BP64: Transport and Energy

Replacement Local Development Plan 2018-2033

Background Paper: Deposit

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CONWY

Mae'r ddogfen hon ar gael yn Gymraeg hefyd.

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Transport and Mobility

The transport sector is a major source of greenhouse gas (GHG) emissions and it is widely recognised that achieving the rapid decrease in emissions that is necessary from the sector to contribute to meeting net zero targets and interim carbon reduction commitments will be very challenging.

1. National and Regional Policy and Plan Context

1.1. Net Zero Wales Carbon Budget 2

The Net Zero Wales Carbon Budget 2[2] focuses on Wales second carbon budget (2021–2025), and beyond to start building the foundations for Carbon Budget 3 and the 2030 target, as well as net zero by 2050. The Budget contains 123 policies and proposals across all ministerial portfolios and has the same five-part structure as the previous plan shown above. It aims to build on the previous plan (Prosperity for All: A Low Carbon Wales) with targets that have increasing ambition – 54% reduction for 2026-2030 compared to 37% for 2020-2025.

Carbon Budget 2 will be the period to plan and innovate for the future energy system for Wales. A major objective is to deliver the smart energy system needed using a regionally planned approach, rather than a top down, market driven approach. This approach is seen to be more likely to enable delivery at the speed demanded by the climate emergency, at optimal cost to the system, and in a way that leaves no people or places behind.

The CB2 links to the Wales Transport Strategy 2021 with the aim of putting people and climate change at the front and centre of our transport system. The vision for an "accessible, sustainable and efficient transport system" is built on three priorities:

- Plan for better physical and digital connectivity, more local services, more home and remote working, and more active travel to reduce the need for people to use their cars daily.
- An integrated transport system that works for everyone, where people and goods can move easily from door-to-door by accessible, sustainable, and efficient transport services and infrastructure. This means significant investment in sustainable modes, such as bus, rail, and active travel to create services that people want to use, can use, and do use.
- Encourage people to make the change to more sustainable transport by making it more attractive and more affordable and by adopting innovations that make it easier to use.

The transport sector includes transport emissions within Wales along with Wales's share of emissions from international aviation and shipping. At 6.6 $MtCO_2e$, transport accounted for 17% of Welsh emissions in 2019. Transport is the third largest greenhouse gas emitting sector following the electricity and heat production sector (second largest) and the industry and business sector (largest).

Although vehicles are becoming increasingly efficient, we are also travelling more, so overall sector emissions have changed little since the 1990 baseline, declining by just 6% to 2019. In fact, cars and light duty vehicles made up 71% of the Welsh transport sector emissions in 2019.

The ambition for the Transport sector is:

- To reduce emissions from passenger transport by 22% in 2025 (from 2019) and 98% in 2050 through:
  - demand reduction,
  - modal shift and
  - the uptake of low carbon technologies.
- To reduce the number of car miles travelled per person by 10% by 2030.
- To increase the proportion of trips by sustainable travel mode (public transport and active travel) to

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[2] Welsh Transport Strategy 2021, Welsh Government, 2021

35% by 2025 and 39% by 2030.

- By 2025:
    - 10% of passenger car travel will be by zero emission car.
    - 48% of new car sales will be zero emission.
    - A comprehensive network of electric vehicle charging points will be in place; and
    - a large proportion of our bus, taxi and private hire vehicles fleet will have transitioned to zero emission vehicles.

The three areas of mitigation along with policies and proposals to deliver are shown in Figure 1-1.

The provision of electric vehicle charging is an essential precursor to rapidly increasing the number of electric cars and vans on the road. Wales's EV charging strategy was published in March 2021 and contains the vision for EV charging in Wales that 'By 2025, all users of electric cars and vans in Wales are confident that they can access electric vehicle charging infrastructure when and where they need it'. The strategy estimates that the number of rapid chargers (43+kW) and the number of fast chargers (22kW) will need to increase rapidly in the next 10 years to meet demand from cars and vans. It contains an EV Charging Action Plan detailing the specific actions that will be taken to help to ensure this vision becomes reality.

By 2025 the aim is to:

- deliver a network of electric vehicle charging points on the strategic trunk road network every 20 miles across Wales to facilitate easier long-distance travel.
- ensure that there is at least one publicly accessible charge point for between every 7 and 11 electric cars and vans in Wales.
- support local authorities to deliver public and on-street charging via the Welsh Government ULEV Charging Fund.

There is the intention to amend building regulations, so they mandate the provision of electric vehicle charging at all new and refurbished buildings. Taken together, the hope is this approach to EV charging will ensure that the charging infrastructure in Wales is on a par with the best in comparable areas of the UK.
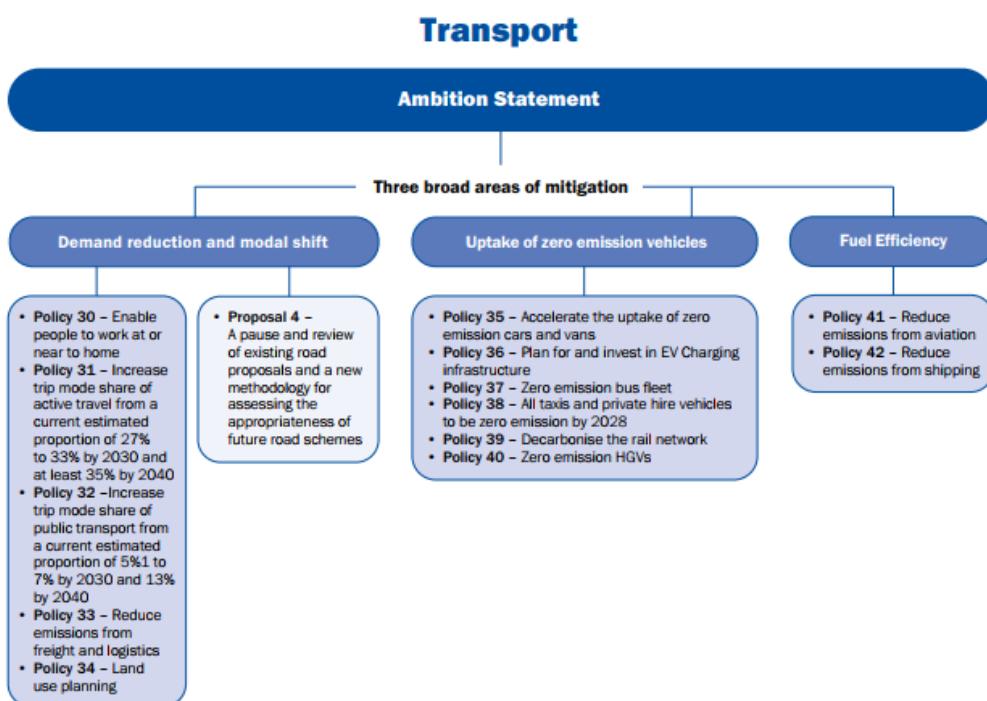

Figure 1-1: Policies and proposals to mitigate Transport emissions

1.1.1. Welsh Transport Strategy

The Welsh Transport Strategy[3] includes four Well-being ambitions identifying the ways in which transport should contribute to the long term (over the next 20 years) wider Welsh Government ambitions and to the goals in the Well-being of Future Generations (Wales) Act 2015. One of the four ambitions is 'Good for the environment: A transport system that delivers a significant reduction in greenhouse gas emissions, maintains biodiversity and enhances ecosystem resilience, and reduces waste."

