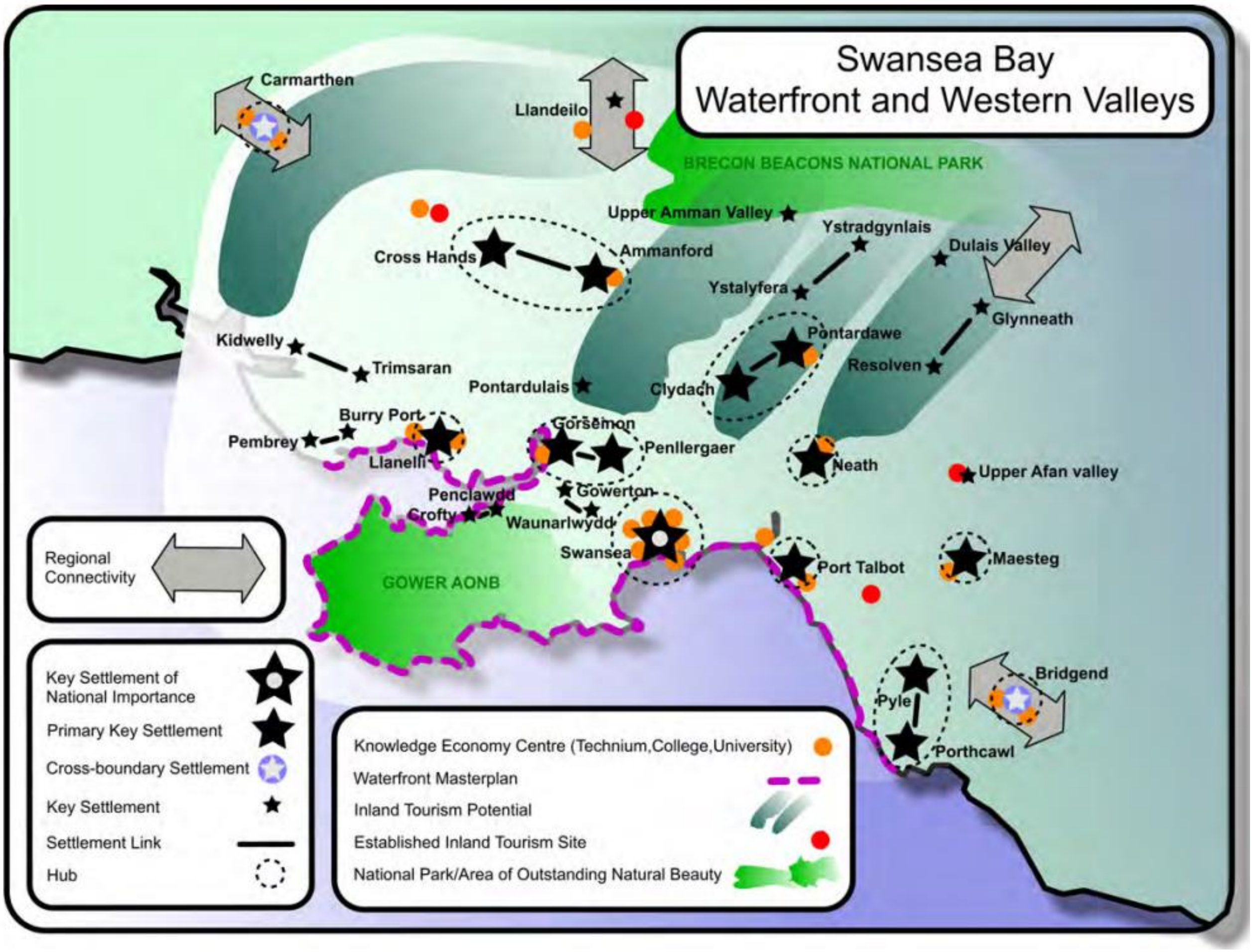


Figure 2: Swansea Bay Waterfront and Western Valleys[7]

1.2.3 Port Talbot has advanced manufacturing capabilities with one of the UK's busiest deep-water ports and an Enterprise Zone offering significant capacity for future growth[8]. Port Talbot is also the location of the Tata Steelworks[9], one of the biggest steel making plants in Europe. The site produces 5 million tonnes of steel each year and employs an estimated 4,000 people[10] however, funding disputes and negotiations on public decarbonisation plans have created uncertainty over its future. It has been reported that Tata Steel could receive up to £300m to electrify the plant's two blast furnaces and lower its carbon emissions[11].

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[4] Neath Port Talbot, '£250m Afan Valley adventure resort comes a step closer' (2022). https://www.npt.gov.uk/1410?pr_id=7127
[5] Neath Port Talbot, Tourism Development. https://www.npt.gov.uk/4418

1.2.4 Port Talbot is one of two ports in the Celtic Freeport Project which has catalysed major business interest, local communities, trade unions and academia in using Wales' largest industrial base as the launch pad for developing new technologies and renewable energy manufacturing opportunities with the potential to unlock £5.5 billion of private and public investment for Wales and create new training and innovation facilities, factories and expanded green energy ports, as well as new alternative fuel production complexes. This green investment and innovation corridor will support the creation of 16,000 green jobs across Milford Haven, Pembroke Dock, Neath Port Talbot, Bridgend, Carmarthen, Swansea, The Valleys and many other communities across Wales.

1.2.5 The coastal corridor along the Swansea Bay, connecting NPT with Swansea holds the main centres of population, employment, and road and rail infrastructure within region. The corridor also provides connections eastwards, via the M4 and rail, to Cardiff and beyond, westwards to Swansea and to the Midlands via the A465 (T) Heads of the Valleys Road[12].

1.2.6 Areas not included within the coastal corridor, include the five main valleys, namely the Afan, Amman, Dulais, Neath and Swansea Valleys. While the individual valleys have strong individual characteristics and identities, they share common features and problems. A lack of urban centres and associated transport infrastructure within the valleys restricts growth potential in several economic sectors.

1.2.7 Employment is largely concentrated in the manufacturing and public sectors with a relatively low proportion in the service sector. The employment base is predominantly located along the coastal corridor where Tata Steel and the Council are the largest employers. In the valleys, the largest employers relate to the mineral extraction industries with the remainder being employed in small and medium sized enterprises.

1.2.8 Significantly more people travel out of the County Borough to access work than those who travel inwards. This work travel pattern reflects the fact that the County Borough is part of the broader Swansea Bay travel to work area. The land bank of industrial land with good access to road, rail and sea performs an important role in the sub-region, as is the Swansea University Campus on Fabian Way and the Coed Darcy Urban Village, which finished development in 2020[13].

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[6] Neath Port Talbot, 'Investment at Afan Forest Park Visitor Centre creates a new Valleys Regional Park Discovery Gateway' (2022). https://www.npt.gov.uk/1410?pr_id=7082
[7] Neath Port Talbot County Borough Council's Local Development Plan, (2021-2026). https://www.npt.gov.uk/media/7321/ldp_written_statement_jan16.pdf?v=20170727124344
[8] Regional Economic Framework For South West Wales, (2021). https://gov.wales/sites/default/files/publications/2021-12/south-west-wales-regional-economic-framework.pdf
[9] Tata Steel, Port Talbot. https://www.tatasteeleurope.com/construction/sustainability/performance-at-our-sites/port-talbot
[10] WalesOnline, Port Talbot Steelworks to get £300m to decarbonise (2022). https://www.walesonline.co.uk/news/wales-news/uk-government-plans-give-port-26045545
[11] The Guardian, 'Future Tory PM tasked with Tata talks over demand for £1.5bn in subsidies' (2022). https://www.theguardian.com/business/2022/jul/22/tata-needs-15bn-subsidies-keep-port-talbot-steelworks-open-south-wales
[12] Neath Port Talbot County Borough Council's Local Development Plan, (2021-2026). https://www.npt.gov.uk/media/7321/ldp_written_statement_jan16.pdf?v=20170727124344
[13] Neath Port Talbot Council, Fabian Way. https://www.npt.gov.uk/2678

1.3 Strategy Vision, Aims & Objectives – Council's Ambition

Vision Statement

The NPT Zero Emission Vehicle Infrastructure Strategy sets the foundation for developing a suitable infrastructure that will encourage and build confidence in the transition to zero emission vehicles to benefit communities, residents, improve air quality and the economy of Neath Port Talbot.

Figure 3 - NPT ZEVIS Vision Statement

Aims

1. Assist decarbonising transport within NPT Council
2. Develop an implementation plan for zero emission vehicle infrastructure
3. Take a proactive approach for the creation of a strong network of publicly accessible zero emission charge points which will be adaptable for meeting future demand
4. Formulate and implement a fast track programme
5. To assist with the improvement of air quality within NPT
6. Raise awareness of the benefits of zero emission vehicles and infrastructure
7. Contribute within the delivery of the Council's DARE strategy
8. Encourage inward investment and create commercial opportunities

Figure 4 - NPT ZEV Core Aims

Objectives

1. Outline the actions and resource needed to develop an implementation plan for net zero vehicle charging infrastructure for all associated vehicles and users within the Council
2. Identify and prioritise net zero vehicle charging infrastructure work areas
3. Identifying collaborative partners to secure external funding opportunities to initiate and support programme rollout
4. Track technological and social change influences
5. Develop and implement a fast track net zero vehicle charging infrastructure programme
6. Formulate a series of net zero vehicle charging infrastructure business models for funding, deployment, and management
7. Identify all suitable tourism destination site locations for potential zero emission vehicle charging Infrastructure provision
8. Engagement with communities and residents within NPT to raise awareness and establish the most suitable solutions where off road parking and domestic charging is not available
9. Highlight the enabling role NPT holds for the delivery of an effective zero emission vehicle charging infrastructure.

1.3.1 NPT ZEVIS will provide strategic direction to the delivery of:

<u>Slow Charging</u> – supporting WG guidance by ensuring all new homes with an associated parking space are ready for an EV charger.

<u>Fast Charging</u> – through collaboration and partnerships, including workplace charging, destination charging, community centres, community focused solutions to on street charging and charging hubs, to include supporting Community EV car clubs.

<u>Rapid and ultra-rapid charging</u> – through collaboration and partnerships, on trunk roads, supporting EV Taxi transition and at EV charging hubs.

Expanding UK and Welsh Government vision to support user confidence by providing a quality user experience on a platform of accessibility, safety and security, contactless card / app payment, consistent information, reliability, support, alignment with emerging regional and national standards.

Sustainability of energy and transport in the context of decarbonisation by using renewable energy generation, engaging with community energy schemes, unblocking SMART charging opportunities, incentivising off peak charging, co-locating with other modes of transport including public and active travel

Local Community Benefit – increasing dwell times in local business areas, training and reskilling opportunities, community energy and charging schemes, local supply chain opportunities, partnerships and collaboration.

Consultation with local businesses – to understand barriers to uptake, understand future demand and plan for it, meet business community needs, promote adoption of ZEVs.

Successful Outcomes – public and private sector collaboration, resource and skills allocation, targeted funding bids, following best practice and methodologies.

1.4 This Document

1.4.1 NPT ZEVIS adopts an evidence-led approach using available data at a local and regional level. In line with WelTAG requirements, this document includes the following sections:

1.4.2 Section 2, Legislation, Policy and Background. This summarises the political context surrounding ZEV adoption on a local, regional, and national scale. Particular attention has been paid to deadlines and targets with which this NPT ZEV Strategy should be aligned to contribute towards.

1.4.3 Section 3, Baseline ZEV assessment. Bespoke analysis has been conducted, including grid capacity assessments and current EV chargepoint (EVCP) infrastructure assessment.

1.4.4 Section 4, Forecasting. Analysis has been carried out to predict future EV uptake throughout NPT, including EVs driven by tourists entering the region each year. These findings were then used to quantify the number of EVCPs that will be required to meet future demand.

1.4.5 Section 5, Technology Review. A review of existing ZEV technologies that are available on the market, and the future technologies that are expected to inform decisions on future schemes in NPT.

1.4.6 Section 6, Priority Focus Areas. This section covers the direction of future projects and schemes that NPTC is considering to encourage and enable ZEV adoption among residents, businesses, and the public sector within the region. Schemes will be further developed and progressed in collaboration with key stakeholders across the public and private organisations that operate in NPT.

1.4.7 Included at the end of the section are summaries of the key findings of the analysis presented (blue call-out boxes) and their relevance to the four core objectives for this NPT ZEV Strategy (turquoise call-out boxes). The four core objectives are shown in Table 1 below:

Table 1: NPT ZEV Strategy Objectives

Symbol	*Objective*
	Promote Inclusive ZEV uptake across Neath Port Talbot
	Promote Private Sector investment in ZEV technologies
	Continue to deliver NPTC's net-zero transport emissions agenda
	Pursue alignment with ongoing innovation projects in and around Neath Port Talbot

Informing the NPT ZEV Strategy

Neath Port Talbot Council (NPTC) is committed to supporting ZEV adoption throughout the region to achieve decarbonisation, improve air quality, and protect NPT's natural beauty. This will be essential in order to mitigate the global climate crisis and ensure that NPT's tourism sector can continue to grow and prosper.

As well as tourist traffic attracted to NPT, the region also experiences significant freight traffic as it is home to the UK's busiest deep-water port, a Celtic Freeport and one of the largest steel plants in Europe. Therefore, as UK-wide ZEV adoption continues to rise, NPT can expect to experience a large influx of these vehicle through this traffic.

Continue to deliver NPTC's net-zero transport emissions agenda

Promote Inclusive ZEV uptake across Neath Port Talbot

2 Legislation, Policy and Background

2.1 Overview

2.1.1 Given the devolution of most transport duties in the United Kingdom (UK), the Welsh Assembly Government (WAG) is responsible for transport policy, planning, and delivery within Wales.

2.1.2 In February 2021, the Welsh Ministers laid Regulations establishing four Corporate Joint Committees (CJCs) which, together, cover all of Wales. Neath Port Talbot is one of four local authorities (LAs) that make up the South West Wales CJC 2021. Figure 6 shows the boundary line of South West Wales CJC 2021.

Figure 6: South West Wales CJC 2021 Boundary Lines

2.1.3 Where jurisdiction is retained by UK Government, particularly surrounding primary policy levers supporting the uptake of EVs, Welsh policy documents[14] highlight recommendations for a unified approach to ensure EV uptake and charging provision has parity across all nations.

2.2 National, Regional and Local Policies

2.2.1 Figure 7 provides an overview of the relevant national, regional and local policies and strategies, and their key commitments which have informed this ZEV Study. Appendix A also addresses UK-wide directives and further detail on key commitments of relevant national, regional and local policies and strategies.

[14] Welsh Government, Net Zero Wales Carbon Budget 2 (2021 – 2025). https://gov.wales/sites/default/files/publications/2021-10/net-zero-wales-carbon-budget-2-2021-25.pdf

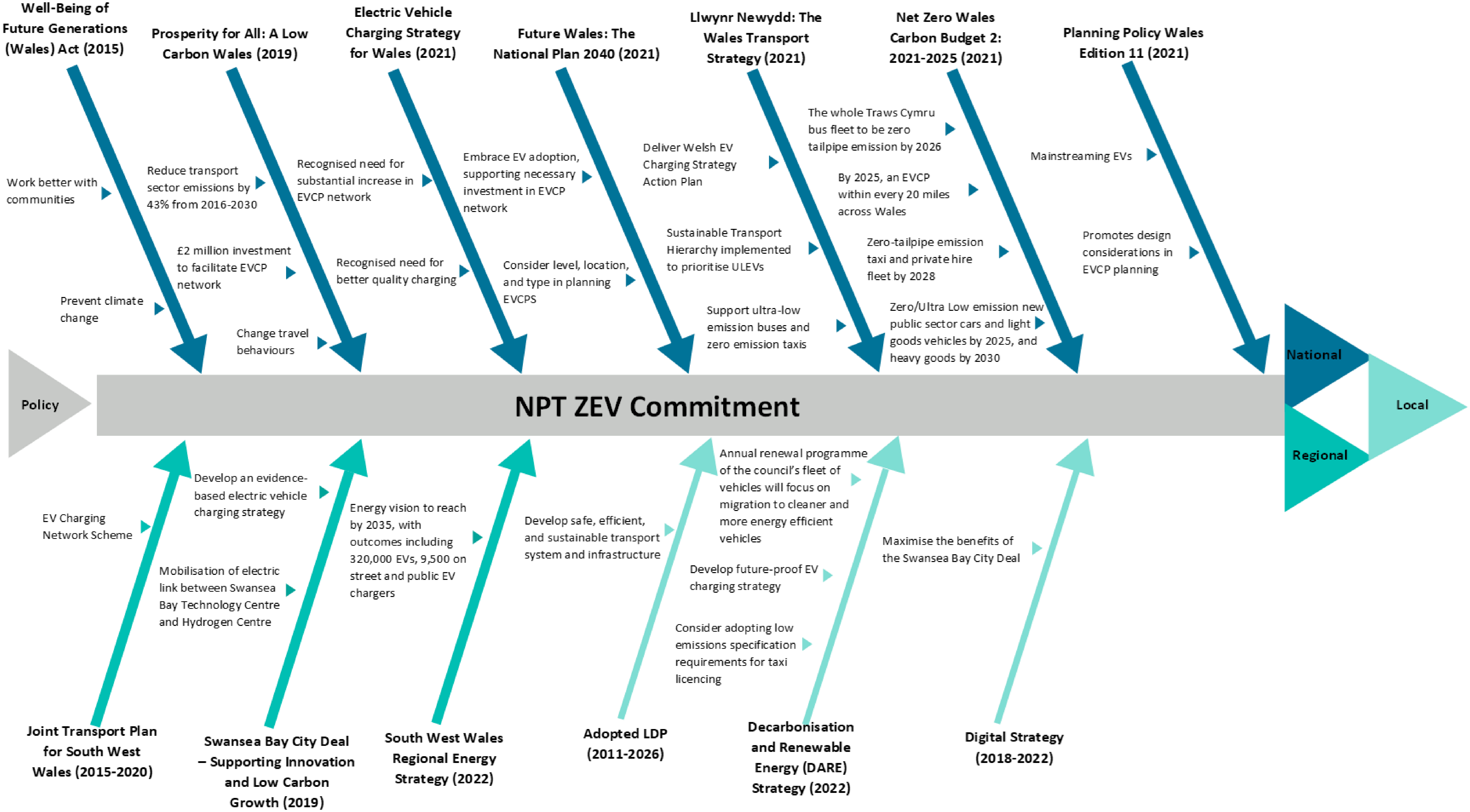

Figure 7: Key Commitments of National, Regional and Local Policies

2.2.2 National policies aim to remove charging infrastructure provision being both a perceived, and a real, barrier to EV adoption[15]. The national policies provide support for regional and local areas to plan and deliver EVCPs with funding and guidance. With regard to guidance, arguably the largest contribution the national policies provide for EV infrastructure rollout is the phase-out dates which provide SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) targets. For instance, the 'Net Zero Wales Carbon Budget 2: 2021-2025' (2021) sets out that by 2025, an EVCP will be located every 20 miles on the Welsh strategic trunk road. These quantified targets set a goal for regional and local strategies to reach in their approach to EV infrastructure rollout.

2.2.3 Regional strategies set further SMART targets in order to reach national objectives. For instance, the 'South West Wales Regional Energy Strategy' (2022) sets an energy vision to reach by 2035, with outcomes including 320,000 EV registrations and 9,500 on-street public EVCPs.

2.2.4 LAs play a vital role in EV infrastructure rollout on publicly owned land such as highways and residential streets. LAs determine asset ownership, operation and will be supplying resources to plan and deliver EVCPs. UK government states that LAs are responsible for publishing a local EV strategy with a commercial and cross-sector approach that integrates into broader local transport plans[16].

2.2.5 Currently, NPT policies have limited EV infrastructure rollout targets. The adopted Local Development Plan (LDP) (2011-2026) commits to developing a safe, efficient, and sustainable transport system and infrastructure. However, the adopted LDP (2011-2026) lacks reference to explicit EV infrastructure actions. Similarly, the Digital Strategy sets out to maximise the benefits of the Swansea Bay city deal but also lacks reference to specific EV actions.

2.2.6 The Decarbonisation and Renewable Energy (DARE) Strategy (2022) does reference EV actions, stating the need to develop a future proofed EV strategy. Reviews of council fleets to migrate to cleaner vehicles and adopting low emission specifications for taxi licensing is also mentioned within the DARE Strategy. However, no SMART targets are provided which stresses the importance of this ZEV study to build on the DARE Strategy and fill the gaps. This ZEV Strategy will set out strategic objectives to initiate the roll-out of EV infrastructure and ensure they align with the clear regional and national targets set.

2.3 Case for Change

2.3.1 In October 2018, the Intergovernmental Panel on Climate Change (IPCC) published a Special Report[17] on the impacts of global warming, and the devastating effects that inaction could have on our ecosystems. The report concluded, that to avoid catastrophic environmental and societal damage we must avoid temperatures rising by 1.5°C and that this requires achieving net-zero global carbon emissions by 2050.

2.3.2 The IPCC report received near-unanimous agreement across the global scientific community and its findings created a wave of climate emergency decelerations across local, national and international governments and organisations.

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[15] HM Government 2022 – Taking Charge: The Electric Vehicle Infrastructure Strategy. Taking charge: the electric vehicle infrastructure strategy (publishing.service.gov.uk)
[16] HM Government 2022 – Taking Charge: The Electric Vehicle Infrastructure Strategy. Taking charge: the electric vehicle infrastructure strategy (publishing.service.gov.uk)
[17] IPCC, Special Report: Global Warming of 1.5°C – Summary for Policymakers (2018) https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf

2.3.3 One of the largest contributors to carbon emission is the transport sector. In 2022, surface transport accounted for 24% of the total UK emissions, with cars contributing 52% of this[18]. ULEV technology has already been proven to be a commercially viable replacement for traditional fossil-fuel powered vehicles.

2.3.4 For these reasons, the UK government pushed forward its commitment to ban new diesel and petrol vehicles from 2040 to 2030 and to stipulate the full conversion of the public sector fleet to ULEVs by 2027.

2.3.5 Estimates published by the WG stated that the NPT public sector fleet, not including any grey fleet, which are vehicles owned and driven by an employee for work purposes[19], drove at least 2.8million miles and emitted 2,727 tonnes of greenhouse gases in the 2019/20 financial year[20]

2.3.6 Between 2019 and 2021, NPTC public sector fleet consisted of over 2,200 vehicles of which over 1,700 formed part of the council's grey fleet and 462 vehicles were in operation as part of the NPTC fleet. The total annual GHG, Nitrogen Dioxide (NO_2) and Particulate Matter (PM) emissions, as well as the total fuel cost associated with these operations are presented in Figure 8 below.

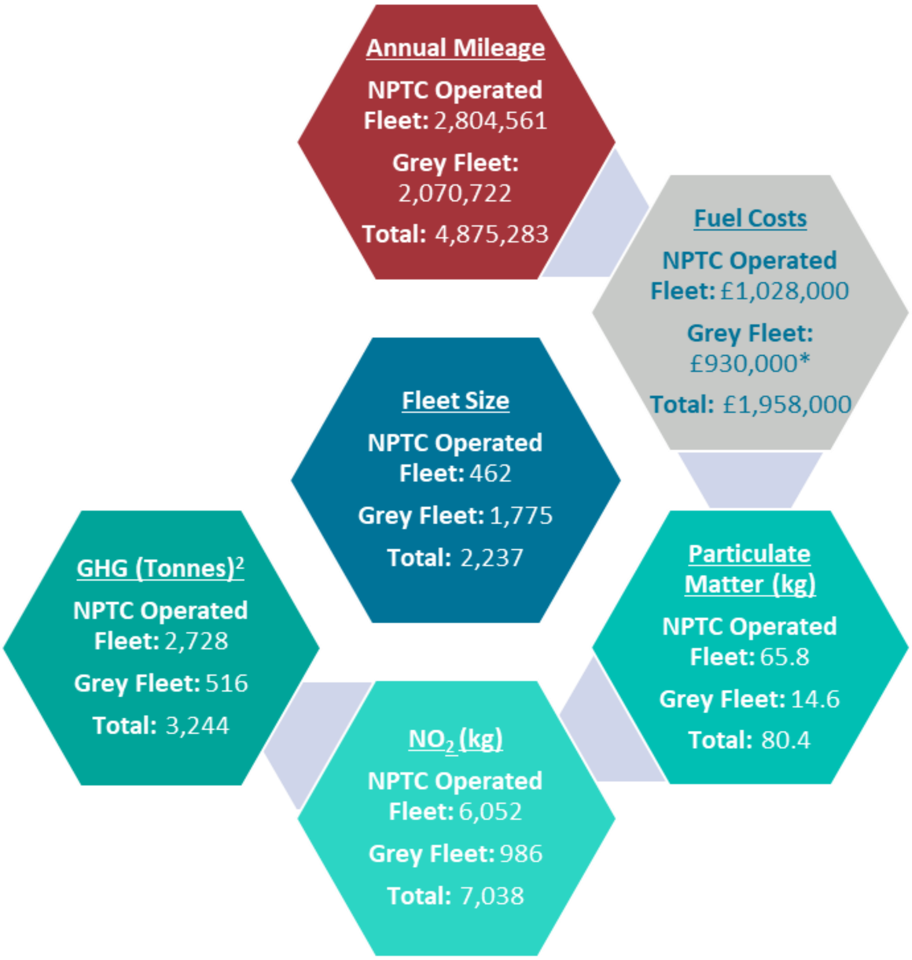

Figure 8: NPTC Fleet Analysis (2019-2021)

[18] DfT, Transport and environment statistics (2022). https://www.gov.uk/government/statistics/transport-and-environment-statistics-2022/transport-and-environment-statistics-2022
[19] Private vehicles owned by NPTC employees and used for business purposes. The operational costs of these vehicles (e.g. maintenance, fuel cost) are typically covered, at least in part, by NPTC.
[20] WG, Fleet Review Neath Port Talbot Council (2021). https://democracy.npt.gov.uk/documents/s72505/DWG%20NPTC%20-%20Fleet%20ULEV%20Transition%20-%20Client%20Draft.pdf

*Based on NPTC Employee grey fleet mileage claims data[21]

2.3.7 Across the entire fleet, 55% of vehicles met Clean Air Zone (CAZ) emission standards, rising slightly to 66% of all grey fleet vehicles. There were three ZEVs and fourteen plug-in hybrid electric vehicles (PHEVs) in operation within the NPTC grey fleet during between 2019 and 2021. During this period there were four battery electric vehicles (BEVs)[22] in the NPTC fleet, three cars (Peugeot ION and two Renault Zoe) and one Renault Kangoo van.

2.3.8 Analysis of 2021 fleet usage data suggests fleet mileage has fallen by approximately 18% compared to the average annual mileage since 2019. This may be attributed to the impact of the Covid-19 pandemic lockdowns on NPTC services and the absence of mileage data across a large number of council fleet vehicles.

2.3.9 The Taibach Margam Air Quality Management Area (AQMA) was declared in 2000 in response to elevated levels of airborne pollutants such as PM, polyaromatic hydrocarbons (PAH) and heavy metals, which can cause serious health consequences if inhaled over long periods of time[23]. In 2020's Annual Progress Report[24], while it was reported that neither the long-term nor the short-term air quality objectives for PM were breached, the Taibach Margam AQMA will remain in force.

2.4 Funding

2.4.1 At this stage of development, there are a range of potential funding options for scheme delivery, dependent on the nature of options progressed. The following section presents potential funding sources, divided into UK-wide sources, Welsh sources and local sources.

UK Funding Sources

2.4.2 Recent UK government decarbonisation publications[25] provide an update of funding scheme commitments, grants, and incentives available regarding ULEVs, and the associated infrastructure[26].

On-Street Charging

2.4.3 The On-Street Residential Chargepoint Scheme (ORCS) provides LAs funding for up to 60% of the cost to install EV infrastructure on-street and in public car parks. The government has allocated £20 million of funding for 2022-23.

2.4.4 ORCS funding rules changed in April 2022 to provide up to a maximum of 60% (reduced from 75%) of project capital costs. The caveats are that the funding provided cannot exceed £7,500 per EVCP unless electrical connection costs are exceptionally high, in which case up to £13,000 may be provided.

Off-Street Charging

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[21] WGES, Grey Fleet Review, April 2021

[22] *BEVs are fully powered by an electric motor, while PHEVs are still reliant on fossil fuels in order to operate*

[23] DEFRA, Emissions of air pollutant in the UK (2023). https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-summary#:~:text=Main%20sources%20of%20emissions%20of%20air%20pollutants%20in%202021,-Emissions%20of%20particulate&text=5%20and%2012%20per%20cent,cent%20of%20PM10%20in%202021

[24] NPTC, LAQM Annual Progress Report (2020). https://www.zap-map.com/live/ *https://www.npt.gov.uk/media/15338/npt-aq-progress-report-2020.pdf?v=20210309102532*

[25] HM Government, Transitioning to zero emission cars and vans: 2035 delivery plan (2021). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005301/transitioning-to-zero-emission-cars-vans-2035-delivery-plan.pdf

[26] *The 2035 delivery plan states: 'our commitment to transitioning to zero emission vehicles are for the whole of the UK. The grants for plug-in cars and vans, as well as the grants for home, workplace, and on-street chargepoints are all available UK-wide. Where funding is provided for England-only programmes, the devolved administrations will receive additional funding through the Barnett formula'.*

2.4.5 The Electric Vehicle Home charge Scheme (EVHS) was launched in 2021 for homeowners to provide a 75% contribution towards the cost of the EVCP and the installation. From April 2022, this has now been replaced with the EV chargepoint grant.

2.4.6 The EVCP grant is targeted at landlords of single use, multi-use and commercially let properties with dedicated parking facilities. Funding is capped at 75% of the total cost of buying and installing an OZEV approved EVCPs, up to a maximum of £350 per socket, and can be applied across a portfolio of properties. The EVCP grant is also open to people who live in rental accommodation or own a flat. Each year, landlords can claim up to 200 grants for residential properties and 100 grants for commercial properties under this scheme.[27]

2.4.7 The Government has opened the *EV infrastructure* (EVI) grant that covers wider building and installation work that's needed to install multiple EVCPs, covering aspects like wiring and posts. The grant is open to public authorities and is intended for entities that rent, lease or manage residential properties. This is available to multi-unit residential properties with a car park of at least 5 parking spaces. There is a limit of receiving up to 30 grants per year and each grant is available to cover 75% off the cost of the work up to a maximum of £30,000 (limited to 1 grant per building). The grants are for £500 per parking space for charging infrastructure and £350 for an EVCP.

