GREATER MANCHESTER
DOING THINGS DIFFERENTLY

ELECTRIC VEHICLE CHARGING INFRASTRUCTURE STRATEGY

Part of the Greater Manchester Transport Strategy 2040







Contents

Preface

A significant amount of work has been undertaken in recent years to place Greater Manchester at the forefront of efforts to deal with Climate Change and Air Quality including the move to science-based carbon budgets, the ambition to be net zero carbon by 2038 and the promotion of a Clean Air Zone to be introduced in 2022.

Given that transport is now the sector making the biggest contribution to carbon emissions and is directly responsible for 80% of noxious emissions, the switch to Ultra Low Emission Vehicles and particularly to Electric Vehicles (EVs), alongside a significant shift away from private car use, will be critical to Greater Manchester's success in meeting its transport emissions targets.

Availability of and access to charging infrastructure is recognised as a critical barrier to the adoption of EVs. As part of the public conversation held last year on the GM Clean Air Plan proposals, the availability of charging points was cited as a key barrier for businesses and individuals in switching to an EV. The requirement for appropriate vehicle charging infrastructure is even more critical given that the Government has now committed to phasing out the sale of new petrol and diesel vehicles by 2030. Ensuring Greater Manchester is ready for this change will require very significant cross-sectoral collaborative working over the coming years. It is recognised that there is a need for an overarching strategy, and a funded programme of works to ensure that we take the focused action in a timely manner. This Greater Manchester Electric Vehicle Charging Infrastructure Strategy sets out the vision-led adaptive planning approach to the provision of charging infrastructure, that we intend to adopt to support a rapid transition towards a net zero transport system.

The EV Charging Infrastructure Strategy provides a clear vision, objectives and strategic principles to inform a programme of works for the deployment of public charging infrastructure across the city region. The aim is to ensure that Greater Manchester has a well-understood and consistent charging infrastructure network across the city region which, in turn, supports engagement with the GM public, the private sector and other public sector organisations to encourage and accelerate the transition to EVs. The GM Local Authorities and TfGM should lead the way in expanding efforts to electrify the public sector fleet as an exemplar. This example should then be used to support local partners and businesses to follow in making the switch to ultra-low emission vehicles.

The GM Local Authorities working in partnership with TfGM, have produced this GM Electric Vehicle Charging Infrastructure Strategy to align activity and inform a coherent programme of works for delivery.

1. Introduction

The UK's commitment to phase out the sale of new petrol and diesel cars and vans by 2030 and hybrid vehicles by 2035 was at the heart of the Government's recent 'Ten Point Plan for a Green Industrial Revolution'. This commitment reflects the urgent need to clean up the transport sector, which is now the UK's largest source of greenhouse gas emissions and contributor to poor air quality. The rapid acceleration of the transition to Electric Vehicles (EVs) that is required will only be delivered if drivers are confident that they will have access to a comprehensive network of Electric Vehicle charging infrastructure (EVCI), allaying fears of 'range anxiety'.

In Greater Manchester (GM) the overall transport vision remains that set out in the GM Transport Strategy 2040 (GMTS 2040) based on a decarbonisation of transport within a framework of reducing overall need to travel, shifting journeys to active travel and sustainable modes and then for those remaining journeys, switching to ultra-low emission vehicles and cleaner fuels.

Following this hierarchy will enable the decarbonisation of transport to act as a catalyst for reducing car dependency and creating healthier, safer and more equitable communities. Maximising a reduction in travel demand and modal shift will help reduce the scale, cost and investment associated with electrification strategies, and also minimise the amount of carbon required to manufacture new vehicles and infrastructure associated with an electrified network.

EVs will not be a panacea in delivering emissions reductions, and they are not without environmental cost. Whilst the role of EVs will be important, the switch to cleaner fuels alone will only account for just over half of the necessary emission reductions. An 'EV first' approach may be perceived to minimise disruption to established transport networks and lifestyles but fails to recognise that high levels of car dependency is ultimately a barrier to the creation of environments that can reduce the need to travel and facilitate the switch to active and more sustainable modes such as walking, cycling and public transport use.

However, we recognise that for certain activities and individuals, cars and LGV vans will remain a necessary mode of transport. Transitioning these vehicles from petrol and diesel to ultra-low emission vehicles is critical, to help achieve the GM climate change and air quality ambitions. When GM businesses and residents choose to travel by car or LGV van they should be able to choose to do so using ultra-low emission vehicles.

Whilst it is acknowledged that there has been development in a number of other types of alternatively fuelled vehicles, such as hydrogen fuel cells, this strategy is concerned purely with plug-in EVs given the recent growth in EV ownership and relative infancy and low uptake of alternative fuels.

The strategy focuses on the publicly accessible EVCI required to enable Greater Manchester's businesses and residents to transition to EVs to make those remaining

journeys that can not be avoided or shifted to more sustainable modes. For clarity, it does not cover charging infrastructure requirements for Heavy Goods Vehicles (HGVs) or buses.

The transition to EVs and provision of EVCI are co-dependent. Availability of and access to charging infrastructure is a critical barrier to the adoption of EVs. As part of the public conversation held last year on the GM Clean Air Plan proposals, the availability of charging points was cited as a key barrier for businesses and individuals in switching to an EV. In order to support and accelerate the transition to EVs across GM it will be important to have the right type of EVCI in the optimal locations to meet demand. This is particularly important given that a significant proportion of people in GM do not have private off-street parking to charge an electric vehicle and also because range anxiety is currently still a barrier to switching to EVs for many people. Having an available public charging network that people have confidence in, is an important factor in encouraging people to switch to an EV. Both actual and perceived availability of public charging infrastructure are key; sufficient numbers of chargepoints must be provided to ensure EV users can charge where and when they need, and their location, availability and reliability must be sufficiently clear to the public so as to support consumer confidence.

To ensure that GM has the EVCI network that it needs to support the transition to EVs over the next 5 years, TfGM and the 10 Greater Manchester Local Authorities (we) have developed this GM EVCI Strategy, based on analysis of the markets we believe we need to stimulate over the next 5 years; and, for the longer term, setting out principles for the design and delivery of publicly funded EVCI. However, EVs and EVCI, are still emerging technologies and it is important to be able to adapt to changes in technology and markets and ensure a flexible approach to the delivery of the strategy.

This GM EVCI Strategy is a sub-strategy of the GM Transport Strategy 2040 (GMTS 2040). It sets outs objectives for EVCI which follow from the GMTS 2040 and should be considered alongside and read in conjunction with GM TS2040 and the “Right Mix” vision for at least 50% of all trips to be made by active travel and public transport by 2040.

History

The delivery and operation of Greater Manchester’s publicly funded Electric Vehicle Charging Infrastructure is co-ordinated by TfGM.

Greater Manchester has approximately 360 publicly accessible charge points operated and maintained by a number of operators. This includes the GMEV (now Be.EV) network launched in 2013 by Transport for Greater Manchester (TfGM). The focus of investment for the GMEV network in 2013 was chargers positioned in Local Authority car parks.

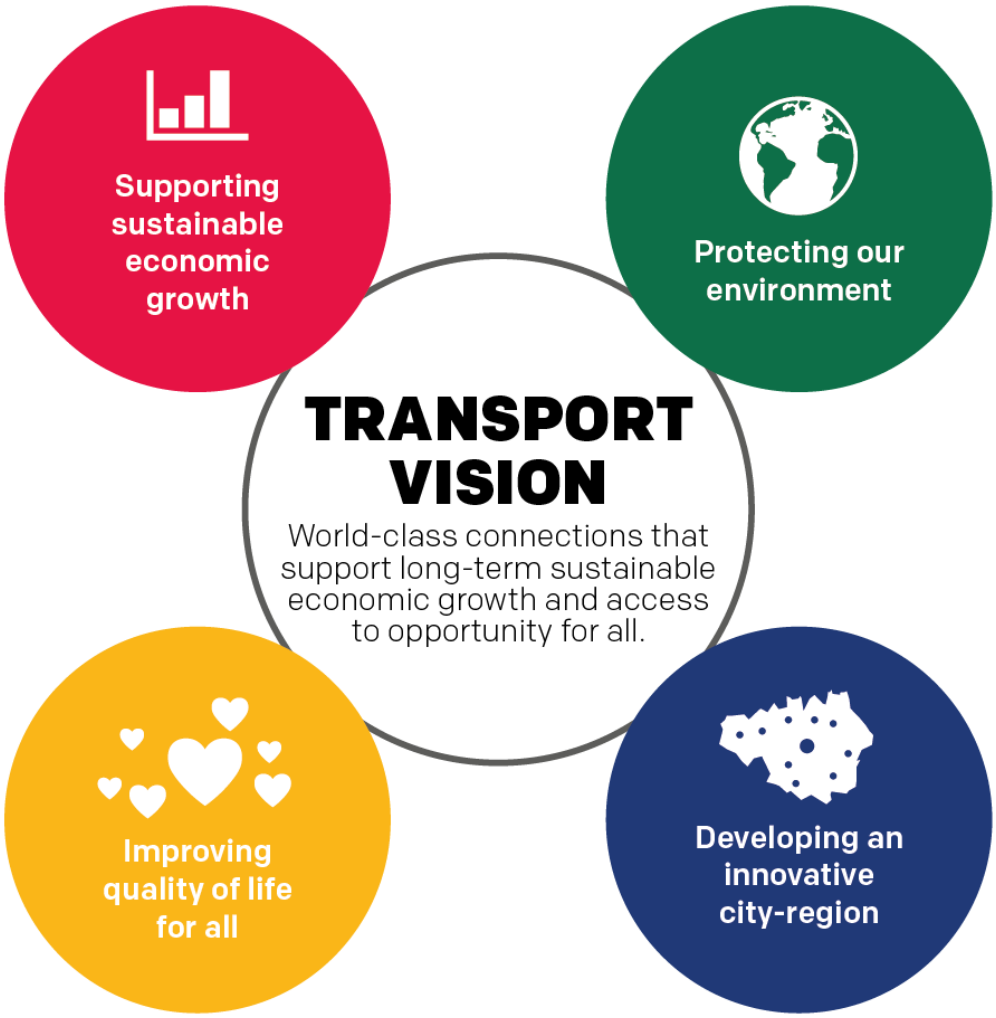
Back in 2013 there was more uncertainty about what public infrastructure would be required and far fewer Electric Vehicles registered in GM. Today, GM needs to meet the requirements of the next generation of Electric Vehicles, which have different charging capabilities and which are now starting to be seen in much larger numbers.

From summer 2020, the GMEV network and brand has been replaced by a new upgraded network called Be.EV. Be.EV is the brand for a new electric vehicle charging infrastructure provider in Greater Manchester. The installation of new rapid charging infrastructure and upgrading the GMEV fast charging network is being carried out under the Be.EV brand. Further information on the Be.EV network is available from the link **be-ev.co.uk**.