In the further detail provided in relation to the greenhouse gas emissions element of the ambition, the strategy states that:

We will deliver a significant reduction in greenhouse gas emissions from transport. The Welsh Government is committed to net zero-emissions by 2050. In 2018 transport was responsible for 17% of Welsh greenhouse gas emissions – 62% from private car use, 19% from Light Goods Vehicles and 16% from bus and Heavy Goods Vehicles. The UK Climate Change Committee has proposed a carbon reduction pathway for surface transport that means that emissions need to be roughly halved between 2020 and 2030. We will deliver a significant reduction in greenhouse gas emissions from transport by reducing demand, supporting low-carbon services and infrastructure and through modal shift in line with the UK Climate Change Committee recommendations, our commitments on net zero, and our five-yearly Wales Carbon Budgets.

The strategy aims to continue to make best use of existing transport infrastructure by maintaining and managing it well, adapt the infrastructure to a changing climate, and upgrade it to support modal shift. Where new infrastructure is needed, the Sustainable Transport Hierarchy is followed, which recognises that Ultra Low Emission Vehicles also have an important role to play in the decarbonisation of transport, particularly in rural areas with limited public transport services.

The provision of sustainable transport infrastructure is seen as essential to the National Plan, in order, to build prosperity, **tackle the climate emergency**, reduce airborne pollution and to improve the social, economic, environmental, and cultural well-being of Wales. With that in mind the planning system should facilitate the delivery, decarbonisation, and improvement of transport infrastructure in a way which reduces the need to travel, particularly by private vehicles, and facilitates and increases the use of active and sustainable transport.

Planning authorities are tasked with supporting necessary transport infrastructure improvements, where it can be demonstrated that such measures are consistent with Welsh Government policy to encourage and increase use of sustainable transport and reduce reliance on the private car for daily journeys. It is expected that transport infrastructure should not generate significant demand for additional car movements or contribute to urban sprawl or neighbourhood severance. The planning and design of transport infrastructure therefore must consider the needs of users of active and **sustainable transport before that of the private car**, taking into account the sustainable transport hierarchy.

This extends to Development plans which should identify and include policies and proposals relating to the development of transport infrastructure and related services (such as public transport interchange facilities, rail facilities, ports, and airports), including areas safeguarded for future transport infrastructure/routes. Where possible, the route of the proposed new or improved infrastructure should be shown in the development plan. When the precise route is not known, a safeguarding policy may be applied to the area of land necessary for the scheme. Blight should be kept to a minimum by including in development plans only schemes which are likely to commence within the plan period. When development plans are prepared or amended, existing transport proposals should be reviewed, to remove any proposals that have previously been safeguarded, but are now abandoned, or any that are unlikely to commence during the plan period.

Local authorities will be supported via the Welsh Government ULEV Charging Fund to deliver public and on-street charging. The building regulations will be amended, so they mandate the provision of electric vehicle charging at all new and refurbished buildings.

1.2. North Wales Energy Strategy

NWEAB produced this regional energy strategy, in November 2021, with support and input from the Welsh Government, and regional stakeholders. The overall objective is to develop a strategic pathway identifying key interventions to deliver on the region's ambitions for decarbonising its energy system, ensure the region benefits from the transition, and to set out a potential decarbonisation route that will put the region on track to achieve a net zero energy system by 2050.

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[3] Welsh Transport Strategy 2021, Welsh Government, 2021

The aims of the strategy are:
- To harness the abundance of local low carbon resource to become a green powerhouse and diversify the energy mix.
- To become a world-leader in offshore wind and marine technologies.
- To improve the energy efficiency of the region's housing and accelerate the decarbonisation of North Wales's building stock.
- To achieve a shift to lower carbon transport.

Currently, the North Wales region has the following baseline:

- Just under a quarter of all energy consumed in Wales, which is slightly higher than its 22% share of the population.
- Between 2005 and 2017, total energy consumption fell by ~5%.
- The associated greenhouse gas emissions have fallen by ~28% from 2005 to 2017.
- At 39%, commercial and industrial consumption represents the largest proportion of the region's energy use by sector, compared with 30% domestic and 30% transport.
- Commercial and industrial electricity consumption constitutes 71% of the total in the region, nearly 10% higher than the Great Britain (GB) average.
- Generates the equivalent of 82% of its electricity consumption from local renewable sources.
- Hosts over a third of Wales's renewable energy capacity, with:
  - 726MW of offshore wind.
  - 98MW of onshore wind.
  - 224MW of solar PV.
- Of the 1,183MW of renewable energy installed capacity in the region, 95MW (8%) is locally owned.
- Has the second highest deployment of renewable heat installations in Wales.
- Just 0.7% of homes have a heat pump or biomass boiler.
- The average EPC rating is D and 36% of homes are rated as EPC band E, F or G.
- There is an above average proportion of homes off the gas grid.
- 8% of all homes in the region (25,000), are currently heated by oil, LPG, coal, or other solid fuels.
- Transport in the region is dominated by private car use.
- Only ~0.1% of cars being pure electric, compared with a GB average of 0.6%.

The targets that need to be achieved, by 2035, to meet Welsh Government targets, and to be on track for net zero by 2050, are to reduce emissions from its energy system by 55% through:
- 57% reduction in domestic heat and power emissions.
- 54% reduction in commercial and industrial emissions.
- 55% reduction in road transport emissions.

In order to achieve the above 2035 targets, it has been modelled that the following must be delivered for road transport:

- **Road transport:**
  - 55% of vehicles driven in North Wales in 2035 are electric.
    - equivalent to 7,000 more electric vehicles per year by the mid-2020s.
    - The peak being 40,000 per year in the 2030s.
    - To be facilitated by the deployment of 2,000 public EV chargers.
  - 2,600 gas HGVs and 1,000 hydrogen vehicles.
  - 15% reduction in private vehicle mileage by 2035.
  - Slowing of the growth in total number of vehicles on the road, facilitated by:
    - Increased use of public transport.
    - Active travel.

