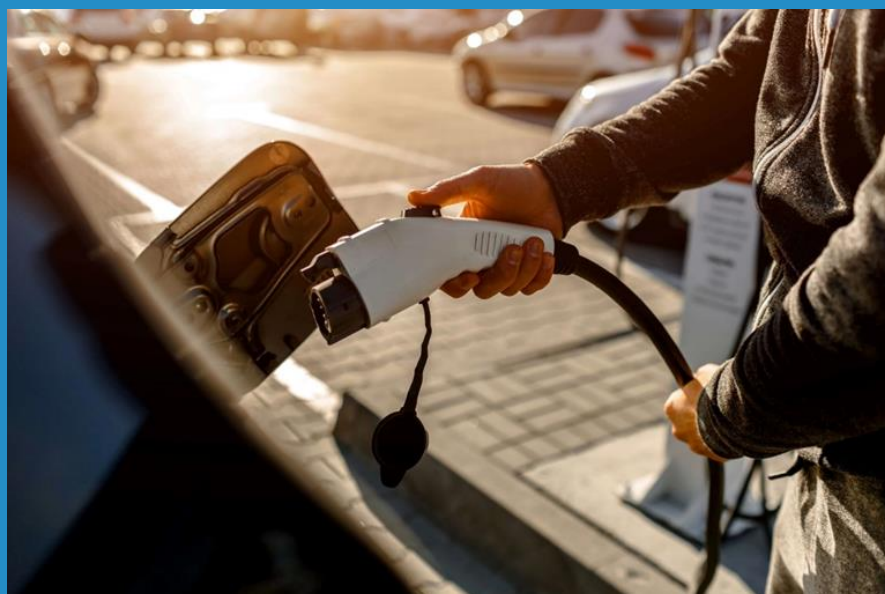


Electric Vehicle Charging Infrastructure Strategy

2021



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Executive Summary

Between 31 October - 12 November 2021, Glasgow is hosting the 26th United Nations (UN) Climate Change Conference of the Parties (COP26) to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change¹. Carmarthenshire County Council and the Welsh Government are committed to delivering net zero targets by 2030 and 2050 respectively, having both declared climate emergencies in 2019. As one of the larger contributors to greenhouse gas emissions and as set out in Llywbr Newydd decarbonising the transport sector is fundamental to achieving environmental ambitions. With increasing emphasis placed upon more sustainable forms of travel, the role of Electric Vehicles (EVs) to reduce emissions and improve air quality, alongside commitments to ban the sale of new petrol and diesel vehicles by 2030², a regional EV Infrastructure Strategy for Carmarthenshire is required to ensure the EV charging infrastructure fulfils future demand. Hydrogen is also emerging as an energy source for the vehicle sector as are other interventions such as car sharing and electric bikes.

As the first step to establishing the unique requirements for Carmarthenshire's EV infrastructure network, this strategy provides an evidence base and recommendations for a convenient, reliable, and accessible charging network that instils confidence amongst users. It also aims to encourage uptake of EVs for businesses, residents, and visitors by demonstrating the availability of a strategic infrastructure network when and where needed Carmarthenshire's Vision is as follows:

“to develop and promote a network of electric charging points, that provides for and encourages future growth in EV use, and in doing so future proofs our transport network and contributes to local and global pollution reductions”

The strategy is structured into three sections:

- baseline,
- forecasting, and
- recommendations.

It complements recent publications, such as Welsh Government's 'EV Charging Strategy for Wales'³ (March 2020), drawing upon regional forecasts and taking into account projected infrastructure requirements.

The baseline section reviews relevant national and local policies to highlight key commitments and references broader UK policies for context. It also presents an EV Charge Point (EVCP) assessment of the current number, type and location of

¹ <https://ukcop26.org/>

² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009448/decarbonising-transport-a-better-greener-britain.pdf

³ <https://gov.wales/sites/default/files/publications/2021-03/electric-vehicle-charging-strategy-wales.pdf>

EVCPs already installed using publicly available data, analyses EV uptake to date and presents a grid capacity assessment from available data/engagement with the distribution network operator (DNO), Western Power Distribution (WPD).

The forecasting section is based on Welsh government forecasts for projected EVCP requirements as well as integrated market research. 'Fast charger dominant' and 'rapid charger dominant' scenarios are extracted from the Welsh Government EV Charging Strategy to ascertain specific forecasts for Carmarthenshire.

The final section entails recommendations for the strategy, including developing solutions based on three 'use-cases': (1) Residential, (2) Destination and (3) Strategic Road Networks (SRN). Residential charging focuses on domestic (on, and off-street) charging, where EV owners will typically use a slow charger to charge their vehicles over a long period of time. Destination charging refers to charging facilities for customers which may act as a means of improving customer experience, commonly using fast charging points that at locations such as gyms, supermarkets, public parks, tourist locations and even workplaces. SRN charging refers to chargepoints used to top up vehicles during long journeys along Carmarthenshire's SRN. A typical charging location along the SRN would be motorway service stations. Options for procurement and operating models are detailed, as well as 'complimentary measures' (i.e. non-EVCP interventions such as EV car clubs or partnerships with organisations). A key recommendation is to review and refresh this strategy continually in order to keep it relevant. The following recommendations are made to facilitate realisation of Carmarthenshire's vision for accelerated uptake of EVs throughout the region:

- EV1 - Facilitate the Provision and Delivery of Public EV Charge Points
- EV2 - Maintain Parking Management Policies Supportive of EVs
- EV3 - Encourage EV Charge Points at Key Employment Centres, and transport interchanges.
- EV4 - Encourage the Use of EVs in Their Fleet.
- EV5 - Trial New Technologies and Encourage Innovation
- EV6 - Investigate ways to Encourage Charge Point Provision through the Planning Process
- EV7 - Investigate incentives for Private Developers and Landowners to Provide Charge Points on Existing Developments and explore the potential for the use of S106 contributions.
- EV8 - Encourage Taxis and Public Transport Providers to Upgrade to EVs
- EV9 - Provide Publicly Available Information About EV Charging Options
- EV10 - Inform Businesses and Residents about opportunities to upgrade to EVs and develop a comms plan to support the EV Infrastructure Strategy.
- EV11 - Encourage Electric Car Clubs
- EV12 - Work in Partnership with Other Organisations
- EV13 – Continually Review and Refresh This Strategy

Vision Statement

This Strategy sets out a vision, supported by relevant policies, to encourage and promote the development of infrastructure necessary to enable employees, residents, communities, visitors, businesses and other organisations to use EVs as part of their everyday routine/use. It will also outline ways in which Carmarthenshire County Council (CCC) will encourage and enable EV use across all sectors.

EV users in Carmarthenshire should be confident that they will be able to recharge their vehicles easily and quickly at convenient locations. The uptake of EVs will lead to improvements in air quality in Carmarthenshire, as well having wider benefits such as helping mitigate climate change through decarbonisation of transport.

Vision: “To develop and promote a network of electric charging points, that provides for and encourages future growth in EV use, and in doing so future proofs our transport network and contributes to local and global pollution reduction targets”

With the increasing number of EVs being sold and national policies set to increase uptake further, it is important we work towards and support the introduction of more charging points across the County. This strategy is the first step in encouraging this and illustrates our commitment as a Council to raising the profile of EVs and their many benefits.

Supporting the deployment of EV infrastructure is an important part of future proofing Carmarthenshire’s transport network and sustaining resilient communities. The Council introduced a number of pool cars to its fleet when EVs were far less commonplace and will continue to work to advance the EV transition in the area.

In doing so, the Council’s actions fit in with the Well-being of Future Generations Act which 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.”

This EV strategy in particular aligns with:

- A Globally Responsible Wales,
- A Healthier Wales,
- A Resilient Wales, and
- A More Equal Wales.



Figure 1 Seven Well-Being Goals of Welsh Government's 'Well-being of Future Generations Act' (Source: <https://gov.wales/well-being-of-future-generations-wales>)

Cllr Hazel Evans Cabinet Member for Environment

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1. Background

Overview

Carmarthenshire is in Southwest Wales and as well as having an established agricultural economy, it has administrative and economic hubs in its three major towns, Llanelli, Carmarthen and Ammanford. Llanelli is the largest town in the county; however, Carmarthen has been an important centre since Roman times and remains the administrative centre. In 2017, the county was estimated to have a population of 188,771⁴, with a significant proportion of the population being in rural regions.

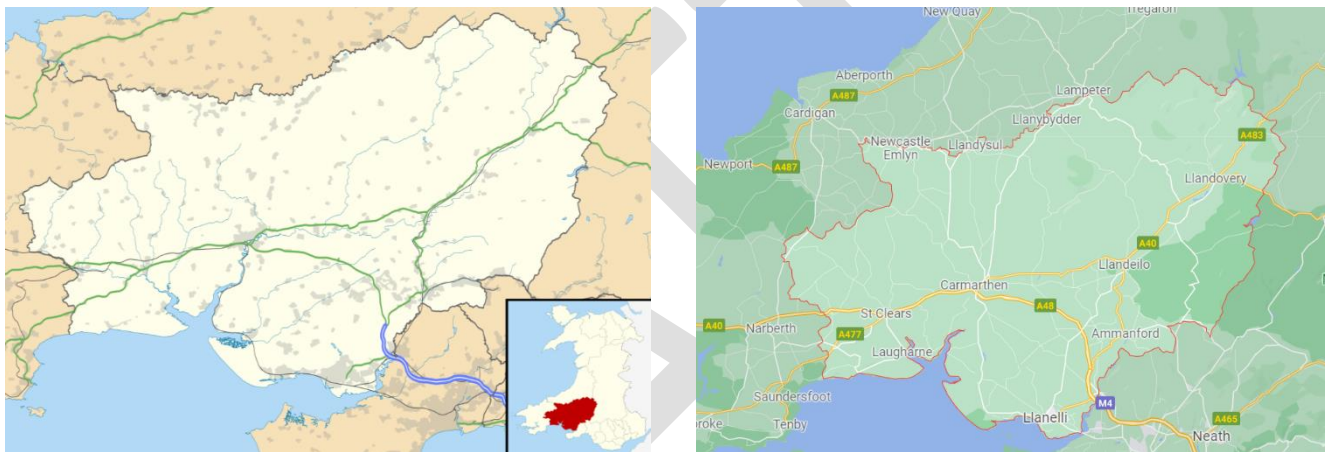


Figure 2 - Situation of Carmarthenshire

Carmarthenshire is bordered by Pembrokeshire, Ceredigion, Swansea, Neath Port Talbot, with three of these combining with Carmarthenshire to comprise the Swansea Bay City Region. Swansea is a regional centre for Southwest Wales with most employment now in the service sector, developing from its industrial heritage.

Carmarthenshire is undertaking strategic action to support the economic recovery and growth of rural towns across the County through the ‘Ten Towns⁵’ Initiative. Developing economic growth plans to drive forward an agenda for change for each of the respective towns and their wider hinterland. The ‘Ten Towns’ Initiative focuses upon the following areas: Cross Hands, Cwmaman, Kidwelly, Laugharne, Llandeilo, Llandovery, Llanbydder, Newcastle Emlyn, St.Clears and Whitland.

Carmarthenshire County Council are also delivering the Pentre Awel⁶ development at a site along the Llanelli coastline. Bringing together business, research, education, community healthcare and modern leisure facilities, Pentre Awel aims to create 1,853 jobs and training/apprenticeship opportunities. It is expected to boost the local economy by a £467million over the next 15 years.

⁴ <https://www.carmarthenshire.gov.wales/home/council-democracy/research-statistics/census-information#.YTIkG45KiUI>

⁵ <https://www.carmarthenshire.gov.wales/home/business/development-and-investment/ten-towns/#:~:text=Our%20Ten%20Towns%20initiative%20is%20to%20support%20the,recommendation%20to%20support%20the%20regeneration%20of%20rural%20Carmarthenshire.>

⁶ <https://www.carmarthenshire.gov.wales/home/business/development-and-investment/pentre-awel/>

The aim of this EV Charging Infrastructure Strategy is to aid in the transition to EV's for the population of Carmarthenshire as well as visitors and those travelling through the county via the strategic road network. This Strategy will ensure there is a focus on these strategic routes, the three major towns, as well as considering more rural and remote communities. This document is important as it provides a delivery roadmap to ensure that an EV charging network will be available when and where it is required.

Carmarthenshire also has a large tourism industry, enticing visitors with its outdoor activities, beaches, and rich heritage.

Purpose of this EV Strategy

This EV Strategy has been created to provide a plan and technical evidence base that supports the transition to zero emission vehicles for Carmarthenshire's residents, organisations, businesses, and visitors. The aims of the strategy include:

1. To support the County Council with existing EV infrastructure planning and delivery work. The strategy will also provide an evidence base for future investment decision-making by Government, The Council and the private sector
2. To develop and promote a network of electric charging points, that provides for and encourages future growth in EV use, and in doing so future proofs the transport network and contributes to local and global pollution reductions.

In achieving these aims, the EV strategy will contribute to broader Welsh Government goals of carbon neutrality in the public sector by 2030. As stated in The Welsh Public Sector Net Zero Carbon Reporting Guide (2021)⁷:

'The aim of this guide is to develop a universal guide set of instructions for use by Welsh public bodies, to estimate baseline emissions, identify priority sources and to monitor progress towards meeting the target collective ambition of a carbon neutral public sector by 2030'.

In February 2019, Carmarthenshire County Council declared a Climate Emergency and made a commitment to becoming a net zero carbon local authority by 2030. Carmarthenshire County Council was also the first local authority in Wales to publish a net zero carbon action plan.

Analysing the current network, high-level demand forecasts and a review of the Welsh Government EV Strategy projections, as well as base and future grid capacity, this strategy delivers a comprehensive update to the existing roadmap, identifying milestone objectives for 5- and 10-year periods. The strategy provides recommendations for the implementation of an infrastructure programme based on best practice review, including technological, procurement, delivery and maintenance options. The report further outlines a series of recommendations for policy

⁷ https://gov.wales/sites/default/files/publications/2021-05/welsh-public-sector-net-zero-reporting-guide_1.pdf

development, strategic investment priorities and complementary measures for public sector investment.

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2. Electric Vehicles in Context

Uptake

EVs sales are set to increase in the UK due to the national targets set by the government. Whilst car ownership is typically lower in dense urban areas than it is in rural areas due to higher public transport or active travel use, the conversion from petrol/diesel to EV is still likely to be quicker in urban areas due to easier access to chargepoints. We are already seeing this happening with the city of London having an electric car ratio of one for every 20 cars, which is 10 times the national average⁸. Also, as they have higher population densities the amount of people purchasing new cars will be higher.

In addition, due to the uptake of EVs there will be a subsequent increase in charging infrastructure at locations of high footfall. Strategic road networks and highways which may be more rural are also set to see an uptake in charging infrastructure due to their role in ensuring that vehicles can recharge for long distance journeys or for people who live far from local communities. Carmarthenshire is predominately rural, with around 60% of its residents living in rural areas⁹, therefore encouraging the strategic deployment of charge points is particularly important to ensure that residents of more deprived and/or rural areas have access to charging infrastructure. EV

Environmental Benefits

As an EV is run on electrical power it has no exhaust emissions like that of a conventional combustion vehicle. This presents a key benefit to EVs as they operate in harmony with the wider environment and can improve the quality of air in which people across our cities, towns and villages breath. Following the Paris Agreement that necessitates 'Net Zero' greenhouse gas emissions, the UK have set an ambitious target to become Net Zero by 2050, such a target will see significant change to the transport industry where the sale of new petrol and diesel vehicles is to be banned in the Wales by 2035.

EVs are not only a cleaner mode of transport than combustion vehicles but they are more efficient at converting energy into motion also¹⁰, and as such have a lower carbon footprint than conventional vehicles, even when charging from mains electricity¹¹. Due to new advanced energy generation, EVs can now be charged from renewable energy sources within the power grid, or directly from renewable sources on your home or on local charging hubs such as solar PV. Due to this greenhouse gas emissions can be reduced even further, presenting the opportunity for a clean mode of transport to use a clean form of power.

Running Cost Benefits

⁸ Electric Vehicle Adoption in the UK | comparethemarket.com

⁹ <https://www.carmarthenshire.gov.wales/media/1214849/corporate-strategy-18-23.pdf>

¹⁰ <https://fueleconomy.gov/feg/evtech.shtml>

¹¹ https://www.carbonfootprint.com/electric_vehicles.html

Although EVs are currently more expensive to purchase than a petrol or diesel vehicle, EVs are cheaper to run from a day-to-day perspective. Typical running costs are 3-4p per mile compared to 12-15p per mile for combustion vehicles¹². They are cheaper to maintain than combustion vehicles and the cost to service, maintain and repair is cut by more than half¹³. This is because EVs have fewer components that require regular maintenance which is inherently down to the reduced number of moving parts in the vehicle itself as well as improved vehicle technology.

Range Anxiety

The driving range is typically lower than fossil fuel vehicles and charging time that is longer. New EVs are also more expensive to buy than fossil fuel vehicles. However, the driving range is increasing and the range of an electric car in the UK now is typically between 100 to 300 miles¹⁴.