2. Background

2.1 The GM Transport Strategy 2040

Greater Manchester's transport vision for 'World class connections that support long-term, sustainable economic growth and access to opportunity for all' is set out in the Greater Manchester Transport Strategy 2040. To provide a focus for transport investment up to 2040 and beyond the four key elements of that vision are set out below:



The role of technology and innovation will be even more important in the period up to 2040, enabling us to improve transport performance and quality of life, protect our environment, reduce costs and resource consumption, and to provide tailored information directly to transport users, providing a much better experience.

2.2 Decarbonising Transport

National Government policy is encouraging a transition away from internal combustion engines and towards ultra-low emission vehicles, including Electric Vehicles (EVs) over the next 20 years. The current Government policy includes ending the sale of new petrol and diesel cars and vans by 2030 and hybrid petrol/diesel vehicles by 2035. Low and Ultra-low emission vehicles are a key part of the Government's 10-point plan for a Green Industrial Revolution, and the National Infrastructure Strategy.

Greater Manchester has a target of achieving carbon neutrality by 2038 (12 years earlier than the national 2050 target). All ten local authorities within Greater Manchester and the Greater Manchester Combined Authority have declared a climate emergency that commit them to working with government of all levels to prioritise decarbonisation and to take bold climate change action.

The GM 2038 target for carbon neutrality is based on a scientific approach by the Tyndall Centre for Climate Change to apportion both UK level and more localised carbon budgets that meet the Paris Agreement. Analysis indicates that urgent action is needed to cut all carbon emissions including transport emissions and that steep cuts need to happen in the next 5 years to stay within our carbon budgets. Further information is available in the GM 5YEP.

https://www.greatermanchester-ca.gov.uk/media/1986/5-year-plan-branded_3.pdf

Transport is now the largest greenhouse gas-emitting sector in the UK, accounting for 28 per cent of emissions and road transport accounts for 87 per cent of this. If we are to meet our commitments to reduce carbon emissions from transport, there will have to be a switch to much greater use of active travel for short journeys and more sustainable travel modes such as public transport. However, changes to mode of transport alone will not be enough; changes to the pattern of trip origins and destinations will also be needed. The pathway to the Greater Manchester 2040 Transport Strategy's Right Mix vision focuses on changing travel behaviour towards public transport, active travel, more local travel, and more travel to town and city centres in order to reduce car mode share from 61% of trips in 2017 to no more than 50% of trips in 2040.

However, we realise that some journeys will inevitably still need to be taken in cars and light goods vehicles and the transition to zero emission vehicles need to be at the core of any successful strategy to decarbonise transport. Electric Vehicles (EVs) will form an important part of the future transport mix as they can ensure that those necessary car journeys are taken in a way that minimises carbon emissions.

2.3 Air Quality

Poor air quality is the largest environmental risk to the public's health in Greater Manchester. Taking action to improve air quality is crucial to improve the health of the general population. Whilst air quality has been generally improving over time, pollutants

remain a serious concern in many urban areas including across Greater Manchester. These are oxides of nitrogen (NOx) and its harmful form nitrogen dioxide (NO_2), and particulate matter (PM).

In Greater Manchester road transport is responsible for approximately 80% of NO_2 concentrations at roadside, of which diesel vehicles are the largest source.

Long-term exposure to elevated levels of particulate matter (PM2.5, PM10) and NO_2 may contribute to the development of cardiovascular or respiratory disease and may reduce life expectancy. The youngest, the oldest, those living in areas of deprivation, and those with existing respiratory or cardiovascular disease are most likely to develop symptoms due to exposure to air pollution.

Public Health England estimates the health and social care costs across England due to exposure to air pollution will be £5.3 billion by 2035 for diseases where there is a strong association with air pollution, or £18.6 billion for all diseases with evidence of an association with air pollution.

Fully electric vehicles offer a partial solution to this problem as they operate with no tail pipe emissions however, GM recognises that although EVs contribute towards reducing emissions, they also emit pollutants into the environment from tyre and brake wear but are overall less polluting than conventional internal combustion engine (ICE) vehicles.

More information on Air Quality Action Plan and GM Clean Air Plan can be found here **https://cleanairgm.com/.**

2.4 Background on Electric Vehicles

There are many types of Ultra Low Emission Vehicles (ULEVs) available, but this EVCI Strategy is largely concerned with Electric Vehicles (EVs) which can be broadly divided into two types:

- Battery Electric Vehicles (BEVs), also known as ‘pure’ or ‘100 per cent’ EV’s (which are always powered by the battery); and
- Plug-in Hybrid Electric Vehicles (PHEVs), which combine a small plug-in battery with an ICE. This category includes both parallel and series plug-in hybrids (also known as range extenders).

BEVs can only run-on battery, do not emit tailpipe emissions and are dependent on charging, whereas the extent to which PHEVs are zero emission depends on the extent they are driven in zero emission mode.

In the UK until recently PHEVs made up a higher proportion of new registrations than BEVs. However, in the last few years this has changed for several key reasons:

- the cost and range difference between hybrid and fully electric vehicles is reducing, with batteries getting cheaper and battery sizes in BEVs increasing, thus increasing range;
- PHEVs are more complex and expensive to maintain, due to having both electric and internal combustion powertrains; and
- the Government grant for most PHEV purchases was removed from November 2018. However, a grant of up to £3,500 remains for low emissions cars approved by the government, these are cars which have CO2 emissions of less than 50g/km and can travel at least 112km (70 miles) without any emissions at all.

The number of EV models available has expanded significantly in recent years. For passenger vehicles, most mainstream car manufacturers now offer an EV model, and there are now more than 130 BEV or PHEV models available to buy or lease in the UK across all vehicle types including city cars, small family cars, superminis, large family cars, hatchbacks, estates, SUVs, executive models, and small and medium-sized vans The notable trends among new models coming to market and upcoming launches are the increasing battery capacities and capabilities to provide greater mileage from a single charge and support faster charging rates.

Alongside the carbon and air quality emissions benefits of EVs they also have operational cost advantages over traditional Internal Combustion Engine (ICE) vehicles, due to greater energy efficiency and lower energy costs and therefore running costs. However, the upfront price is higher and remains a considerable barrier to adoption. Upfront prices are expected to continue to decline, with some analysts suggesting cost parity of EVs with equivalent ICE vehicles in the early 2020s.

3. Vision and Objectives and Strategic Principles

3.1 The Vision

To be an exemplar city region for enabling the electrification of transport in the context of a smart, integrated, sustainable mobility network. By 2030, Greater Manchester's residents and businesses and visitors to the region, who choose to travel by car or LGVs, will be able to use electric vehicles with the confidence that they will be able to conveniently recharge them (via public or private charging points); and in doing so will help to improve air quality and reduce carbon emissions across the conurbation.

3.2 Strategy Objectives

- To establish a financially sustainable, publicly accessible EVCI network, scalable to growth in demand and flexible to changes in vehicle technologies.
- To clarify GM's requirements for a future public and privately funded and delivered EVCI network that supports the accelerated transition to EVs among businesses, residents, and visitors; whilst minimising car dependency and private car ownership.
- To establish a clear set of priorities for the expansion of the publicly funded section of the EVCI network, focused on supporting the delivery of GM's Clean Air Plan and 2038 carbon neutral target by accelerating the transition to EVs for the most polluting vehicles.
- To provide a clear set of EVCI network strategic principles and delivery criteria for publicly funded EVCI to highlight the types of infrastructure and charging locations that will be supported in principle by TfGM and GM local highway authorities.
- To attract and shape private sector investment in the EVCI network by providing more clarity on GM's priorities and how TfGM and Local Authorities will work with private sector EVCI providers and operators; with the ultimate aim of establishing a mature, commercial EVCI market.

3.3 EVCI Network Strategic Principles

Through the provision of publicly-funded infrastructure, we will set the standard and best practice and raise customer expectations, encouraging private sector EVCI providers and operators to follow suit. We have set out strategic principles to help guide the future expansion of publicly-funded EVCI. These mutually reinforcing strategic principles aim to guide decision making at a GM and local level when addressing the key challenges that the development of a GM EVCI network faces. The Network Strategic Principles are set out below and discussed in more detail in the following section which sets out our ambitions for the public EVCI network.

Integrated

Interoperability between charge points is an issue that directly impacts the appeal of EV ownership and will be key to ensuring an integrated EVCI network for GM that allows EV users to be able to roam between charging points without needing separate memberships. Different physical and commercial systems must be able to work together seamlessly and invisibly to the consumer allowing any EV to be able to be plugged into any public charge point with the electricity that it uses being paid for in a way that is transparent. This will require a standard unit of charge (for example p/kWh). Company fleet managers and drivers need a simple payment solution that operates across the EVCI network and allows them to monitor and manage payments centrally to run their business effectively.

The recent upgrade of the GMEV network to Be.EV has ensured that about a third of GM's charging devices are now interoperable, meaning customers can access these public chargers without needing to subscribe to a membership scheme. A Be.EV recharging card

for company fleets is now being tested prior to it being made more widely available. Whilst we can ensure that future expansion of the Be.EV charge points are interoperable we also need to encourage private EVCI providers and operators to open up their infrastructure to make the network more customer focussed and reliable. We also need to lobby central government to use the powers they have for greater regulation of the market. In July 2019, the Secretary of State for Transport announced that government wanted to see all newly installed rapid and higher-powered charge points provide debit or credit card payment by spring 2020. Several private EVCI operators have responded, and 41% of existing rapid charge points now have contactless card payment compared with 28% in 2019. This is a step in the right direction but more work needs to be done especially on fast chargers.

Our Ambition – to improve the EV charging experience by having a fully interoperable public charging network across Greater Manchester.

Infrastructure should also be integrated with other transport modes and e-mobility services where appropriate to provide an important element of the urban transport mix. Grouping charge points together in hubs or mini-hubs will increase opportunities to provide other services at the hub for example e-bike hire or EV car clubs, where this is deemed appropriate. Locating EVCI at park and ride sites will allow EV users to access GM's rapid transit network. Locations adjacent to or integrated within, other land uses that generate activity throughout the day and evening such as leisure / shopping destinations, community centres or local centres will help to ensure EVCI can be utilised safely and conveniently by different EV users at different times.

Our Ambition – to ensure that publicly funded EVCI is conveniently located to enable EV users to access other sustainable transport modes and services, thereby reducing overall reliance on private cars.

Environmentally Responsible

EVCI should supply zero carbon electricity, ensuring supplies are from renewable energy sources and utilising generation and storage from the local energy system where feasible. The Be.EV network uses 100% renewable energy to supply the electricity for charge points. Where commercial charge point operators are not providing zero carbon electricity, we will work to encourage them and/or host suppliers to transition to a renewable energy supplier.

The installation, operation and maintenance of publicly funded EVCI will use sustainable materials and construction methods where feasible. Wherever feasible, we will adopt off-grid, on-site zero carbon electricity generation such as solar panels and battery storage.

Our Ambition – to have an EVCI network supplying 100% of electricity generated by renewable energy.

