



Cyngor Sir
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County Council

Ceredigion County Council ULEV Strategy and Action Plan

March 2022
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Abbreviated Key Terms

CCC	Ceredigion County Council
EV	Electric Vehicle
ULEV	Ultra Low Emission Vehicle
ICE	Internal Combustion Engine
EVCP	Electric Vehicle Charge Point
DNO	Distribution Network Operator
CPO	Charge Point Operator
ICE	Internal Combustion Engine
WPD	Western Power Distribution
SPEN	Scottish Power Energy Network

EXECUTIVE SUMMARY

Overview

WSP have been commissioned on behalf of Ceredigion County Council (CCC) through the South West & Mid Wales Engineering Services Framework to prepare a Countywide Ultra Low Emission Vehicle (ULEV) Strategy and associated Action Plan.

This report presents the analysis undertaken, recommendations, and an action plan.

1. **Baselining – Registrations and Charge Points**
2. **Background – Research and Review**
3. **Electricity Baselining – Grid Constraints**
4. **Delivery – Models and Funding Opportunities**
5. **Wider Context – Policy Review and Stakeholder Engagement**
6. **Forecasting Demand and Charging Requirements**
7. **Summary – Conclusion and Recommendations**

Baselining

The number of ULEVs in Ceredigion has been growing steadily over the past five years. Currently, 0.56% of vehicles registered in the County are ULEVs – this equates to 300 vehicles. Of these 300, 118 are Plug-In Hybrid Vehicles and 174 are Battery Electric Vehicles. There is only a small variation in the uptake of EVs across Ceredigion.

There are currently 45 public Electric Vehicle Chargepoints in Ceredigion, which means there are 61.7 per 100,000 people. This is higher than the Welsh average

(33.3 per 100,000 people).

Background

The report looks at the different types of chargers available to Ceredigion and the different location types. Most drivers of EVs will seek out areas with chargers, so it is important that areas are well equipped.

Looking at the future of mobility is important and we consider how transport and movement will change as we go forward. This is considered with a specific Ceredigion lens, including looking into EV uptake and tourism in the region with specific jobs that may come for an area like Ceredigion as a result of the changes.

Electricity Baselining

Looking into the electricity capacity in the region, there appears to be a reasonable amount of demand headroom capacity available at both the primary and secondary substations in the region, though this can change rapidly even from the time of writing this report. This is a high level summary and further investigation may be warranted.

Delivery

There are a range of funding opportunities available in Ceredigion:

- Fund for Wales
- On-street Residential ChargePoint Scheme
- Workplace Charging Scheme (WCS)
- Office for Low Emission Vehicles Grant

It is worth considering Public-Private Partnerships to keep the public cost of the chargers down.

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Wider Context

Key findings of reviews of relevant policies were:

- There will need to be around 8,000 chargers in Ceredigion in 2025 and around 24,000 in 2030 (inclusive of domestic charging).
- The Welsh Government will support operational, technological and digital innovations to encourage people to switch to more sustainable modes.
- Increasing use of sustainable transport to improve people's well-being
- Local Authorities need to play a major role in delivering:
 - Charging infrastructure
 - A Welsh Quality Standard for charging
 - Facilitating infrastructure Deliver
 - Increasing awareness of the needs of transport decarbonisation
- There will be £620m of funding allocated for zero emission vehicle grants.
- To achieve the vision for Mid-Wales there needs to be an acceleration to net zero transport and a harnessing of innovation to support clean growth
- The Ceredigion local wellbeing plan has the following aims
 - Enable Communities to become more prosperous
 - Creating environmentally responsible communities
 - Supporting physical and mental health

- Ceredigion fleets produced 1,674 tonnes of greenhouse gases in 2019/20 and will need to reduce diesel usage by around 72,000 litres every year to be net zero by 2030.

CCC Stakeholder interviews raised the following key points:

- CCC's strategy regarding EVs is strongly linked to the Welsh Government strategy.
- Lack of charging in the region is causing a bit of a "chicken and egg scenario" for people considering EVs.
- Covid-19 has created a unique and challenging scenario regarding understanding people's behaviours.
- Any operator who installs EVCPs should also maintain them.
- The topography of Ceredigion means that EVs are not always suitable for many people in the region.

Forecasting demand

WSP's in-house EV:Ready tool was used to derive forecasts for future EV uptake. EV:Ready enables sophisticated EV uptake forecasting and scenario testing. It generates granular forecasts to a neighbourhood level, accounting for highly localised spatial variations in the key determinants of EV uptake rates, including consumer profiles, socio-demographics, the availability of off-street parking, vehicle ownership and vehicle sales.

The tool estimates that by 2025, around 5% of vehicles will be EVs (around 2,735) and 30% by 2030 (around 17,250). Areas around the Urban Service Centres are likely to have a greater percentage of EVs.

Low, mid, and high forecasts for EVCPs is provided. The findings show that Ceredigion will need at least 87 and as many as 225 publicly available chargers and between 198 and 700. However, these forecasts don't take into account a growth in tourism, which will need a separate piece of work (see action plan).

EXECUTIVE SUMMARY

There will be likely gaps in provision, particularly in rural areas so this provision will need to be picked up by the public sector. Over the next 10 years, we forecast that the public sector will be responsible for fewer and fewer publicly available chargers, from 80% now down to around 40% in 2030. The mid range estimates are that Ceredigion will need to provide an additional 67 chargers by 2025 and 89 by 2030.

Recommendations and Action Plan

The report came up with the following recommendations:

- Accelerate charge point deployment to promote EV uptake.
- Build on the existing network deployments, focusing on establishing good charge point coverage and plugging gaps.
- Promotional activities and awareness raising.
- Deliver a Ceredigion specific solution.
- Take a pragmatic approach over trailing across footways.
- Make the most of available funding opportunities.
- Let the private sector take the strain and carry the risk where possible.
- Take a balanced approach to delivering charging infrastructure, inviting private investment but retaining control.
- Monitor new developments.
- Seek opportunities for hydrogen.
- Address issues of social equity.
- Build on community links.

EXECUTIVE SUMMARY

The Action Plan can be found at the end of this report, but the key tasks are:

- Increase charge point deployment in line with recommendations detailed.
- Continue to meet regularly as the Ceredigion ULEV Steering Group.
- Continually ensuring delivery of a Ceredigion specific solution.
- Engage with tourist boards Discover Ceredigion and Visit Wales as well as local attractions to understand their plans/ambitions for charge point installation and how CCC can support this.
- Join up conversations with neighbouring authorities.
- Refinement and better promote the online site for Ceredigion residents to submit EV charge point requests/feedback.
- Run a digitally based campaign such as setting up a webpage or running a series of social media posts.
- Establish a core specification for charge points and develop a guidance document for how Ceredigion want charge points to be delivered.
- Improved mechanism for communicating information and contacts to groups such as community action and local businesses.
- Seek to prepare applications for available funding.
- Monitor changes to building regulations in Wales.
- Decarbonise the Ceredigion owned fleet as the vehicles come up for renewal.
- Host a series of promotional events or a pop-up EV experience centre.
- Develop and run a public needs and perceptions survey.
- Continue to monitor the stance of Welsh Government and neighbouring local authorities on trailing charging cables across footways.
- Identify opportunities for Ceredigion to take part in funded hydrogen pilot schemes.
- Encourage Ceredigion staff to switch to electric vehicles.
- Undertake a small scale trial, informed by the findings from the public perceptions survey.



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Introduction

Strategy Background and Objectives



PROJECT SCOPE

This study was undertaken in distinct stages, reported in the sections summarised below. Following this, the concluding section provides recommendations and outlines considerations for the future of ULEVs in Ceredigion.

Background – Research & Review

Current EV Registrations: Data on current EV ownership locally was obtained from the Department of Transport (DfT).

Charge Point Technologies: A desktop review was conducted on the range of available charge point types and chargers (three-pin plug, type 1 or 2 connector), the three types of EV charging (rapid, fast, slow) and charging location types (Home-based, workplace, destination, intermediate) throughout Wales.

Future Proofing: Present and future trends in EV ownership, user attitudes, and the impact of COVID-19 were analysed through the lens of Future:Ready to understand how mobility will evolve throughout Ceredigion.

EV Uptake and Green Tourism: Drawing on information from Greenpeace UK's Cambridge Econometrics report and the Mid Wales Regional Tourism Strategy, links between EV growth and factors such as economic prosperity and green tourism are analysed.

Electricity Baseline – Grid Constraints

Grid Constraints Mapping: A desktop review was undertaken to show the constraints on the electricity grid throughout Ceredigion and Wales for providing adequate power to facilitate a widespread shift to ULEVs.

Delivery – Models and Funding Opportunities

Review of Delivery Models and Funding Opportunities: This section reviews past sources of funding for public charge points currently installed in Wales and identifies potential funding for further development of EV infrastructure.

Wider Context – Policy Review and Stakeholder Engagement

Policy Review: A review of existing key documents was undertaken to summarise existing commitments and stated objectives, including the All Wales Plan 2021-25 Working Together to Reach Net Zero, the EV Charging Strategy for Wales and the Net Zero Strategy.

Stakeholder Engagement: Internal CCC technical stakeholders were consulted to gain an understanding for their requirements and preferences in terms of EV charging provision.

Grey Fleet Review: A review was conducted on the current type of vehicles constituting the Welsh Grey Fleet, existing considerations in moving towards electrification of the grey fleet, and recommendations on how to put this in place.

Forecasting – Demand and Charging Requirements

EV Uptake Forecasting: A range of forecasts for uptake of EVs were developed using WSP's EV:Ready tool.

Impact of Covid-19: the short and long term effects of the pandemic on EV uptake throughout the UK are analysed.

Conclusion, Recommendations and Action Plan

TRAVEL HIERARCHIES

Considering Other Modes

Any design of new schemes needs to consider the travel hierarchies of users. While this report is focussed on Electric Vehicles, there are other modes that should be considered as well. Simply switching from ICE vehicles to EVs, would not solve issues around congestion or public health.

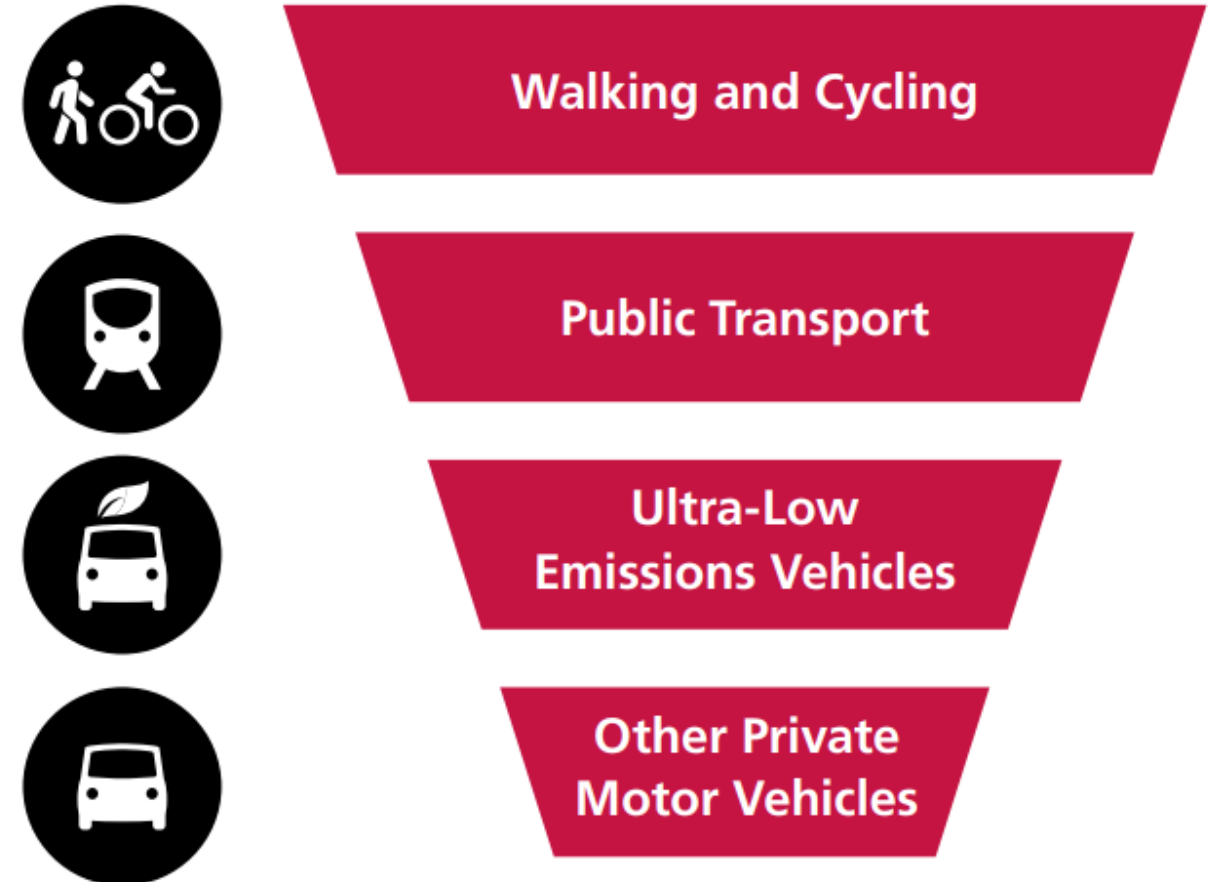
“Llwybr Newydd: The Wales Transport Strategy 2021” uses the hierarchy shown in Figure 2. Considering first walking and cycling, then public transport, before ULEVs. We could also consider emerging forms of micro mobility and shared mobility in this hierarchy along with public transport and active travel.

This road user hierarchy demonstrates lower to higher carbon production moving from the top down, as well as a demonstration from the most sustainable down to the least sustainable modes of transport. Lastly, it could also be used as a proxy for the modes of travel that improve wellbeing of the people of Ceredigion through lower emissions, quieter roads, and more healthy residents.

It should also be recognised that “digital modes” could be considered at the top of the diagram. Giving people the ability to not travel when they do not need to is a positive way to encourage greener behaviour. Ensuring everyone has access to high quality internet can help decrease carbon emissions from transport.

With this hierarchy in mind, it is therefore important that we recognise that a ULEV strategy is complementary to the work being done across Ceredigion County Council. Each is a piece of the puzzle to help the Council deal with the climate emergency.

Figure 2: The Wales Transport Strategy 2021 travel hierarchies.



Llwybr Newydd: The Wales Transport Strategy 2021(Pg 19)
https://gov.wales/sites/default/files/publications/2021-03/llwybr-newydd-wales-transport-strategy-2021-full-strategy_0.pdf



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Baselining

Registrations and Charge Points



CURRENT EV REGISTRATIONS

Summary

As of 2021 Q3, Ceredigion had a total of **300** registered ultra low emission vehicles (ULEVs). Of these, **58% (174)** are battery electric vehicles (BEVs) and **39% (118)** are plug-in hybrid electric vehicles (PHEVs). The remaining **3%** are unknown.

Figure 3 shows the increase in total ULEV registrations in Ceredigion from 2016 to 2021. Between Q1 2016 and Q2 2018, registrations were steadily increasing, rising from 22 to 51. After this, the registrations rose by **275%**, from **80** in Q1 2019 to **300** in Q3 2021.

There has been no notable change in the number of EV registrations in Ceredigion throughout the Covid-19 pandemic.

Figure 3: Ceredigion ULEV registrations at the end of the quarter, since 2017 Q1.

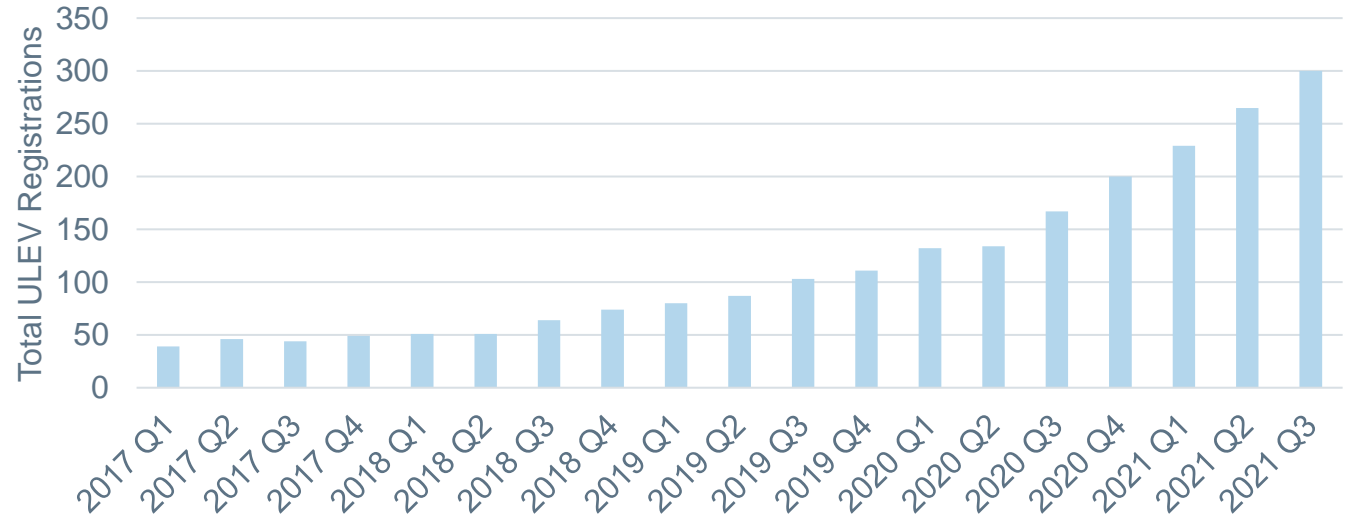


Table 1: National and Regional EV registration comparison as of 2021 Q3.

Location	BEVs	PHEV	Total ULEVs	Total Vehicles	% of Total vehicles that are ULEV
UK	348,816	272,996	644,818	39,800,900	1.62%
Wales	7,578	4,894	12,887	1,962,300	0.66%
Ceredigion	174	118	300	53,100	0.56%
Gwynedd	254	151	414	79,900	0.52%
Powys	359	227	619	109,500	0.57%
Carmarthenshire	423	239	682	134,100	0.51%

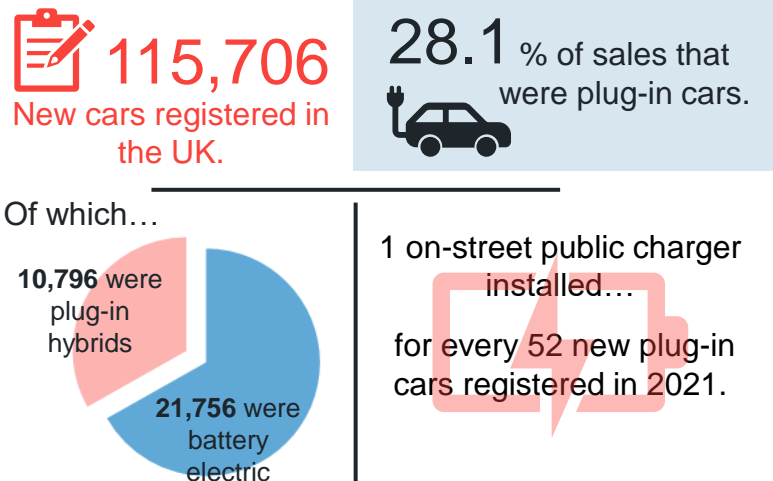
Table 1 compares the total number of EV registrations in Ceredigion with regional and national levels. A total of **644,818** ULEVs were registered in the UK as of 2021 Q3, **12,887** of these are in Wales. Table 1 also shows the number of registered vehicles depending on the type: BEVs, PHEVs and total ULEVs. The percentage of total vehicles that are registered ULEV in Ceredigion (**0.56%**) is below that of Wales (**0.66%**), but above nearby counties Gwynedd and Carmarthenshire.

RECENT TRENDS

Impact of COVID-19

The Covid-19 pandemic has resulted in seismic shifts in the transport sector. Whilst total sales of new vehicles fell significantly in comparison to pre-pandemic levels, the percentage of these sales that were EVs has rapidly increased.

According to research by SMMT (November 2021):



In April 2020, the UK Government reduced the benefit-in-kind tax rate for company EV cars to **0%** (due to rise to 1% in 2021/22, 2% in 2022/23, and being held at 2% up to 2024/25). It is widely expected that this will increase demand for EVs from those entitled to a company vehicle. Apart from financial incentives, the non-financial incentives such as free parking, permission to drive in bus lanes, and accessing areas cut-off from normal vehicles will again spur the increased demand of EVs.

Figure 4: shows the registrations of new cars by propulsion type, with % change between November 2021 to November 2020. It also shows the changes in % of market share.

	2021	2020	% change	Mkt share -21	Mkt share -20
Diesel	5,939	15,925	-62.7%	5.1%	14.0%
MHEV diesel	5,179	4,719	9.7%	4.5%	4.1%
Petrol	50,073	55,855	-10.4%	43.3%	49.1%
MHEV petrol	12,369	12,104	2.2%	10.7%	10.6%
BEV	21,726	10,345	110.0%	18.8%	9.1%
PHEV	10,796	7,727	39.7%	9.3%	6.8%
HEV	9,624	7,106	35.4%	8.3%	6.2%
TOTAL	115,706	113,781	1.7%		

Figure 5: shows the registrations of new cars by propulsion type, with % change between YTD (January to November) 2021 to YTD in 2020. It also shows the changes in % of market share.

	YTD 2021	YTD 2020	% change	Mkt share -21	Mkt share -20
Diesel	130,572	245,959	-46.9%	8.5%	16.4%
MHEV diesel	94,852	55,199	71.8%	6.2%	3.7%
Petrol	720,055	845,467	-14.8%	46.8%	56.4%
MHEV petrol	185,310	105,550	75.6%	12.0%	7.0%
BEV	163,022	86,291	88.9%	10.6%	5.8%
PHEV	106,218	58,004	83.1%	6.9%	3.9%
HEV	138,556	101,912	36.0%	9.0%	6.8%
TOTAL	1,538,585	1,498,382	2.7%		

CURRENT EV REGISTRATIONS

Distribution of EV Registrations in Ceredigion

Of the 300 EVs currently registered in Ceredigion, the following maps (Figures 6, 7 and 8) show ownership by postcode district, based on information published by Department for Transport.

At a district level there is not a great deal of variation between the different postcode districts. There would be greater differences if we were to investigate at a lower level, however, that data is not available to us.

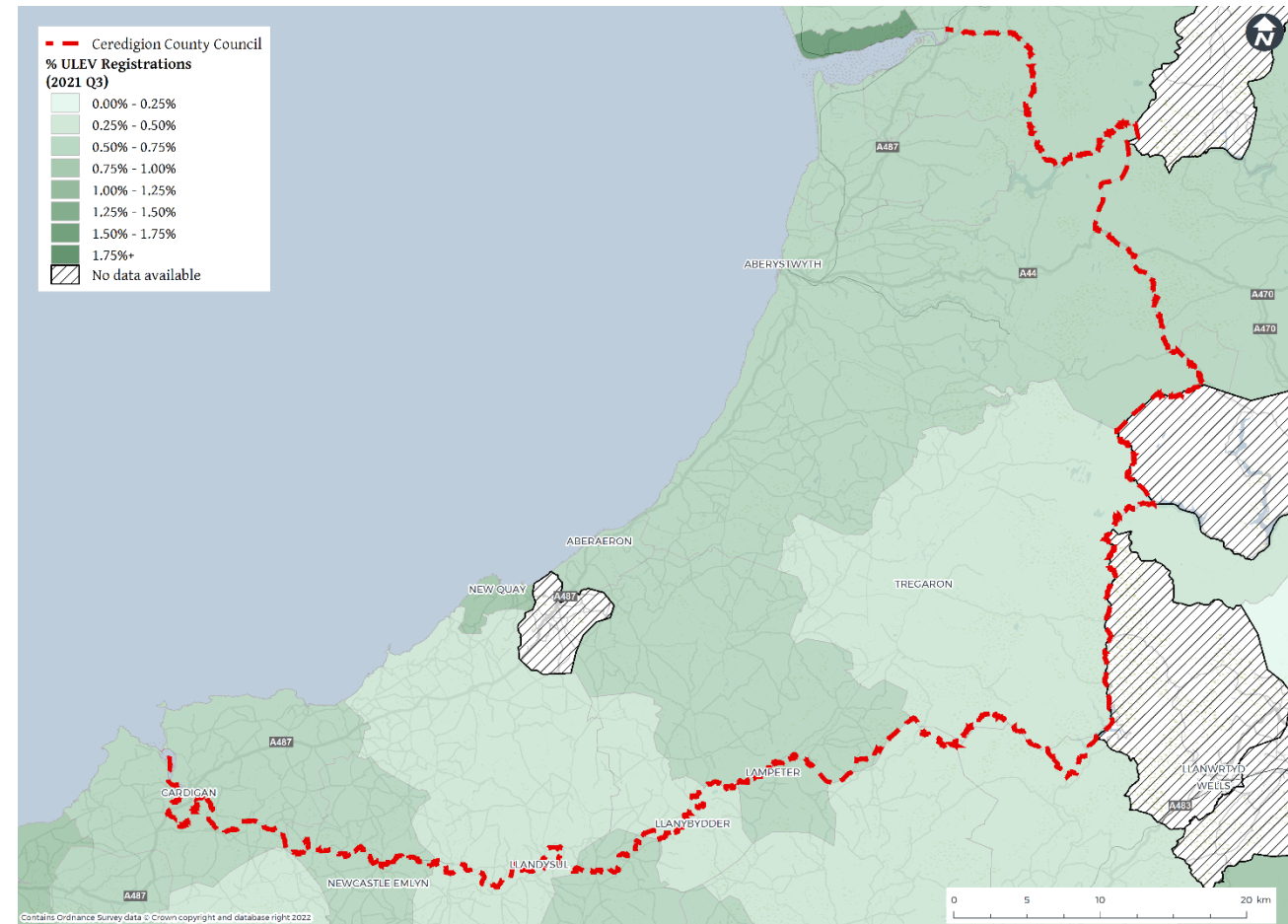
The area around Tregaron and between Cardigan and New Quay appear to have the lowest levels of ULEV ownership.

Table 2 shows that from 2016 to 2019, the percentage of EV ownership in Ceredigion exceeded the rate across Wales.

Table 2: National EV uptake comparison at the end of each year, since 2016.

		2016	2017	2018	2019	2020	2021 Q3
Wales	EV Ownership	2,033	2,876	3,951	5,315	8,163	12,887
	%Change	41.5	37.4	34.5	53.6	57.9	n/a
Ceredigion	EV Ownership	33	49	74	111	200	300
	% Change	48.5	51.0	50.0	80.2	50.0	n/a

Figure 6: ULEV ownership in Ceredigion and neighbouring local authorities by postcode district.



CURRENT EV REGISTRATIONS

Distribution of EV Registrations in Ceredigion

Figure 7: BEV ownership in Ceredigion and neighbouring local authorities by postcode district.