Increases in the average distance travelled per person per year occurred in the three decades 1970 to 2000, for personal travel. This was largely due to increases in average trip lengths since the 1970s, which rose over 50% to 7 miles in 2014. However, since the early 2000s average distance and trip length have levelled off.

Charging times are reducing as charging technology improves, and as more charge points are installed, using EVs becomes more practical.

As the number of EV users increases, having enough chargepoints in an area will not only help aid the issues associated with range anxiety but will also ensure different charging areas stays economically competitive, socially equitable in terms of access to services and furthermore encourage more visitors to the area. As well as these benefits they can also provide an additional income to the chargepoint host and demonstrates the areas commitment to the environment, innovation and future trends, which supports the Swansea Bay City Deal vision “To place the region at the forefront of energy innovation and establish the region as a globally significant player in the production and storage of energy”¹⁵.

Range anxiety has a major impact on large scale public uptake of EV's. To ease this anxiety, investment is needed to construct a comprehensive high quality EV charging network. The public need to be confident in the fact that on their journey they will be able to find an appropriate EV charger in close proximity. EV uptake depends heavily on a step change in current mobility practices and to support this the public need to be confident the infrastructure is in place to allow this.

Cost Comparison

To provide an overview regarding the shape of the current EV market a cost comparison has been conducted, this analysis also includes an overview of EV battery capacities and ranges which have evolved over the last few years. Data has

¹² <https://www.zap-map.com/electric-vehicles/ev-benefits/>

¹³ <https://www.consumerreports.org/car-repair-maintenance/pay-less-for-vehicle-maintenance-with-an-ev/>

¹⁴ <http://www.carbuyer.co.uk/reviews/recommended/best-electric-cars>

¹⁵ <http://www.swanseabaycitydeal.wales/>

been collected from the EV Database (<https://ev-database.uk/>) as this takes several sources into account to provide an industry-wide view of vehicle costs, battery size and typical range. The analysis on vehicle range can vary depending on driving style and climate, therefore a combined average of both city and highway travel has been selected under mild conditions to reflect that of the Carmarthenshire County.

All non-2021 EV prices presented are based on second-hand vehicles available to purchase in the current UK market. Prices are based on market availability from websites such as Autotrader during October 2021.

The cost provided was the 10th lowest price vehicle. This is to exclude any potential outliers (cars that are in poor condition) so to give a fair representation on the average price of the second-hand car from that specified year.

Second-hand vehicles have been presented as they represent a likely purchase option for a large proportion of general public ownership. If there is to be a large uptake in EVs based on government targets, it is unlikely that these will be made up of a significant number of second-hand models due to their affordability in the current market. Note inflation is not accounted for in price comparison.

The analysis conducted presents an overview of the following three EVs: Renault Zoe, Tesla Model 3 & the Nissan Leaf. Table 1 – 3 present this analysis.

Renault Zoe (Supermini)

Table 1 - Renault Zoe Model Development

Model Year	Range (miles)	Battery Size (kWh)	Retail Price (GBP)
2018	180	44.1 kWh	£14,490 ¹⁶
2021	220	52 kWh	£27,595 ¹⁷

Tesla Model 3 (Standard)

Table 2 - Tesla Model 3 Model Development

Model Year	Range (miles)	Battery Size	Retail Price (GBP)
2019	190	50 kWh	£39,500 ¹⁸
2021	250	55 kWh	£40,990 ¹⁹

¹⁶ <https://www.autotrader.co.uk/> as of 04/10/2021

¹⁷ <https://www.renault.co.uk/electric-vehicles/zoe.html> as of 04/10/2021

¹⁸ <https://www.autotrader.co.uk/> as of 04/10/2021

¹⁹ https://www.tesla.com/en_gb/model3 as of 04/10/2021

Nissan Leaf (Standard)

Table 3 – Nissan Leaf Model Development

Model Year	Range (miles)	Battery Size	Retail Price (GBP)
2015	120	30 kWh	£9,500 ²⁰
2018	160	40 kWh	£25,995 ²¹

As is evident from the tables above, vehicle range and battery are consistently increasing over time²². This is including improvements in vehicle where the newer model has a more advanced user interface and all-round aesthetic build.

Despite some EVs still being relatively expensive to date, research does show that brand new EVs are set to become cheaper to make than petrol or diesel vehicles by 2027²³. Research also suggests that some segments of EV production and sales may achieve price parity by 2026. Due to economies of scale, as well as battery technology improvements, costs are envisaged to come down further in real terms. Given BloombergNEF projections about costings, the forecasts made assumed that vehicles will become more affordable which will trigger an increase in EV uptake.

Accessibility of Chargepoints

The predicted uptake of EVs across Wales provides an indication of the scale that Carmarthenshire will have to match in terms of the availability of charging infrastructure. Rural local authority areas such as Carmarthenshire will require comparatively high numbers of charging units to be deployed (compared to urban areas such as Cardiff and Swansea) as Carmarthenshire is set to see the 3rd largest uptake of EVCPs in Wales according to figures presented in the official EV Charging Strategy for Wales (2021). As such, substantial planning, resources and investment will be required across the public and private sector to deliver the charging needs of the county.

Carmarthenshire will roll out its own charging strategy that will be broken down into three groups: Residential, Destination and Strategic. Further information on these categories has been presented in Table 3.

Residential charging presents the most likely form of EV charging, as EV owners will have the opportunity to plug into a dedicated domestic EV charging unit whenever required. Commonly EV charging could commence after work where a daily EV recharge could be conducted overnight. The Welsh Government will introduce requirements for new homes to implement charging infrastructure through changes to building regulations. Encouraging or incentivising the uptake of EVCPs on a residential basis will play an integral part in ensuring the availability of

²⁰ <https://www.autotrader.co.uk/> as of 04/10/2021

²¹ <https://www.nissan.co.uk/vehicles/new-vehicles/leaf.html> as of 04/10/2021

²² <https://ev-database.uk/#sort:path~type~order=,rank~number~desc|range-slider-range:prev~next=0~600|range-slider-bijtelling:prev~next=0~600|range-slider-acceleration:prev~next=2~23|range-slider-fastcharge:prev~next=0~1100|range-slider-lease:prev~next=150~2500|range-slider-topspeed:prev~next=60~260|paging:currentPage=0|paging:number=9>

²³ Price parity for electric cars and vans within 'five years' | Electric fleet news

infrastructure within Carmarthenshire, whilst reducing the demand public charging points. Residential charging is less feasible for residents without off-street parking, but there are various options for on-street parking that will be considered, such as public parking charging bays, rising changepoints and lamppost chargepoints.

Destination charging is installed at many different types of locations (workplaces, supermarkets, gyms etc.). This form of charging infrastructure will become increasingly important for all EV owners in the future, particularly those unable to or choosing not to charge at home. These chargers are publicly available, and therefore sufficient infrastructure needs to be provided to keep pace with rising levels of demand.

Strategic charging is a very important part of Carmarthenshire's EV infrastructure plans as there is a key Strategic Route Network which covers the county. These routes can be viewed in Figure 10. Ensuring that there is charging infrastructure available in strategic routes will facilitate the commuting and business needs in the region, including work-purpose EV cars and small vans or for tourists, travelling longer distances with confidence of overcoming range anxiety. The chargepoints within this purpose will most likely be Rapid or Ultra-Rapid to ensure that users spend less time recharging and can continue their journey after a short break.

The EV Charging Strategy for Wales highlighted that much of the charging infrastructure installed to date has not been designed with the needs of disabled users in mind. Specific issues include heavy cables and difficult connectors presenting problems for those with mobility and dexterity impairments. One in five people in the UK have a disability and there are indications that EV uptake amongst disabled customers has been limited to date²⁴. Therefore, ensuring an equal opportunity for disabled users to have ease of accessibility to EV charge points must be considered in accordance with the Disability Discrimination Act 1995 (DDA), and all chargepoints should be DDA compliant.

Table 3 Table 3 describes the different types of charging locations discussed, including their likely target users, challenges and the advantages associated with each one.

²⁴ ²⁴ <https://www.motability.org.uk/about/news/electric-vehicle-charge-points-lack-accessibility>

Table 3 - Description of different types of charging infrastructure and their likely target users and challenges.

Types of Chargers	Description	Likely Target Users	Challenges	Advantages
Residential (Off-Street Charging)	Personal charge point located within the user's residential property.	Users with off-street parking availability.	Onus is on the user to arrange installations.	Flexibility to charge when suits. Confidence in the quality of the charge point. Prevents congestion.
Residential (On-street Charging)	Stand-alone pillars, typically 'fast' chargers. Kerbside charging points developed to avoid trailing cables.	Users with no off-street parking e.g., terraced housing. Visitors to destinations where on-street parking is available.	Managing parking to ensure access and others don't block spaces when not charging. Funding and arranging installation can be time consuming. Any obstructions (cables or pillars) in the footway will have an adverse impact on disabled access and will reduce usability as active travel routes. Standalone pillars also raise liability issues should damage or electrocution occur. Any on street charging scheme needs to be CCC promoted and controlled scheme.	Incentivises the purchase of EV's for those who do not have access to off-street parking.
Destination Charging	Fast charging is provided at destinations such as gyms and shopping centres. Hotels may take advantage of overnight charging.	Destination visitors.	Not strategically planned or managed – based on individual investment decisions at destination.	Customers are motivated to stay for longer. Demonstrates environmental commitment and supports brands values. Increases convenience of charging for EV users.
Strategic Charging (including SRN)	Used to top up midway through a journey e.g., motorway services. Predominantly along the SRN.	Business travel users, private leisure users, freight and logistics.	Market segmentation, resulting in incompatibility across charging equipment and supporting payment and data infrastructure. Sufficient grid capacity must be available to accommodate high powered charging.	Demonstrates environmental commitment and supports brands values. Increases convenience of charging for EV users.

Car Clubs

With their relatively low running costs, EVs lend themselves well to car clubs. These can allow residents who do not own their own vehicle or have limited access to public transport, to travel to other areas more frequently. The shared ownership

aspect of car clubs can encourage communities in living more cooperatively, working together towards a low carbon, low-cost future. Rural communities can become isolated if there is limited public transport and access to amenities, and young people leaving to study often may struggle to return as residents. Providing shared cars may help with this.

3. Policy Context

Most transport responsibilities are devolved within Wales and as such the Welsh Government has a responsibility for transport policy, planning, and delivery. A summary of relevant policies and strategies are listed below:

Welsh Government Policy

Welsh Government has the ambition for the public sector in Wales to be carbon neutral by 2030²⁵, and expects ultra-low emission vehicles to have a key role in achieving this.

The latest plan from Welsh Government²⁶ states:

- Where practicably possible, all new heavy goods vehicles in the public fleet are ultra-low emission by 2030.
- All new cars and light goods vehicles in the public sector fleet are ultra-low emission by 2025.

Wales Transport Strategy

A new Wales Transport Strategy has been published in 2021 with commitments to EV infrastructure and Taxis/Private Hire Vehicles. The strategy states that over the next 5 years, the Welsh Government will:



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 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 PHVs to zero-emission and make certain that the required infrastructure is in place to support the transition to zero-emission taxis.

The strategy notes that the proposed Climate Change Committee carbon reduction pathway for Wales means emissions from surface transport must be roughly halved between 2020 and 2030 from 6 to 3 million tonnes CO². Welsh Government note that

²⁵ https://gov.wales/sites/default/files/publications/2021-05/welsh-public-sector-net-zero-reporting-guide_1.pdf

²⁶ <https://gov.wales/welsh-public-sector-be-carbon-neutral-2030>

whilst EVs may provide the biggest emissions savings, this is unlikely to be the main source of savings until the late 2020s and possibly later and thus other measures need to be considered.

EV Charging Strategy for Wales: Facilitating the Transition to Net Zero

As alluded to in the Wales Transport Strategy (2021), the Welsh Government published a specific EV Charging Strategy for Wales²⁷ in 2021 with key action points. The strategy covers the period until 2030 yet recognises the urgency of taking action now to ‘put us (Wales) on the right path by setting the vision for 2025’.

The Strategy outlines the current situation regarding EV ownership and associated infrastructure in Wales, with 105 EVs licensed per 100,000 of population (2020) and 21 chargepoints per 100,000 of population (2020). There are approximately 320 workplace chargers installed in Wales, at least 145 on-street chargers, approximately 300 destination chargers at around 150 locations and approximately 130 rapid chargers at 70 ‘on-route’ locations. The vision is that by 2025, all users of electric cars and vans are confident that they can access EV charging infrastructure when and where they need it.

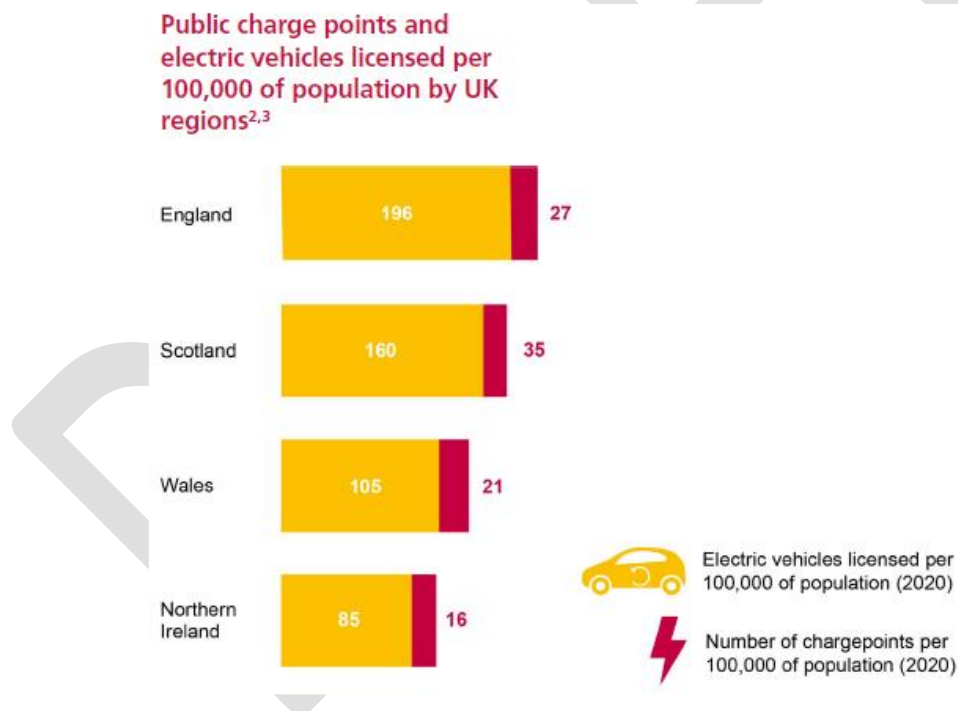


Figure 3 - Public Chargepoints and EVs licensed per 100,000 of population by UK regions (source: Welsh Government)

Based on the scenarios modelled for EV uptake, the following conclusions are made to be taken forward in action planning:

1. The need for a substantial increase in the number of slow, fast and rapid/ultra-rapid chargers available in Wales. Meeting the need for up to 55,000 fast chargers in Wales, alongside home charging, will be a key area of focus to promote equality of access to charging.

²⁷ <https://gov.wales/sites/default/files/publications/2021-03/electric-vehicle-charging-strategy-wales.pdf>

2. The need for better quality charging, to improve the user experience for electric cars and vans Desirable quality outcomes include contactless debit/credit card payment and associated app-based system, information about charging on main roads to help drivers choose where/when to charge, reliable infrastructure with high availability and clear pricing information).
3. To work within the current regulatory framework with these stakeholders to plan for the decarbonised grid network (including heat, renewable electricity generation and transport) so that the needs of charging will be met in a way that is efficient for network management incorporating smart technology.

An action plan from the aforementioned strategy conclusions was scheduled to be published in June 2021, with the Welsh Government recognising its enabling role in delivering this charging infrastructure through the use of regulatory and planning levers, land use planning guidance, use of public land and resources, funding, and targeted support programmes. The strategy further states that targeted action planning will be undertaken to meet the rapidly growing need for charging to ensure that a lack of EV charging infrastructure does not become a barrier to transitioning to electric cars and vans.