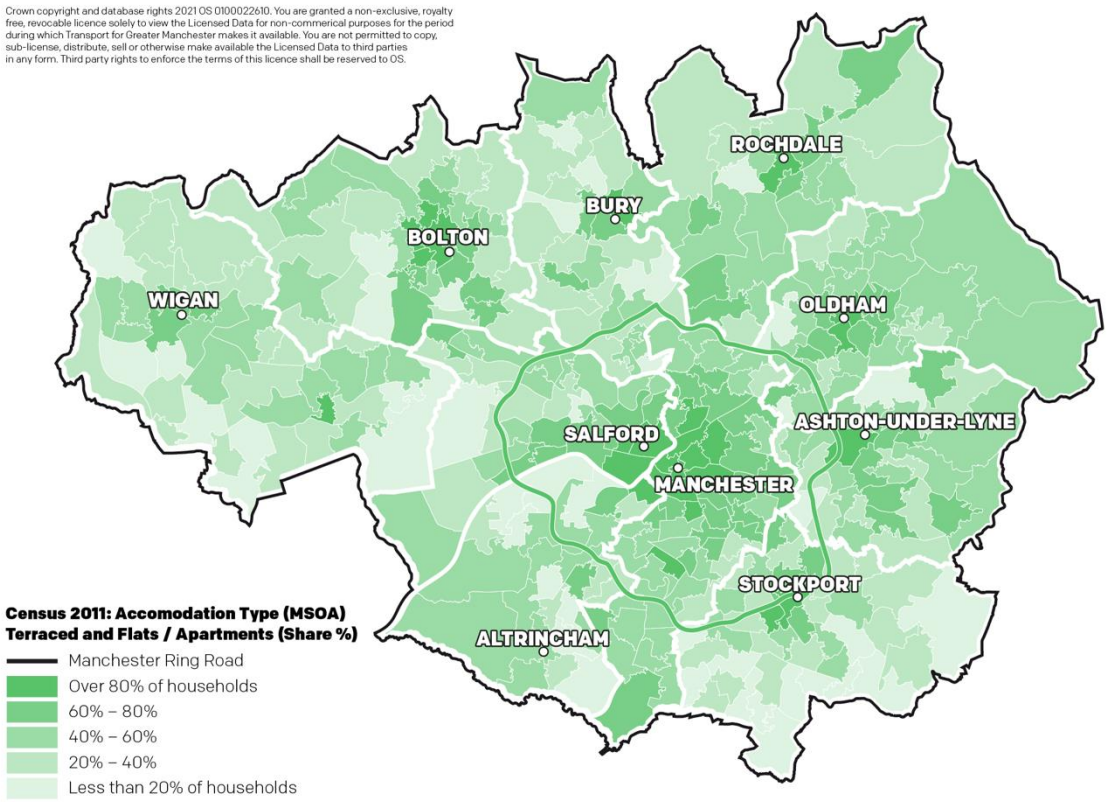
Inclusive and customer-focused

Greater Manchester has a wide variety of housing stock, including a significant proportion without a private drive or a dedicated parking space to allow off-street charging. The convenience of being able to charge vehicles at home has resulted in queries from residents asking if it is legal to run EV charging cabling crossing the footpath between properties and EVs parked on-street.

The 10 Local Authorities in Greater Manchester all have a responsibility to provide safe and accessible footpaths. Under the Highways Act 1980 it is illegal for any person to place or run a cable or wire along or across a public highway including the use of pavement drainage channels or a cable protector.

The government have invited Local Authorities to submit applications to the On-Street Residential Chargepoint Scheme. The purpose of the scheme is to increase the availability of on-street chargepoints in residential streets where off-street parking is not available, thereby ensuring that on-street parking is not a barrier to realising the benefits of owning a plug-in EV. The scheme gives local authorities access to grant funding that can be used to part-fund the procurement and installation of on-street EV chargepoint infrastructure for residential needs.

Owner occupier households that have access to off-street parking will be able to access low cost EV charging with time of use tariffs at home, however this will not apply to households with on-street parking including many households in the private-rented sector or local authority housing. Importantly, many of these households are in urban areas that have most to gain from the local air quality improvements offered by EVs. In Greater Manchester, terraced housing and apartments make up 43% of the housing stock (Census 2011) and these areas typically have limited access to off-street parking. Map 1 below shows the Census 2011 MSOA percentage share of households in terraced housing or apartments which are unlikely to have access to off-street parking.



A socially equitable GM EVCI network is needed to provide affordable alternatives to home charging to ensure that those without access to off-street parking are not disadvantaged. Failure to provide alternatives could delay the transition to EVs for many GM residents.

For residents without the ability to charge EVs off-street a number of alternative options to home charging will be important in enabling a transition to EV use. The expansion of EV Car Clubs operating in these residential locations could offer a genuine alternative to private EV ownership. Through the development of a Shared Mobility Strategy and engagement with Car Club operators we will seek for opportunities to enable them to transition to fully EV fleets and expand the car club offer across GM.

Workplace charging during the day will also be an important option . In appropriate locations and where employees are dependent on car travel; we will work with both public and private sector employers to encourage them to make use of the Government Workplace Charging Grant to establish and expand a workplace EV charging offer as part of a wider review of workplace car parking requirements for employees. We will work with large public sector employers such as hospitals, schools and colleges and medical centres with workplace car parking to determine EVCI requirements and opportunities.

For those who commute to work on the rapid transit network (making use of existing park and ride facilities) there could be the opportunity to charge EVs during the working day whilst EVs are parked at rail station, Metrolink and bus park and ride sites. We will align TfGM's emerging Access to Public Transport Strategy and the development of the Travel Hubs programme with this GM EVCI Strategy and investigate options to expand the Be.EV

network at Metrolink park and ride sites and other transport interchanges; and we will also work with Network Rail and Northern Rail to encourage them to provide EV charging infrastructure at rail station car parks across Greater Manchester.

Retail and leisure destination car parks with dwell times of an hour or more also offer an opportunity to provide alternative EV charging options. We will investigate opportunities to expand the Be.EV network in local authority owned car parks in town and district centres and at other local authority assets such as car parking at leisure centres, gyms, libraries, community and health centres and recreation / sports facilities. We will engage and work with private EVCI providers and operators to encourage them to install EVCI in retail and leisure destinations

Off-street, community charging hubs in residential areas could also provide an alternative option in some locations. Where there are residential areas with significant on-street car parking we will investigate opportunities to provide off-street community charging hubs on a case by case basis where appropriate locations can be found and look at options that will support residents to use these facilities for overnight charging where possible. These community charging hubs could potentially include charging bays for EV Car Club vehicles as well as other mobility services such as cycle hire or e-bike hire facilities, offering residents alternatives to private car ownership. We will establish an on-line system for local residents and communities to register an interest in trialling community hub charging infrastructure.

Our Ambition – to provide affordable alternatives to home charging that enable those who can't charge at home to transition to EV.

An interoperable Be.EV network represents an important step in improving the inclusiveness of EV charging in Greater Manchester. There is now an easy to use App and web-site for customers to access Be.EV. However, a simplified and standardised full public EVCI network is required that is easy to use and accessible to as many EV users and vehicles as possible. An integrated, interoperable network that it is open to the broadest customer base possible will be more inclusive. We will work with private charge point operators to encourage interoperability and improve access through innovation.

Disabled drivers should not be excluded from transitioning to EV because they are unable to access public EVCI. We will work with our Disability Design Reference Group to develop our Design Guidance for EVCI.

Our Ambition - Further expansion of publicly funded EVCI to be designed to provide for disabled EV drivers with step free access and larger parking bays for disabled access.

A customer focused EVCI network should include convenient locations, with up to 24/7 access. EVCI needs to be in visible locations to increase visibility for EV users and raise awareness of the network amongst potential EV users to give them the confidence to transition to an EV.

Our Ambition – to provide multiple EVCI charging points clustered in hubs or mini-hubs in highly visible convenient locations.

Well Maintained and Resilient

A well-functioning public EVCI network will become increasingly more important as the transition to EVs increases, and the network will need to be well maintained to ensure charge points are in a safe and usable condition. A poorly maintained network will also impact on reliability for customers and the viability of the network through the loss of charging events. We have recently invested in upgrading the Be.EV network to ensure it is fit for purpose. Leading by example and raising customer expectations will encourage private EVCI providers and operators to ensure their infrastructure is well maintained. We will continue to work with our EVCI Service Provider to ensure that the Be.EV network is maintained to a good standard, to adapt it and to improve its resilience.

The large-scale transition to EVs will place pressure on the electricity power supply and we have worked and will continue to work with the Electricity North West (the Distribution Network Operator) and Independent Distribution Network Operators (IDNOs) to identify areas with electrical grid constraints and to ensure that there is sufficient capacity across Greater Manchester. As regulated infrastructure providers, ENW and IDNOs have obligations to provide capacity ahead of need and invest to remove constraints.

Publicly funded EVCI should be future proofed so it is able to be easily expanded as the transition to EVs increases demand; and is able to be adapted to incorporate new developments in technology and innovation. Grouping charge points together in hubs or mini-hubs will allow for future expansion and aid the efficiency of maintenance improving resilience against broken or faulty infrastructure. Data on the usage of the network and customer feedback will be used to monitor and improve the operation and maintenance of the network and determine future requirements as demand grows.

Our Ambition – to ensure that the Be.EV network is maintained in a good state of repair and that it is resilient to future increase in demand.

Safe and secure

Safety must be a fundamental consideration in the design of the GM EVCI network. Publicly funded EVCI will be well designed so that the operation and maintenance of the network is safe for the EV users, the EVCI service provider and other road users including pedestrians and cyclists. EVCI will be placed in visible, open locations overlooked by nearby activity to provide natural surveillance, with good natural and artificial lighting, and security (including CCTV) for vehicles left over night. This will help ensure that concerns around personal security and crime (including the perception of crime) are not barriers to using EVCI at all times of the day and night. Grouping charge points together in hubs or mini-hubs will contribute to safety and security and will make it more economical to provide required security measures.

Our Ambition – to ensure that people feel safe using the public EVCI network at all times of day and night and that perceptions of crime are not a significant barrier to using the network.

Reliable

A reliable EVCI network will be essential if people are to have confidence in EVCI provision, availability and maintenance to minimise range anxiety and promote the transition to EVs. The recent upgrade of the Be.EV network has provided more reliable charge points with technical solutions that allow EV users to check a real time status of individual charge point availability. We will support the Government proposals to set a data standard that private EVCI operators need to meet when making public-chargepoint-data openly available and lobby for this to include live 'availability' data.

Groups of charging points in a hub or mini-hub, will also increase the likelihood (real and perceived) that a charger will be available for use on arrival. A well-maintained network will be needed to ensure the timely repair of broken or damaged charge points and we will work with our EVCI service provider to ensure the Be.EV network continues to be reliable. We will support the government proposal for a minimum reliability standard for all EVCI operators and the proposals for all EVCI operators to provide a 24/7 call helpline for consumers so that help can be provided to consumers who are struggling to access or use a charge point.