2.4.8 In September 2022, the EVI Grant has also been made available for small and medium size businesses (less than 249 employees) who want to install EVCPs in their car parks to supply staff and fleet vehicles. EVCP provision must cover a minimum of 5 parking spaces each with their own EVCP. The grant covers up to 75% of the cost of EVCP installation and that of supporting infrastructure up to a maximum £15,000 per grant[28].

Workplace Charging

2.4.9 The Workplace Charging Scheme (WCS) provides funding towards the cost of purchase and installation of EVCPs at workplaces. The WCS can be applied for by any eligible business, charity or public sector organisation. The grant covers up to 75% of the total costs of the purchase and installation of EVCPs, capped at a maximum of £350 per socket and 40 sockets across all sites per applicant.[29] There is further guidance (published in March 2022) which is for charities and accommodation businesses. The Government will continue to fund the WCS until at least 2024/25

Tax Grants/Tax Incentives

2.4.10 The plug-in car grant scheme closed in June 2022 to refocus £300 million in plug-in grants for electric taxis, vans, trucks, motorcycles, mopeds and wheelchair accessible vehicles, reducing ZEV purchase prices for consumers. Details and guidance surrounding these grants is available on the HM Government website[30].

2.4.11 Vehicles eligible for this funding are:

- Light vans (less than 2.5 tonnes) – 35% of the purchase up to £2,500.
- Heavy vans (between 2.5-4.25 tonnes) – 35% of the purchase up to £5,000.
- Wheelchair accessible vehicles – 35% of the purchase price up to £2,500.
- Motorcycles – 35% of the purchase price up to £500.
- Mopeds – 35% of the purchase price up to £150.
- Taxis – 20% of the purchase price, up to £7,500.

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[27] HM Government, EV Charge Point Grant for Landlords (2022). https://www.gov.uk/guidance/ev-chargepoint-grant-for-landlords-installer-guidance
[28] HM Government, EV Infrastructure Grant for Staff and Fleets: Customer Guidance (2022). https://www.gov.uk/guidance/ev-infrastructure-grant-for-staff-and-fleets-customer-guidance
[29] HM Government, Workplace Charging Scheme: Guidance for Applicants (2022). https://www.gov.uk/guidance/workplace-charging-scheme-guidance-for-applicants
[30] HM Government, Low-emission vehicles eligible for a plug-in grant (2022). https://www.gov.uk/plug-in-vehicle-grants

- Small Trucks (N2 Cat, between 4.25-12 tonnes) – 20% of the purchase price, up to £16,000, with a maximum of 10 grants available per organisation.
- Large Trucks (N3 Cat, above 12 tonnes) – 20% of the purchase price, up to £25,000, with a maximum of 10 grants available per organisation.

2.4.12 Favourable company car tax rates are in place for ZEVs up to at least March 2025. Zero emission cars and electric vans will pay no vehicle excise duty until April 2025[31].

Research and Development

2.4.13 Driving the Electric Revolution Challenge, delivered by UK Research & Innovation (UKRI), provides £80 million to scale-up and unite UK supply chains to deliver fundamental components of EVs. Funding is committed to support this initiative until at least 2025.

2.4.14 Previous funding available was targeted on challenges associated with the transition to zero emission vehicles by supporting UK businesses, including:

- Transitioning towards ZEVs – £7 million towards developing on-vehicle solutions[32].
- Infrastructure solutions for ZEVs - £10 million towards developing infrastructure solutions[33]

2.4.15 The 'Zero emission road freight battery electric truck demonstration' funding competition was launched by Innovate UK and Department for Transport in 2022. The funding allowed UK registered organisations to apply for a share of up to £140 million to demonstrate battery electric trucks[34].

Hydrogen Funding

2.4.16 A commitment to fund the Hydrogen for Transport programme until 2022 is given in the 2035 HM Car and Van Zero Emission Delivery Plan, however, it is unclear whether this is applicable to Welsh authorities for application. The Welsh Hydrogen Strategy (consultation) outlines UKRI funding as a potential source, as well as highlighting the UK hydrogen funding stipulations in the (then forthcoming) 2021 UK Hydrogen Strategy[35]. The Welsh consultation document also highlighted that 'in November 2020 the Government outlined a Ten Point Plan for a Green Industrial Revolution, which included a target to install 5GW of low carbon hydrogen production capacity in the UK by 2030 and up to £500m of funding to support new production facilities and trials of hydrogen for heat'.

Welsh Funding Sources

Ultra-Low Emission Vehicle Transformation Fund (ULEVTF)

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[31] HM Government, ZEV Vehicle Excise Tax (2022). https://www.gov.uk/government/publications/introduction-of-vehicle-excise-duty-for-zero-emission-cars-vans-and-motorcycles-from-2025/introduction-of-vehicle-excise-duty-for-zero-emission-cars-vans-and-motorcycles-from-2025
[32] HM Government, Transition towards Zero Emission Vehicles (2021). https://apply-for-innovation-funding.service.gov.uk/competition/870/overview
[33] HM Government, Infrastructure solutions for zero emission vehicles (2021). Competition overview - Infrastructure solutions for zero emission vehicles - Innovation Funding Service (apply-for-innovation-funding.service.gov.uk)
[34] HM Government, Zero emission road freight battery electric truck demonstration (2022). Competition overview - Zero emission road freight battery electric truck demonstration - Innovation Funding Service (apply-for-innovation-funding.service.gov.uk)
[35] HM Government, UK Hydrogen Strategy (2021). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011283/UK-Hydrogen-Strategy_web.pdf

2.4.17 As identified in the Electric Vehicle Charging Strategy for Wales: Action Plan (2021)[36], the ULEV Transformation Fund (TF) is a funding source aiming to deliver charging infrastructure, 'kick-start initiatives and promote collaboration within delivery'.

2.4.18 Based on the latest guidance for the 2023-2024 period[37], the following are the main considerations stated for applications, which had to be submitted by 07 February 2023:

- Applications must follow the WelTAG, and application forms should reflect the WelTAG approach.
- Applications must demonstrate that the proposal maximises the contribution to the Welsh well-being goals and objectives[38].
- The schemes should deliver public EVCPs in their areas in line with the objectives of the Electric Vehicle Charging Strategy for Wales[39] and its accompanying action plan[40].
- Applications must demonstrate how the proposal will meet the following grant purpose/objectives:
  - Delivery of destination charging: fast, rapid EVCPs at destination car parks and visitor locations.
  - Delivery of hub charging facilities: provision of rapid and ultra-rapid charging at dedicated sites, often serving multi-modal vehicle demand, sometimes with retail or industrial facilities on-site. Also used for on-route charging.
  - Delivery of on-street charging: for slower public charging, with vehicles often dwelling at the charger overnight. Slow and fast EVCPs often incorporated into street-side lamp posts or installed along the kerb. Local authorities are encouraged to submit applications to the Office for Zero Emission Vehicle (OZEV) for the On-Street Residential Chargepoint Scheme (ORCS),[41] to increase the availability of on-street EVCPs in residential streets where off-street parking is not available, ensuring that on-street parking is not a barrier to realising the benefits of owning an EV and to help prepare for and support the transition towards ZEVs.

2.4.19 Funding for the 2022-2023 period has not been announced at this time. A list of some of the Welsh schemes funded by the ULEV Transformation Fund from 2021-22 is given in Table 2, below[42]:

Table 2: Previous ULEVTF Funded Schemes in Wales

Local Authority	Scheme	Funding
Bridgend	*Destination and Car Park Hubs Package*	*£352,000*
Bridgend	*Workplace Charging Hubs Package*	*£110,000*
Cardiff	*EV Charging Infrastructure*	*£168,000*
Carmarthenshire	*Phase 3 Fast Charging and Future Provision*	*£254,041*
Ceredigion	*Electric Vehicle Charging Network*	*£420,000*

[36] Welsh Government, Electric Vehicle Charging Strategy for Wales – Action Plan (2021). https://gov.wales/sites/default/files/publications/2021-09/electric-vehicle-charging-strategy-for-wales-action-plan.pdf#:~:text=Welsh%20Government%20policy%20and%20regulations%20will%20be%20kept,a%20framework%20for%20strategic%20and%20local%20development%20plans.pdf
[37] Welsh Government, Guidance to Applicants for Local transport fund, Resilient Roads Fund and Ultra Low Emission Vehicle Transformation Fund for 2023 to 2024 (Dec 2022), https://www.gov.wales/local-transport-fund-resilient-roads-fund-and-ultra-low-emission-vehicle-transformation-fund-html
[38] Welsh Government, The Well-being of Future Generations Act (2015), https://gov.wales/well-being-of-future-generations-wales
[39] Welsh Government, Electric Vehicle Charging Strategy for Wales (2021). https://gov.wales/sites/default/files/publications/2021-03/electric-vehicle-charging-strategy-wales.pdf
[40] Welsh Government, Electric Vehicle Charging Strategy for Wales: action plan (2021). https://www.gov.wales/electric-vehicle-charging-strategy-wales-action-plan
[41] HM Government, On-Street Residential Chargepoint Scheme guidance for local authorities. 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
[42] Welsh Government, Ultra-Low emission vehicle transformation fund: grants awarded 2021 to 2022 (2021). https://gov.wales/local-transport-fund-grants-awarded-2021-2022-html

Gwynedd	*EVCPs and solar ports*	*£902,000*
Isle of Anglesey	*EVCPs*	*£164,000*
Merthyr Tydfil	*Regional Transport Authority ULEV Transformation Programme*	*£4,814,095*
Monmouthshire	*EV charging strategy and implementation plan*	*£80,000*
Newport	*EV development and infrastructure*	*£690,000*

Local Authority	**Scheme**	**Funding**
Pembrokeshire	*EV charging facilities Phase 4*	*£420,000*
Powys	*EV programme*	*£120,000*
Swansea	*Swansea Central Charging Hub*	*£140,000*
Swansea	*EV charging infrastructure phase 1b*	*£426,000*
Vale of Glamorgan	*EV charging for residential properties with no off-street parking*	*£50,000*
Wrexham	*Community EV charging points*	*£35,000*

Local Funding Sources

Vattenfall Pen y Cymoedd Wind Farm Community Fund

2.4.20 Pen y Cymoedd, the largest onshore wind farm in England and Wales,[43] is a £220 million wind energy project to generate electricity in Rhondda Cynon Taf and Neath Port Talbot in South Wales. The project became operational in 2017 with a capacity of 228 MW of electricity through 76 turbines. It can power the equivalent of 188,000 UK homes per year, which is about 15% of Welsh households. Pen y Cymoedd wind farm has a community fund that provides funding support to the local communities in the upper Neath, Afan, Rhondda and Cyon valleys in Wales[44]. The fund prioritizes innovation, skills development, training, community organisations and enterprise[45].

2.4.21 The annual budget of the community fund is £1.8 million until 2043 and £6.9 million of funding has been allocated to date. Overall, the fund has awarded 321 grants, supported 239 community groups and 78 projects, and backed 82 businesses so far. This fund presents a good option for developing local zero emission initiatives such as community car clubs and accompanying electric vehicle charging infrastructure in areas of the Neath valley. As options develop through subsequent WelTAG stages and costs become more robust, further local funding sources may be released and reviewed for suitability.

[43] Vattenfall, Pen y Cymoedd. https://group.vattenfall.com/uk/what-we-do/our-projects/pen-y-cymoedd
[44] Pen y Cymoedd Wind Farm Community Fund, Towns and villages in the area of Benefit (2017). https://penycymoeddcic.cymru/wp-content/uploads/2017/04/AOB-Towns-and-Villages-PDF-1-1.pdf
[45] Vatternfall, Pen y Cymoedd Wind Farm Community Fund. https://penycymoeddcic.cymru/home/

Informing the NPT ZEV Strategy

National strategies aim to remove charging infrastructure provision as being barrier to EV adoption, for everyone in the UK. To facilitate this the government has developed specific targets, deadlines, and milestones surrounding EVCPs. This NPT ZEV Strategy will serve to form an evidence base NPTC to develop local targets that align with national strategies and contribute to the UK's 2030 Net-Zero Agenda.

Local Authorities, like NPTC, play a fundamental role in decarbonising transport emissions by incentivising local ZEV uptake and by adopting ZEVs into their own fleet. To help fund these ventures there are numerous of national, and UK-wide grants available to local authorities. Funded schemes have been held in the principal areas surrounding NPT and have ranged from installing EVCPs across residential sites, car parks, local authority depots, and workplaces.

Promote Inclusive ZEV uptake across Neath Port Talbot

Pursue alignment with ongoing projects in and around NPT

Continue to deliver NPTC's net-zero transport emissions agenda

3 Baseline ZEV Assessment

3.1 Current ZEV Usage

3.1.1 To analyse trends in vehicle registrations, quarterly data published by the Department for Transport (DfT) was accessed from their online database[46]. While the DfT data does not report ZEV registrations, it does report on Ultra-Low Emission Vehicles (ULEVs). These are defined as a vehicle with tailpipe emissions of less than 75 grams of CO_2 per kilometre travelled[47]. Figure 9 below shows ULEV registration data in NPT.

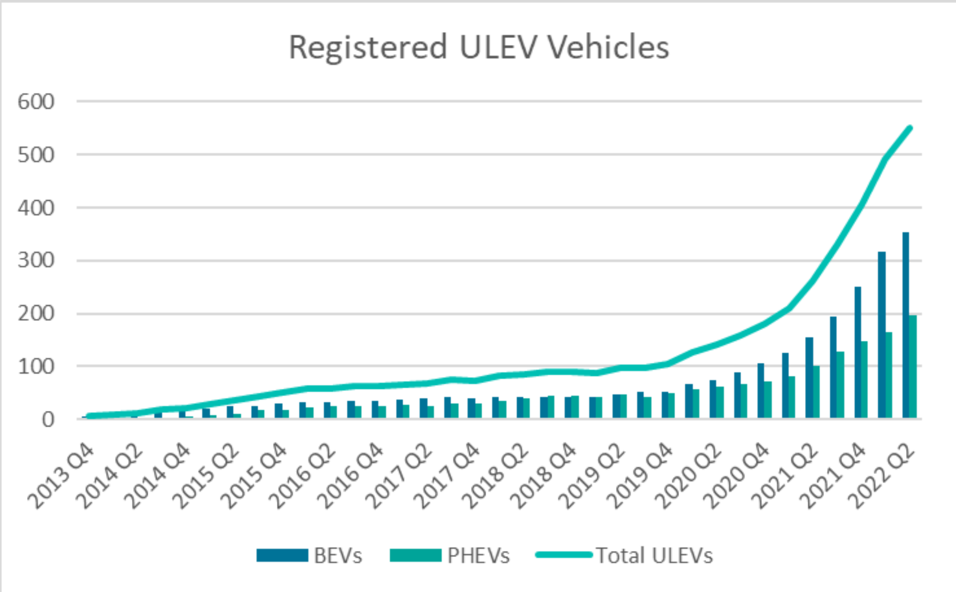

Figure 9: Registered ULEV vehicles in NPT

3.1.2 From the figure, the following trends can be extracted regarding ULEV uptake in the region between 2013 and 2022 (the most recent data provided by DfT):

- ULEV uptake has increased rapidly, particularly since 2020, illustrating the accelerating growth in the usage of these vehicles and the behavioural change that is occurring.
- There are significantly more BEVs[48] operating in the region than PHEVs[49].
- BEVs are gaining popularity over PHEVs each year.

3.1.3 As of 2022, there were over **550 ULEVs** registered across the region, of which there were **353 BEVS** and **196 PHEVs**. ULEV registrations as a percentage of the total registered vehicles can also be accessed from the DfT database and is presented in Figure 10, below.

[46] DfT, Ultra-Low Emission Vehicle Statistics Database (2022). https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01#ultra-low-emissions-vehicles-ulevs
[47] Vehicle Certification Agency, New Car Fuel Consumption & Emission Figures (2022). https://www.vehicle-certification-agency.gov.uk/fuel-consumption-co2/fuel-consumption-guide/zero-and-ultra-low-emission-vehicles-ulevs/
[48] BEVs are fully EVs with no Internal Combustion Engine (ICE). Electricity is stored within battery packs and the power is used to run the electric motor.
[49] PHEVs are not fully EVs as they are powered by both an electric motor and an ICE. The motor is typically only used at lower speeds to minimise fuel consumption and enhance efficiency. PHEVs can be charged through regenerative breaking or plugged in to an EVCP.

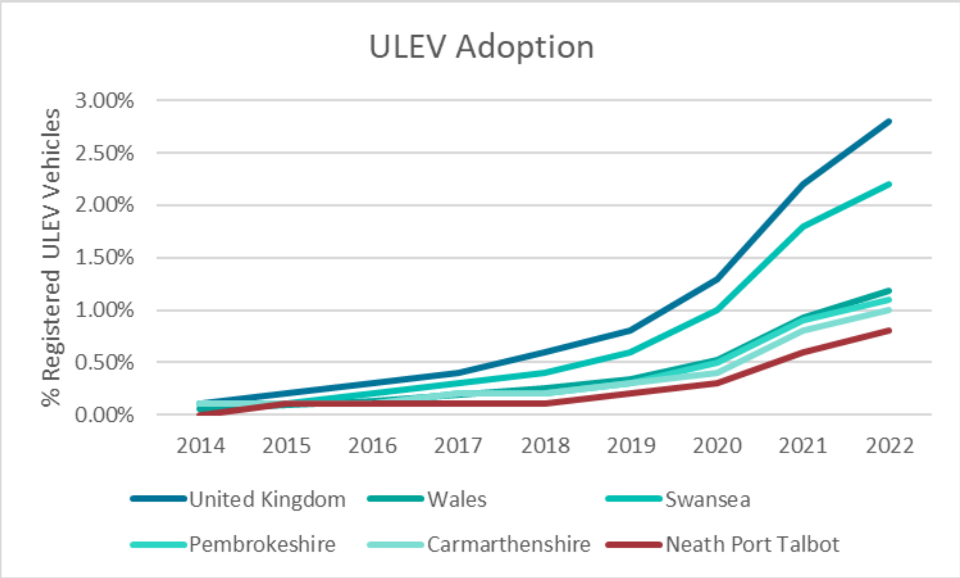

Figure 10: ULEV Adoption as a proportion of total registrations

3.1.4 As of 2022, there were over **70,253 vehicles** registered within the Neath Port Talbot, of which 0.79% were ULEVs. The shape of the six curves shown in Figure 10 illustrates the accelerating growth that ULEV uptake is experiencing across the UK, Wales, and Neath Port Talbot, and surrounding councils.

3.1.5 The figure shows that although ULEV uptake in NPT is growing, the growth lies significantly below the surrounding councils' growth and the gap has been increasing in recent years.

3.2 Existing EVCP Network

Public EVCPs

3.2.1 There are currently 14 publicly available EVCPs in NPT, 8 fast EVCPs and 6 ultra-rapid/rapid EVCPs. The majority of the chargers are located at supermarkets and restaurants, therefore privately owned and operated. These private operators include InstaVolt, GeniePoint, Pod-Point, Shell Recharge, and BP Pulse. Usage data is not available.

3.2.2 A popular metric for assessing the availability of EV charging infrastructure is to use the ratio of BEV registrations to the number of public EVCPs (BEVs:EVCPs). According to the Society of Motor Manufacturers and Traders (SMMT), Britain's BEVs:EVCPs is one of the lowest among the top 10 global EV markets[50]. The International Energy Agency (IEA)[51] has since set a target of 10:1, which can be considered a long-term target for LAs. In NPT, this ratio is currently 25:1, compared to 16:1 in the UK as a whole, highlighting the extent of investment that is needed into the regional EVCP network.

NPT Council EVCPs

3.2.3 At present, there are 12 EVCPs installed at NPTC depots for the purposes of supporting an electrified public sector fleet. The extent of installed EVCI and the number of vehicles that operate at different NPTC sites is presented in Table 3.

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[50] 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
51 What Is The "Minimum Acceptable" Ratio Of EVs to Charging Stations? | EVAdoption

Table 3: NPTC Sites and Public Sector Fleet EVCI

NPTC Site	Fleet Vehicles	Installed EVCI	Planned EVCI
The Quays	*200*	*4*	*22*
MREC Crymlyn Burrows	*1*	*0*	*0*
Tregelles Court	*49*	*5*	*0*
Port Talbot Civic Centre	*5*	*2*	*0*
*NPT Schools**	*35*	*0*	*0*
Tawe Terrace	*7*	*1*	*0*
Cimla Hillside	*2*	*0*	*0*
Margam Park	*1*	*0*	*0*
SRC Depot	*8*	*0*	*0*
Neath Civic	*1*	*0*	*0*
Total	***309***	***12***	***22***

* Fleet distributed across one or multiple site

3.2.4 Most of the NPTC fleet (200 out of 309 vehicles) is based at The Quays, a further 49 at Tregelles Court, 35 in schools around the region, and a further 25 distributed across 7 smaller depots and council sites.

3.2.5 Plans are currently underway to install an additional 22 fast EVCPs at The Quays NPTC site. The scheme will deliver a staff car park with 6 dual-socket EVCPs and service vehicle charging hub, with 16 dual-socket EVCPs, a solar panel canopy and a battery storage installation. In total, these installations will enable 48 fleet vehicles to be charged simultaneously.

3.2.6 Additionally, the waste fleet based at The Quays may be relocated to the refurbished Material Recovery and Energy Centre (MREC) at Crymlyn Burrows. This site in particular offers desirable locations for EVCP installation, as there is high power availability, owing to the energy produced on-site from the processing of waste material.

3.2.7 According to the NPTC EV Charging Infrastructure Report[52], based on the 2019/20 composition of the fleet, up to 117 rapid chargers will be needed to power the heavy goods vehicles and 195 fast chargers will be needed for the van and car fleets. Table 4 below illustrates the estimated energy requirement of an all-electric fleet.

Table 4: Estimated energy requirements for an all-electric fleet

Fleet	Charger Type	Fleet Size	BEV Demand (kWh/vehicle/day)	Total Fleet Demand (kWh/day)
HCV – Refuse and Recycling Vehicles	*Rapid*	*42*	*115.3*	*4,841*
HCV – Rigids, Tippers, Gritters, etc.	*Rapid*	*39*	*45.9*	*1,791*
HCV – Minibuses (9-17 seat)	*Rapid*	*36*	*14.1*	*507*
LCV – vans up to 3.5 tonnes	*Fast*	*163*	*18.4*	*2,999*
Fleet Cars – SUV MPV Estate etc.	*Fast*	*32*	*9.5*	*303*

[52] Welsh Government Energy Service, Neath Port Talbot Council Electric Vehicles Charging Infrastructure Report (2021)

3.3 Grid Capacity Assessment

3.3.1 Power availability at a specific location is often the limiting factor to whether it is suitable as a site for installing EVCPs. Increasing power availability requires interventions by the Distribution Network Operator (DNO), National Grid (formerly Western Power Distribution), to reinforce the existing power supply and install additional electrical infrastructure, as required. Depending on the condition of the surrounding power grid and the power requirements of the desired EVCI, DNO upgrade costs can form the majority of the total project cost and can range from between £75,000 and £2 million[53].

3.3.2 To this end, an initial assessment of NPT's power grid was carried out using opensource data published by National Grid. Data was assessed across 18 primary substations that feed the NPT power grid and each were categorised into Red, Amber, Green (RAG) depending on the available demand headroom, and consequently the number of rapid, 43kW, EVCPs that each could supply.

3.3.3 Rapid 43kW EVCPs were selected as they provide a realistic middle ground between the power demand of fast EVCPs (7kW-22kW) and rapid to ultra-rapid EVCPs, that the grid network will be subject to in the future.

3.3.4 It should be noted that slow EVCPs (typically 3.4kW) have significantly lower power demands and can typically be installed without fear of exceeding grid network capacities. However, installations of multiple slow EVCPs (typical for residential hubs) may have comparable power requirements as the higher-powered EVCPs.

3.3.5 The results of this assessment are shown in Table 5 and have been mapped in Figure 11 below.

Table 5: RAG Key for Primary Substations

RAG Status	Available Demand Headroom	# Primary Substations	# Fast Chargers	Details
Green	*>3 MVA*	*8*	*>70*	*No upgrades required to install >70 rapid EVCPs*
Amber	*1 MVA – 3 MVA*	*2*	*20-70*	*Upgrades required to install >70 rapid EVCPs*
Red	*< 1 MVA*	*0*	*<20*	*Upgrades required to install <20 rapid EVCPs*

[53] UKPN, 'Getting electric vehicles moving'. a_guide_for_electric_fleets.pdf (umbraco.io)

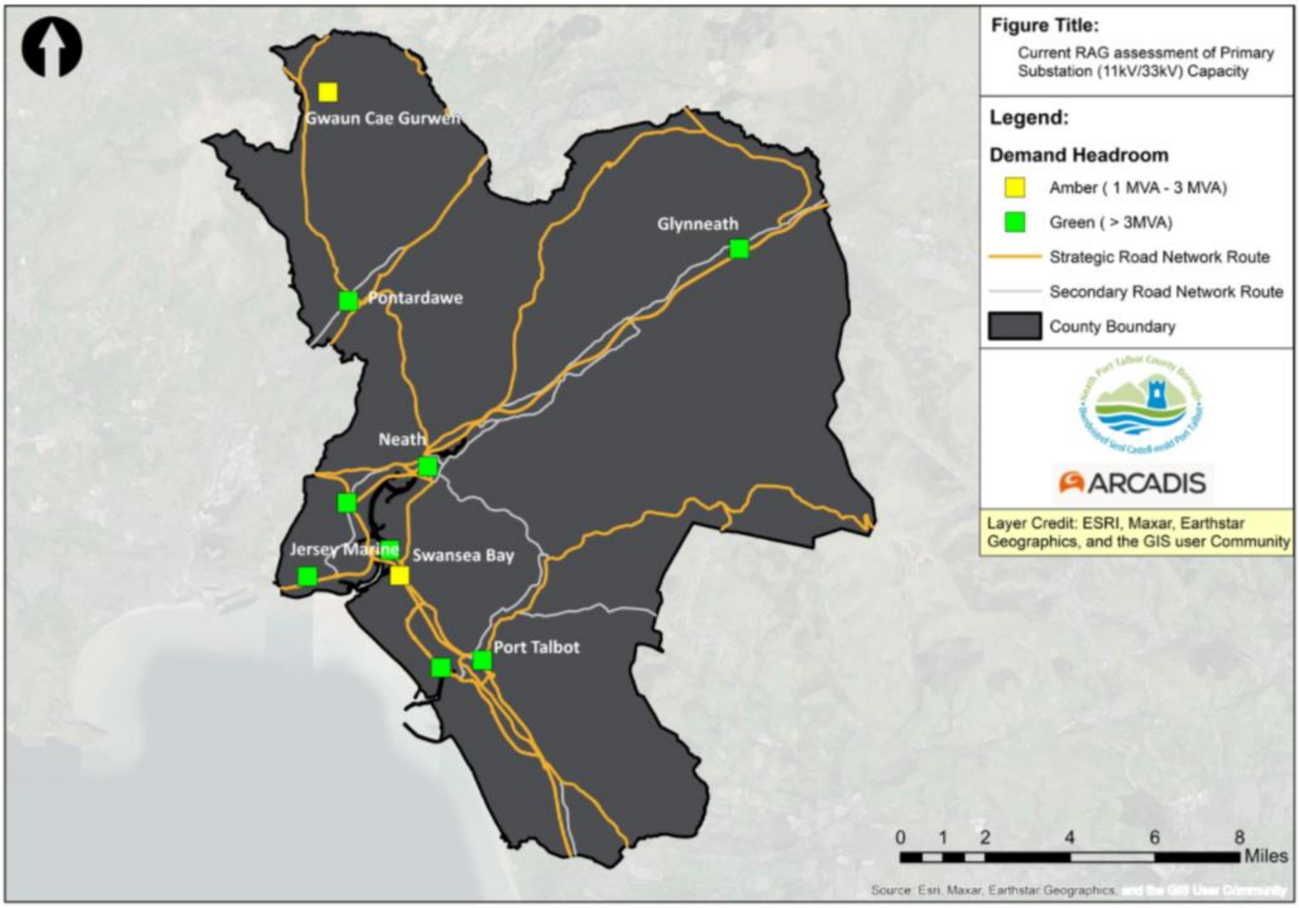


Figure 11: RAG Assessment of the Neath Port Talbot Power Grid

3.3.6 Analysis revealed that the majority of primary substation across NPT are in good condition to facilitate the immediate deployment of a significant number of EVCPs.

3.3.7 There are 2 substations that will require reinforcement to facilitate large-scale future EVCP deployment:

- The Gwaun-Cae-Gurwen substation
- The Briton Ferry substation, south of Neath

3.3.8 Reinforcement of the power grid follows a lengthy planning procedure and significant lead-times. Therefore, early engagement with DNOs is essential to ensure that the demand headroom at these primary substations can be increased to facilitate the future installation of EVCI in these areas.

3.3.9 When referring to Figure 11, there are considerably large areas that appear to be without a primary substation. This is typical for predominantly rural areas, as they will not rely on a single primary substation, but will instead draw power from smaller, secondary substations.

3.3.10 Further assessment will be required in collaboration with National Grid to assess the power availability at the distribution, secondary substation, level that feed the exact location of potential sites. Additional parameters that will impact the complexity and cost of EVCI installations including cable availability and surrounding electrical infrastructure will also be assessed at this stage.