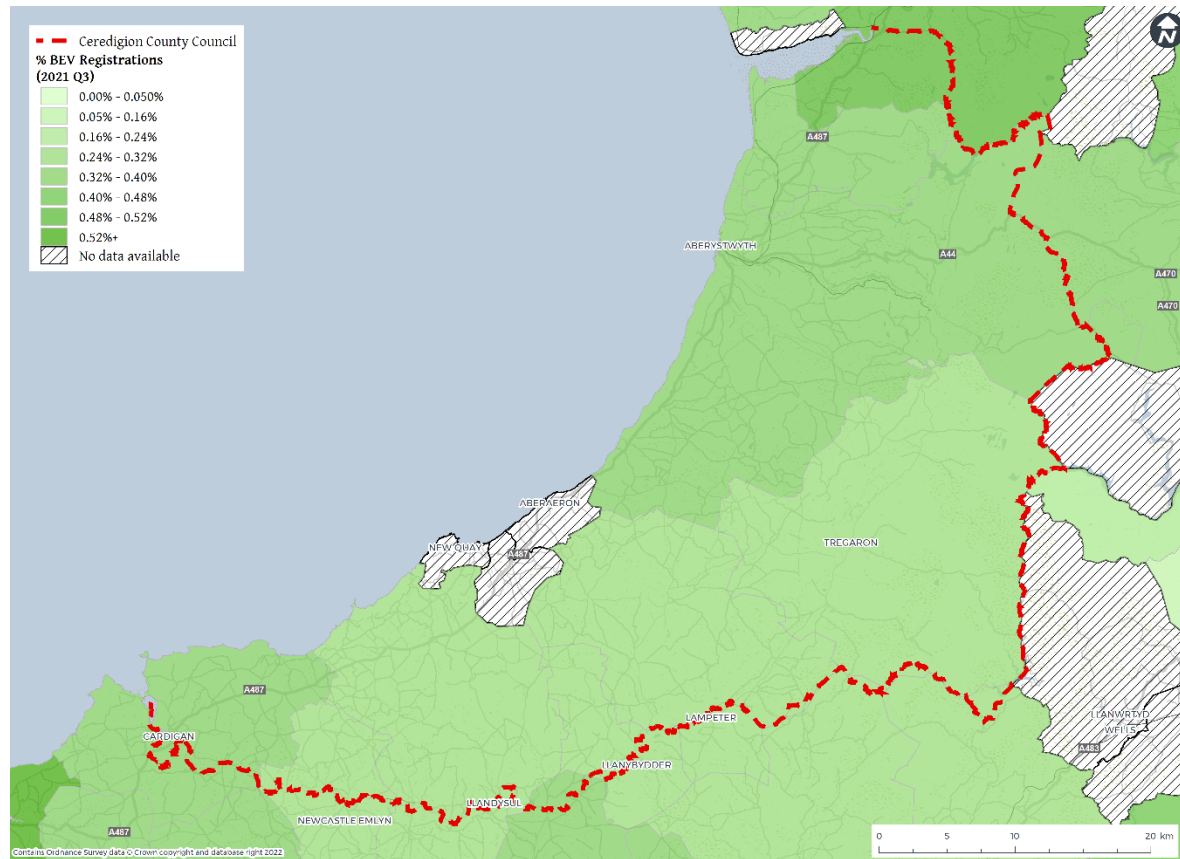
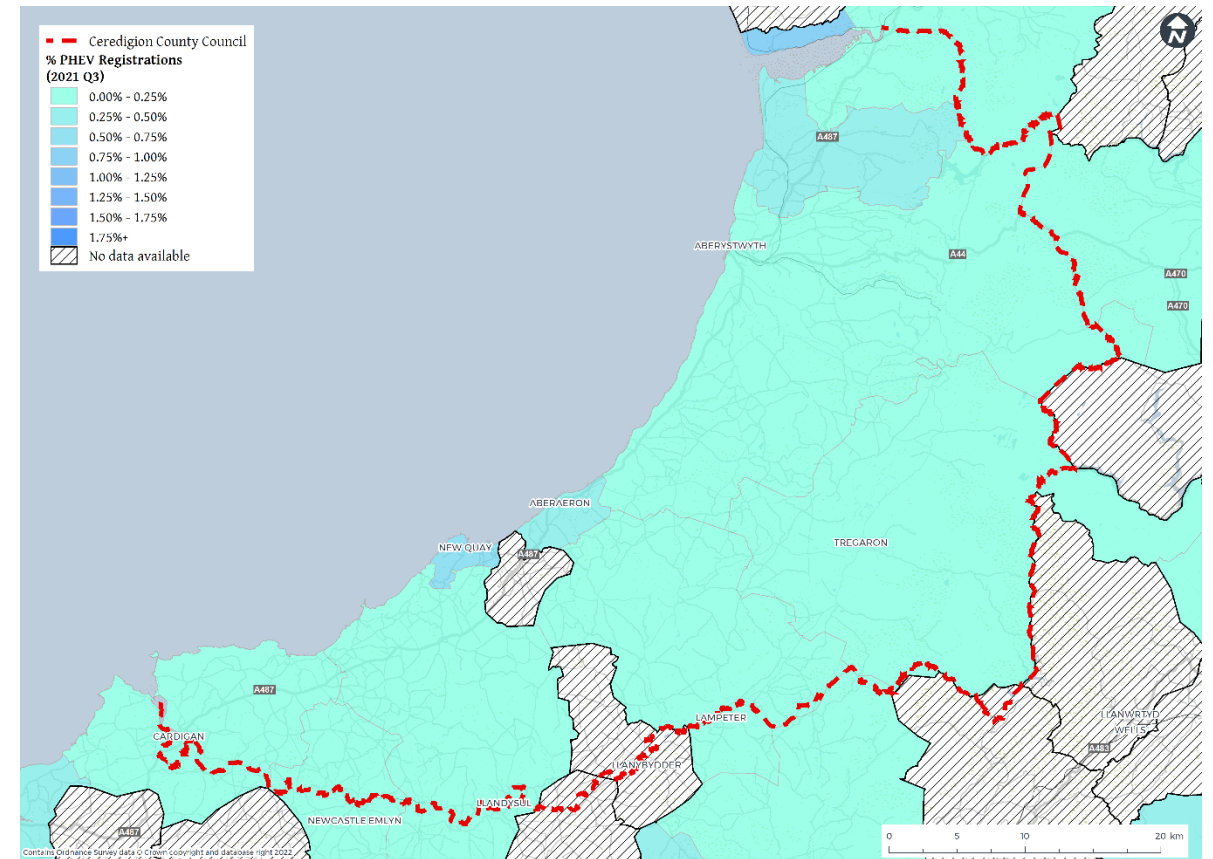


Figure 8: PHEV ownership in Ceredigion and neighbouring local authorities by postcode district.



EXISTING CHARGE POINTS

Overview

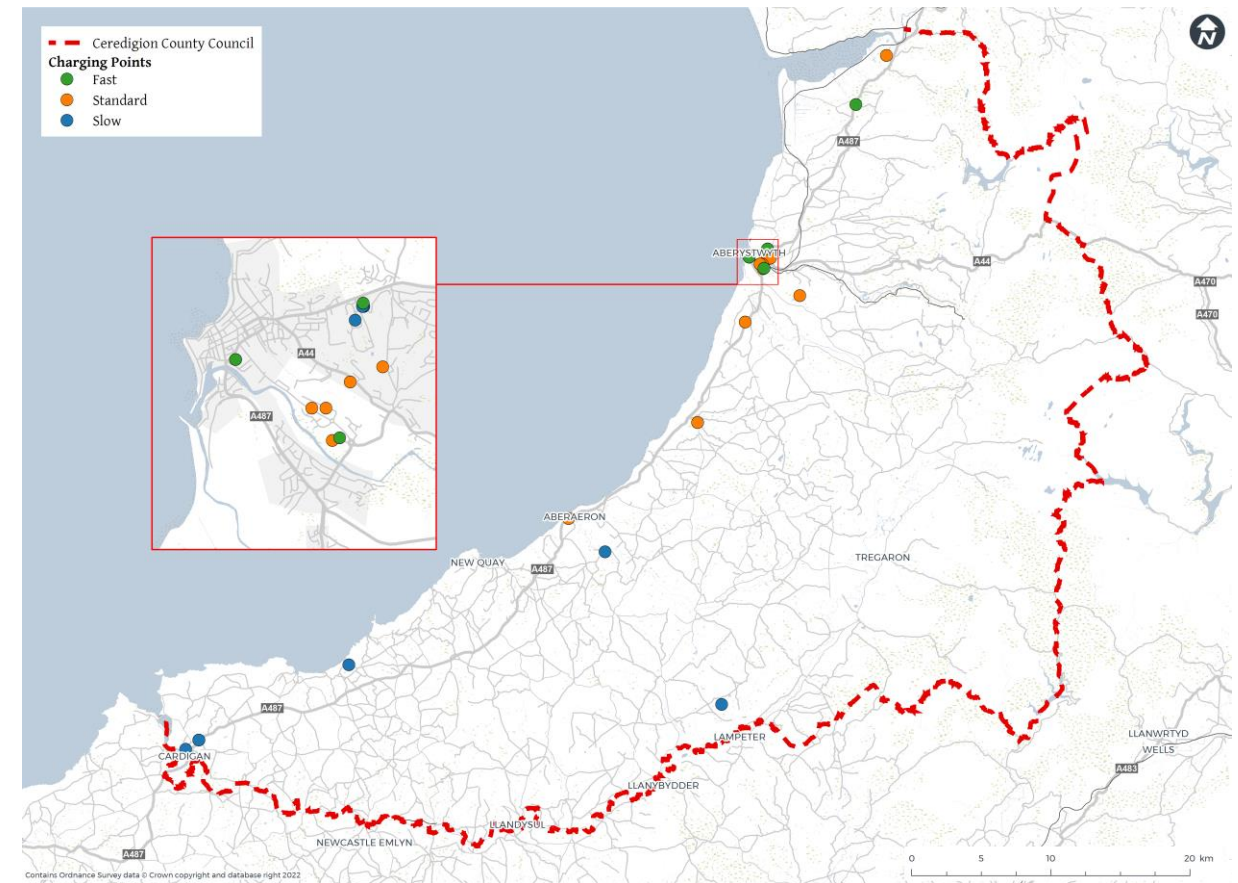
As of January 2022, Table 3 shows there were **45** public EVCPs in Ceredigion, though this Figures is constantly increasing. Ceredigion and the surrounding counties have a greater number of EVCPs per head of population than average for Wales or the UK - Ceredigion particularly so with regards to rapid chargers. This may be due to smaller populations or that there are major link roads through these counties.

Figure 9 indicates where the chargers are. The majority of chargers are focused in Aberystwyth, as the main Urban Service Centre (USC) in the region. Three other USCs – Cardigan, Aberaeron and Lampeter – also feature a number of chargers. There are currently no publicly available EVCPs in the other USCs (Llandysul, Newcastle Emlyn or Tregaron).

Table 3: Number of EVCPs in Ceredigion and surrounding counties

Area	Total Public EVCPs (Devices)	Total Rapid EVCPs	EVCP per 100,00 Population	Rapid per 100,000 Population
United Kingdom	28,375	5,156	42.3	7.7
Wales	1,055	169	33.3	5.3
Ceredigion	45	10	61.7	13.7
Gwynedd	90	4	71.9	3.2
Powys	90	3	67.7	2.3
Carmarthenshire	85	10	44.7	5.3

Figure 9: Map of existing EVCPs in Ceredigion



National Charge Point Registry (NCP) and OpenCharge Map data

<https://www.gov.uk/government/statistics/electric-vehicle-charging-device-statistics-january-2022>



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Background

Research and Review



CHARGE POINT TECHNOLOGIES

Overview

There are a range of EVCP technologies which are appropriate for different users and situations. This section provides a review of existing charge point technologies, including charging types, rates and layouts/format, alongside a review of emerging charge point technologies.

Charge Point Types

The range of charging solutions for EVs is evolving rapidly and reflects the ongoing technological developments and increasing investment in this market, as well as the range of different users and use cases for charging.







The suitability of a particular charging technology is dependent on a wide range of factors, including the use case of the individual, their vehicle type, the type of location and the available power supply.

Most EVs are supplied with two cables for slow and fast AC charging; one with a three-pin plug, and the other with a Type 2 connector. These cables enable an EV to connect to most standard Type 2 sockets.

In the case of rapid chargers, the cable is tethered to the unit, much like a petrol pump, and the user selects the applicable connector for their vehicle. There are three types of DC rapid charger connectors on the market in the UK: CHAdeMO, CCS and Tesla.

Table 4 summarises the different charge point types and provides information on the rates of charge, socket/plug type and charging duration.

Table 4: Summary of existing charge point types available on the market.

Charge point types		Maximum Power Output (Kilowatts)	Current/ Supply Type	Input Voltage (Volts)	Maximum Current (Amps)	Charging Mode	Socket/Plugs	Charging duration (40kW battery)
	Domestic Socket	2.3-3kW	AC – Single Phase	230	10-13A	1/2	Type 1/2	Approx. 17 hours
	Slow	3.7kW	AC – Single Phase	230	16A	2/3	Type 1/2	Approx. 11 hours
	Standard	7.4kW		230	32A	2/3	Type 1/2	Approx. 6 hours
	Fast	11-22kW	AC – Three Phase	400	16-32A per phase	3	Type 2	Approx. 2-4 hours
	Rapid	43kW	AC – Three Phase	400	60A per phase	3	Type 2	Approx. 55 mins
		20-50kW	DC	400	100A	4	CHAdeMO/CCS	Approx. 40 mins
	Tesla Super Charger	75-250kW	DC	Up to 400	Up to 800A	4	Tesla adapted Type 2	Approx. 10-20 mins
	Ultra-Rapid	Up to 350kW	DC	Up to 920	Up to 500A	4	CCS/Tesla adapted Type 2	Approx. 7-16 mins

CHARGE POINT TECHNOLOGIES

Charging Locations

It is important to note that the various makes and models of EVs support different connectors and plugs, which may also vary by charge point location.





The four main types of charge point are summarised in Table 5. Home-based charging dominates, with a few thousand home charge points installed in Wales.

However, other forms of charging as organisations realise the value of EVs and EV charging facilities. For businesses, having a fleet of EVs is a convenient method of reducing workplace vehicle emissions to zero. There are approximately **320** workplace chargers across Wales.

EV charging is also becoming increasingly profitable for businesses offering destination or intermediate charging facilities – **90%** of EV drivers will seek out destinations that have charge points over those which do not. It's vital to the ongoing success of businesses to keep up with the imminent influx of EV drivers. Across Wales, there are approximately **300** destination chargers at around **150** locations. There are approximately **130** rapid chargers providing on-route charging at approximately **70** locations across Wales.

Wales is behind England and Scotland in terms of both electric vehicle ownership and EV charging infrastructure; in Wales, there are **105** EVs and **21** charge points per 100,000 of the population.

Table 5: Summary of existing charge point types available on the market.

Charging Location Types		
	Home-Based Charging	Between 70 and 80% of EV charging occurs at dedicated home charging points given that they are typically faster, cheaper and provide maximum flexibility. Home units are typically mounted on an exterior wall or garage and being connected to the mains power supply. By charging overnight, EV drivers can take advantage of cheap night time electricity rates and drive for as little as 2p per mile. Overnight charging also provides reliability, ensuring that the battery is full each morning.
	Workplace Charging	Work-based charging is a convenient charging solution for employees and visitors at the workplace, suited to the long dwell times of office work. For businesses with an EV fleet, it can be a necessary operating factor. Most workplaces use wall-mounted units as they are the cheapest to install, alternatively, posts can be used, which are more expensive given the need to supply electricity underground.
	Destination Charging	Destination chargers are publicly accessible units which are typically used by EV drivers while they run errands or go about their day-to-day. They are located at destinations such as shops, cinemas, hospitals, universities or hotels. Destination charge points may also be available for on-street parking facilities.
	Intermediate Charging	Intermediate chargers are publicly accessible units which are typically used for a brief period of time, for example, when stopped at a service station during a multi-day long road trip.

CHARGE POINT TECHNOLOGIES

Publicly Accessible Charging Formats Off-Street Chargers

Car Park Destination Chargers

The majority of publicly accessible charge points exist in city and town centre multi-storey car parks, as well as leisure, retail and hotel car parks. Depending on the destination, they will typically consist of slow and/or fast chargers. For example, a shopping or leisure centre car park will typically have fast chargers which take 3-4 hours to fully charge, as this suits the typical length that a user may spend at these locations. However, a hotel car park is more likely to have slow chargers, taking 8-10 hours to fully charge an EV, given that users will likely charge their vehicle overnight.

Car park destination chargers are likely to become more popular as businesses realise the added value of having EV stations installed. Furthermore, given that many do not have access to a driveway or off-street parking EV charging, this allows for more people to consider an EV as an option in the future.

Residential/Community Charging Hubs

Residential or community charging hubs have been designed to cater for EV owners and businesses who do not have access to designated off-street EV parking, or a driveway. These typically exist as or

part of an off-street car park in a suburban environment. These hubs ideally work on a booking model, whereby residents can book an overnight charge once or twice a week with confidence, and enable the chargers to be efficiently utilised, whilst minimising the inconvenience of unnecessary trips to plug in.

Similarly to car park destination chargers, these tend to be either fast or slow charging stations. However, to cater for business EV fleets who may require a faster turnaround, some may have a number of rapid chargers installed.

Rapid Hubs

These typically describe a cluster of 4 or more DC rapid chargers, utilised during an intermediate stop of a long journey at a petrol or service station. These are crucial to facilitate the uptake and transition to EVs.

EV charging network Osprey has announced the roll-out of 150 rapid hubs over the next four years, totalling at least 1,500 rapid units. Transport for Greater Manchester is implementing 30 rapid chargers across the region, to go live in 2022, with a further 30 to be implemented by 2023.



Milton Keynes EV Charging Hub, BP

CHARGE POINT TECHNOLOGIES

Publicly Accessible Charging Formats On-Street Chargers

Residential

Charging can be a barrier to EV uptake amongst drivers that have no off-street parking, such as a driveway or garage. Residential on-street chargers have a key role to play in overcoming this challenge, as around a third of Welsh households live in flats and terraced housing.

Residential on-street charging is rapidly increasing, even more so with the introduction of the [On-street Residential Chargepoint Scheme \(ORCS\)](#), which provides grant funding to local authorities for installation of on-street facilities, commonly standalone charging posts and in or on lampposts.

Destination

On-street charge points at destinations are typically standard or fast AC chargers, and are more likely to take the form of conventional chargers.

Enabling On-Street Charging from Home

For those who do not have access to any of the

options previously described, this presents a major obstacle in switching to EVs. The only remaining option in this case is to trail a cable over the pavement charge from their own three-pin domestic plug socket. Whilst a cost-effective and low tech resolution for EV owners, there are also several health and safety hazards using this method.

Firstly, given that the cord is frequently not long enough to reach the domestic socket, extension cables must be used. This is not recommended because most extension cords are manufactured from cables which are not sufficiently large in diameter to handle the **10-13A** current required. Such cords are also typically manufactured using PVC, which is prone to mechanical and UV damage and is not recommended for outdoor use or at temperatures below **5°C**. Using extension cables creates greater risk of fire and electric shock to users.

Even when using a specially manufactured extension cord, or when the connector cable is long enough to reach the domestic socket, this still creates a potential trip hazard for pedestrians, particularly as EVs are usually charged at night, making cables more difficult to see. A frequently suggested solution

is to use cable protection by covering them with secured rubber matting. These are typically brightly coloured to attract attention to its presence, and textured to create grip in unfavourable conditions. However, this is only a solution for those who have access to parking immediately outside their home, where the cable will only trail across a single section of pavement. Furthermore, people should not trail cables as this is still regularly deemed a health and safety hazard as they can restrict accessibility to the footway and restrict access for people with limited mobility.

For those who do not have access to any of the options previously described, this presents a major obstacle in switching to EVs.



A cable cover available on eBay and the Green Mole solution for home EV charging

FUTURE PROOFING

Overview

Throughout the next decade, emerging technological and social trends will reshape road transport and mobility as we currently know it. These changes will have important implications for vehicle electrification and charging.

The Welsh Government Llywybr Newydd: the Wales Transport Strategy highlights the need for an accessible, sustainable and efficient transport system. The strategy details three key headline priorities for the Welsh Government:

1. to bring services and to people in order to reduce the need to travel,
2. to allow people and goods to move easily from door to door by accessible, sustainable and efficient transport services and infrastructure, and
3. to encourage people to make the change to more sustainable transport.

It is clear that EVs and indeed ULEVs will play a key role in delivering these ambitions over the next five years, particularly for priority 3.

Wales' transport system needs to positively benefit people and communities, the environment, the economy and places. It must also support Welsh language and culture.

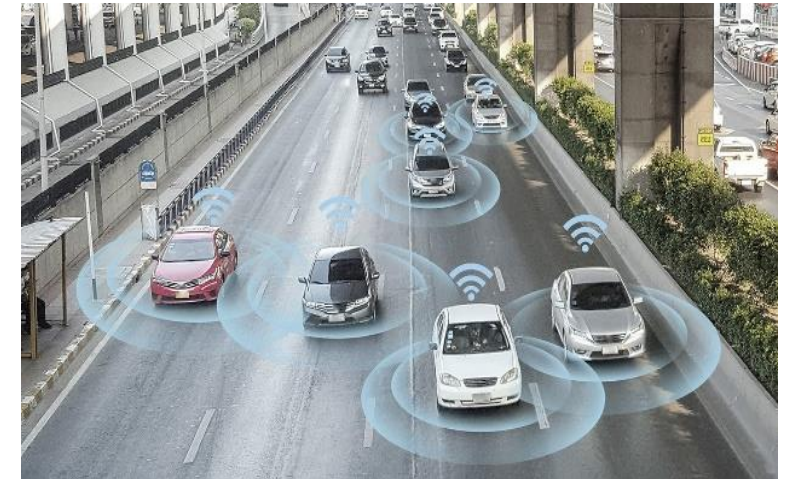
Taking a holistic approach in relation to the above themes, this Future Proofing report section will look at how advances in automation, connectivity, new transport modes and business models will impact electric vehicle utilisation and/or charge point implementation.



https://gov.wales/sites/default/files/publications/2021-03/llywybr-newydd-wales-transport-strategy-2021-full-strategy_0.pdf

Automation

Improved sensing technology, computing power and software engineering are leading to increasing levels of automation in transport.



WSP Global Image Library

Whilst the consequence of automation on EVCPs and Ceredigion is largely unclear, two potential impacts may include:

- Automation could increase the utilisation of vehicles, which is likely to increase daily travel distances. This means EVs would require larger and more expensive battery packs or more frequent charging.

FUTURE PROOFING

- A transition towards connected and autonomous vehicles (CAVs). It is widely accepted that CAVs will be electrically powered. Depending on the ownership and usage models for CAVs, the charging requirements may differ. Rather than using a network of single chargers dispersed across an area, they may benefit from a central hub of multiple chargers. CAVs may also be better suited for inductive charging, negating the need for the user to physically plug the vehicle in.

The Law Commission of England and Wales, and the Scottish Law Commission undertook a review of the legal framework for automated vehicles for the Centre for Connected and Autonomous Vehicles (CCAV), published at the end of 2021.

It included making clear distinctions between self-driving cars and driver support features, transparency on safety processes, and steps to prevent misleading marketing of CAVs. It also featured a more substantial validation process of the approval of vehicles, new legal roles for users and manufacturers, with the removal of criminal responsibility for the passengers, and holding manufacturers responsible for the disclosure of safety information.

<https://www.lawcom.gov.uk/project/automated-vehicles/>

Connectivity

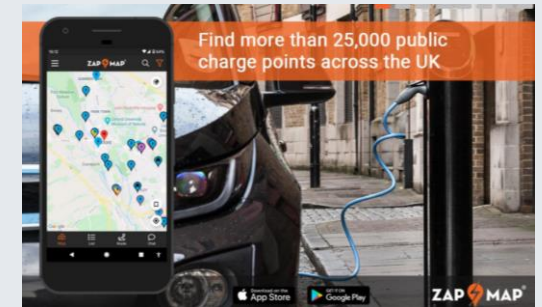
The availability of data and the ability for vehicles to communicate with each other and infrastructure is developing rapidly, and the arrival of 5G is set to accelerate this trend. Connectivity can provide information to network operators and users in real-time, the potential of impacts of which include:

- Customer-centricity focuses on creating positive experiences for the customer, or in this case the user, at every step of the project or journey. Users now have near real time relationships with network and service operators across all transport modes via social media and formalised channels.

The location and accessibility of charge points needs to be carefully considered by ECVP operators more so than ever in the age of connectivity. Ensuring ease of use and positive interactions for customers will help encourage EV uptake.

- The rise of apps has led to consumers expecting information at their fingertips. These apps must follow a customer-focused model with an easy-to-use, intuitive service. For example, Zap-Map as shown to the right.

Zap-Map is a widely used App amongst UK EV drivers to find a nearby charger. Amongst its functions, it provides users with real-time data on charger availability, and enables payment via Zap-Pay as an aggregator service (with participating CPOs)..



<https://www.zap-map.com/>

The majority of under 65s now own a smart phone, which is bringing connectivity to the user and into our vehicles i.e. using GoogleMaps rather than a SatNav. As there are no motorways in Ceredigion, it may be longer before 'typical' methods of transport connectivity, smart signs with variable speed limits, reaches the County. Moving forward it will be important to think about how Ceredigion residents can use smart phones to their advantage and for user benefit.

FUTURE PROOFING

New Modes

Technology is enabling new and innovative ways of transporting people and goods. These innovative new transport modes have the potential to influence EVCPs in the following ways:

- Various new micro mobility modes are now powered by electricity including docked/dockless bikes and electric shared scooter schemes. These will require different charging points, business models and operation locations to EVs.
- Small delivery robots are being used in, for example, Milton Keynes, to transport groceries and small retail packages to consumers in the local catchment area. This scheme was initiated by the Covid-19 pandemic and the need for deliveries to still be made, whilst observing social distancing. These robots are electric and require charging with a different type of charge point, due to their smaller size than a conventional EV.
- Whilst not a specific mode, a mobility hub is the consolidation of multiple transport services and complementary community functions. At a centre of this type, charge points may be installed that could cater to multiple different vehicle types in a central location.

- Whether human or autonomous, electric shuttles will have different charging habits than privately owned EVs. As they are constantly in use, they drive many miles throughout the day and so require faster charging at the origin, or destinations on their journey. In order to minimise time spent stationary, dynamic wireless charging could be an option



<https://www.theguardian.com/uk-news/2020/apr/12/robots-deliver-food-milton-keynes-coronavirus-lockdown-starship-technologies>

New Business Models

In recent years, there has been an emergence of new, digitally enabled models of transport provision. The following may have an impact on EVCP provision:

- All taxi and ride-sharing fleets need reliable access to efficient chargers. If the number of overnight or off-peak charging facilities are limited, drivers will experience range limitation and this could detrimentally impact revenue.
- Mobility-as-a-Service (MaaS) provides a single platform for users to pay for all of their transport usage. If EV charging was incorporated into this cost, it may contribute to EVCPs being better placed at mobility hubs or transport interchanges. Increasingly, people are happy to share assets and services, if it is convenient and the price is right. When hiring an EV, customers will expect the vehicle to be sufficiently charged for their journey. This may require EVCPs at the locations the vehicles are stored when not in use.
- A number of retailers have described a shift from customers consuming products to more disposable income being spent on experiences – the experience economy. Our current retail centres will shift focus to leisure i.e. bars, restaurants gyms, rather than shopping. This has the opportunity to increase the dwell time in these areas and therefore, slower charging speeds may be sufficient.

FUTURE PROOFING

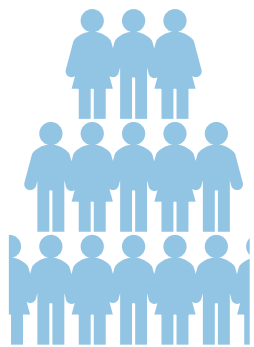
Changing Attitudes

Consumer attitudes to transport are changing. A study described in the Welsh Government's 'Climate Change and Reaching Net Zero: Perceptions and Awareness in Wales' report found that at **80%** of respondents were at least fairly concerned about climate change, with 37% being very concerned. **82%** also perceived transport as the biggest contributor to carbon emissions. However, attitudes towards charging infrastructure and range anxiety have harmed the uptake of EVs in Wales. Societal trends that have the potential to impact EVCPs include:



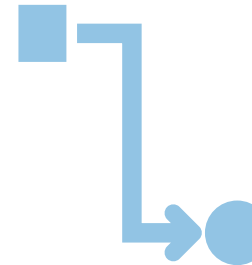
Net Zero Knowledge

In Wales, **35%** of surveyed participants either hadn't heard of Net Zero or knew hardly anything about it. Given that behavioural and attitudinal change is required for uptake of EVs, education may be required on Wales and UK Net Zero targets to instigate a call to action from the public. The likelihood of buying an EV is slightly less for Wales (**30%**) than the rest of the UK (**35%**).



Social Inequality

Any social inequalities impact transport choices. Therefore, EV charging needs to be in locations accessible to everyone and affordable. E-Car clubs and ensuring charging infrastructure is available to all residents and visitors are two ways of addressing these inequalities. In Wales, users which had the most positive experience had purchased a package of personal e-mobility services when purchasing an EV, meaning that cost and availability of charging was part of the service which they expected from the outset. However, this approach currently carries a significant cost premium and is unlikely to be accessible for many.



Range Anxiety

The most common themes of concern for EV users nationwide are: anxiety over lack of charging locations, unreliability of charging infrastructure, and incompatibility of charging cables.



Expectation of Immediacy

People want everything on-demand. With the rise of the internet and increasing levels of almost real-time consumption of everything from information to food, there is an increasing expectation for immediate access to products and services. This can impact dwell times by shortening them at certain locations which could increase the need for faster EV charging. It could also mean that consumer expectations of EVCPs may increase, with expectations to have charge points located in convenient locations, be available when required, to work every time with no faults and to charge quicker. The Welsh EV Charging Strategy found a need to have **30,000-55,000** fast chargers available for use in Wales by 2030, of which less than **1%** of this is currently installed, and up to **4,000** rapid/ultra-rapid chargers installed within the next 10 years, of which less than **3%** is currently installed.