Other challenges to reliability include the blocking of charging bays by people parking conventional cars and EV users overstaying once charging is complete or using a charging bay to just park their EV. We will need to find solutions to the potential blocking of charging bays which could include enforcement and financial penalties for overstaying. Bay markings and signage will be used to identify EV charging bays and Traffic Regulation Orders used to prevent blocking of EV bays and charge points. EV charging systems can use both technical and behavioural solutions to ensure that charging infrastructure remains available for use when needed. Data on the usage of the network and customer feedback will be used to monitor and improve the reliability of the network.

Our Ambition – to develop and maintain a reliable EVCI network that offers available charging solutions that reduce range anxiety and give people the confidence to transition to EVs.

Supporting a Healthier Greater Manchester

The air quality emissions benefits of EVs are discussed elsewhere in this strategy and clearly a well-planned and delivered EVCI network will encourage and accelerate the transition to EVs, with associated clean air benefits to the GM population.

EVCI should also be integrated with other GM initiatives that encourage active travel. EVCI locations will form part of a wider 'place making' with the siting of EVCI considering adjacent

uses. For example, EVCI could be integrated with “parklets” which provide seating, cycle parking, e-bike or e-scooter charging, green space, and play areas.

Any on-street EVCI should avoid creating obstructions to other users of the highway, and particularly those with reduced vision or mobility or those using pushchairs or prams. EVCI should not discourage the use of active travel modes or reduce the space available for people travelling on foot or by bike. GMCA’s Interim Active Travel Design Guide recommends that a footway width of 1.4m should be regarded as an absolute minimum at localised constraints, and a minimum of 2.0m should be provided at all other locations. This width must be clear, continuous and free from any obstacles or obstructions such as bollards, parked vehicles, or signs. To ensure that any on-street EVCI does not create obstructions and footway widths are maintained, there should be a presumption in favour of carriageway build-outs unless this is impractical. Where it is necessary to position EVCI on the footway it should not create localised constraints of less than 1.4m.

Locations will also be considered which allow EV users to charge their vehicle whilst undertaking active travel for the final stages of their journey. Destination charging at locations for a leisure, recreation or sporting activity will enable EV users to charge their vehicles whilst pursuing activities that support their physical health and mental wellbeing.

Our Ambition – To develop an EVCI network that supports people in leading active, healthy lives.

Viable

The operation and maintenance of publicly funded EVCI should remain cost neutral wherever possible so as to minimise public subsidy. User tariffs should support the day-to-day costs of operation and maintenance and the publicly funded EVCI should not be subsidised by non EV owning residents or the 31% of Greater Manchester households that do not own a car. The location of charge points has a strong influence on how often and how easily they are used by residents, businesses and visitors and therefore how much revenue they generate. Locations for EVCI can lead to a potential loss of existing parking spaces in local authority car parks or existing areas of car parking serving local communities. Community engagement will be an important aspect of locational decisions and there is clearly a need to focus investment on EV user groups that will generate the highest utilisation rates. EVCI locations that have community support and offer justifiable utilisation rates and value for money should be prioritised.

Capital investment into the network will be sought from a balance of local and central government funding. Greater value for money can be achieved through cost efficiencies associated with grouping charge points together in hubs or mini-hubs and future proofing those locations for possible future expansion. Utilising existing public sector land assets will also help reduce capital costs and avoid third party ownership agreements.

Our Ambition – In the medium term, to develop a self-sustaining publicly funded EVCI network that is not dependent on public subsidy.

It is acknowledged that some financial support will be required in the short term for public intervention in the market that will encourage the transition to EVs and grow the demand for public charging required for private EVCI providers and operators to commit to investment.

In the long term there is a need for private sector investment to build and operate a self-sustaining public EVCI network, aligned with the objectives and principles of this EVCI strategy. It is essential that a viable, matured commercial market is developed to meet future demand and ensure continued maintenance and improvements to the network. This will allow public sector intervention in the market to be scaled back over time.

3.4 EV Tariff

When it was first introduced, EV users could access the GMEV network for free. This allowed GM to test the new scheme whilst providing an incentive for users to purchase electric vehicles. However, with the expansion of the EVCI network and the increase in usage of this network, it is now appropriate to introduce a tariff.

The tariff should align with the GMTS 2040 Fares and Ticketing Objectives in the following way:

- Simplicity – Customers can easily understand and choose options to pay for their electricity charge.
- Convenience – Transactions are quick and easy for the user and delivers efficiencies to the operator.
- Value for Money – Users see the tariff as a fair price for the service they get.
- Transparency and Trustworthiness – Users have a clear understanding of pricing and product.
- Inclusivity - related to the affordability of public charging
- Balanced Funding – Tariffs should raise the revenue needed to balance costs with available subsidy.

4. Developing an EV Charging Network for GM

4.1 Current Network

There are three main types of EV charging – slow, fast and rapid. These represent the power output, and therefore charging speeds, available to charge an electric vehicle.

- Slow Chargers (3.5kW) – are a common method of charging EVs at home overnight; due to their slow charge they are uncommon in publicly accessible networks.
- Fast Chargers (between 7kW to 23kW for AC, and 10kW to 22kW for DC) – are used for home charging and at destinations where vehicle dwell times are likely to be for an hour or more such as at workplaces, park and ride sites or long stay car parks for destinations such as town centres, supermarkets or leisure centres.
- Rapid Chargers (between 43kW to 44kW for AC, and 50kW to 62.5kW for DC) – are the fastest way to charge an EV and are therefore found at locations close to main routes and motorways. Rapid chargers can deliver up to 80% battery charge in around 30 minutes. There are also Ultra-rapid chargers with a charging output greater than 62.5kW (including up to 350kW).

An important factor in encouraging the transition to EV is the EVCI network size and availability of suitable charging points. However, research suggests that provision of EVCI alone will not be enough to encourage a speedy transition and therefore additional measures will be required such as the continuation of the Government grants to help reduce the purchase price of EVs and promotional and behavioural change programs.

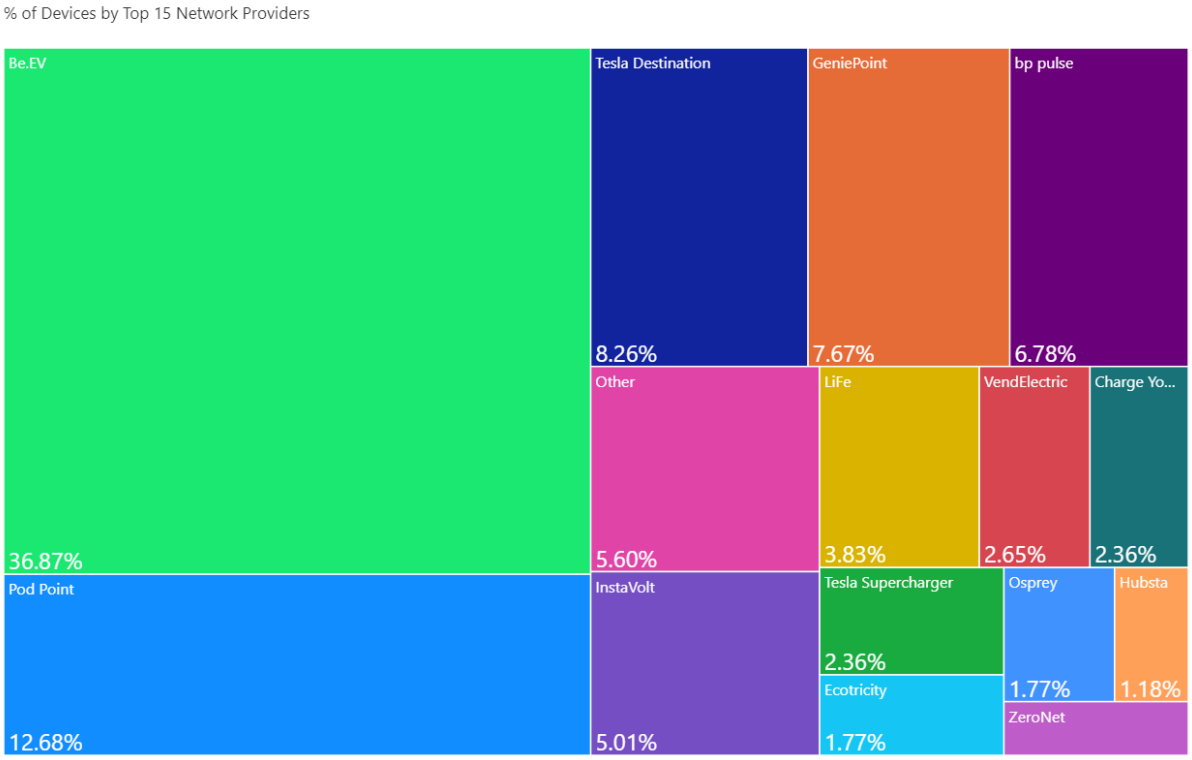
Currently, GM's EV registration is significantly behind the national average EV registrations as a percentage of the total vehicle population. As part of the GM public conversation on the clean air plan proposals, the availability of charging infrastructure was cited as a key barrier for businesses and individuals in switching to an electric vehicle. GM's EVCI provision is also below the national average and North West average of charging devices per capita. Table 1 below shows the Jan 2021 position.

Region	EV Registration % of total fleet	EV Charging devices	Charging devices per 100,000 population
United Kingdom	0.7%	20,775	31.1
North West	0.4%	1,410	19.2
Greater Manchester	0.3%	346	12

The EVCI network in GM should facilitate, not inhibit, the transition from petrol and diesel car and light goods vehicles to EVs by being of sufficient scale and type to meet users' needs. There is a need to ensure that the absence of charging infrastructure isn't a barrier to this transition to EVs. There is also a need to encourage and accelerate the transition to

EVs and ensure that network comprehensiveness avoids any gaps that may reduce confidence in the ability to charge amongst different EV markets.

In GM, the current publicly funded EVCI network, Be.EV accounts for approximately a third of the charge points, with the remaining two thirds delivered by over 20 private sector providers and operators.



80% of the publicly funded charge points are made up of 7kW (fast) chargers and 20% of 50kW (rapid) chargers, whereas private operators have 91% of their network composed of chargers with a speed superior to 7kW. The private sector operators have a very different business model and charging speed offer compared to the existing publicly funded network.

The private sector business model is typically focused on:

- rapid (and ultra-rapid charging) to achieve the best commercial returns on investment; and
- providing customers with an experience as close as possible to the 'convenience' of owning an Internal Combustion Engine vehicle and therefore replicating the current conventional behaviours of refuelling.

4.2 The scale of the Network required by 2025

A vision-led adaptive planning approach is required to encourage and accelerate the transition to EVs across GM. Projections can be made of public EVCI that will be required in the future based upon assumptions of general EV transition. To enable such projections to be determined, a model has been developed that projects the number of public fast and

rapid chargers required for a given fleet proportion of electric cars and LGVs. The modelling assumptions for public EVCI are set out in Appendix A

Planning Scenario

The development of the EVCI strategy needs a Planning Scenario to allow a plan of interventions to be developed, and this in turn needs an input level of transition to electric vehicles to aim for.