3.4 Surrounding Project Activity

Table 6: Surrounding Project Activity

Location	Name	Timeline	Scope
Carmarthenshire	*The Gwynedd Community EV Scheme*[54]	*2019-2021*	*The scheme facilitated nearly 200 journeys within isolated rural communities. Gwynedd Council partnered with Co-Wheels, a private operator who provided the EVs and the operational support throughout the scheme. Following completion of the scheme, demand for EVs has increased in the area and the EVCP network has grown.*
Powys	*EV Refuse Collection Vehicle*[55]	*April 2021 - Ongoing*	*An electric-powered refuse collection vehicle (eRCV) joining Powys Council's fleet is one of only three currently in use in Wales, and the first to be used in such a rural and expansive county. Manufactured and supplied by Dennis Eagle, the vehicle will be used to collect residual waste from households across the county and reduce emission by approximately 25-35 pounds per year.*
Southwest & Mid Wales	*Electric Nation - National Grid Vehicle to Grid (V2G) Trial*[56]	*2020-2022*	*National Grid, in partnership with Crowdcharge, have launched the next phase of the V2G trail by offering free installation of smart chargers worth £5,500 to domestic Nissan EV drivers. The V2G trail is recruiting 100 people to trial domestic smart charging to help DNOs understand the potential of V2G charging.*
Growing Mid Wales	*Hydrogen Feasibility Study*[57]	*March 2022*	*Growing Mid Wales, a regional partnership and engagement arrangement, has commissioned Radical Innovations Group (RIG) to undertake a feasibility study on the potential of hydrogen in Wales as a driver for decarbonisation. The feasibility study is exploring opportunities for future industrial-scale investment into green hydrogen production to support decarbonisation.*
Anglesey	*EV Recycling Truck Trial*[58]	*March 2022*	*Anglesey Council's Waste Management team conducted a trail of electric recycling collection vehicles in March 2022. Findings over the month showed a significant reduction of CO_2 emissions (414kgs) and fuel savings of £146.34 over a six-day period for the LA. Vehicles were also shown to have sufficient range to complete the longest routes.*

[54] Cowheels, Car share: Co Wheels Car Club. https://www.co-wheels.org.uk/
[55] Powys, Powys welcomes its first electric refuse collection vehicle to the county's waste and recycling fleet (2021). https://en.powys.gov.uk/article/10912/Powys-welcomes-its-first-electric-refuse-collection-vehicle-to-the-countys-waste-and-recycling-fleet
[56] Electric Nation, New electric nation vehicle to grid project launches (2022). https://electricnation.org.uk/2020/06/03/new-electric-nation-project-launch/
[57] Smart Energy, Feasibility study to explore hydrogen's potential for Mid Wales (2022). https://www.smart-energy.com/renewable-energy/feasibility-study-to-explore-hydrogens-potential-for-mid-wales/
[58] Nation Cymru, Trail of electric recycling vehicles 'extremely encouraging' says Council (2022). https://nation.cymru/news/trial-of-electric-recycling-vehicles-extremely-encouraging-says-council/

Location	Name	Timeline	Scope
Merthyr Tydfil	*EV Scheme*[59]	*March 2022*	*Merthyr Tydfil Borough Council has secured £4.8m in WG funding for the delivery of the schemes, in partnership with a third-party consultant. The schemes cover the provision of Taxi ULEV and public use charging infrastructure, 3 year 'try before you buy scheme' pilot project, a car club, and a decarbonisation of school transport study.*
Bridgend, Cwmbran, Denbigh and Newport	*NHS Wales EV - HGV Trial*[60]	*July 2022*	*A £3.25m funded trial by the DfT and Innovate UK, comprising 10 zero-emission electric trucks for use by Welsh healthcare system to help with the collection and distribution of laundry at Bridgend, Cwmbran, Denbigh and Newport. The project will look to create a predictive tool to make accurate comparisons for fleet electrification and infrastructure requirements. Magtec will work with data analytics specialist Dynamon to develop software to predict battery state of charge, road performance and grid load.*
Powys	*EV Charging Public Consultation*[61]	*September 2022*	*The aim of this Strategy is to provide direction in the deployment of charging infrastructure across the county. This will enable the adoption of electric vehicles for residents and visitors, whilst ensuring the most efficient deployment of on-street infrastructure.*
Metro Region	*Regional Hydrogen Study*	*Ongoing*	*The study will be delivered by Arcadis in collaboration with the 4 LAs of the SB&WW Metro region. The scope of the project will focus on the feasibility of Hydrogen fuel and exploring its generation and distribution to fuel public-sector fleets.*
Metro Region	*Regional LA Depot EVCI Study*	*Ongoing*	*As above, this study will look specifically at the future roll-out of EVCPs at LA depots to supply an electrified public sector fleet.*
Cardiff City Region	*EVCI Rollout*[62]	*Ongoing*	*The Cardiff County Region has funded the installation of 178 dual EVCPs across 146 sites (council-owned car parks and highways). In October 2022, 24 EVCPs are currently installed/underway.*

[59] Cardiff Capital Region Transport Authority, Ultra Low emission vehicles (2022). https://www.cardiffcapitalregion.wales/wp-content/uploads/2022/02/item-5-ulev.pdf
[60] Business Live, NHS Wales to get zero emission trucks as part of multi-million pound electric fleet trail (2022). https://www.business-live.co.uk/enterprise/nhs-wales-zero-emission-trucks-24364207
[61] Powys, Business invited to have their say on electric vehicle charging (2022). https://en.powys.gov.uk/article/13176/Businesses-invited-to-have-their-say-on-electric-vehicle-charging
[62] Wales Online, Where all the 24 new electric vehicle charging points in Cardiff will be located (2022). https://www.walesonline.co.uk/news/wales-news/24-new-electric-vehicle-charging-25171472

Location	Name	Timeline	Scope
Cardiff City Region	*CSconnected cluster*[63]	*Ongoing*	*A state-of-the-art innovation centre within the campus at Imperial Park, South Wales. This work will directly impact our ability to use more renewable energy and electrify vehicles.*
Mid Wales	*TripTo - Community Car Club*[64]	*Ongoing*	*TripTo brings together four car clubs, based Llanidloes, Newtown, Machynlleth and Welshpool. They are a non-profit social enterprise run by and for the communities in which they operate. TripTo procure and operate the Car Club fleet, and support in the installation of community EVCPs.*
Cardiff & Newport	*ZEV Bus Fleets*[65]	*Ongoing*	*Cardiff have procured a fleet of 36 EV Buses in 2022 after a successful bid for DfT Ultra Low Emissions Bus Scheme.*
Dolen Teifi	*Community Transport*[66]	*Ongoing*	*Dolen Teifi is a non-profit organisation with a goal to provide sustainable and accessible transport. With operations in Llandysul, Pont-Tyweli Ymlaen Cyf, Ceredigion and Carmathenshire, the organisation operates 4 EVs, electrified minibuses, and community EVCPs.*
Milford Haven	*Milford Haven: Energy Kingdom (MH:EK)*[67]	*Ongoing*	*MH:EK is gathering detailed insight into Milford Haven Waterway energy system, and the potential it has in becoming a global green hydrogen port/hub through Floating Offshore Wind. The Milford Haven Waterway Future Energy Cluster have stated that the waterway will deliver 20% of the UK Government low carbon hydrogen production target by 2030.*
Swansea Bay	*Swansea Bay City Deal*[68]	*Ongoing*	*The Swansea Bay City Deal is a programme of investment in the Swansea Bay City Region to support innovation and low carbon growth. The programme, developed around the Swansea Bay technology centre, includes hydrogen refuelling centres, a centre of excellence, and a EVCI route map to encourage EV uptake and implement EVCP network. In 2021, the programme aimed to mobilise an electric link between the Swansea Bay technology centre and Hydrogen centre.*

[63] Department of International Trade, Compound semiconductors and applications in South Wales. https://www.great.gov.uk/international/content/investment/opportunities/compound-semiconductors-and-applications-in-south-wales/ https://www.great.gov.uk/international/content/investment/opportunities/compound-semiconductors-and-applications-in-south-wales/
[64] TripTo Mid Wales Electric Car Clubs (2022). https://www.tripto.org.uk/
[65] Pelican Yutong, Cardiff Bus place substantial zero-emission bus order (2022). https://pelicanyutong.co.uk/cardiff-bus-order-zero-emission-buses/
[66] Dolen Teifi Community Transport, About Dolen Teifi (2022). https://www.dolenteifi.org.uk/dolenteifi/about-dolen-teifi
[67] Fuel Cell Systems, Refuelling hydrogen vehicles at Milford Haven Marina (2022). https://www.fuelcellsystems.co.uk/news/milfordhaven
[68] Swansea Bay City Deal, Welcome to the Swansea Bay City Deal. (2022) https://www.swanseabaycitydeal.wales/

Location	Name	Timeline	Scope
Cardiff City Region	*Accelerating Transition to Hydrogen*[69]	*Proposition*	*Wales & West Utilities are committed to transitioning large parts of their network to hydrogen, with recent regulatory price control determinations meaning they can start laying the first hydrogen pipes within the next 5 years. The South Wales Industrial Cluster through its Deployment and Cluster Plan projects led by Costain and CR Plus are developing proposals to produce Blue and Green Hydrogen at scale in various location across South Wales. This work will inform and help deliver the hydrogen transition across the Cardiff City Region (CCR).*
Cardiff City Region	*Management of Renewable Energy at Depots using Digital Twins*[70]	*Proposition*	*Innovate UK is supporting CCR, and 10 other local authorities in the region, look for innovative deployment technology to enable zero emission council fleets. Specific focus is being paid to Council Digital twins for managing large-scale renewable energy next to depots and employing data driven approaches for deploying ZEV and charging/refuelling infrastructure.*
Cardiff City Region	*Optimisation of on-site renewable energy for EV fleet charging at council depots*[71]	*Proposition*	*This innovation scheme is focussed on identifying suppliers of technologies that can enable the adoption of ZEVs and can support the decarbonisation of council fleets. Any solutions should be scalable and be applicable to other Local Authorities in the region.*
Cardiff City Region	*Zero emission auxiliary energy supplies for utility and community vehicles*[72]	*Proposition*	*This innovation scheme is focussed on identifying integrated energy solutions to enhance the energy capacity of ZEVs to allow auxiliary energy usage.*

[69] Cardiff Capital Region, Accelerating Transition to Hydrogen and a Commercial Property Energy Refit Programme (2022). https://www.cardiffcapitalregion.wales/investment-opps/accelerating-transition-to-hydrogen-and-a-commercial-property-energy-refit-programme/
[70] InnovateUK, Digital twins for large scale renewable energy next to depot (2022). https://ktn-uk.org/opportunities/digital-twin-for-management-of-large-scale-renewable-energy-next-to-depot/
[71] InnovateUK, On-site renewable energy for EV fleet charging at council depots. https://ktn-uk.org/opportunities/optimisation-of-on-site-renewable-energy-for-ev-fleet-charging-at-council-depots/
[72] InnovateUK, Zero emission auxiliary energy supplies for utility and community vehicles (2022). https://ktn-uk.org/opportunities/zero-emission-auxiliary-energy-supplies-for-utility-and-community-vehicles/

3.4.1 Table 6 summarises a range of projects in adjacent regions which are working towards similar objectives as this ZEV Strategy. NPTC would benefit from complementing these projects as they provide support towards the successful options in ZEV implementation.

3.4.2 Several of these projects relate to hydrogen transition. Hydrogen vehicles have the potential to offer greater range, faster refuelling times, and less emissions[73] than EVs and are particularly well suited for large vehicles and plant infrastructure. The benefits of alternative fuels and the role they play in meeting net-zero carbon are covered in Section 5.3.

3.4.3 The high concentration of hydrogen projects suggests that NPT and the surrounding area could be an ideal location within Wales for hydrogen generation and distribution. Furthermore, by aligning within these projects, NPTC has the opportunity to leverage existing research, infrastructure and knowledge of best practice to capture efficiencies.

3.4.4 Surrounding area projects also focus on the electrification of large fleet vehicles. Currently, the EV market for large, specialist vehicles (e.g. refuse collection vehicles) is still relatively immature and present their own unique challenges. Therefore, NPTC can take advantage of expertise from completed projects and align with ongoing initiatives.

3.4.5 Car clubs and community transport projects are popular within the surrounding area. Investment into car clubs is becoming increasingly popular for local authorities with the aim of taking cars off the road and changing mobility patterns away from private car usage. Car clubs also provide residents, visitors or employees access to a vehicle without being tied to ownership. NPTC should consider engaging with these regions to get insight into how LAs selected operating models and how stakeholder engagement was carried out to ensure successful uptake by the local community.

3.4.6 NPTC is developing similar projects, for instance, a new community car scheme covering Neath East and Briton Ferry. The council are also committed to producing:

- An energy use (MWh) assessment covering all road transport.
- A GHG footprint covering all road transport including grey fleet and plant.
- A Fleet Profile covering all road vehicles: Age, carbon intensity, fuel type, emission standard, Clean Air Zone compliance.
- Consideration of alternative net zero fuels where electrification is not viable.
- Whole life cost models covering the replacement of cars, vans and trucks with ULEVs.
- Estimated charging/refuelling requirement including site models for main offices and depots.
- Proposals for EVCI and for supporting photovoltaic and battery storage systems.
- Supporting business case where required for ULEV procurement.
- Suggestions for dealing with grey fleet mileage and transitioning it to ULEV vehicles.

3.4.7 With large overlaps in projects between NPTC commitments and existing surrounding project activities shown in Table 6 there is great opportunity for NPTC to form partnerships with councils and echo existing successes in surrounding projects.

[73] US Department of Energy, 'Alternative Fuels Data Center: Fuel Cell Electric Vehicles' https://afdc.energy.gov/vehicles/fuel_cell.html

Informing the NPT ZEV Strategy

Although ZEV adoption is growing within NPT, it is still well below that of neighbouring LAs as well as the Welsh and UK averages. There is also currently little provision of public EVCPs, meaning that access to chargers is limited, these are exclusively privately owned, and the charging costs are high due to lack of competition. While NPTC has begun to install EVCPs for council fleet vehicles, recent WGES have revealed more planned EVCPs are needed in order to meet net-zero fleet targets by 2030. A high-level assessment of NPT's power grid revealed no areas of high risk, where power constraints would hamper EVCP installation.

There are a variety of ZEV-related projects planned or underway surrounding NPT. There is an opportunity for NPTC to leverage the knowledge and expertise picked up by local authorities and align with future projects further the NPT ZEV agenda.

Continue to deliver NPTC's net-zero transport emissions agenda

Pursue alignment with ongoing projects in and around NPT

Promote Inclusive ZEV uptake across Neath Port Talbot

Promote Private Sector investment in ZEV technologies

4 Forecasting

4.1 EV Uptake

4.1.1 It is estimated that the UK could see between 4 and 13 million EVs registered by 2030, and as many as 31 million by 2040[74]. However, there is a level of uncertainty with all EV forecasts and modelling given the rapidly changing market. The forecasting assumptions made in this section have been compared with comparative studies and are broadly aligned with them.

4.1.2 To create a range of EV uptake forecasts, analysis was carried out across published research from private and public sector bodies. The findings of this analysis are shown in Table 7**.**

Table 7: Desktop Research on EV/ULEV Forecasts

Source	Year	Low %	Medium %	High %	Comment
Road to Zero % (2018) [75]	*2025*	***15%***	***20%***	***30%***	*% New Car Sales - ULEVs*
	2030	***40%***	***50%***	***70%***	
Transitioning to Zero Emission (2022)	*2025*	*25%*	*34%*	*42%*	*% New Car Sales – ULEVs*
	2030	*60%*	*80%*	*100%*	
	2025	*8%*	*18%*	*28%*	*% New Van Sales – ULEVs*
	2030	*38%*	*70%*	*100%*	
The UK's Transition to Electric Vehicles (2020)[76]	*2032*		*55%*		*% Total Car and Vans - ULEVs*
	2050		*100%*		
The Sixth Carbon Budget Surface Transport (2020)[77]	*2030*	*27%*	*-*	*37%*	*% Total cars and vans - BEVs*
National Grid's Future Energy Scenario[78]	*2030*	*11%*	*-*	*36%*	*% Total cars and vans - BEVs*
	2025	*9%*	*-*	*21%*	

[74] National Grid Future Energy Scenarios (2021) https://www.nationalgrideso.com/document/199871/download
[75] HM Government, DfT: The Road to Zero (2018). CD:A7 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739460/road-to-zero.pdf
[76] Climate Change Committee, Transition to EVs (2020). https://www.theccc.org.uk/wp-content/uploads/2020/12/The-UKs-transition-to-electric-vehicles.pdf
[77] Climate Change Committee, Surface Transport Summary (2020). https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Surface-transport.pdf
[78] National Grid, Future Energy Scenarios (2022). https://www.nationalgrideso.com/future-energy/future-energy-scenarios

Source	Year	Low %	Medium %	High %	Comment
London's 2030 EVCI Strategy (2020)[79]	*2030*	*34%*	*-*	*49%*	*% Total cars and vans - BEVs*
GIPA[80]	*2025*	*19%*	*-*	*21%*	*% Total cars - ULEVs*
AutoTrader[81]	*2025*		*18%*		*% Total cars and vans - ULEVs*
	2030		*40%*		
Average	***2025***	***15%***	***18%***	***20%***	
	2030	***28%***	***40%***	***41%***	

4.1.3 From this analysis the following scenarios were developed to forecast total EV registrations in NPT in 2025 and 2030 according to the values shown in Table 8:

- **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 increase that will be required to achieve the remaining two scenarios.
- **Medium - Good practice:** Developed following the desktop research on EV projections shown in Table 7. EV uptake, as a percentage of total vehicles in NPT, put forward in this scenario is aligned to the DfT Road to Zero uptake figures and closely resembles the industry average figures. Therefore, it is likely that this scenario provides the most realistic forecasts.
- **High - Exemplar:** Assumes that the perfect conditions exist to enable mass adoption of EVs between now and 2030. This would require substantial investment from the private and public sector to remove real (economic, supply chain, lack of infrastructure, energy) and perceived (range anxiety, mistrust of the technology) barriers that currently limit EV adoption. The EV uptake associated with this scenario is greater than the percentages observed in Table 8 and have been included to show an upper limit and inform future-proofing the NPT EV infrastructure network.

Table 8: Total EV Uptake Projection Scenarios

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

4.1.4 Two forecasting growth models were applied to the baseline vehicle registration data, covered in Section 3, to project future vehicle registrations:

- National Highways 2% steady growth model – applying a constant growth factor of 2% for vehicle registration is common for EV forecasting and provides a reliable 'worst-case' scenario.
- Mathematical linear extrapolation of historic registration data.

[79] TfL, London 2030 EV Infrastructure Strategy (2021). https://lruc.content.tfl.gov.uk/london-2030-electric-vehicle-infrastructure-strategy-executive-summary-december-2021.pdf
[80] IAAF, UK EV Forecasts (2021). https://www.iaaf.co.uk/news/gipa-uk-forecasts-electrified-vehicles-will-represent-20-of-the-passenger-car-parc-by-2025/
[81] Autotrader, EV Demand News (2022). https://plc.autotrader.co.uk/press-centre/news-hub/demand-for-electric-cars-drops-for-first-time-since-pandemic/

4.1.5 Each projection has its strengths and weaknesses as presented in Figure 12 and Figure 13. Both projections have been presented to ensure a holistic picture of EV forecasts based on total vehicle ownership in NPT. The variation in these projections methods is explored in the next section. Figure 14, sets out the assumptions that have been made as part of the EV forecasting methodology.

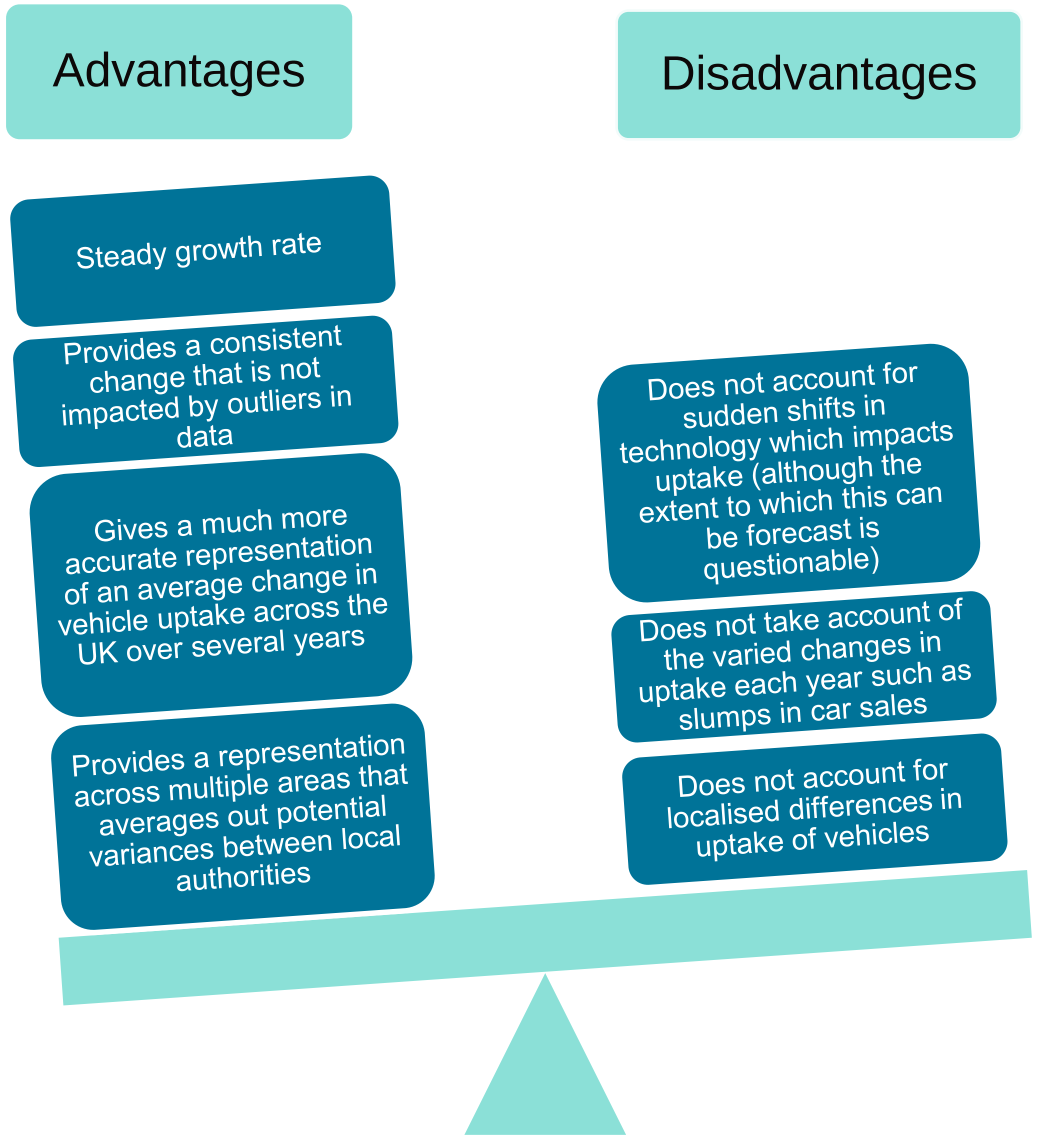


Figure 12: Strengths and Weaknesses of National Highways 2% Steady Growth Forecasts

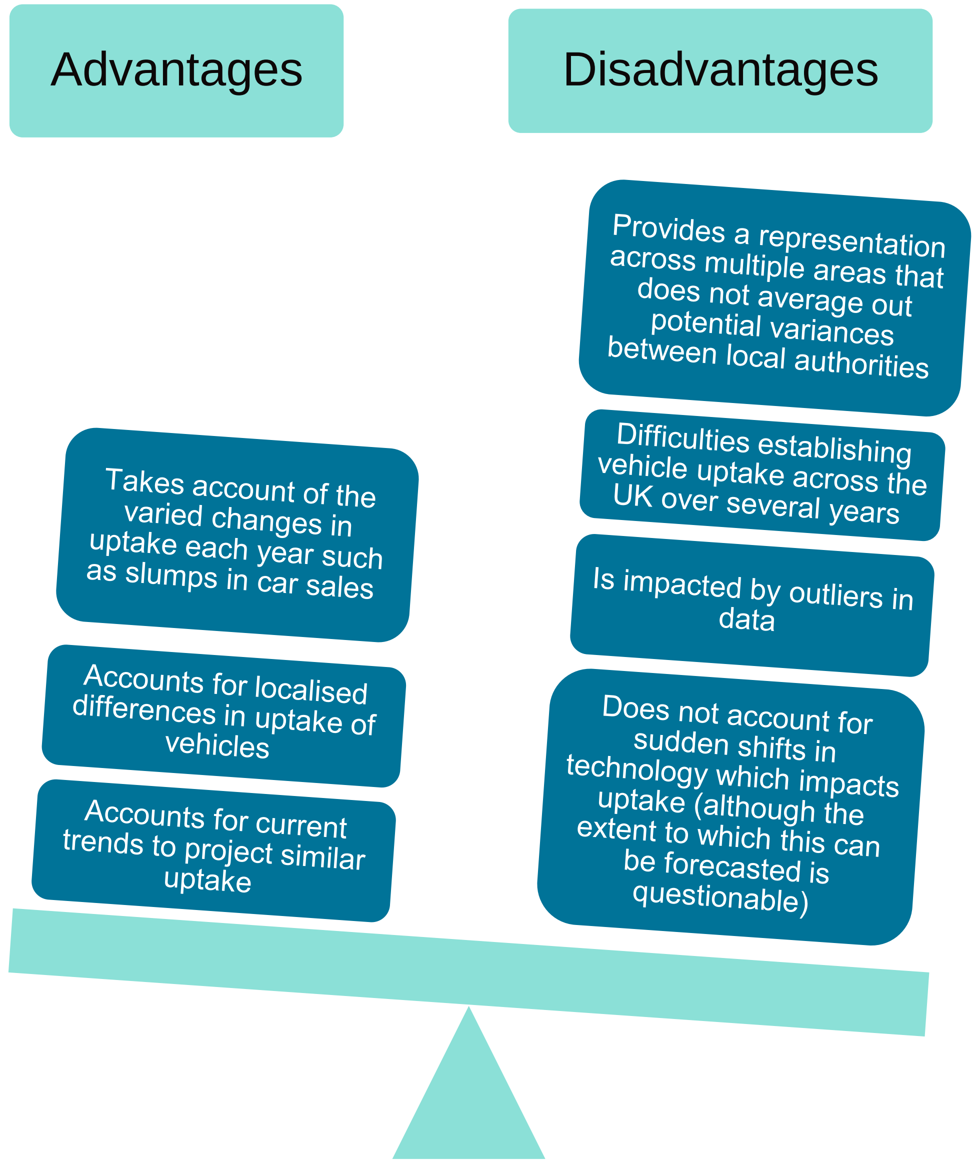


Figure 13: Strengths and Weaknesses of DfT Linear Extrapolation Forecasts

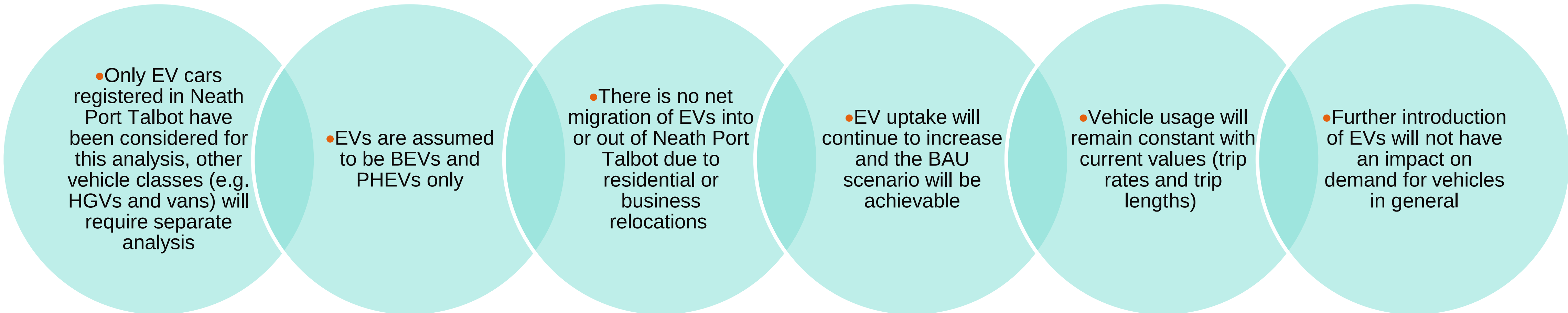


Figure 14: Assumptions made to forecast EV registrations within Neath Port Talbot

Future EV Uptake in the NPT

4.1.6 Figure 15 shows the historic number of total registered cars at the end of each year, in the NPT area between 2009 and 2020.

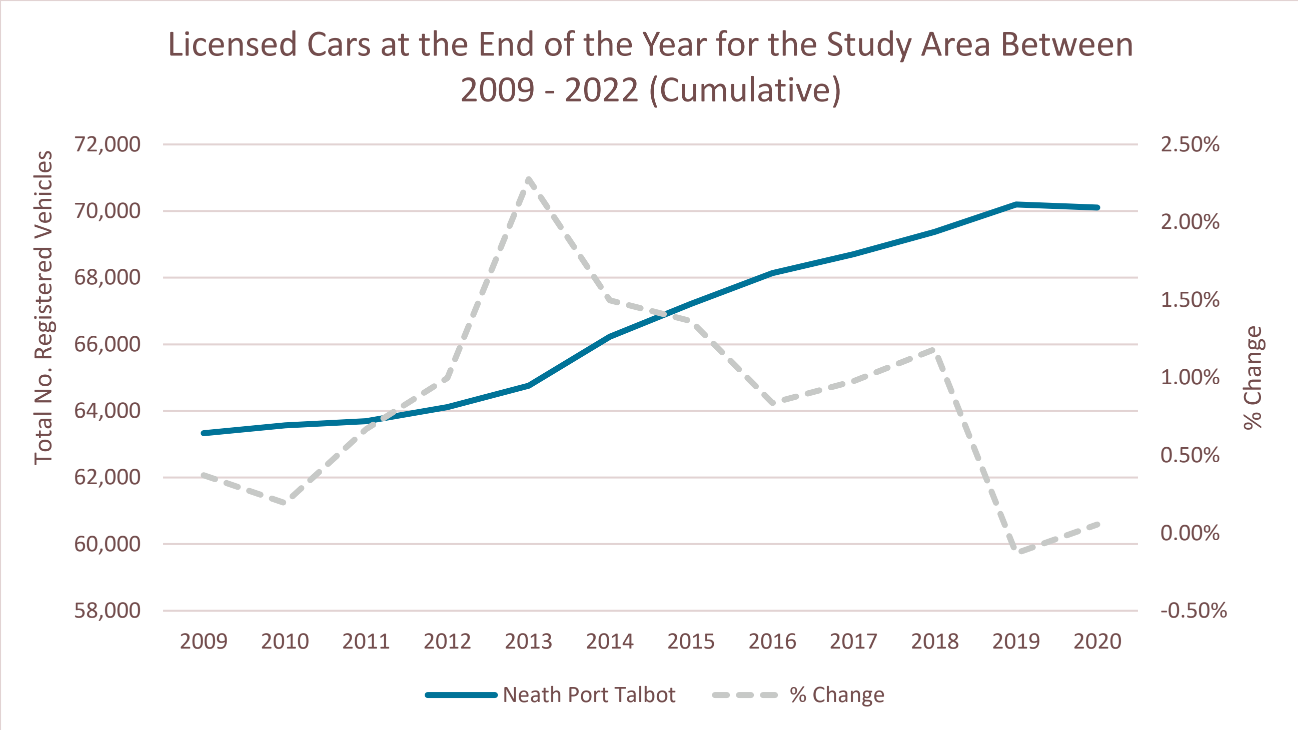


Figure 15: Licensed Cars at the End of the Year in NPT Between 2009-2022

4.1.7 From Figure 15, NPT has seen a relatively steady growth in the number of registered vehicles of all fuel types over the eleven-year period. The only period where registrations decreased was between 2019 and 2020, this is likely a of impact the Covid-19 pandemic on travel. By 2020, there was total of over **70,000 registered vehicles in NPT.** The total number vehicles registered follows a staggered trendline, year-on-year varying from **between just below 0% to 2% growth.**

4.1.8 Table 9 below shows the total numbers of vehicles expected to be registered, in NPT, in 2025 and 2030 for both the National Highways 2% Steady Growth and Linear Extrapolation projections.