FUTURE PROOFING

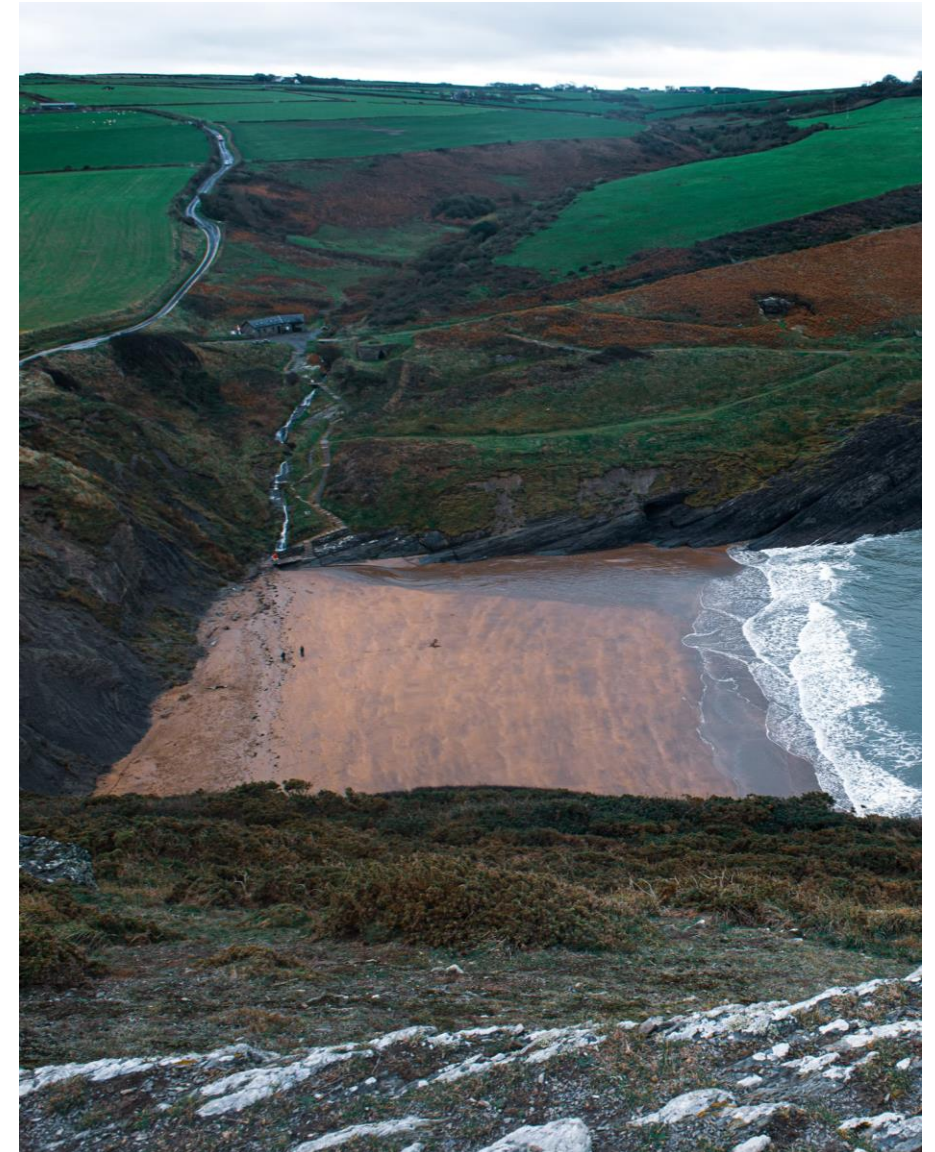
Simplicity

New technologies are making it possible to reduce the complexity in products, services, procedures and communications. Consumers in turn are no longer willing to accept complexity, instead demanding transparency, simplicity and availability in everything. In the context of transport, new mobility business models, enabled by innovative digital technology, have challenged long-established transport players and are increasingly offering personal simplified user experiences. Users will expect EVCPs to be simple, easy to use, in convenient locations, to always work without faults and universal to all vehicles, with the ability to pay using contactless payment methods.

Ageing Population

Although the population is aging, older people are becoming more technologically literate. However, there is still an expectation that the older population may have reservations or struggle with new technology. Therefore, relating to simplicity, EVCPs will need to be designed and located in areas where the ageing population can access and use them, with providers or the Council offering support (through an app or over the phone). The population of Ceredigion skews towards older demographics with over a quarter of the population above 65, so this needs to be given particular consideration. Consultation on the draft Electric Vehicle Charging Strategy for Wales highlighted the need for charge points in safe, secure locations with amenities and charging that is accessible and user-friendly for all.

Accordingly, an inclusive design approach should not only account for an aging population but also those with mental health or physical disabilities that may experience more barriers when trying to charge a vehicle.



Mwnt, Cardigan. Nick Russell

EV UPTAKE AND GREEN TOURISM

Economic Growth Opportunities Linked to EV Uptake

Thousands of job opportunities will be created across various sectors directly linked to the transition to electric vehicles such as energy, battery manufacturing and the rollout of electric vehicle charging infrastructure. Many of these new jobs will be created in industries such as retail, leisure and entertainment – this offers a tourist destination like Ceredigion the opportunity to capitalise on the changes.

A phase out of ICEs will require a rapid deployment of electric vehicle infrastructure. Although the vast majority of the charging infrastructure will be at drivers' homes, public charging will be needed for the many drivers who do not have access to off street parking and to enable EV drivers to drive long-distance.

Under the 2030 phase out of ICEs, the UK needs around **240,000** slow public (3-22kW) and **62,000** (>50kW) charge points, on top of the **13 million** home charge points, requiring £7bn more infrastructure investment compared to a 2035 phase out.

Green Tourism

Electric vehicle infrastructure also has a role to play in attracting and facilitating tourist trips.

According to the Mid Wales Regional Tourism Strategy, Mid Wales has **1.75 million** staying visitors per year, of which the majority (**36%**) are to Ceredigion. There are many tourist destinations in Ceredigion, such as Aberystwyth, New Quay, Llangrannog, Aberaeron, Borth and Cardigan, which draw people in from all over the country.

If there are EVCPs at a tourist destination, anxieties regarding EV range can be addressed, particularly if tourists have travelled a long way. In turn, this could result in an uptake in visitor numbers due to an increased confidence in travel. Additionally, tourist destinations in Ceredigion can benefit from visibility on websites and applications such as ZapMap, which shows the location of EVCPs.

Providing electric vehicle charge points in tourist destinations in Ceredigion provide an opportunity to demonstrate corporate social responsibility and express the region's commitment to environmental sustainability. Additionally, it allows tourists to reach their destination without worry they cannot re-charge

for their return journey and enable fewer adverse affects of ICEs such as air pollution. This may be particularly beneficial to destinations in particular need of protection, such as nature reserves or SSSIs.

In addition to people visiting Ceredigion, the "Welcome to Wales: priorities for the visitor economy 2020 to 2025" report suggested looking at EVCPs along The Wales Way – specifically the Coastal Way.



New Quay, Wales



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Electricity Baseline

Grid Constraints



GRID CONSTRAINTS MAPPING

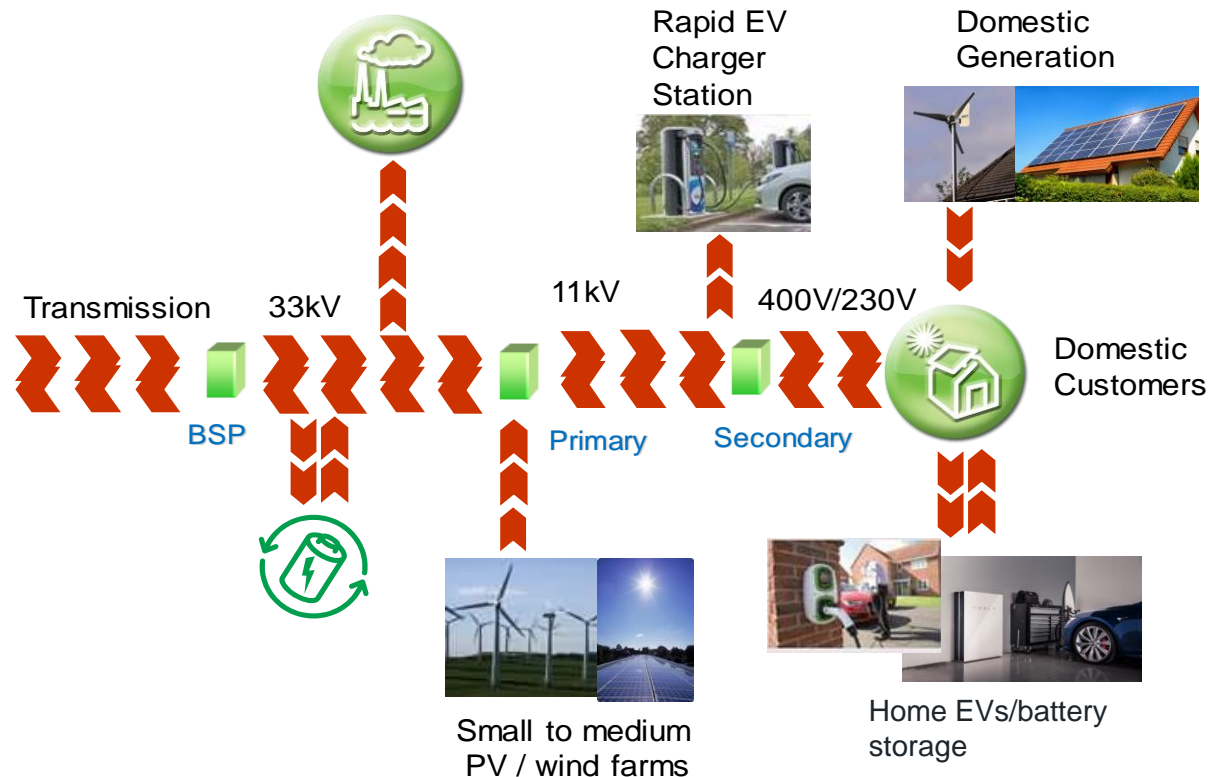
Electricity Network

In the UK, Distribution Network Operators (DNOs) are responsible for the distribution of electricity from the transmission network to end users. Electricity is distributed at different voltages, which are stepped up and down using transformers at various substations. This analysis considers “primary” substations, which generally contain **33/11kV** or **22/6.6kV** transformers and “secondary” substations, which have **11 kV/400 V** transformers to step down the voltage and distribute electricity to domestic properties.

Figure 10 shows a simplified electrical network representing the UK transmission and distribution system. Individual chargers, such as single domestic or fast chargers, have a demand of 3 kW (single phase) to 22 kW so these will connect to the low voltage network and will initially have the potential to overload the secondary substations if there is a cluster of chargers in the same street or estate. Large groups of chargers or rapid chargers (such as in EV service stations or supermarkets with a large quantity of EV chargers) are likely to connect to the 11 kV network or direct to primary substations.

Ceredigion encompasses **11** primary substations, which are owned and operated by Western Power Distribution (WPD) and 7 primary substations owned and operated by Scottish Power Energy Networks (SPEN).

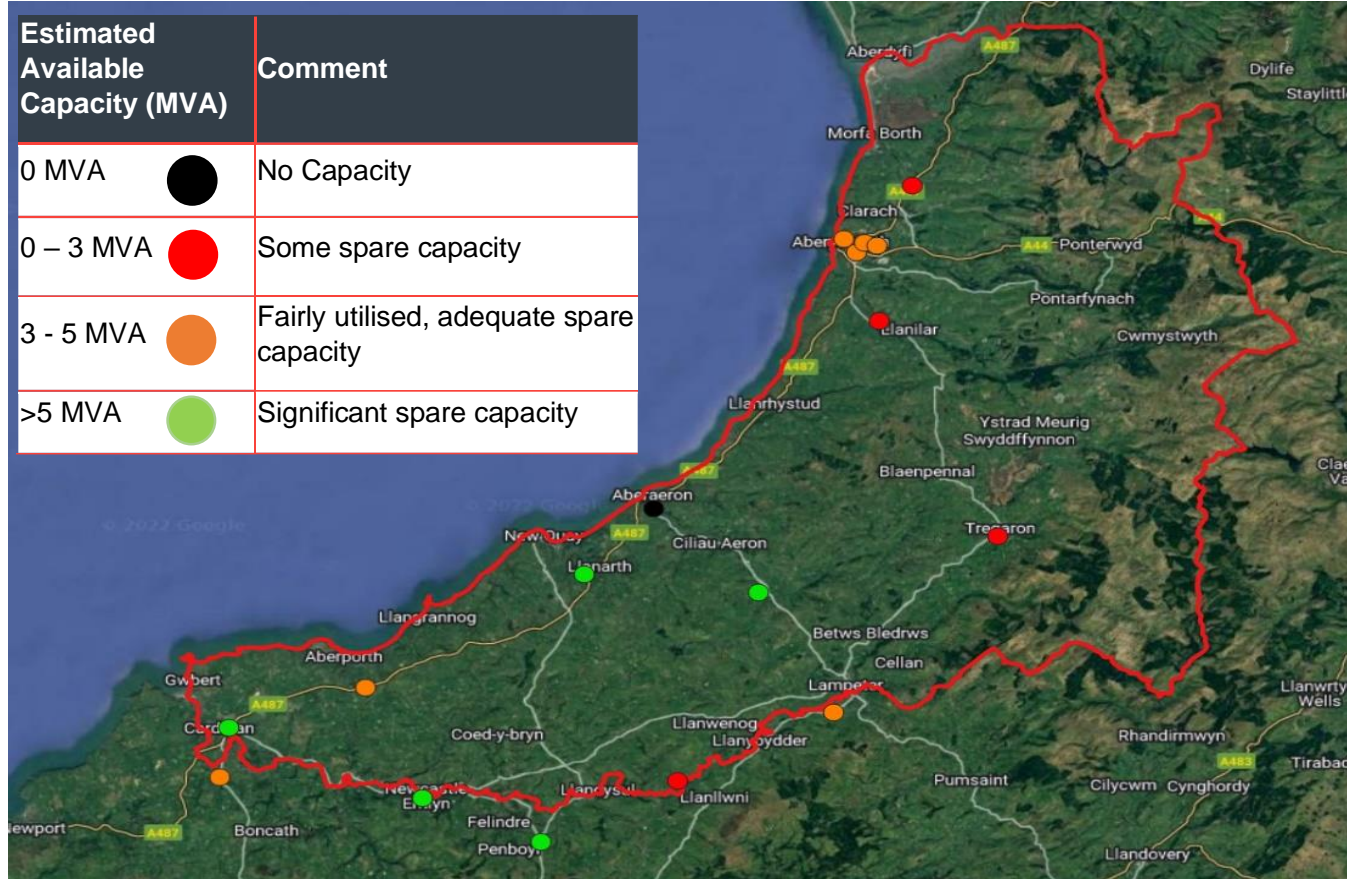
Figure 10: Simplified electrical network.



GRID CONSTRAINTS MAPPING

Electricity Network

Figure 11: Estimated spare capacity at primary substations.



By analysing data published by WPD and SPEN, the estimated available capacity (MVA) can be approximated by taking the maximum forecasted demand and the amount of capacity available at each primary substation. This gives a worst-case high-level indication of how much additional demand can be added at this level before network reinforcements would be required.

The above analysis is shown in Figure 11, which shows a constraint map of Ceredigion, listing the estimated available spare capacity at each primary substation. The results show that in this area there is still a reasonable amount of headroom at the primary substations, with the most limited substation (**Aberaeron 33/11kV**) having **-0.75 MVA** of headroom. It should be noted that although there appears to be capacity at each primary substation, the 11kV network leading to the substation could be limited in capacity, therefore a long 11kV (or 33kV for larger capacity) circuit could be required to connect to the primary, which could be expensive.

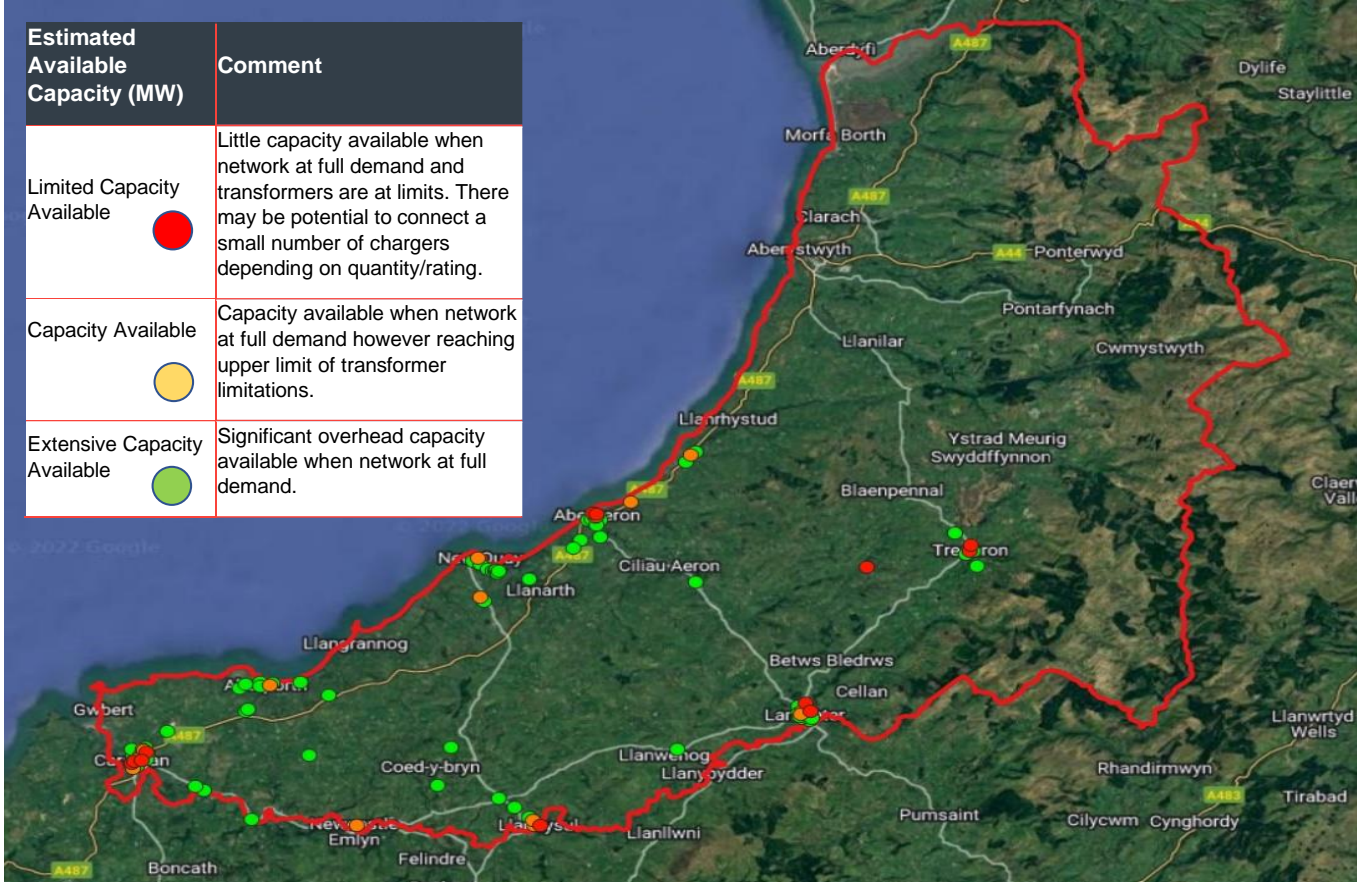
It should be noted that these are high level assessments, to be used for illustrative purposes only. Detailed power systems modelling would be required to determine the actual capacity that could be connected at each site, taking into account the existing demand and conductors.

Throughout Ceredigion, a significant proportion of primary substations have some spare capacity for both the WPD and SPEN licence areas. By analysing further data from WPD, it has been shown that there may be some modest EV capacity at the secondary substation level. The secondary substations data in the SPEN operated area is not included in the publicly available information and therefore, needs to be requested for further analysis.

GRID CONSTRAINTS MAPPING

Electricity Network

Figure 12: Estimated spare capacity at secondary substations.



WPD provides estimates of available capacity for EVs at the secondary substation level and, after discussions with WPD, they have advised that both the capacity and EV maps, alongside Long-Term Development Statement data, are based on a worse-case scenario, i.e., assuming maximum load at all times. Additionally, the EV capacity map (for available capacity) assumes 7 kW fast chargers are to be connected into the network, this is pessimistic as domestic chargers could charge at a lower rating. WPD secondary substations generally have a maximum capacity of **500 kVA** (though older ones could be as low as 25 kVA), therefore those substations with extensive capacity available could facilitate larger charging stations.

The secondary substation analysis provided by WPD uses basic transformer maximum demand Figures (for both day and night) from an asset management system. Calculations begin by taking the headroom between the transformer rating and its maximum load demand, and then converting this to a number of notional charges per customer. If there are between **1 - 2** charges per week per customer, this is classed as “capacity available”. If there are more than two charges then it is classed as extensive, and with less than one charge it is classed as limited. These calculations assume all customers have an EV, with the expectation that load increases on the network will be managed accordingly.

Figure 12 shows the secondary substations across Ceredigion and their corresponding availability for EV capacity.

GRID CONSTRAINTS MAPPING

Electricity Network

The uptake of EVs across the County will increase the demand on the network, and it is likely that reinforcements will be required to the electrical network to ensure that the grid can supply and match the nationwide demand. Network reconfigurations and reinforcements will vary from low level changes, such as redistributing load between feeders for small increases in demand, to high level changes, such as installing new circuits and upgrading primary or secondary substations, to enable large increases in demand to be accommodated.

Although reinforcements will be necessary, some demand could be deferred through “smart charging”, increasing demand diversification by deferring the load, and reducing the load during the times at which the network is busiest (peak demand). Various smart technologies have been developed which focus on tackling the problems associated with EVs and charging strategies. Smart EV charging can reduce grid constraints by, for example, utilising various Time of Use (ToU) tariffs, which offer cheaper electricity rates during off-peak hours (e.g. 12am – 5am). Charging an EV during these hours offsets the demand of the customer and flattens the load demand profile. However, this is a fairly simple way of deferring demand and has the potential to create a new peak when the cost decreases. Smarter load deferring would involve communications between the network operator or potentially constrained equipment and chargers to reduce charging rates as appropriate.

Vehicle to Grid (V2G) technology offers incentives to those willing to use their EVs as an energy storage device. When coupled with a dual-rate or ToU energy tariff, customers can avoid on-peak surcharges by charging their EVs overnight at off-peak rates and then selling the energy back to the grid at high demand (to ease local network constraints). Vehicle to Home (V2H) is a derivative of this technology and follows the same principle; however, the homeowner uses the stored energy

to offset their own peak demand requirements. If renewable energy sources were to be used in conjunction with this technology it would reduce demand on local networks, providing a higher capacity for EV charging. Both technologies would be advantageous during a power outage (caused by storms, falling trees, vehicle collisions etc.) as (EV) battery storage provide additional local supply within these events.

A number of the sites would potentially benefit from alternative mitigating measures to conventional grid upgrades, with some key considerations being the:

Relative cost of battery storage as compared to the network reinforcements to meet peak demand of the charging units.

Space constraints of site and the ability to accommodate a potentially large battery storage facility.

Loading profile of the sites and whether variable connection capacity, either based on time of use or network loading, would be effective.

Availability of land to install on-site renewable generation (wind or PV), either reducing the overall demand or keeping the batteries charged.

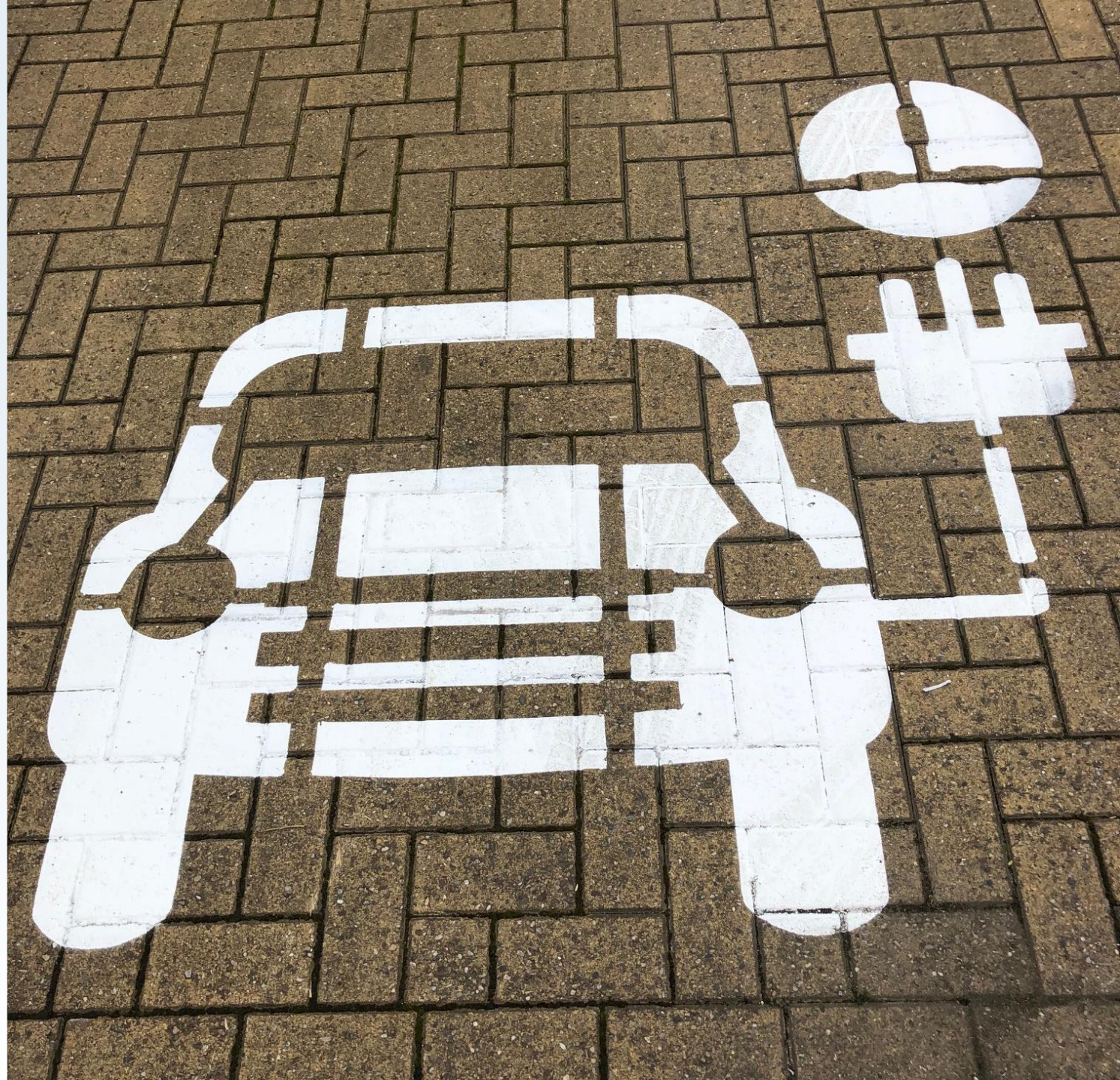
The above would need to be considered on a site-by-site basis.



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Delivery

Models and Funding Opportunities



REVIEW OF DELIVERY MODELS AND FUNDING OPPORTUNITIES

Funding for EVCPs

To date, the majority of public charge points installed in Wales have been from public sector funding including grants from the Welsh Government Ultra Low Emissions Transformation Fund. Figure 13 outlines four of several grant schemes that are available for local authorities and residents to apply to, for charging of electric vehicles at home, at work or on local streets.

There are three types of delivery models which can broadly be defined as; Public Sector, Private Sector/Independent CPOs and Utilities. These will be further discussed in this section in addition to a public-private partnership approach.

Public Model

The most common model to date in Wales and the rest of the UK is the public sector funded model, where government bodies define the requirements and fund capital investment, or at least part of the investment costs using funding pots.

Public sector funding models are generally operated on a concessionary basis or an 'own and operate' model. The 'own and operate' model entails the greatest role of local authorities as they fund the installation, enabling works and operating costs. However, in doing this, the local authorities retain all revenue generated by the schemes.