1.3. North Wales Joint Local Transport Plan 2015

In accordance with the Transport Act 2000 and the modified Transport (Wales) Act 2006 Flintshire County Council as local transport authority, has prepared a Joint Local Transport Plan (LTP) with Wrexham, Denbighshire, Conway, Gwynedd and Anglesey local transport authorities. The LTP is a statutory document that will sit alongside the Local Development Plans and other policies and plans of each of the Local

Authorities, once adopted. The plan sets out all of the six North Wales Local Authorities vision to 'remove barriers to economic growth, prosperity and well-being by delivering safe, sustainable, affordable and effective transport networks' and details this Councils specific transport interventions and projects to achieve this aim. It is a statutory requirement for local transport authorities to produce a Local Transport Plan (LTP) every five years and to keep it under review.

The LTP needs an urgent update considering the new Wales Transport Strategy published in 2021 and the transport issues highlighted in the previous section by the regional energy strategy also published in 2021. This document presents a detailed programme from 2015-2020 and a framework for schemes until 2030. However, what were then seen as aspirations now need action plans in place for implementation at both the regional and local level and to address new issues that have arisen especially with respect to decarbonisation.

2. Transport decarbonisation measures

This section outlines the type of measures that could be deployed by CCBC to support the decarbonisation of the transport sector.

2.1. Influences on transport emissions

Transport carbon emissions depend directly on the number of vehicle kilometres travelled and the emissions produced per vehicle kilometre. Therefore, to achieve decarbonisation, measures implemented need to:

- Reduce vehicle distance travelled; and/or
- Reduce the emissions produced on remaining vehicle kilometres which will depend on changes in fuel/energy type, vehicle design and factors such as driving speed.

Most transport is a 'derived demand', undertaken to provide those travelling with access to services, activities, or opportunities. The key challenge for decarbonising the transport sector is therefore to identify measures that provide access to equivalent services and opportunities in an alternative, more efficient manner. The measures then reduce the amount of travel required for accessibility and the energy use and emissions associated with the travel.

Views on the measures needed to reduce transport carbon emissions are generally consistent between different sources such as the Climate Change Committee (CCC)[4] and the Local Government Association's (LGA) series of briefing notes on Decarbonising Transport[5].

They identify that a variety of measures are required to achieve the scale of carbon reduction needed from transport. Emphasis is also placed on the need for collaboration and co-ordination between a range of stakeholders, including national government, different levels of local authority, other public bodies, local economic partnerships, businesses and residents.

2.2. Categories of transport decarbonisation measure

The CCC groups the actions that can be taken locally to reduce transport emissions into three categories of:

- **Strategy/planning** – including working with partners to deliver improved provision of sustainable modes (walking, cycling and public and shared transport).
- **Infrastructure** – including measures such as charging for use of infrastructure, including parking charges and clean air zones, as well as provision of digital infrastructure.
- **Communications and enabling actions** – highlighting the importance of raising awareness of options and the need for change in travel behaviour and of working with residents, businesses and other organisations to support change.

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[4] Climate Change Committee, Sixth Carbon Budget, 2020 and supporting papers on the Transport Sector and the Role of Local Authorities. Climate Change Committee (theccc.org.uk)
[5] Decarbonising transport | Local Government Association

The UK Government's Transport Decarbonisation Plan[6] identifies four themes that are relevant for decarbonising local transport:

- Accelerating modal shift to public and active transport;
- Decarbonising road transport;
- Decarbonising how we get our goods; and
- Place-based solutions to emissions reductions.

The LGA and several other bodies consider the same range of measures to reduce transport emissions but categorise them in terms of the route through which they reduce carbon, broadly grouping them in terms of the **Avoid, Shift, Improve** travel hierarchy shown in Figure 2-1.

Figure 2-1 – Avoid, Shift, Improve travel hierarchy for measures to address transport emissions

Category	Emissions reduction approach
Avoid	Reduce overall travel (through reduced trips or length – logistics, land use planning, online activities)
Shift	Increase the proportion of travel by the most efficient modes
Improve	Increase vehicle energy efficiency Move to alternative, less carbon intensive fuel/energy sources

The main transport decarbonisation measures can be grouped into eight main policy areas against the Avoid, Shift, Improve categories as set out in Table 2.1.

Table 2-1 – Key policy areas for transport decarbonisation

Policy Area	Category
Land use planning	Avoid
Digital connections	Avoid
Active travel/personal mobility	Shift
Public/shared transport	Shift
Demand management	Shift
Supporting behaviour change	Shift/All
Efficient driving/network operation	Improve
Promoting zero emission vehicles	Improve

The following sections provide more detail on each of the three categories of Avoid, Shift and Improve and the eight policy areas falling within them. The way in which each of the categories and policy areas could contribute to decarbonisation is set out, along with the types of measure involved. The measures available will continue to develop and evolve, particularly as technology continues to evolve. Appendix A provides further detail on some of the key areas of technology change ongoing and anticipated in the transport sector.

2.3.   Avoid measures

Avoid measures reduce the number or length of trips made. The key mechanisms for doing this are by replacing a physical journey with either online activity or a shorter journey to access more local activity. The

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[6] Transport decarbonisation plan - GOV.UK (www.gov.uk), DfT, July 2021.

potential for change of this type was brought clearly into focus early in the COVID-19 pandemic by the step change seen in remote working, online meetings and appointments and use of local shops and services.

Travel planning to combine or shorten journeys is another potential route to reducing travel by making most efficient use of each journey made, particularly for delivery journeys (see box).

However, most Avoid measures are based on the fact that transport connections are not the only way to improve accessibility, improvements can also be delivered in two other ways, as illustrated in Figure 2-2, i.e.:

> **Travel planning** is likely to be particularly effective in relation to freight and deliveries. For instance, a common delivery hub (e.g. deliveries to central lockers rather than to individual homes) could be used to reduce the number of delivery trips to a given area associated with online shopping.

- **Land use planning for improved spatial proximity** – integrated land use planning to encourage localisation, bringing more services and activities closer to residents (e.g. the 20-minute neighbourhood concept); and

- **Digital connections** – providing digital connections and the options to access services and opportunities online.