The Welsh Government has set out its legal commitment to achieve net zero emissions by 2050 and are passing regulations in 2021 to set interim targets for 2030, 2040 and 2050, against carbon budgets (2021-25 and 2025-2030). To be transposed into Welsh Building Codes, the Energy Performance Buildings Directive signal the requirement for all new homes with associated parking be ready for EV charging. The same obligation is placed on any refurbishment scheme covered by the Code. The following outcomes to develop into the forthcoming EV action plan have been identified regarding infrastructure:

Table 4 - Charging Infrastructure in Relation to Welsh Government Policy Commitments

Slow Charging (3.6kW AC)	(a) All new homes with an associated car parking space will be ready to have EV charging installed.
	(b) Homeowners and occupiers with off-street parking in Wales will be supported to charge at home.
	(c) Home charging will be 'smart enabled' for value and efficiency.
Fast Charging (7kW - 22kW AC)	(a) need to have between 30,000 and 55,000 fast chargers available for use by 2030 (currently have less than 1% of this installed).
	(b) New non-residential buildings with more than 10 parking spaces will have a charge point provided by 2025.
	(c) Business provides charging facilities at places of work for the use of staff and visitors.
	(d) Destinations provide charging facilities for the use of customers which may act as a means of improving customer experience.
	(e) On-street charging and in car parks will be encouraged in villages, towns and cities throughout Wales; with a view to installing on average one charge point for one in every three EVs that cannot charge at home.
	(f) Charging hubs, including out of town park and ride, and supporting active travel will feature in enabling decarbonised multi-modal journeys across Wales.
Rapid Charging (43kW AC)	(a) predicted that up to 4,000 rapid/ultra-rapid chargers will be needed in Wales over the next ten years (currently have less than 3% of this installed).

& (50kW - 120kW DC)	(b) By 2025, a rapid charging network will be provided across the strategic trunk road network of Wales, providing charging at a distance of approximately 20 miles.
	(c) In urban centres taxis and private hire vehicles will have extensive access to charging facilities by 2025.

The strategy also comments on quality outcomes for EV users such as charging facilities to be available to everyone, including those with accessibility needs and payment platforms to be simple, accessible and easy to use with clear pricing information available.

Sustainable outcomes, notably, where possible, EV charging should be installed at locations that complement other modes of sustainable transport, including the use of public transport, walking, and cycling. Consideration will be given to allowing sufficient additional spare capacity and cableways to meet anticipated need for EV charging.

Welsh Government Policy Commitment Summary:

1. 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.
2. Deliver the Welsh EV Charging Strategy and encourage the use of motorbikes and powered light vehicles instead of cars where there are no other transport choices.
3. Work with the sector to move all taxis and PHVs to zero-emission and make certain that the required infrastructure is in place to support the transition to zero-emission taxis.
4. Need for a substantial increase in the number of slow, fast and rapid/ultra-rapid chargers available need for a substantial increase in the number of slow, fast and rapid/ultra-rapid chargers available in Wales.
5. 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

Net zero carbon status by 2030: A route map for decarbonisation across the Welsh public sector

Accelerating the rollout of EV charging infrastructure constitutes a specific component in the routemap to achieve Welsh Public Sector net zero greenhouse gas emissions by 2030. As part of the 'Mobility and transport' priority area for action identified in the routemap, EV policy commitments are present in action points across the three distinct phases plans. The three phases of action the routemap identifies for achieving net zero ambitions by 2030 are as follows:

- 'Moving Up A Gear' (2021-22) - understanding the context and what needs to be done and where action needs to accelerate.
- 'Well on our way' (2022-26) - where there is an expectation that low

carbon is becoming the norm and the Welsh Public Sector are definitely on the way to net zero status.

- 'Achieving our goal' (2026-30) - where choosing zero carbon has become routine, culturally embedded and self-regulating.

As part of the 'Moving Up a Gear' phase of action, the policy document highlights the Welsh Government will: (1) understand the nature and use of our fleet, future patterns of usage, and a feasible technological pathway for an ultra-low emission transformation, (2) accelerate the roll-out of EV charging infrastructure and our staff will be offered the opportunity to test ultra-low emission vehicles, and (3) commit to fleet transformation plans (considerable upscaling of ULEV uptake). As part of the 'Well On Our Way' phase of action points, all new cars and light goods vehicles in the public sector fleet are set to be ultra low emission by 2025. Where possible, all new Heavy goods vehicles in the public fleet are ultra low emission by 2030, as part of the final 'Achieving Our Goal' phase of this plan.

Welsh Government Policy Commitment Summary:

1. We will understand the nature and use of our fleet, future patterns of usage, and a feasible technological pathway for an ultra-low emission transformation.
2. We will accelerate the roll-out of EV charging infrastructure and our staff will be offered the opportunity to test ultra-low emission vehicles.
3. We commit to fleet transformation plans and there is a considerable upscaling of ULEV uptake.
4. All new cars and light goods vehicles in the public sector fleet are ultra low emission by 2025.
5. Where practicably possible, all new Heavy goods vehicles in the public fleet are ultra low emission by 2030.

Southwest Wales Policy

The Joint Local Transport Plan for Southwest Wales (2015 - 2020)²⁸ provides a consistent policy which is applied across the four councils in Southwest Wales: Carmarthenshire County Council, City and County of Swansea, Neath Port Talbot County Borough Council and Pembrokeshire County Council. It lists EVs as an emerging trend and outlines an EV Charging Network scheme "to investigate and implement a network of EV charging points across Southwest Wales. This will seek to draw together fragmented existing provision and install new sites at strategic locations using standardised technology." It also mentions the Sustainable Travel Centres scheme in Carmarthenshire, which helped fund the Rapid charger at Nant y Ci.

Work is due to commence on the next version of the Regional Transport Plan. This EV Charging Infrastructure Strategy will inform the process. Feeding into regional

²⁸ <https://www.swansea.gov.uk/localtransportplan>

plans that will translate into an integrated Metro system for Southwest Wales, this Charging Infrastructure strategy will also inform development of the South West Wales Metro²⁹.

The Economic Regeneration Strategy for the Swansea Bay City³⁰ region whilst not specifically covering EVs, includes in its strategic aims to “keep a strong eye on the emerging market and technology trends” and “Nurture and support our emerging growth sectors”.

South West Wales Policy Commitment Summary:

1. An EV Charging Network scheme “to investigate and implement a network of EV charging points across South West Wales. This will seek to draw together fragmented existing provision and install new sites at strategic locations using standardised technology”.

Carmarthenshire County Council Policy

Route towards becoming a Net Zero Carbon Local Authority by 2030

Carmarthenshire County Council’s ‘Route towards becoming a net zero Carbon Local Authority by 2030’ is an important local policy driver for this EV strategy. On the 20th February 2019, Carmarthenshire specifically declared a ‘notice of Motion’ entailing the following:

1. Declare a climate emergency.
2. Commit to making Carmarthenshire County Council a net zero carbon local authority by 2030.
3. Develop a clear plan for a route towards being net zero carbon within 12 months
4. Call on Welsh and UK Governments to provide the necessary support and resources to enable effective carbon reductions.
5. Work with Public Services Board and Swansea Bay City Deal partners to develop exciting opportunities to deliver carbon savings.
6. Collaborate with experts from the private sector and Third sectors to develop innovative solutions to becoming net zero carbon.”

The Council was the first local authority in Wales to have EVs in 2010, and currently has 10 EV cars, 1 EV van, and hybrid vehicles too and is aiming to increase its electric fleet as an alternative to existing diesel-powered vehicles. Grant funding from the Office for Low Emission Vehicles (OLEV) was secured to install 26 electric charging points for public use throughout the County. The Council has reduced carbon emissions from its fleet mileage by 19% between 2012-2019. The Council has reduced carbon emissions from its business mileage by over 36% between 2012-2019.

The Council will adopt a pragmatic approach for the route towards the Council becoming a net zero carbon local authority by 2030 in recognition that this approach

²⁹ <https://gov.wales/swansea-bay-and-west-wales-metro>

³⁰ <https://www.swansea.gov.uk/swanseabaycityregioneconomicregenerationstrategy>

needs to be sufficiently flexible to accommodate changing circumstances, including the reporting requirements yet to be introduced by Welsh Government as part of its ambition for a carbon neutral public sector by 2030. The Council will review the most appropriate fuel powered vehicles for each of the Council's Services and develop appropriate carbon reduction target for the Council's fleet mileage as part of an annual review. This Council will also undertake a review of the Council's pool cars to identify opportunities for carbon reduction, finalise this EV strategy for the County and develop appropriate carbon reduction targets for the Council's business mileage as part of an annual review.

Carmarthenshire County Council Existing Policy Commitment Summary:

1. Review the most appropriate fuel powered vehicles for each of the Council's Services and develop appropriate carbon reduction target for the Council's fleet mileage.
2. Undertake a review of the Council's pool cars to identify opportunities for carbon reduction, finalise this EV strategy for the County and develop appropriate carbon reduction targets for the Council's business mileage.

Other Carmarthenshire Policies / Strategies

EVs and related issues are already covered in several Carmarthenshire Council policies; the document Carmarthenshire County Council Moving Forward in Carmarthenshire: the next 5-years³¹ states that the Council plans to "improve the infrastructure for the use of EVs especially in rural areas"

Carmarthenshire County Councils Corporate Strategy³² outlines the need to invest in infrastructure to support more sustainable journeys.

As part of Carmarthenshire County Council's commitment to increase the supply of affordable housing, EV points are included in all council new build developments.

Carmarthenshire County Council has three Air Quality Management Areas, in Carmarthen, Llanelli and Llandeilo, as shown in the maps in Annex A. Whilst not providing the full solution to improving air quality issues it is recognised that wider EV use in these areas could make a positive impact on air quality.

The Taxi Licencing team have Licence Conditions for Hackney Carriages and Private Hire Vehicles in Carmarthenshire, which includes a minimum size of 1200cc, but they have an exemption for electric cars which are fully compliant with all Conditions of Licence to have an Engine Capacity of below 1200cc.

The Carmarthenshire Parking Strategy 2018 includes several proposals relating to EVs, including:

³¹ <https://www.carmarthenshire.gov.wales/media/1212982/moving-forward.pdf>

³² <https://www.carmarthenshire.gov.wales/media/1214849/corporate-strategy-18-23.pdf>

- Increase the use of iconography on the County Council website to promote car park facilities such as; electric charging points, public transport connectivity, cycle parking, opening times and tariffs.
- To facilitate increased use of EVs appropriate charging facilities and parking spaces will be provided for EVs.
- Consideration should be given to parking spaces at new developments for EVs with associated infrastructure.
- Where appropriate, provide electric charging facilities and spaces to short term parking for EVs.

The current Local Development Plan³³, adopted December 2014, does not specifically cover EVs but states that it “looks to tackle the causes and effects of climate change within our communities”, and describes how Transport takes up a sizable proportion (28%) of the overall figure for the County’s carbon footprint.

The emerging Local Development Plan includes a Sustainability Appraisal³⁴, which has amongst its objectives:

1. To maintain/reduce the levels of the UK National Air Quality pollutants (objective 3.1).
2. To reduce the emission of greenhouse gases (objective 4.1).
3. Improve the integration of different modes of transport (objective 6.5).
4. Promote the use of more sustainable modes of transport (objective 6.6).

Carmarthenshire County Council Existing Policy Commitment Summary:

1. Plans to improve the infrastructure for the use of EVs especially in rural areas. Review the most appropriate fuel powered vehicles for each of the Council’s Services and develop appropriate carbon reduction target for the Council’s fleet mileage by March 2021.
2. Carmarthenshire undertake a review of the Council’s pool cars to identify opportunities for carbon reduction, finalise this EV strategy for the County and develop appropriate carbon reduction targets for the Council’s business mileage
Taxi licensing team exemption for electric cars which are fully compliant with all Conditions of Licence to have an Engine Capacity of below 1200cc.
3. Parking Strategy proposals - parking spaces will be provided for EVs during periods of charging.
4. Consider the appropriateness of promoting powered light vehicles.

This will allow us to reference EV provision as part of the ongoing development process.

³³ <https://www.carmarthenshire.gov.wales/home/council-services/planning/planning-policy/local-development-plan-2006-2021/#.W32HsfIKgdU>

³⁴ <https://www.carmarthenshire.gov.wales/media/1215165/sa-scoping-non-technical-summary-final.pdf>

UK Policy

Building upon previous UK strategy documents for low emission vehicles and related infrastructure³⁵, the 2021 publication of 'Decarbonising transport - A Better, Greener Britain'³⁶ and 'HM Transitioning to zero emission cars and vans: 2035 delivery plan'³⁷ provide important action points to decarbonise transport by 2050. The main commitments of each policy are summarised below, to which Carmarthenshire County Council's EV strategy will compliment.

Decarbonising Transport - A Better, Greener Britain

Although transport policy is devolved and responsibility rests with the Welsh Government (the proposals in this plan apply to England only), it is useful to understand the direction UK Government is moving towards in terms of EV policy and strategy.



By law, the UK's Emissions must now be net zero by 2050. The Government have committed to remove all emissions from road transport:

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

2035- all new L-category vehicles to be fully zero emissions at the tailpipe.

2040- End the sale of all non-zero emission HGVs.

Given the crucial role that local authorities must play in supporting the roll-out of charging, and to navigate the complexities involved, the Government will publish an EV infrastructure guide for local authorities later this year. For those households unable to charge at their home, the On-Street Residential Scheme supports local authorities in installing EV infrastructure on-street and in public car parks and the workplace Charging Scheme/EV Homecharge scheme are committed to continue.

The Government will further regulate to ensure that all new home and workplace chargepoints have smart capability by the end of this year and through regulation by Ofgem, network operators must ensure that they provide connecting customers with the cheapest option that meets their requirements.

³⁵ E.g. Department for Transport's 'Road to Zero' (2018)

<https://www.gov.uk/government/publications/reducing-emissions-from-road-transport-road-to-zero-strategy>, 'Government Vision for England's Rapid Chargepoint Network' (Department for Transport, 2020) <https://www.gov.uk/government/publications/government-vision-for-the-rapid-chargepoint-network-in-england/government-vision-for-the-rapid-chargepoint-network-in-england> and 'Decarbonising Transport – Setting the Challenge' (Department for Transport, 2020) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf

³⁶https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009448/decarbonising-transport-a-better-greener-britain.pdf

³⁷https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005301/transitioning-to-zero-emission-cars-vans-2035-delivery-plan.pdf

UK Policy Commitment Summary:

1. 2030 - end sale of new petrol and diesel cars and vans
2. 2035 - all new cars and vans must be 100% zero emission at the tailpipe
3. £2.8 billion to support the switch to clean vehicles across the UK, through a range of funding packages.
4. UK's Emissions must be net zero by 2050.

HM Transitioning to zero emission cars and vans: 2035 delivery plan

 HM Government

Transitioning to zero emission cars and vans: 2035 delivery plan



Whereas the 'Decarbonising Transport' strategy is holistic, encompassing multi-modal action points, the 'HM 2035 Delivery Plan' expands upon specific commitments made regarding zero emission cars/vans.

The 2035 delivery plan states: 'our commitment to transitioning to zero emission vehicles is 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'.

Figure 4 is taken from the 2035 delivery plan and visualises the forthcoming government guidance as well as funding to realise ambitions around net zero cars and vans³⁸.

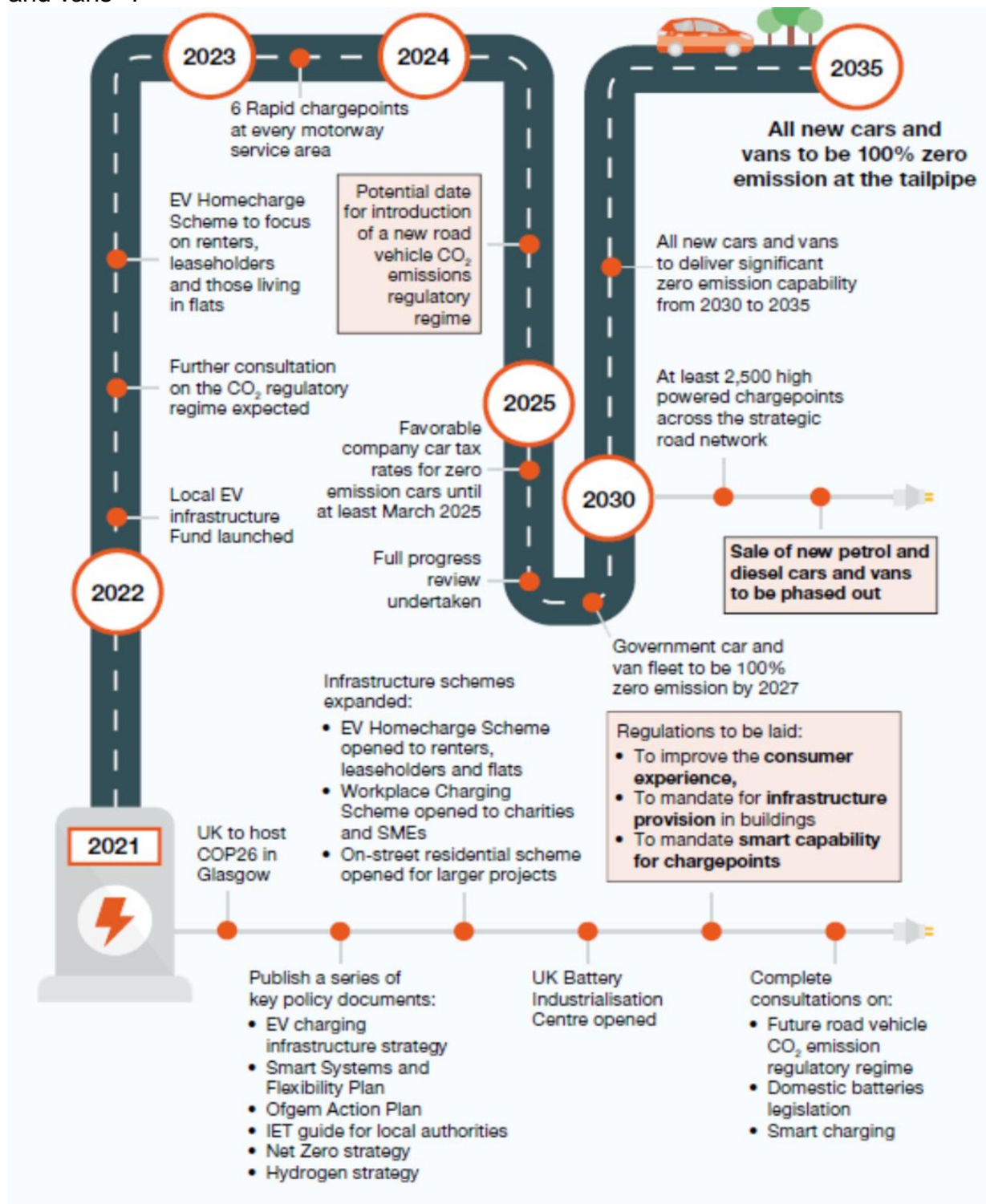


Figure 4 - Timeline of Key deliverables (source: HM Government)

³⁸ Note, not all initiatives on the roadmap apply to Wales/are available funding sources (e.g. Local EV Infrastructure fund).