National Grid's 2019 Future Energy Scenarios set out 4 main scenarios for electric vehicle transition. The scenario with the fastest uptake in the near term, called "Community Renewables", projects that 8.18% of vehicles will be electric in 2025, rising to 75% 2035.

Using the FES 2019 'Community Renewables' scenario of 8.18% of the whole UK vehicle fleet being EVs in 2025, this projection gives a Planning Scenario with charger requirements of 2,700 fast, and 300 rapid public chargers in GM by 2025. As of February 2021, there are 264 fast and 59 rapid public chargers in GM.

The Planning Scenario indicates that GM requires significant expansion of publicly accessible charging infrastructure in the next few years to 2025. Between 2025 and 2030, demand for public charging infrastructure is projected to increase significantly, however, the technology surrounding charging an EV is rapidly being developed and continuously changing; in turn, the charging needs of EV users is likely to change over the coming years.

Beyond 2025, there is a significant degree of uncertainty around projecting demand for EVCI depending on the rate and distribution of EV transition over the medium to long term. This highlights the importance of continuous review of market needs in order to be able to both respond to and shape future demand.

4.3 The need for public sector intervention

Whilst the private sector contribution to expanding the GM EVCI network will clearly be invaluable, currently there is limited evidence that private EVCI providers and operators are delivering at the scale and pace needed to meet the 2025 projected demand, or the required type of infrastructure in the right locations.

Therefore, there is a continued need for public sector intervention, supported by a clear policy position, to influence the scale and distribution of EVCI investment that is required. However, there is a need to avoid an oversupply of publicly funded charge points, as this may result in:

- under-utilised assets requiring ongoing revenue support to cover the cost of operation and maintenance;
- unused charging bays with spaces left empty for long periods of the day causing issues in areas where there is already a high demand for limited car parking; and
- discouraging private sector investment.

It is likely that, without public sector intervention in EVCI now, a number of gaps in the market will emerge as set out below.

- Inclusive market coverage

The private sector will not invest significantly ahead of demand and there is a clear correlation between the early adopters of EV technology and average salary. There is a risk that private sector provision will be initially limited to more affluent areas or destinations where the investment returns would be attractive. Leaving less affluent areas without EV charging solutions that will act as a barrier to EV transition.

- Delay in delivery

Due to the requirement to ensure a short-term return on investment, the private sector may take a largely reactive approach, following demand for EVCI and delaying investment until returns are attractive. This could delay rather than promote transition to EVs.

- Interoperability

There are currently more than 20 different private operators active in Greater Manchester and potentially additional companies seeking to gain market share for profitable locations. Whilst some attempt has been made by the private sector to ensure EV users can access sites with different operators, the current service is far from perfect or integrated.

In the short term there is a need for public sector intervention in the market to fill these gaps and invest in locations and types of charging that the private EVCI providers and operators will currently find unattractive; not only to meet future demand and accelerate the transition to EVs but also to ensure the ECVI network is developed in a way that delivers our ambitions. Public sector intervention will also demonstrate commitment to EV technologies and encourage investment from the private sector.

In the long term we need to encourage and leverage private sector investment to build and operate a self-sustaining public network supported by the right policy framework. It is essential that a viable, matured commercial market is in place to meet future demand and ensure continued maintenance and improvements to the network.

4.4 EV User Profiles

To aid a better understanding of the EV market and where the focus for public (and private) sector investment might be, we have identified a number of market segments based on potential EV user profiles and charging behaviours and requirements. For clarity, this strategy does not cover charging infrastructure requirements for Heavy Goods Vehicles (HGVs) or buses. Potential EV users have been segmented into EV user profiles shown in Table 2 below and further discussion on the development of these EV User Profiles is included in Appendix B.

Table 2 EV User Profiles

Vehicle Type	User Profiles
Taxis	Hackney cab taxi drivers
	Private Hire Vehicle (PHV) drivers
Light Goods Vehicles (LGVs)	Company fleets
	Small and medium-sized enterprises (SMEs)
	Privately owned/leased LGVs
Local Authority and other public sector fleets	
EV Car Clubs	
Private Cars	Residents with off-street parking at home
	Residents with on-street parking at home
	Visitors to GM

4.5 EVCI Typologies

In many areas of Greater Manchester it is not considered to be physically possible or financially viable to install on-street, publicly accessible charge points in residential areas to the scale required to meet demand from private car ownership transitioning to EVs.

Whilst there may be appropriate locations for well planned, designed and managed on-street charging, rather than providing large amounts of on-street publicly accessible residential charge points, the GM EVCI Strategy will focus on providing alternatives designed to support residents that do not have access to home charging including:

- EV Car Clubs
- Community charging hubs
- Workplace charging; and
- Destination charging including park and ride sites

A set of basic EVCI Typologies have been developed by considering charging behaviours, dwell times and charger types and assigning these to particular locations or land uses. Further discussion on the development of these EVCI Typologies and alternatives to large-scale on-street charging provision is included in Appendix C.

Table 3 EVCI Typologies

Typologies	
Home Charging	Private home or apartment parking off street
On Street charging	On street parking bays
Residential Community Charging	Community hub car parks in residential areas with high levels of on-street parking
Destination	Work-place parking Town/local centre and city centre car parks Park and Ride sites Retail parks Visitor attractions
On route	Motorway Service stations and existing petrol stations, Lay-bys near areas of business activity

- H**ome charging often overnight** (available to EV users with access to off-street parking) which takes advantage of the long dwell times of vehicles and is best suited to slow or fast chargers.
- **On-street charging** at on-street parking bays which could include a broad range of dwell times and accommodate fast or rapid chargers depending on likely dwell times.
- **Residential community charging** (for EV users without access to off-street home parking) also able to take advantage of the long dwell times of vehicles and is best suited to fast chargers.
- **Destination charging**, defined as locations other than where the EV user resides, which includes a broad range of dwell times and can accommodate fast, rapid and ultra-rapid chargers depending on the average dwell times of vehicles.
- **On-route charging** which would typically require rapid and ultra-rapid chargers due to the higher proportions of short dwell times.

Table 4 below sets out how we envisage the different EV user profiles we have identified will correlate to the different charger typologies based on charging behaviour and requirements.

Table 4 EV User Profiles and EVCI Typologies matrix

	Home (slow/fast chargers)			Destination (fast/rapid chargers)					On-Route (rapid chargers)	
	At home	On-Street	Community Hub	Workplace	Visitor Attraction	Town/City Centre car parks	Retail Park	Transport Interchange/ P&R	Motorway Service Area and existing petrol stations	Lay-By
Hackney Cab	✓	✓	✓			✓		✓		✓
PHV	✓	✓	✓			✓		✓		✓
LGV	✓		✓	✓						✓
LA fleets				✓						
Car Club	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Private Car	✓		✓	✓	✓	✓	✓	✓	✓	✓
Visitors (from outside GM)					✓	✓		✓	✓	✓

✓ = primary charging location

✓ = top-up/secondary charging location

Understanding the potential scale of each of these markets at different future points in time will enable us to determine if the transition to EVs is constrained by an under provision of EVCI and identify which market segments should be the focus of public sector investment; and which would be more suited to investment from the private sector.

5. The Case for Public Sector Investment to support the transition to EVs

5.1 The role of the public sector in influencing and delivering a GM EVCI network.

There are a number of ways in which TfGM and the 10 GM Local Authorities, working in partnership with other stakeholders, can aid the delivery of a GM EVCI network that encourages and accelerates the transition to EVs. Alongside the deployment of publicly funded EVCI, the public sector can lead by example in the transition of their own fleets to EV and also use Local Planning Authority powers to ensure new development makes provision for EVCI.

5.2 How we will invest in expanding the publicly funded EVCI network.

Deployment of publicly funded EVCI

In terms of deployment of publicly funded EVCI, the priority will be projects which support the CAP and 2038 net zero carbon ambitions by aiding the accelerated transition to EVs for the most polluting vehicles; providing opportunities for those businesses most affected by the CAZ to transition to EVs and supporting those who will find it most difficult to transition to EVs due to home charging constraints. These projects will also help stimulate private sector investment by demonstrating a commitment to the transition to EVs and confidence in the market.

The most sustainable solution for transport and energy systems overall is for publicly funded EVCI hubs or mini-hubs of varying power requirements and scales to correlate with destination dwell times and charging behaviours. Whilst a mix of fast and rapid chargers will allow EV users to choose the most appropriate charging speed for their needs, the particular mix will be determined by the likely vehicle dwell times at any given location.

The expansion of an EVCI network for GM requires a high proportion of fast chargers as this enables a more sustainable form of charging that fits with electricity grid capacity and most vehicle duty cycles. This approach enables deployment of EVCI with the lowest impact on the electricity grid (and therefore costs).

Initial investment will provide a blend of EVCI that prioritises meeting the demand likely to be generated by the most polluting vehicles transitioning to EVs to support achieving air quality and carbon targets.

The deployment of publicly funded infrastructure must also be aligned with a business engagement programme with both public sector and private sector employers to encourage the provision of workplace EV charging infrastructure.

Deployment of EVCI by the EVCI Service Provider

GM has appointed an EV Charging Infrastructure Service Provider (EVCISP) to deliver a range of EVCI solutions through a 7-year EVCI contract. The EVCI Contract allows for the EVCISP to make their own investments in EV charge points to aid the development of the network. This Supplier Owned Infrastructure (SOI) will be aligned with the EVCI Strategy objectives.

Leading by example

It is important that TfGM and the GM Local Authorities along with other public agencies show leadership and demonstrate a commitment towards the transition of EVs. TfGM and GM Local Authorities already have a number of EVs in their fleet and the transition should include a review of their respective fleet requirements and the development of a shared approach to purchasing or leasing further EVs. Vehicle replacement strategies should be agreed so that a clear pathway to net-zero carbon Local Authority fleets can be outlined. Working together, GM Local Authorities could also include a provision for EVs when tendering for fleet management services. To facilitate the transition of fleets to EVs, EVCI should be installed or expanded where required at Local Authority offices and depots and opportunities for sharing charging infrastructure should be investigated. This will act as useful demonstrations to other businesses of a commitment to the technology to help encourage transition to EVs amongst the business community. Lessons learnt through the transition process should be shared with other fleet managers in the public and private sectors as part of a wider business support package.

Development of Planning Policy

Planning policies and guidance provide opportunity for GM's Local Planning Authorities to facilitate and coordinate the development of an EVCI network that supports and encourages the transition to EVs in areas beyond the publicly funded and controlled EVCI network.

By developing and adopting policies and guidance, local planning authorities can ensure EVCI is integrated and normalised within new developments from the design stage. Policies can be used to set expected requirements for provision of EV charge points in new residential, workplace and commercial developments, offering a clear framework for developers to plan, design and fund the provision of EVCI as part of the development.