Figure 2-2 – Triple Access System[7]
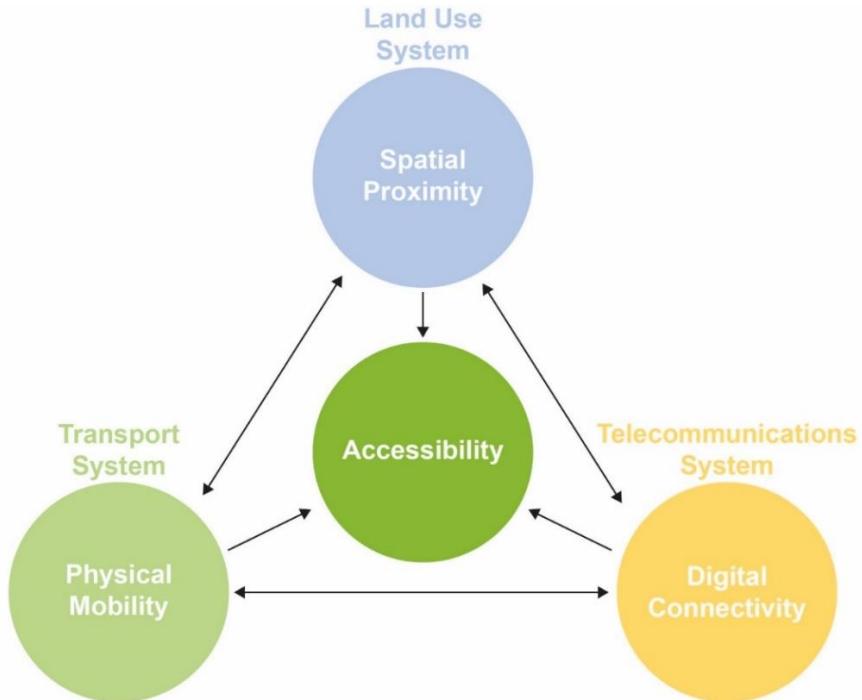
The following sections provide more detail on land use planning and digital connections which have the potential to reduce carbon emissions but fall beyond the usual scope of transport planning.

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[7] Triple Access System, Glenn Lyons & Cody Davidson, 2016

2.3.1.   Land use planning (spatial proximity)

Local land use planning has the potential to reduce transport carbon emissions by increasing the opportunity for people to access services, activities, and opportunities without using a car by improving access in two ways:

- Increasing local access, through planning for localisation of activity using the 20-minute neighbourhood principles (see box), typically reducing the length and number of trips made (as people combine purposes in individual trips) and increasing the likelihood of walking and cycling as trip lengths reduce; and

- Increasing access by public transport, through planning for transit-oriented development around public transport hubs.

The changes in travel patterns during different phases of the response to the COVID-19 pandemic in 2020 and 2021 highlighted the potential scale of emissions reduction that could be achieved through localisation of activity.

It is widely recognised that, if delivered well, localisation of activity can bring a number of wider benefits in addition to reduced travel and carbon emissions, including increased equality of access, strength of local community and physical activity and health.

The land use planning measures required to support localisation fall outside the usual scope of transport planning. However, co-ordination between sectors is important and transport measures play an important supporting role through providing good quality walking and cycling facilities to support local movements and public transport services to the hub. Measures such as 20 mph zones and traffic calming on central streets are also important in contributing to the attractiveness of local centres.

2.3.2.   Improving digital connectivity

High quality digital connections provide significant potential to reduce physical trips to activities by replacing them with digital connections, such as virtual work meetings or online doctor's appointments or training.

In 2020 and 2021, responses to COVID-19 restrictions caused a step change in levels of digital access, the range of opportunities offered online and people's familiarity with the options available, providing a clear understanding of the potential to reduce travel and carbon emissions through this route.

Comprehensive access to strong and reliable 5G and broadband connections, including at local digital hubs, would reinforce these trends by allowing remote access to services, work, and other opportunities. The digital hubs would expand the options available by providing office style facilities and opportunities to access other online opportunities (such as appointments) away from home but at a local site, reducing the need to travel.

To maximise the impacts of digital connections, it will also be important to develop clear plans to support development of online opportunities and services which take advantage of the connectivity, including services provided by local and national government. IT literacy training will also be needed to ensure all sectors of the population are able to access the opportunities.

20-minute neighbourhoods are areas providing most of residents' daily needs within a 20-minute walk or cycle ride. Key features include local shopping and health facilities, education, green spaces, affordable and diverse housing, safe streets, active travel and public transport, and employment (as shown in the widely used graphic below, originally produced by the Melbourne government).

2.4.   Shift measures

Shift measures encourage a mode shift in journeys up the sustainable transport hierarchy (shown in Figure 2-3, as used in Planning Policy for Wales[8] and the Welsh Transport Strategy[9]), to use more efficient, less energy and emissions intensive modes. This typically involves moving away from car journeys to public transport and active modes such as walking and cycling.

Figure 2-3 – Sustainable Transport Hierarchy[10]
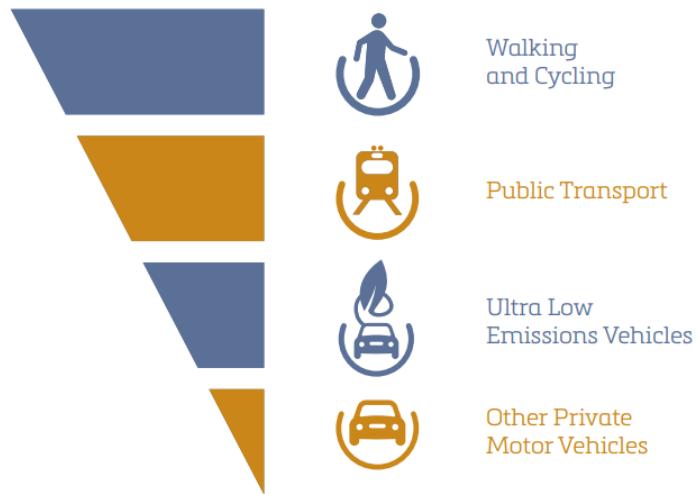
Shift measures can be closely related to Avoid measures that reduce journey lengths by increasing local activity which in turn means that more sustainable modes of transport (such as cycling) become feasible options for the newly shortened trips.

To be successful, measures to encourage **shift** need to '**tip the balance**' to ensure that the more sustainable modes are easy and attractive to use.

Figure 2-4 – The need to 'tip the balance' to sustainable modes[11]

Measures to reduce the priority currently given to car use are typically required to encourage substantial mode shift by altering the cost and convenience balance between cars and more sustainable modes. Relevant measures include increasing charges for parking and relocating parking to less central and convenient locations.

The following sections provide more detail on the types of measures required to:

- Attract shift to **active modes and micro-mobility options;**

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[8] Planning Policy Wales, Welsh Government, 2021
[9] Welsh Transport Strategy, Welsh Government, 2021
[10] Source: Planning Policy Wales, Welsh Government, 2021
[11] Source: Better planning, better transport, better places, CIHT, 2019

- Attract shift to **public/shared transport;**

- Deliver **demand management** to encourage shift away from road travel; and

- Support the **behaviour change** required for mode shift.