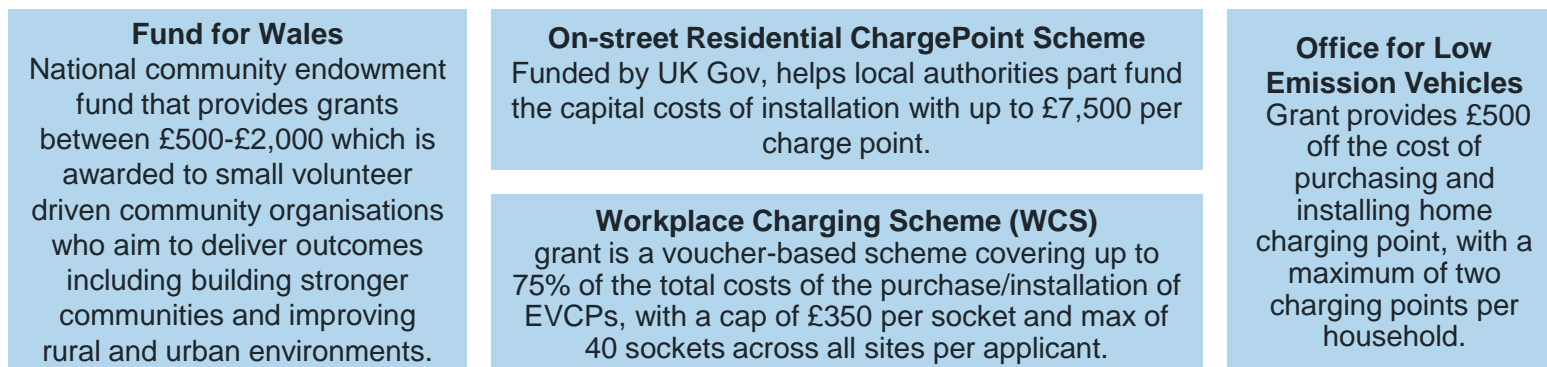
The local authority retains the ownership of both the charge point and the electrical connection and would usually contract a charge point operator (CPO) to operate and maintain the charge point. The cost of the CPO will then either be covered through a share of the generated revenue or on a fixed rate basis regardless of utilisation.

In a concessionary model, instead of all the capital coming from the local authorities, some or all of the investment is funded by the charge point supplier/operator and may involve the local authority being responsible for completing enabling works and electrical connection points at the sites before the CPO then installs and operates the charger.

Generally, the greater the share of risk taken on by the local authority through a public model, the greater the potential revenue share and control they have. On the other hand, if the concessionaire has a larger stake in the investment than the local authority, they will usually require more assurance over controls so they can recoup their investment.

The public sector model is expected to remain the dominant model in areas where the commercial case does not appeal to private sector investments. This is because either the utilisation is going to be modest or the delivery costs are going to be higher.

Figure 13: Examples of EV Grant funding available for Wales.



REVIEW OF DELIVERY MODELS AND FUNDING OPPORTUNITIES

Providing on-street charging, rapid or ultra fast EVCPs in rural or urban areas with high connection costs are expected to continue requiring some sort of public sector support to make the investment case. For Ceredigion, the County is predominantly rural and the public sector role will be particularly prominent in the area, especially as the public sector model is expected to evolve towards a greater focus on harder to reach areas.

Private Sector/Independent Model

In 'Transitioning to Zero Emission Cars and Vans 2035 Delivery Plan', the UK Government states that the private sector will lead the change towards mass ownership of zero emission vehicles. A number of industry leaders have already come forward with commitments and plans to phase out ICEs cars and vans. A wide range of private sector companies have already begun entering the EV infrastructure market such as those in the oil and gas industry, electrical hardware manufacturers and start-ups and innovators in a technology or renewable background.

In the Welsh EV Charging Strategy, the delivery of electric vehicle infrastructure and charge points is said to be most effective through partnerships and collaboration between both the public and private sector to maximise the co-benefits of different charging types and facilities. Nevertheless, the strategy promotes private sector investment for the roll-out of charge point provision, particularly provision of rapid chargers in rural areas.

In a private-sector/independent model, chargers are

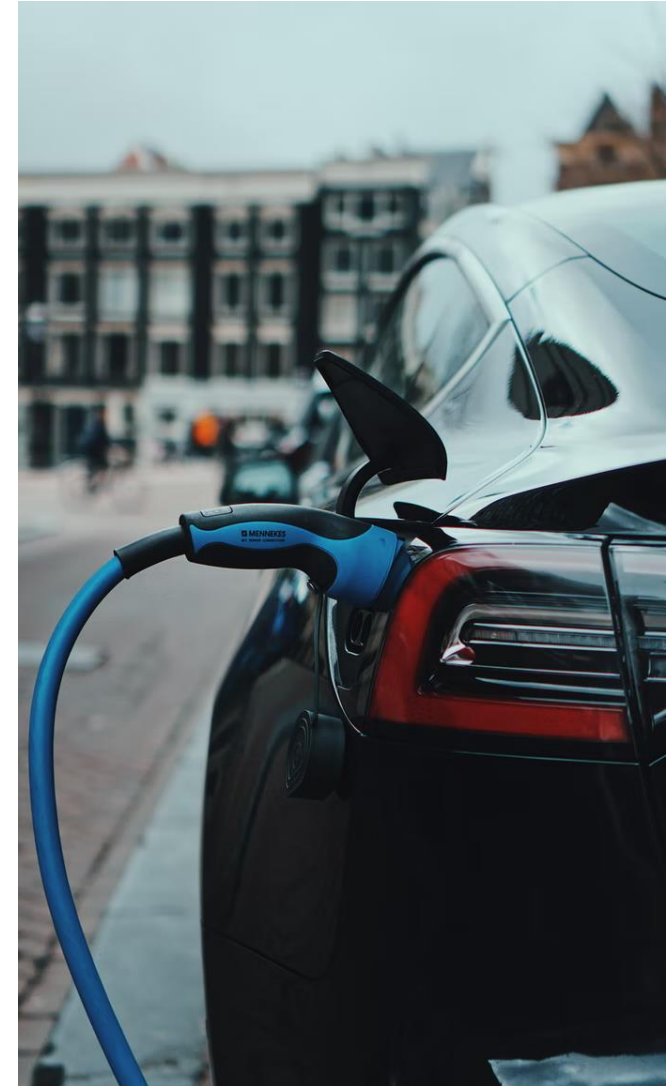
usually installed on a fully funded leased basis whereby all capital and operating costs are covered by the private sector/independent investor and a percentage of the revenue is given to the host. Some investors also pay lease fees to the host for the space occupied by the charger and bays.

The most common host sites for fully funded models are hotels, retail and food outlets, leisure facilities, car parks and motorway services stations. A fully funded/lease model requires the least investment from the host/local authority which as a result presents the least exposure to financial risk.

However, this model offers the lowest opportunity for revenue generation and more limited controls from the host. For local authorities, a further limitation is that only commercially attractive sites will be of interest to an investor operating under this model and so local authorities could be left with more commercially challenging sites and no lucrative sites to parcel them up with when they seek to leverage private sector investment for wider deployment.

Utility Model

In the utility model, electricity distribution companies (distribution network operators and distribution system operators), also known as DNOs, finance and own the charging infrastructure and use electricity tariffs to recover the investment, maintenance and operating costs.



WSP Global Image Library

REVIEW OF DELIVERY MODELS AND FUNDING OPPORTUNITIES

Public Private Partnerships

In the Welsh EV Charging Strategy, it is noted on numerous occasions that the delivery of electric charging infrastructure in Wales will be most effective through a collaboration between public and private sector.

The emerging public-private partnership (PPP) model is an agreement between public and private parties to bring about changes for more rapid and sustainable development and can offer a promising way forward to accelerate the delivery of electric vehicle charging infrastructure. Additionally, public-private partnerships, given they are robust and well-coordinated, provide opportunities to collaborate on resources, expertise and powers that could not be achieved by each single sector.

Figure 14: TAI Ceredigion provide housing in Ceredigion, an example of a PPP.



<https://welshicons.org/tai-eredigion-new-build-provides-family-home/>

Figure 15: Key Benefits of Public Private Partnerships



REVIEW OF DELIVERY MODELS AND FUNDING OPPORTUNITIES

Action of Community Groups in Ceredigion

In Ceredigion, the Council work with several organisations to ensure transport is available for groups that are active in the County and for residents with mobility problems. Such groups include;

- Aberystwyth Town Rider – runs Tuesdays, Wednesdays and Fridays between 09:00 and 22:00, with people being able to be picked up and dropped off at a time they chose.
- Bws a Bryniau – a pre bookable service that runs every Thursday between Cwmystwyth and Aberystwyth.
- Dolen Teifi Community Transport – mini buses and Cady cars that are used to carry wheelchairs and up to 4 passengers allowing local residents to access places they would not have been able to otherwise.
- Cardigan Town Rider – a minibus services operated by Preseli Rural Transport Association and runs is operational on Mondays, Wednesdays and Fridays between 09:30 and 15:30.

In September 2021, there were 5 new electric seven seater wheelchair accessible vehicles that joined the Dolen Teifi Community Transport fleet that provide safe, accessible and affordable transport. Three Nissan eNV-200 full accessible vehicles that seat seven people were funded by the National Lottery through the Rural Wales Fund, with the group also receiving the Welsh Government ULEVT (Ultra Low Emission Vehicle Transformation Fund or Community Transport Electric Fund Wales) through the Community Transport Association.

Figure 16: One of five new electric seven-seater wheelchair-accessible vehicles in the Dolen Teifi Community Transport fleet that has been used to transport people to vaccination centres.



<https://www.dolenteifi.org.uk/index>



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Wider Context

Policy Review and Stakeholder Engagement



POLICY REVIEW

Overview

This section presents a review of current policy applicable to Ceredigion and uptake of EVs within the County.

National Policy – Wales

All Wales Plan 2021-25 Working Together to Reach Net Zero (2021)

This plan was published as part of the Pledge Campaign that was launched at the Climate Change Conference in 2019, held at Cardiff's City Hall. Since the launch, over **100** pledges have been made across Wales from businesses, public sector bodies, communities, schools and individuals to take action in addressing the climate emergency. Around **4%** of these pledges were from members of the transport sector, examples detailed below:

- Pembrokeshire Coast National Park Authority (PCNPA), working in partnership with Pembrokeshire County Council has an ongoing project to improve the electric vehicle charging infrastructure within the National Park. This includes:
 - Addressing EV charging needs of residents and visitors, supporting and encouraging the transition to electric vehicles through coverage of EVCPs across the County.
 - Fast and Rapid charging availability increased across the County, supporting the increase electric vehicle purchase, benefiting residents who do not have off-street charging.

- Implementing PCNPA's fleet management strategy to replace its internal combustion engine vehicles with EV's.
- Welsh Universities supporting the decarbonisation agenda by installing EVCPs on campus and nearby.
- Carmarthenshire declared a climate emergency in February 2019, the first local authority in Wales. Carmarthenshire was also the first Council in Wales to introduce electric pool car vehicles around seven years ago, and has recently secured funding for plug-in chargers following an increase in electric vehicle sales.



All Wales Plan 2021-25

**Working Together to
Reach Net Zero**

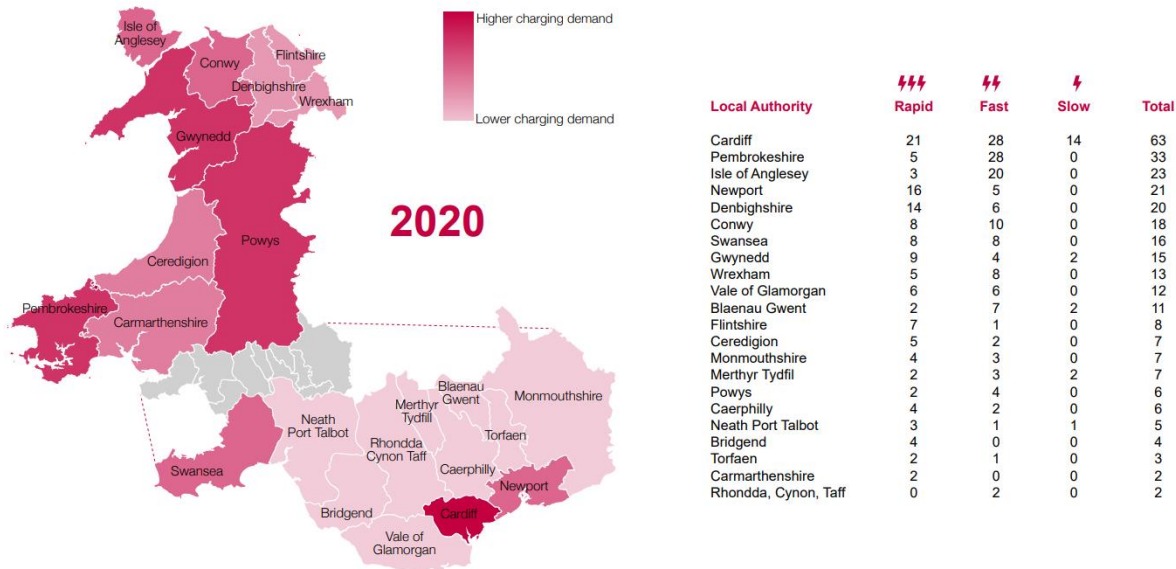
POLICY REVIEW

Electric Vehicle Charging Strategy for Wales (2021)

The publishing of this strategy represents the first step in targeted action towards EV charging within Wales. It sets out where Wales are now in providing charging for cars and vans, predicted charging needs for the decade and how these can be met.

According to data from the Chargepoint Registry in July 2020, Ceredigion had 7 ECVPs available to use within the County, 5 of which were **Rapid**, 2 **Fast** and 0 **Slow**. The number of chargers by location are shown in the Figure 17.

Figure 17: Number of chargers by County across Wales as of July 2020.



The strategy has accounted for two future scenarios, one weighted towards widespread use of Fast charging, the other to widespread use of Rapid chargers. The relative balance of these charging types will depend on several factors including user behaviour and preference, infrastructure costs and pricing.

Table 5: Predicted charging requirement in Ceredigion over the next decade (from strategy publish date).

Year	Fast Charging Dominant	Rapid Charging Dominant
2025	8,260	7,935
2030	24,615	24,015

Assumptions and charging predictions for all counties across Wales can be found in the full document (such as inclusion of domestic charging).

User engagement has identified issues including lack of charging locations, availability, reliability and compatibility issues, which has undermined confidence in charging. Responses have also highlighted inclusivity and accessibility concerns. There is a substantial need for an increase in slow, fast, rapid/ultra-rapid chargers available in Wales. Key to focus on will be fast charging alongside home charging, to promote equality of access.

It is also recognised that delivering this Electric Vehicle Charging Strategy will require significant levels of investment and technological advancements in battery technology, micro-mobility, autonomous vehicles and hydrogen will need to be kept under review.

POLICY REVIEW

Llwybr Newydd – The Wales Transport Strategy 2021

This strategy sets a long-term direction for transport within Wales, with three urgent and immediate priorities detailed on page 17. Within these priorities, commitments are specifically aimed to reduce the number of cars on the road and improve uptake of active travel, public transport and ultra-low emissions vehicles in line with the Sustainable transport hierarchy set out in Planning Policy Wales (PPW) 11.

The strategy states that the Welsh Government will support operational, technological and digital innovations that enable and encourage more people to use sustainable transport with reduced carbon emissions. They will be providing grants towards the cost of electric bikes, implementing pilot schemes to make use of e-bikes and e-cargo bikes an affordable option for more individuals and businesses. The Government are striving towards an improved and future-proofed road network that supports vehicle charging.

It is clear from this strategy that the Welsh Government is prioritising the encouragement of the uptake of sustainable transport, as seen in the hierarchy on page 5.

Well-being of Future Generations (Wales) Act (2015)

This Act places a duty on public bodies such as CCC, enshrined in law, to carry out sustainable development. CCC have already set and published their well being objectives in the Ceredigion Local Well-being Plan 2018-2023, summarised in page 39.

The next action is to take all reasonable steps to meet these objectives.

When devising the Ceredigion EV Strategy, for design and implementation, consideration must be given to the following 5 points to show application of the sustainable development principle: Long-term, Prevention, Integration, Collaboration and Involvement.

Figure 18: The 7 Connected Well-being Goals for Wales



<https://gov.wales/well-being-of-future-generations-wales>

POLICY REVIEW

Electric Vehicle Charging Strategy for Wales – Action Plan (2021)

There is currently no statutory duty for local authorities to install Electric Vehicle Charging points. However, in order to deliver the Council's ambition to achieve Net Zero for Ceredigion, CCC seek to support opportunities to work in partnership to achieve the installation of infrastructure, where there is currently no commercial interest.

“By 2025, all users of electric cars and vans in Wales are confident that they can access electric vehicle charging infrastructure when and where they need it”.

Four main outcomes are highlighted to achieve this vision: increased total charging provision; quality charging experience; sustainable approach and localised benefits. Actions are set out up to 2030 with a delivery timescale and are monitored and reviewed annually to track progress.

The onus is on local authorities to play a major role in delivering the following specific actions :

Delivery of charging infrastructure through funding and collaboration – with the Welsh Government Ultra Low Emissions Vehicle Transformation Fund (ULEVTF) used to kick-start initiatives. The key performance indicator is for the provision of one public charge point for every 7-11 electric vehicles on the road by 2025. It states that Welsh Government will work with local authorities to establish projects that align with The Wales Transport Strategy 2021 that are replicable, scalable and support local needs.

Develop a Welsh Quality Standard for charging – by Welsh Government to be

used in public sector procurement. This will include provisions for safety, placed in well-lit environments and for everyone, including those with accessibility needs.

Facilitating Infrastructure Delivery – by reviewing building policy and regulation by 2022 and updates made, where appropriate, to include electric vehicle uptake.

Increase awareness of the needs of transport decarbonisation – by raising the profile of the electric vehicle charging strategy and action plan and enhancing public confidence in electric vehicle charging, moving Wales from the innovator stage to early majority stage of market maturity by **2030**.

The action plan also states it wants to improve the coherence in messaging and cross-sectoral collaboration in the context of decarbonisation. Ceredigion should continue to ensure that there is consistency in messaging across their County wide strategy documents for efficient uptake by residents.



POLICY REVIEW

National Policy – UK

Net Zero Strategy: Build Back Better (October 2021)

This document set out the policies and proposals to meet the UK's decarbonisation of meeting net zero carbon emissions by 2050, building upon The Ten Point Plan for a Green Industrial Revolution (see right). The transition to EVs is identified as central to decarbonising road transport, with plans to introduce a zero-emission vehicle mandate setting targets for a percentage of manufacturers' new car and van sales to be zero emission each year from 2024. This is hoped to result in improved air quality in our cities and towns, as well as better informed consumer choice.

The strategy also states that £620 million of funding is going to be allocated for zero emission vehicle grants and EV Infrastructure, including further funding for local EV Infrastructure, with a focus on local on street residential charging. This will promote greater use of green vans to deliver our goods and improvements in local public charge point provision for the UK's charging infrastructure to be more reliable, accessible and meet the demand of motorists.

The transition to EVs has a potential knock-on impact on the industrial sector and its wider supply chains, particularly in certain regions of the UK like Ceredigion. For example, creating additional demand for new wind turbine manufacture and installation is something that will become more important in areas with ideal conditions for renewable energy creation. This is particularly relevant to Ceredigion as an already net exporter of green energy, there may be greater demand for wind and hydro-electric power.

The Ten Point Plan for Green Industrial Revolution (2020)

From 2030, the UK Government have banned the sale of new petrol and diesel cars and vans. All vehicles are required to have a significant zero emission capability (e.g. plug-in and full hybrids) from 2030 and be 100% net zero emissions from 2050.

The deadline has been bought forward to 10 years earlier than planned, placing greater emphasis on accelerating the delivery of electric vehicle charging infrastructure. The UK Government are investing £1.3 billion to accelerate the roll out of charging infrastructure. This will target providing rapid charge points on motorways and major A roads (around 6,000) to ease range anxiety on long journeys, plus installing on-street charge points near homes and workplaces.



POLICY REVIEW

Local Policy – Ceredigion

Tyfu Canolbarth Cymru – Growing Mid Wales Energy Strategy (2020)

The vision for Mid Wales:

“To achieve a net zero-carbon energy system that delivers social and economic benefits, eliminates fuel poverty, better connects Mid Wales to the rest of the UK, and contributes to wider UK decarbonisation.”

Of the 6 key priorities for achieving this vision, specifically related to transport are:

- Accelerating the shift to zero carbon transport and improve connectivity.
- Harnessing innovation to support decarbonisation and clean growth.

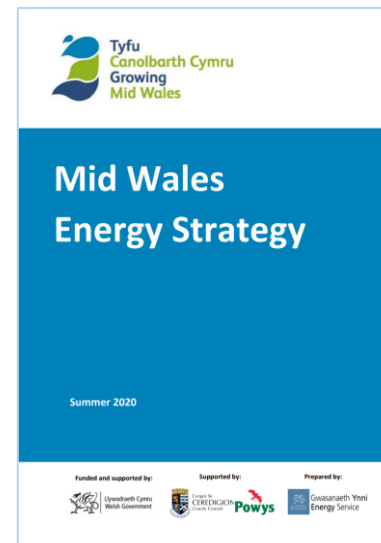
The strategy sets out the energy vision scenario modelling that demonstrates a pathway to achieve a **280** kt CO₂ reduction (523 kt in 2017 to 243 kt by 2035) in road transport emissions. It states that **53%** of vehicles driven in mid Wales in 2035 are electric with a slowing number of total vehicles on the road, facilitated by increased public transport and active travel.

Given the region and indeed Ceredigion’s dependence on the private car, the strategy supports the transition of these to low carbon emission vehicles by implementing an effective electric vehicle charging network to increase the EV uptake in the area. Welsh Government will collaborate with DNO’s to ensure efficient network infrastructure to encourage a fast roll out is in place.

Ceredigion Local Well-being Plan (2018 – 2023)

Within this plan, EV uptake and usage relates to, and supports, the following three aims:

- Enable communities to become prosperous, sustainable and connected by supporting the transformation of economic prospects
- Create environmentally responsible and safe communities that can adapt and respond to the effects of climate change
- Support physical and mental health and improve wellbeing through promoting healthy behaviours



POLICY REVIEW

Achieving Net-Zero Carbon by 2030 Action Plan (2020) & Ceredigion County Council Carbon Management Plan (2018 – 2023) (2019)

This study has been developed as a complimentary strategy to the existing plans that Ceredigion has published. It forms part of Ceredigion's holistic approach to sustainable transport and decarbonisation. As these documents have been developed by the Council, only the EV related commitments have been drawn out for reference here.

Grey Fleet

- CCC is exploring use of using electric pool cars.
- Potential to install more EVCPs at Council buildings, hopefully encouraging wider uptake of ULEVs amongst staff.

Travel Expenses

- In the process of reviewing travel and subsistence policy, in particular the mileage schemes relating to hybrid and electric vehicles.
- Council offers a car leasing employee benefits scheme, which regularly promotes electric vehicles due to them providing the greatest cost savings.

E-Bikes/Cycling

- Electric bicycle charging has been installed at the Canolfan Rheidol Council Office in Aberystwyth.

Electric Buses

CCC is actively engaged with partners who are investigating the potential for use of electric buses on the TrawsCymru network in Ceredigion and the infrastructure that would be required to support and facilitate this.

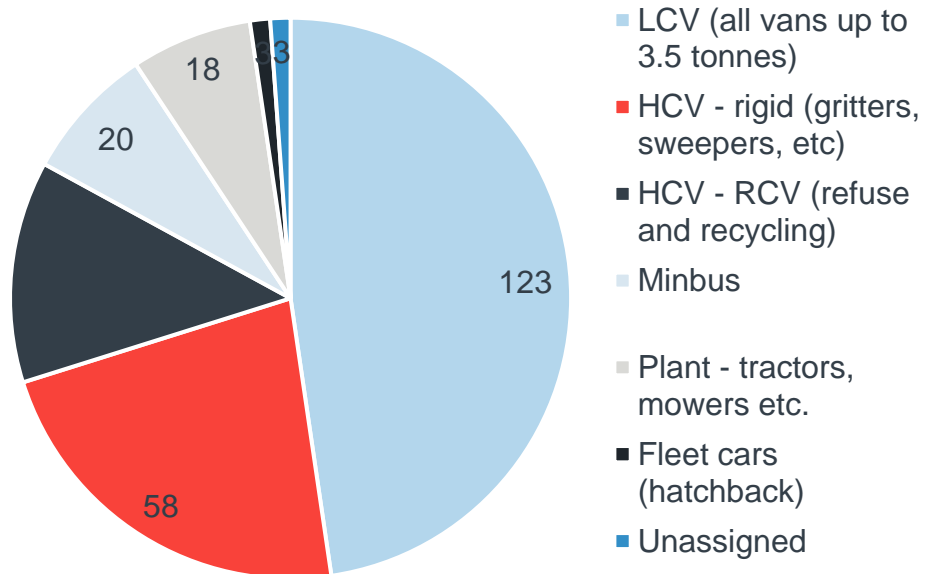
For Ceredigion Residents

- **Currently there are issues around development of EV charging facilities in the public realm and on the arterial roads, to ensure availability of EV charging points for use by:**
 - Residential householders without off-road parking.
 - Rural residents who need to make relatively long journeys for shopping/leisure/hospital visits, etc.
 - Tourists and leisure visitors for whom recharging facilities will be an important factor in choosing their holiday/leisure destination.
- **CCC is committed to installing electric vehicle charging points within all of its new schools.**
- **EVCPs at Penmorfa, Aberaeron and Canolfan Rheidol, Aberystwyth offices are available for public use.**

POLICY REVIEW

Ceredigion County Council ULEV Transition Fleet Report

Figure 19: Composition of CCC Owned Fleet.



Ceredigion County Council own a total of 258 vehicles, the breakdown of which can be seen in Figure 19. 48% of the fleet are light commercial vans (LCV) and 7% is made of 18 items of plant. 91 fleet vehicles are classified as heavy commercial vehicles (HVC). Vehicles include a tipper, Tel material handler, mini bus, refuse vehicles and special mobile units.

The CCC ULEV Interim Report, undertaken by the Welsh Government Energy Service and funded by the Welsh Government Decarbonisation and Energy Division provides an in depth analysis and benchmark of road transport greenhouse gas (GHG) emissions.

The Ceredigion fleet produced at least 1,674 tonnes of greenhouse gases (Tank-To-Wheel, CO₂e) in 19/20 financial year. No vehicle in the fleet was zero emission, but 72% were clean air zone compliant.

To achieve net zero in 2030 will require an average reduction in diesel use of about 72,000 litres every year. In order to achieve this, the following actions have been recommended to map out a pathway to achieving a zero-emission CCC fleet :

- Establish a “Transition Team” with SMT support.
 - This could be formed with members of the Fleet team and ULEV Steering Group. Consider adding this as a recurring agenda item to the steering group meetings to discuss performance, maintenance and continual identification of opportunities to switch to ULEV alternatives.
- Review low vehicle utilisation (under 6,000 mpa) – consider pooled or rental.
- Downsize the LCV fleet from 3.5 tonne to 3.1 tonne or smaller where possible.
 - Small vans with high mileage are ‘low hanging fruit’ – lower cost to switch, relative to HGVs. Generally have higher mileages so more frequent maintenance/replacement required.
- Adapt the fleet replacement cycles to warranty period of BEVs.
- Install Electric Vehicle Charging Infrastructure (EVCI) – review depots and locations.
- Introduce a ULEV Procurement Policy – use a whole life cost (WLC) selection model.
 - Follow guidance from neighbouring Local Authorities and monitor advice from Welsh or UK Government.
- Provide BEV maintenance training to workshop team to Level 5.
- Consider internal carbon accounting and departmental GHG targets.

STAKEHOLDER ENGAGEMENT

Overview

This stage of the study involved engaging with key internal CCC stakeholders, to understand the current situation in Ceredigion, plans, barriers and needs. These stakeholders included staff members from across the Council representing the following departments:

- Parking Services
- Fleet Management
- Estates
- Human Resources
- Planning
- The Sustainability Champion for Ceredigion

Open discussions were held with members of each department over Microsoft Teams. Questions were focussed around establishing a baseline position, including current charging situation, aspirations, and constraints regarding ECVP position.

The list of questions that were asked to the stakeholders can be found in Appendix A. These were used as a guide and to ensure consistency amongst the discussions.

The following section provides a summary of the main findings from the stakeholder engagement.

Policy and Overarching Strategy

There was clear, unanimous support from all stakeholders within CCC for an EV strategy to be developed for Ceredigion. Stakeholders were aware that EVs are becoming more prominent, whether owned by residents of Ceredigion or from tourists visiting the area and felt the urgency for installing appropriate infrastructure, to work around existing needs of the community and meeting future demand.