The physical location, design, and management of EVCI as part of new development can be coordinated through planning policies and design guidance. Policies can ensure new developments are designed with the infrastructure needed to expand EV charge point provision in future as demand increases. This can be done through requirements for both active and passive EVCI. Active charge points refer to spaces that are fully wired and ready to use from the outset of the development. Passive provision refers to the provision of the necessary underlying infrastructure (power supply capacity and the ducting installed within car parking facilities) to enable simple expansion of charge points at a future date.

To ensure that adequate provision of EV charging infrastructure is provided in new developments a number of factors need to be considered including:

- The development type;
- EV user profiles, vehicle dwell times and charging behaviour;
- Potential for EV Car Club requirements;
- Future management, operation and maintenance requirements; and
- Passive and Active charge point provision

New developments within GM should make adequate provision of EVCI to meet demand and encourage and accelerate the transition to EVs. To achieve this, new developments should be required to provide a minimum number of active EV charge points and offer enough passive provision to enable efficient expansion as demand increases. Each Local Planning Authority will develop their own Local Plan policies relating to the provision of EVCI in new development. The recommendations set out in the table below are intended to aid policy development and act as supplementary guidance.

Table 5 Guidance on provision of EVCI in new development

Development Type		Active Provision	Passive Provision
Residential	Within property-based parking e.g. driveway and/or garage	1 per dwelling	-
	Designated off-street residential parking	1 per dwelling	-
	With non-designated off-street parking	10% of spaces	20% of spaces
Commercial	Office / General Industrial	10% of spaces	20% of spaces
	Retail uses	10% of spaces	20% of spaces
	Sports Centres, Gyms and Leisure Facilities	10% of spaces	20% of spaces
Other	Education & non-residential institutions	10% of spaces	20% of spaces
	Petrol filling and Motorway Service Stations	10% of spaces	20% of spaces

5.3 Priorities for Public Investment to 2025

The initial focus for investment will be to provide a blend of EVCI that prioritises meeting the demand likely to be generated by the most polluting vehicles transitioning to EVs. We will target businesses and vehicles most affected by the CAZ.

The taxi trade

We have undertaken detailed engagement with the taxi (Hackney cab and PHV) trade and further analysis of this particular market segment's charging requirements. Clean Air Plan modelling estimates that 15% of all hackney cab and PHV trips will need to be made by EV by 2025 in order to achieve air quality compliance.

Modelling has been undertaken to understand what this means in terms of EV charging infrastructure. This estimated that between 34 (low scenario), 90 (central scenario) and 190 (high scenario) rapid charging devices will be needed by 2025 to support that transition.

The OZEV and GM CAP EVI Taxi Projects represent targeted investment of approximately 70 rapid chargers (in total) dedicated for use by the taxi trade, in combination with the Clean Taxi Fund (CTF), which aims to provide the financial support needed to transition to EVs.

EV Car Clubs

The E-Hubs trial project is funded by the European Regional Development Fund and aims to demonstrate innovations in technology focused on low carbon shared mobility. It provides for car clubs using Electric Vehicles (EVs) and e-cargo bikes for-hire in co-locations. It is intended that the project will have a number of benefits including a reduction in carbon emissions, expediting the reduction of car ownership, making electric vehicles more accessible to the general public, encouraging more active travel practices and creating a knowledge bank of how to embed the use of an EV car-club and e-Cargo Bikes into Greater Manchester, creating a blueprint for further mobility roll-out. The E-Hubs trial project has identified 5 potential locations which include EVCI dedicated to an EV Car Club operator.

In partnership with EV car club operators we will look for further opportunities to expand the EV car club offer in suitable locations across GM making shared electric vehicles more accessible.

Priority locations for community hub charging infrastructure

Through further research and engagement with businesses and communities we will look for opportunities to trial a small number of EVCI community hubs in locations where high demand is aligned with constraints on home charging or where demand from significant EV LGV business activity may justify public investment. We will establish an on-line system for local residents and communities to register an interest in trialling community hub charging infrastructure so that, funding permitting, we can direct investment to areas of identified demand.

6. Delivery and Monitoring

6.1 Existing Commitments

Delivery is currently being managed by TfGM on behalf of the Greater Manchester Local Authorities. GM has appointed an EV Charging Infrastructure Service Provider (EVCISP) to deliver a range of EVCI solutions through a 7-year EVCI contract to expand, upgrade, re-brand and maintain the existing publicly owned EVCI.

The EVCI contract involves two phases; the first phase involves the transition from GMEV to Be.EV including the upgrade of 118 old GMEV fast chargers to new fast charge points (which is now complete) and the delivery of the Early Measures project delivering 24 new rapid charging points across 22 sites (including 1 site which is a dedicated taxi charge point).

The second phase will include the delivery of additional publicly funded EVCI projects and the potential for the EVCISP to fund and deliver their own charge points.

Through the OZEV taxi project we have secured funding to install 30 rapid chargers dedicated to taxi use across GM by 2022. On-line engagement with the taxi trade and consultation with ENWL is underway to aid the determination of sites for deployment.

Over the coming years we will continue to seek and secure further funding opportunities that align with our priorities for investment.

6.2 Site Prioritisation Process

Site selection for EV charging points is important as the choice of location influences both costs and usage. TfGM, through delivery and operation of Greater Manchester's publicly funded Electric Vehicle Charging Infrastructure, has identified the following key challenges in site selection.

Land ownership – Permissions and legal requirements can add delays to installing EVCI on third party land, including where this is land owned by the Local Authority. In the case of large organisations, they may also have their own national contracts with EVCI providers. There are also costly feasibility studies required to ensure the host's power supply has the necessary spare capacity.

Accessibility - On-street locations often do not have the carriageway space needed to accommodate the charging infrastructure and relevant electricity supply support e.g. chargers and feeder pillar. Off street locations can be in quieter areas that may bring additional security/access problems, particularly if the area requires closures at certain times.

Electricity network - Availability of the required power, particularly for high powered chargers (50kw+) can be an issue. Connection costs vary from site to site as each site has

varied levels of available electricity network capacity. By clustering chargers together in hubs or mini-hubs, electricity network costs are reduced as well as saving on other civil engineering works such as cable length and trenching work.

An approach has been developed to identify suitable, available and sustainable locations to create a pipeline of sites to deploy public EV Charging Infrastructure informed by EV user profile needs, dwell times and battery re-charge requirements.

Site identification has focused on off-street parking locations (rather than on-street). This has naturally led to favouring existing car parks as potential sites, with a preference for Council-owned car parks and TfGM Park & Ride car parks to minimise coordination and costs associated with third parties.

Locations have been prioritised that serve areas that are likely to have greatest demand for EVCI in the near-term to ensure charge points achieve the required number of charge events and are not underutilised or stranded assets. Locations with existing space to accommodate EVCI and good network capacity that minimises land acquisition and grid connection costs have also been prioritised.

6.3 Design Guidance

Design guidance is being developed to standardise publicly funded EV charging bay markings and signage across GM and ensure that the infrastructure is accessible to all included disabled EV users. Consistent and clear bay markings and signage for public charging infrastructure will help to ensure that EV users can easily identify and find public charging infrastructure; and improve perceptions about the prevalence of EVCI across GM. It is recommended that, where possible, the design guidance is also applied to new EVCI installed by other providers and operators to help achieve our network ambition for standardised EVCI that is instantly recognisable by the general public.

6.4 Market Research and Engagement

Public Engagement

To give GM businesses and residents the confidence to transition to EVs they need to be aware of the availability of appropriate and reliable charging infrastructure, to address issues of range anxiety. There is a need to create a public engagement campaign, to engage the public in the transition to EVs and to demonstrate that the required EVCI is available. A public campaign to highlight the level of investment and raise public awareness of the expansion to EVCI network should be run alongside the roll-out of publicly funded EVCI across GM.

Business Engagement

It is anticipated that the initial future growth in EV users will be greater amongst the company car market than the private car market. Company car and private business make up the bulk of new car registrations within the UK accounting for approximately 55% of new car registrations in 2019 with 1.23m new car registrations going to business users and in addition, LGVs contributed 365,778 sales to the fleet sector. (Business vehicle registrations include both vehicles registered directly to a company, for example commercial goods vehicles and fleet vehicles, which are vehicles purchased by a company for the intention of use by staff, for example as company cars.) In 2019 business registrations accounted for 2.6% of new vehicle registrations whilst fleet registrations accounted for 52.4% of new vehicle registrations.

In 2019 the UK Government announced it would revise taxation processes impacting the ownership of company cars (Benefit in kind, BIK), and as of 20/21 BEV (Battery Electric Vehicles) are no longer required to pay company car tax. A number of large vehicle manufacturers, including EV only manufacturers such as Tesla, are beginning to actively target the business and fleet market, advertising the taxation relief benefits.

A programme of targeted engagement is required, in partnership with ENWL, to work with both public and private sector employers to encourage the use of the Government Workplace Charging Grant to establish and expand a workplace EV charging offer for their employees.

Engagement with local residents and communities

There is a need to establish a on-line system for engagement with local residents and communities to enable them to request community hub charging infrastructure so that, funding permitting, investment can be directed to areas of identified demand.

Engagement with private EVCI providers and operators

To better understand their investment priorities and encourage them to install EVCI in the retail and leisure destinations where agreements are already in place.

6.5 Monitoring the scale and performance of the network

For each step along the journey of transitioning to EVs we need to ensure that an under provision of EVCI is not prohibiting the transition for each of the identified user groups. We also need to ensure that the GM EVCI network remains fit for purpose. We therefore need to monitor EV registrations across Greater Manchester and the utilisation and performance of the Be.EV brand as well as the level of private sector provision, to assess if the expansion of the network is ahead of demand and our network ambitions are being realised. We will also need to maintain continued dialogue with representatives of the different user groups and gain insightful feedback regarding the provision and location of publicly funded EVCI. A regular user group could be established and utilised to provide feedback from a network of

local experts. Monitoring will be regularly reviewed to ensure we are keeping up to date with EV market developments. If the transition to EVs exceeds modelled assumptions, we must be able to respond quickly to ensure that the GM EVCI network continues to meet with demand.

The technology surrounding charging an EV is rapidly being developed and continuously changing. It will be important to maintain an understanding of these changes as they arise and how they will influence our EVCI network and the way in which EV users charge across GM. With advances in technology the charging needs of EV users are likely to change over the coming years. To ensure we continue to deliver an EVCI network that meets the needs of businesses, residents, and visitors to GM, we will need to keep abreast of emerging technologies and charging options as they develop, to ensure infrastructure remains fit for purpose.

7. Final Conclusions and Next Steps

Availability of and access to charging infrastructure is recognised as a critical barrier to the adoption of EVs. GM requires significant expansion of publicly accessible EV charging infrastructure in the coming years to encourage and accelerate the transition to EVs in order to meet its transport emissions targets.