2.4.1. Active modes and micro-mobility

2.4.1.1. Measures to encourage active mode and micro mobility use

Encouraging mode shift to walking/wheeling, cycling and other forms of micro mobility (such as e-bikes and e-scooters if they are legalised after the current trials) is a core requirement for decarbonising transport. The measures also bring a wide range of additional benefits, such as health, air quality and public realm improvements.

Switch to active modes is likely to be greatest where there is a **high quality, integrated network** that directly serves key desire lines for travel, for instance linking residential areas to destinations including high streets and local centres, employment centres and healthcare. Public transport hubs are another important destination, helping to encourage mode shift on longer journeys where walking or cycling can be used for the first and last leg to and from the public transport network.

To be attractive the walking and cycling network should follow good practice design standards and be well maintained. It is typically considered that **cycle routes should be segregated where possible**. In some cases, this could be achieved through removing on street parking (linking to demand management measures, described

> **Micro-mobility**: refers to personal vehicles that can carry one or two people. Technology is adding to the range of active and micro mobility options available. E-bikes are now well established. They bring similar benefits to conventional bikes and some additional advantages. They are suitable for a wider range of potential users, including the less fit and those travelling in more challenging terrain, and they extend travel ranges by up to 15 to 20 miles.
>
> E-scooters have also become increasingly visible in recent years. They have the potential to bring many of the same benefits as e-bikes, although they require less physical activity. They provide efficient personal mobility that is accessible to a wide range of physical ability levels and can cover ranges of up to 20 miles. In the UK city trials these are generally available on demand using an app. They have the potential to make public transport more attractive by providing a viable means of accessing public transport stops and stations.
>
> However, they also bring some additional challenges, particularly around safety and are currently being trialled around the country, to see how and if they can be rolled out safely and legally.

further below). Elsewhere, it may require wholly new high-quality cycle lanes to be built or reallocation of existing road space to active modes. Reallocation of space requires careful design to ensure that it does not result in increased carbon emissions from traffic due to additional congestion.

Where segregation is not possible, **reduction in speed limits**, for instance 20 mph zones, and traffic calming measures help to provide a suitable and safe environment for cycling or scooting and have the benefit of requiring limited construction (and associated cost and embodied carbon).

Provision of priority and **good quality facilities at junction and crossings** for pedestrians and cyclists are another important component of a high-quality network, along with clear signage and wayfinding.

In addition to the provision of a high-quality network, **supporting measures** that further encourage active mode use include:

- The provision of **supporting facilities** in residential areas and at cycle destinations, including cycle parking facilities, storage, changing and charging for e-bikes, including safe and secure cycle storage for each household; and

- **Bike, e-bike and e-scooter hire schemes**. These provide the opportunity for single way connecting trips and the ability to cycle or scoot without the responsibility and cost of ownership, maintenance and storage.

There is also a role for active travel in decarbonising freight. Cargo-bikes and e-cargo-bikes used in conjunction with HGV restrictions and consolidation centres, will help to minimise emissions on the last leg of journeys to distribute goods.

2.4.2. Public transport/shared transport

2.4.2.1. Measures to encourage public and shared transport use

Shifting journeys away from using single or low occupancy cars to using more efficient public transport and other shared transport is another important component in reducing transport emissions.

Switch to public transport is likely to be greatest where there is provision of **reliable**, **high quality, affordable services providing connections between key locations**.

Good quality **connections between services**, both in terms of physical connections and timetable alignment for bus and rail services are also important in encouraging mode switch. The development of **Mobility Hubs or interchanges** can promote integration by providing clearly distinguished, attractive foci for public and shared transport access and connections, focussed around an existing rail or bus station or stop where possible and providing easily accessible information on travel options as well as access to other services and opportunities (such as shops, digital hubs and package delivery points).

> **Mobility Hubs and Points** provide a focal point for transport options and other services, connecting communities to multiple modes of public or shared transport as well as for instance acting as consolidated delivery points for parcels or freight. They are defined by:
>
> 1. Co-location of public and shared mobility modes.
>
> 2. The redesign of space to reduce private car space and improve the surrounding public realm.
>
> 3. Clear branding that identifies the space as a mobility hub and information and wayfinding to demonstrate the links to the wider transport network.

Measures to **improve the environment of stops and stations** and **on-board vehicles** can also help to attract patronage.

Mode shift from car can also be increased by promoting use of efficient, well integrated **shared transport** to support public transport provision. Shared transport options are improving as a result of increased availability and accessibility of data on travel patterns to operators and flexibility of booking apps for users.

Shared options such as **e-bike and e-scooter hire** help to expand the coverage of public transport provision by providing integrated options for the first and last leg of the journey to and from the public transport stop/station.

> **Demand responsive transport** services typically serve an identified route and timetable but only run if passengers pre-book and only serve those parts of the routes required.
>
> Bookings are made with a central dispatch, either online or by phone, and vehicles are often equipped with fleet telematics technology which allows the location and timings of the vehicle to be known either by the dispatcher or by the customer. DRT could work 'backwards' from a known shift start time, train timetable or other fixed end point, and design its route to maximise patronage.
>
> If well designed, DRT can provide an efficient and flexible service. However, some risks need to be avoided such as reduced visibility of the service (as it is no longer at set bus stops at identified times), potentially reducing viability.

Other shared transport modes such as **car share, car clubs** and **demand responsive transport** (see box) help to provide alternatives to private car use on routes that do not have sufficient demand to support public transport services.

Mode shift can also be encouraged through technology-based measures such as provision of **Mobility as a Service (MaaS)** (see box), made possible by increasing data availability and mobile phone technology. Well-designed

> **Mobility as a Service** applications bring together information on a wide range of transport modes and services for instance in a smartphone application. They provide features such as end-to-end journey planning, multi-modal ticket purchasing and the ability to earn and spend rewards. Each system provides a unified framework for accessing shared travel alongside timetabled public transport, reducing complexity and cost, and making the options more attractive and accessible to users.
>
> MaaS will combine different services to put together the whole trip from door to door, including micro-mobility service booking, taxis, and tickets for public transport.
>
> Mobility as a Service (MaaS) usually involves either a single monthly subscription, which will then cover the cost of all of the transport booked within the month, or a 'pay as you go' system.

MaaS frameworks integrate public and shared transport modes and provide ease of payment, ease of access to reliable information and improved integration between services. The system makes planning and paying for trips as a single journey from start to finish easier, increasing the attractiveness of the option and mode shift.