Table 9: Expected Total Number of Vehicles to be registered in NPT in 2025 and 2030

Forecast Year	National Highways 2% Steady Growth	Linear Extrapolation
2025	*77,404*	*70,302*
2030	*85,460*	*70,497*

4.1.9 From Table 9 the variation between the two projections is 7,102 (9.2%) registered vehicles by 2025 and 14,963 (17.5%) by 2030. Given the inherent uncertainty of vehicle forecasting, a difference in projections is acceptable and will be used to form upper and lower limits during the analysis covered in later sections of this report.

4.1.10 Figure 16 shows the projected number of EVs registered in NPT by 2025 and 2030 against both models, and applying the low, medium and high uptake scenarios.

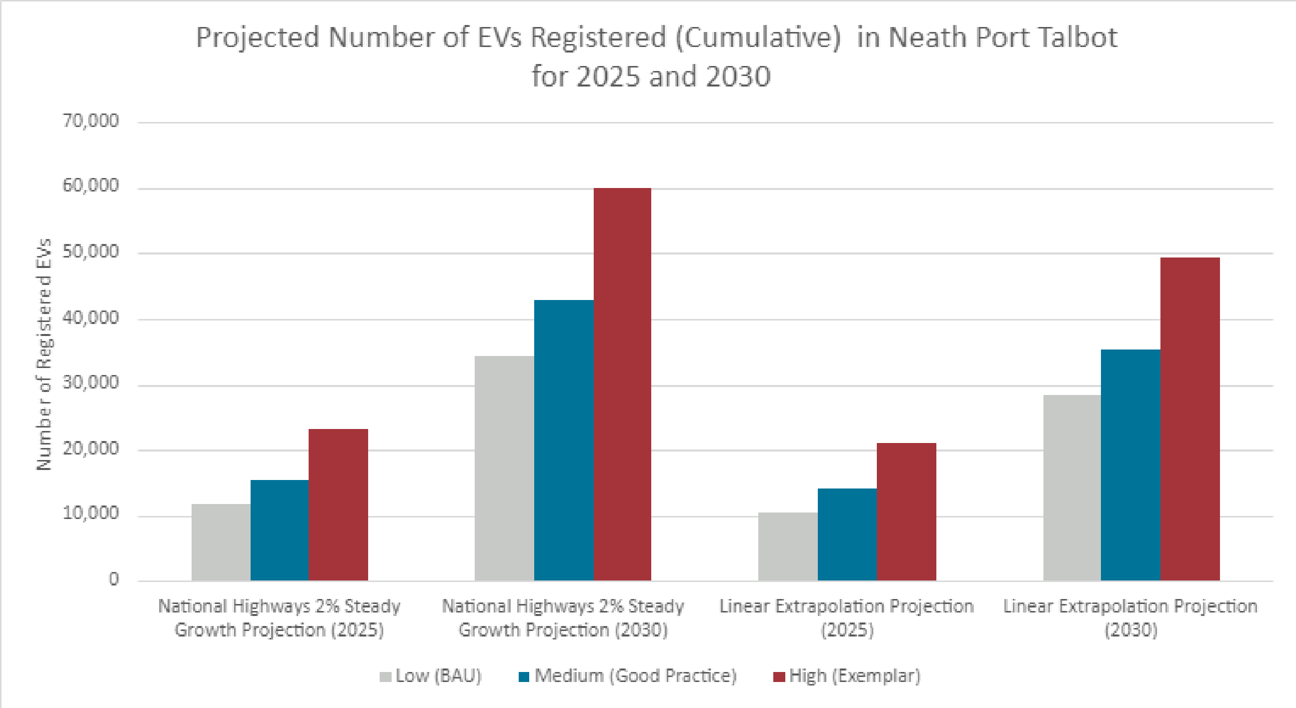


Figure 16: Projected Number of EVs Registered in NPT by 2025 and 2030

4.1.11 From Figure 16, there is forecast to be between **10,500 and 23,000** EVs registered in NPT **by 2025** and between **28,000** and **60,000 EVs by 2030**.

Vehicle Usage

4.1.12 Vehicle usage has been incorporated into the forecasting model, to calculate the total daily distance travelled by fossil fuelled internal combustion engine (ICE) vehicles and EVs. Through utilising Transport for Wales' Southwest and Mid Wales Transport Model (SWMWTM), the number of trips per day and daily trip lengths were captured for the NPTC study area. From this data, the average daily trip length within NPT was found to be **14.2 miles.**

4.1.13 The Total Distances Travelled for each selected projection and the defined forecasted year has been presented below in Table 10.

Table 10: Total Distances Travelled Projections

Vehicle Usage	*SWMWTM Results (Current)*	*National Highways 2% Steady Growth Projection*		*Linear Extrapolation Projection*	
		2025	2030	2025	2030
No. Daily Trips by Car	277,616	306,340	338,224	278,233	279,005
Total Distance Travelled (miles per day)	3,955,004	4,364,215	4,818,447	3,963,799	3,974,794

4.1.14 Table 11 and Table 12 show the total number of vehicle trips per day by car and the average daily trip length, which was then used to calculate the results for the total travelled distance (miles per day) for EVs and ICE vehicles based on the National Highways steady 2% growth and the Linear Extrapolation, respectively, for each EV uptake scenario: Low (BAU), Medium (Good Practice) and High (Exemplar).

Table 11: Daily Car Trips and Average Daily Trip Length According to National Highways Steady 2% Growth

Vehicle Usage/ EV Uptake Scenarios		Low (BAU) Scenario		Medium (Good Practice) Scenario		High (Exemplar) Scenario	
		ICE	EV	ICE	EV	ICE	EV
No. of Vehicles	*2025*	*65,793*	*11,611*	*61,923*	*15,481*	*54,183*	*23,221*
	2030	*51,276*	*34,184*	*42,730*	*42,730*	*25,638*	*59,822*
Total miles travelled per day	*2025*	*3,709,584*	*654,632*	*3,491,373*	*872,843*	*3,054,951*	*1,309,265*
	2030	*2,891,068*	*1,927,379*	*2,409,224*	*2,409,224*	*1,445,534*	*3,372,913*

Table 12: Daily Car Trips and Average Daily Trip Length According to Linear Extrapolation

Vehicle Usage/ EV Uptake Scenarios		Low (BAU) Scenario		Medium (Good Practice) Scenario		High (Exemplar) Scenario	
		ICE	EV	ICE	EV	ICE	EV
No. of Vehicles	*2025*	*59,757*	*10,545*	*56,242*	*14,060*	*49,211*	*21,091*
	2030	*42,298*	*28,199*	*35,249*	*35,249*	*21,149*	*49,348*
Total miles travelled per day	*2025*	*3,369,229*	*594,570*	*3,171,040*	*792,760*	*2,774,660*	*1,189,140*
	2030	*2,384,876*	*1,589,918*	*1,987,397*	*1,987,397*	*1,192,438*	*2,782,356*

4.1.15 The total distances travelled by EVs shown in Table 11 and Table 12 have been used to calculate the environmental benefits associated with increased EV uptake.

Environmental Impacts

4.1.16 Department for Environment, Food and Rural Affairs (DEFRA) emissions factors for 2021 were taken from the GHG reporting data and multiplied by the total distance travelled in each vehicle usage scenario to establish an overall level of carbon and Nitrous Oxide (N_2O) emissions for each EV uptake scenario in 2025 and 2030. N_2O is a greenhouse gas approximately 300 times as damaging as CO_2 and is a produce by most catalytic converting systems, making an unavoidable by-product of ICE vehicle use[82]. The DEFRA emissions factors provide the average CO_2 (equivalent) and N_2O emissions in kilograms per km for different types of vehicles including petrol, diesel, PHEV and BEV. Up-stream emissions have also been included, for example the emissions of grid power production to supply electricity for charging PHEVs and BEVs, to show the true environmental impacts for comparison purposes.

[82] Air Quality Expert Group, Exhaust Emissions from Road Transport (2021). https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2112201014_1272021_Exaust_Emissions_From_Road_Transport.pdf

4.1.17 A single ICE emission factor has been calculated by averaging petrol and diesel values. Due to the uncertainty surrounding the future adoption BEVs and PHEVs, emission values for both these ULEV types have also been averaged to form a single combined EV emission factor.

4.1.18 Table 13 below highlights the average CO_2e and N_2O emissions (Kg per mile) for ICE vehicles and EVs which has been used for this forecast.

Table 13: Average CO_2 and N_2O emissions for ICE vehicles and EVs

	ICE (kg CO_2e)	ICE (kg N_2O)	EV (kg CO_2e)	EV (kg N_2O)
Per km	*0.1714*	*0.0011*	*0.0726*	*0.0004*
Per mile	*0.2758*	*0.0018*	*0.1168*	*0.0006*

4.1.19 Based on the emissions factors shown in Table 13, total emissions are calculated for each EV uptake scenario (Low (BAU), Medium (Good practice) and High (Exemplar)) for both the National Highways 2% Growth Forecast and the Linear Extrapolation Forecast projections.

4.1.20 Figure 17 and Figure 18, below, compare how CO_2 emissions (tonnes CO_2e per year) and N_2O (tonnes N_2O per year) savings vary, depending on the different projection scenarios for 2025 and 2030.

Figure 17: National Highways 2% Steady Growth Predictions on CO_2 and N_2O Savings by EV Uptake Scenarios in 2025 and 2030

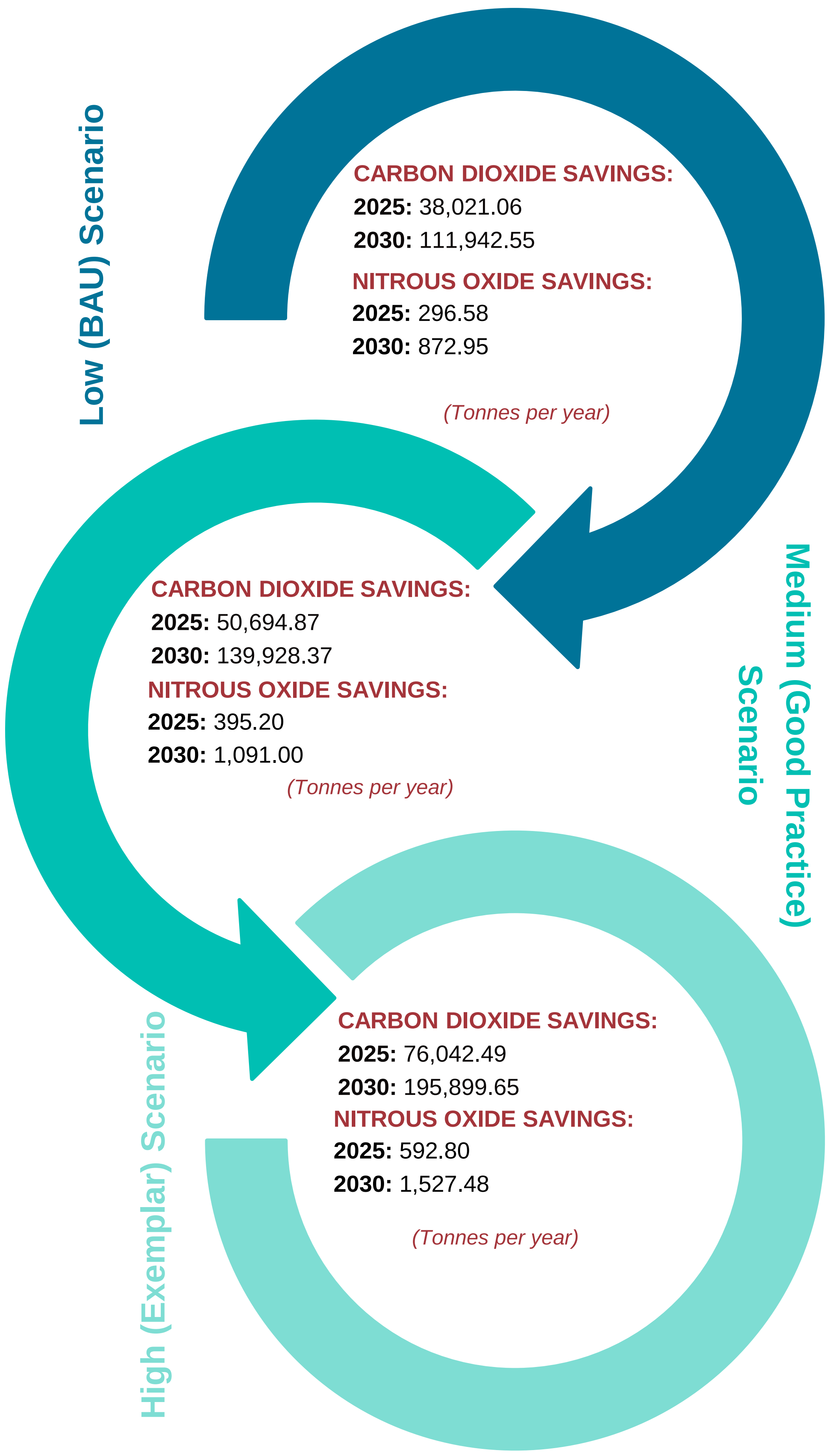
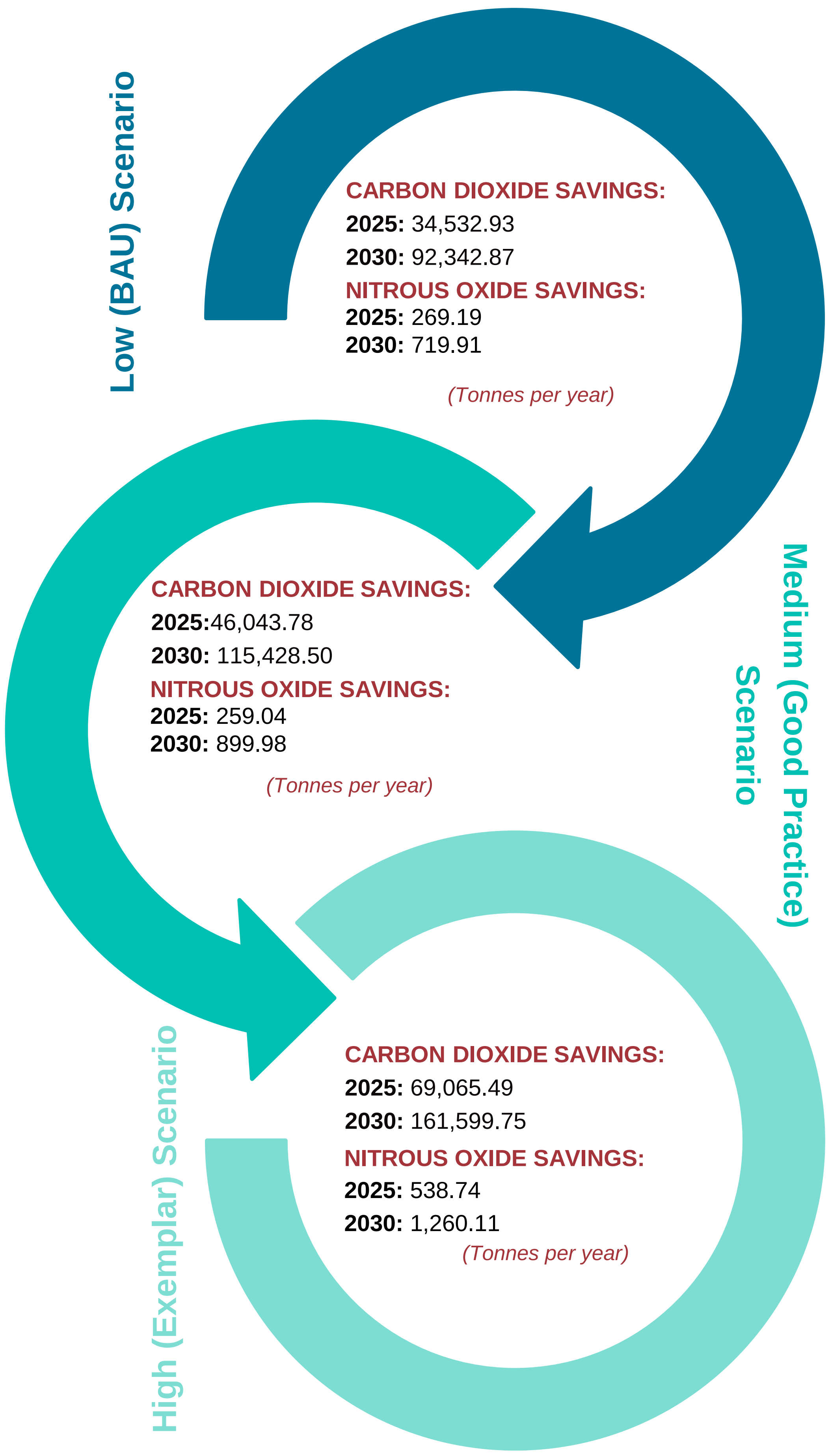


Figure 18: Linear Extrapolation Predictions on CO_2 and N_2O Savings by EV Uptake Scenarios in 2025 and 2030



Summary of Forecasting Model Results

4.1.21 A forecasting assessment revealed that EV uptake within NPT has potential to save between **34,532.93 tonnes** and **76,042.49 tonnes of CO_2e per year by 2025. By 2030**, these saving would rise to between **92,342.87 tonnes** and **195,899.65 tonnes** as EV uptake increases.

4.1.22 Similarly, there is potential to save anywhere between **269.19 tonnes** and **592.80 tonnes of N_2O per year by 2025** and between **719.91 tonnes** and **1,527.48 tonnes** because of increased EV uptake.

4.1.23 Using the Linear Extrapolation forecasting method, the more conservative of the two, for total vehicle registrations up to 2030, **EV uptake in the NPT could save 115,428.50 tonnes of CO_2 emissions and 899.98 tonnes of N_2O each year,** if a Medium (Good Practice) scenario for EV implementation is achieved whereby 50% of all operating vehicles are EVs.

4.1.24 However, to achieve this level of benefits will require **35,249 EVs** to be registered in NPT by 2030. This, compared to the current figure of approximately 550 EVs demonstrates the enormous growth needed and the number of EVCPs that will be required to support this demand.

4.2 EVCP Requirements

4.2.1 To facilitate the increased uptake of EVs, significant investment will be required to expand the NPT EVCP network. To quantify the extent of this, analysis was carried out using travel patterns, tourist data and EV charging behaviour statistics.

Total Daily Mileage – Commuter and Domestic Trips

4.2.2 To calculate the frequency of car trips for different purposes, data from the South West Wales Integrated Consortium (SWWITCH) Regional Transport Plan for Southwest Wales[83] was analysed. For this analysis, all trips carried out for 'Work Commuting', 'Education', and 'Work Business' purposes were designated as commuter trips and all of the other purposes, the 'General Domestic' category. These results are summarised below:

- Total Car Trips **– 12,168**
- Commuting Trips – **6,274 (52%)**
- General Domestic – **5,894 (48%)**

4.2.3 These percentages were then applied to the figures of vehicle usage to give the daily EV mileage for commuting and domestic trips in NPT using the three forecasting Scenarios.

Total Daily Mileage – Tourist Trips

4.2.4 Tourist travel data was obtained from The Great Britain Day Visitor 2019 Annual Report[84], which captured average yearly figures for tourist trips lasting over 3 hours and overnight trips. Of these trips, an estimated 50%[85] were completed in a car and the average trip length was estimated to be **70 miles**. The results of this analysis are displayed in Table 14.

[83] SWWITCH, The Regional Transport Plan for Southwest Wales (2007). https://democracy.swansea.gov.uk/Data/Council/20090730/Agenda/Email_Only_Appendix_of_RTP__-_Appendices_RTP.pdf
[84] 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
[85] Welsh Government, Joint Transport Plan Appendices – South West Wales 2015-2020. https://www.npt.gov.uk/media/4063/ltp_appendices_2015_2020.pdf?v=20170627002133

Table 14: Average Day and Overnight Tourist Trips to NPT

	Average Overnight Tourist Trips to the NPT	**Average Day Tourist Trips (3hours+) to the NPT**
Annually	56,000	3,966,000
Annually, by car driver	*28,167*	*1,982,994*
Daily, by car driver	*77*	*5,433*

4.2.5 Using these results, and assuming that tourism is constant, the different uptake scenarios were applied to determine to number of tourists travelling into the NPT in EVs. These results are shown in Table 15 below.

Table 15: Forecasted Daily EV Tourist Trips and Mileage in NPT

	2025			**2030**		
	Low (BAU)	*Medium*	*High*	*Low (BAU)*	*Medium*	*High*
Daily Trips	*827*	*1,102*	*1,653*	*2,204*	*2,755*	*3,857*
Daily Mileage	*57,855*	*77,140*	*115,711*	*154,281*	*192,851*	*269,991*

Types of EVCPs

4.2.6 The next stage of analysis was to forecast the future demand on EVCPs, based on the figures of EV uptake presented in the previous section. To do this, different trip types and the appropriate EVCI in each case were considered:

- **Commuter Trips – Residential Slow EVCPs:** Research has shown that 75%[86] of all charging events occur at or near to home. It is estimated that 40%[87] of households do not have access to off-street parking so rely on on-street parking (i.e., they do not have their own private driveway). Recent statistics revealed that 95% of current EV drivers have access to off-street parking[88], On-street residential chargers are low powered (7kW) and can provide a full charge (0% to 100%) in around 7-11 hours, depending on battery size, so are typically used overnight. For this reason, they are best suited for EV commuters as they can plug in their vehicle when they return in the evening, and it will be fully ready for the morning commute. It is important to note, given the long duration of charging sessions required, it is likely only a single user will be able to charge their EV per EVCP each day.
- **General Domestic Trips – Town Centre Fast EVCPs:** Public Town Centre EVCPs are 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

[86] 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
[87] 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
[88] Department for Transport, Electric Vehicle Charging Research - Survey with electric vehicle drivers (2022) Electric Vehicle Charging Research. Survey with electric vehicle drivers. Research report. (publishing.service.gov.uk)

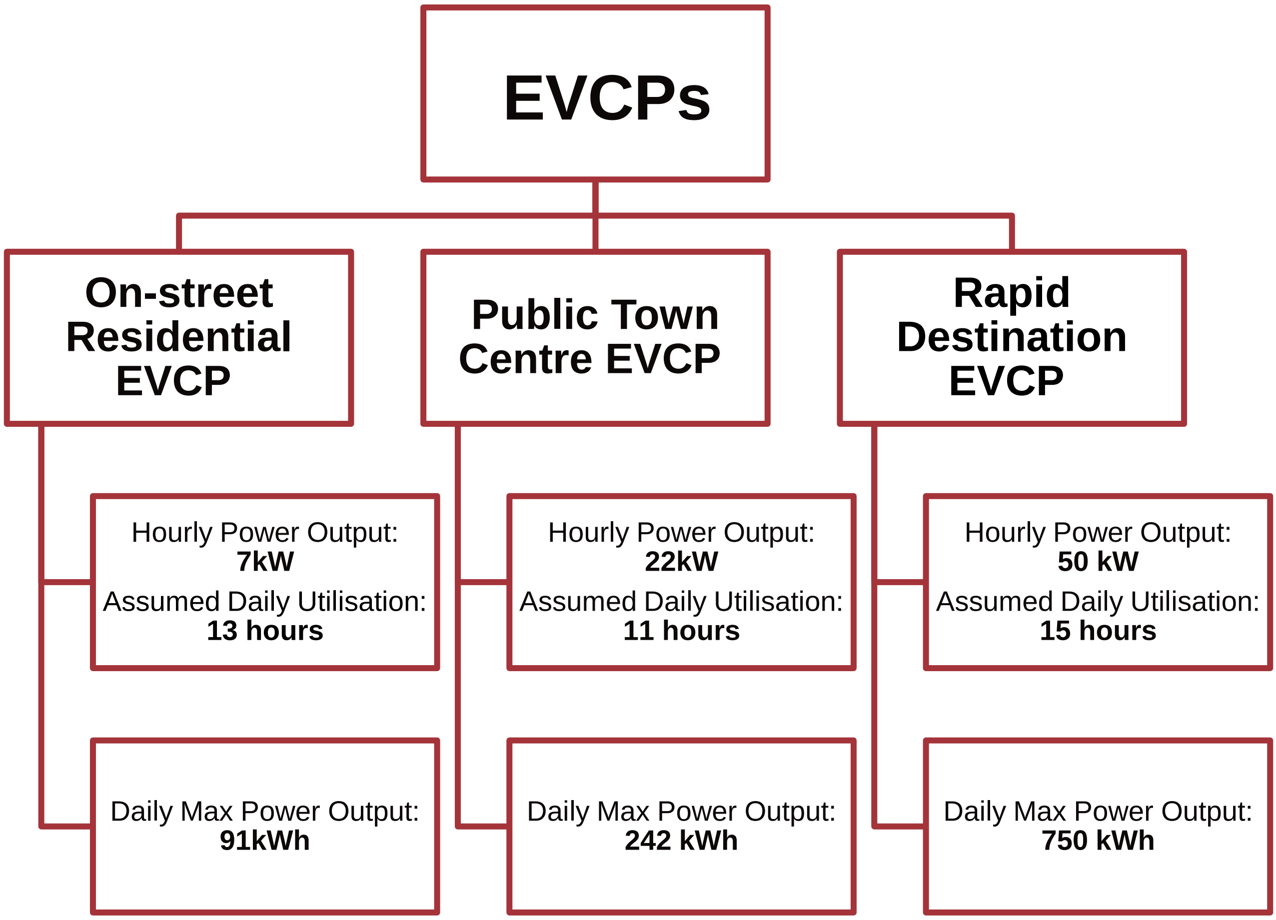
purposes and are therefore only away from their vehicles for a few hours at a time. These EVCPs are typically only used during the day and may be used by multiple users in a single day.

- **Tourist / Leisure Trips – Strategic / Destination Rapid EVCPs:** Rapid destination EVCPs are high power and can provide significant charge (0% to 80%) over very short periods of time. These EVCPs are typically located at tourist destinations, petrol stations and designated EV charging hubs with multiple charge points available facilitating long-haul EV journeys with minimal added time required for charging.

4.2.7 Further details of the different EVCP types are covered in Section 5.2

4.2.8 Given the power supply and the typical use case, the maximum power output of a single On-street EVCP, a single public town centre fast EVCP and of a single rapid destination EVCP, could be calculated, this is presented in Figure 19 below. It should be noted that although destination EVCPs commonly exceed 50kW[89], the vast majority of EVs currently available have are limited to recharging at a maximum 50kW. Therefore, they would recharge at the same rate at any EVCP rated above 50kW.

Figure 19: Power Output of EVCPs



[89] With ultra-rapid EVCPs now rated at 150kW and 350kW

Forecasting Future EV Performance

4.2.9 EV technology is constantly developing with batteries becoming more powerful, and EV ranges growing. To model future EVCI requirements, Table 16 outlines the forecasts for future EV performance.

Table 16: Forecasted Future EV Battery Performance

	Range (miles)	Battery Size (kWh)	Battery Efficiency (Wh/mile)	EV Performance (miles/kWh)
Current EV Specifications[90] (Renault Zoe ZE50[91])	*195*	*52*	*267*	*3.8*
Forecasted 2030 EV Specifications[92]	*375*	*75*	*200*	*5*

4.2.10 The values for battery efficiency were used to convert the total number of EV miles driven for a particular use case (e.g., commuting) into the total power required to complete those miles.

Charging Behaviour

4.2.11 Element Energy modelling of current EV usage[93] estimates the share of charging demand for residents is 75% residential overnight charging, of which 40% is carried out at residences without off-street parking facilities, 5% rapid public charging and 6% fast public charging. The remaining proportions are covered by workplace charging, which are typically privately procured, owned, and operated, and are outside of the responsibility of the LA. The results are shown in Figure 20 below. It is assumed that 100% of tourists who travel within the region will use rapid destination EVCPs.