Table 5 below summarises the main commitments across three broad areas of the delivery plan.

Table 5 - Commitments Summary - Transitioning to zero emission cars and vans: 2035 delivery plan

Increasing uptake of zero emission vehicles	Accelerating infrastructure roll-out	A Sustainable Transition
Aim to introduce a new road vehicle CO ² emissions regulatory regime in 2024.	Publish an EV Infrastructure Strategy in 2021.	Published our smart charging consultation response and later this year will legislate to mandate that all private chargepoints must be smart.
Continue to fund the plug-in van grant until at least 2022/23.	Support provision of on-street chargepoints until at least 2024/25.	Publish with Ofgem a second phase of the Smart Systems and Flexibility Plan (SSFP) in 2021 to set out reforms needed to secure flexibility across the energy system, including EVs.
Review the Category B derogation in 2021.	Ofgem is considering changing the way charges for connecting to the electricity network are allocated. It has recently published a consultation proposing that all network reinforcement costs should be socialised across energy bill payers in future. This should often reduce the costs of connecting EV chargepoints to the network. Any changes are expected to come into force in 2023.	In conjunction with Ofgem, publish a plan to maximise the contribution of EV flexibility in 2022.
Accelerate Government fleet commitment - 100% of our car and van fleet will be fully zero emission at the tailpipe by 2027.	Shift the support of the EV Homecharge Scheme (EVHS) to focus on leaseholders, renters and those living in flats from April 2022.	Publish a call for evidence for Vehicle-to-everything (V2X) technologies in a net zero energy system.
We will work closer than ever with local authorities, to encourage uptake of central government funding and ensure more widespread action in the transition to ZEVs.	Continue to fund EVHS until at least 2024/25	Publish a consultation on domestic batteries legislation in 2021 to ensure we have an appropriate legal framework governing the increasing numbers of EV batteries
	Continue to fund the Workplace Charge Scheme until at least 2024/25	Publish a Net Zero Strategy including the recommended actions of the Green Jobs Taskforce in 2021.

Carmarthenshire County Council are looking to provide and encourage the installation of relevant infrastructure to help meet these targets.

UK Policy Commitment Summary:

1. Continue to fund the plug-in van grant until at least 2022/23.
2. Support provision of on-street chargepoints until at least 2024/25.
3. Continue to fund EV Home Scheme until at least 2024/25.
4. Continue to fund the Workplace Charge Scheme until at least 2024/25.
5. Accelerate Government fleet commitment - 100% of our car and van fleet will be fully zero emission at the tailpipe by 2027.

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4. Baseline Context

Introduction

A baseline assessment has been conducted to understand Carmarthenshire's existing position in relation to EV uptake, the EV network, and the existing grid capacity. Additionally, the baseline includes a review of the existing EV and EVCP technologies currently in the market.

The baseline of this EV strategy provides a key role in determining the starting off point and in turn influences forecasting, EVCP recommendations/ complimentary measures and the ambitions and targets set and upheld via policy.

Types of EV

Battery EVs (BEV) or simply EVs (EV)

These are fully EVs with no Internal Combustion Engine. Electricity is stored within battery packs usually under the car and the power is used to run the electric motor. EVs are charged via electricity from an external source usually at home, work or via a public charge point.

Hybrid EVs (HEV)

Hybrid vehicles are powered by both petrol/diesel and electricity. The electricity is usually powered by 'regenerative braking' or in newer 'self-charging' the petrol engine generates electricity whilst in use.

Plug in Hybrid EV (PHEV)

Plug in vehicles can recharge battery via 'regenerative braking' or can be plugged in to an external source. PHEV models usually have around 10-40 miles on one charge.

Baseline EV Registrations

Vehicle registrations for Ultra Low Emission Vehicles (ULEVs), (broken down into Battery EVs (BEVs) and Plug-in Hybrid EVs (PHEVs)) in Carmarthenshire County Council study area have been analysed to establish a baseline position from which EV uptake scenarios can be developed.

The data used can be found in the Department for Transport (DfT) dataset (VEH01) (subset dataset VEH0132)³⁹.

ULEVs are vehicles that reported to emit less than 75g of carbon dioxide (CO₂) from the tailpipe for every kilometre travelled. In practice, the term typically refers to BEVs, PHEVs and fuel cell EVs. For clarity and to assist further analysis of EV uptake in the future (Section 4), the data presented in this section exhibits separate totals for ULEV, PHEV and BEV registrations.

³⁹ <https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01>

Details of ULEV registrations for Carmarthenshire were taken from the DfT dataset VEH0132. This dataset provided the total number of ULEV registrations, BEV registrations and PHEV registrations at the end of each quarter (Q) from 2011 Q4 to 2020 Q4 for the UK, Wales and Carmarthenshire.

Vehicles are allocated to a local authority according to the postcode of the registered keeper. This is the keeper's address for privately owned vehicles or the company's registered address for company owned vehicles. The address does not necessarily reflect where the vehicle is located. This is especially true for large fleets kept by companies involved with vehicle management, leasing or rentals. Significant changes in the number of vehicles from year to year can often occur when these companies change their registered address.

Registrations can be assumed to be a minimum as due to some major dealerships being based outside of the Carmarthenshire boundary, some vehicles will be registered outside the boundary and used within Carmarthenshire. Therefore, the registered vehicles can be assumed to be conservative.

An initial analysis has been undertaken to gauge the level of ULEV uptake as a proportion of total vehicles registered. This has been conducted for the UK, Wales and Carmarthenshire. The figure below illustrates the level of ULEV uptake in relation to the total vehicles registered within the respective defined geography. It can be seen that the UK has a higher proportion of ULEVs, reaching 13% at the end of 2020.

Carmarthenshire's ULEV uptake is in line with the level of ULEV uptake in Wales, whereby the proportion of ULEVs out of the total vehicles registered follow a similar trajectory.

This highlights that Carmarthenshire's rate of adoption is in line with Wales with regards to the number of ULEV in proportion to the total vehicles registered.

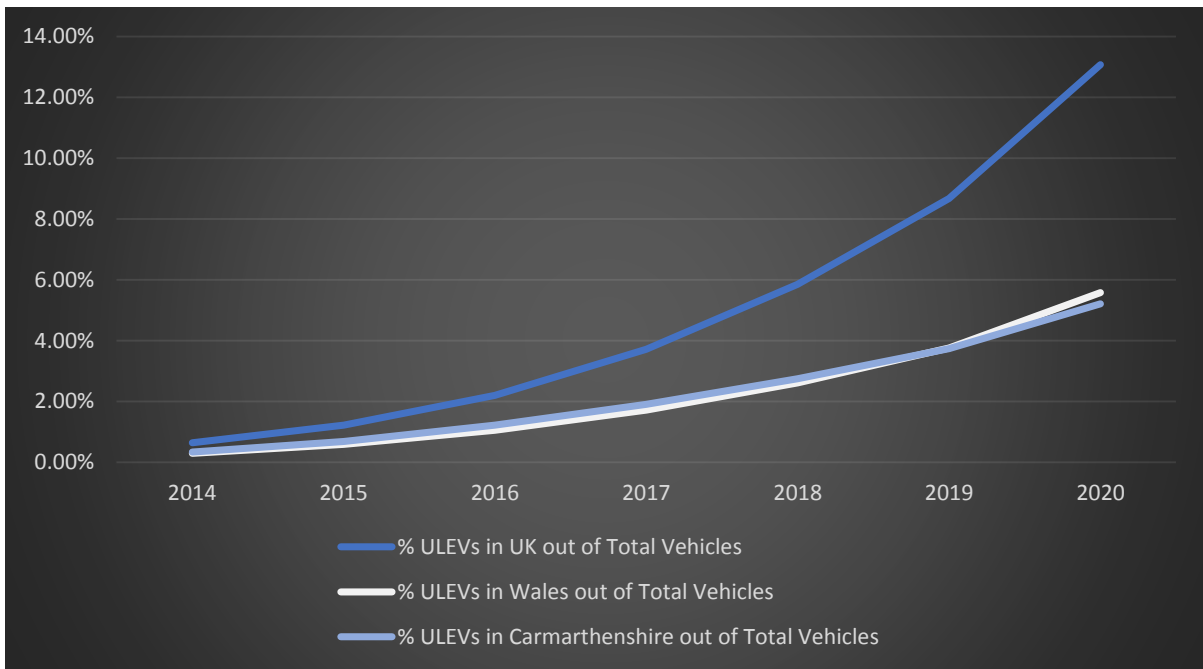


Figure 5 - % of ULEV Uptake out of Total Vehicles Registered for the UK, Wales and Carmarthenshire (2014 – 2020)

Figure 5 illustrates ULEV uptake in Carmarthenshire and in Wales from 2011 Q4 to 2020 Q4 to convey both the rate of increase and the number of ULEVs that have been registered in Carmarthenshire which contributes to the national uptake. This dataset has been presented on a cumulative basis, highlighting the total number of ULEVs by the end of each quarter whilst considering the average life span of a vehicle. For the basis of this analysis, it has been assumed that all registered ULEVs will remain within Carmarthenshire and in Wales.

By the end of 2020 Q4, the level of ULEV uptake in Carmarthenshire, cumulatively, accounted for 6% (5,852 ULEVs) of the registered ULEVs across Wales, illustrated in Figure 6 below. For context, the DfT dataset for ULEV registrations for Cardiff reveals that the capital city accounts for approximately 10% (10,211 ULEVs) of the registered ULEVs in Wales.

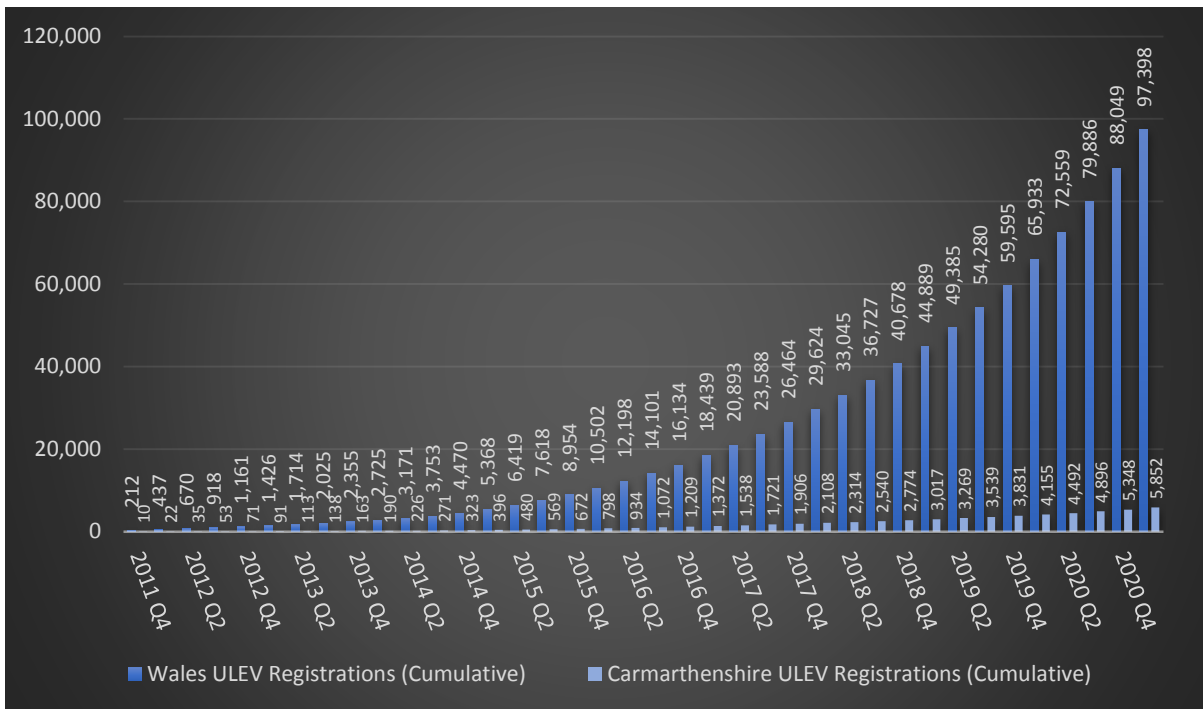


Figure 6 - ULEV Registrations for Wales and Carmarthenshire (Cumulative) (2011 Q4 – 2021 Q1)

A breakdown of ULEV registrations by BEV and PHEV has been illustrated for Carmarthenshire between 2011 Q4 and 2021 Q1, shown in Figure . Between 2011 Q4 and the end of 2014 Q1, it is shown that there were early adopters for BEVs, whilst zero presence of PHEV uptake. From 2014 Q2 to 2019 Q2, a rise in PHEV emerged, from 5 registered PHEVs to 128, respectively, for said quarter. However, following 2019 Q3, a sharper uptake of BEVs can be evidenced (129 BEVs registered in 2019 Q3 in contrast to 291 BEVs registered in 2021 Q1, an increase of 126%), a result of clear policy, market forces, funding and increase in charging infrastructure.

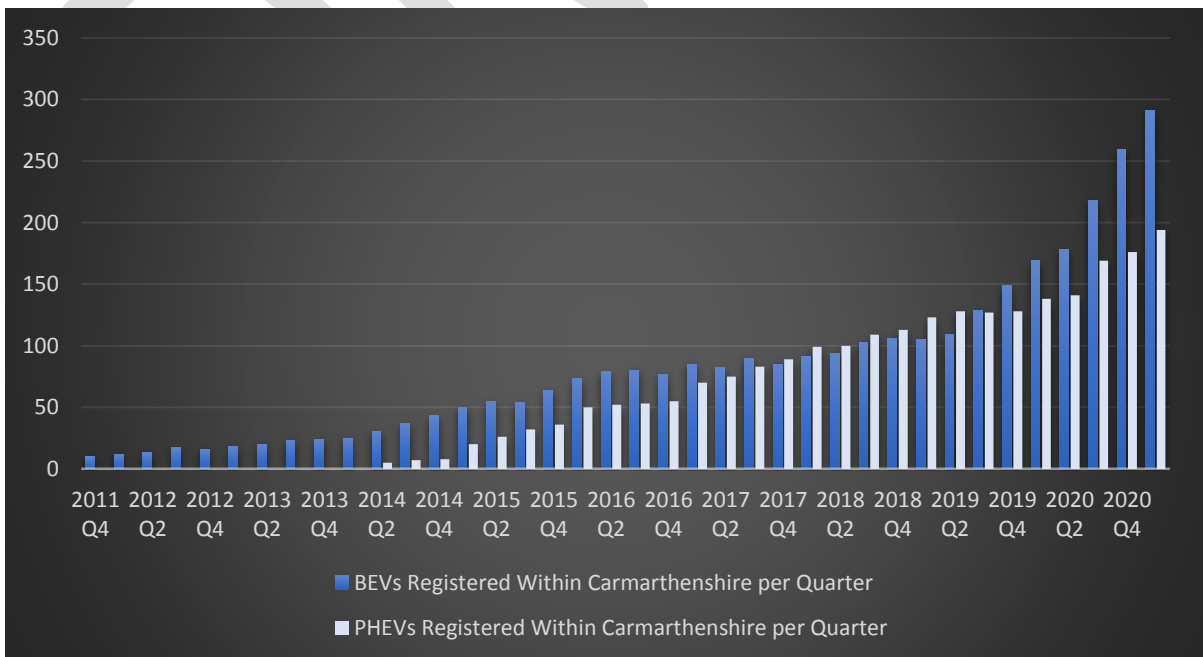


Figure 7 - BEV vs PHEV Registrations Within Carmarthenshire (2011 Q4 – 2021 Q1)

Figure highlights ULEV uptake by type within Carmarthenshire from 2011 Q4 to 2021 Q1. With regards to the data series for “% ULEV of Total Vehicle Registration”, this has been illustrated from 2012 Q3 to capture a cumulative total amount ULEV registrations which cover 4 quarters, which can then be used to take as proportion for total number of vehicles registered for 2012. Due to the granularity of total vehicle registrations (on a yearly basis) it has been assumed that each quarter the number of total vehicle registrations stay the same for that year.