Stakeholders reported that:

- The current approach that CCC is taking to EVCPs and encouraging uptake is heavily linked to the Electric Vehicle Charging Strategy for Wales (2021).
- There has been a significant injection of funding from Welsh Government for the provision of EVCPs.



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County Council

- There is desire for an overarching strategy for CCC, to join up conversations within the Council and to take a leading role in defining its own policy and action plan for EVCPs, to support local uptake and demand.
- Following declaration of a climate emergency on 20 June 2019, CCC have published their strategy to achieving net zero carbon emissions from Council activities by 2030.

Current Demand and Charging Locations

CCC currently have four EVCPs located in staff car parks outside of the main office buildings, two in Aberaeron and two in Aberystwyth. Both of these are 'Fast' charge points, which were installed and are now maintained by Silverstone Green Energy. Payment for charging here is coordinated through GeniePoint. Further detail on the usage of these can be found on page 46 and 47.

CCC also own and operate 21 public car parks across the County. Stakeholders raised concern over ensuring accessibility of spaces in these car parks, finding the balance between providing ECVPs to meet demand, whilst still offering enough 'normal' spaces.

STAKEHOLDER ENGAGEMENT

Although the usage for the ECVPs is known, due to the unprecedented impact of Covid-19 over the past two years there is a reluctance within the Council to use this data to base decisions on.

Stakeholders were asked what they felt were the local barriers to EV uptake and deployment of EVCPs in Ceredigion. Whilst the main concerns were the same as those in other parts of the UK, it was clear that they were of heightened severity in Ceredigion, as detailed below:

- **Lack of charging infrastructure** – the lack of existing ECVP infrastructure is likely causing a ‘chicken and egg’ problem. Residents are reluctant to purchase or invest in an EV until there are reliable, local charge points.
- **Range anxiety** – the topography and ruralness of Ceredigion, with the lack of existing ECVP infrastructure means that range anxiety is a prominent issue. This may have an increasing impact on tourism rates within the County.
- **Culture of car ownership and cost sensitivity** – there is a high reliance on private vehicles in mid Wales (Ceredigion and neighbouring County, Powys) and skeletal public transport services available to residents. This leads to high car ownership rates, often with multiple vehicles belonging to a single household. The high cost of running two or more vehicles, combined with the

- tendency for prolonged usage mean that a County-wide switch to EVs will be a slow process.

Discussion with stakeholders also moved to the car ownership model and how this culture will likely change over the next decade. There was acknowledgment that simply switching ICE vehicles to EVs won't solve the transport issues across the County. Consideration of shared mobility and active travel, as discussed in travel hierarchies on page 5, is necessary.



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Future Demand and Charging Locations

Stakeholders were asked whether the Council has any forward plans for EVCP provision and for their predictions on the number or location of charge points that may be required.

Due to the unprecedented circumstances of the past two years throughout the Covid-19 pandemic, it is difficult to make demand predictions based on the usage of EVCPs that staff have seen. Many stakeholders presupposed that there have been changes in behaviour, with people travelling using different modes or reducing the number of journeys they make.

The general consensus amongst CCC colleagues was EVCP type should depend on the requirement at the location. For example: ‘rapid’ chargers at supermarkets, slower chargers at tourist attractions. They also mentioned that certain junctions within the County, where major roads intersect, are ideal locations for charge points as the nearby shops and restaurants benefit from the additional revenue when EV owners are parked and waiting. Encouraging dwell times at town centres through slower charging was suggested as an additional way to boost local economies.

Stakeholders were considerate of the need for EVCPs to be included within new housing developments and cater to the tourism/coach demands the County has.

STAKEHOLDER ENGAGEMENT

Ceredigion County residents can submit location requests for EVCPs, as well as forward praise or complaints over the existing through the Council website, CLIC Customer Service Centre. These are directed to the Carbon Reduction, Energy and Asset Management Programme Manager, but **currently requests for EVCPs are very infrequent.**

Stakeholders highlighted that they **expect to see more private businesses taking the initiative**, such as the 6 Tesla superchargers that Ffordd Parc y Llyn, Aberystwyth Park Lodge Hotel recently have installed. They are also keen to see the rise of community groups taking action to raise or apply for funding for EVCP, more details can be found on page 29.

As Ceredigion receive a **high volume of tourists** during the summer months, particularly to Aberaeron, New Quay and Llangrannog, **demand will be heightened from May to September.** The number of EVCPs installed need to be a balance between meeting demand at this time of year and downtime when visitor numbers are lower.

Whilst CCC are looking at installing around 2 – 4 EVCPs per Council owned car park, they are

proceeding with caution to look at how each is used. However, as for example, lighting columns are sparser across Ceredigion than in urban areas, they felt that conventional column mounted AC chargers are the primary option for charging provision.

Stakeholders were concerned that EV charging should be accessible to all residents of Ceredigion, particularly those with no off-street parking provision. CCC foresee that local car parks with EVCPs will provide a reliable charging option for local residents, as well as visitors to the area.

Charging Solutions

The greater presence of EVs around the County has meant that stakeholders feel more pressure to think about charging provision.

During one of the sessions, one stakeholder shared that they “think it’s important that we [CCC] play a part, especially in car parks especially with regards to tourism, but can’t bear the brunt of it all, businesses must play their part”.

CCC has a **ULEV Steering Group** that meet fortnightly to discuss all matters arising, related to EVs and charging infrastructure.

Stakeholders highlighted that as more charge points are installed across the County, continuity must be maintained to as great an extent as possible. This could mean a centralised app, or a single provider, all with contactless payment mechanisms. This is to provide ease of service to residents and tourists following a Mobility as a Service (MaaS) approach.

Stakeholders understood that regardless of the way EVCPs evolve, they needed to be visible so those considering an EV would not be put off by a perceived lack of charging infrastructure. They need to be considering the right charge point for the right location, including considering mobility hubs for overnight charging with residents that don’t have access to off-street parking.

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STAKEHOLDER ENGAGEMENT

Installation, Operation and Maintenance

For all EVCPs that are installed across the County, CCC would want this provider to carry also out the operation and maintenance.

As outlined in the Electric Vehicle Charging Strategy for Wales Action Plan, in the next year, Welsh Government will review building regulations to support the provision of home and workplace charging across Wales for both refurbishment and new build projects. Whilst in England, this is now required by law. Stakeholders were aware of this possible legislative change and have already seen EVCPs being installed at new school sites or refurbishments. As part of this, they were also keen to understand how the Council can support residents that don't have access to off-street parking, what the demand will be for off-street charging and whether this falls under the remit of the Council.

An Operators View

Engagement with Charge Point Operator (CPO), Dragon Charging was carried out as part of this Strategy, about their plans for Ceredigion. They already had one charger in Ceredigion but had plans for more.

They envisage the growth of EVs to continue and they consider that Ceredigion as the midpoint on the Welsh coast and a major tourist destination offers the opportunity to be a prime location for EVCPs.

The Topography of Ceredigion

Many of the interviewees highlighted the challenging topography of the region and how this shapes the lives and habits of the residents. The way people access work, leisure, and services is different in such a rural area. There is no back up mode of transport, so any solution needs to work, every time.

As a largely rural County, many people work in agriculture and using large diesel vehicles is not only normal, it is a way of life. Switching these individuals to EVs is not an easy challenge. For EVs to become commonplace in the more isolated parts of the area, they are going to have to demonstrate that they are reliable, can handle the road conditions in Ceredigion year-round, and are able to manage the unique challenges that people working in agriculture face.

There are many areas of conservation within Ceredigion and for installation of EVCPs in these areas, planning permission may need to be sought.

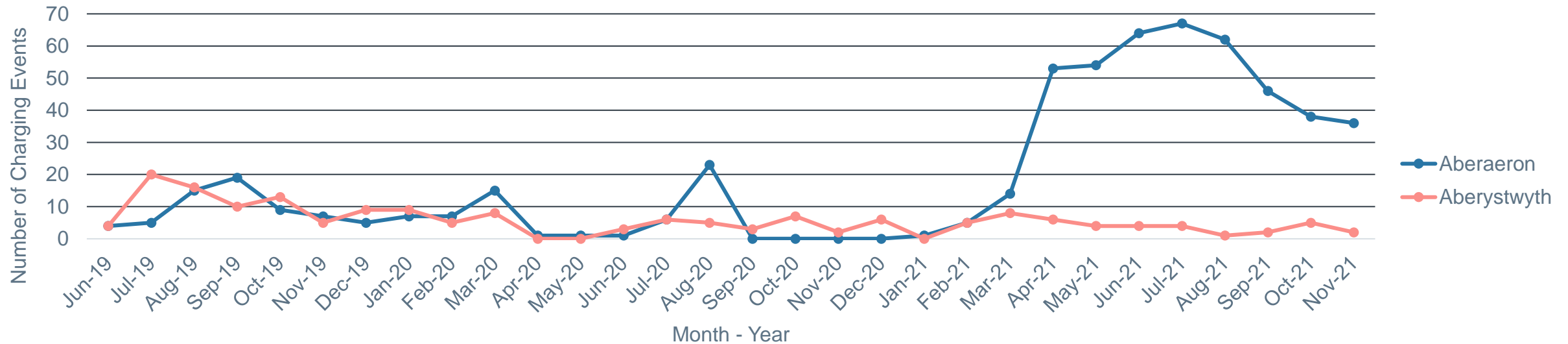


Ceredigion County Council

CCC OFFICE CHARGE POINT DATA

Overview of Current Council Carpark EVCP Usage

Figure 20: Comparison of total number of charging events per month between Aberaeron and Aberystwyth Council office EVCPs.



CCC collect an extensive dataset from their existing EVCPs in the two Council office car parks - Aberaeron/Aberystwyth. As shown in Figure X, usage at Aberystwyth has been fairly stable over the past two years, with the typical number of charging events **under 10**.

In Aberaeron, usage at this EVCP was similar to Aberystwyth until February 2021. From March 2021 onwards, this EVCP has seen over a **150%** increase in usage. Despite both the EVCPs being located within staff car parks, members of the public are also allowed to use the charge points. This means that Covid-19 work from home restrictions may not impact usage as local residents can still access the charge point.

According to ZapMap there is only one EVCP in Aberaeron. It is possible that as demand for EVCPs has increased, particularly over the past 12 months, that this chargepoint has seen such an increase in demand due to lack of surrounding charging options.

The Aberystwyth office is located more remotely in comparison to the central location of the Aberaeron office. In turn, at the local supermarket in Aberystwyth, EVCPs have been installed which are therefore more convenient for people to use than driving out to the Council office charge point.

CCC OFFICE CHARGE POINT DATA

Overview of Current Council Carpark EVCP Usage

Figure 21: Comparison of average charge duration each month between Aberaeron and Aberystwyth Council office EVCPs.

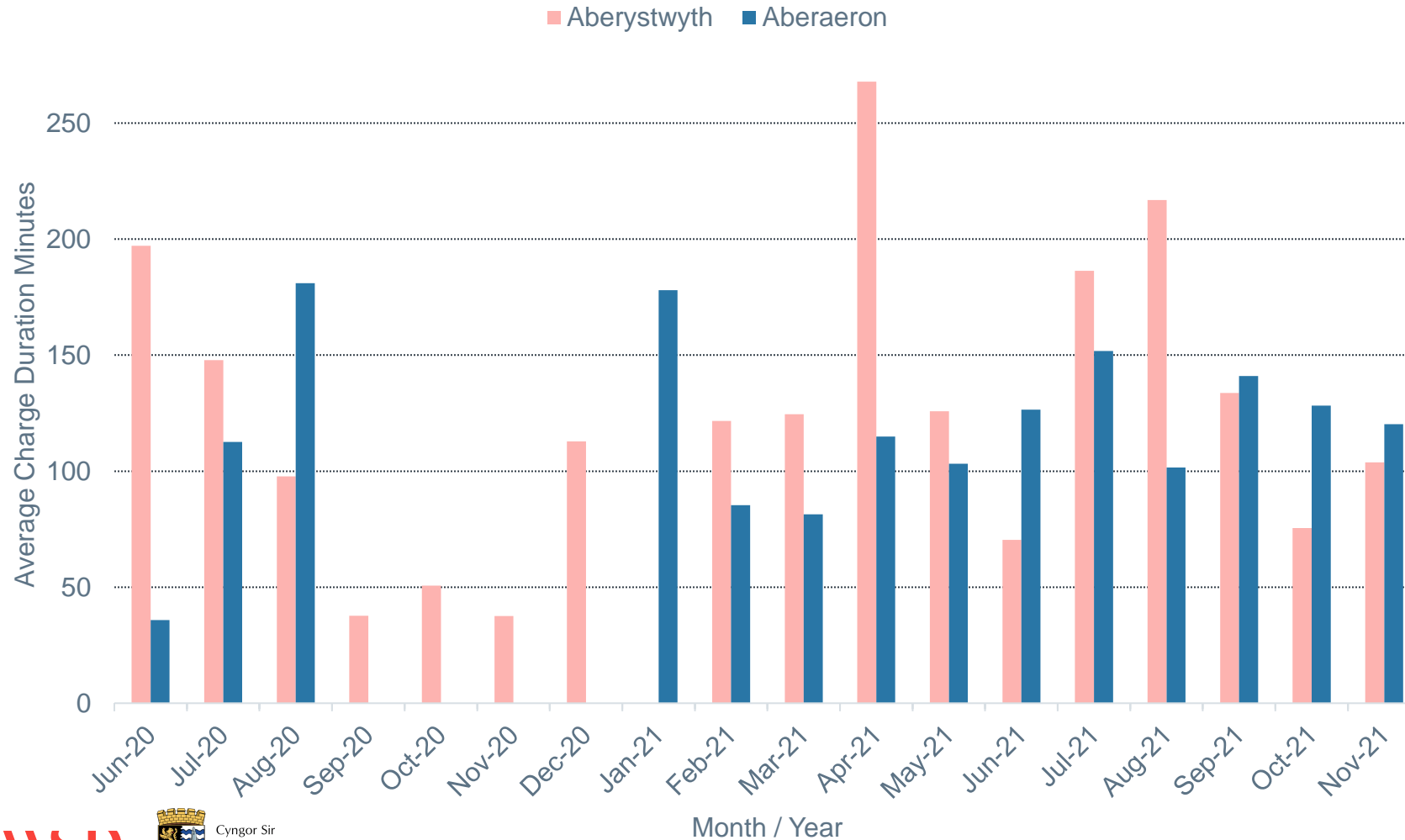


Figure 21 shows the average charge duration each month at each of the EVCPs in the Council office car parks.

Across both sites, since the EVCPs were installed in 2019, the average charge duration has been **122** minutes.

While the previous chart showed that Aberaeron has recently been used much more, this chart shows us that average use at Aberystwyth is generally longer. This is likely due to the location, as a longer stay 'destination' than Aberaeron.

FLEETS

A Note on Hydrogen

Using hydrogen as a fuel was considered prior to this project, however, it falls out of the scope of this study.

In addition to EVCPs, there is a potential for hydrogen to be an alternative fuel for large fleet vehicles run by the Council (e.g. buses and waste lorries).

There is an opportunity to work with private companies to create a hydrogen solution within Ceredigion and there are a range of subsidies that may be available to the Council when investigating this route. Ceredigion is already working with Statkraft to investigate producing green hydrogen in the region.

Hydrogen should be considered as complimentary to EVCPs with each having a role to play in the decarbonisation of transport.

The Department for Transport are investing in a hydrogen transport hub in the Tees Valley and it is seen as a key strategic component in fully decarbonising the UK's economy. In Wales, there is the Holyhead Hydrogen Hub which aims to build a plant to support the decarbonisation of heavy goods vehicles.

Grey Fleet

As of January 2022, a report carried out by the Welsh Government Energy Service found that there are **1,484** vehicles in their grey fleet (private cars used for staff travel). **53%** of these were diesel vehicles, with only one zero-emission electric car in the grey fleet – a VW Golf. There were also three petrol plug-in hybrid vehicles and four petrol hybrids.

In 2019/20, the Ceredigion grey fleet mileage totalled **2.3 million** miles and emitted 616 tonnes of greenhouse gas emissions. Mileage repayments cost CCC £1.03 million.

If CCC is to meet its target of being a net zero Council by 2030, it needs to reduce grey fleet mileage by 287,000 miles every year from 2022 to 2030, or transfer the mileage to a zero emission fleet. The recommendations from the report by the Welsh Government Energy Service are reflected, where applicable in the Action Plan presented from page 76 onwards.

Council Owned Fleet

Welsh Government has set targets for the decarbonisation of the public sector fleet within the 'Prosperity for All: A low carbon Wales' plan. They stress that the public sector need to take a proactive

approach to considering and implementing opportunities to reduce emissions from their transport activities.

A particular case study within the plan highlights success in Swansea, when Swansea City Council switched 10, and then 40, small vans within their fleet to all-electric. They applied a lessons learned approach, using telematics data for detailed analyses of usage, dash mounted driver monitoring and route optimisation. The payload and range have not been a barrier to implementation, with only slight changes in working patterns required, given vehicles largely return to depots at the end of the day, avoiding the need for fast or rapid chargers in Council depots.

As identified in the stakeholder interviews undertaken as part of this study, previous concerns over going electric included range anxiety across a large and sparsely populated region, lack of capacity and the necessity to upskill staff as expertise is required for maintenance.



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Forecasting

Demand and Charging Requirements



FORECASTING DEMAND AND CHARGING REQUIREMENTS

EV Uptake Forecasting

Overview

Having baselined the existing EV uptake and EVCP provision in Ceredigion, this report section focuses on the future uptake of EVCPs, forecasting demand and requirements to 2030.

Using the demand forecast, analysis has been undertaken to provide an indication of requirements for publicly accessible EVCPs. Those requirements have informed the recommendations presented later.

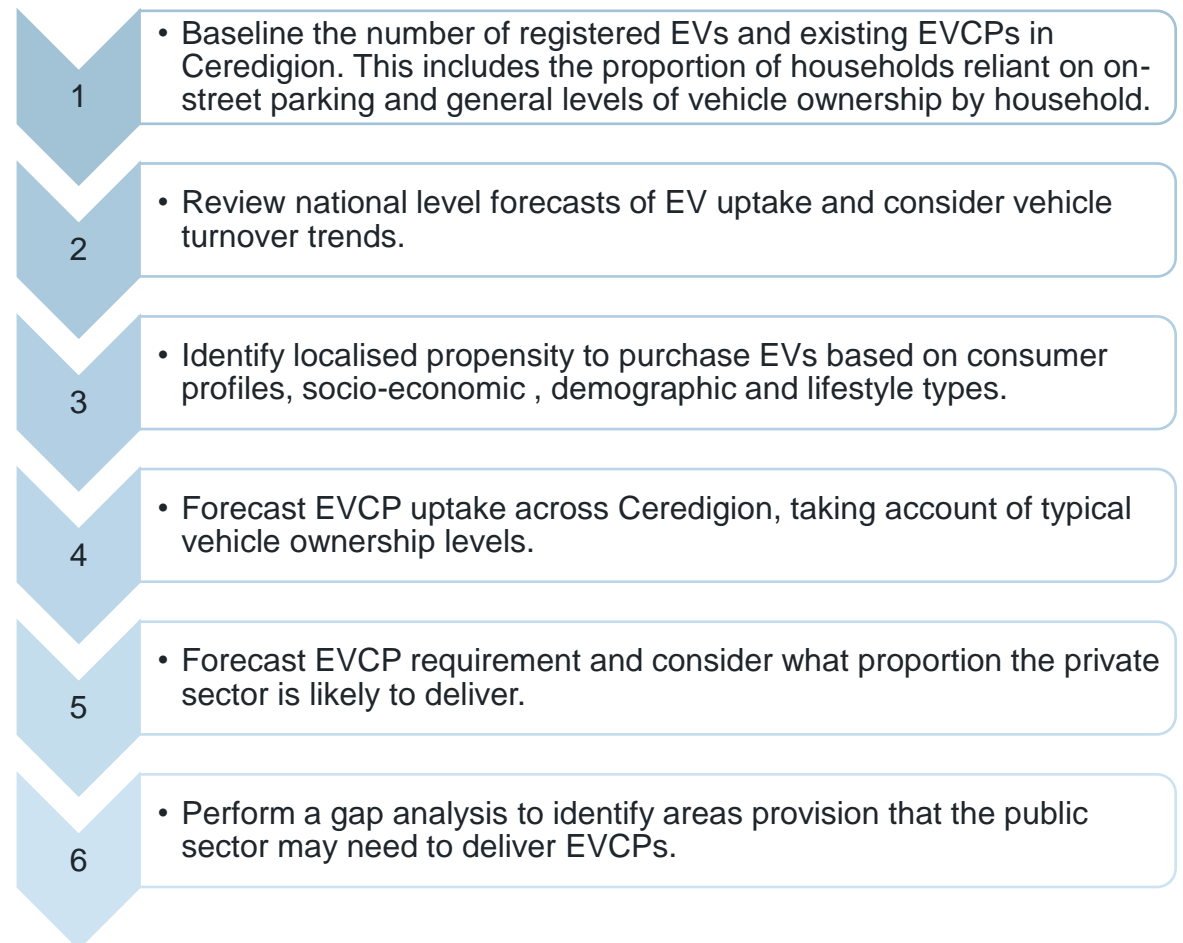
Approach

The broad approach taken to forecast EV uptake across Ceredigion, and subsequent requirements for EVCP provision is summarised in Figure 22. The approach utilises WSP's in-house EV:Ready tool to derive forecasts for future EV uptake.

EV:Ready enables sophisticated EV uptake forecasting and scenario testing. It generates granular forecasts at a neighbourhood level, accounting for highly localised spatial variations in the key determinants of EV uptake rates, including consumer profiles, socio-demographics, the availability of off-street parking, vehicle ownership, vehicle sales and turnover rates and vehicle ownership trends.



Figure 22: Steps taken as part of EV:Ready.



EV AND EVCP FORECASTING

The following section covers forecasting, but while we have been as precise as we can be, it is necessary to be mindful of the changes impacting vehicles, chargers and ownership.

Trends in Vehicle Technologies

Trends in vehicle technology, in particular range, battery size, efficiency and charge rates supported influence future charging infrastructure requirements. There has been a steady upward trend in all of these aspects and that trend is expected to continue.

Faster charge rates (kWh) and an increasing number of vehicles supporting ultra-rapid charging potentially means a greater share of charging (in terms of energy consumed) could be delivered by fewer ultra-rapid chargers.

Equally, however, larger ranges and battery capacities will lessen the need to stop at an intermediate charger on route. Improving vehicle efficiencies (miles per kW) also

having implications for charging requirements, – range, efficiency.

Trends in Charger Technologies

Similarly, the EV charger technology is evolving, with increasing charge rates being delivered at up to 400kWh/ 900V+, as well as improved functionality and ease of payment, scalable lower cost deployments and smart load management.

Whilst future EVCP requirements will depend on the prevailing average charge rates and the number of vehicles which can be supported by each unit, a further consideration is the legacy charge points and what this means for their average charge rate.

Ownership Trends

The number of EVs on the road is growing and will continue to grow over the coming years – in 2020 more alternative fuel vehicles were registered than diesel. Department for Transport statistics shows that while there is

an increase in the number of all vehicle types registered the UK, the increase has been slowing in recent years.

A rise in Shared Mobility options has the potential to depress new registrations further. As those who use Shared Mobility are often urban and choose to do so due to environmental concerns, these vehicles may be more likely to be EVs.



EV UPTAKE FORECASTING

Spatial Analysis of Forecast Uptake

The EV:Ready forecasts allow the spatial variations in EV uptake across Ceredigion to be considered and in turn, the resultant requirement for EV charging infrastructure across the County.

Figures 23-30 present a number of the key determinants in forming these forecasts.

Propensity of Local Residents to Switch to an EV

Figure 23 presents the forecast propensity of residents to register an EV across Ceredigion, based on the socio-demographic factors such as earnings, education and lifestyles, including attitudes towards new technology and to environmental issues, as well as their likelihood to buy a new vehicle and hybrid vehicle ownership.

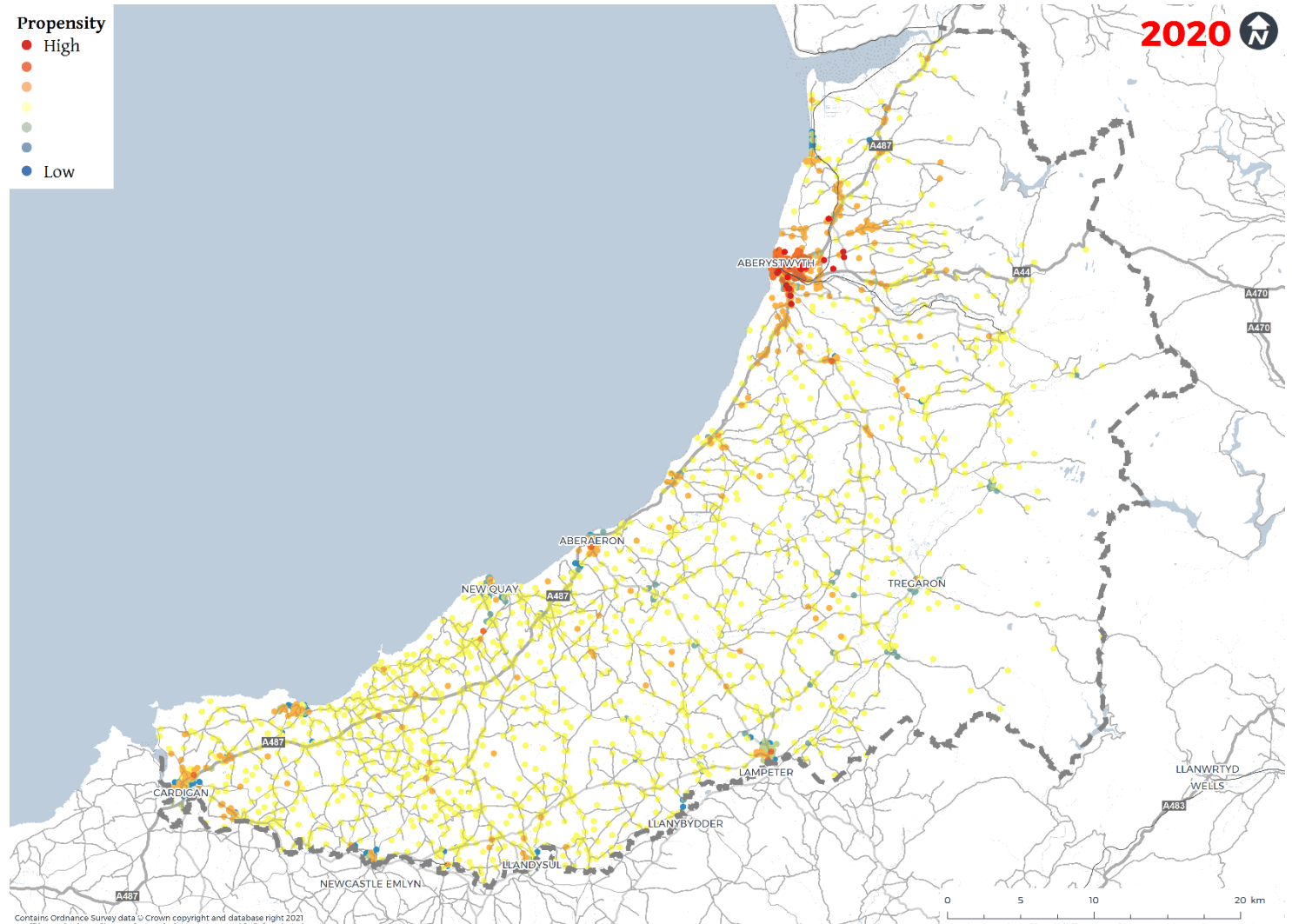
These findings indicate that the areas with the greatest propensity for switching to EVs are concentrated in and around Aberystwyth.

Whilst the majority of areas in the County have a medium propensity, Tregaron, Llandysul, and the parts of Newcastle Emlyn and Llanybydder in Ceredigion, are much lower.

Lampeter, Aberaeron, New Quay and Cardigan have a mixed concentration, with the forecast towards switching to EVs in pockets of both high and low propensity.

This is only one of several factors influencing EV uptake, however, as discussed on the following pages.

Figure 23: Forecast propensity of residents of Ceredigion to switch to electric vehicles.



EV UPTAKE FORECASTING

Vehicle Ownership Levels

Figure 24 presents average vehicle ownership levels by household at a post code level, based on ONS data.