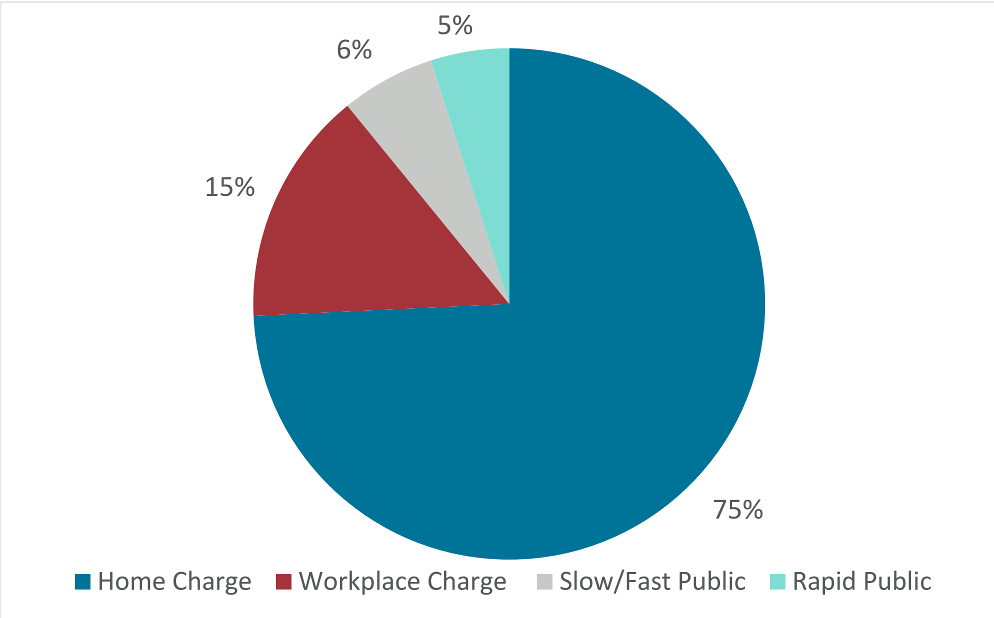


Figure 20: Charging Behaviour Based on Element Energy EV Behaviour Study (2019)

[90] NimbleFins, Average Electric Car Range in the UK 2021. https://www.nimblefins.co.uk/average-electric-car-range
[91] EV Database, Renault Zoe ZE50 R110. https://ev-database.uk/car/1164/Renault-Zoe-ZE50-R110
[92] IEA, Global EV Outlook (2020). https://www.iea.org/reports/global-ev-outlook-2020
[93] 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

4.2.12 Using these findings and the forecasted EV usage data from the previous section, estimates were made on the number of EVCPs required across the region to support future EV usage. The results of these calculations are presented in Table 17 below in numbers of single socket EVCPs required.

Table 17: Forecasted EVCP Requirements

Projection	EVCPs Required	2025			2030		
		Low	Medium	High	Low	Medium	High
National Highways 2% Uptake	Fast (7kW) EVCPs	297	396	593	655	819	1,147
	Fast (22kW) EVCPs	21	28	42	46	58	81
	Rapid (50kW) EVCPs	21	27	41	41	51	72
Linear Extrapolation	Fast (7kW) EVCPs	270	359	539	541	676	946
	Fast (22kW) EVCPs	19	25	38	38	48	67
	Rapid (50kW) EVCPs	21	27	41	41	51	72

4.3 Future Grid Assessment

4.3.1 A grid capacity assessment was conducted to assess the influence of EV charging on the grid network by 2025. The implementation of the 2025 EV uptake figures was used instead of 2030 to maintain relevance to the current state of the grid network, which may be heavily updated by 2030. The usage of current EV technology with respect to range and battery capacity was used for this assessment to maintain consistency.

4.3.2 The forecasted 2025 grid analysis was a combination of both the existing energy baseline along with an average EV demand based on an assumed daily recharge for EV users. The methodology calculated the average daily EV recharge based on current EV technology and regular daily vehicle journey trends. Taking these findings, we inferred the capacity of primary substations in terms of the number of EVs that can be charged simultaneously, based on their daily recharge requirements. These findings have been presented in Table 18 and are mapped in Figure 21, below.

Table 18: Future Assessment of Primary Substations

RAG Status	Maximum #EVs that could be charged simultaneously	# Primary Substations	Details
Green	>2500	4	No upgrades required
Amber	1500 – 2500	1	No Immediate Upgrades Required
Red	< 1500	5	Futureproofing Upgrades Required

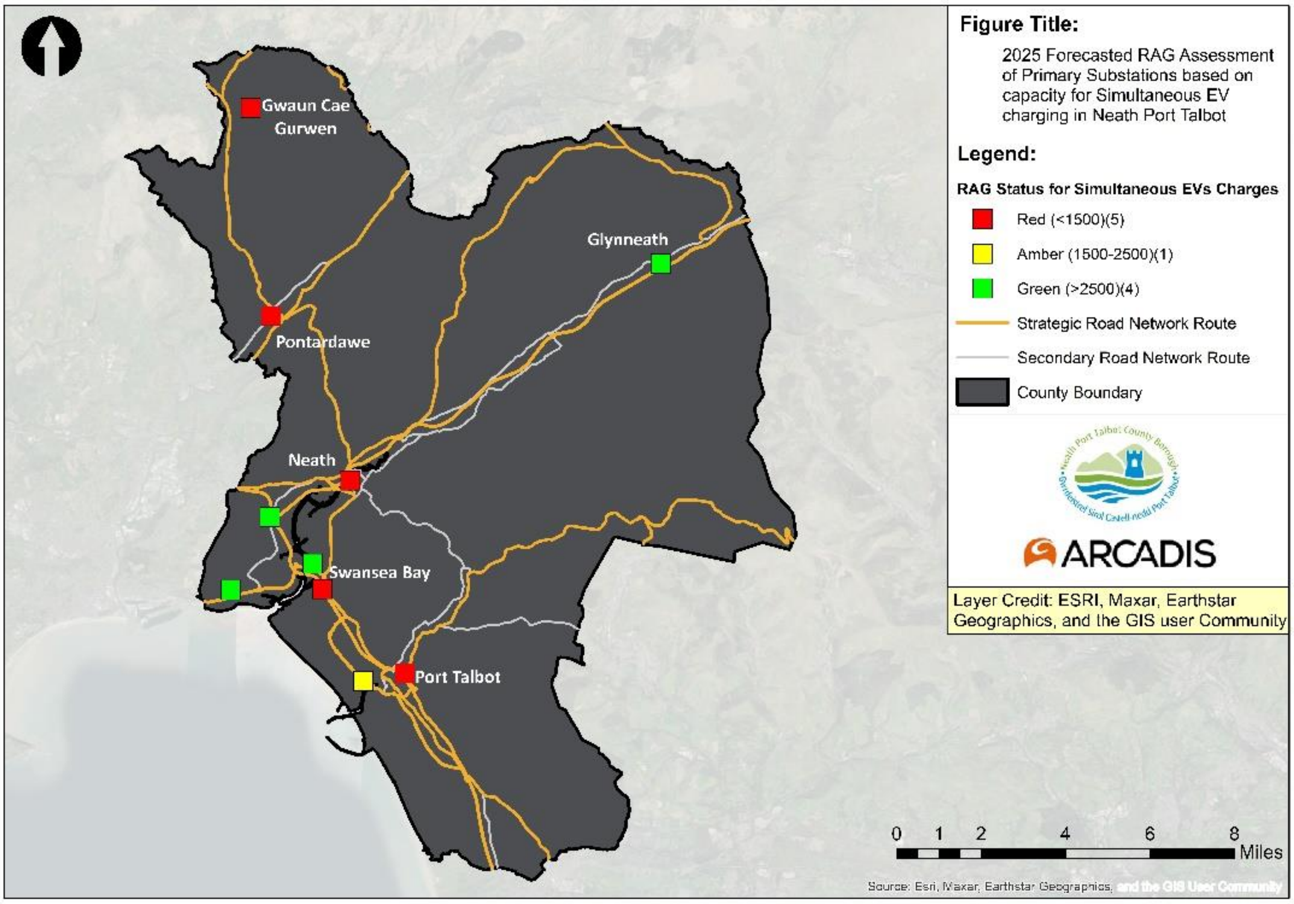


Figure 21: Mapped Capacity of Primary Substations by 2025

4.3.3 As can be seen in Table 18 and Figure 21, 5 substations within NPT will require grid capacity upgrades to cater for the expected EV uptake by 2025. Upgrades must be planned and coordinated in collaboration with National Grid to increase the power supplied to a location and install the required electrical hardware. The existing capacity of the primary substations in the study area could provide the required power to **simultaneously charge a maximum of 19,352 EVs**. How this figure relates to total EV forecasts are presented in Table 19 and described below.

Table 19: Forecasted EVs supplied in 2025

	National Highways			Linear Extrapolation		
2025	*Low (BAU) 15%*	*Medium 20%*	*High 30%*	*Low (BAU) 15%*	*Medium 20%*	*High 30%*
Forecasted EVs	*11,611*	*15,481*	*23,221*	*10,545*	*14,060*	*21,091*
% EVs Supplied	***166.7%***	***125.0%***	***83.3%***	***183.5%***	***137.6%***	***91.8%***

4.3.1 Under the **lowest projected uptake**, there would be capacity for around **183.5% of vehicles to be able to charge simultaneously in 2025**. In the **high scenarios, over 83% of all EVs are supplied** for. It is important to note that these results suggest there is ample power supply within NPT, but it **does not account for the difference in spatial distribution** of power demand.

4.3.2 An assumption of this analysis is that the average daily mileage of EVs is consistent across each primary substation within NPTC area. In reality, we expect the mileage of rural EV users to be higher than average with a greater daily required EV recharging demand and consequently greater demand at rural substations. It follows that there would be greater demand on rural substations and therefore a lower number of EVs could be simultaneously charged. The opposite would be true for dense urban locations, where fewer and shorter journeys will be completed by cars.

4.3.3 From the results of this analysis, green rated substations appear to be concentrated around the urban centres. There are isolated areas, in the north of NPT and between Port Talbot and Neath, that appear to have high concentration of red and amber rated substations and should therefore be the focus of engagement with DNOs.

4.3.4 Costs associated with reinforcing the power grid can range from £75,000 - £2 million per site and take over 6 months to plan, design, and carry out the required works[94]. Additionally, even for sites with adequate supply, will 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. These cost and timeframes must be accounted for within budgets and programmes by any local authority planning to install new EVCPs. For this reason, it is essential that NPTC work close in collaboration with National Grid to assess future demand and map areas in the region where power upgrades should be focussed to accommodate planned EVCP installation.

Informing the NPT ZEV Strategy

Future ZEV uptake in NPT will be essential if NPTC is to achieve their long-term decarbonisation targets and the lowest 2025 forecasts project a reduction in annual greenhouse gas emissions of 34,000 tonnes compared to current levels. However, to achieve this will require 10,545 ICE vehicles to be replaced with EVs, a vast increase in the 505 EVs currently in operation. To support this level of EV uptake, and that of tourists entering NPT, will require a network of 289 Fast(7-22kW) and 21 Rapid (50kW+) EVCPs, highlighting the significant investment and planning required to ensure an extensive and diverse EVCP network can serve the entire NPT population. An assessment of the power grid revealed that in order to accommodate increasing EV uptake, several areas of NPT are at risk of reaching capacity and will require close collaboration with National Grid to ensure the network can be reinforced.

Continue to deliver NPTC's net-zero transport emissions agenda

Promote Inclusive ZEV uptake across Neath Port Talbot

[94] UKPN, 'Getting electric vehicles moving'. https://media.umbraco.io/stage-uk-power-networks/pwwftji5/a_guide_for_electric_fleets.pdf

5 Technology Review

5.1 Current EV Market

5.1.1 This section analyses current and future EV market trends, as well as charging solutions. It is noted that recent significant increases in the wholesale price of electricity has flowed through as increasing public charging prices which in term is impacting the EV market[95]. Forecasting future electricity prices and their impact on consumer behaviour is beyond the scope of this Strategy document.

5.1.2 The current EV market is ever evolving with new, more efficient, and technologically improved vehicle models being released every year. In this section, a list of luxury cars, family saloon, large family SUVs, supermini cars, small vans and transit vans have been identified to represent different segments in the EV market. By providing a comparison of these sampled vehicles, this section explores the different EV market sectors and over time.

Price

5.1.3 The growing trend of EV adoption is linked to a progressive increase in EV battery size and range and a steady fall in battery price and associated reduction in EV purchase prices[96]. If these trends continue, BEVs will become increasingly more competitively priced in comparison with ICE vehicles. This trend has also been driven by a progressive increase in EV battery capacity combined with a significant reduction in charging times within just a few years due to improvements in EV charging technology.

5.1.4 The automotive industry is divided as to when exactly price parity between EVs and ICE vehicles may occur. Some estimates claim that the lower operational costs of EVs and the subsidies available mean that they have already achieved price parity[97]. More reserved estimates place price parity to occur sometime before 2030[98]. Factors delaying price parity include increasing costs of raw materials, which make up 80% of the cost of an EV battery, and volatile geopolitical climates[99].

5.1.5 Figure 22 shows that luxury cars have the highest market price. This is followed by medium vans and then, with similar prices, by family saloons and large family SUVs. The small van segment is next, followed closely by the supermini car segment as the most affordable category.

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[95] WhichEV, (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.
[96] BloombergNEF, Annual Battery Price Survey (2021). https://about.bnef.com/blog/battery-pack-prices-fall-to-an-average-of-132-kwh-but-rising-commodity-prices-start-to-bite/
[97] Deloitte, Insights: Electric Vehicles (2020). https://www2.deloitte.com/content/dam/insights/us/articles/22869-electric-vehicles/DI_Electric-Vehicles.pdf
[98] CleanTechnica, EVs and ICE Price Parity (2022). https://cleantechnica.com/2022/07/07/have-electric-vehicles-reached-parity-with-their-ice-counterparts/
[99] Automotive New, Renault doubtful on price parity for EVs and ICEs (2022). https://europe.autonews.com/automakers/renault-ceo-de-meo-doubtful-ev-and-ice-price-parity

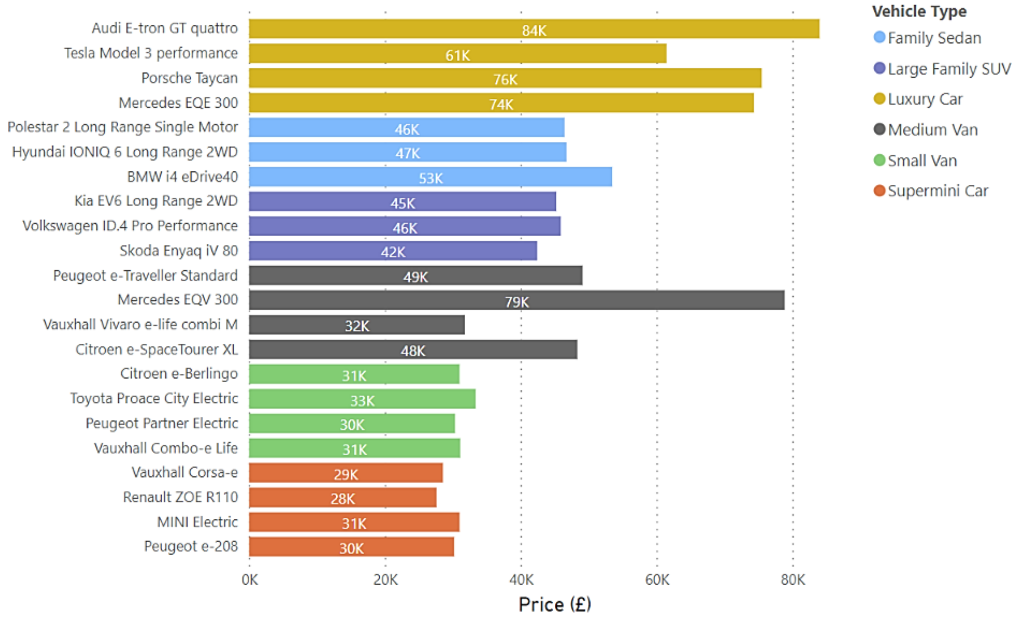

Figure 22: A market price comparison of EVs[100]

Battery & Range

5.1.6 In 2020, Castrol published a report suggesting that the 'tipping point' for switching to an EV for most motorists in the UK is based on a driving range of 285 miles. The average range of EV models available in the UK in 2020 was 220 miles[101], with some high-performance cars exceeding 375 miles. As technological advancements in battery size and range continues, the frequency of needing to recharge reduces, increasing the confidence to travel further distances, but also minimising the level of behaviour change for the average driver. Despite some new vehicles in the market such as the Lucid Air Dream Edition having tested a range of 500+ miles in real world conditions, this range will not rise indefinitely as sheer battery size and associated expense will become a limiting factor. The luxury car sample in Figure 23 have the highest battery capacity on average (with the exception of the Mercedes EQV 300).

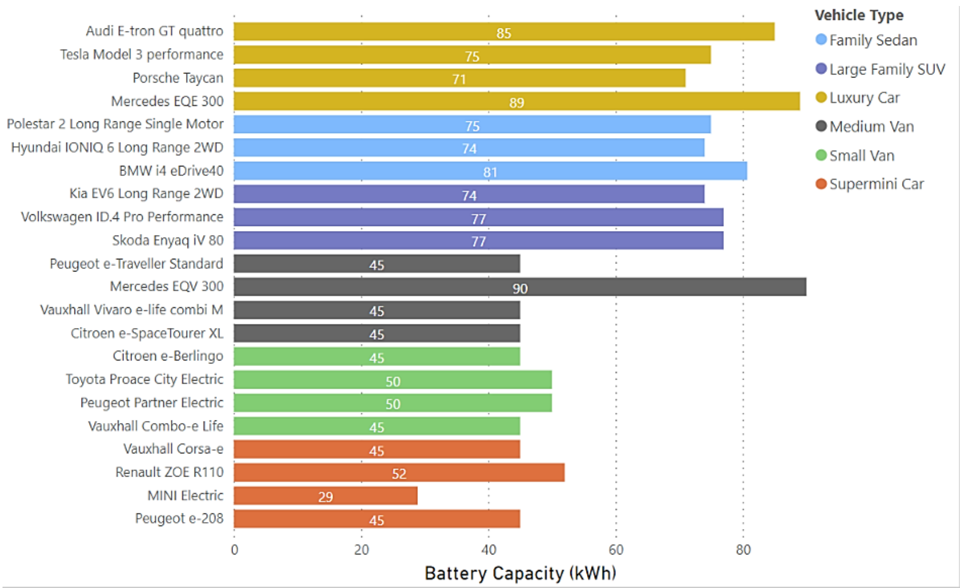

Figure 23: EV Battery Capacity Market Comparison

[100] Electric Vehicle Database. https://ev-database.org/uk/
[101] IEA, Global EV Outlook (2021). https://www.iea.org/reports/global-ev-outlook-2021

5.1.7 As shown in Figure 24, the driving range was between 110 miles and 320 miles for all of the electric vehicles in the sample. Aided by constant development in battery technology and energy efficiency in recent years, the family sedan category was found to have the highest driving range on average. This is matched by the luxury car category that offers similar range but with significantly higher performance, an attribute that contributes to it being the category with the highest market price.

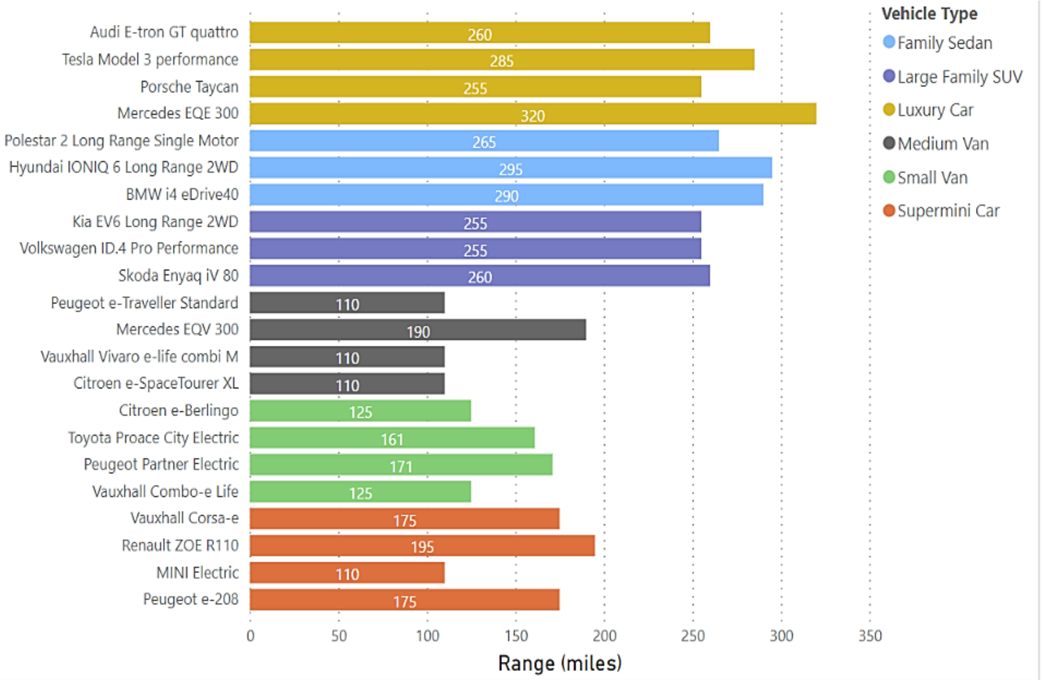

Figure 24: Range comparison of EVs[102]

Charging Speed

5.1.8 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 below approximately 80% of full charge, maximum charging rate can normally occur. However, above this, the charging rate tails off. While we expect that battery EV charging capability will further improve in the future, our research shows that maximum power levels of up to 150kW are likely to be sufficient for most EV models.

5.1.9 From Figure 25, the charging time comparison showed that fast charging times were fairly similar across categories, ranging from an average of 24 minutes for the luxury car category to 34 minutes for the supermini car category. Any technological innovations leading to faster charging times largely depends on the make and model of vehicle rather than the category. An example of this in Figure 25 is the fast-charging capabilities of the Hyundai IONIQ 6 family sedan and the Kia EV6 SUV which have charging times similar to the much more expensive luxury offerings from Audi and Porsche.

[102] Electric Vehicle Database. https://ev-database.uk/compare/newest-upcoming-electric-vehicle#sort:path~type~order=.id~number~desc|range-slider-range:prev~next=0~600|range-slider-towweight:prev~next=0~2500|range-slider-acceleration:prev~next=2~23|range-slider-fastcharge:prev~next=0~1100|range-slider-eff:prev~next=150~500|range-slider-topspeed:prev~next=60~260|paging:currentPage=0|paging:number=9

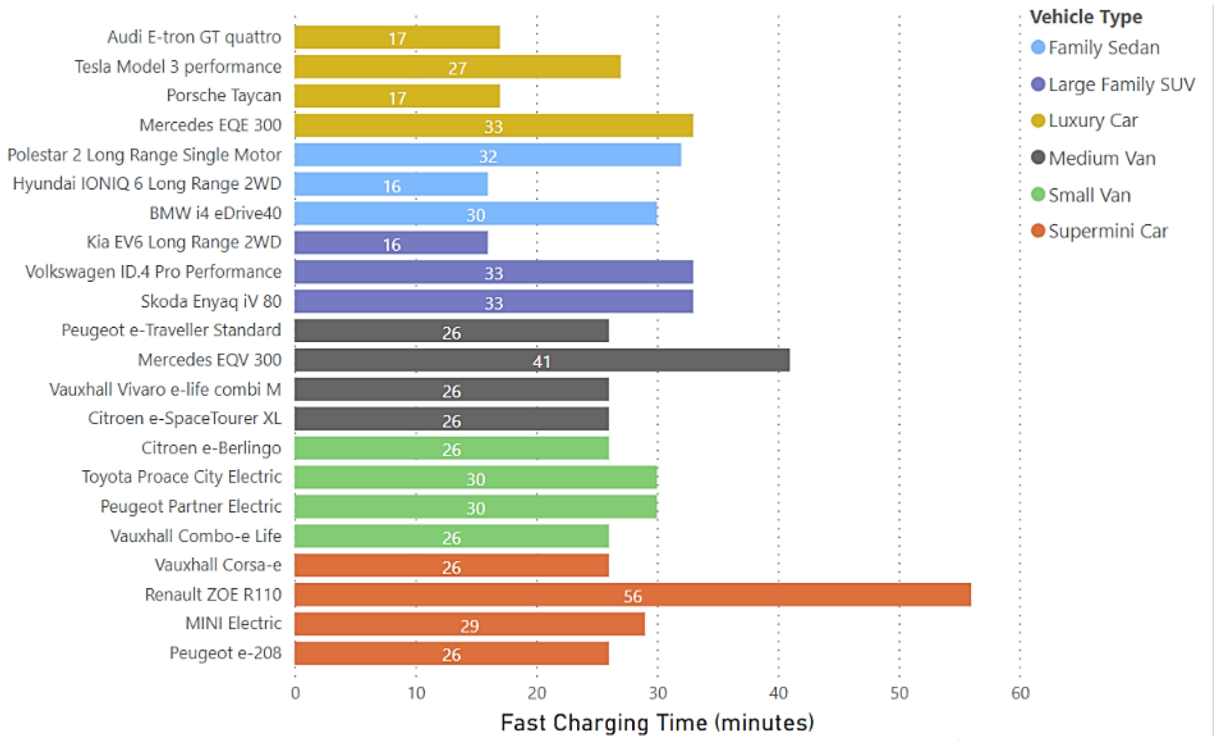

Figure 25: Fast charging time comparison of electric vehicles[103]

5.1.10 Analysis of an EV model (Renault Zoe R110) is presented in Figure 26 to show developments over time as new variants are released.

5.1.11 As evident from Figure 26, the trend shows a progressive increase in EV battery capacity and range over time with a significant reduction in charging times within just a year due to improvements in EV charging technology. The charging time increased from 45 minutes in 2019 to 56 minutes in 2020 due to the increase in battery capacity and not a reduction in charging speed.

5.1.12 Due to economies of scale, as well as battery technology improvements, EV costs are expected to fall in the long-term. However, in the short term, global supply chain issues, and rising commodity costs have led to an increase in EV battery costs for the first time since 2010[104].

5.1.13 Cost of EVs is currently one of the biggest barriers limiting widespread EV uptake, with global supply chain issues cited as the root cause.

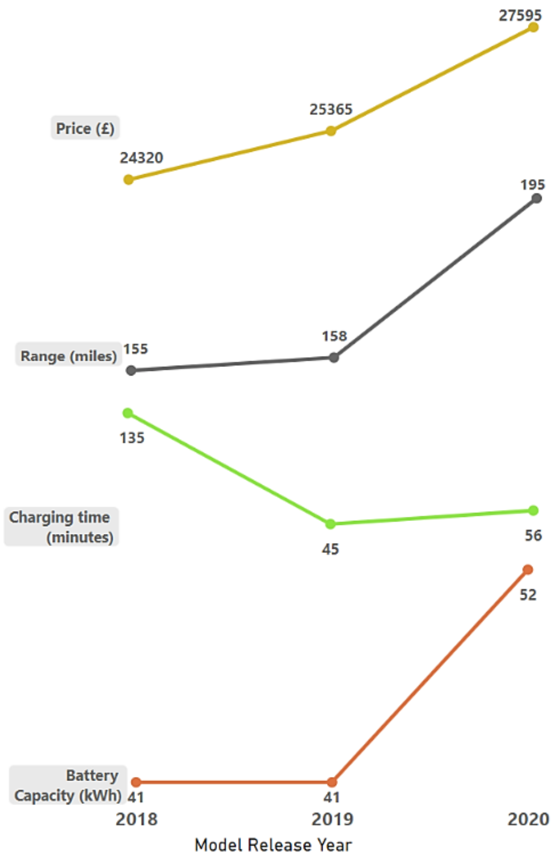

Figure 26: Comparison of Renault Zoe (R110) between 2018 and 2021

[103] Electric Vehicle Database. https://ev-database.org/uk

[104] Statista, EV Battery Prices (2021). https://www.statista.com/chart/7713/electric-car-battery-prices/

5.1.14 In 2020, EV sales rose by 43% against 2019[105] and analysts predict a continuation in this trend of increased EV adoption if EV battery prices can continue to fall. However, drivers switching to EVs are waiting on average around eight months before they receive the vehicle[106]. These lead times present a challenge as it limits EV uptake due to lack of accessibility and convenience.

Recycling EV Batteries

5.1.15 As EV uptake increases, the importance of recycling and repurposing EV batteries emerges. EVs typically use lithium-ion batteries which can last up to 12 years within EVs. However, these batteries can retain up to two-thirds of their initial energy storage capacities in a 'second life' usage[107]. Second life uses for EV batteries involve energy storage systems, such as a backup power source for the grid. Nissan uses Leaf EV batteries for behind the meter storage systems[108]. However, the disassembly and extraction of the batteries is costly and difficult, therefore the recycling of EV batteries will be dependent on prices of EVs and lithium-ion batteries. A study conducted in 2017 projected that by 2025, 75% of spent EV batteries will be reused in second-life purposes and supply over 100 gigawatt-hours per year by 2030[109].

5.2 Existing EV Charging Technology

5.2.1 The following section describes the EV charging technology currently available on the market that can be utilised for different use cases. The UK promotes the following standard terminology when referring to EVCPs to avoid confusion:

- EVCP/charging unit – a single upstand or wall-mounted structure offering one or more socket outlets or tethered plugs suitable for charging EVs.
- EV charging station – a site with at least one EVCP as well as additional infrastructure including energy supply enclosures, weather shelters, signage, and protection barriers.

5.2.2 EVCPs are available in a range of charging speed and design options. Although EVs can be charged via a UK 3-point plug, dedicated EVCPs are more efficient in terms of charging speed, convenient, and safer. Specifications of EVCPs available in the marketplace are also differentiated by their communication protocol, type, and number of charging outlets. The main types of EVCPs, their typical charging times and use cases are described Table 20.

Table 20: Overview of different EVCP types

EVCP Type	***Typical Use Case***	***Power (kW)***	***Typical Charging Time***	***Remarks***
Slow	*Residential*	*3.6 AC*	*6-12 hours*	*Charging time is for a full charge. Slow charging is equivalent to charging via a mains socket.*
Fast	*Destination*	*7– 22 AC*	*3-6 hours*	*Charging time is for a full charge.*
Rapid	*Destination & SRN*	*43+ AC 50+ DC*	*20 minutes – 1 hour*	*Charging up to 80% after which power is reduced to preserve battery life.*
Ultra-Rapid	*SRN*	*150+ DC*	*10 – 20 minutes*	*Many EVs currently cannot handle such high powers due to the thermal impacts on the battery*

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105 EV Volumes: https://www.ev-volumes.com/
106 Electrifying, How to beat the queue for a new electric car (2022). https://www.electrifying.com/blog/article/waiting-times-for-electric-cars
107 Hive Power, 'Is Repurposing EV Batteries for Grid Energy Storage a Sustainable Plan?' (2022). https://www.hivepower.tech/blog/is-recycling-ev-batteries-for-grid-energy-storage-a-sustainable-plan
108 GTM, 'Nissan, Green Charge Networks Turn 'Second-Life' EV batteries into Grid Storage Business (2015). https://www.greentechmedia.com/articles/read/nissan-green-charge-networks-turn-second-life-ev-batteries-into-grid-storag
109 McKinsey and Company, Second-life EV batteries: The newest value pool in energy storage. https://www.mckinsey.com/~/media/McKinsey/Industries/Automotive%20and%20Assembly/Our%20Insights/Second%20life%20EV%20batteries%20The%20newest%20value%20pool%20in%20energy%20storage/Second-life-EV-batteries-The-newest-value-pool-in-energy-storage.ashx

5.2.3 It is important to note that EV batteries are limited by the maximum power they can accept while charging. For example, if an EV is limited to accepting a maximum of 50 kW charging power, then it will charge at the same rate even when connected to an EVCP with a power output higher than 50 kW. Therefore, even though EVCPs with power outputs of 150kW or more have been rolled out, there is still time before most EVs in the market are capable of utilising them.