2.4.3.   Demand management

2.4.3.1.   Demand management measures

Demand management of road vehicles plays an important role in decarbonisation through rebalancing the costs and convenience of road-based modes relative to sustainable modes. The result is to reduce the priority given to the convenience of road vehicle use over other objectives. The favouring of road vehicles has been built into transport and urban design over several decades. This long-term influence has led to the current position of high levels of road vehicle use and their dominance in urban areas, despite their widely recognised negative impacts. The wider impacts include those on air quality, noise, public realm and equality of access to facilities.

Measures to rebalance the situation and better reflect the wider negative impacts of road vehicle use on society in the costs of their use include:

- **Reducing parking spaces available and relocating** them to less central locations, freeing up areas in the centre for other uses.

- **Increasing parking charges,** with fees reflecting emissions impacts based on fuel type, vehicle size and ownership (private or car club). Increased charges have potentially negative impacts on social equity. One way to offset this would be to combine parking charge changes with widespread access to car clubs including small electric vehicles (EVs) to ensure low cost access to low emissions vehicles for those on low incomes (who are more likely to have older less efficient cars).

- **Expanding the coverage of parking charges**, for instance:
    - o   Workplace parking levies; and
    - o   Charges for currently free parking such as local shopping centres, possibly with an allowance of a limited number of daily or weekly free visits to avoid deterring use of local facilities

> **Impact of demand management**
>
> Introducing parking or road use charges would put car travel on a more even footing with other modes, moving away from the current situation where costs (such as insurance) are largely paid up front, on purchase, annually (such as insurance) and at each fill up of fuel, which means the cost of each new trip is perceived to be relatively low. The charges would help to reflect the wider impacts of road use on the environment and society. Increasing travel times through speed restrictions and relocation of parking spaces helps to reverse the speed advantage gained by the priority they are currently given on the road network and in urban space. The change in balance will encourage mode shift and more efficient travel planning.

- **Traffic calming, including 20 mph zones and low traffic neighbourhoods** which reduce the time advantage of car use and deter goods vehicles.

- **Road user charging/eco-levy** meaning that road users pay a charge for the environmental damage each kilometre of travel causes, rather than the costs being absorbed by wider society as they are now. Charging would be most effective if applied across all roads and would be most successful if applied as a regional or national system, avoiding rerouting effects. At the county level, the most feasible approach is likely to be to charge entry to urban and sensitive areas.

For freight, additional potential demand management measures include **delivery bans and restrictions** for central urban areas that can be combined with **consolidation centres** and the use of electric vehicles or e-cargo bikes for the final leg of deliveries.

> **Freight Consolidation Hubs** work by collecting goods headed for an urban destination into a single hub and consolidating the deliveries into a smaller number of larger loads or loads in ULEVs in order to relieve congestion and emissions.
>
> For residential areas, delivery hubs work on a similar basis, providing a single drop off point for parcels to the area either to be picked up or delivered by electric van or e-cargo bike

2.4.4.   Supporting behaviour change

2.4.4.1.   Behaviour change measures

Behavioural change measures provide people and organisations with the **information, awareness and incentivisation** required to change travel choices going forward. Examples include supporting changes in

habits to shop and undertake activities more locally, use online services more, cycle or walk more, use public transport, pay more to park or comply with lower speed limits.

A **variety of approaches** are required to influence different sectors of the community. For instance, targeted campaigns may focus on raising awareness amongst those travelling to key destinations such as workplaces to highlight the travel options available.

The more successful behaviour campaigns have been typically shown to be those that **focus on incentives** and encouragement rather than on telling people what ought to be done. Technology provides a range of opportunities to provide incentives, for instance smartphone apps to incentivise particular forms of travel behaviour with digital rewards or scores such as the Love to Ride, Betterpoints and Love Exploring Apps.

2.5. Improve measures

Improve measures increase the efficiency and reduce the emissions intensity of vehicles that are used. This category includes measures to improve the efficiency of driving styles and the operation of the road network so that vehicles operate more efficiently (particularly avoiding inefficient congested speeds and repeated acceleration and deceleration). However, increasing uptake of electric vehicles (EVs) and smaller more efficient vehicles is the key measure in this category, along with the use of hydrogen or other alternative fuels for some vehicle types (currently primarily buses and local delivery vehicles).

2.5.1. Efficient driving and network management

2.5.1.1. Efficient driving and network management measures

Vehicles in slow congested conditions operate inefficiently producing high rates of emission per kilometre travelled. As speeds increase emissions per car kilometre reduce until a point of about 80 kph, above which increasing speed causes emissions rates to rise again. LGV emissions increase again from about 50 kph (as shown in the box). Increases in emissions at higher speeds are greater for heavier vehicles. Therefore, measures to manage the network more efficiently and smooth flow can help to reduce emissions from the road network.

However, the measures need to be applied carefully to avoid encouraging additional traffic flow which would offset emissions savings.

Achieving efficient network management involves **making best use of available data on network conditions** from the growing range of available sources. This will enable more efficient management of traffic conditions and provide appropriate information to drivers to inform route and timing choice.

Another key component involves ensuring that **traffic signal patterns are optimised** for changing conditions, particularly along key corridors and in central areas to minimise queueing.

> **Emissions and speed**
>
> Emissions per kilometre are higher in congested conditions and at high speeds than in free-flowing conditions at moderate speeds (up to 80 kph).
>
>
>
> Source: TAG Unit A1.3

Efficient network management may require some **minor road capacity increases to alleviate congestion hotspots** or to provide connections to new developments, that are well designed to reduce travel distances and encourage multi-modal travel. In some limited locations, there may be a case for new links to enable the removal of traffic from sensitive communities. In these cases, the change could be integrated with significant reallocation of road space within the affected community to support walking and cycling, meaning that there is no significant increase in total highway capacity.

Speed limit reductions on the fastest roads will provide a further option to significantly reduce emissions on the most heavily trafficked roads by reducing speeds from inefficient levels to more efficient levels of 80kph to 90kph.

Within urban areas, good quality, readily available **information for drivers on parking and EV charging locations and availability** can help efficient use of the road network by avoiding circulation of drivers

searching for parking spaces. The impact would be particularly effective if combined with measures to consolidate parking spaces to less central locations, as outlined under Demand Management above.

Measures to improve the operation of the network can also be supplemented by measures to train and encourage drivers to drive more efficiently. **Eco-driving training**, particularly when supported by instruments in vehicles to record fuel usage can reduce fuel consumption and associated emissions by 10% to 15% for some drivers.