The requirement for appropriate vehicle charging infrastructure is even more critical given that the Government has now committed to phasing out the sale of new petrol and diesel vehicles by 2030. In the short term there is a need for public sector intervention in the market to influence the scale, type and distribution of EVCI investment that is required.

This EVCI Strategy sets out the vision-led adaptive planning approach to the provision of charging infrastructure, that we intend to adopt to support a rapid transition towards a net zero carbon transport system.

Using a planning scenario to 2025 has allowed us to determine the overall scale of the EVCI network required for Greater Manchester in the coming years and also highlighted the importance of continuous review of the EV market needs in order to be able to both respond to and shape future demand.

This EVCI strategy has set out strategic principles and identified potential EV user profiles, charging behaviours and requirements. This has enabled a set of EVCI typologies to be developed to determine the nature and shape of the EVCI network required to meet our ambitions and has highlighted where the focus for public sector investment will be required.

Public investment will be targeted at those who will find it most difficult to transition to an EV due to charging constraints. Initial investment will provide a blend of EVCI that prioritises meeting the demand likely to be generated by the most polluting vehicles transitioning to EVs as well as providing opportunities for those businesses most affected by the CAZ to transition to EVs. This approach will support GM in meeting its air quality and carbon targets.

To accompany this EVCI Strategy, the detailed measures to support progress towards providing the EVCI network that will enable GM to rapidly accelerate the transition to EVs are set out in a funded programme of works that can be found here.

The final version of the document to include a link to the micro-site which will display the funded programme of works.

APPENDIX A

Appendix A

Modelling Assumptions for public EVCI

The public EVCI demand has been estimated using an urban model, which estimates public charger requirements for those unable to charge at home, and an on-route model, which estimates charger requirements for EV users visiting Greater Manchester and passing though Greater Manchester.

The analysis factors in the ability of EV users to charge from home and has segmented charging types and charging locations to reflect different charging behaviours and requirements. The model helps project public EVCI demand by:

1. Selecting an assumed transition to EVs.
2. Estimating the ability to charge at home in GM based upon Census 2011 housing type and assuming that everyone with a detached or semi-detached house can, and will, charge at home instead of using public charging.
3. Assuming all car users in other types of housing are unable to charge at home, and so must use public EVCI.
4. Using the GM highway model to give the distribution, length, and split of car commute, car business, car other, and LGV trips to each destination area.
5. Determining the energy requirement for those journeys from fast and rapid chargers, by assuming a split of requirements by use type (for example, commuting requiring mainly fast chargers, LGVs requiring mainly rapid chargers).
6. Converting that energy requirement into numbers of chargers required, by assuming an arrival time profile throughout the day, and scaling charger numbers to meet peak requirement.
7. Modelling on-route charge demand for rapid chargers for visitors from outside GM, who need to top-up charge while in GM, so assumed to require 'rapid' top-up charging.

Different projections can be developed by a) varying the input assumption regarding EV transition at Step (1) and b) varying the internal model assumptions. Figure 1 below shows projections for what the public EVCI requirements would be in GM by varying levels of the EV transition by 2030 of 10%, 20% and 30% of the fleet. Each projection uses a central set of model assumptions for other parameters.

The Figure also shows the current level of public EVCI provision (in yellow) and a projection of what the current TfGM procurement mechanism could achieve, with existing levels of funding.

These projections show that the public EVCI requirement could be between 3,000 and 7,000 by 2025.

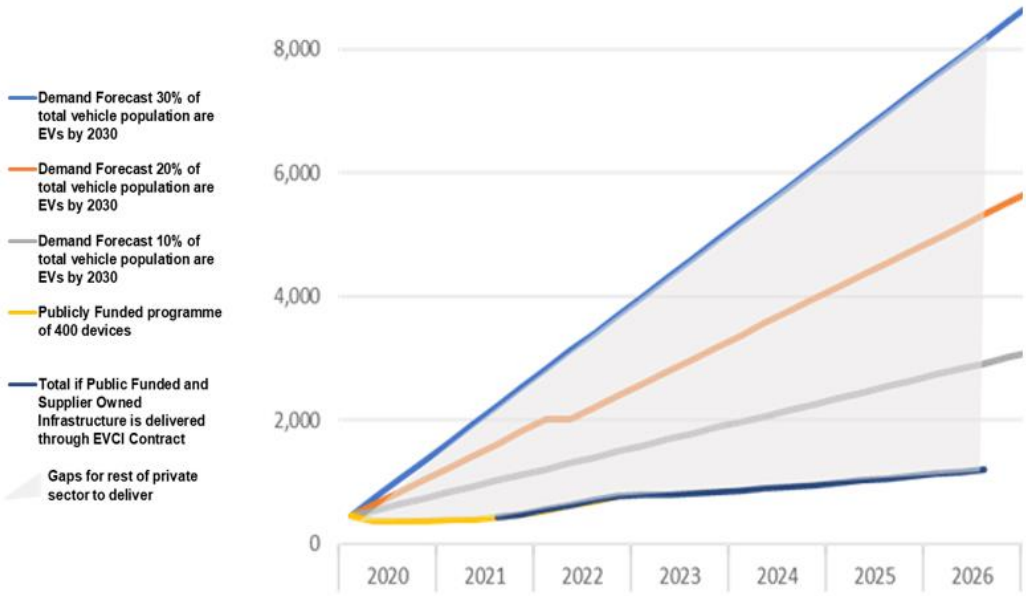


Figure 1: Public EVCI Requirements in GM for a range of EV transition scenarios.

Commentary on projections

The FES 2019 'Community Renewables' scenario has been chosen as the input assumption for the Planning Scenario as it represents a reasonable optimistic scenario for the transition to EVs. In this way, the Planning Scenario represents a good basis for planning EVCI given this strategy's stated aim of:

- Ensuring that EVCI is not a barrier to EV transition; and
- Setting out a plan that delivers EVCI just in advance of need.

It is noted that while the FES scenarios do account for a conventional car sales ban, the November 2020 UK Government announcement of an end to conventional engine sales in 2030 is sooner than all FES 2019 scenarios. This highlights that the Planning Scenario will need to be kept under review as part of the EVCI strategy proposals to monitor the scale and performance of the network set out in section 6.5.

When considering the Planning Scenario, it is important to note that projection is made based on fast chargers being 7kW chargers and rapid chargers being 50kW. This provides a reference for considering other speeds of charging covering slow, fast, rapid and ultra-rapid charging in particular locations. For example, fewer rapids will be required if ultra-rapid chargers are considered the best solution for certain locations and EV user types, such as EV Taxi or PHV charging hubs where faster charging is required.

APPENDIX B

Appendix B

Development of EV User Profiles

Taxis

Hackney cabs are typically parked at or near to the driver's home between shifts, providing an ideal time to charge. If access to off-street parking at home is available, it is expected that most Hackney cab drivers will seek to charge daily at home if possible, for convenience and because of the lower costs. However, there will be drivers without the ability to charge from home and therefore need daily access to either public or designated taxi charge points. Taxis also typically have a high daily mileage and may therefore require a charge during a shift when time is at a premium so access to rapid charging infrastructure would also be a priority for these users.

PHV drivers transitioning to EVs will share similar charging requirements to those of Hackney cab drivers possibly with a larger proportion unable to charge vehicles at home. Some PHVs are used as pool cabs by multiple drivers working different shifts with high mileage and minimum dwell time between shifts. So public charging provision will be required from rapid chargers in convenient locations for this user group. The distribution of trips made by PHVs tends to be more evenly distributed across Greater Manchester than those trips made by Hackney cabs and there are a number of quite large PHV firms fairly evenly spread across GM serving relatively local markets. Furthermore, PHVs generally have higher daily mileage than Hackney cab drivers, so on-route charging facilities will be important for this user group.

Light Goods Vehicles (LGVs)

Light Goods Vehicles (or vans) have grown in use (measured in kilometres travelled) on Greater Manchester roads in recent decades. LGVs now account for c. 1.7 billion kilometres on Greater Manchester roads, representing 13% of all traffic (up from 9% in 1993). Much of the recent growth has been driven by the growing service economy, the development of the home shopping market and the expansion of delivery services that has accompanied this and the growth of the "gig economy". Improving the efficiency of freight deliveries is an important part of GM's Freight and Logistics Strategy particularly in congested areas such as the city centre and other town centres and investment in EVCI will need to reflect this.

Drivers of LGVs can be split between drivers of vehicles that are part of a large company fleet, Small and Medium-sized Enterprises (SMEs) and self-employed individual drivers who own or lease their vehicles and use them commercially.

For a transition to EVs, larger company fleet owners are likely to provide their own depot-based private charging solutions or rely on staff home charging and therefore make minimal use of public charge points particularly with future improvements in range. The majority of charging is expected to be overnight in depots or at staff homes. However, higher mileage

delivery vehicles may require some access to public charging during the day and with businesses wishing to minimise time lost to charging they are likely to prioritise access to rapid chargers.

Small and medium-sized enterprises are less likely to have their own private charging solutions for smaller company fleets of cars and LGVs and may also be reliant on staff home charging. There is likely to be some potential demand for both fast and rapid public charging facilities to enable drivers to charge vehicles, both overnight and during the working day. An increasing number of privately owned or leased vehicles are being used commercially and to transition to EVs, users of these vehicles are likely to face similar charging challenges to owners of private cars especially where they don't have access to off-street charging at home. Many of these vehicles have higher daily mileage than private cars and may require more regular overnight charging as well as opportunities for charging during the day. For charging during the day access to rapid charging infrastructure will be a priority as time will be at a premium.

Local Authority and other public sector fleets

Local Authority and other public sector fleets are made up of a wide range of vehicles including cars, LGVs and specialist vehicles that perform a wide variety of roles with varying daily mileage, operational needs, duty cycles and dwell times. To transition these fleets to EVs it is likely that in-house provision for EVCI will be required and they are less likely to need to make use of the publicly accessible EVCI network, although occasional access may be required.

Car Clubs

Car Clubs contribute positively towards a progressive urban transport policy. There is clear evidence that members reduce levels of vehicle ownership and mileage at the same time as increasing their use of other, more sustainable modes. Traditionally, transition to EVs has represented a challenge for Car Clubs in terms of potentially reduced utility due to customers range anxiety, availability of EVCI, greater capital costs and potential driver apprehension. The main operating model for Car Clubs in Greater Manchester is the back to base or round-trip hire which involves the vehicle being collected from and returned to the same destination (often a specific parking bay) and whilst this may be suited to fast charging it is probably not so suitable for rapid charging.

Currently there are no privately operated fully EV Car Clubs in Greater Manchester although a number do have PHEVs amongst their fleet. However, increasing demand for Car Clubs is leading to greater innovation and flexibility in applications and operating models and it is possible that future GM Car Clubs with targeted user group needs, may be able to operate a fully EV fleet. Through informal engagement with Car Club operators there are early indications that there does seem to be operator appetite to provide an EV based Car Club in GM.