The data displays progressive increase in the number of EV’s registered in the County over this time from 10 ULEV registrations by 2011 Q4, to 504 ULEV registrations by 2021, Q1.

As a percentage of total vehicle registrations, there is an increase from 0.06% in 2012 to 5% in 2020, highlighting an increase of 4.94% in terms of the proportion of total vehicles registered to be ULEV. Although total ULEVs in Carmarthenshire is shown to be a minimal 5% of total vehicle registration, it is very likely that the projections for ULEV % will increase at a rapid rate, due to charging infrastructure investment (reducing range anxiety), innovation within BEV technology, defined policy targets and increased awareness on the environmental benefits of EV adoption.

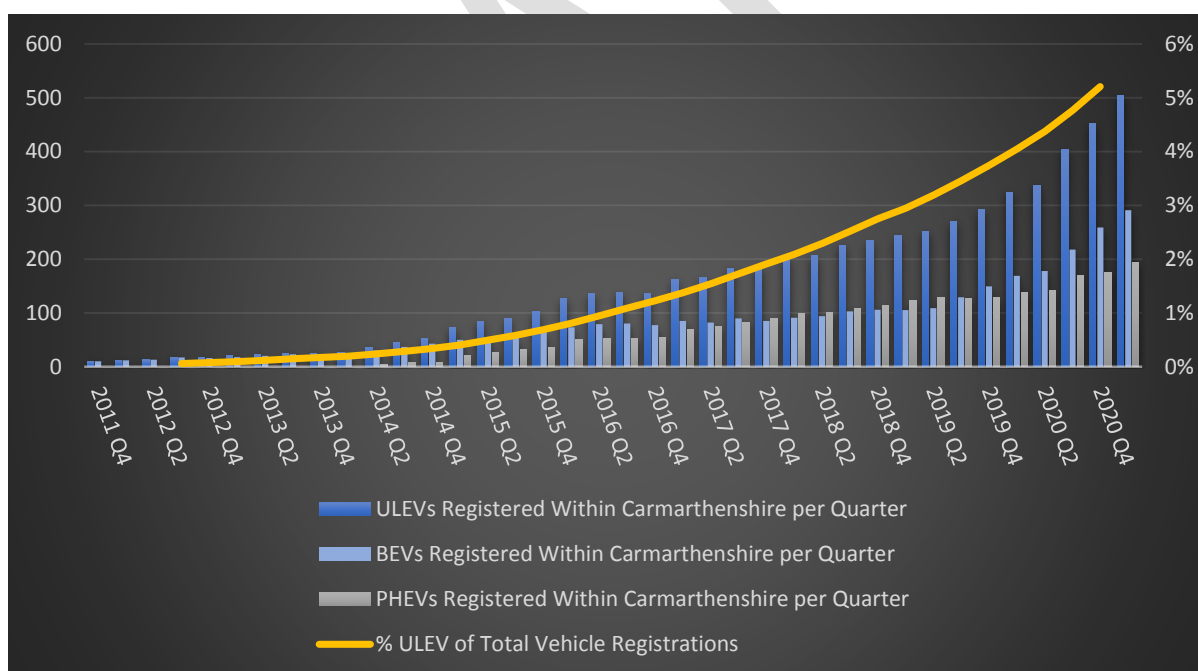


Figure 8 - ULEV Registrations by Type Within Carmarthenshire and Proportion of ULEVs in Relation to Total Vehicles Registered (2011 Q4 – 2021 Q1)

EV Charging

Whilst EVs can be charged via a normal household plug socket, charging with this method takes a long time. EVs are usually charged via dedicated charge points. There are three main EV charger types described in Table 6 below; the times given are estimates.

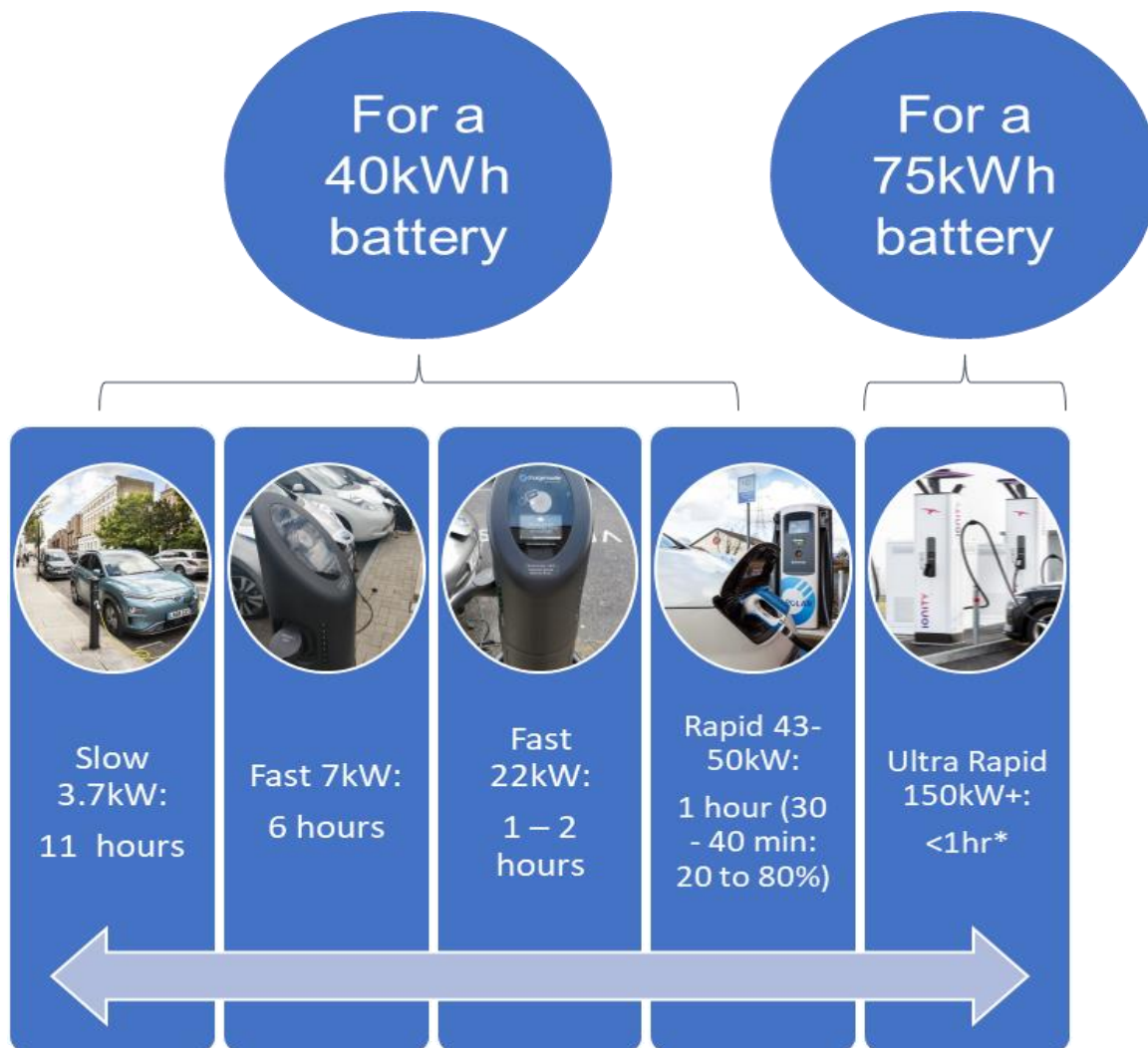
Table 6 - Charger Types and Times

Charger Type	Typical use case	Power	Typical Charging Time	Comment
Slow	Residential	3.6kW	6-12 hours	Time given is to fully charge. Slow charging is equivalent to charging via a mains socket.
Fast	Destination	7kW – 22kW	3-6 hours	Time taken to achieve a full charge.
Rapid	Destination & SRN	43kW, 50kW, 120kW	20 minutes – 1 hour	Time given is to 80% charge where the unit's power output will reduce to preserve battery life and maximise charging levels.
Ultra-Rapid	SRN	150kW	10 – 20 Minutes	Due to high current via this charging method incurs, many older vehicles cannot handle the charge due to thermal impacts on the battery, therefore this form of charging is more common in modern vehicles with larger battery capacities.

Using the power outputs stated in Table 6 this has been applied to a 40kWh battery and a 75kWh battery, shown in Figure 9 to highlight an approximate charge time based on battery size^{40 41}. The 75kWh battery has been included to showcase the charge time for an Ultra Rapid chargepoint.

⁴⁰ <https://pod-point.com/guides/driver/how-long-to-charge-an-electric-car>

⁴¹ <https://www.projectev.co.uk/ev-fast-charging-all-you-need-to-know>



*Charging time based on the Tesla Model S (2019)

Figure 9 - Charging Technology – Defined Power Output and Charging Duration (Based on a 40kWh and a 75kWh Battery)

EV Charging and the Highway Network

Data provided by Zap-map⁴² gives the total number of publicly available connectors in the UK as over 21,000 (Jan '19) across almost 7,500 different locations. This has increased from just over 13,000 connectors in November 2017. However, in Wales there are only 655 connectors.

Carmarthenshire has over 60 active chargepoints, the majority being Fast chargepoints, with a small number of Rapid chargepoints, with plans to facilitate the delivery of more. Some of these are available to any member of the public at any time, however others are only available some of the time or are for eligible customers of the charge point owner only.

CCC Corporate Strategy⁴³ describes how Carmarthenshire has the second largest highway network in Wales, covering 3,536 Kilometres, more than double the Welsh

⁴² <https://www.zap-map.com/statistics/#region>

⁴³ <https://www.carmarthenshire.gov.wales/media/1214849/corporate-strategy-18-23.pdf>

average of 1,566 Kilometres. EV charge points should be available to destination and through traffic, at specific destinations as well as for residents.

Figure below shows the location of existing publicly available EVCP infrastructure across Carmarthenshire in August 2021. Clusters are shown around the three largest towns, Carmarthen, Llanelli and Ammanford. Fast chargers are the most common, with them accounting for 51 out of 62 chargers in Carmarthenshire. Rapid chargers currently account for 5 of the EVCP's,

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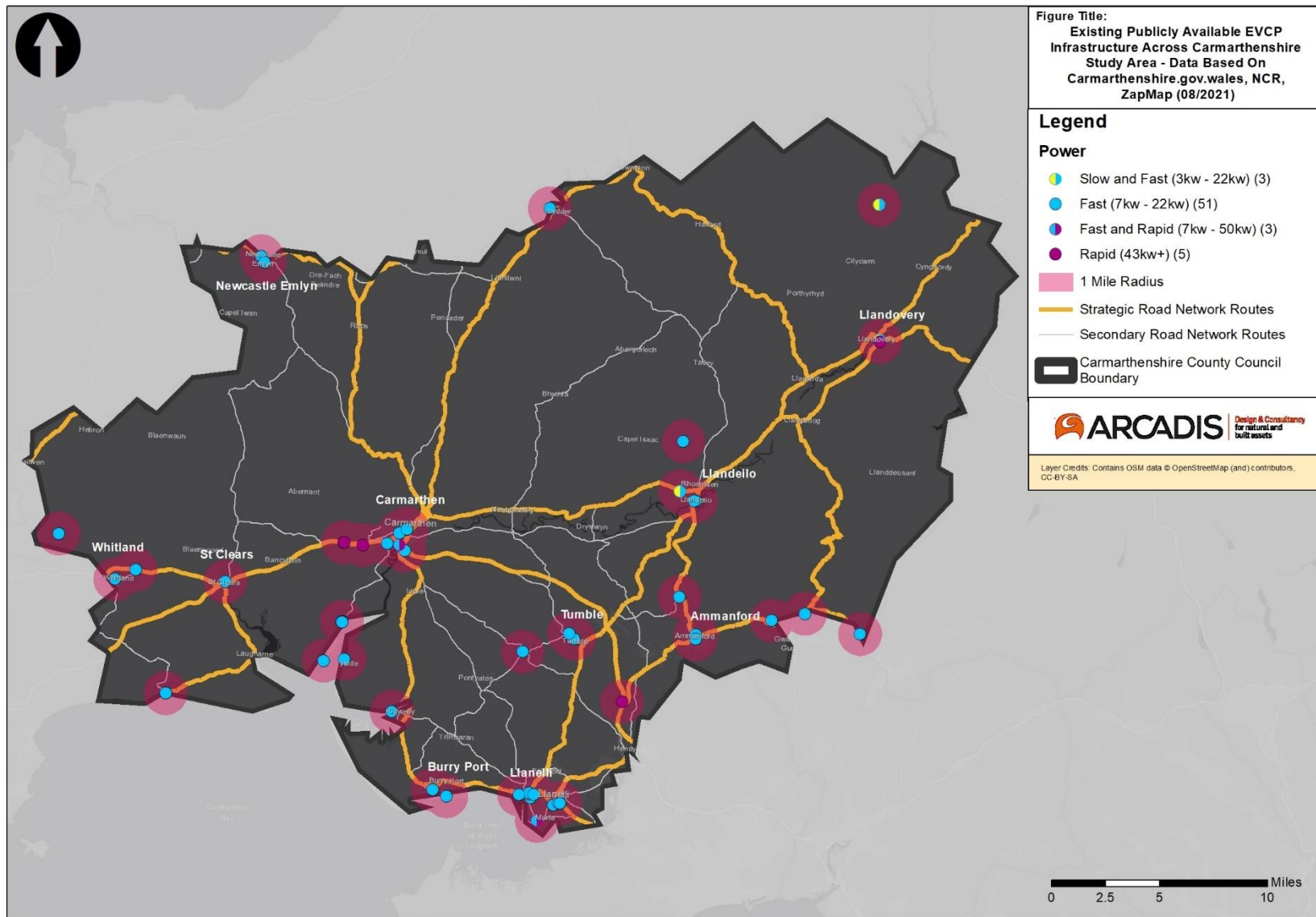


Figure 10 - Existing EVCP Infrastructure Across Carmarthenshire Study Area (08/2021)

Grid Capacity

For EVs to be charged, the delivery of power from the grid network must be in line with network capacities. This is particularly important during peak demand times which can be subjective depending on the area of EVCP operation. To assess available network capacity a nominal use case scenario was applied to each substation in the Carmarthenshire area.

Use case scenario

The selected use case scenario for Carmarthenshire simulates the implementation of Rapid EV chargers. This scenario was simulated to develop a baseline energy analysis of primary substations (33kV/11kV) and the demand headroom across the Carmarthenshire area.

The Swarco C63 ONE 43kW AC EV charger, with a power factor of 0.98 for accurate capacity analysis was used. This charger was selected as it provides a power output adequate to provide a full recharge (0% to 100%) for most EVs in little over an hour. Furthermore, this style of charging station is more cost effective than that of DC charging stations and can be integrated directly with the AC network.

The demand headroom for all primary substations was calculated based on 'Firm Capacity' and 'Measured Peak Demand' gathered via the Western Power Distribution online energy database. It should be noted that due to the usage of Firm Capacity opposed to Max Capacity/Ratings of the substations, a more general/universal analysis was conducted. However, for a more subjective analysis of individual substations in the future, the usage of Max Capacity/Ratings is advised.

Based on this baseline analysis all substations with available headroom in the Carmarthenshire area, and within 2km of the border, were evaluated and broke down into a Red, Amber, Green (RAG) categories. The RAG categories were based on the number of chargers that could be implemented within each substations connected network for this particular use case. The RAG Key can be viewed in Table 7 below.

Table 7 - RAG Key for Primary Substations

RAG Status	Number of Chargers	Infrastructure
Green	>100	No upgrades required to install over 100 rapid chargers
Amber	10-100	Upgrades required to install over 100 rapid chargers
Red	<10	Upgrades required to install over 10 rapid chargers

Analysis concluded that the Carmarthenshire grid network is currently in a healthy condition to facilitate a large uptake of EVCPs. The network at this point will require

no upgrades to primary substation capacities but may require upgrades regarding the connection of new charging sites as per the standard process. Further analysis may be conducted at distribution level (11kV/400V) to assess headroom, as and where required, for the development of EVCPs in the future at lower voltage levels for more specific site plans.

Figure presents a mapped analysis of the RAG rating and locations of all primary substations in the Carmarthenshire area with available headroom. It should be noted that when referring to the north/northeast of Carmarthenshire within the map, there may be considerably large areas that appear to be without a primary substation in close proximity. This is as these areas are particularly rural and will not rely on a large primary substation for power but will instead use secondary substations which will provide sufficient power to the area. This would however require further investigation upon delivery.