2.5.2. Shift to Zero Emissions Vehicles (ZEV)

Shifting the vehicle fleet to ultra-low and ultimately **zero emissions vehicles (ZEV)** is widely recognised to be a fundamental component of the decarbonisation of transport. However, organisations such as the Urban Transport Group, Local Government Association and Transport for Quality of Life stress that ZEVs are not the single solution to decarbonisation for a number of reasons:

- Fleet change cannot occur quickly enough to deliver the pace of change required. Even with rapid take up of electric cars and vans, petrol and diesel vehicles will remain in the fleet into the 2040s.

- Lifecycle emissions associated with the production of electric (and all) vehicles are significant.

- The replacement of petrol/diesel vehicles with electric vehicles does not solve the wide range of other problems associated with high levels of road vehicle use, including congestion, severance, and the social inequality implications of lack of accessibility for those unable to afford or use cars.

For these reasons, private car is at the bottom of the sustainable travel hierarchy for personal travel (shown in Figure 2-3).

However, private cars (including in car clubs), taxis, buses, and freight vehicles will continue to be on the roads. Therefore measures to rapidly switch the fleet to ZEVs are a key part of decarbonisation.

National government action will play a key role in achieving fleet change, in particular the ban on petrol and diesel car and van sales in 2030 (announced in November 2020) and diesel HGV sales between 2035 and 2040 (announced in November 2021). However, supporting action at the local level will be important to make sure this ban feeds through to electrify the fleet as anticipated.

Relevant measures to support the change include:

- Rapid development of charging/fuelling infrastructure.

- Accelerating uptake in vehicle fleets.

> The '**Electric Vehicle Charging Strategy for Wales**, Facilitating the Transition to Net Zero By 2025' sets out the following vision:
>
> *'all users of electric cars and vans in Wales are confident that they can access electric vehicle charging infrastructure when and where they need it.'*
>
> Wales currently has one of the lower levels of electric vehicle ownership (0.17%) in the United Kingdom (0.37%) and is behind England and Scotland in terms of the number of chargers available and electric vehicle ownership.

Planning and delivering well-positioned public charging infrastructure for electric vehicles (including e-bikes and e-scooters) will include providing on street charging in residential areas without off street parking and charging at destinations such as retail and leisure centres. This is important for ensuring all sectors of the community have access to charging and to increase confidence in the ability to charge vehicles widely, helping to overcome issues of range anxiety.

For a county council **accelerating uptake in vehicle fleets** could include promoting uptake of ZEV amongst the fleets over which they have influence, i.e.

- **Council and supplier fleets** – procurement contracts provide the opportunity for councils to set minimum standards for emissions rates for the vehicles used by suppliers.

- **The taxi fleet** – this would involve supporting districts and boroughs in upgrading taxi licencing regulations to require taxis to be electric. This could be supplemented by a loan or grant to help taxi drivers with the hurdle of high upfront costs, combined with provision of charging at relevant locations and clear communication on the likely operating cost savings. Converting the taxi fleet brings a number of benefits. The vehicles are well used, maximising lifetime emissions savings and are visible on the roads, increasing public awareness and experience of EV use.

> **Car clubs** have the potential to provide a key role in the transformation of travel behaviour. They provide the opportunity to roll out affordable access to EVs and ensure that each vehicle is well used. They also have the potential to reduce car use more generally by reducing individual car ownership. The clubs provide flexibility of access to cars for those journeys for which alternatives do not work well but help to deter car use by putting it on a pay per use basis like other types of travel. Car owners pay much of their car ownership costs up front, making each additional journey in the year relatively low cost. For those using cars relatively little each year, car clubs can save considerable costs as well as removing the responsibility of maintenance and updates.
>
> Car club use also provides the scope to use the smallest vehicle appropriate for each journey. For instance, small or micro cars (or potentially even e-Scooters) could be used for most journeys as they involve only 1 or 2 people in the car. Instead, often an SUV or large estate car is used for these short local journeys as it is the household's only car, purchased to meet occasional needs (such as holidays). This increases the energy use and emissions associated with each journey made through the year.

- **The bus and community transport fleet** – converting the bus fleet is beneficial as the vehicles are large and well-used, maximising lifetime emissions savings and again are visible to the public, helping to normalise EV use.

- **Car club fleets**. Establishing and expanding EV car club fleets, encouraging small vehicle use through the pricing structure, could make an important contribution to carbon reductions (see box). The fleets could be part of the shared transport accessed through the MaaS system. They would provide lower cost access to EVs, accessible for those unable to afford a new electric car. This would be important in combination with any demand management measure differentiating parking or use charges by vehicle size and emissions.

It is also important to minimise the number and size of vehicles purchased wherever possible, rather than simply replacing the existing vehicle fleet with equivalent electric vehicles. Although the vehicle manufacturing emissions are outside the scope of emissions covered by transport sector emissions targets, they will contribute to national and international totals. Producing fewer vehicles and smaller vehicles will reduce emissions overall.

Car club expansion would also be beneficial in this area as distance travelled would be undertaken by fewer vehicles, rather than many individually owned vehicles (which are typically stationary for at least 95% of their life).

3. Transport carbon reduction measures and targets for new development

3.1. The potential for carbon reduction measures in individual developments

Most of the measures outlined in the Chapter 2 would be most effective if applied comprehensively at the local authority, regional or even national level to provide consistency and to influence travel choices and costs at each stage of the journey.

However, it is widely agreed that the specification of individual new developments can make a significant contribution to reducing the transport carbon emissions associated with the site, particularly the emissions generated by travel by residents and employees.

A number of organisations (including Campaign for Better Transport, CIHT, COMO UK, RTPI, TCPA and Transport for New Homes,) have produced documents in recent years setting out best practice in relation to integrating sustainable transport with new developments, particularly in the context of the development of Garden Towns. The box lists some of the most relevant recent documents.

The reports highlight that measures are challenging to implement and requirements will vary by location (dependent on factors such as the existing transport system and land use patterns). They also identify that as yet there are relatively few examples of good practice in action.

A review of the range of documents identified a number of measures and characteristics of development design that would help to reduce transport carbon emissions. These measures can be grouped in terms of three broad characteristics required to reduce transport emissions associated with a development.

- Strong alternatives to car/road travel;
- A low traffic environment; and
- Support for Zero Emission Vehicle use.