The e-Hubs project is funded by the European Regional Development Fund and aims to demonstrate innovations in technology focused on low carbon shared mobility. It provides for car clubs using EVs and e-cargo bikes for-hire in co-locations. It is intended that the project will have a number of over-arching benefits including a reduction in carbon emissions, expediting the reduction of car ownership, making EVs more accessible to the general public, encouraging more active travel practices and creating a knowledge bank of how to embed the use of an EV car-club and e-Cargo Bikes into Greater Manchester, creating a blueprint for further mobility roll-out.

An opportunity exists to establish an EV Car Club within Greater Manchester utilising the e-Hubs project and also aid the initial delivery of the EVCI Strategy. An EV Car Club could provide an anchor tenant for EVCI in community charging hubs or mini-hubs offering an alternative to private EV ownership. An EV Car club could also provide an opportunity for people to try an EV before they commit to purchasing one.

Private Car Drivers

The transition to EVs by private car drivers in GM has been slow to-date, varying between Local Authority areas. Given the OZEV funding for installing home charging points, the majority of early adopters are expected to, or at least have the ability to, charge at home and the average daily mileage suggests most private EV drivers are unlikely to need to charge their cars more than once or twice per week. At present it is therefore likely that most EV private cars receive a high proportion of their charging from slow and/or fast charging at home overnight or at a workplace car park during the day. The relative cost of different charging solutions will also be an important factor in private EV drivers' charging decisions.

EV users living in residential properties with off street parking (such as a private drive or garage) can normally easily install a 7kW home charger that will allow them to recharge an EV at home. Currently there is still OZEV funding available to cover some of the costs involved in installation. However, there will still be occasions when this user group requires access to alternative charging solutions.

Residential areas with a large number of terraced streets or apartment blocks which have no off street parking present a problem for EV ownership as properties without off street parking are likely to be unable to install a home charger. The inability to charge an EV at home will be a barrier to transition for many people across GM particularly for those residents that live in properties with no off-street parking.

In Greater Manchester, terraced housing and apartments make up 43% of the housing stock (2011 Census) and these areas typically have limited access to off-street parking. Clearly not all residents in these areas are car owners and many residents in these locations have already made the decision to pursue car-free lifestyles. However, within many of these residential locations there remain significant levels of car ownership and it will be important to ensure that these car owners are able to make the transition to EVs. Destination

charging, particularly at workplaces but also at park and ride sites, town/local centres and other key destinations as well as existing petrol stations; will all be a very important part of the charging mix for this EV user group; however, a solution to home charging is also likely to be required to overcome this barrier and provide opportunities for private car drivers in these locations to transition to EVs.

Visitors to Greater Manchester

For those visiting Greater Manchester from outside the conurbation, the nature of their journey and the battery range of their vehicles will determine charging requirements, but they are more likely to need to charge their vehicles at their destination or on-route. Visitor attractions and other destination charging as well as motorway service stations and other on-route charging will be important to this user group. Existing petrol station sites could provide visible on-route rapid charging facilities and could also provide charging facilities for residents who do not have the ability to charge at home. Clearly signed park and ride facilities with EVCI near the boundaries of GM would be useful to visitors allowing them to charge whilst continuing their journey on the rapid transit network and reducing vehicles on the Key Route Network within GM.

APPENDIX C

Appendix C

Development of EVCI Typologies

On-Street Residential Charging

In many areas of Greater Manchester, it is not considered to be physically possible or financially viable to install large numbers of on-street, publicly accessible charge points in residential areas to the scale required to meet demand from private car ownership transitioning to EVs.

There are a number of reasons for this, as set out in the following paragraphs:

On-Street charging solutions could include modifying street lighting columns or installing dedicated on-street charging points but these both have issues and in both cases the ability to scale-up provision as the transition to EVs increases, is a major constraint. Whilst satisfying current demand for on-street charging infrastructure in residential areas might be achievable, it would not be possible to meet future on-street residential demand as the transition to EVs increases amongst this user group.

Street lighting column charging relies on the lighting column being next to the carriageway so that charging cables don't stretch across footways causing an obstruction to pedestrians. GM Local Authorities, in line with best practice have undertaken programmes to move lighting columns to the back of the footway to reduce street clutter making more space on footways for pedestrians, wheelchairs, prams and buggies and people with reduced mobility or visual impairment. In addition, the cabling for street lighting columns can usually only support charging of between 3 – 5 kW which is less than the 7.4 kW delivered by a home charger. This type of charging system requires the user to buy an additional charging cable to record the power used. In addition to this expense, the tariff per kWh is generally high for a slow connection speed which means poor value for money for the user.

Dedicated charge points can deliver 7.4 kW matching the output of a home charger. However, they are difficult to locate on-street in large numbers without compromising carriageway or footway space particularly on narrow streets and pavements where space is already at a premium. This is particularly relevant in areas where there is already a lack of space for car parking, limited footway space and congestion. To ensure effective footway widths are maintained charge points would need to be located on the carriageway. When sited in the carriageway, with build-outs, charge points would significantly reduce the available space for car parking. There would also be issues to address around minimising or avoiding disruption of public services operations such as street cleaning, domestic refuse collection services and emergency service access.

In a residential on-street location, each charge point installed would need to have a dedicated EV charging bay with it. This effectively provides a protected private car parking space on the public street and reinforces car use as the dominant mode of travel by

formalising and locking-in on-street car parking in areas with limited road space. Providing dedicated private car parking spaces does not support GM's long-term goals of reducing private car ownership and encouraging sustainable modes of travel. Furthermore, to bring in parking restrictions requires a residents' parking permit scheme or TROs, which would require the support of a proportion of residents on the street.

A dedicated charge point is able to transmit more power than a modified street lighting column because it would have a dedicated electrical connection this however requires a separate feeder pillar (requiring additional space) and makes installation more expensive. The relatively low level of usage (generally a single user) means that it is challenging to generate enough income from each charge point to cover ongoing operational and maintenance liabilities. If this solution was delivered at scale it would require significant ongoing financial support which is contrary to the development of a viable EVCI network. The charge points would therefore require a higher user tariff (and therefore would not be equivalent to home charging options). Implementing a higher tariff would make the on-street solution less attractive for users and mean that they are more likely to seek out cheaper charging alternatives which would lead to underuse of charge points and a requirement for greater subsidy. Potentially on-street charge points in residential areas could become stranded assets, with ongoing financial liabilities generating limited revenue, and creating unused car parking spaces increasing competition for on-street car parking which is already an ongoing issue for residents in many locations.

When considering these issues, it is clear that providing an on-street public charge point solution in residential areas isn't achievable at the scale required to match the required transition to EVs.

Alternatives to on-street public EVCI provision

For those GM residents without the ability to charge EVs off-street at home; a number of alternative options will be important in enabling a transition to EV use.

EV Car Clubs

An expansion of EV Car Clubs operating in residential locations could offer a genuine alternative to private EV ownership for many residents. Dedicated EV Car Club charge points, in residential locations will often be best located on-street where carriageway space is available, in order to increase convenience for users. Through the development of a Shared Mobility Strategy and engagement with Car Club operators we will seek for opportunities to enable them to transition to fully EV fleets and expand the car club offer across GM.

Community charging hubs

Off-street community charging hubs, in close proximity to residential areas (with large amounts of on-street car parking), could support different EV user groups including private EV owners providing a further alternative option in some locations. Where there are

residential areas with significant on-street car parking we will investigate opportunities to provide off-street community charging hubs on a case by case basis where appropriate locations can be found and look at options that will support residents to use these facilities for overnight charging where possible. These community charging hubs could potentially include charging bays for EV Car Club vehicles as well as other mobility services such as cycle hire or e-bike hire facilities, offering residents alternatives to private car ownership. Wider community facilities could also potentially be provided at these locations.

We will establish an on-line system for local residents/communities to register an interest in trialling community hub charging infrastructure so that, funding permitting, we can direct investment to areas of identified demand.

Workplace Charging

Workplace charging during the day will also be an important option for many potential EV users without the ability to charge at home, however we do not wish to encourage commuting by EV ahead of more sustainable modes such as active travel or public transport especially in areas that already experience traffic congestion in peak hours. In appropriate locations and where employees are dependent on car travel; we will work with both public and private sector employers to encourage them to make use of the Government Workplace Charging Grant to establish and expand a workplace EV charging offer as part of a wider review of workplace car parking requirements for employees. Many large public and private sector employers already have Workplace Travel Plans in place which could be expanded to include the provision of an EV charging infrastructure offer as part of a wider review of workplace car park requirements. We will work with large public sector employers such as hospitals, schools and colleges and medical centres with workplace car parking to determine EVCI requirements and opportunities.

Destination Charging

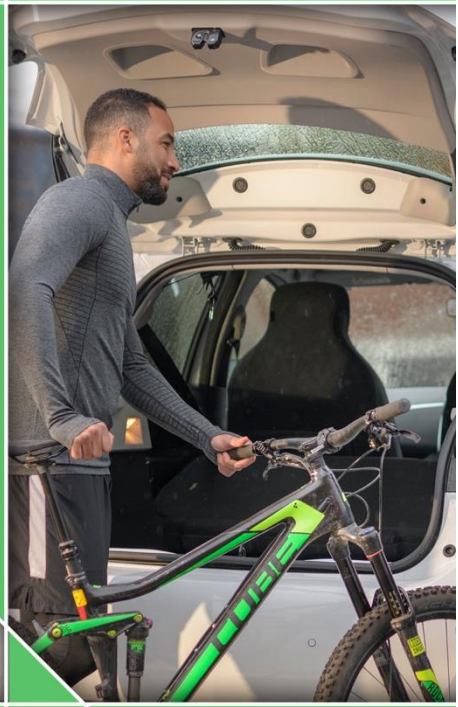
For those who commute to work by the rapid transit network (making use of existing park and ride facilities) there could be the opportunity to charge EVs during the working day whilst EVs are parked at rail station, Metrolink or bus park and ride sites. We will align TfGM's emerging Access to Public Transport Strategy and the development of the Travel Hubs programme with this GM EVCI Strategy and investigate options to expand the Be.EV network at Metrolink park and ride sites and other transport interchanges; and we will also work with Network Rail and Northern Rail to encourage them to provide EV charging infrastructure at rail station car parks across Greater Manchester.

Retail and leisure destination car parks with dwell times of an hour or more also offer an opportunity to provide alternative EV charging options for those without off-street home charging. We will investigate opportunities to expand the Be.EV network in local authority owned car parks in town and district centres and at other local authority assets such as car parking at leisure centres, gyms, libraries, community and health centres and recreation / sports facilities. In many other locations, investment may come more from private operators

particularly on privately owned sites at out of town retail parks or leisure and entertainment venues such as cinemas or concert venues and theatres. We will engage and work with private EVCI providers and operators to encourage them to install EVCI in retail and leisure destinations where there are already many agreements in place.

On-route Charging

On-route charging will also form an important part of the EVCI mix, whilst Highways England have responsibility for EVCI at motorway service stations, there will be a need for further on-route EVCI within GM such as at existing petrol stations and this is an area where we expect private sector investment to be more prevalent.



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