DC Charging

5.2.4 Direct current (DC) charging is one of the ways industry professionals are looking to reduce charging times and thereby improve the experience of using an EV. Despite DC chargers being larger and more expensive, they can achieve much higher power levels than that of alternating current (AC) charging, therefore achieving a much faster charge time for users.

5.2.5 The difference between AC and DC charging is that AC charging requires power drawn from the grid to be converted within the vehicle itself via an on board charger, since an EV battery itself can only store power as DC. Whereas DC charging has a converter built into the charger itself which can feed power directly to the EV battery. A visual example of both AC and DC charging has been presented in Figure 27, below.

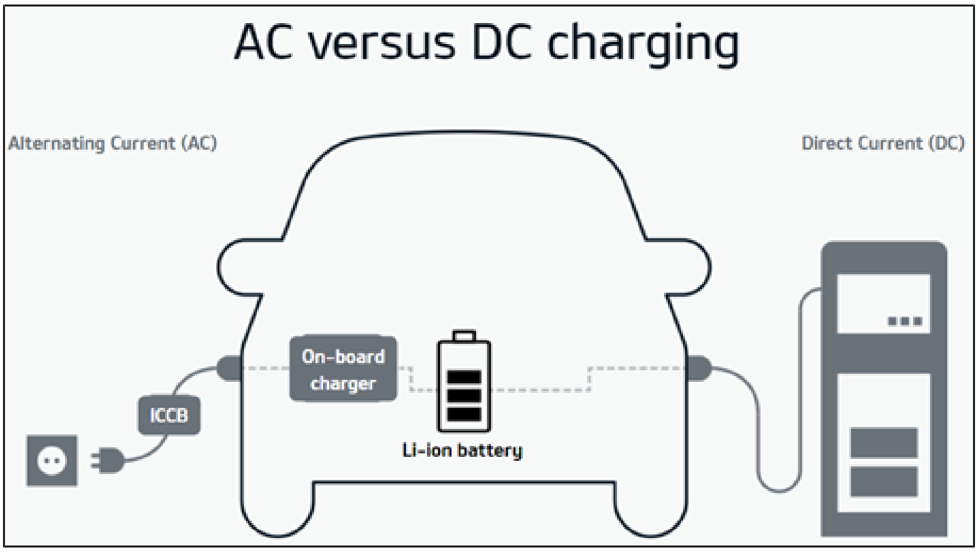


Figure 27: AC vs DC EV Charging

5.2.6 Most new EVs are compatible with combined charging system (CCS) connectors which can provide 50kW DC or more as well as 7-22kW AC depending on the requirement. These are becoming the preferred type of chargers for public EVCPs.

5.2.7 DC charging can also utilise power electronic devices such as voltage boosters to reduce the requirements from the grid whilst achieving high power levels to charge EVs quicker. Such a charging topology is referred to as Ultra-Rapid or Hyper charging where the EVCP can have a power output between 150kW-350kW. Ultra-Rapid chargers present an exciting opportunity to significantly reduce EV charging times.

On Street Charging Solutions

5.2.8 The provision of home-charging solutions is essential to meet the demands of current EV charging behaviour, ensure inclusive provision of EVCI and maximise accessibility across the region. This will ensure that users have the ability and confidence to charge their EVs, which in turn will promote EV adoption.

5.2.9 In recent years, public policy and funding opportunities have been focussed on the provision of EVCI for those with access to dedicated off-street parking, such as the OZEV EV Home Charge Scheme which covers up to 75% of the eligible costs of a EVCP and its installation (capped at £500, including VAT.

5.2.10 Based on current research, these homes without off-street parking could become the location of 48%[110] of all private EV charging events, highlighting the importance of these locations to ensure EVCI inclusivity and maximise EV uptake.

5.2.11 On-street parking is unavoidable across much of the UK and Wales due to the number of terraced streets with no private driveways, especially in post-industrial towns, typical of parts of Wales and northern England. The same can be said for Neath Port Talbot where many towns have a high density of terraced housing in their centres, including: Port Talbot, Briton Ferry, Neath, Resolven, Glynneath and Pontardawe.

5.2.12 In these locations, it is highly unlikely that residents will be able to use home chargers due to a lack of private driveways. It is also not advised to run a cable to an EV to supply power to charge as loose cables across a footway can be hazardous and severely impact access for residents. To avoid this, gullies can be installed within the footway to house the cables or, preferably public residential EVCPs are provided to meet demand. Installation of EVCI in on-street locations presents the following additional challenges and considerations:

- There are no designated parking locations, therefore exact placement must be selected based on close collaboration between residents and DNO (power requirements)
- 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 or design 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.

5.2.13 Table 21 below illustrates the pros and cons of different types of EVCPs.

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

Table 21: Pros and cons of on-street EVCP types

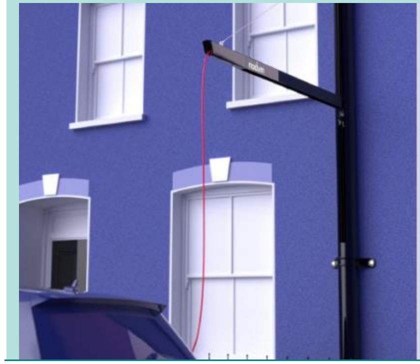
Type of EVCPs	Pros	Cons
Lamppost Mounted EVCPs[111] 	*Utilise existing physical and electrical infrastructure – quicker, cheaper, and less embodied carbon.* *Avoid challenges surrounding additional street furniture, accessibility, and resident concerns about street clutter.* *With several lampposts located across the study area, EVCPs can be planned at short notice and relocated easily if necessary.*	*Non-EV users might accidentally park their vehicles within these spaces due to how discrete the signage and charging socket is – however, this can be mitigated through EV parking only bays.* *Constrained by the existing power supply to the lamppost while also needing to ensure that capacity remains to power the light itself.* *Capacity to power a slow 3.7kW charger which takes 8-10 hours to charge. There's a risk these chargers won't be powerful enough to charge more powerful batteries.* *Potential for trailing cable trip hazard if bollard not installed to bring EVCPs kerbside from lampposts situated at the back of the footway.*
Bollard Chargers[112] 	*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.* *Will require additional civils to install such as trenching, feeder pillars, associated traffic management.* *Additional street furniture.*

[111] Air Quality News.Com, 1000 EV charge points installed on London's lamp posts (2019). http://airqualitynews.com/2019/05/02/1000-ev-charge-points-installed-on-londons-lamp-posts/
[112] Barriers Direct, Security Bollards (2022) https://www.barriersdirect.co.uk/bollards-c1022/?msclkid=f6065c2e8ec71d9c6e7c3f753865b5f8&utm_source=bing&utm_medium=cpc&utm_campaign=Bollards%2520-%2520Types&utm_term=protection%2520bollards&utm_content=Protection%2520Bollards

Type of EVCPs	Pros	Cons
Pop Up Columns[113] 	*Can reduce costs, visual impact, and embodied carbon* *Flush with the surface of the footway.* *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 and civils will be required.* *Can be harder to locate.* *Reduces width of footway when in use, reducing accessibility.*
Standard EVCPs Installed on A Build Out[114] 	*Does not impact accessibility as the buildout doesn't reduce the size of the footway.* *Newly installed power connections can ensure that EVCPs can supply multiple charging sockets and can be future proofed to provide excess capacity to later supply additional or higher power EVCPs.*	*New electrical connections will be required.* *Will require additional materials and civils to expand footway and install trenching, feeder pillars, associated traffic management, increases environmental impact.* *Additional street furniture which also reduces the amount of parking availability.*

Type of EVCPs	Pros	Cons

[113] This is Money Oxford installs UK's first pop-up chargers that rise out of the pavement (2019). https://www.thisismoney.co.uk/money/cars/article-7732287/Oxford-installs-UKs-pop-chargers-rise-pavement.html?ns_mchannel=rss&ns_campaign=1490&ito=1490
[114] Transport Network, Government's EV charging plans 'won't be enough', report argues (2021). https://www.transport-network.co.uk/Governments-EV-charging-plans-wont-be-enough-report-argues/17113

Community Charging Hub 	*Designed for overnight use so makes charging convenient as less likely the vehicle will be in use overnight.* *Newly installed power connections can ensure that EVCPs can supply multiple charging sockets.* *Hubs can attract additional customers to local businesses and create economic benefits for the wider community.*	*New electrical connections will be required.* *May be hard to find suitable space within residential areas.* *Increasing the amount of car parking spaces increases the chance of uptake of EV vehicles that will stop people from choosing a method of active travel.*
Wireless Charging 	*Provides unmatched charging safety and convenience as its automated and hands-free and doesn't require any specific qualifications or training to use.* *Operational through rain, snow, ice, mud, and leaves with no loss in efficiency.*	*High cost of installation and additional civils to install such as trenching, feeder pillars, associated traffic management.* *Technology varies between companies so may be difficult to identify which is most suitable.* *Current vehicle technology does not enable wireless charging without adaptation and uncertainty over the ability to retrofit.*
ChargeBridge (prototype) 	*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.* *The impact of attaching infrastructure to existing street furniture or buildings is untested.*

Demand Mitigation Opportunities

5.2.14 Opportunities to use innovative technologies that can sustainably aid the charging process and protect the grid should be considered by EVCP suppliers. For example, integrating renewable energy generators such as solar photovoltaics (PVs) can reduce the power demand of a charging hub.

5.2.15 Battery energy storage systems (BESS) are another option that can be utilised at EVCPs to mitigate demand on the grid during peak hours when there is also a high demand for EV charging. These systems store power from onsite renewable sources (e.g., PV / wind) or the grid network itself during periods of low demand. Then, when demand on the grid is high, BESS can discharge the stored power to charge the EV. This offsets the total grid power consumption (the total power consumption remains the same) and alleviates pressure on the wider grid network.

5.2.16 Smart EV charging systems can dynamically control charger output to help maintaining power network stability whilst maximizing the number of EVs that can be charged simultaneously. This form of charging is referred to as dynamic load management in the power industry. Smart charging thereby optimizes EV charging patterns in line with grid network capacities. Although smart technologies come with higher capital costs, they can result in long-term operational savings and reduce the likelihood of needing to upgrade the power upgrade grid when expanding the EVCP network.

Vehicle to Everything (V2X)

5.2.17 An innovative and exciting prospect of EVs is their potential to aid grid load balancing. During periods of high demand on the power grid, when consumption is greater than generation, the energy stored within EV batteries can be discharged to the grid to balance the load and avoid a potential network blackout. Conversely, when generation exceeds consumption, excess power can be diverted to charge the batteries in EVs. As we continue to move towards Net Zero, the decentralization of power systems to solar and wind farms will continue to grow, thus making the issue of grid balancing vital to avoid intermittency and ensure that there is a continuous supply of power when needed. Since BESS technologies currently require a high capital investment for manufacturing and installation, EVs present a more affordable alternative for grid balancing.

5.2.18 Vehicle to Grid (V2G) capability also presents an opportunity for EV users and fleet operators to generate revenue from their fleet by taking advantage of varying energy prices across the day. This can be achieved by charging an EV fleet when power is cheaper (e.g., at night), and then discharging this cheaper power when energy is more expensive (e.g., during the day).

5.2.19 For operators of large EV fleets, using this cheap power stored within their EVs can be used to offset their existing energy demands and greatly reduce their energy bill. A prime example of this will be a local authority that charges their EV fleet overnight and during the day has offices to power. A trial of this has recently been conducted in the USA, where a public sector fleet of 21 EVs, through V2G, was able to reduce energy costs by over £2,300 per year[115].

5.2.20 To make two-way charging simpler for domestic customers, a V2G demonstration programme led by Octopus Electric Vehicles called Powerloop[116] was developed by Innovate UK. The Powerloop app helped users to charge and discharge intelligently and automatically. The optimisation technology behind the app tells a two-way charger when to charge and discharge to the grid after assessing when the grid needs energy from the vehicle and when it can use the battery to store energy.

[115] Smart Cities Worlds, V2B grid pilot demonstrates how EV fleets can reduce municipalities' energy costs (2022). https://www.smartcitiesworld.net/news/v2b-grid-pilot-demonstrates-how-ev-fleets-can-reduce-municipalities-energy-costs-7551

[116] UK Research & Innovation, V2G charging can benefit EV Users. https://www.ukri.org/about-us/how-we-are-doing/research-outcomes-and-impact/innovate-uk/bundled-vehicle-to-grid-v2g-charging-can-benefit-ev-users/

5.2.21 Bidirectional charging allows the user to use the stored power in their EV for something other than driving such as powering their home / appliances, providing power back to the grid, powering other items when remote or charging another EV. Although some vehicles already offer bidirectional charging, they require additional hardware, specific charging stations and software and often come at a high price. For example, a limitation of the V2G enabled Nissan Leaf is that it still uses a CHAdeMO socket, which the industry across North America and Europe has moved away from. The Ford F150 Lightning, also comes with bidirectional charging capability however, requires the purchase of additional technology to convert the power from DC to AC to be able to supply power to a home.

5.2.22 Vehicles such as the Hyundai IONIQ, Kia EV6 and Rivian R1T use an integrated inverter to allow users to plug in any standard plug into the vehicle to power appliances (V2L) such as lights, computers, a fridge, etc. Many EV manufacturers such as Volkswagen, GM and Lucid among others are actively working to adopt vehicle-to-everything (V2X) capability to their vehicles, which integrates all of the bidirectional charging types outlined above.

5.2.23 The V2X Innovation Programme[117] is being delivered by Innovate UK as part of UK Research and Innovation on behalf of the Department for Business, Energy and Industrial Strategy. The programme aims to address barriers to enabling energy flexibility from bi-directional electric vehicle charging. Phase 1 of the competition held between March and May 2022 supported the development of V2X bi-directional charging technologies and business models, aiming to overcome barriers to V2X deployment and accelerate commercialisation of V2X technologies and services. Phase 2 of the competition will support small scale V2X demonstrations in 2023.

5.3 Alternative Fuels – Hydrogen

5.3.1 Figure 28, below, shows a fuel hierarchy pyramid based on their carbon footprint, alongside the pros and cons of each. To quantify the equivalent carbon emission (CO_2e) values for each fuel source shown in Figure 28, data on direct (e.g., tail-pipe emissions) and indirect (e.g., production and transportation) data was obtained[118] [119] [120].

5.3.2 Transitioning up the pyramid, towards hydrogen, is critical to achieve net-zero ambitions. While progress has been made, specifically trials for buses and large vehicles[121], there are several key challenges that must first be addressed to enable large-scale adoption.[122]

- **Green Hydrogen** – Generated by splitting water molecules, through electrolysis, with electricity generated renewable sources. The technology is immature and currently cost prohibitive.
- **Blue Hydrogen** – Created through Steam Methane Reforming (SMR) which converts natural gas into hydrogen. Although SMR has a carbon footprint, emissions can be captured, stored and reused, minimising impact. Although not a net-zero fuel source, blue hydrogen is considered a necessary stepping-stone for facilitating wider green hydrogen usage[123]. In the UK, a blue-green hydrogen mix is being considered as a method of balancing sustainability with economic feasibility.

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[117] Department for Business, Energy & Industrial Strategy, V2X Innovation Programme (2022) https://www.gov.uk/government/publications/v2x-innovation-programme
[118] Howarth, R.W. and Jacobson, M.Z., How Green is Blue Hydrogen? (2021) https://onlinelibrary.wiley.com/doi/full/10.1002/ese3.956#:~:text=3.3%20Total%20carbon%20dioxide%20and%20methane%20emissions%20for%20blue%20hydrogen&text=To%20summarize%2C%20when%20only%20the,g%20CO2%20per%20MJ
[119] The International Council on Clean Transportation, Biodiesel Briefing (2012) https://theicct.org/wp-content/uploads/2021/06/ICCT_biodiesel-briefing_Jan12.pdf
[120] HM Government, Greenhouse Gas Reporting Conversion Factors (2021). https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021
[121] Element Energy, Hydrogen development in Wales (2020) https://gov.wales/sites/default/files/consultations/2021-01/baselining-report-hydrogen-development-in-wales.pdf
[122] Arcadis Consulting (UK), Exploring our hydrogen future (2021) https://www.arcadis.com/en-gb/knowledge-hub/blog/united-kingdom/agnieszka-krzyzaniak/2021/exploring-our-hydrogen-future
[123] ATCO, Hydrogen (2022) https://www.atco.com/content/dam/web/projects/projects-overview/hydrogen/hydrogen-types.pdf
Conserve Energy Future, Advantages and Disadvantages of Hydrogen (2022) https://www.conserve-energy-future.com/advantages_disadvantages_hydrogenenergy.php

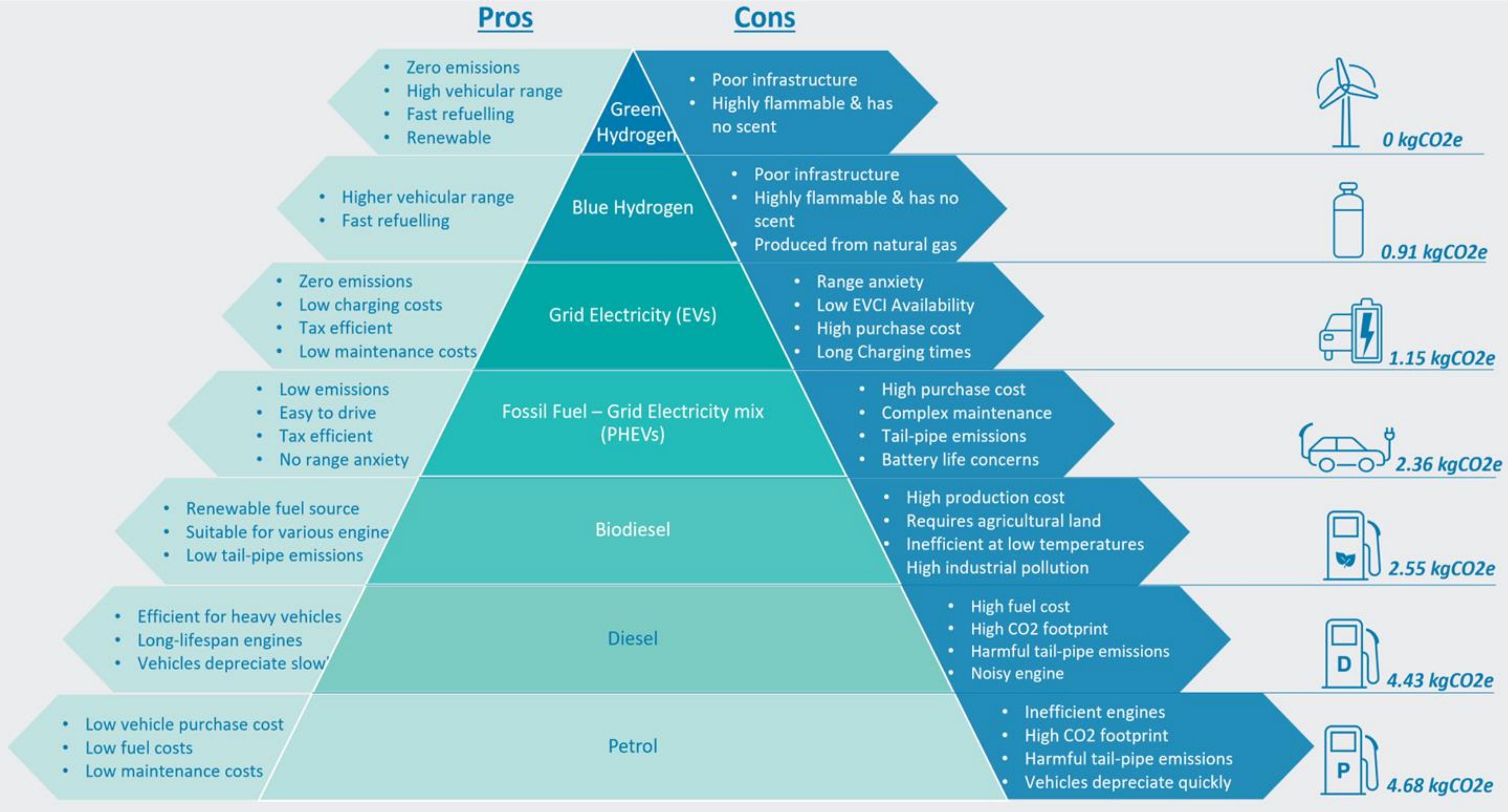

Figure 28: Fuel hierarchy pyramid and CO_2 emissions for an average trip in NPT (14.2 miles)

5.4 Future Technology

5.4.1 This section explores the rapidly evolving EV and EVCP market, covering innovations and technologies that are under development.

Smart Regenerative Braking

5.4.2 Regenerative Braking System (RBS) is an energy recovery mechanism that slows down a moving vehicle by converting its kinetic energy into a form that can either be used immediately or stored until needed. This kinetic energy while braking is otherwise lost to the environment due to friction. RBS retrieves some of this energy and drives it back to the battery, improving energy efficiency and increasing EV range by as much as 25%[124].

5.4.3 Nearly all EVs and PHEVs are fitted with RBS to recover energy otherwise lost when the vehicles brakes of decelerates and recharge the battery. The amount of restored energy that is achieved from regenerative braking depends on factors such as driving behaviour, conditions, and terrain.

5.4.4 As one of the major disadvantages of most EVs remains their low driving range, improved RBS offer an effective approach for extending EV range. In addition to boosting range and improving the overall efficiency of the vehicle, RBS also helps control braking operations and can significantly extend the life of the braking system.

5.4.5 EV efficiency and range can be further maximised through adjustable RBS, a recently introduced feature in Hyundai EVs. Adjustable RBS allows the driver to adjust the level of regenerative braking from different levels of deceleration and charging strength[125]. With each higher level, the car decelerates more using the electric motor, increasing the recharging strength at the same time. The higher the level, the more the car slows and recharges the battery.

5.4.6 A leap in the automotive regenerative braking industry is being witnessed with the development of Smart RBS, an advanced driver-assistance system application that analyses driving and traffic conditions and autonomously adjusts the regenerative braking level for even more driving efficiency. Smart Regenerative Braking uses radar sensors to automatically control braking in traffic, slowing the car down as per surrounding conditions.

5.4.7 With advancements in RBS, OEMs have removed the need for heavy flywheels that add extra weight to the total weight of the vehicle. OEMs are further expected to invest in developing next-gen smart RBSs. Regenerative brake intensive vehicle applications are expected to develop further as the automotive industry prioritises EV development.

Solid State Batteries

5.4.8 Solid-state batteries, so called because they have solid components where lithium-ion batteries would have a fluid, offer improved battery performance in extreme temperatures and battery durability, they also avoid risk of fluid leaks and the need for bulky and expensive cooling mechanisms[126].

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[124] Electronic Design: https://www.electronicdesign.com/markets/automotive/article/21140424/global-marketing-insights-fast-and-agile-regenerative-braking-is-redefining-vehicle-dynamics

[125] Hyundai, Ioniq Electric (2022). https://www.hyundai.com/eu/models/ioniq-electric/Features.html

[126] Rodrigo Elizalde-Segovia et al, Solid-State Lithium-Sulfur Batteries (2020). https://iopscience.iop.org/article/10.1149/1945-7111/abc4c0#:~:text=Conclusions,85%25%20of%20the%20theoretical%20capacity

5.4.9 Solid state EV batteries offer greater EV driving range, shorter recharging times, and lower risk of fires than current lithium-ion batteries. These are compelling benefits that have drawn big investments from automakers in recent years. Despite this, a commercial and affordable solid-state EV battery has not yet reached the market.

5.4.10 Solid Power, a Colorado-based battery start-up backed by BMW and Ford, has begun pilot production of an innovative solid-state EV battery cell. The company expects to begin shipping these batteries to its automotive partners, BMW, and Ford, for testing in prototype vehicles by the end of 2022 and mass production could begin as soon as 2024[127].

Graphene Batteries

5.4.11 One of the major issues to EV adoption is the slow charging rate compared to the time taken to refuel ICE vehicles. A variety of options have been explored for rapid charging EV batteries, including various inorganic nanomaterials, but the use of graphene is now being commercially realized. This is primarily because it has high electrical conductivity, high charge carrier mobility, and is highly stable.

5.4.12 Guangzhou Automobile New Energy (GAC) Group started researching graphene battery technology in 2014 and they have now unveiled a breakthrough graphene battery for EVs that can be charged with an ultra-rapid EVCP twice as fast as a traditional EV battery, in as little as 10 minutes[128]. Furthermore, during a demonstration of this battery, it was able to extend the range of an EV by 207 km (129 miles) on a five-minute charge.

5.4.13 The newly developed battery units appear to have a high degree of quality and reliability and the ability to charge an EV battery in a very short time, giving EVs the capability to make regular long journeys. But whether we will see any other EVs being manufactured with graphene batteries depends on how it performs in real-world use on the road over time.

5.4.14 Skeleton Technologies, a firm that specializes in ultracapacitors, also announced that it is working together with the Karlsruhe Institute of Technology (KIT) in Germany, on a new graphene battery named SuperBattery. The SuperBattery will utilize a patented Curved Graphene carbon material to achieve a charging time of just 15 seconds[129].

5.4.15 Ultracapacitors are increasingly emerging as the ideal complementary technology to lithium-ion batteries which will not replace lithium-ion batteries but may supplement it for better performance. As such, the new SuperBattery might be a perfect fit for different types of hybrids and might also be a supplement for the main traction battery in BEVs to carry on the high power under acceleration or strong recharge. This could extend battery life and lower the cooling needs of EV battery packs.

Hyper Charging

5.4.16 A 1,000 kW EV charger with HyperCharging technology has been launched by EV Technology developer Voltempo which is designed to charge the next generation of EVs in as little as six minutes, delivering nearly three times the power of an ultra-rapid EVCP and can charge up to 24 vehicles at the same time[130] [131].

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[127] CNBC, Pilot Production of Solid State EV Battery (2022) https://www.cnbc.com/2022/06/06/solid-power-begins-pilot-production-of-solid-state-ev-battery.html

[128] Azonano, GAC Group's Breakthrough Fast-Charging Graphene Battery (2021): https://www.azonano.com/article.aspx?ArticleID=5655

[129] Inside EVs, Graphene Superbattery (2022). https://insideevs.com/news/442980/new-graphene-superbattery-charge-15-seconds/

[130] Fleet News, Voltempo launches 1,000kW electric vehicle HyperCharging technology (2022). https://www.fleetnews.co.uk/news/latest-fleet-news/electric-fleet-news/2022/01/28/voltempo-launches-1000kw-electric-vehicle-hypercharging-technology

[131] Zap-Map, Worlds Fastest EV Charger (2022) https://www.zap-map.com/voltempo-launches-world-fastest-electric-vehicle-charger/

5.4.17 For the current generation of EVs, HyperCharging provides 30% faster charging through dynamic power management, and it has demonstrated that it will be able to charge the next generation of EVs in the time it takes to refuel a conventional, petrol-driven vehicle. This technology aims to enable petrol stations to transform into cost-effective charging hubs and is designed around the charging needs of fleets. Voltempo's HyperChargers can be particularly suitable for locations that need to charge a lot of vehicles at the same time, and the technology's modular system and patented centralised charging design enables it to be installed 70% faster than other charging systems with 30% lower installation costs.[132]

5.4.18 The chargers are not solely reliant on energy from the grid, but can use multiple sources, including solar, biofuel power generation, waste-to-energy technology and battery stored energy.[133] So far, HyperCharging has caught the attention of the EV industry by being a future-ready, scalable charging technology that is significantly faster than any comparable EV charging solution available today.

Quantum Charging

5.4.19 The improvement in battery technology was one of the main technical bottlenecks which had to be solved to kick start the current EV revolution. A new technology pioneered by scientists at the Institute for Basic Science in South Korea, known as Quantum Charging, could rapidly reduce EV charging times by charging all cells in a battery simultaneously[134]. This is not possible within typical EV batteries.

5.4.20 Studies show that quantum batteries can accelerate current EV charging speeds by a factor of 200[135]. For a typical EV, this is equivalent to a standard 10-hour home charging session being complete in 3 minutes, and a 30-minute rapid-charging session being completed approximately 9 seconds[136]. These reductions would make EV recharging comparable to the time spent at a fuel pump.

5.4.21 Quantum technologies are still in their infancy and there is a long way to go before these methods can be implemented in practice. Research findings such as these can help incentivize funding agencies and businesses to further invest in these technologies. If employed, it is believed that quantum batteries would completely revolutionize the way we use energy and take us a step closer to our sustainable future.

ZEV in Motorsport

5.4.22 Several motorsport events have been introduced that support decarbonization by using ZEV in their racing competitions, including Formula E[137], FIA eTouring[138], and the eSkootr Championship[139]. These events promote ZEVs and advertise the improvement in ZEV technology to a wider audience, as well as enabling engineering innovations which will flow through into production vehicles.

[132] Traffic Technology Today, EV Infrastructure (2022) https://www.traffictechnologytoday.com/news/electric-vehicles-ev-infrastructure/worlds-fastest-ev-charging-technology-announced.html

[133] Which EV, Worlds Fastest EV Charger (2022) https://www.whichev.net/2022/01/24/voltempo-launches-worlds-fastest-charging-system-for-evs/

[134] PV-Magazine, Quantum Physics EV Charging (2022) https://www.pv-magazine.com/2022/03/25/the-mobility-revolution-quantum-physics-based-tech-to-cut-ev-charging-time-to-nine-seconds/

[135] Institute for Basic Science, New technology to speed up charging electric cars (2022). https://www.sciencedaily.com/releases/2022/03/220321091916.htm

[136] Innovation News Network, Quantum EV Charging (2022) https://www.innovationnewsnetwork.com/quantum-charging-technology-ev-charging/19608/

[137] FIA Formula E World Championship. https://www.fiaformulae.com/en

[138] FIA eTouring Car World Cup. https://www.fia-etcr.com/

[139] eSkootr Championship. https://official.esc.live/

ZEV Innovations in Motorsport

5.4.23 Continuous efforts are being made to upgrade existing technologies and develop more efficient zero emission racing vehicles which have smaller sized batteries, higher top speeds, higher energy storage, and the ability to be charged rapidly.