As described earlier, understanding the baseline car ownership levels across the County is important, as whilst some local populations may have a high propensity to switch to an EV in principle, if they are not already a vehicle owner, they would not be expected to become one just to purchase an EV. So EV propensities must be considered in conjunction with the car ownership levels of a given area.

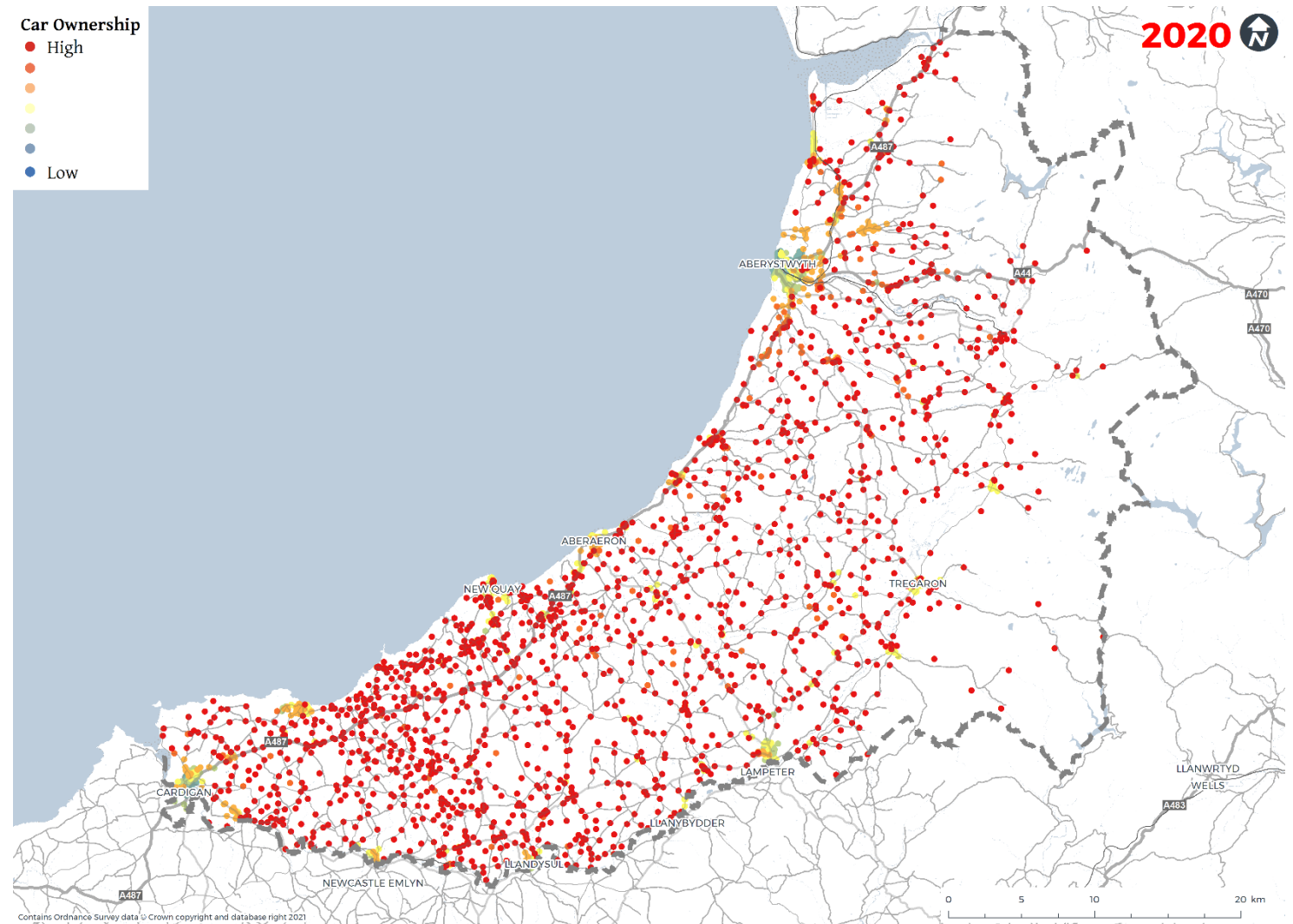
The areas of lower car ownership are concentrated mainly in and around Aberystwyth. Lower levels are also observed in the smaller towns of Cardigan and Lampeter, but not to such the extent as in Aberystwyth.

This is likely due to where public transport and active travel is more greatly accessible and parking is more constrained, as well as student populations.

In contrast, the smaller more rural settlements across the County are very much more car dependent, which is reflected in their higher levels of vehicle ownership

Blank areas on the map indicate a lack of data due to these areas being very low in population.

Figure 24: Vehicle ownership by household in Ceredigion.



EV UPTAKE FORECASTING

Off-Street Parking

An important factor in EV ownership is the extent to which areas have access to off-street parking, where owners can conveniently and reliably charge their vehicle overnight.

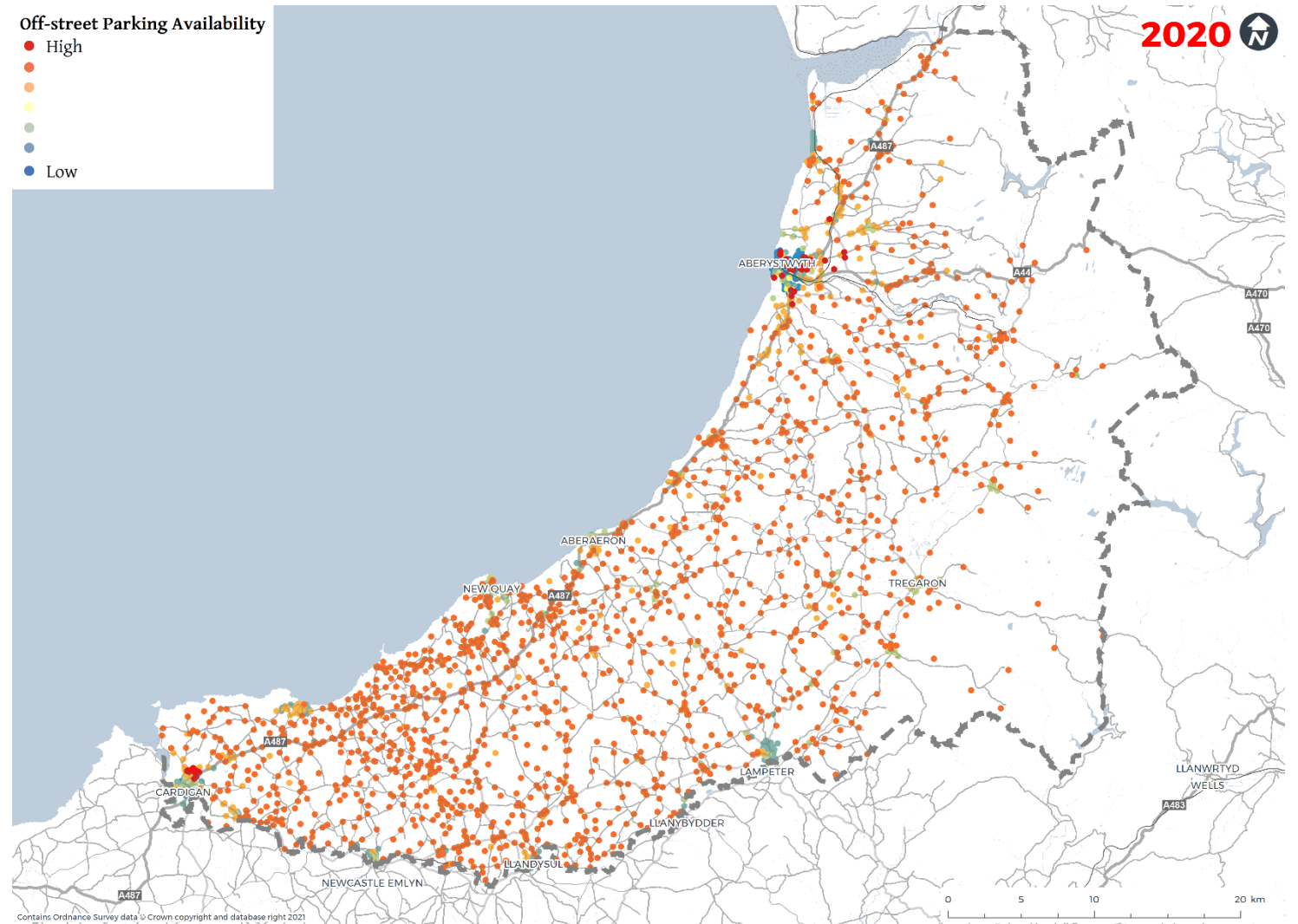
In the NextGreenCar, Committee on Climate Change's 'Plugging the Gap' (2018) study it was found that those with access to off-street charging are three times more likely to switch to an EV. It also showed 93% of EV owners are estimated to have access to home charging, despite between 20-40% of vehicles nationally having no such access.

The likelihood of an area having access to off-street parking is based on the typical property types of the predominant Mosaic group at a postcode level and assumes that terraced dwellings and converted flats would be reliant on on-street parking. All other housing types such as detached dwellings, semi-detached dwellings and purpose-built flats are assumed to have dedicated off-street parking and therefore not reliant on on-street parking.

The detrimental impact of a lack off-street parking is expected to lessen over time as EV ranges increase, recharging times shorten and public infrastructure improves.

In Ceredigion 19% of households are estimated to be reliant on on-street parking.

Figure 25: Off-street parking availability in Ceredigion as of 2020.



EV UPTAKE FORECASTING

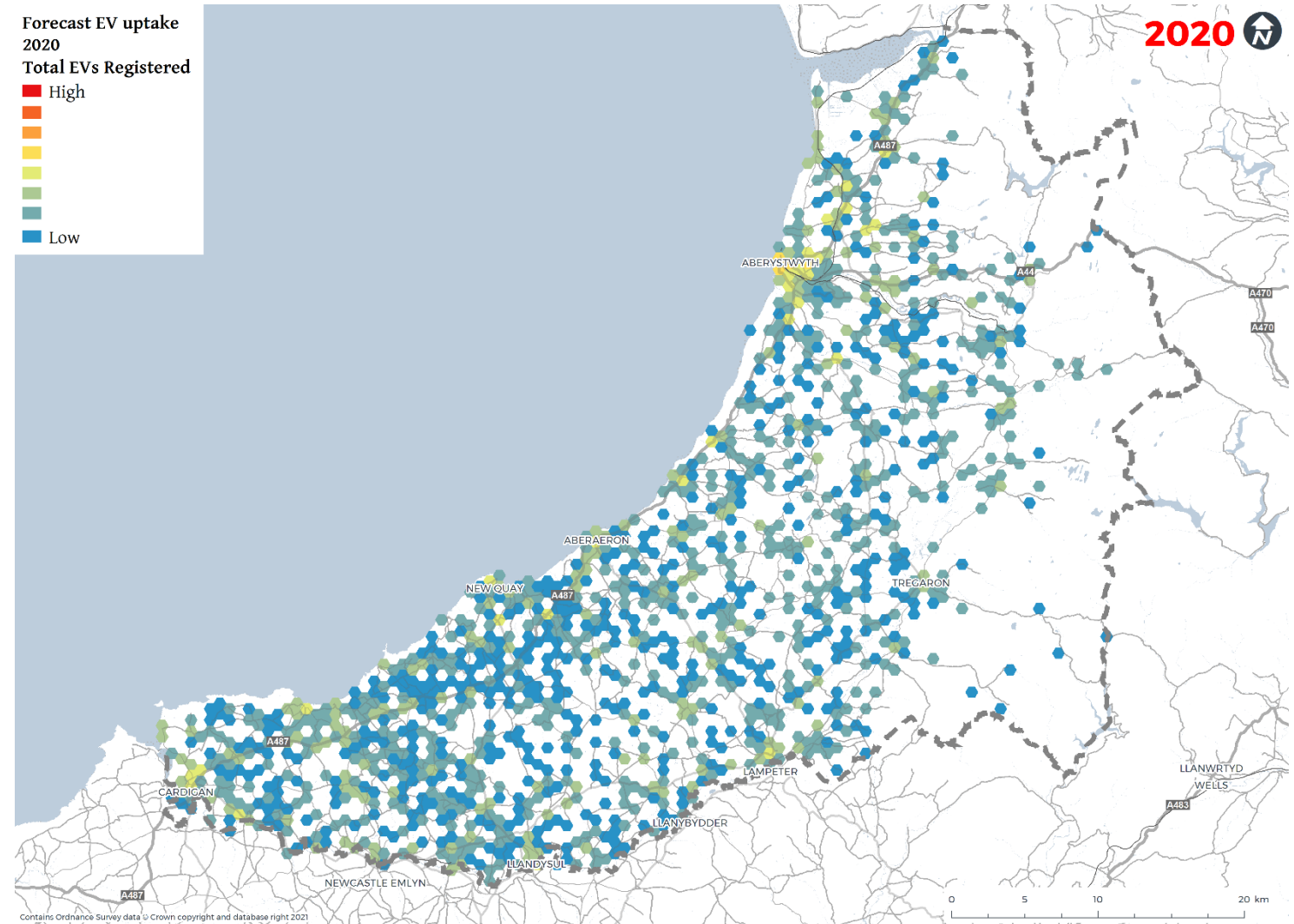
Forecasting EV Uptake across Ceredigion

The preceding inputs and analysis culminate with a detailed spatial forecast of EV uptake across Ceredigion up to 2030.

As can be seen in Figure 26, 27 and 28, the competing influences of the local populations propensity for switching to EV, their car ownership levels, and the extent to which they are reliant on on-street parking serve to create a nuanced picture of EV ownership across Ceredigion. This is because areas with high propensities towards EV ownership are often partly offset by also being areas of lower car ownership and greater reliance on on-street parking.

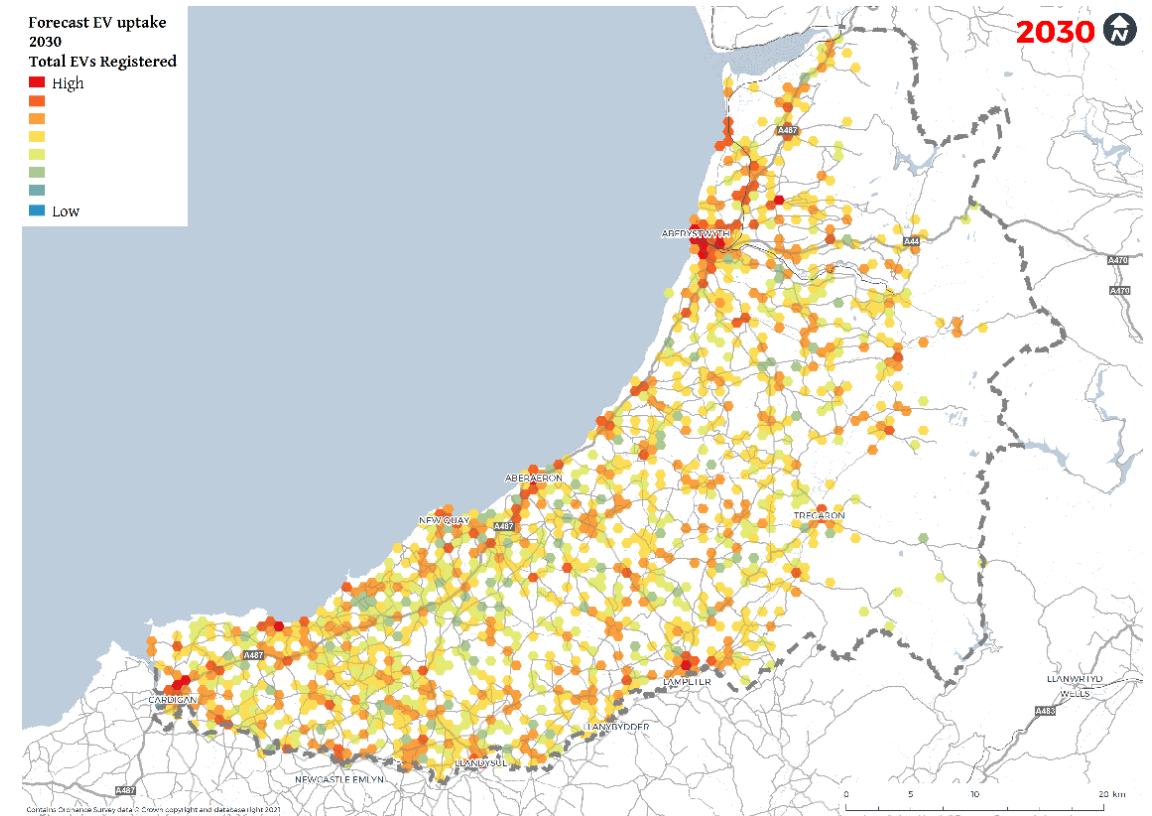
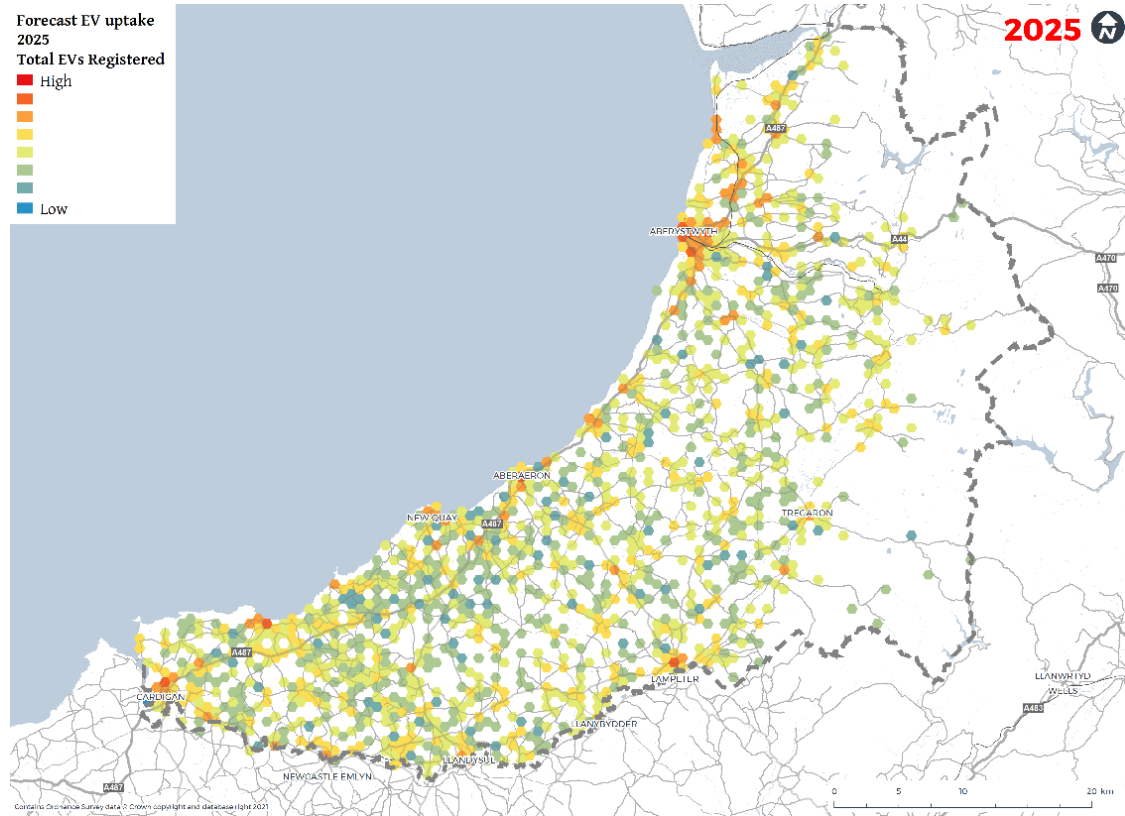
In 2020, Aberystwyth had the greatest concentration of EVs, though this in part reflects the greater density and numbers of vehicles owned.

Figure 26: Forecast EV uptake across Ceredigion (number of EVs registered) 2020.



EV UPTAKE FORECASTING

Figure 27 and 28: Forecast EV uptake across Ceredigion (Number of EVs registered) 2025 (Left) and 2030 (Right).



EV UPTAKE FORECASTING

Share of Vehicles

Figure 29 and 30: Forecast share of vehicle registered made up by EVs (%) in 2020 (Left) and 2025 (Right).

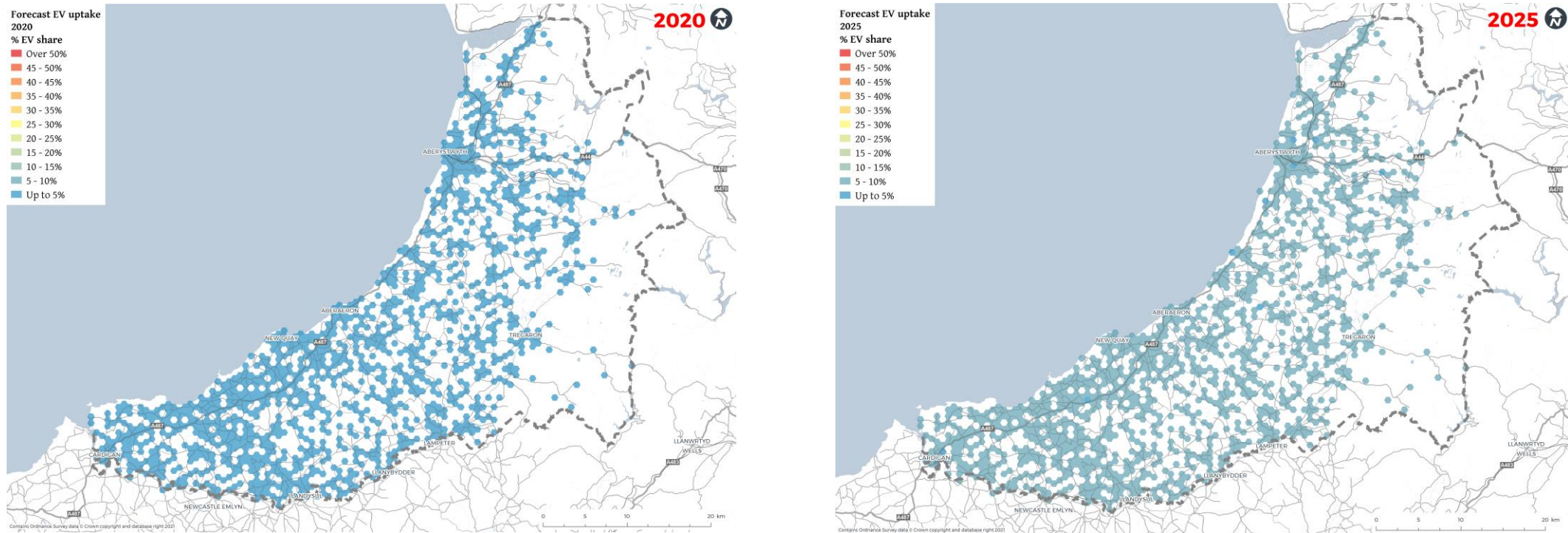


Figure 29, 30 and 31 report the proportion of total vehicles registered in the County, which are forecast to be EVs by 2030. This gives a clearer sense of where EV ownership is expected to be higher in relative terms, once accounting for difference in the numbers of vehicles registered.

In 2020, EV ownership of the total proportion of registered vehicles is up to 5% all across the County. This will increase to **5-10%** by 2025. The reason for the lack of variability is because, currently, the numbers are so low – the highest point is **0.09%** of vehicles in an area are ULEVs. In addition, there is a lot of homogeneity among the population of Ceredigion so the numbers seem to grow at the same rate across the region.

See next page.

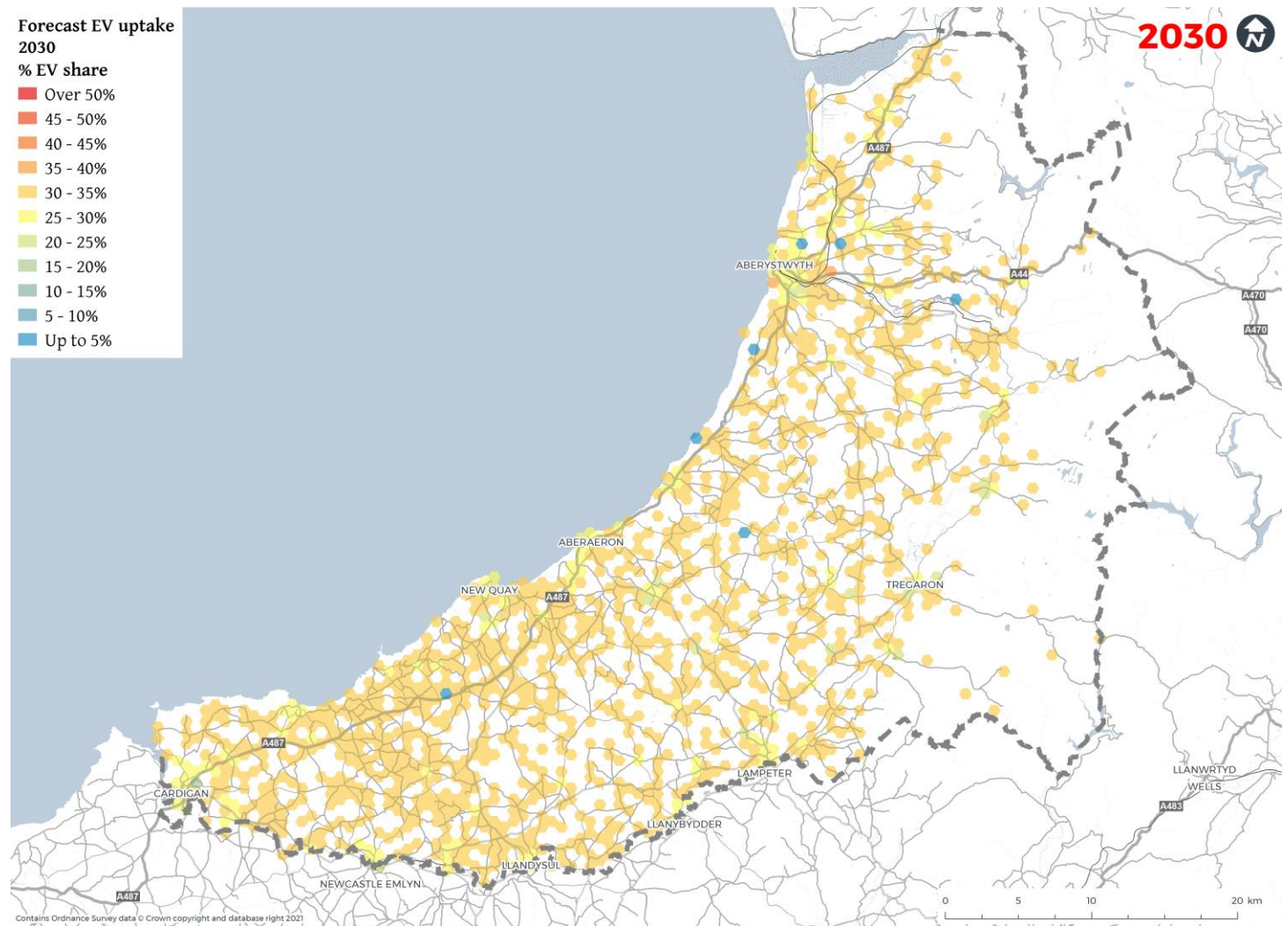
EV UPTAKE FORECASTING

As can be seen in Figure 31, it is estimated that by 2030 **30-35%** of registered vehicles will be EVs across the majority of Ceredigion. Across the urban service centres, registered EVs are only between **25-30%**.

There are six points across the County in which only 5% or less of registered vehicles that are EVs. These are located particularly along the A487 and outside Aberystwyth. These may be areas that are important to target in the Council's communication and engagement, but these lower rates of registration are likely due to local variation and may differ in location or forecast percentage value.



Figure 31: Forecast share of vehicles registered made up by EVs (%) in 2030.