DRAFT

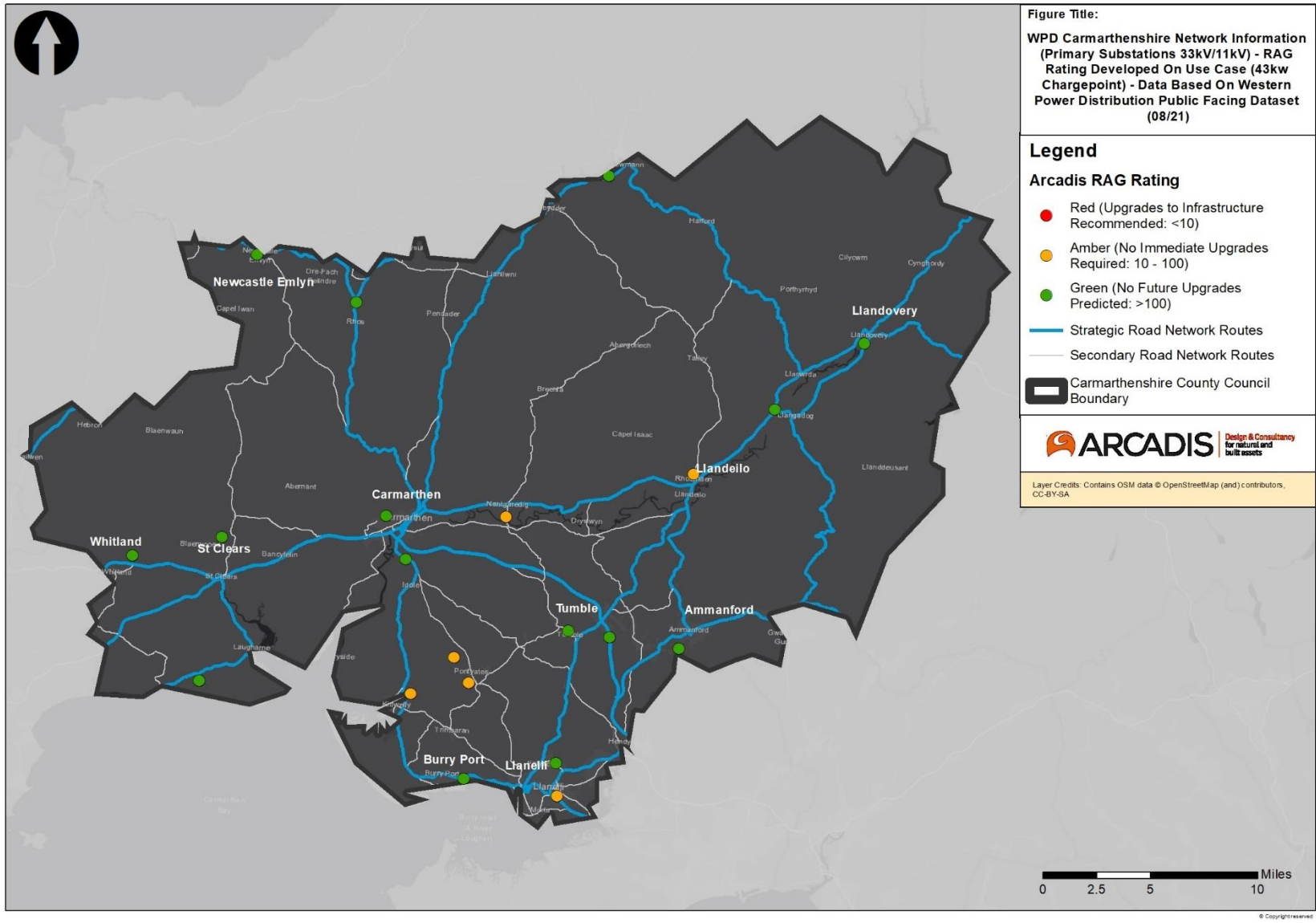


Figure 11 - RAG Assessment for Primary Substations

5. Forecasting

EV Expansion

According to the IEA report, Global EV Outlook 2018⁴⁴, sales of new electric cars worldwide surpassed 1 million units in 2017, a record volume which represents a growth in new electric car sales of 54% compared with 2016. The same report also lists how in the UK the total electric car stock (including hybrids) went from 86,440 in 2016 to 133,670 in 2017, with a UK target of 396,000 to 431,000 electric cars by 2020.

The growth in EVs is set to continue, and The Future Energy Scenarios⁴⁵ document produced by the National Grid in July 2018, predicts that in the UK there could be as many as 11 million EVs by 2030 and 36 million by 2040.

The report Roll-out of Public EV Charging Infrastructure in the EU by Transport and Environment⁴⁶ finds that “Despite the considerable emphasis on the importance placed on public recharging to drive EV acceptance, the data shows that public chargers are only used for about 5% of charging events. Furthermore, as the market matures this share is expected to decline with a preference for more fast charging over slow kerbside sites. The visibility of public recharging may however be important in encouraging existing drivers of conventional cars to switch to electric options although public chargers are rarely used.”

This reiterates evidence from trials and pilots that exposure to EVs and EV infrastructure results in an increase in uptake in EVs and EV infrastructure usage. Examples of this include EV taxis / private hire, EV rental or hire vehicles, and EV public service vehicles.

Leadership from both national and local governments is therefore vital in the strategic deployment of public chargepoints needed to facilitate and encourage the uptake of EVs.

There are a number of potential funding sources for chargepoint installation, some of which are listed in Annex G.

EVCP Forecast Modelling (EV Charging Strategy for Wales, 2021)

To develop an EVCP forecasting model that presents the trends regarding the uptake of EVCPs in Carmarthenshire, the official ‘EV Charging Strategy for Wales’ has been used to represent Carmarthenshire, which is projected to have the second largest uptake of EVCPs in all of Wales, second to that of Cardiff. A breakdown of EVCP uptake on a local authority basis for 2025 and 2030 is presented in

⁴⁴ <https://webstore.iea.org/global-ev-outlook-2018>

⁴⁵ <http://fes.nationalgrid.com/fes-document/>

⁴⁶ <https://www.transportenvironment.org/publications/roll-out-public-ev-charging-infrastructure-eu>

Figure respectively, as presented in the associated strategy. The strategy itself can be reviewed in further detail via the footer link⁴⁷.

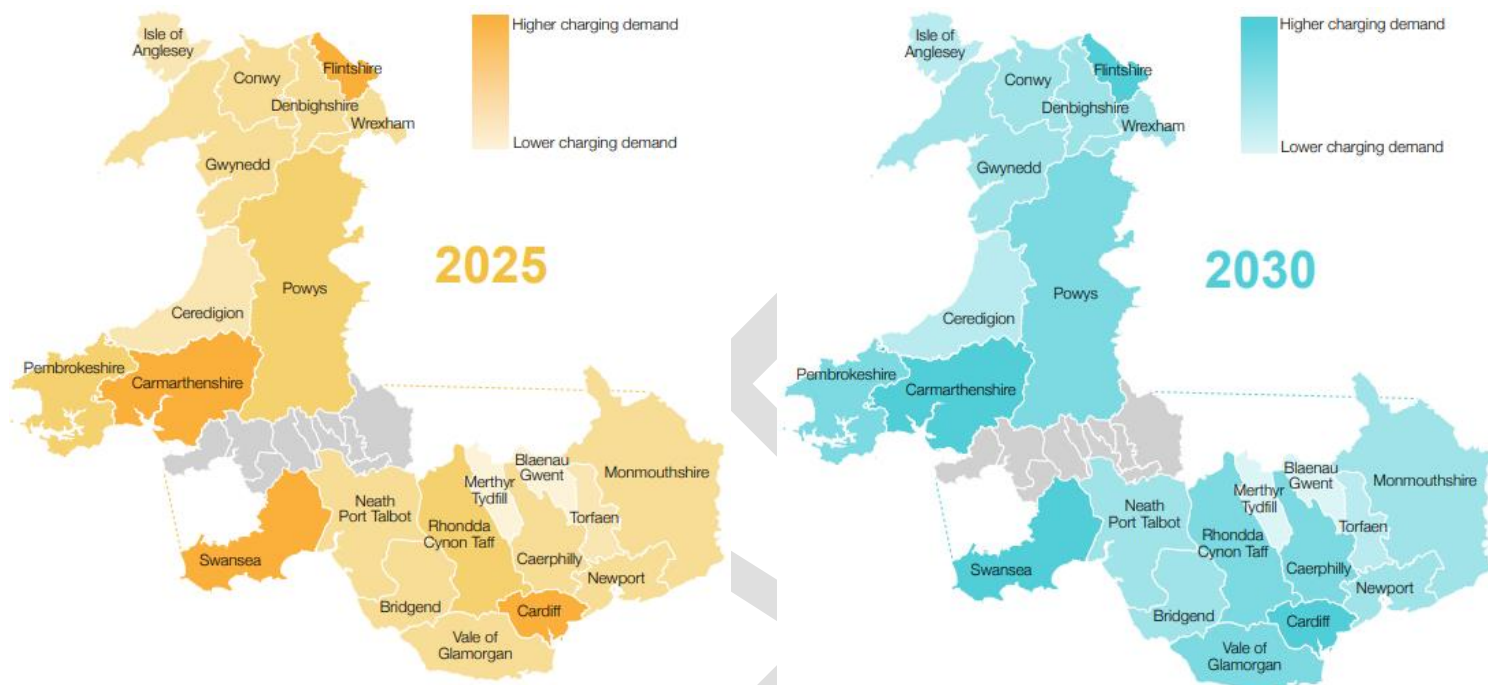


Figure 12 - Charging Demand Forecasts

The strategy itself takes 2 different approaches to modelling the increase of EVCPs. The first being ‘Fast charging dominant’ and the second being ‘Rapid charging dominant’. As charging infrastructure requirements can be heavily dependent on user behaviours and locations of deployment, these two scenarios were developed to provide a projection considerate of one method becoming more favourable than the other, whether that be financially or logistically.

It should be noted that this modelling will be reviewing publicly available EVCP and therefore domestic EVCPs will not be included.

Fast charging dominant - Based on the widespread use of fast charging measures this scenario assumes EV charging will be utilised at locations where several hours of slower charging would be appropriate such on-street hubs, workplaces or Train stations. Fast charging is less demanding on the electrical grid network and is often more cost effective.

The EVCP modelling data has been extrapolated from the Wales EV Strategy as well as current EVCP registration databases to provide a projection from now until 2030 for the uptake of a ‘Fast charging dominant’ EVCP approach. This data

⁴⁷ <https://gov.wales/sites/default/files/publications/2021-03/electric-vehicle-charging-strategy-wales.pdf>.

modelling will use key milestones of 2021, 2025 and 2030 to provide a linear output for all years in between and is presented in Figure 13 below.

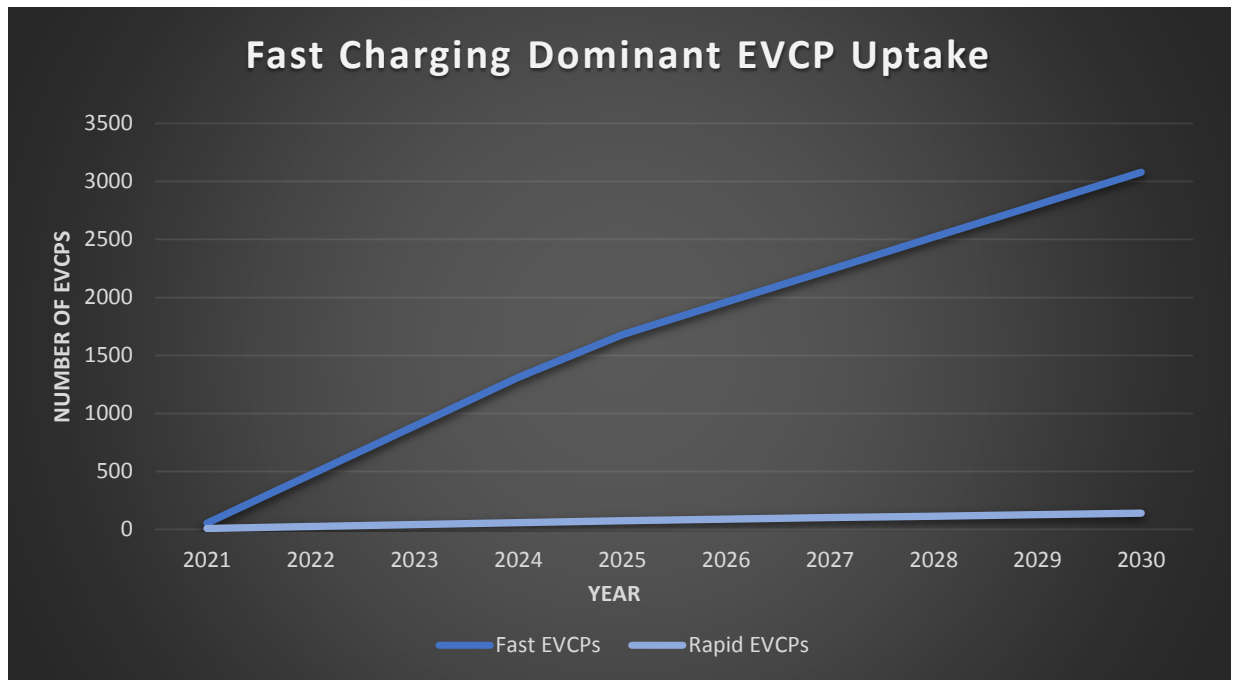


Figure 13 - Fast Charging Dominant EVCP Uptake

Rapid charging dominant – Based on the widespread use of rapid chargers. This scenario assumes that car battery capacities will continue to grow, permitting a much greater electrical range than current EVs. Along with improved battery performance and a reliable grid network this method will allow EV owners to achieve a much more convenient charge time to relieve the stresses of range anxiety and long journey breaks.

Again, the EVCP modelling data has been extrapolated from the Wales EV Strategy for the uptake of a 'Fast charging dominant' EVCP approach. This data modelling will use key milestones of 2021, 2025 and 2030 to provide a linear output for all years in between and is presented in Figure 14.

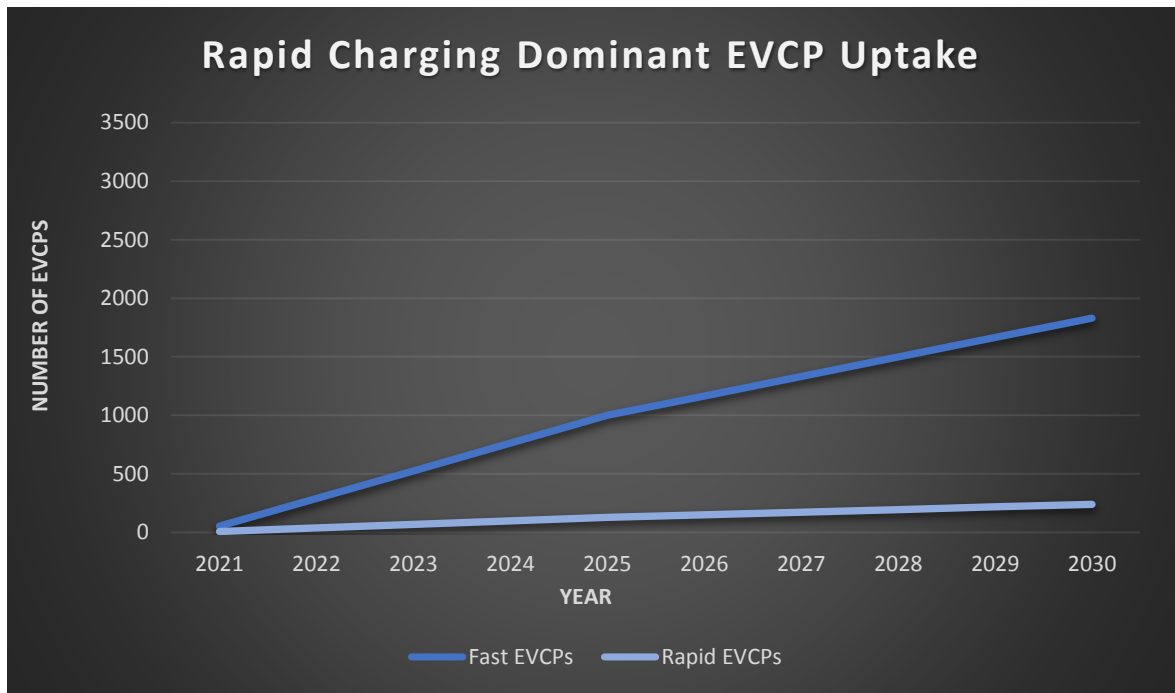


Figure 14 - Rapid Charging Dominant EVCP Uptake

To compliment the modelled EVCP uptake data for both EV charging scenarios, a side-by-side presentation of key milestone table arrays for both Fast charging dominant & Rapid charging dominant in Carmarthenshire has been presented across Table 8 & **Error! Reference source not found.** This helps clearly distinguish between both approached where 2030 targets present significant differences in projections.

It should be noted that the displayed installation targets are not a representation of CCC individual responsibility but are in fact a representation of the collective responsibility set for Carmarthenshire inclusive of private investment by Welsh Government.