5.4.24 The third generation (Gen3) car in Formula E is under the development stage which will be lighter and faster than the existing Gen2 vehicles and is expected to launch in 2024. The expected top speed of the Gen 3 car will be 320 kph compared to 284 kph in the current Gen 2 cars. Developers of Gen 3 cars are trying to reduce the size of the battery which can be recharged at a pit stop with a 600kW ultra-rapid charger within a very short duration[140].

5.4.25 MotoE world championship[141] is an electric motorbike racing event that started in 2019. The motorbike can produce a maximum 120 kW of power and achieve a top speed of 270 kph. Within 20 minutes, 85% of the battery can be recharged via the integrated DC fast charging technology.

5.4.26 Extreme E[142] is an international off-road, fully electric Sport Utility Vehicle racing event that started in 2018. The racing locations are chosen to raise awareness for some aspects of climate change and have included the Saudi Arabian desert, and the Arctic. Due to the challenging conditions of the track, the vehicle is manufactured in such a way that it can generate 400 kW of power which allows it to reach a speed of 62 mph in 4.5 seconds at a gradient of up to 130%.

ZEV Motorsport Events in the UK

5.4.27 Cambrian rally is a premier motorsport event held in Wales. A 'Green Cambrian Rally', is planned to be introduced by 2025[143] alongside the main rally as a zero-emission event. This will become one of the first rally events in the UK to demonstrate electric race vehicles. The organizers have set the following objectives for the rally to achieve net zero carbon emissions by 2025:

- planting more trees which will offset the carbon footprint produced by vehicles,
- ensure all non-competitive vehicles are electric or hybrid,
- meet the standards of a 1 Star FIA Institute Environmental Accreditation,
- set annual environment targets for the Conwy Cambrian Rally.

5.4.28 London will host round 15 and 16 of Season 9 of the Formula E[144] world championship in July 2023. These two rounds are scheduled to be held at the ExCel Circuit around the Royal Victoria Dock.

5.4.29 Extreme E had its first season in 2021 with the final round organized in Bovington Training Area (BTA) on the Jurassic Coast of Dorset[145]. The second round of the 2023 season is scheduled to be held in Scotland.

EV Conversion Market

5.4.30 The demand for EVs has gained substantial momentum over the last few years supported by a growing network of charging infrastructure. While there are a growing number of EV makes and models becoming available on the market, some ICE owners prefer to retrofit their existing vehicle to convert it to an EV, this is becoming especially collector/classic cars owners.

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[140] The National News, Formula E is electrifying automotive industry's 'biggest revolution' in decades (2022). https://www.thenationalnews.com/weekend/2022/07/29/formula-e-is-electrifying-automotive-industrys-biggest-revolution-in-decades/
[141] Moto GP, MotoE. https://www.motogp.com/en/FIM+Enel+MotoE+World+Cup
[142] Extreme E. https://www.extreme-e.com/en/the-car
[143] Cambrian Rally, Cambrian Rally Goes Green (2021). https://cambrianrally.co.uk/news/2021/cambrian-rally-goes-green
[144] FIA Formula E, 2023 Hankook London e-prix. https://www.fiaformulae.com/en/races/2022-23/r15-london
[145] Inside DIO, Extreme E: An electrifying race weekend at Bovington Training Area (2022). https://insidedio.blog.gov.uk/2022/01/04/extreme-e-an-electrifying-race-weekend-at-bovington-training-area/

5.4.31 Conventional cars can be retrofitted and converted to EVs by replacing the engine with an electric motor and then adding batteries to power the electric motor. Retrofitting of vehicles can either be done by a suitably trained professional or by one-self, with sufficient knowledge and expertise in electrical engineering.

5.4.32 Before converting any vehicle into an EV, the owner must first register for EV conversion along with submitting documents such as the vehicle's tax payment receipt, original vehicle registration certificate, and current MOT certificate if the vehicle is more than three years old[146].

5.4.33 In the UK, retrofitting of a conventional vehicle into an EV is legal but the retrofitted vehicle has to be re-registered with the government as the newly converted EV will fall under either rebuilt vehicles or radically altered vehicle categories. The new vehicle will also have to pass the MOT test every year except if it is a classic car over 40 years old.

EV Conversion costs

5.4.34 Self-retrofitting[147] of a vehicle is the cheapest way to convert an existing vehicle into an EV but it requires a high level of electrical and mechanical knowledge and one has to be very cautious while handling the equipment. Everything EV is a company that offers complete DIY kits[148] which start from £5,000 but does not include any tools needed to install the kit. The conversion kits need to be registered with gov.uk if it is going to be used on UK roads.[149]

5.4.35 A registered electric car conversion company can also undertake the conversation. Electric Car Converts[150] is an example of a company that converts classic cars into electric cars based on customer requirements. The cost of vehicle conversion depends on the client's requirement and model which can range from £10,000 to £50,000+.

5.4.36 Initially, retrofitting a conventional vehicle may seem like a cost-intensive process but in the long run, users can save on maintenance and fuel costs, reduce their personal carbon footprint, avoid penalties in AQMAs and clean air zones, and enjoy other regulatory benefits such as in the case of on-street parking.

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[146] RAC, Electric car conversion: how to convert a car to electric (2022). https://www.rac.co.uk/drive/electric-cars/choosing/electric-car-conversion-how-to-convert-a-car-to-electric/
[147] YourCar, Electric Car Conversion Guide (2021). https://yourcar.co.uk/electric-car-conversion/
[148] Everything-EV, Basic EV conversion kits to suit many vehicles. https://www.everything-ev.com/index.php?route=product/category&path=62_97
[149] Bonnet, Electric Car Conversion Law in the UK: Things You Need to Know (2022). https://www.joinbonnet.com/post/ev-conversion-law-uk
[150] Electric Car Converts. https://www.electriccarconverts.com/

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As the market continues to mature, ZEV uptake is expected to continue increasing as performance and cost reach parity with ICE vehicles. A diverse charging / refuelling network in NPT will be required to ensure ZEV users have the ability and confidence to charge their vehicles. On-street residential EVCPs will be vital do this however, they present particular challenges which must be addressed. To overcome these, NPTC will explore a variety of different EVCP types that best meet the constraints and opportunities of different location.

The ZEV market is undergoing rapid innovation. As this occurs the performance and affordability of ZEV technology will improve. NPTC will continue to pursue opportunities to build on cutting-edge research and ongoing projects to monitor technological development, pursue partnerships with private organisation, and ensure that it can be effectively adopted in NPT.

Pursue alignment with ongoing projects in and around NPT

Promote Inclusive ZEV uptake across Neath Port Talbot

Promote Private Sector investment in ZEV technologies

6 Priority Focus Areas

6.1 Overview

6.1.1 The following section outlines a series of Priority Focus Areas (PFAs) that have been developed for this Strategy. It is recommended that the PFAs are delivered through a phased approach starting with small work packages that lay foundations for larger, more ambitious schemes.

6.1.2 PFAs have been developed in collaboration with NPTC to ensure that the main concerns and ambitions of the council have been addressed. PFAs were then further developed using Arcadis' experience delivering ZEV strategies across the UK and understanding of the current 'state' of ZEVs on a local, regional and national scale.

6.2 Strategic Objectives

6.2.1 A series of objectives were developed to ensure that the PFAs were aligned with the commitments of NPTC and designed to create long-term social, environmental and economic benefits for NPT. These objectives are presented in Table 22, below.

Table 22: Strategic Objectives of the NPT ZEV Strategy

Symbol	Objective
	Promote Inclusive ZEV uptake across Neath Port Talbot
	Promote Private Sector investment in ZEV technologies
	Continue to deliver NPTC's net-zero transport emissions agenda
	Pursue alignment with ongoing innovation projects in and around Neath Port Talbot

Promote Inclusive ZEV uptake across Neath Port Talbot

6.2.2 There are 2 major barriers to ZEV adoption[151], which NPTC can help address. These are:

- Provision of charging/refuelling infrastructure
- Affordability of ZEVs

6.2.3 Given the current market, EVs provide immediate opportunities for the adoption of ZEVs and therefore they are the current focus of this objective. As other alternative fuel cell-powered vehicles (e.g. hydrogen) become more commercially viable and available on the market, inclusive uptake of these vehicles will also be promoted.

[151] EXRO, Barriers to EV Adoption (2022). https://www.exro.com/industry-insights/barriers-to-electric-vehicle-adoption-in-2022

6.2.4 Analysis of the existing NPT EVCP network, covered in Section 3.2, revealed that there are currently only 8 publicly available EVCPs, concentrated within the urban centres and along the strategic road network. These 8 EVCPs are all high-speed (either fast of rapid) and located in retail car parks or attractions (e.g. restaurants). This is significant for 3 reasons:

1. There are no public on-street residential EVCPs to cater for people without driveways or off-street parking. Research has shown that 75% of all EV charging events occur at home[152], therefore provision of convenient residential EVCI is significant to promoting EV uptake.
2. Given the lack of competition, EVCP operators can impose higher tariffs on the price of electricity. According to ZapMap data on NPT EVCPs, current public charging costs are between 70p and 78p per kWh, approximately 180% greater than the cost of using residential EVCP[153].
3. There is currently no public EVCP provision in rural areas. Of the 42 wards in NPT, 24 are classed as rural accounting for approximately 50% of regions population[154].

6.2.5 To achieve inclusive ZEV uptake NPTC must also consider those without access to their own vehicles. The average proportion of residents without access to their own car is over 25% across NPT and reaches as high as 34% in the Afan Valley[155]. This can significantly impact people's choices and their ability to access key services and employment opportunities. It is important to note that options should try to avoid private ZEV ownership and promote public/shared ZEV options.

Promote Private Sector investment in ZEV technologies

6.2.6 Utilising private sector investment is essential to support NPTC in delivering and maintaining ZEV schemes. By maximising funding from external sources, schemes capture efficiencies through increased purchasing power and economies of scale. Furthermore, through shared business models, NPTC can reduce their capital and operational expenditure.

6.2.7 Private sector investment can also come in the form of installation of workplace EVCPs, available to staff. Currently there is no evidence that any workplace EVCPs have been installed in NPT. This can help increase provision of EVCI, without public funding. The forecasts outlined in Section 4 of this Strategy will provide confidence to private sector investors and CPOs that there is and will be demand for EV charging within NPT and so installing EVCI will be commercially viable.

6.2.8 Encouraging investment can also take the form of subsidies towards incentives or training courses aimed at promoting ZEV technologies or upskilling workforces in the automotive industries. This also supports the creation of high-skilled private sector jobs within NPT surrounding EVs and EVCPs.

Continue to deliver NPTC's net-zero transport emissions agenda

6.2.9 To meet NPTC's 2030 net-zero commitments, the council must replace an average of 58 public sector vehicles with ZEVs each year, not accounting for the councils' grey fleet of nearly 1,800 vehicles. This will require an estimated 200 fast/rapid EVCPs at depots and other council owned sites. There are currently 12 EVCPs installed at NPTC depots with a further 22 planned for installation next year.

[152] 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
[153] https://pod-point.com/guides/driver/cost-of-charging-electric-car#:~:text=Most%20network%20rapid%20chargers%20cost,owners%20of%20Tesla%20electric%20vehicles.
[154] NPTC, Rural Neath Port Talbot (2007) https://regenerate.npt.gov.uk/media/6908/rdpbro-eng-finallowres.pdf?v=20190807091543
[155] NPTC, Local Development Plan 2011 – 2026: Transport (2013). https://www.npt.gov.uk/PDF/ldp_deposit_transport_topic_paper_august_2013.pdf

6.2.10 To facilitate this network, NPTC will need to work with National Grid to assess suitability of each depot, incorporate innovative demand mitigation technologies (e.g. on-site renewable energy generation) and plan future reinforcements to the power grid.

Pursue alignment with ongoing innovation projects in and around Neath Port Talbot

6.2.11 Section 3.4 provides an overview of recent and ongoing ZEV schemes in the areas surrounding NPT. By aligning closely with these schemes, there is an opportunity for NPTC to:

- Gain access to additional pots of public and private funding.
- Explore new and emerging ZEV technologies.
- Utilise findings and lessons learned from other local authorities.

6.2.12 Where possible, NPTC should pursue schemes as part of a joint approach with other public and private organisations. Joint ventures have the benefit of:

- **Increased Purchasing Power** – to facilitate larger investments towards selected options.
- **Economies of Scale** – A joint procurement strategy could capture cost savings through bulk orders (e.g., EVCPs) or larger contracts (e.g., private Charge Point Operators).
- **Spreading Resources & Risk** – Sharing resource requirements and risk allocation across multiple parties to mitigate issues associated with manpower and low risk-appetite.
- **Sharing Knowledge** – A collaborative approach can ensure best practice and lessons learned are shared across all LAs.
- **Cohesive solutions** – Avoiding fragmented solutions that differ across LA boundaries which confuse and frustrate potential users (e.g., LA-specific EVCP payment apps).

6.3 A Phased Approach

6.3.1 Figure 29 below illustrates how the PFAs are interconnected and how they can be progressed to further NPTC's ambitions.

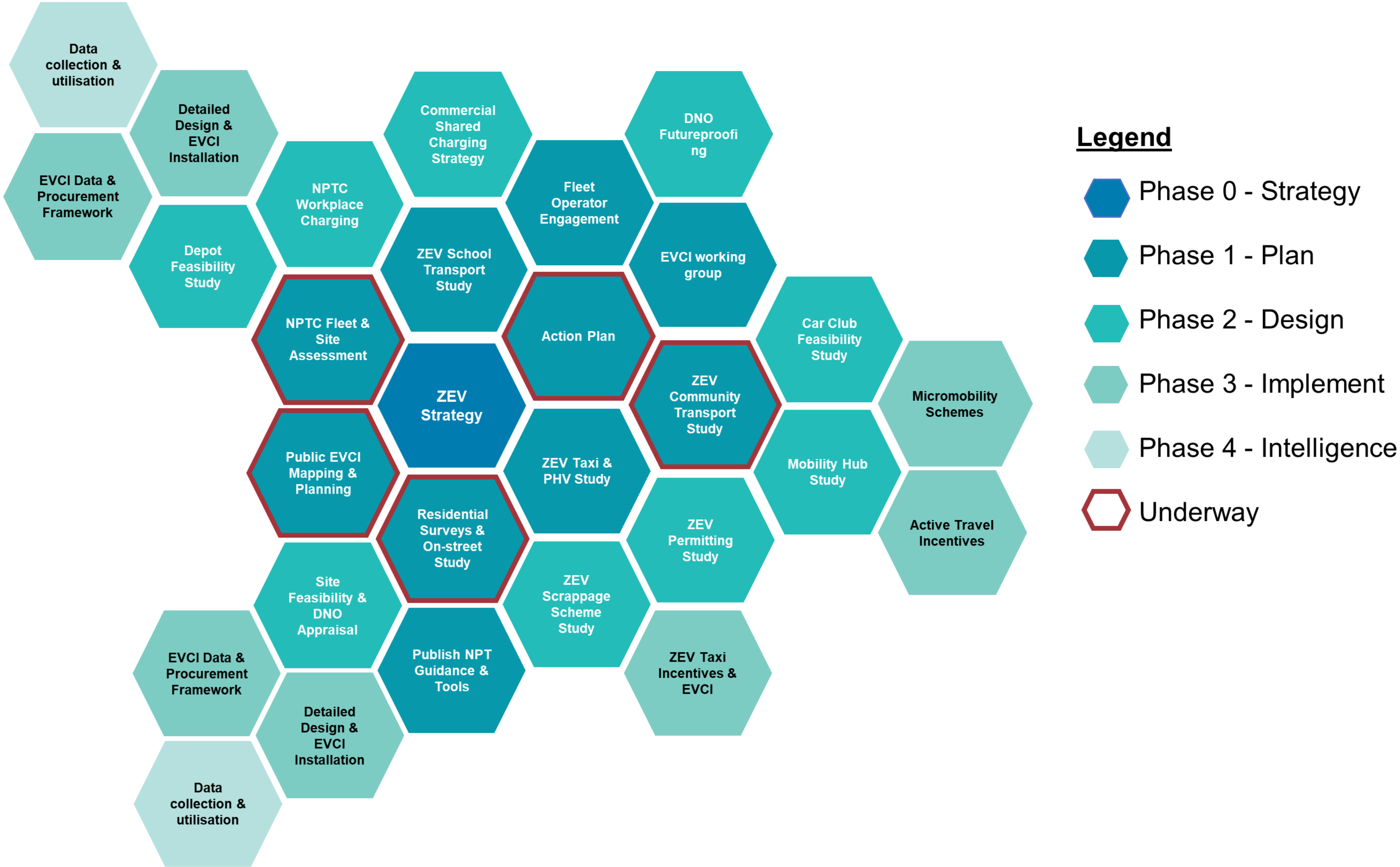

Figure 29: Phased Delivery of Priority Focus Areas

6.3.2 The following sections of the report cover the proposed PFAs that NPTC will explore to further the ZEV Strategy objectives, outlined in in Section 6.2, which have been symbolised in each PFA heading. PFAs are likely to change and adapt following discussions within NPTC, involvement from key stakeholders and likely funding available.

6.4 Public Charging/Refuelling Infrastructure

Public EVCI Mapping & Site Selection

6.4.1 NPTC will continue to explore how geospatial data can be utilised to assess potential sites for EVCI based on a series of parameters, including:

- Flood zones.
- Protected sites and ecological areas.
- Air Quality Management Zones.
- Proximity to housing without off-street charging availability (e.g. apartments or terraced houses).
- Accessibility and distance to surrounding road network.
- Power Availability.

6.4.2 NPTC is committed to creating a fair and equal provision across the region. To achieve this will require identification of specific communities and areas that are without access to private EVCI and therefore reliant on public provision. Areas of current focus include public car parks, public highway network and residential neighbourhoods.

6.4.3 With a portfolio of potential sites, NPTC will then be in a position to develop a spatial plan and roadmap for the rollout of EVCPs across the region. Sites identified may also be selected to be progressed into the feasibility study stages.

Residential Surveys & On-Street Mapping

6.4.4 This PFA is closely aligned with *Public EVCI Mapping & Site Selection*, however with a specific focus on On-street Residential EVCPs, covered in detail in Section 5.2. Across the UK it is estimated that 40% of all homes do not have private driveways and therefore rely on on-street parking for 75% of their charging events. Provision of adequate on-street EVCPs is therefore essential in enabling inclusive adopting of EVs across NPT.

6.4.5 Through public consultations and surveys NPTC can identify what barriers exist for residents wanting to switch to EVs and what opportunities exist to generate additional demand. Analysis of these findings could then reveal:

- Locations where demand for on-street EVCPs already exists.
- Locations where provision of on-street EVCPs will encourage EV uptake.
- Number/location/speed of EVCPs required.
- Sites where power assessments and feasibility studies could be initiated.

Public Site Feasibility Studies & Power Assessments

6.4.6 Formal DNO applications for installing EVCPs include a detailed power and costs assessment and will reveal the alternative substations / connection methods to access additional power sources as required. This will also be the first step of assessing the suitability of on-site renewable energy generation (e.g. solar panels) to provide a source of power to reduce the demand on the power grid

6.4.7 Studies can also focus on exploring BESS technology. BESS act similarly to onsite renewable generation, and can supplement power in a site constrained by the grid network[156]. However, rather than producing additional power BESS are charged when power demand is low (i.e. in the middle of the day when the depot is empty), and discharged when demand is high

EVCI Data & Procurement Framework

6.4.8 NPTC will develop a robust and comprehensive framework surrounding the procurement of EVCI-related goods and services, to ensure that any installed public EVCPs are:

- Built to last without requiring constant maintenance.
- Safe and easy-to-use.
- Managed and operated to a high standard.
- Able to collect and share usage data.

6.4.9 NPTC will also look into the value of collecting EVCP usage data to observe user behaviour and inform future decision making. For this to be possible NPTC will work with EVCP operators to ensure data is regularly collected and shared in consistent format with NPTC.

EVCI Detailed Design & Installation

6.4.10 According to the required standards outlined in EVCI Data & Procurement Framework, NPTC should select appropriate contractors to undertake:

- detailed site design, utility surveys, power connections, cost estimation and work planning.
- civils work to install physical infrastructure at the site.
- Completing electrical connections with the mains grid to ensure adequate and safe supply.
- Commissioning EVCPs, including setting up back-office systems as required.

6.4.11 NPTC will continue to explore opportunities to utilise existing Welsh Government funding to support installation costs. NPTC will also look into innovative business models to enable investment from private EVCP installation companies to cover a proportion of the costs, as part of a revenue share model. This is advantageous as it minimises the financial investment for capital required by NPTC.

EVCP Usage Data Collection and Analytics

6.4.12 EVCP utilisation is a useful indicator to assess:

- User charging behaviour.
- Trends in frequency and number of EV users.
- Whether EVCPs are well placed.
- Whether more EVCPs are required at certain locations.

6.4.13 Having visibility of this data can be leveraged to inform decision making. To this end, NPTC will draft suitable agreements with CPOs to include provision of collected data in a timely and presentable manner.

6.4.14 NPTC will also study how best to ensure a consistent approach to the collection and visualisation of usage data through an automated process to minimise the labour required by the council.

[156] Zenobe, Stagecoach Park and Ride Guildford (2019). https://www.zenobe.com/case-studies/stagecoach-park-and-ride/

6.5 NPTC Staff / Fleet ZEVs

NPTC Fleet & Site Assessment

6.5.1 To accurately quantify the exact requirement for the number and location of EVCPs across NPTC sites, the council will continue to study the behaviour of public sector fleets, including:

- Fleet usage data analysis (telematics), with an option to include the NPTC Grey fleet[157].
- Identification of suitable ZEV replacement vehicles.
- Cost benefit analysis of transitioning to ZEVs.
- Studies into alternative ZEV technologies.

6.5.2 NPTC will also explore how these studies can be translated into identifying the optimal extent and placement of EVCP at depots to meet the need of the public section fleet.

ZEV School Transport Study

6.5.3 NPTC will explore the benefits of commissioning a study to assess feasibility of current and emerging ZEV technologies in the context of decarbonising school transportation across NPT, including high-level indicative costs that would be associated with their uptake and implementation.

6.5.4 Such a study would analyse the current school transportation fleet, and facilities where charging/refuelling would take place to reveal operational requirements of a ZEV fleet and power availability at school sites.

6.5.5 The findings of a feasibility study would then be intended for use when applying for government grants, attract private investments, and justify the spending of NPTC funds based on the environmental, economic and social benefits that could be created.

NPTC Depot Feasibility Studies and Site Survey

6.5.6 According to WGES[158] reports, local grid capacity constraints were identified at several NPTC depots. NPTC will look into conducting, more in-depth studies, in collaboration with National Grid, to investigate options for alleviating these constraints and increasing the number of EVCPs that can be installed at NPTC sites.

6.5.7 The process will follow that of the Public Site Feasibility Studies & Power Assessments PFA outlined in Section 6.3.2, however may also include monitoring the site to obtain high-quality power consumption and supply data that will inform EVCP decision making.

6.5.8 Sites with ample power capacity to supply EVCPs may then be progresses to the detailed design phase which will include:

- Design of EVCP layout, including electrical infrastructure and bay markings.
- Estimations of initial costs.
- Identifying opportunities to future proof sites (e.g. installation of ‘skeleton EVCPs).
- Align with ongoing maintenance / civils projects planned for the site.

[157] Leased personal vehicles operated by NPTC employees and paid for by NPTC
[158] Welsh Government Energy Service, Neath Port Talbot Council Electric Vehicles Charging Infrastructure Report (2021)

6.6 Commercial Charging

Fleet Operator Engagement

6.6.1 Fleet operators can benefit significantly from ZEV adoption through reduced fuel costs, lower maintenance requirements and improved working conditions for employees. However, many are currently either unable or unwilling to adopt ZEVs within their fleet due to:

- High initial capital costs of vehicles and infrastructure.
- Lack of publicly available infrastructure.
- Concerns and doubt over the commercial viability of ZEV technology.

6.6.2 NPTC will explore opportunities to engage directly with private fleet operators across to understand key barriers to adopting ZEVs and identify considerations to inform ZEV promotions and incentive schemes. Schemes planned in collaboration with these parties have a higher chance of being successful and encouraging private investment into these technologies. Examples of engagement methods possible, include:

- Online consultations and surveys to capture fleet owners and operators' input.
- Public workshops and presentations covering ambitions of NPTC, knowledge shares, panel discussions and Q&As.

6.6.3 Possible fleets to engage with could include delivery services (food, groceries, postal services), public service fleets (ambulances, police force), commercial freight, taxi operators, public transportation, and private fleets (contractors, estate agents).

Shared Commercial Charging Study

6.6.4 Shared commercial charging is an agreement between multiple parties to share use of the same charging/refuelling infrastructure. To facilitate this, it is essential that both fleets have similar charging requirements and compatible operational cycles. There are many benefits to this, including:

- Organisations can share the costs of installing and maintaining EVCPs.
- Maximum utilisation of charging infrastructure.
- High returns on investment for charging infrastructure.
- Increased resilience by sharing charging networks in the event of malfunctions or supply issues.

6.6.5 NPTC should explore the possible benefits of a specific shared charging study covering:

- Identifying suitable partnerships involving private and public sector organisations based on operational requirements and locations.
- Explore suitable business models.
- Engage with stakeholders to discuss pain points and develop collaborative solutions.
- Identify best practice and lessons learned from similar projects across the UK and internationally.

NPTC Workplace Charging Scheme

6.6.6 To reduce the demand on public charging infrastructure, NPT will continue to promote workplace charging schemes, whereby business owners install private charging/refuelling infrastructure for use by employees, visitors, or fleet vehicles on a regular basis.

6.6.7 This scheme is closely aligned with the findings of the Shared Commercial Charging Study, as there may be scope for NPTC sites to facilitate charging and refuelling of private fleet vehicles. However, to achieve this, a study will be required to take into consideration:

- Commercial viability.
- Impacts on NPTC fleet operations.
- Risks to NPTC.

6.7 Taxi and Private Hire Vehicle Charging

ZEV Taxi & PHV Study

6.7.1 Taxis and other Private Hire Vehicles (PHVs), although part of a wider fleet, are formed typically by self-employed drivers. They are therefore unique and unsuited for the fleet operator engagement and workplace charging schemes.

6.7.2 NPTC will engage with local Taxi and PHV drivers to understand the demands and barriers associated with ZEV taxi fleets and begin to explore the role of NPTC in incentivising and promoting ZEVs for these drivers, including:

- Provision of designated refuelling/recharging infrastructure in town centres and destinations.
- Funding scrappage schemes to replace older more polluting vehicles with ZEVs.
- Permit schemes to enable free parking / charging for ZEV taxis and PHVs.
- The role of the private sector, taking inspiration from national and international examples.

6.8 ZEV Alternative Transport

Zero-emission Community Transport Study

6.8.1 Community transport is an essential service for rural or isolated communities within NPT, providing much needed access to employment opportunities and social services. Community transport vehicles have unique and varied operational patterns and are often available to be used by any registered member of a community. These vehicles do not fit into the typical ZEV fleet studies and require a specific study.

6.8.2 To this end, NPT will assess the benefits of a specific study looking into ongoing community services in NPT and what the impact would be of incorporating ZEVs into these fleets. Such a study may include engaging directly with community transport organisations as a key stakeholder and using best practice examples from similar ongoing and completed projects across the UK and internationally to identify key challenges and lessons learned.

ZEV Car Club Study

6.8.3 Car clubs allow users to access a vehicle when they need without owning one and thereby offer a flexible and convenient alternative to private car ownership or leasing. Car clubs are a socially inclusive and sustainable alternative transport, especially if ZEVs are incorporated into the club.

6.8.4 NPT will look to assess the feasibility of an NPT car club taking and:

- Identify communities and regions that would benefit from car clubs.
- Identify locations charging/refuelling infrastructure that would support ZEVs being incorporated into the car club.
- Review requirements for the number and type of ZEVs that would form part of the car club.

- Explore different operating models and indicative costs to implement and manage.
- Create outline business cases to support obtaining public funding and private investment.
- Create a road map for potential expansion plans.
- Observe similar schemes to identify best practice and lessons learned.

Mobility Hubs Study

6.8.5 Mobility hubs are accessible spaces where public, shared, and active travel modes are co-located. They are designed around the principle of reallocating space within the public realm away from private cars, enhancing the area for pedestrians, and making travelling with alternative mobility services efficient and convenient. The concept has been widely applied across Northern European and American cities and is starting to be replicated in the UK.

6.8.6 Figure 30 and Table 23 below display the pilot mobility hubs across the UK which are at various stages of development, according to CoMoUK[159].