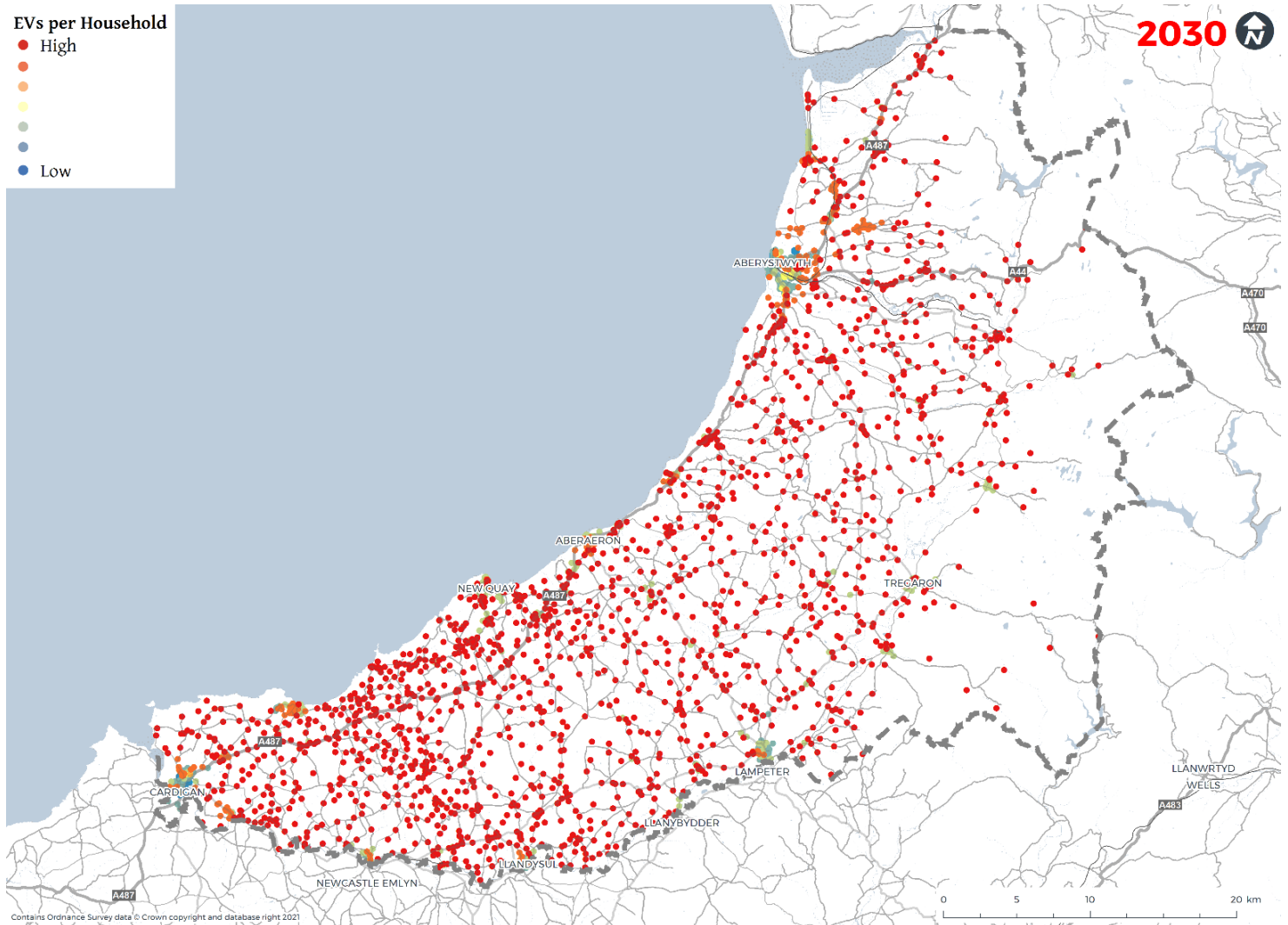
EV UPTAKE FORECASTING

EVs per Household

Figure 32 reports the forecast number of EVs per household, which provides a further means of reviewing how uptake may vary, once accounting for household densities. This illustrates that at a household level, many of the more rural parts of the District are expected to see relatively high EV registrations, in part reflecting the greater car dependency and increased availability of off-street parking, making it easier to charge at home.

More dispersed settlements stand out as areas with a high ratio of EVs per household forecast. Cardigan, Llandysul, Aberystwyth and Lampeter are predicted to have areas with a lower number of EV ownership per household which, particularly in Aberystwyth and Lampeter, may be due to the large student populations. In Cardigan, the lower number of EV ownership per household may be due to lack of availability of off-street parking as shown in Figure 25.

Figure 32: Forecast number of EVs per household by 2030.



	By 2025 5% EVs	By 2030 30% EVs
Forecasted EVs	2,735	17,250

FORECASTING DEMAND AND CHARGING REQUIREMENTS

Defining Adequate EVCP Provision?

As well as the challenges already outlined, a further difficulty in forecasting EVCP requirements lies in what is deemed to be 'adequate' EVCP provision. This could be taken to mean the absolute minimum level of provision required, assuming all the EVCPs are optimally positioned and intensively utilised.

Conversely, it could be taken to mean what is sufficient in terms of providing users with the utmost reassurance that there is adequate EVCP coverage/availability, or their perceived requirement. It could also extend to minimising waiting times and maximising convenience, or sweating the asset and maximising EVCP utilisation to improve the investment case. Whether the charge points are provided at scale at destinations and used to graze/ 'top up charge', or used intensively in EV only bays is another underlying factor.

A further consideration is EVCP reliability and availability. At present EVCP utilisation is typically very low, in many cases EVCPs have been installed ahead of demand and have sometimes been poorly

situated. As the number of EVs increases this would be expected to increase.

Ratio of EVs to EVCPs

A critical judgement around the ratio of EVCPs to EVs required, is the proportion of EVCPs made up of standard/fast chargers and rapid chargers.

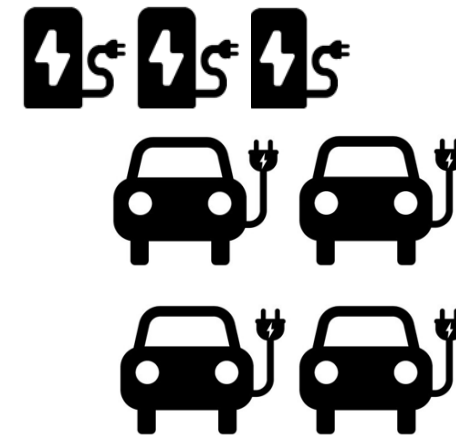
Recognising the challenges outlined above, a top-down and bottom-up approach was undertaken, to enable benchmarking of the outputs against a range of industry forecasts. The assessments were also informed by stakeholder engagement undertaken with a range of CPOs.

A wide range of estimates for EV:EVCP ratios are reported within industry publications, including IEA, CCC, ICCT, T&E, Deloitte, and SMMT, drawing markedly different conclusions as to the number of EV chargers required.

Based on a literature review and market engagements, for standard/ fast chargers between 5

and 50 EVs per EVCP were suggested, whilst for rapid chargers between 90 and 1,000 EVs per Rapid were suggested.

The significant ranges in these Figures serve to illustrate the significance of the differing assumptions as outlined earlier, plus in many cases each is referring to a slightly different scenario (e.g. standard/fast chargers only, differing charge rates assumed, inclusive of workplace chargers etc).



EVCP DEMAND FORECASTING

EVCP Requirements

The forecast of uptake of EVs in Ceredigion by 2030 enables an assessment of charging infrastructure requirements.

Demand that is considered within this report is limited to publicly accessible charge points. Forecasting these requirements present a number of challenges and is a matter of debate within the industry. There a wide range of estimates based on a number of critical assumptions and forecasts implicit with any such estimates, including the following:

Charging Habits

At present, a large majority of charging takes place at homes and workplaces (~80% of kW delivered). However, this ratio may change over time and it is necessary to consider the extent to which vehicles will use public chargers and so the demand, as opposed to private residential or workplace charging.

There are some contrasting and often strong held views amongst the EV industry as to whether in the future, EV charging habits and infrastructure will pivot more decisively away from the current model, towards a far larger proportion of charging at ultra-

rapid charging hubs, with quick turnaround times which are more akin to the petrol station model.

Others anticipate sustained high levels of home and workplace charging, or greater destination charging, with slow/fast chargers proliferating within car parking spaces and supporting a 'grazing' or top-up behaviour.

Workplace charging may sometimes double as publicly accessible charging. There are also diverging views of the extent to which workplaces will accommodate employees wishing to charge, particularly where larger numbers of chargers would be required, triggering electrical upgrades making them more costly to install. Comment about how this doesn't really support workplace travel hierarchies and may be difficult to predict post covid.

Off-street Charging Availability

Assessing the future trends in EV charging behaviour is difficult due to the small number of present owners, compared to the overall vehicle fleet. Current EV owners are still dominated by early adopters which is not necessarily reflective of attitudes of the wider population.

In addition, most EV owners to date are estimated to have access to off-street parking. Lack of this may act as a substantial barrier to uptake.

As the profile of EV owners comes to reflect the wider population, this will see an increase in the proportion of EVs with no access to home charging, and so more reliant on public infrastructure.



EVCP FORECASTING - TOURISM

Tourism

According to data from 2019 (the best estimate given Covid disrupted summers), there were 2.9 million visitors to Ceredigion. 88% of visitors arrive by car and an average of 2.5 people per car, means there were around 1 million cars driving to Ceredigion in 2019. If we consider the distances travelled, 50% of the cars travelled from over 41 miles. Using this as a round trip Figure, these are the cars that may require charging as their trip is over 80 miles. As technology

improves, battery lives will get longer. and people change their behaviour or create new habits (perhaps charging over night to leave on a full battery) the lengths of journey requiring charging may change.

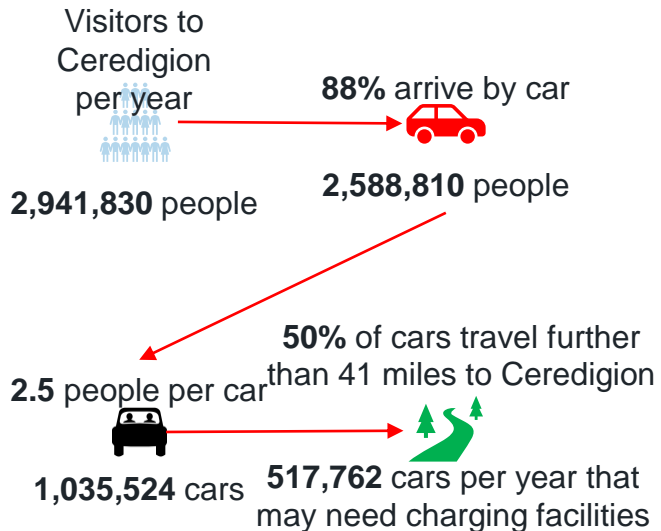
These rough figures indicate that there are about 500,000 cars per year, who might need to charge their vehicles in Ceredigion. Below we have set out the number of ULEVs from tourists based on rates of 1.62% (current national uptake), 5% (rough national

2025 uptake), and 30% (rough national 2030 uptake). As the type of people who visit Ceredigion (older families) are more likely to have ULEVs, these numbers may be an underestimate.

As the vast majority of visitors come in the summer, and camp/caravan (where there may be limited electrical supply) public EVCPs must be a priority.

Additional WSP EV Studies, Global Tourism Solutions STEAM Report, Visit Wales Accommodation Occupancy Survey Annual Report 2020, Tourism Profile – Mid Wales 2017 - 2019 (gov.wales), Welcome to Wales: 2020 – 2025 - Priorities for the visitor economy.

Table 6: Estimated tourism numbers across the year in Ceredigion.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
More than 41 miles	18,220	22,488	38,753	37,516	49,704	46,084	70,639	92,143	54,681	44,026	25,821	17,686	517,762
% by Month	4%	4%	7%	7%	10%	9%	14%	18%	11%	9%	5%	3%	100%

Predicted ULEVs	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2022 - 1.62%	295	364	628	608	805	747	1,144	1,493	886	713	418	287	8,388
2025 - 5%	911	1,124	1,938	1,876	2,485	2,304	3,532	4,607	2,734	2,201	1,291	884	25,888
2030 - 30%	5,466	6,746	11,626	11,255	14,911	13,825	21,192	27,643	16,404	13,208	7,746	5,306	155,329

FORECAST EVCP REQUIREMENTS

Forecast Scenarios

Based on the ratios of EVs to EVCPs, a series of forecasts for the number of publicly accessible EVCP required across Ceredigion were developed. Forecasts are presented for the Low, Mid and High ratios, where:

- **Low** – means fewer EVs per EVCP, i.e. a more generous level of public charging provision, assuming each charger is utilised less intensively, with lower average charging rates.
- **High** – means more EVs per EVCP, i.e. fewer public charger points, assuming chargers are optimally deployed, with higher average charge rates.
- **Mid** – is a middle ground between these two extremes, assuming increasing utilisation and charging rates.

Table 7 shows that in 2030, there is expected to be a requirement for around **376** EVCPs under the mid ratio forecast, assuming a blend of both rapid and fast chargers. Under a lower ratio of EVs to EVCPs, this rises to **700** EVCPs, and under a high ratio it falls to **198** EVCPs.

These forecasts do not take into account tourist numbers as we do not have enough data to make those forecasts comfortably. However, we would suggest that the holiday sites cater for these groups: campsites, caravans, and B&Bs.

Table 7: Forecast EVCP requirement to 2025 and 2030.

Forecast EVCP Requirement	2021	2025	2030
Low	15	87	198
Mid	21	153	376
High	32	225	700



FORECAST EVCP REQUIREMENTS

Figure 33 Forecast requirements between now and 2030 for publicly accessible chargers based on Lower, Medium or Higher EVCP provision as explained on page 63.

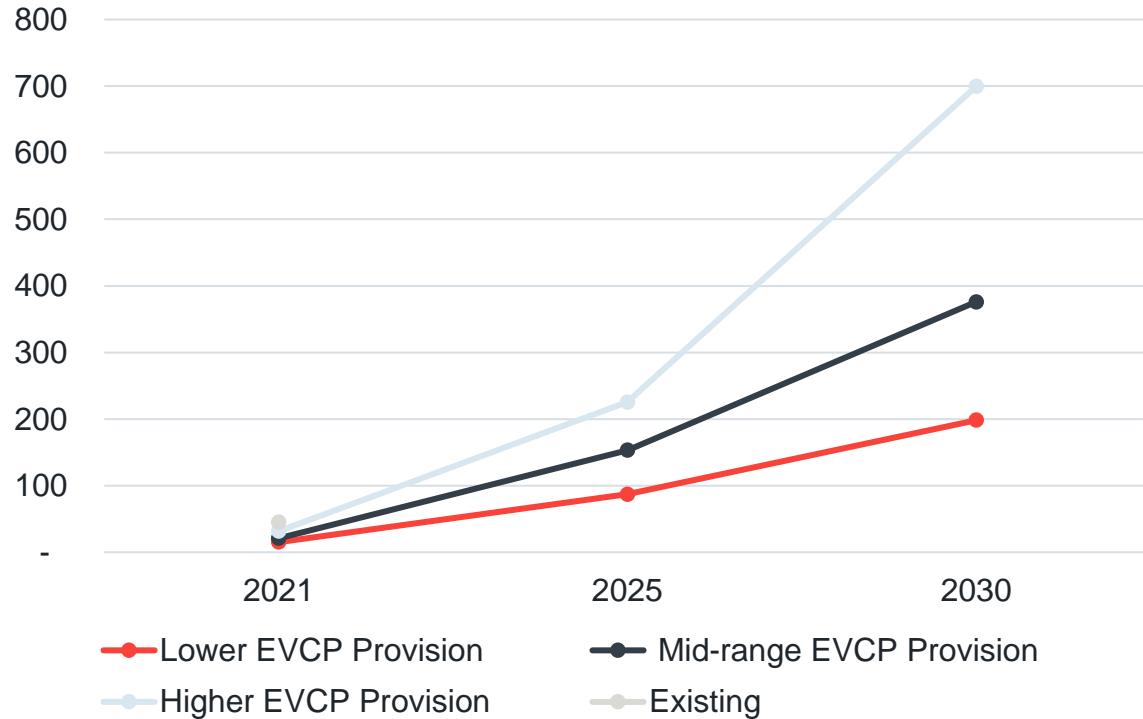
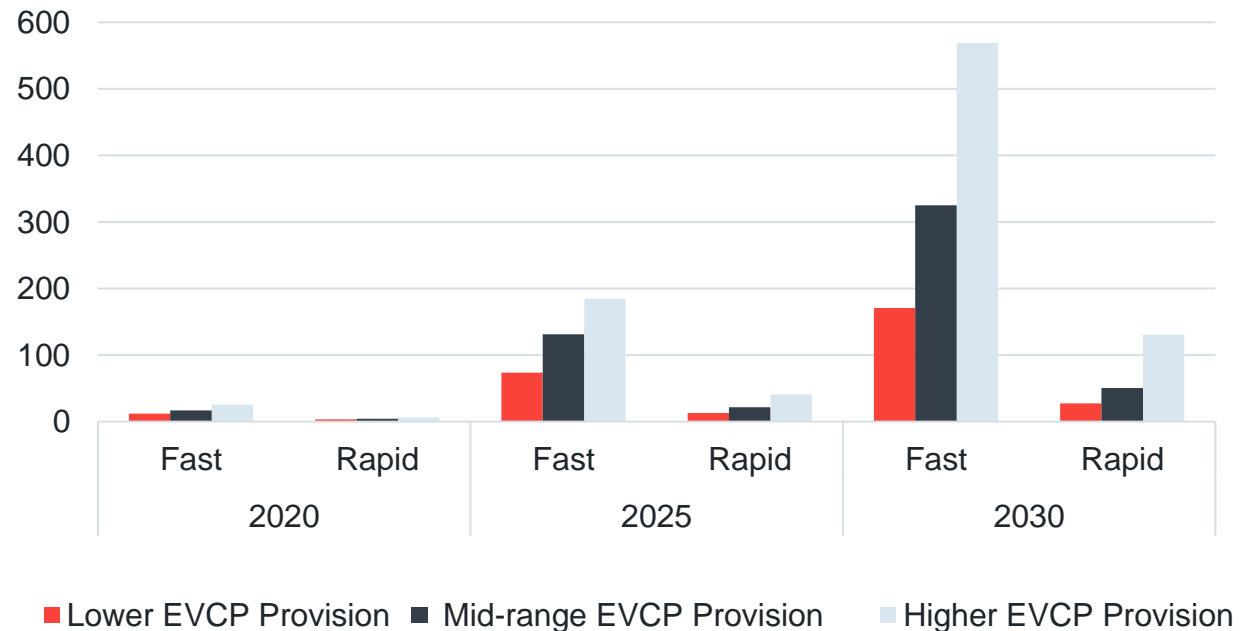


Figure 33 demonstrates the forecast requirement for publicly accessible chargers between 2020 and 2030, with only a modest requirement forecast in a high ratio scenario, and a significantly increased provision required in the low ratio scenario. The mid range scenario represents something of a middle ground, with a balanced set of assumptions in terms of technical developments and charging behaviours.

The black marker shows the current number of EVCPs (45) within Ceredigion is currently above the forecast requirement for 2021.

It is important to emphasise, given the range of forecasts and assumptions required, that these Figures are intended to provide only a high level indication for the potential numbers required for planning purposes. The increasing divergence between the low, mid and high ratios in the later forecast periods reflect this increasing uncertainty.

Figure 34 Forecast number of EVCPs required up to 2030, segmented by charger type, under each of the low, mid and high ratio scenarios.



FORECAST EVCP REQUIREMENTS

In Need of Public Funding Support

The forecast requirement for EV chargers developed throughout this assessment serves to provide an indicative range of requirements for EV charging infrastructure across Ceredigion. In the context of this study publicly funded refers to any publicly accessible charger which is not entirely funded by a private organisation. Public funding could take multiple forms, including national grants and developer contributions.

Crucially, in order to enable CCC to plan effectively for meeting future EV charging requirements, a reasonable estimate of the number of publicly accessible charge points that are required, and may not be delivered by the private sector alone, is essential for forward planning.

Based on the feedback of CPOs and the key parameters informing a sites' commercial viability, it was estimated that approximately 50-60% of publicly accessible chargers delivered by 2030 may be privately funded. This is based on the share of chargers delivered by the private sector rising from around 25% in 2020 to 75% by 2030, as demand increases, costs fall, and commercial viability improves, as shown in Figure 35.

Figure 35: Forecast percentage split between public and private funded EVCPs from now to 2030.

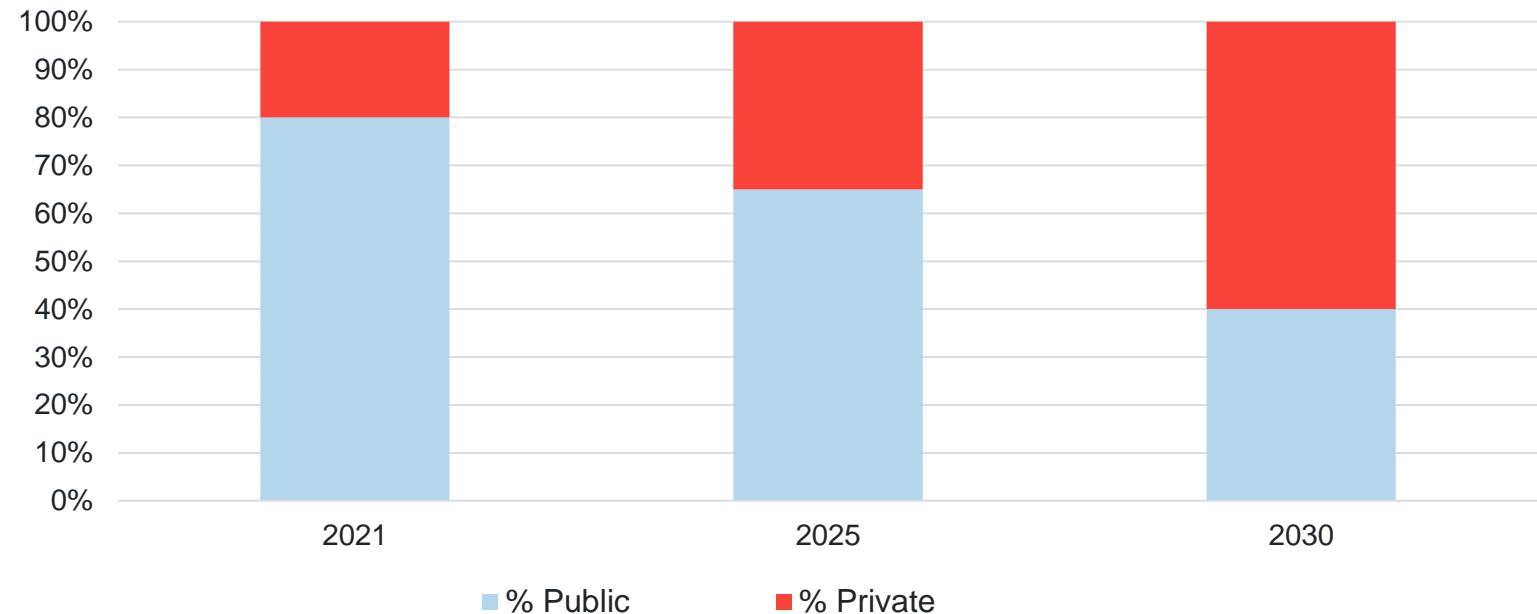


Table 8: Forecast additional public funded EVCP requirement.

Forecast Scenario	By 2025	By 2030	Total
Low	23	45	67
Mid	67	89	156
High	115	190	305

EV UPTAKE FORECASTING

EVCPs When Dependent on On-Street Parking

Areas where there is a demand for EV charging, but with limited off-street parking, have long posed challenges to the prevailing delivery models for public charge points.

The commercial case for slow/standard chargers, and particularly residential chargers, is less attractive than rapid chargers, due to a number of factors, including:

High delivery costs relative to the units of electricity delivered per day, on which the CPOs make their revenues.

TROs, particularly in on-street settings, are often contentious amongst the wider public, especially where parking is limited and already a source of frustration.

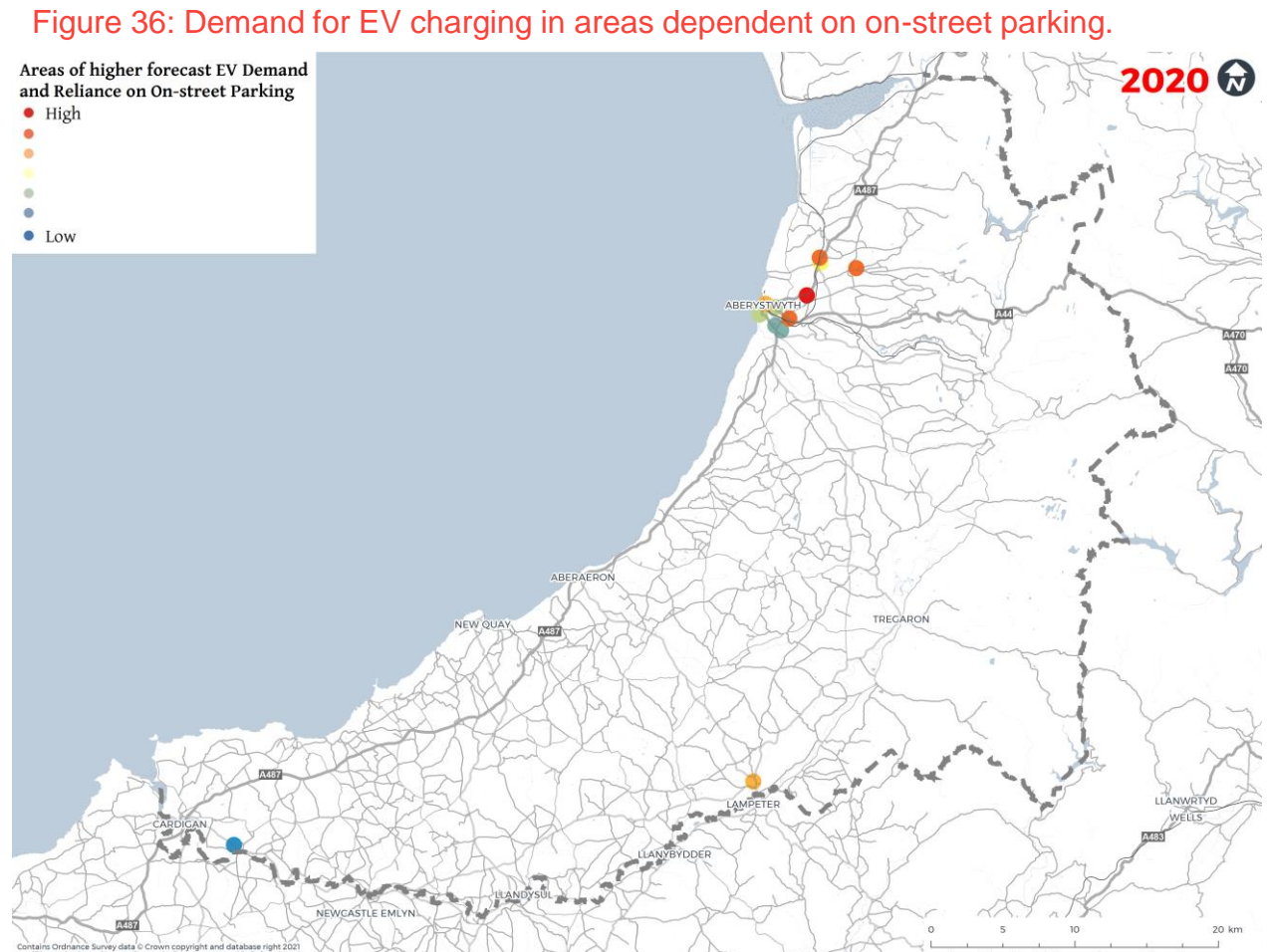
Challenges in finding available space for on-street chargers and feeder pillars where footways are narrow, or basements, trees and other street furniture prevent

deployment.

Whilst rapid chargers are often quite clearly demarcated and visibly EV bays, standard charger bays can be more anonymous and prone to being 'ICE'd (when an internal combustion engine (ICE) vehicle parks in an EVCP space which stops an EV user from charging their vehicle), with long dwell times meaning the charger is potentially unavailable for extended periods.

Consequently, areas reliant on on-street parking merit particular consideration.

Figure 36 highlights areas where residents are more reliant on on-street parking, and are also forecast to be areas of moderate or high EV ownership relative to the rest of Ceredigion, with Aberystwyth, Cardigan being the areas of greatest concentration, though there are smaller pockets of reliance elsewhere across the County.