Table 8 - Welsh Government Fast Dominant Scenario

Fast charging dominant EVCP uptake (Carmarthenshire Milestones)		
Year	Fast EVCPs	Rapid EVCPs
2021	54	8
2025	1680	75
2030	3080	140
Rapid charging dominant EVCP uptake (Carmarthenshire Milestones)		
Year	Fast EVCPs	Rapid EVCPs
2021	54	8
2025	1000	130
2030	1830	240

Table 9
- Welsh

Government Rapid Dominant Scenario

Future Vehicle Technology

As EV ownership continues to rise and national targets regarding the decarbonisation of transport become more accelerated, the concerns of range anxiety and recharge times become increasingly relevant. Therefore, industry professionals are constantly looking to innovate new concepts that improve the user experience with regards to EVs.

The power drawn from the grid to charge an EV will be AC. However, an EV battery itself can only store power as DC meaning somewhere along the line there must be a power conversion.

The difference between AC and DC charging is that AC charging requires power to be converted within the vehicle itself via an onboard charger, 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 provided in the infographic below.

Despite DC chargers being larger and more expensive, they can achieve much higher power levels than that of AC charging, therefore achieving a much faster charge time for users. DC charging can 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 can be referred to as Ultra-Rapid or Hyper charging where the EVCP itself can be rated anywhere from 150kW-350kW. Developments such as Hyper charging present an exciting opportunity to mitigate any issues associated with EV charging times.

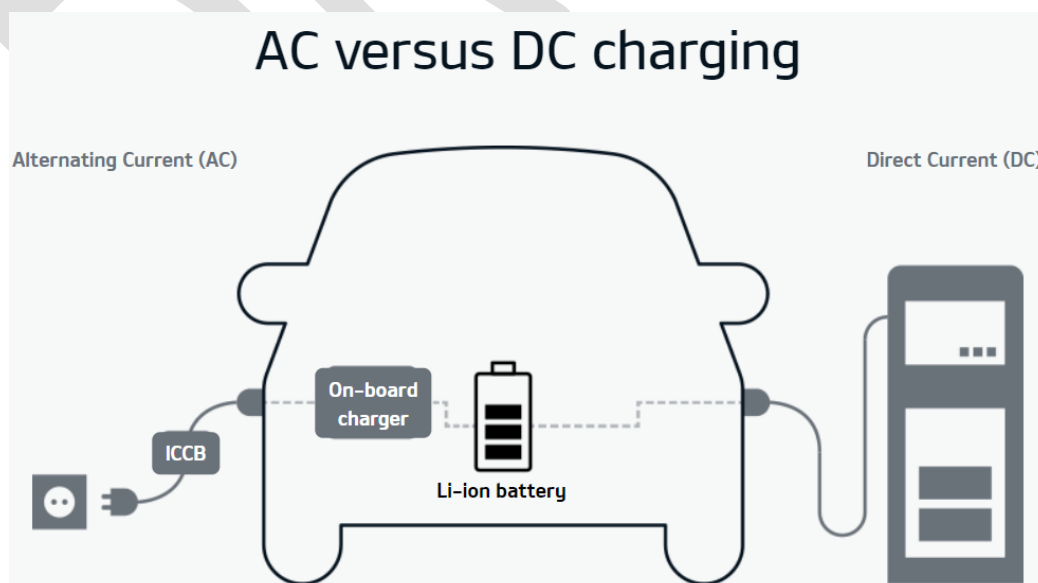


Figure 15 - AC vs DC Charging

Future Grid Demand

Carmarthenshire has 25 substations that are feasible for extra demand that will be encountered from an increase in EVCPs. This has been plotted back in the baseline chapter displaying grid capacity and a use case scenario RAG assessment.

By utilising the Welsh EV strategy forecast data for EVCP uptake for a 'Rapid charging dominant scenario' a model can be simulated to analyse the future demand headroom for each substation in line with their firm capacities. This model has been simulated for years 2021, 2025 and 2030. It should be noted that rapid charging dominant has been selected due to it being a more likely scenario to deliver charge points for Strategic Road Networks (SRN) within Carmarthenshire.

For this modelling if a substation is running over its capacity, it will gain a Red rating, if the substation is running below an available headroom of 1MVA it will gain an Amber rating and if it has over 1MVA it will gain a Green rating.

This model will incorporate domestic (5kW) charging, local fast (22kw) charging and rapid (43kW) charging to represent the most considerate and accurate forecast. It should be noted that this analysis has been evenly split across all substations and to develop a more specific and accurate analysis of each substation, more precise EV forecasting measures will be required for each community in Carmarthenshire opposed to Carmarthenshire as a whole. Furthermore only 25% of domestic EVs will be incorporated into this analysis as not all 100% will be charged at one time but some overlapping may occur due to slow charging rates.

Key Milestone results:

- **2021:** All substations can operate safely within substations firm capacity ratings. With 1 substation operating below 1MVA headroom.
- **2025:** 23 of the substations can operate safely with 2 substations forecast to be operating over substation capacity.
- **2030:** only 14 substations can operate safely with 11 substations forecast to be operating over substation capacity.

Table 10 provides a representation of the number and RAG rating of substations based on future grid demand based on the Welsh EV strategy.

Table 10 - Future Grid Capacity RAG Analysis

Future Grid Capacity RAG Analysis			
Year	Red (operating over substation capacity)	Amber (operating with below 1MVA headroom)	Green (operating with more than 1MVA headroom)
2021	0	1	24
2025	2	2	21
2030	11	5	9

Demand Mitigation Opportunities

When reviewing EVCP options CCC will consider opportunities to use innovative technologies that can sustainably aid the charging process and protect the grid. CCC

will encourage charge point suppliers to use innovative solutions to aid the EV uptake in Carmarthenshire, for example the integration of renewable energy generators such as solar PV could be used to reduce the demand that a charging location/hub would have on the grid.

Battery energy storage systems (BESS) represent another option that can be utilised at charge points where the grid may require some demand alleviation, or at points of high throughput where EV charging demand may be particularly large. This technology will allow power to be stored from onsite renewable sources or the grid network when demand is low allowing a discharge to EVs when grid demand is high, alleviating pressure on the grid network.

In addition, smart EV charging systems that control charger output in line with active infrastructure loadings will be considered, to maximise EV charging penetration levels whilst maintaining network stability.

All the above will be considered on an SRN, Destination and Residential basis when applicable.

Currently CCC is delivering a sustainable EV Charging Hub located at Cross Hands in Carmarthenshire, working with Arcadis and Swarco. This project represents not only the initiative that CCC are taking, but also the incorporation of solar panels on the roof that feed into battery back-up storage on site is one example of the measures that can be used to protect the grid network and sustainably charge EVs. This charging site is presented in



Figure 16.



Figure 16 - Cross Hands EV Charging Hub (in construction)

Vehicle to Grid (V2G)

Another innovative and exciting prospect of EVs would be their potential to aid in grid balancing.

UK distribution systems achieve frequency response by using a primary and secondary response system. This refers to low frequency events around 50Hz. During a period when the system frequency falls below 50 Hz there must be quick action taken to avoid a blackout. During a period where the frequency is over 50Hz, there must be adequate action taken to avoid the possibility of damaging supplied devices.

A principal problem with renewable power sources is their intermittency, and as we continue to move towards Net Zero, the decentralization of power systems such as solar and wind farms will continue to grow and dominate the market, thus making the issue of grid balancing vital.

Therefore, digital control within decentralised power systems is becoming more important. Integrating digital systems with technologies such as BESS provides an opportunity to harness energy and ensure that the grid remains stable during the ever-changing daily supply and demand cycle.

BESS currently requires a high capital investment for installation, due to the high manufacturing and installation costs. EVs present an alternative solution due to their ability store and release electricity during periods of low or high demand, furthermore due to the vast amount of EVs that is expected to be on the market in the future there will be enough collective battery capacity to provide this service without major influence on EV users. Therefore, grid balancing with EVs may prove to be a useful tool in the future.

Generally, the more charge and discharge cycles the EV battery goes through, the more it degrades. However, this is based on high levels of battery discharge, often more than 50%. In the case of vehicle to grid (V2G) operation, each vehicle would be subject to a discharge of a very low percentage as there would be a collective input from multiple vehicles connected to the network. This removing the concerns of battery degradation.

Alternative Fuels and Technology - Hydrogen

Hydrogen vehicles are similar in many ways to EVs and run on a motor powered by electricity. The difference between a hydrogen vehicle and a BEV is that a hydrogen vehicle uses a hydrogen fuel cell instead of a battery.

While EV charging via the electrical grid network represents some inefficiencies with the conversion from AC to DC power, the process of generating hydrogen to be used in fuel cell vehicles represents a much more complex procedure than that of connecting directly to the grid network for a BEV. The process from the generation right the way through to usage of hydrogen is relatively inefficient, and despite its ability to provide a greater range than that of BEVs these inefficiencies drive up the costs of hydrogen charging compared to electrical charging, and even when range is considered, the BEV is still considerably more favourable based on charging cost.

Despite this many manufacturers are experimenting with hydrogen vehicles as they could prove to be a great option for larger transportation vehicles such as planes, trains, and lorries. The Government has recently published a UK Hydrogen Strategy (August 2021)⁴⁸. The strategy (p53) highlights: 'hydrogen is likely to be fundamental to achieving the full decarbonisation of transport, with particular potential in areas of heavy transport 'that batteries cannot reach''. The first multi-modal hydrogen transport hub had £3 million investment committed in 2021 in Tees Valley, which it is stated could provide a blueprint for the creation of hubs in other areas across the UK⁴⁹.

However, EVs continue to see much faster growth and are currently the more widely adopted low emission vehicle of the two. As such, this strategy focuses on EVs, however the national policy position will be kept under review and the inclusion of hydrogen vehicles in more detail will be considered for future versions of Carmarthenshire County Councils EV Strategy.

⁴⁸https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011283/UK-Hydrogen-Strategy_web.pdf

⁴⁹ P175 Decarbonising transport - A Better, Greener Britain
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009448/decarbonising-transport-a-better-greener-britain.pdf

6. Recommendations

Introduction

Recommendations have been brought forward in this section of this EV Strategy, with the objective to outline options for funding sources, the approach to procurement and operating models.

Policy objectives have been recommended based on the development and findings of this EV Strategy thus far, in the efforts to accommodate and/or accelerate EV uptake in the region and achieves Carmarthenshire's overarching vision.

Applicable Funding Sources

The recent government publications analysed in section two of this strategy⁵⁰ provide an update of funding scheme commitments, grants and incentives available regarding EVs and the associated infrastructure:

Infrastructure

On-street Charging

- The On-Street Residential Chargepoint Scheme provides local authorities access to up to 75% of funding to install EV infrastructure on-street and in public car parks.
 - From April 2021 the scheme has changed to address prohibitively high electrical connection costs by increasing the maximum funding available per chargepoint installation from £7,500 to £13,000. The funding will also help to encourage larger rollouts of charging infrastructure projects by removing the £100,000 maximum project cap.

Off-street Charging

- For properties with dedicated off-street parking, the EV Homecharge Scheme will provide funding towards the cost of a chargepoint and its installation. From April 2022, focus will shift to supporting leaseholders, renters and those living in flats.
- The Government will continue to fund EVHS until at least 2024/25.

Workplace Charging

- Workplace Charging Scheme (WCS) The Workplace Charging Scheme will provide funding towards the cost of the purchase and installation of EV chargepoints at workplaces. Since April 2021, the scheme has been opened up to small and medium enterprises (SMEs), as well as the charity sector, providing a boost as staff return to work. B&Bs will be eligible for the grant to provide visitors with certainty that they will be able to charge when they visit.

⁵⁰ 'Decarbonising transport - A Better, Greener Britain' and 'HM Transitioning to zero emission cars and vans: 2035 delivery plan'

- The Government will continue to fund the WCS until at least 2024/25

Vehicle Grants/Tax incentives

- £582 million for plug-in car, van, taxi, and motorcycle grants until 2022-23, reducing Zero Emission Vehicle (ZEV) purchase prices for consumers.
 - Plug-in car grant provides up to £2,500 towards the purchase of a car priced under £35,000.
 - Plug-in van grant provides funding of 35% of the purchase price for eligible vans up to £3,000 for vans less than 2.5 tonnes, and up to £6,000 for vans between 2.5 and 3.5 tonnes.
- Favourable company car tax rates for zero emission cars up to at least March 2025, zero emission cars and electric vans pay no vehicle excise duty, and a nil rate of tax is applied to zero emission vans within the van benefit charge.

Supply Chain

- £1bn to build EV supply chain at pace and scale in the UK. (First £500m delivered through Automotive Transformation Fund over next 4 years (battery cell manufacturing and gigafactories).

Research and Development

- Faraday Battery Challenge (FBC) is a £330 million programme designed to create the innovation ecosystem needed for the UK to become a battery science superpower.
- 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 and net zero – power electronics, electric motors, generators and drives (PEMD). Funding is committed to support this initiative until at least 2025.

Procurement and Operating Models

There are a wide range of potential operating models due to the complex roles in procurement, installation, operation and maintenance of EV chargepoints. Due to commercial agreements, contractual terms and available incentives, there is a great number of bespoke operating models in existence, but some typical and common operating models and their advantages and disadvantages are explained below.

When procuring EV charging infrastructure up to £25,000, 3 quotes must be sought from companies. Any charging units with a total life cost of over £25,000 are procured via a tendering process through Sell2Wales. This includes all rapid chargers and fast charger packages covering a number of sites.

Table 11 - Typical Models of EVCP Operation

	LA Operated	Private Agreement	Private Licensed	Private Operated
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Land costs	LA	LA	LA	Private
EVCP Infra	LA	LA	Private	Private
Installation	LA	LA	Private	Private
Maintenance	LA	Private	Private	Private
Operation/	LA	Private	Private	Private
Revenue	LA	Mixed	Mixed	Private

There are currently 2 operating models implemented by Carmarthenshire County Council:

LA Operated

Purchase, installation and operation of the charging units by the local authority. This can be via grant funding or internal CCC funds. Currently in use on the St Peters and Mart Car Park chargers.

Advantages:

- All income generated will come straight back to the council;
- Charging units remain an asset of the council;
- Free to move chargers around to other sites if necessary;
- Flexibility in charging;

Disadvantages:

- After initial period maintenance and monitoring costs must be absorbed by the Council.
- As technology develops the units may require upgrading – full cost for this to be absorbed by the council.

Private Licensed

Agreement with a company to provide and maintain units as a service to the public. Currently in use on the Nant y Ci and Llandovery Rapid Chargers.

Advantages:

- No initial cost or need to find/secure funding;
- No ongoing cost or risk to the Council;
- All maintenance, upgrade and monitoring covered by the external company.

Disadvantages:

- Any profits must be split between third party and the Council;

Other Operating Models

There are a range of alternative operating models not currently utilised by Carmarthenshire County Council which include, but are not limited to:

- Private Agreement - If new charging points were to be installed by local authorities on local authority land, private operators could be used to maintain and / or operate the EVCPs, with a fee paid to the operator, or a shared revenue risk model to offset any future costs to the local authority. Grant funding could be sourced to offset the initial cost, but it is likely there would still be DNO costs and installation costs;
- Private Operated - If the charging points were purchased, installed, and operated by a private operator, there would be no initial capital cost for a local authority in terms of procurement and installation of the infrastructure, or operating costs in terms of maintenance. Grant funding could be sourced to help encourage private operators to install further EVCPs, possibly through a match funding agreement;
- Using development control or planning permission requirements to encourage private operator funded EV chargepoint installation.

Proposed Policies

Following the review of current National, Regional and Local policies on EV's, a series of policy objectives have been developed which will assist us in achieving our overarching Vision:

“To develop and promote a network of electric charging points, that provides for and encourages future growth in EV use, and in doing so future proofs our transport network and contributes to local and global pollution reductions”

The policy options have been considered for implementation in Carmarthenshire to accommodate or accelerate EV uptake in the region. These options have been generated and considered based on achievability, benefit, and risk.

EV1 Facilitate the Provision and Delivery of Public EV Charge Points

Carmarthenshire County Council will facilitate the provision of a charging network that provides mixed speed public charging infrastructure which is available, affordable, consistent, convenient and user friendly.

Carmarthenshire Council will investigate strategic locations throughout the county for fast and rapid charge points and identify zones where charge point installation should be particularly encouraged. The Council will consider the speed of charging for each location considered, providing a range of Fast and Rapid chargers as appropriate.

The EV chargers should primarily be placed in locations that are accessible to the majority to ensure good uptake. At the same time, the council will work with rural communities to ensure that less-populated rural areas are not excluded from EV use by lack of infrastructure and will seek to identify funding sources for charge points in more remote areas where the private sector may be less likely to install. The Council

will monitor usage statistics of charge points and use this in informing future decisions and strategy.

Funding contributions will be required from a range of contributors, including private sector investment for new development, property owners for planning applications, UK Government and Welsh Government and Carmarthenshire County Council. The quantum from each is yet to be understood, and will be dependant on locations, delivery options (including chargepoint type) and demand timescales.