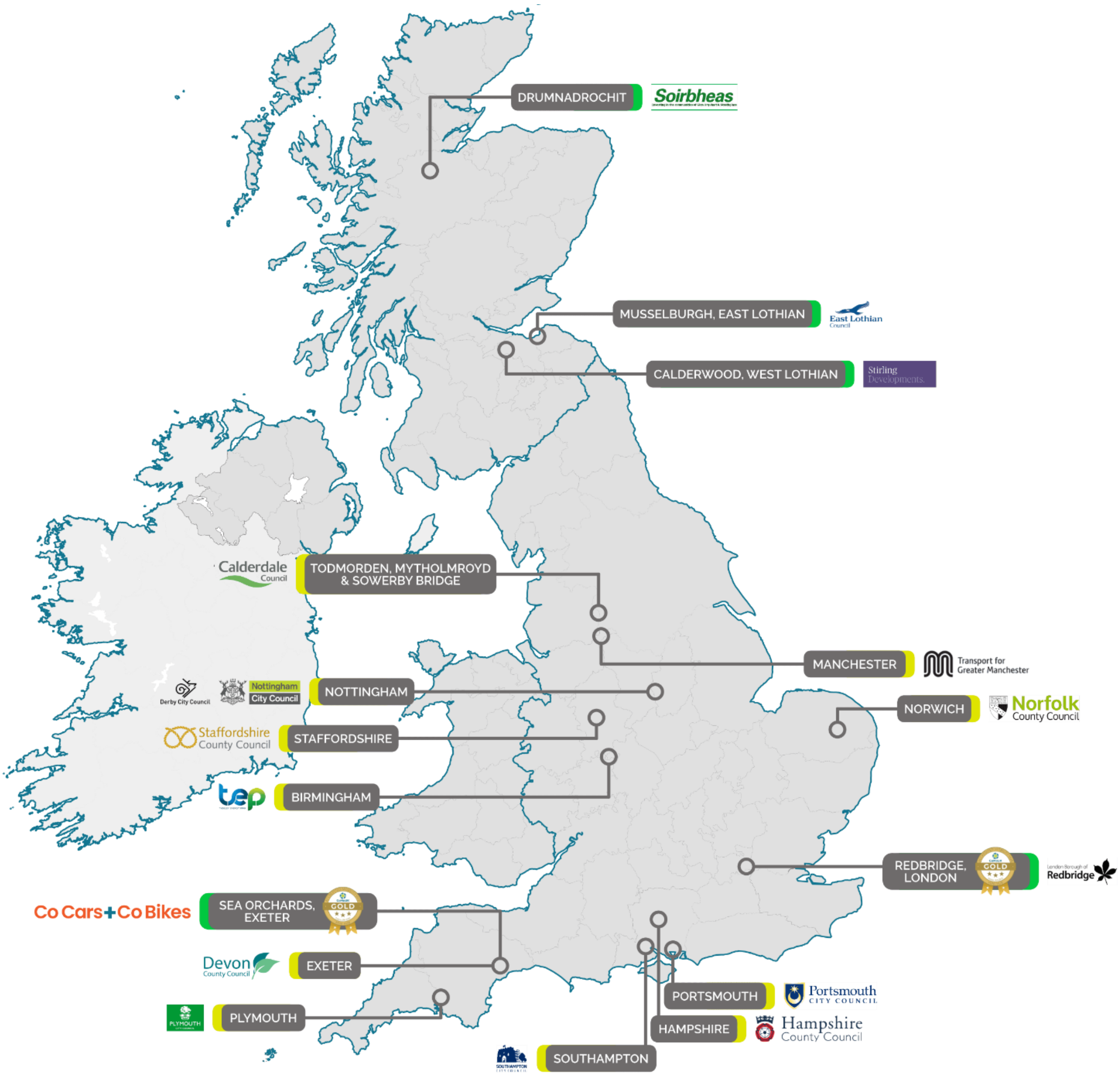

Figure 30: UK Mobility Hub Trials

[159] CoMoUK, Mobility Hubs: Built and planned hubs. https://www.como.org.uk/mobility-hubs/built-and-planned-hubs

Table 23: UK Mobility Hub Schemes

Location	Progress	Description
Exeter	Open	An all-electric mobility hub at the Bloor Homes development, near Exeter. Featuring a fleet of Co Bikes e-bikes and two Co Cars EVs, with a one-minute walk to a bus stop.
London Borough of Redbridge	Open	Suburban mini hub including a community café, planting, car club, EV charging and space to include micro-mobility
Calderwood, West Lothian	Open	Calderwood mobility hub serves the new housing development of Calderwood in West Lothian; providing car club and bike share at a transport interchange for express bus services to Edinburgh.
Loch Ness Community Hub	Open	Situated in the village of Drumnadrochit on the banks of the famous loch, Loch Ness Hub is a community mobility hub promoting sustainable modes of transport including e-bike share, with additional modes planned in the future.
Musselburgh	Open	Developed in conjunction with SEStran, this hub includes car club bays, bike sharing facilities, public transport, wayfinding, and streetscape elements all under the new brand of Journey Hub.
Calderdale Council	In development	Mobility hubs are being developed at the rail stations in Todmoden, Mytholmroyd and Sowerby Bridge to link to the local car club and provide enhanced cycle storage and landscaping
Devon County Council	In development	The council are working with South Western Railway and Co-cars / Co-bikes to gradually upgrade new sites to integrated mobility hubs.
Hampshire County Council	In development	There are 4 mobility hubs in development in the area. A town centre hub funded by DfT Transforming Cities Fund and three hubs at railway stations (one funded by DfT Transforming Cities Fund and the other two by National Highways Travel Demand Management).
Norfolk County Council	In development	30 hubs planned over the Greater Norfolk area with shared bikes, cars and e-scooters alongside street redesign.
Nottingham and Derby City Councils	In development	Future Transport Zone funding is supporting three types of mobility hub– neighbourhoods, campuses, and depots with electric car club hire, electric bike sharing, vehicle charging points, digital, real-time information
Plymouth City Council	In development	Up to 50 mobility hubs being planned for the city including e-bikes, electric car club, EV charging and an associate app.
Portsmouth City Council	In development	The council are planning 5 mobility hubs across the area including one on the Isle of Wight.
Southampton City Council	In development	2 transport interchange/corridor hubs are being created and funded through DfT Transforming Cities Fund.
Staffordshire County Council	In development	Several mobility hubs are being developed including a range of shared modes, as part of the ADEPT Live Labs initiative.
Greater Manchester	In development	Car clubs and e cargo bikes are being developed in new mobility hubs in Chorlton and Bury.

Location	Progress	Description
Tyseley Energy Park	*In development*	*Hub development in Birmingham including: electrical Vehicle Charging, along with an innovation hub and a café area*
Yorkshire	*Proposed*	*West Yorkshire Combined Authority have plans a network of inclusive mobility hubs for Leeds & Wakefield including a range of shared modes*

6.8.7 There is no set model for mobility hubs, and they can be designed to fit the constraints of an area and the needs of the surrounding population. However, they all share three main characteristics:

- co-location of public transportation and shared mobility modes (e.g., car clubs, micro-mobility).
- public realm improvements (e.g., pavement widening, converting parking into cycle infrastructure
- a branded pillar identifying the space as a mobility hub within a wider network of hubs and providing travel information.

6.8.8 NPTC will explore mobility hubs within the context of NPT, where they may be located, and what considerations must be taken to deploy them would be the first step in their adoption.

Micro-mobility Study

6.8.1 Micro-mobility modes, including e-bikes and e-scooters, have already been deployed across much of Europe, Asia, and Northern America. However, they are only slowly being adopted in towns and cities within the UK. In the UK, shared eScooter pilots, funded by DfT[160] are operating in England only, to inform future potential regulatory changes.

6.8.2 In London, the UK's first accredited mobility hub was introduced in South Woodford, Redbridge. Reclaiming on street car parking spaces, the Redbridge mini hub was the first to meet the standards set by national shared transport charity, Collaborative Mobility UK (CoMoUK). The hub consists of bike share schemes, car clubs, walking and cycling provision, alongside community facilities, such as cafes, fitness areas, and green space[161 162].

6.8.3 NPTC will explore how and where these technologies could be implemented in NPT, with an aim to help support future government funding applications.

Active Travel Incentives

6.8.4 Promoting active travel (e.g., walking and cycling) modes to replace private car trips creates equivalent benefits to that of many ZEVs schemes and is closely aligned with the objectives outlined in Section 6.2. By incentivising Active Travel, NPTC hopes to:

- Reduce NPT's Transport Sector GHG emissions.
- Improve air quality within NPT's urban areas.
- Create an inclusive transport network, benefitting all who live and work in NPT.

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[160] DfT, E-scooter Trial Guidance (2022). https://www.gov.uk/government/publications/e-scooter-trials-guidance-for-local-areas-and-rental-operators/e-scooter-trials-guidance-for-local-areas-and-rental-operators
[161] Intelligent Transport, 'UK's first "accredited mobility hub" unveiled in London' (2021). https://www.intelligenttransport.com/transport-news/126087/mobility-hub-london/
[162] Meristem Design, Meristem's Parklets awarded UK's 1st Acreditted Mobility Hub, (2021). https://www.meristemdesign.co.uk/news/2021/7/5/meristems-parklets-awarded-uks-1st-accredited-mobility-hub

6.8.5 Examples of incentives for Active Travel include:

- Improvements to the public realm to make streets safer for cyclists and residents.
- Expanding the existing cycle network and incorporate infrastructure, including Bike lockers and repair stations.

6.9 Community Engagements & ZEV Promotions

Develop EV Library & Guidance on NPTC Website

6.9.1 NPTC will explore the benefits of publishing a single source of truth on the councils existing platforms to show useful information surrounding ZEVs, debunk myths and offer guidance for residents/businesses wishing to transition to ZEVs. This could be expanded into the future to include cost-calculator tools and maps of EVCPs.

Subsidised Training Courses

6.9.2 NPTC will consider subsidising accredited training courses to improve understanding of ZEV technologies, support upskilling through improved access to higher qualifications, and ensure a highly skilled workforce in preparation for widespread uptake of these technologies. Possible target beneficiaries of this scheme include: Fleet operators, mechanics, civils / electricians installing EVCPs, and drivers.

6.9.3 To achieve this, NPTC will investigate the availability of public funds to either part-subsidise existing courses or explore the development of a ZEV Centre of Excellence in NPT, in close collaboration with surrounding engineering schools and colleges including Neath College, Pontardawe College, Brecon Beacons College, and Newtown College.

ZEV Scrappage Schemes Study

6.9.4 Scrappage schemes have been shown to incentivise businesses and residents to trade in their old fossil-fuelled powered vehicle in exchange for a ZEV. Similar schemes across the UK have been extremely effective, however they require detailed planning and assessment to effectively design and implement. Important factors to consider in such a scheme include:

- Identifying suitable replacement ZEVs.
- Identifying sources of funding/
- Undertaking cost-benefit analysis of different proposal/
- Ensuring the scheme supports inclusive ZEV uptake.

6.9.5 NPTC will explore what an NPT ZEV scrappage scheme could look like using successful examples of similar schemes across the UK and internationally and using this to lobby government for access to funding to deliver such a scheme.

Informing the NPT ZEV Strategy

This section covers the PFAs that will be explored to meet the strategic objectives of this Strategy. These PFAs cover six themes: Public infrastructure, NPTC fleet, Commercial Charging, Taxis and Private Hire Vehicles, Alternative Transport, and Community Engagements. PFAs are intended to be delivered in phases from planning through to installation and management to ensure. The development of a NPT Delivery Plan will form the next steps of the ZEV Strategy.

7 Way Forward – Implementation of this Strategy

7.1.1 This strategy document is the central core element of creating a co-ordinated and structured **Implementation Action Plan** for increasing the provision of zero-emission vehicle infrastructure within the geographical area of Neath Port Talbot Council. It must be clearly understood that this is the starting position, and the **Implementation Action Plan** will be the mechanism for developing and establishing the required delivery initiatives and programmes.

7.1.2 NPTC will continue to develop an **Implementation Action Plan** outlining committed initiatives and schemes targeted at increasing the adoption of ZEVs and the installation of supporting infrastructure within NPT. Plans are developed with buy-in from across NPTC and collaboration from key stakeholders to ensure commitments timescales are achievable.

7.1.3 The NPTC **Implementation Action Plan** will be benchmarked against a roadmap of relevant private and public sector ZEV commitments, shown in Figure 32, to ensure commitments are suitable, ambitious and in line with the industry.

7.1.4 This strategy provides the evidence base and analysis to inform evidence-based decision making on the topic of zero-emission vehicles in Neath Port Talbot. The process of developing this strategy has collected and collated information and context to provide a strategic awareness that will facilitate stakeholder buy-in to future developments in this area.

7.1.5 The priority focus areas developed through this work are at time of writing relevant for the region and provide a springboard to enable agility and flexibility to develop the work into the future. This means future work can be aligned and make best use of external factors such as strategy and policy making, technology trends, political decision making, funding and financing opportunities, and external demand and supply.

8 Next Steps

8.1.1 The following next step actions will be essential for delivering the aims and objectives of the ZEV infrastructure strategy. Figure 31 illustrates the next step core actions.

Figure 31 - Next Step Actions

8.1.2 To commence the development and demonstrate progress of the Implementation Action Plan the following shortlist of priority focus areas have been developed:

- Publish Guidance & Tools on NPTC Website – this would create a resource bank on the council's website, identifying trusted sources and create calculators for residents / businesses to understand emissions and costs impacts of switching to zero emission vehicles.
- ZEV Taxi & PHV Study – this would engage with key Hackney Carriage and private hire vehicle stakeholders to understand barriers and opportunities, identify how NPTC can help, and explore next steps
- Establish Regional EVCI Working Group – this would enable regular workshop / panels to share and discuss challenges, lessons learned and opportunities for collaboration and alignment.
- NPTC Workplace Charging Study – this would include surveying NPTC employees to understand current or future planned levels of EV uptake, including understanding how to incentivise transition to zero-emission vehicles and understand charging requirements on site.
- Mobility Hub Study – this would evidence where mobility hubs should be located, and which service offerings should be at each site, leveraging available data and geospatial analysis and stakeholder engagement to ideally locate hubs.
- Public Site EVCI Feasibility Studies – this would progress a pipeline of identified EVCI sites through DNO engagement, power assessments, and scheme design including scheme cost, enabling an 'off the shelf' approach to charging infrastructure funding and financing.

8.1.3 In conjunction with the develop of the Action Plan Programme, a fast track key charging point node installation programme will be identified and implemented, this fast track programme will identify key core charging hubs within / key travelling routes, Towns, Villages, Communities and Valley Areas, focused on enabling locations such as:

- Council carparks
- Council owned facilities
- Key visitor attractions within NPT
- Key retail outlets

8.1.4 Another key action will be a mapping exercise to identify all potential funding sources aligned to the following charging provision:

- Public facing charging provision
- Fleet charging provision
- Community charging provision
- Disadvantaged areas charging provision
- Innovative one-off projects

8.1.5 Regional engagement will also be undertaken to ensure effective co-ordination with surrounding councils and the councils within south-west Wales.

8.1.6 Another fast track enabling action will be the development and provision of individual separate policy/guidance notes i.e.:

- NPT Council – Fleet
- NPT Council –Workplace Charging
- New build and refurbishment requirements
- ZEV Engagement strategy (All sectors)

8.1.7 To ensure internal co-ordination across the council regarding zero emission vehicle infrastructure the Zero Emission Vehicle Infrastructure Officer will set up a working group of key internal stakeholders to identify all relevant existing and proposed initiatives and projects.

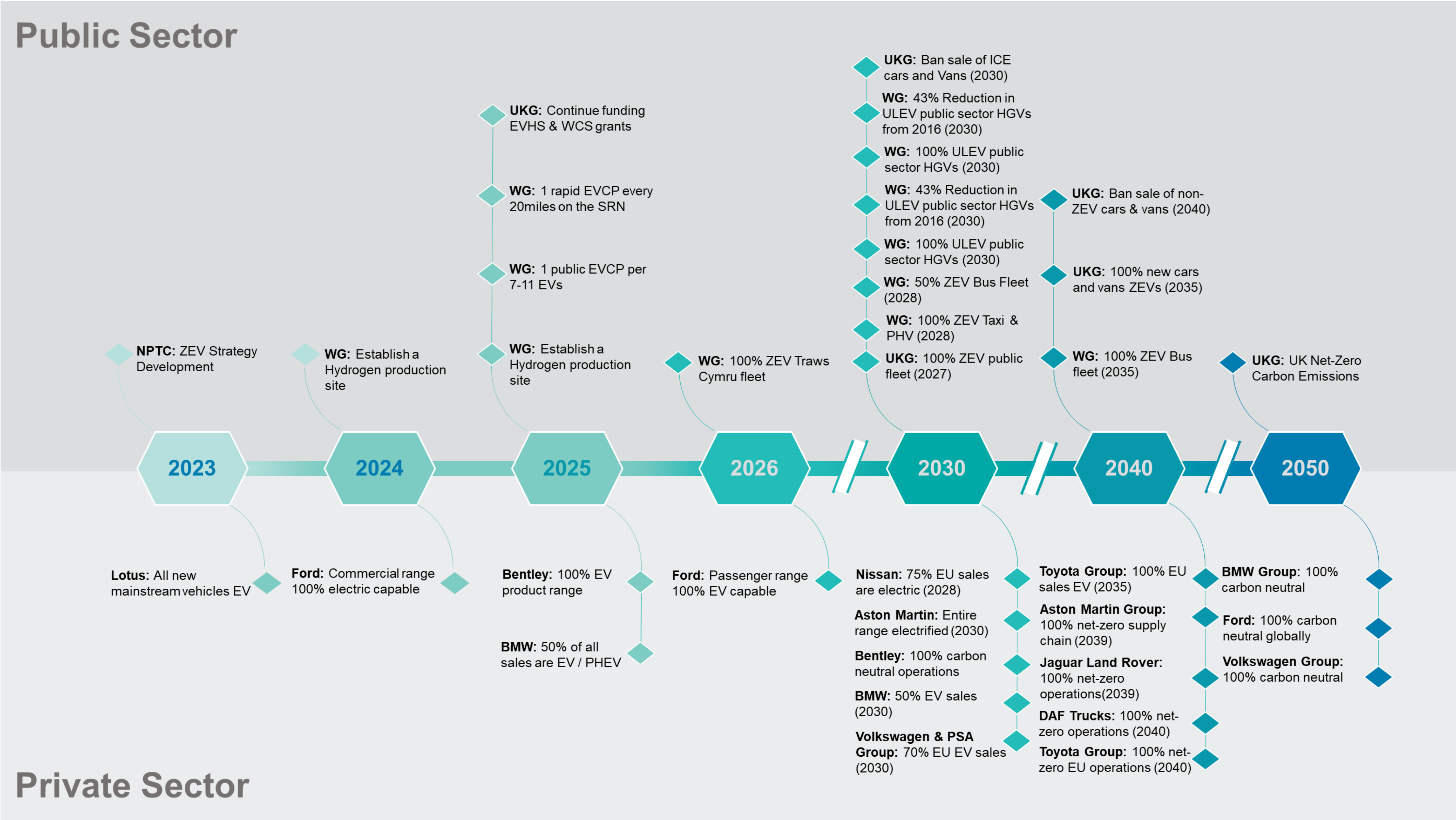

Figure 32: Roadmap of ZEV commitments made by private and public sector organisations.

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Appendix A

National Policy

Transport Policy	Key Commitments
Well-being of Future Generations (Wales) Act (2015)	• *The Well-being of Future Generations Act requires public bodies in Wales "to think about the long-term impact of their decisions, to work better with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change."*
Prosperity for All: A Low Carbon Wales (2019)	• *Welsh Government aims to reduce Transport sector emissions by 43% from 2016 levels by 2030 through behavioural change Options (modal shift to more sustainable travel), increasing uptake of electric vehicles, and reducing emissions from road and rail transport through vehicle and fuel efficiency Options.* • *Welsh Government will support a change in travel behaviours by rolling out EV car clubs and car sharing initiatives, ensure that new homes and developments provide for EV charging capabilities, invest in active travel routes and the rail network, and improve the integration of bus services.* • *Welsh Government aims to increase the uptake of zero and ultra-low emission vehicles in an inclusive manner supported by an initial investment of £2m to facilitate a network of rapid EV chargers, incentives to maintain price parity, planning for electricity grid capacity upgrades, delivering zero emission bus fleets by 2028, promoting and facilitating the transition of taxis and private hire vehicles into ULEVs and exploring opportunities offered by hydrogen fuel.* • *Welsh Government will assess the opportunities to promote renewable energy to support the increased demand for electricity.* • *Welsh Government will develop a procurement strategy to increase the use of zero and ultra-low emission vehicles in public sector fleets.*
Hydrogen In Wales: A Pathway and Next Steps for Developing the Hydrogen Energy Sector in Wales	• *Deployment of 200 fuel cell buses in a town/city/region in Wales.* • *Establish Wales as an early market for commercial fuel cell vehicles.* • *Consider support for vehicle manufacturers such as Riversimple, a Wales-based designer and manufacturer of fuel cell EVs.* • *Attract vehicle integrators to Wales.* • *Deploy fuel cell trains in Wales.* • *Establish at least one renewable hydrogen production site 10+ MW by 2023/24.* • *Scope large-scale hydrogen production sites.* • *Support industrial decarbonisation through skills development and research and development.* • *Support local projects and place-based approaches.* • *Engage with other hydrogen initiatives.*
Electric Vehicle Charging Strategy for Wales (2021)	• *Need for a substantial increase in the number of slow, fast and rapid/ultra-rapid EVCPs available need for a substantial increase in the number of slow, fast and rapid/ultra-rapid chargers available in Wales.* • *Need for better quality charging, to improve the user experience for electric cars and vans and to work within the current regulatory framework with these stakeholders to plan for the decarbonised grid network.*
Electric Vehicle Charging Strategy	• *Delivery of charging infrastructure through funding and collaboration (target of one public charge point for every 7 to 11 electric vehicles on the road by 2025).*

for Wales: Action Plan (2021)	• *The Welsh Government Ultra Low Emissions Vehicle Transformation Fund (ULEVTF) will be used to kick-start initiatives and promote collaboration within delivery groups.* • *Welsh Government will work with Distribution Network Operators (DNOs) in Wales to maximise the availability of power for charging vehicles and a connections group will be established involving DNOs, charge point providers, and Government.* • *Welsh Government will work with Transport for Wales to deliver the provision of rapid charging every 20 miles on the strategic trunk road network of Wales by 2025.* • *Welsh Government will influence the UK Government's setting of national standards for quality of charging provision and will supplement them where appropriate to ensure the needs of Wales are addressed.* • *Welsh Government will establish a Charge Point Operator working group involving private, public, not-for profit and community organisations in pursuit of coordinating charge point operators to determine suitable locations.* • *Welsh Government will work with public and private sectors to increase awareness of the needs of transport decarbonisation.* • *Welsh Government aim to complete a supply chain and opportunities review by end of 2021 and establish a programme to realise opportunities for innovation and investment.*
Future Wales: The National Plan 2040 (2021)	• *Welsh Government will embrace the adoption of electric vehicles in an inclusive manner, supported by the necessary investment in charging infrastructure.* • *It is recommended for planning authorities to ensure that the level, location and type of provision is appropriate to the scheme and local circumstances when situating EVCPs. EVCPs should be planned as part of the overall design of a development and 'passive' provision may be appropriate to enable future installation and activation.*
Llwybr Newydd: The Wales Transport Strategy (2021)	• *Upgrade, improve and future-proof the road network, addressing congestion pinch points and investing in schemes that support road safety, journey reliability resilience, modal shift and electric bike, motorbike and vehicle charging.* • *Deliver the Welsh EV Charging Strategy Action Plan and encourage the use of motorbikes and powered light vehicles instead of cars where there are no other transport choices.* • *Work with the sector to move all taxis and Private Hire Vehicles (PHVs) to zero-emission and make certain that the required infrastructure is in place to support the transition to zero-emission taxis.* • *To improve air quality by pursuing modal shift, encouraging more active travel, greater use of public transport and ultra-low emissions vehicles,* • *Where new infrastructure is needed, the Sustainable Transport Hierarchy will be used. This will give priority to interventions that support active travel, public transport and ultra-low emissions vehicles over other private motor vehicles.* • *Over the next five years, a priority is to roll out the technology and infrastructure to deliver ultra-low emissions buses.* • *A commitment to explore future infrastructure improvements that reduce carbon emissions, including infrastructure for new fuels.*
Net Zero Carbon Status By 2030: A	• *The Welsh Government will understand the nature and use of the fleet, future patterns of usage, and a feasible technological pathway for an ultra-low emission transformation.*

Route Map for Decarbonisation Across the Welsh Public Sector (2021)	• *They will accelerate the roll-out of EV charging infrastructure and their staff will be offered the opportunity to test ultra-low emission vehicles.* • *They commit to fleet transformation plans and there is a considerable upscaling of ULEV uptake.* • *All new cars and light goods vehicles in the public sector fleet are ultra-low emission by 2025.* • *Where practicably possible, all new Heavy Goods Vehicles in the public sector fleet are ultra-low emission by 2030.*
Net Zero Wales Carbon Budget 2: 2021 – 2025 (2021)	• *Welsh Government will accelerate the uptake of zero emission cars and vans.* • *By 2025 Welsh Government will deliver a network of electric vehicle charging points on the strategic trunk road network every 20 miles across Wales to facilitate easier long-distance travel and will ensure that there is at least one publicly accessible charge point for between every 7 and 11 electric cars.* • *The whole Traws Cymru bus fleet to be zero tailpipe emission by 2026, the most polluting 50% of service buses to be replaced by a zero-tailpipe emission bus fleet by 2028 and the remaining 50% of the service bus fleet to be zero emission by 2035.* • *Welsh Government have committed to deliver a zero-tailpipe emission taxi and private hire fleet by 2028.* • *All new public sector cars and light goods vehicles should be zero/ultra-low emission by 2025 and heavy goods by 2030.*
Planning Policy Wales | Edition 11 (2021)	• *The transportation system should be adaptable to future advances in innovation such as the mainstreaming of electric vehicles.* • *EVCPs should be planned as part of the overall development design and should be located where there is good lighting, natural surveillance, where they do not obstruct pedestrians and where they are resistant to vandalism.*
Welsh Government Engagement Approach for Low Carbon Delivery Plan 2 (2021)	• *Welsh Government will create high-quality digital resources and tools surrounding proposed climate actions and will make these readily available to organisations and individuals.* • *Welsh Government will proactively engage with Public and Private Sector organisations to create a joined collaborative approach in the development and subsequent delivery of Climate Policies*

UK Policy

Transport Policy	Key Commitments
Decarbonising Transport - A Better, Greener Britain (2021)	• *Introduction of a zero-emission vehicle mandate setting targets for manufacturers where a certain percentage of their sales must be zero emission from 2024.* • *Ending the sale of new petrol and diesel cars and vans from 2030, with all new cars and vans being zero tailpipe emissions from 2035.* • *Ending the sale of all new, non-zero emission road vehicles by 2040.* • *£12 billion invested into local transport systems to support decarbonisation.* • *Additional £620 million to support the transition to electric vehicles, particularly focusing on the implementation of EVCPs in residential areas.*

	• *Will build a globally competitive zero emission vehicle supply chain and encourage data sharing across the transport sector.* • *25% of the UK Gov car fleet to be ultra-low emission by December 2022 and all government vehicles to be zero emission by 2027.*
Net Zero Strategy: Build Back Greener (2021)	• *2030 - end sale of new petrol and diesel cars and vans* • *2035 - all new cars and vans must be 100% zero emission at the tailpipe* • *£2.8 billion to support the switch to clean vehicles across the UK, through a range of funding packages.* • *UK's Emissions must be net zero by 2050.* • *The UK Government commit to invest £3 million in 2021 to establish the UK's first multi-modal hydrogen transport hub in Tees Valley.* • *The UK Government also commit to develop a sector-wide Hydrogen Strategy, including its role for transport.* • *The UK Government commit to demonstrate Zero Emission HGV technology on UK roads this year and decarbonise how we get our goods, including hydrogen. They also state a commitment to stimulate demand for zero emission trucks through financial and non-financial incentives.*
HM Transitioning to Zero Emission Cars and Vans: 2035 Delivery Plan (2021)	• *Continue to fund the plug-in van grant until at least 2022/23.* • *Support provision of on-street EVCPs until at least 2024/25.* • *Continue to fund the EVHS until at least 2024/25.* • *Continue to fund the Workplace Charge Scheme until at least 2024/25.* • *Accelerate Government fleet commitment - 100% of our car and van fleet will be fully zero emission at the tailpipe by 2027.* • *Publish a Hydrogen Strategy in 2021 to develop the UK's Hydrogen economy and continue to fund the Hydrogen for Transport Programme until 2022.*
Taking Charge: The Electric Vehicle Infrastructure Strategy (2022)	• *Remove charging infrastructure as both a perceived, and a real, barrier to the adoption of electric vehicles (EVs).* • *Support the accelerated rollout of a comprehensive and competitive rapid charging network on major roads.* • *Regulate to make sure public EVCPs are reliable and easy to use.* *Work with Ofgem to make sure that EVCPs are easy to connect and integrate with the electricity system.*
HM UK Hydrogen Strategy (2021)	• *£23 million funding for the Hydrogen for Transport Programme* • *deliver the (England) National Bus Strategy and its vision of a green bus revolution.* • *An end date for the sale of new diesel buses will be set and the Zero Emission Bus Regional Areas (ZEBRA) scheme established.*

Regional Policies

Transport Policy	**Key Commitments**

Joint Transport Plan for South West Wales (2015-2020)	• *An EV Charging Network scheme "to investigate and implement a network of EVCPs across Southwest Wales. This will seek to draw together fragmented existing provision and install new sites at strategic locations using standardised technology".*
Swansea Bay City Deal - Supporting Innovation and Low Carbon Growth (2019)	• *Aims to create the right environment for innovation, new technologies and a decarbonised local and region economy.* • *Targets include the installation of air quality monitors, evidence-based electric vehicle charging strategy, mobilisation of electric link between Swansea Bay Technology Centre and Hydrogen Centre and the development of commercial strategy.*
South West Wales Regional Energy Strategy (2022)	• *Sets out an energy vision to reach by 2035, with outcomes including 320,000 electric cars, 9,500 on street and public EV chargers, and 10% reduction in private vehicle mileage.* • *The energy vision will result in 2.5 TWh reduction in petrol and diesel energy consumption and 0.6 TWh increase in electricity consumption, with a carbon saving potential of 580 kt CO2 (51% reduction).*

Local Policies

Transport Policy	Key Commitments
Adopted LDP (2011-2026)	• *The transport system and infrastructure will be developed in a safe, efficient and sustainable manner through implementing key transport projects and supporting schemes identified in the Joint Transport Plan, requiring development proposals to be designed to promote sustainable transport and requiring appropriate parking provision.*
Decarbonisation and Renewable Energy (DARE) Strategy (2022)	• *The annual renewals programme of the council's fleet of vehicles will focus on migration to cleaner and more energy efficient vehicles. The council will trail new alternative fuel vehicles and continue to monitor new technologies as they enter the market.* • *The council will work with leading academics and industry partners to produce an effective, impactful and future-proof electric vehicle charging strategy.* • *The council will consider options for adopting low emissions specification as a future requirement for taxi licencing.* • *The council is working with 'Lanzatech' which specialises in the re use of waste gases from industrial processes to enable conversion into biofuels.*
Digital Strategy (2018-2022)	• *Maximise the benefits of the Swansea Bay City Deal, helping to create a fully connected region which is at the forefront of the digital innovation*

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