FORECAST EVCP REQUIREMENTS

Forecast Demand for Public EV Charging

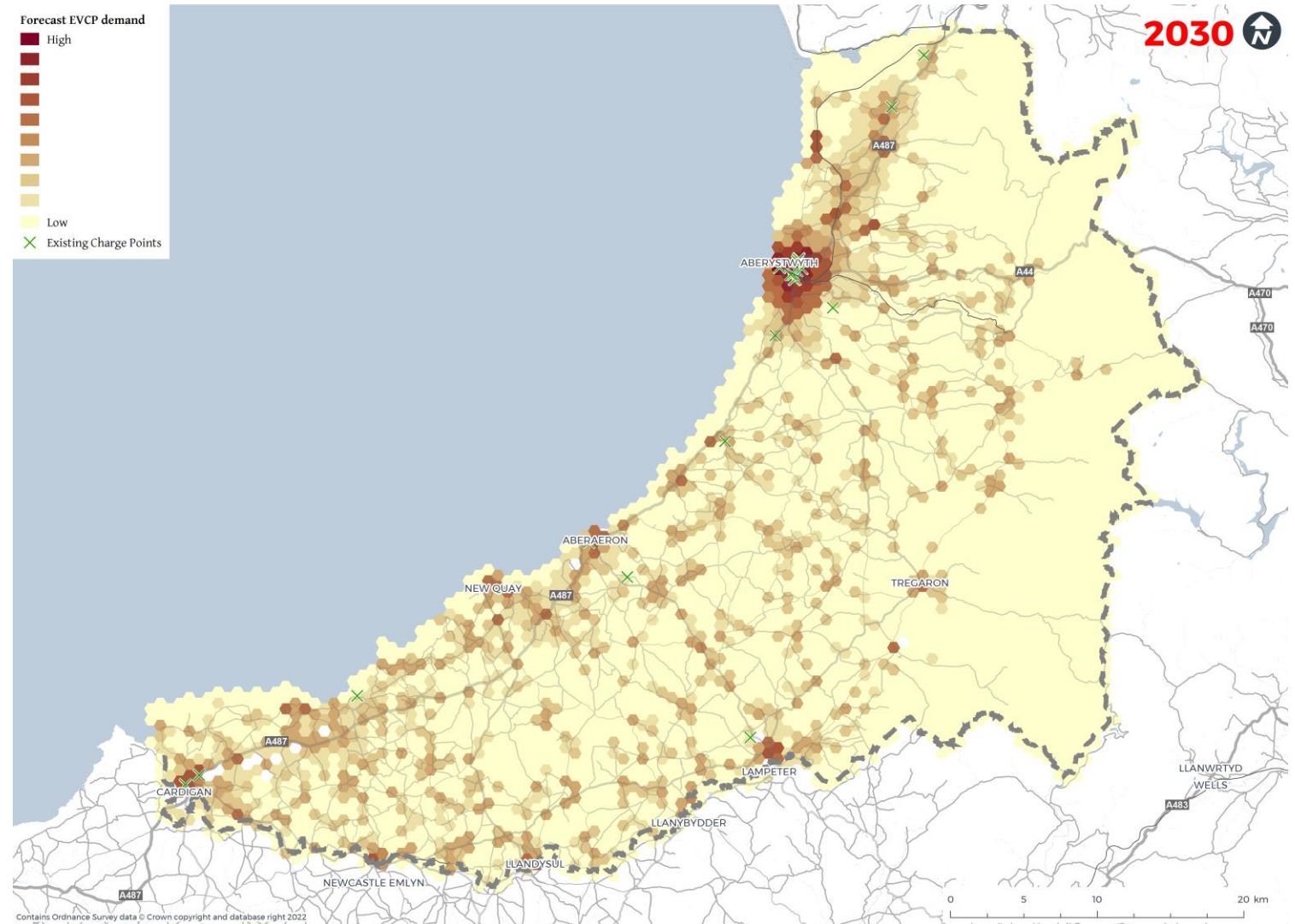
Based on the preceding analysis of the potential requirements for public EV charging infrastructure, a spatial analysis of the likely distribution of EVCP demand was undertaken. This analysis is informed by:

- Forecast EV uptake by postcode
- Number of destination land uses by postcode
- Proximity to the strategic road network
- Proximity to the secondary road network
- Reliance on on-street parking

A radius of influence and/or weighting was attributed to each dataset, to illustrate the likely spatial variation in demand at a granular level across Ceredigion.

This analysis indicates a strong focus of demand around the larger conurbations of Aberystwyth, Aberaeron, New Quay, Lampeter and Cardigan.

Figure 36: Forecast EVCP demand by 2030, highlighting existing charge points.



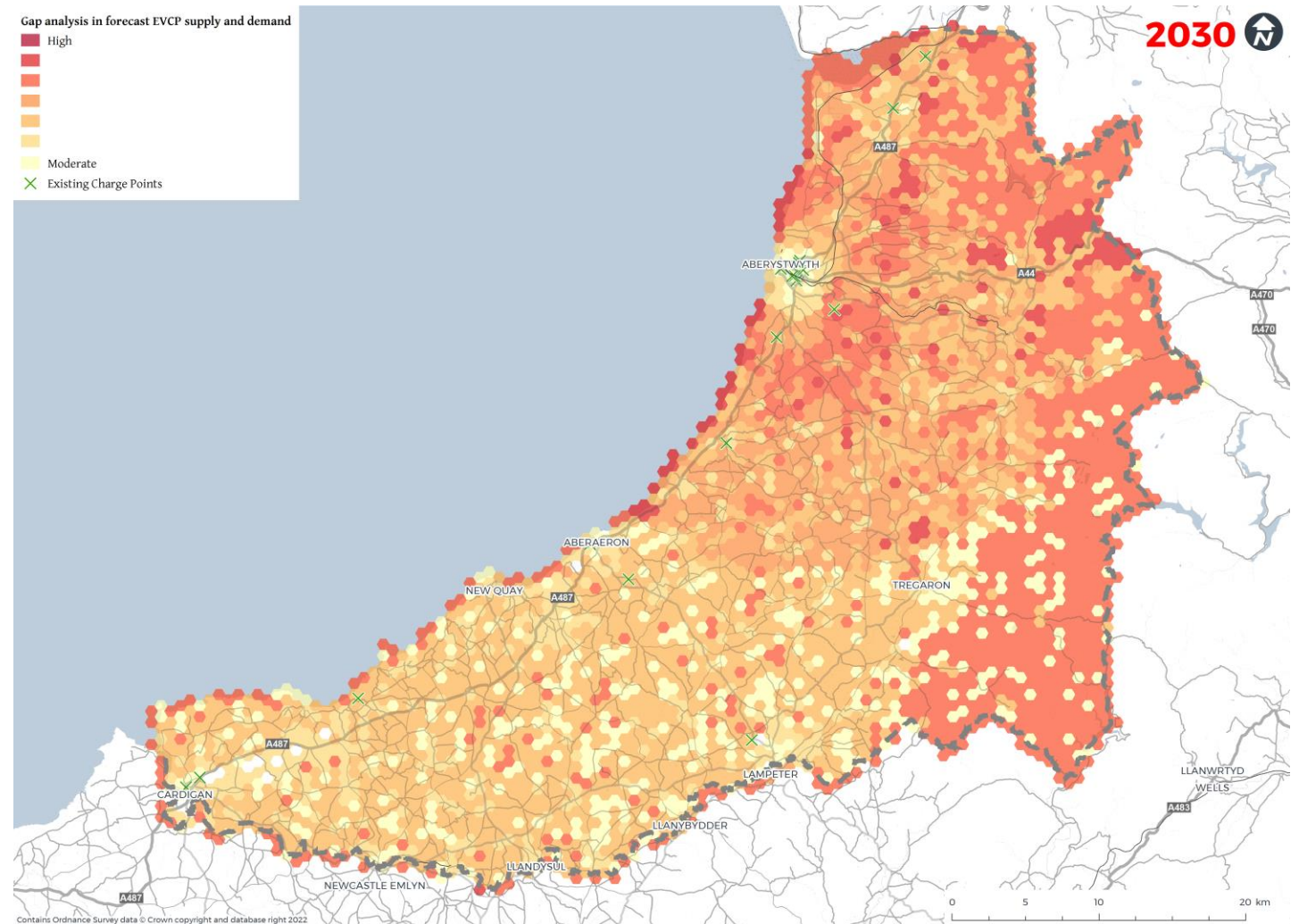
FORECAST EVCP REQUIREMENTS

Forecast Gaps in Privately Funded Charging Provision

The results indicate the areas where gaps in the charge point network are thought most likely to occur, including:

- **Remote areas with limited demand**, but still requiring baseline provision to cater for low level demand, e.g. tourist sites/ routes.
- **Rural or secondary routes** with moderate levels of demand, but with fewer destinations (retail stores, food outlets etc) to serve as a platform for charge point rollout.
- **Areas with greater reliance on on-street parking** and few amenities with the potential to host local charging hubs.
- **Primary routes with high demand and delivery constraints**, particularly in areas where there are sections of road with few destinations to readily cater for charge points, or where there are grid constraints making sites commercially unviable.
- **Areas of high demand** with delivery constraints, including high installation costs/ grid constraints which pose a barrier to delivery.
- **Areas with more constrained grid capacities** or more remote from a primary substation.

Figure 37: Gap analysis in forecast EVCP supply and demand in 2030.





Cyngor Sir
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County Council

Summary

Conclusion and Recommendations



CONCLUSION

As outlined in Llwybr Newydd: The Wales Transport Strategy 2021 and through almost all of the stakeholder engagement sessions undertaken as part of this study, it is important that ULEVs are used as part of the future of sustainable transport, not as the sole solution to decarbonisation. Walking and cycling, then public transport must be the first and second options for a given journey.

The number of EVs currently registered in Ceredigion is low. However, their popularity is increasing and uptake is forecasted to rapidly accelerate over the next 5–10 years. According to the Wales Electric Vehicle Strategy, Ceredigion will need in the region of 24,000 EVCPs within the next decade to support local charging. Welsh Government will aid facilitation of this infrastructure delivery whilst developing a Welsh standard for charging. With this ULEV Charging Strategy and Action Plan and continuing with their current good progress, Ceredigion have the opportunity to be at the forefront of the transition to EVs in Wales, raising awareness of the need to decarbonise and reach net zero carbon emissions by, at least, 2030.

Whilst the majority of charging will continue to take place at home, publicly accessible charge points will be of greater importance in the future, particularly for Aberystwyth and Cardigan where fewer residents have access to off-street parking.

Charge point reliability is a critical component for widespread uptake of EVs in Ceredigion. Particularly during the transition phase within this largely rural County, if the local EVCP is not in operation, there is unlikely to be another

‘back-up’ EVCP for some distance.

A deficit in public charge point availability in certain areas would serve to heighten range anxiety, limiting EV uptake amongst residents as well as exacerbating any feeling that Ceredigion isn’t in a realistic position to welcome EVs from tourists or businesses.

As identified by this work, there is a clear role for the public sector to intervene in the short to medium term until the market matures, to provide effective and easy to use public charging infrastructure, fundamental in encouraging drivers to transition from an ICE to an EV.



WSP Global Image Library

RECOMMENDATIONS (SLIDE 1 OF 5)

This section sets out the recommendations from this study, drawing on the findings of the baseline assessments and research, stakeholder engagements, forecasting and analysis, and soft market testing.

Accelerate charge point deployment to promote EV uptake.

The EV demand and forecasting requirements developed and assessed within this study rely on a number of critical assumptions. WSP would recommend that the **mid range scenario (376 EVCPs by 2030)** is taken forward as a central estimate for planning purposes. It balances the assumptions of technical developments with the change in charging behaviour.

The chargers in Ceredigion that are due to be delivered in the 2021/22 financial year, funded by Phase 1 of the ULEVTF, on top of the 45 EVCPs already in place, would mean Ceredigion is making good progress towards the **medium term requirement for 153 EVCPs by 2025**.

Build on the existing network deployments, focusing on establishing good charge point coverage and plugging gaps.

Chargers should be located in areas where higher uptake of EVs is forecast and not currently catered for, such as Cardigan and Tregaron. As shown in Figure 25, areas such as Aberystwyth and Cardigan that have limited access to off-street parking also have very high demand for EVCPs. Where possible, Ceredigion should continue to collect usage data from the EVCPs they own to drive a **demand-led approach to further installation**.

In the more rural areas of the County, there are likely to be moderate levels of demand in places, but fewer logical destination sites to play host to chargers or attract privately funded deployments. Rural and remote areas such as Llandysul and Newcastle Emlyn are unlikely to attract public sector charge point investment. Whilst these residents are more likely to have access to off-street parking, it is important to offer a baseline provision to cater to demand.

Elsewhere in places like New Quay where there are high levels of tourism in the summer months and the streets are very narrow, **well signed off-street parking and charging provision will be important**.

Furthermore, there are areas where grid constraints may result in high installation costs/grid constraints and limit private sector deployments, including areas around Tregaron and Llandysul.

Promotional activities and awareness raising.

As current uptake of EVCPs in Ceredigion is limited, **raising awareness to residents of the benefits** of switching to EVs, in line with those outlined in the Welsh Government EV Charging Strategy is **critical for a smooth and efficient transition**.

Ceredigion County Council should consider holding promotional events or a pop-up EV experience centre to demonstrate the vehicles and demonstrate the actions the Council is taking to support EV uptake.

RECOMMENDATIONS (SLIDE 2 OF 5)

It provides residents with the opportunity to try the vehicles and speak face-to-face with members of the Ceredigion ULEV Steering Group, to hear about perceived barriers and challenges people are facing in relation to EVs.

This could be run in conjunction with a digitally based 'campaign' such as setting up a webpage to communicate recent actions, feature articles highlighting local charge points and advertising available grants.

Deliver a Ceredigion specific solution.

Each site needs to be considered on its own merits but for most car parks, a **number of standard/fast chargers (7-22kW) would be appropriate**, capable of smart charging and load management of the available electrical supply.

Rapid chargers (50-150kW) should be deployed where dwell times are shorter, or the use case of visitors is likely to require quicker turnaround times. Table 4 provides outline guidance on charge point provision by land use and site type, as well as a number of key design principles to be followed. These should be delivered in clusters where possible, with multiple units provided at each site. This reduces the risk of a driver arriving at the site and being unable to charge. **Greater availability is in turn likely to attract a greater number of users.**

Rapid charge points should be futureproofed to support higher charge rates, preferably at least 150kW. Where possible 3-phase 22kW Fast chargers should be considered as whilst 7kW is typically adequate for longer dwell times, the faster charge rates can enable the available energy supply to be utilised more effectively and cater for a larger number of vehicles. Even if not all of them support 11/22kW AC charging, it accounts for future additional capacity.

Passive provision for additional chargers should always be considered as part of the initial installation to lessen the costs of subsequent installations.

When catering for residents without off-street parking, a number of options are available, including:

- Conventional on-street chargers with dedicated EV only bays;
- Lamp column/kerbside charging;
- Residents charging hubs in nearby car parks; or
- Remote rapid charging hubs.

The existing mechanism for Ceredigion residents to submit location requests for EVCPs is used infrequently. This mechanism using the CLIC Customer Service Centre could be better promoted across the Council website. This is a useful way of understanding localised demand, as well as inviting praise or complaints over the existing EVCPs to understand ongoing operation.

It is particularly important for Ceredigion to engage with tourist destinations to explore opportunities associated with EVs. Well placed EV charge points play an important role in **attracting tourists to an area, enhancing a 'green tourism' offering**, and aid people travelling through the County.

RECOMMENDATIONS (SLIDE 3 OF 5)

Take a pragmatic approach over trailing across footways.

Ceredigion County Council is aware that an increasing number of local authorities are considering how to address some of the issues that are arising on residential streets with little or no private off-street parking. Guidance has been produced by individual local authorities in the UK (such as Hampshire County Council) as well as by organisations representing people with a range of mobility difficulties such as the policy statement by Guide Dogs for the Blind Cymru (2021). However, it is the Council and County Surveyors' Society Wales view that any **reference to good practice is informed by the development of national UK or Welsh Government guidance** on this matter. This guidance, when available, may then be adopted and applied locally.

Make the most of available funding opportunities.

Whilst there continues to be a significant role for LAs in funding or part funding charge point provision, they should **seek opportunities to secure additional grant funding to supplement any existing budgets.**

- On-street Residential Charging Scheme (ORCS) Funding – whilst still available remains a key fund for delivering public chargers.
- Fund for Wales - National community endowment fund that provides grants between £500-£2,000 which is awarded to small volunteer driven community organisations who aim to deliver outcomes including building stronger communities and improving rural and urban environments.

- Workplace Charging Scheme (WCS) - grant is a voucher-based scheme covering up to 75% of the total costs of the purchase/installation of EVCPs, with a cap of £350 per socket and max of 40 sockets across all sites per applicant.

Let the private sector take the strain and carry the risk where possible.

Ceredigion County Council should where possible, allow the **private sector to take the strain** in providing EV Infrastructure. In particular, for example at rapid charging hubs and destination charging in some retail outlets, private operators have pre-existing partnerships with nationwide chains, allowing for quick deployment with a low level of stakeholder consultation.

This is not to suggest that Ceredigion should not install EVCPs in their own car parks, but rather to suggest that they focus on **delivering charge points in areas where the private sector is not likely to do so.** This will ensure that these areas are not left behind and that a good level of overall coverage can be established.

A balanced approach to EVCP provision must be taken to ensure more commercially attractive sites are delivered alongside 'less attractive' sites. Stakeholders consulted as part of this study clearly understand that in some cases, it is necessary to decline offers for fully funded investments to ensure that the Council isn't left with owning a loss making site, with ongoing revenue support required.

RECOMMENDATIONS (SLIDE 4 OF 5)



Take a balanced approach to delivering charging infrastructure, inviting private investment but retaining control.

Ceredigion should consider seeking public sector grant funding alongside private sector investment to expand the local charging network, as part of a public led model operated as a concessionary scheme.

In a **concessionary model, some of the investment is funded by the charge point supplier/ operator with the local authority funding the enabling works and electrical connection point at the sites**, for the charge point operator to then install the charger.

The CPO then operates and maintains the charge points for an agreed period under a profit share agreement. This model potentially enables public funding to go further in terms of the number of charge points deployed and strikes a good balance of risk and control. It would enable Ceredigion to leverage some private sector investment which could be utilised to deliver chargers in prioritised Council owned car parks and parcels of land/Council owned estate where appropriate.

Where a single CPO is granted rights across the County, there is scope for economies of scale to be achieved. There may also be opportunities to attract large scale private investment from infrastructure funds, if a large enough area can agree to a collective approach and present an attractive investment opportunity.

Once the prioritised sites and charger requirements have been identified, a soft market testing exercise can undertaken with CPOs to explore the level of interest, enabling a scope to then be developed which accounts for their feedback. The

procurement process should avoid being overly prescriptive to leave room for innovation from the suppliers.

A **revenue sharing arrangement could be used to share the potential benefits**, with a maximum concession period of 10 years allowing the Council to take stock and review once the EV market has matured.



Monitor new developments.

Monitor announcements regarding changes to building regulations, and in interim consider developing regulations can be introduced to ensure that new developments (housing, shopping, business, and tourist sites) include a set amount of EVCPs. This can help to transition EVCPs from being publicly led to privately-led.



Seek opportunities for hydrogen.

Investigate opportunities to secure funding to run trials and a feasibility study on the use of hydrogen for large fleet vehicles. This work could also consider how hydrogen development could be used for visiting coaches as part of the reach of tourism in the area. This would further achieve the aim of becoming Net Zero and help to decarbonise transport.

RECOMMENDATIONS (SLIDE 5 OF 5)

Address issues of social equity.

There were varying preferences amongst stakeholders between these deployment models, highlighting the need to **identify the right solution for the right location**.

Stakeholders stressed the importance of ensuring EVCPs are accessible to all communities within Ceredigion and that through the transition to EVs from ICEs, pre-existing inequalities are improved, not reinforced. The best approach to EVCP roll-out is to balance a demand led approach with an adequate provision across the County, and in less-affluent areas.

Following the ambition of the Welsh Government to develop a design standard for charge point installation and operation, Ceredigion should look to follow their lead and adopt good practice in deployment, embedding and reinforcing key principles around maintaining minimum footway widths, and providing accessible charge points for disabled users. Charge points should be positioned **to allow additional passing space within the bay enabling the driver to access the charger without being obstructed by vehicles in adjacent bays**. Bays must be designed with specific consideration to users with reduced manual dexterity - refer to **DfT's Inclusive Mobility and British Standard BS 8300** when considering the particular context of a parking bay. As with parking meters, the charge point controls should be at a height which permits access by wheelchair users. Clear instructions (visual where possible) should be provided with the chargers.

Build on community links.

Some Community Groups have been successfully introducing EVs recently. Use this model and publicise these successes to enable more community groups, parish Councils and others to add EVCPs to community hubs. Share case studies on the improvement of community networking through shared EV mobility.

Seek opportunities to working with community groups to deploy EVCPs co-located with renewable energy schemes in locations such as community centres, particularly in areas where the grid is constrained or there is likely to be limited private sector appetite to invest.



ACTION PLAN

Proposed Next Step	Description	Priority	Term
Increase charge point deployment in line with recommendations detailed.	Accelerating charge point deployment, expanding the local network, to promote EV uptake to reach medium term requirement for 153 EVCPs by 2025 and mid range scenario (376 EVCPs by 2030). Prioritise a mixture of areas with high forecast demand, areas reliant on off street parking and anticipated gaps in private sector provision. Seek to deliver the identified no. of charge points as part of a public led model operated as a concessionary scheme.	1 - High	Short/Medium
Continue to meet regularly as the Ceredigion ULEV Steering Group.	Invite guest speakers to attend e.g. from local tourist boards, or neighbouring County steering groups to join up efforts. Consider expanding the scope of topics covered, with presentations from DNO's or private CPO's looking to deploy charge points in Ceredigion.	1 - High	Short/Medium
Continually ensuring delivery of a Ceredigion specific solution.	Assess the needs each locations, based on the local development plan and information within this Strategy, to ensure the right charger is installed at the right location.	1 - High	Long
Engage with tourist boards Discover Ceredigion and Visit Wales as well as local attractions to understand their plans/ambitions for charge point installation and how CCC can support this.	Well placed EV charge points play an important role in attracting tourists to an area and enhancing a 'green tourism' offering. Joining up the conversations between local attractions and boards could mean consistency of CPO across the area for user ease and ensure the right type of charger for the right destination. Undertake a project to better forecast numbers of visitors to the County who drive EVs.	1 - High	Short
Join up conversations with neighbouring authorities.	Consider bidding (joint procurement) with local authorities Powys or Carmarthenshire, broadening the number of charge points to be installed and allowing CPO's to prioritise larger programmes. Join up conversations with other ULEV steering groups to align priorities and share knowledge.	1 - High	Short
Review depot and depot infrastructure.	Carry out a full review of the existing depot locations for readiness of decarbonising the Council owned fleet. Identify opportunities for installation of EVCPs and staff training.	1 – High	Short/Medium

ACTION PLAN

Proposed Next Step	Description	Priority	Term
Refinement and better promote the online site for Ceredigion residents to submit EV charge point requests/feedback.	Utilising the existing mechanism (CLIC Customer Service Centre), but more widely promoting across the Council website will enable residents to actively engage in charge point installation and operation, as well as providing useful feedback to the Council for understanding localised demand.	2 - Medium	Short
Run a digitally based campaign such as setting up a webpage or running a series of social media posts.	To communicate recent actions, to feature articles highlighting local charge points and advertise grants available to individuals and community groups.	2 - Medium	Short
Establish a core specification for charge points and develop a guidance document for how Ceredigion want charge points to be delivered.	Developing a set of design principles will enable a consistency in charge points across the County to be achieved. This should include: the number of standard/fast chargers (7-22kW) and rapid chargers (50 – 150 kW) that should be deployed, depending on the site, and identifying key constraints. Monitor policy as in the next year, the UK Government will set national standards for quality of charging provision.	2 - Medium	Short
Improved mechanism for communicating information and contacts to groups such as community action and local businesses.	Advertise grant opportunities for individuals/local community groups, provide basic support for applications and general updates on actions the Council is taking.	2 - Medium	Short
Seek to prepare applications for available funding.	Monitor calls and proactively seek public funding options e.g. On-street Residential ChargePoint Scheme.	2 - Medium	Short/Medium
Monitor changes to building regulations in Wales.	The Economy, Infrastructure and Skills Committee of the Welsh Assembly has recommended that all new housing estates built in Wales should have EV charging points. Continue to monitor changes and consider whether it is worth developing a Ceredigion specific guidance document or local standard in the interim.	2 - Medium	Short/Medium
Decarbonise the Ceredigion owned fleet as the vehicles come up for renewal.	Review opportunities for the CCC fleet, in particular small vehicles/vans to be decarbonised by switching to EVs or hybrid.	2 - Medium	Medium/Long

ACTION PLAN

Proposed Next Step	Description	Priority	Term
Host a series of promotional events or a pop-up EV experience centre.	Demonstrating EVs and the actions the Council is taking to support uptake, to raise awareness amongst Ceredigion residents. Consider inviting a private CPO to co-organise and host.	3 - Low	Short
Develop and run a public needs and perceptions survey.	Launching a short online survey to understand the locations residents would like to see charge points installed, localised data to inform planning. Also for collecting data on barriers to uptake and attitudes to switching to EVs.	3 - Low	Medium
Continue to monitor the stance of Welsh Government and neighbouring local authorities on trailing charging cables across footways.	Keep tracking Welsh Government and the position of other County Council's in Wales. Place a holding statement to communicate this intention to follow the lead from Welsh Government on the CCC website.	3 - Low	Short
Identify opportunities for Ceredigion to take part in funded hydrogen pilot schemes.	Monitor websites such as Innovate UK and GOV.UK for upcoming competitions or tenders for trial participants such as this (historic): Competition overview - Hydrogen Transport Hub: demonstration - Innovation Funding Service (apply-for-innovation-funding.service.gov.uk). Seek to engage with their communications and frequent webinars for soft market engagement to this area.	3 - Low	Long
Encourage Ceredigion staff to switch to electric vehicles.	Implement a salary sacrifice EV scheme for Council staff members to take advantage of and consider switching to an electric vehicle. Install more chargers outside the office buildings for use by staff and for residents/tourists nearby. Only offer pool cars that are preferably electric, if not hybrid.	3 - Low	Long
Undertake a small scale trial, informed by the findings from the public perceptions survey.	For example, conduct a pilot of innovative solutions in a narrow, terraced street to tackle blockers to EV uptake such as cable channels or lamp column chargers to establish whether this is something CCC would want to deploy more widely.	3 - Low	Medium

APPENDIX A

Stakeholder Engagement Survey

Section A: Policy and Overarching Strategy

1. Can you summarise CCC's current approach to EVs and ECVPs? What steps are you taking to encourage the uptake of EVs? What steps are you taking to encourage the uptake of EVs?
2. How prominent are EVCPs in your current and future policy/strategy documents?
3. For new developments, do you have any policies for the requirement of EVCPs?
4. What strategic and policy actions should CCC be undertaking to support EV adoption?
5. What do you feel the Councils remit is in providing access to EVCPs?
6. How do you envisage supporting residents without off-street parking switching to EV?
7. Would your authority consider providing incentives to encourage residents and businesses to choose EVs? *For example, preferential parking policy and charges.*
8. What do you think are the main barriers to the uptake of EVs in Ceredigion?
9. What do you think are the main barriers to providing EVCPs in Ceredigion?
10. Have you applied for public (or private) funding for EVCPs? – successfully or unsuccessfully. *For example, through central government schemes.*

Section B: Current EV Demand and Locations

1. Do you have data on current/historic charge point usage for any Council owned chargers?
2. Do you receive requests for more charging points? – or any evidence of further need.
 - a. Do you keep a log of requests?
3. Do you receive many complaints/comments in relation to current state of existing EVCPs infrastructure?
4. Do you feel there is a particular area in Ceredigion that is clearly in need of EV charging facilities?

Section C: Future EV Demand and Charging Locations

1. What plans do you have for future EVCP provision?
2. How many more EV charging points do you envisage in the next 5 years? And 10 years? Have you produced any forecasts that you can share?
3. What areas do you anticipate the district will need more charging points in the future?
4. What are the areas where most employment and residential development is happening in the district?
 - a. Where do you expect most development to take place in the future?

Section D: Charging Solutions

1. What is your view on the role of different charging point options (standard, fast, rapid, ultra-rapid) and how they are deployed in the district?
2. What criteria do you have when assessing the suitability of a charging solution? Examples could include:
 - i. User convenience?
 - ii. A low cost to the authority?
 - iii. Trialling innovative solutions?
 - iv. Minimising loss of parking bays?
3. Has CCC engaged with/been approached by ECVP operators with a view to establishing new charge points/networks within the area?

Section E: Installation, Operation and Maintenance

1. What do you see as the preferred delivery model for your authority in delivering EVCPs? – who will the funder, provider and operator of services be? *For example, funded by the authority but operated by the private sector.*
2. What do you see as the preferred commercial model in Ceredigion in delivering EVCPs?