Different areas of the County will have different needs with regards to EV charge points, but consideration needs to be given to public charge points in the following environments:

1. Locations near the strategic road network, with at least a pair of rapid and a fast charger at least every 20 miles.
2. Destination chargers for tourist, leisure, and shopping venues.
3. Shared carparks and other locations to encourage people without off-road parking to use EVs.
4. Employment centres.
5. Air Quality Management Areas.

Carmarthenshire County Council will also investigate the possibility of lamppost chargers and other solutions such as rising chargers within the footway to encourage use of EVs amongst residents without off-street parking.

EV2 Maintain Parking Management Policies Supportive of EVs

Carmarthenshire County Council will, where appropriate, provide electric charging facilities and spaces in parking bays at council owned car parks. Installations have already been completed at several council owned car parks as of September 2021 fast charge points are installed at 28 locations across the county. In addition, there are rapid charge points at the Park & Ride car park at Nant-y-Ci and Castle Car Park in Llandovery. The Cross Hands charging hub is due to be opened imminently and will provide a further 4 rapid chargers (50kW) and 1 super rapid (150kW) on the strategic road network.

The council has had positive feedback on the installation of the current charge points, with one EV owner saying that they would not have visited Carmarthen had there not been EV charging facilities available.

EV3 Encourage EV Charge Points at Key Employment Centres, and Public Transport Interchanges.

Carmarthenshire County Council will seek to put out a tender to EV charge point providers for facilities at their main staff car parks. Some of these car parks act as council employee parking during the week and public parking at weekends, giving an additional benefit. They will also investigate available grant funding to install EV charge points at destinations used for leisure purposes.

Carmarthenshire County Council will also seek to encourage and facilitate EV parking at other employment centres, by providing information to employers about EVs, and pass any enquires about EVs onto the relevant organisations.

EV4 Encourage the Use of EVs in the Fleet

Carmarthenshire County Council will investigate opportunities to upgrade its fleet to EVs and other similar technologies such as hydrogen. The Council are developing a fleet strategy in 2022. A successful trial has already been undertaken involving the introduction of EVs in the council's fleet, with six vehicles based at Parc Myrddin Parc Dewi Sant and Spilman Street– two Mitsubishi iMIEVs and four Peugeot IONs. This initiative took place when Public Body use of EV's was in its infancy and saw Carmarthenshire become the first Local Authority in Wales to do so.

Carmarthenshire County Council are currently reviewing their fleet strategy in terms of introducing EVs into the fleet, changing the mix of technologies and will pilot the use of further EVs in the fleet, and will also seek to install EV chargepoints in their depots. The Council will also investigate training for staff so that more work on the EVs in the fleet can be done in house.

EV5 Trial New Technologies and Encourage Innovation

When looking at EV options for their fleet Carmarthenshire County Council will consider opportunities to use innovative technologies. The Council will also encourage charge point suppliers to use innovative solutions, for example integration with renewable energy generators or batteries at charge points where the grid is lacking capacity

EV6 Investigate ways to Encourage Charge Point Provision through the Planning Process

Carmarthenshire County Council will seek to support the inclusion of EV charging points within developments they permit. Planning Policy Wales 10 states that the planning system should encourage and support the provision of ULEV charging points as part of new development and suggests that planning authorities should seek a minimum of 10% of car parking spaces to have ULEV charging points. Carmarthenshire County Council will review ways in which to proactively encourage and facilitate the provision of EV charge point as part of the emerging Local Development Plan and other planning policy, and the draft Highways Design Guide for developers.

EV7 Investigate incentives for Private Developers and Landowners to Provide Charge Points on Existing Developments and explore the potential for the use of S106 contributions.

Carmarthenshire County Council will research possible incentives to encourage the installation of publicly available charge points on private land. They will investigate the precedent from other Local Authorities and discuss with relevant departments the applicability to Carmarthen. This is likely to be via the South West Wales Regional EV Network meetings and can also be used to review available grant and other

funding opportunities that can aid in identifying and providing information to landowners about funding options.

EV8 Encourage Taxis and Public Transport Providers to Upgrade to EVs

Taxi firms are well placed to benefit from the use of EVs. Taxis based at urban centres are likely to be undertaking mostly shorter journeys and would be more suitable to switch to vehicles that run solely on electricity, with hybrids being better suited to firms or vehicles undertaking longer trips to rural areas.

Carmarthenshire County Councils licensing team have already exempted EVs from the 1200cc minimum size vehicle for private hire, and the Council will investigate other mechanisms to encourage EV use amongst Carmarthenshire's taxi companies. The Council will send out appropriate information about EVs to all taxi companies on their register and seek to facilitate the installation of EV charge points at taxi ranks. This information could include estimates of cost savings on fuel and maintenance, and where possible cite examples from other taxi firms that have converted to EVs, see case study below.

Case Study: 'AJ's Taxis' EV Fleet Transition, Llanelli

The achievability and benefits for taxi firms to transition to full EVs within Carmarthenshire has been long standing. This is evidenced by an exemplar case study located within Llanelli, whereby a taxi firm had been declared the first taxi firm in Wales to go fully electric and successfully operates as being eco-friendly. This highlights the case for change to EV is achievable and can incur numerous commercial and environmental benefits.

EV9 Provide Publicly Available Information About EV Charging Options

Carmarthenshire County Council will provide easily accessible information with regards the charging infrastructure available within the county so that both locals and visitors with EVs are confident in finding a place to charge. There is a map showing charge points on the Council's website⁵¹ and this map will be developed further with further information such as charger type and pricing structure labelled.

Signage will be placed near charge points to assist vehicle owners in finding them. Public facing communication will be provided where suitable to direct residents and visitors to the Council's website where further information can be accessed for those looking to upgrade to EVs.

EV10 Inform Businesses and Residents about opportunities to upgrade to EVs and develop a comms plan to support the EV Infrastructure Strategy.

Carmarthenshire County Council will investigate other ways to encourage EV use, for example organising clear air day events and EV supplier days. The council will

⁵¹ <https://www.carmarthenshire.gov.wales/home/council-services/travel-roads-parking/electric-car-charging-points/#.W03wVE2ouUk>

seek to utilise existing community links and knowledge within the third sector, such as Carmarthenshire Energy Ltd and the Community Transport Association.

EV11 Encourage Electric Car Clubs

Carmarthenshire County Councils Corporate Strategy⁵² outlines how 60% of the County's people live in rural areas, and that many residents, particularly elderly ones, do not have access to a car or van. The strategy states "community-based services are important to enable people to continue to live within their communities; it can mean the difference between a person staying independent at home or entering residential care."

Additionally, the document 'A Strategic Regeneration Plan for Carmarthenshire 2015'⁵³ highlights the limited penetration and frequency of service of public transport provision in parts of rural Carmarthenshire seeks to "invest further in the application of new technologies to ensure that our local businesses are able to compete in wider market" as well as highlighting the importance of "access to rural transport".

Electric car clubs could be used to help to meet these goals when integrated with the public transport sector, to strengthen rural communities and allow elderly and vulnerable residents to remain independent.

Carmarthenshire County Council will support communities who wish to consider setting up electric car clubs and will refer any enquiries they get onto relevant bodies. The council will also lend support to organisations promoting electric car clubs. They will also include details of existing EV car clubs and similar schemes such as the Eco Travel Network⁵⁴ in the information they provide to business and residents in the area. This type of initiative could encourage more low carbon tourism to the area, for example visitors arriving by public transport and having access to EVs whilst staying.

EV12 Work in Partnership with Other Organisations

Many of the publicly available chargepoints in the UK are not owned by the landowner of the site they are located on, but are owned by another organisation, typically a private sector company, who pay the supply and installation costs of the charge points and either take a percentage of the income or pay a lease to the landowner. This allows landowners who lack the capital or who do not want to take the financial investment of a charge point installation.

Carmarthenshire County Council will work with these organisations in identifying sites suitable for charge points on council owned land and tendering for installation. The Council will also seek to provide information on charge points and reputable installers to local business. The Council will work with community groups and other

⁵² <https://www.carmarthenshire.gov.wales/media/1214849/corporate-strategy-18-23.pdf>

⁵³ <https://www.carmarthenshire.gov.wales/media/1212060/strategic-regeneration-plan-for-carmarthenshire-2015-2030-pdf.pdf>

⁵⁴ <http://www.ecotravelnetwork.co.uk/>

not for profit organisations in supporting the development of community owned charging hubs in the county.

The cost of installing EV charge points can vary considerably depending on the capacity of the electrical distribution network in the area. When considering charge point locations Carmarthenshire County Council will liaise with Western Power Distribution (DNO) to ensure costs and grid availability are taken into consideration.

Carmarthenshire County Council will also seek to work with neighbouring local authorities on promoting EV use and the strategic deployment of charge points, to develop a coherent consistent approach across the Swansea Bay City Region and in doing so realise potential economies of scale in terms of procurement and contract arrangements.

Setting up a “Carmarthenshire EV Centre of Excellence” will be considered with the inclusion of academics, local authority representatives, private EVCP operators, vehicle manufacturers and EV strategy consultants. This would enable open discussion, knowledge share, lessons learnt and exchange of best practice between key stakeholders, with the objective to improve the rollout of EVCP infrastructure and its operational use. This proposed policy will be further explored and investigated.

EV13 Continually Review and Refresh This Strategy.

The market for low emission vehicles is changing rapidly, and many of the policies outlined here may need revision as the technologies develop. As such, Carmarthenshire County Council will need to keep this strategy under regular review with a periodic strategy refresh undertaken depending on any major changes in policy or availability of funding.

The table below summarises the policies and actions:

Table 12 - Summary of Proposed Policies

Policy	Action
EV1	Facilitate the Provision and Delivery of Public EV Charge Points
EV2	Maintain Parking Management Policies Supportive of EVs
EV3	Encourage EV Charge Points at Key Employment Centres, and transport interchanges.
EV4	Encourage the Use of EVs in the Fleet
EV5	Trial New Technologies and Encourage Innovation
EV6	Investigate ways to Encourage Charge Point Provision through the Planning Process
EV7	EV7 - Investigate incentives for Private Developers and Landowners to Provide Charge Points on Existing Developments and explore the potential for the use of S106 contributions.
EV8	Encourage Taxis and Public Transport Providers to Upgrade to EVs
EV9	Provide Publicly Available Information About EV Charging Options

EV10	EV10 - Inform Businesses and Residents about opportunities to upgrade to EVs and develop a comms plan to support the EV Infrastructure Strategy.
EV11	Encourage Electric Car Clubs EV
EV12	Work in Partnership with Other Organisations
EV13	Continually Review and Refresh This Strategy

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7. Measuring Success

Carmarthenshire County Council are committed to their vision of developing and promoting a network of electric charging points that provides for and encourages future growth in EV use, and in doing so future proofs the transport network and contributes to local and global pollution reductions. Recognising the importance of self-accountability and delivering to timescales stated, the following milestone objective programme has been created based on 5 and 10-year time-periods. Typically, a 15-year time-period would also be included, but there is now unlikely to be targets or ambitions after a 10-year period due to Welsh and UK Government bringing targets dates forward to 2030.

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5-year Milestone Objectives

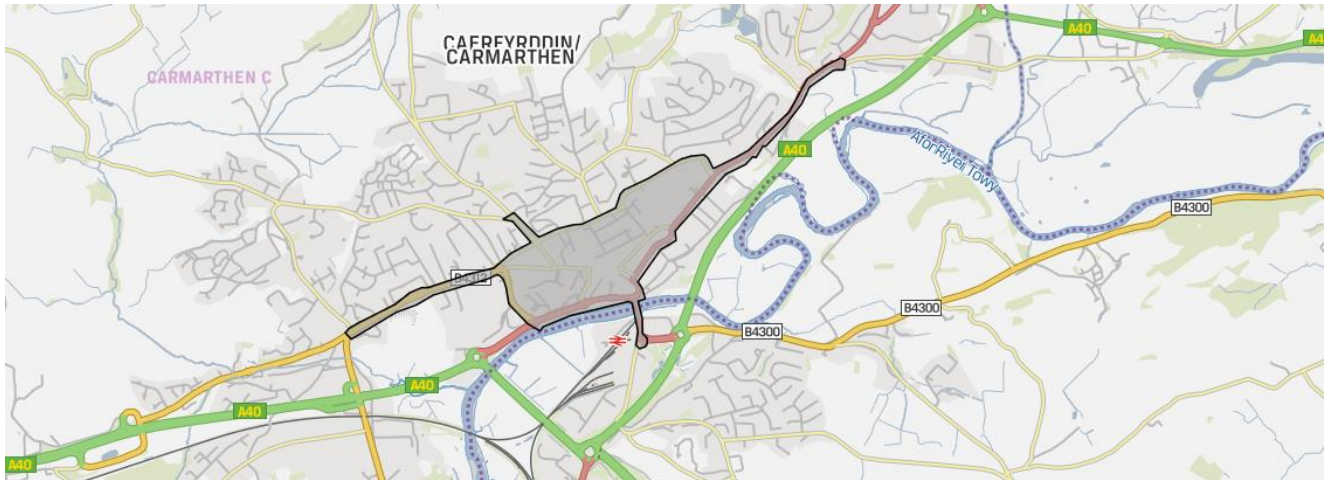
Milestone (KPI)	Measure	Timescale	Driver	Source/Reference
Facilitate EVCP provision in line with WG forecasts (not just CCC installations)	Fast EVCPs – between 1000 and 1680 available Rapid EVCPs – between 75 and 130 available	By 2025	EV Charging Strategy for Wales – Requirement for Carmarthenshire	EV Charging Strategy for Wales
Review and refresh this strategy every 3 years	Document and associated documents updated within 3 years	Before the end of 2024	Requirement to keep strategy and policy relevant and appropriate.	Carmarthenshire County Council EV Charging Infrastructure Strategy
Investigate and encourage development of car club within Carmarthenshire with a significant EV fleet	Car club with EV vehicles in operation		Facilitate EV uptake through public procurement	Carmarthenshire County Council EV Charging Infrastructure Strategy

10-year Milestone Objectives

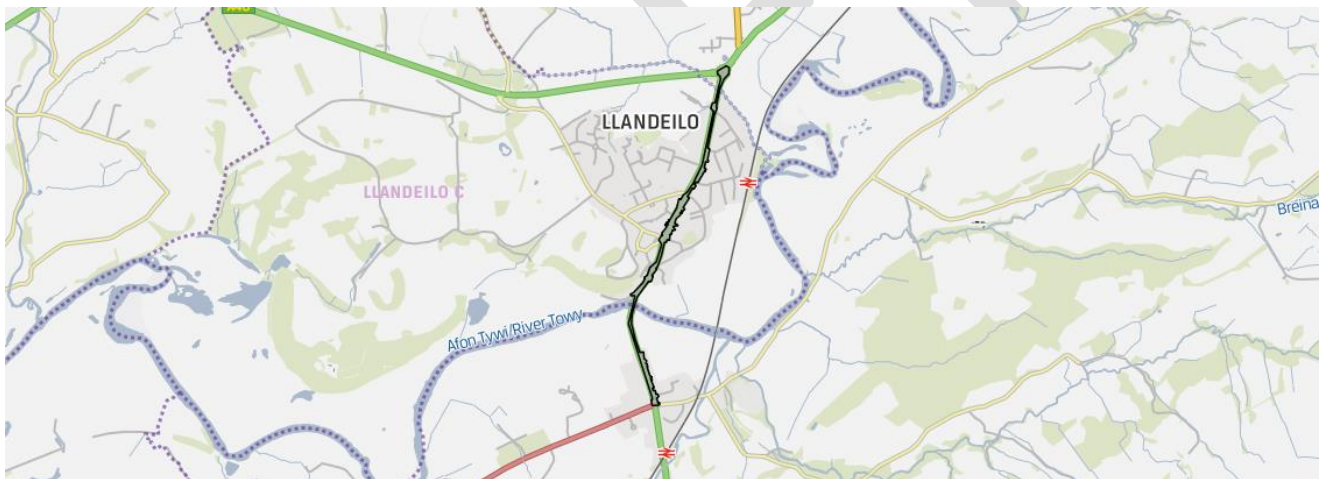
Milestone (KPI)	Measure	Timescale	Driver	Source/Reference
Facilitate EVCP provision in line with WG forecasts (not just CCC installations)	Fast EVCPs – between 1830 and 3080 available Rapid EVCPs – between 140 and 240 available	By 2030	Welsh Government EVCP requirements for Carmarthenshire	EV Charging Strategy for Wales
Carmarthenshire County Council to be net zero carbon local authority.	Greenhouse gas emissions net zero across fleet.	2030	Welsh Public Sector net zero greenhouse gas emissions by 2030	Net zero carbon status by 2030: A route map for decarbonisation across the Welsh public sector
Established car club within Carmarthenshire with whole EV fleet	Car club with all EV vehicles in operation		Facilitate EV uptake through public procurement	Carmarthenshire County Council EV Charging Infrastructure Strategy

Annex A – Air Quality Management Areas

Carmarthen



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