Selection of recent papers covering the integration of sustainable transport and new development

Getting There: How Sustainable Transport Can Support New Development, Campaign for Better Transport, 2015

Better planning, better transport, better places, CIHT, 2019

Mobility Hubs Guidance, COMO UK, 2019

Integrating the planning and delivery of sustainable transport with new housing development, KPMG for Greener Transport, 2019

Sustainability Guidance and Checklist, Harlow and Gilston Garden Town, 2021

Decarbonising Transport – The Role of Landuse, Localisation and Accessibility, LGA, 2020

Net Zero Transport: The role of spatial planning and place based solutions, RTPI, 2021

The Climate Crisis – A Guide for Local Authorities on Planning for Climate Change, RTPI and TCPA, 2021

Garden City Standards for the 21st Century, Guide 13 – Sustainable Transport, TCPA, 2020

20 Minute Neighbourhood – Creating Healthier, Active, Prosperous Communities: An Introduction for Council Planners in England, TCPA, 2021

Transport for New Homes – Checklist for New Housing Development, Transport for New Homes, 2019 (reproduced as Appendix B to this report)

Transport for New Homes – Project Summary and Recommendations, Transport for New Homes, 2018

Transport Scotland – Promoting Low Car Neighbourhoods in Scotland, Transport Scotland, 2017

Table 3-1 indicates how these development characteristics align broadly with the Avoid, Shift, Improve hierarchy of carbon reduction measures outlined in the previous chapter.

The following sections then provide more detail on the measures involved.

Table 3-1 – Development characteristics compared against Avoid, Shift, Improve framework

Development Characteristic	Avoid	Shift	Improve
Strong alternatives to car/road travel	Digital alternatives to travel for accessing services and opportunities – avoiding trips altogether Local alternatives for accessing services and opportunities – avoiding travel by encouraging shorter trips Delivery hubs consolidating deliveries, reducing journeys	Good quality public, shared and active transport alternatives to car use.	
A low traffic environment	Potentially support for a move to shorter trips as well as mode shift by making walking and cycling more attractive and car use less attractive	More attractive environment for walking, cycling, public and shared transport use and less convenient conditions for car use and road deliveries - helping to 'tip the balance' between modes to deliver mode shift	
Support for ZEV use			Encouragement for use of smaller and electric vehicles – reducing emission per km travelled.

3.2. Carbon reduction measures in individual developments

The following sections provide an overview of the carbon reduction measures that could be relevant for new developments, with further detail provided in Table 3-2.

The focus in the following sections is on vehicle emissions for trips to, from and within the development sites (i.e. including the elements of the journey that occur outside the development site). However, it is important to note that there will also be the need to minimise carbon emissions associated with construction of the infrastructure and buildings required to provide the transport. Specification of infrastructure and buildings will need to require designs that minimise carbon emissions.

3.2.1. Strong alternatives to car and road travel

Creating strong connections to a good quality public transport network will form a key component in reducing car emissions associated with new developments.

The strategic sites have been selected on the basis of good public transport services so it would be important to ensure that this strong starting point is capitalised upon. Measures required would include provision of bus stops in the developments (ideally within 400 m of all homes) and adjustments to public transport services to serve the sites. Consideration of any opportunities to supplement formal timetabled services with demand responsive transport to serve other destinations would also be important.

Clear, safe, direct and attractive walking and cycling routes to the bus stops would also be a key requirement as would the provision of a good quality waiting environment at the stops and generally good quality, readily accessible information on services and their performance.

Ideally at least one stop for each development would be treated as a Mobility Hub, providing other opportunities, including hiring bikes/e bikes/e-Scooters and the opportunity to access some services including a digital hub. The latter measure would feed into the Avoid emissions category by providing for local access to online activities and opportunities such as appointments. This would allow people who do not have the scope to access online opportunities from home to do so with limited travel.

Other aspects of providing alternatives to car travel would involve considering land use mix to ensure provision of other services locally in the new development and integrating with existing land use, to develop the principles of the 20 minute neighbourhood

Finally high quality, accessible walking, cycling, scooting routes will be crucial, both within the developments and importantly to key destinations beyond (such as health centres and shops).

3.2.2. Creating a low traffic environment

Ensuring that new development is a low traffic environment (with low speeds and limited traffic movement) would support the measures to achieve mode switch away from car use. It would also bring wider benefits including ensuring that core areas of space in the development are not allocated to prioritise traffic and parking, bringing the potential for other uses such a green space or additional development.

Measures contributing to a low traffic environment would include:

- Prioritising walking and cycling on routes within the development so that they are designed to feel primarily pedestrian. Speed limits, design and restrictions would mean that road traffic access to buildings would only be allowed at very low speed.

- Locating parking away from housing and buildings, with allowance for low speed drop offs/access as required for accessibility needs; and

- Selling parking spaces separately to housing and commercial space so that it is not the default to have parking space. Charges for parking could include and up front purchase cost and ongoing annual fee, with the potential to buy permits for visitor parking.

3.2.3. Supporting ZEVs

Key measures to support rapid uptake of zero emissions vehicles (ZEVs), particularly electric vehicles (EVs) for trips to, from and within new developments would include:

- Ensuring sufficient and appropriate EV charging points are provided in the parking spaces, including a mix of rapid and slower chargers.

- Supporting an EV car club – providing residents with the opportunity to use electric car club vehicles rather than own their own cars. This measure is a crucial component of reducing emissions within the development, bringing a number of benefits including making EV car use more affordable, encouraging the use of smaller cars, encouraging better use of cars and deterring car ownership which helps achieve mode shift. The car clubs developed would link into the growing network across Wales, which is set to expand further with the recent announcement of funding to Charge Up Wales for seven new rural community EV car clubs across the country[12]

- Supporting delivery hubs enabling delivery vans to drop off deliveries for the development (and potentially a wider area) at a single location rather than routing round residential areas. The deliveries could then be picked up by recipients or taken on by eCargo bike or electric van.

3.3. Outline Strategy

Table 3-2 sets out the actions to deliver the measures outlined above in more detail

Table 3-2 – Potential strategy actions to reduce transport emissions

Measures	Strategy Actions for consideration
Strong alternatives to car/road travel	
Local provision of services/opportunities	Develop mixed land use within the site to provide the option for shorter local trips e.g. to shops, surgeries, schools. Supplement with the provision of high quality walking and cycling links to existing services and opportunities beyond the development. *Aim: to reduce travel overall by encouraging shorter trips.*
Support for digital connections/hubs	Support high quality broadband connection to all homes and businesses and provide digital hubs to be used by local residents to allow them to work locally to avoid their commute or to access other activities/opportunities online (such as medical appointments). The spaces would provide office level equipment (including V/C, network connection, meeting rooms) and space and company that may not be available when working from home directly. Engage with organisations to promote home working or flexible working and encourage increase in range of online opportunities/services

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[12] Major Funding Boost for Green Car Clubs Across Rural Wales - Business News Wales

Measures	Strategy Actions for consideration
	Aim: to reduce travel overall by replacing the need for travel with online opportunities e.g. reducing commuting by encouraging remote working, local to home or at home.
Provide delivery consolidation centres/hubs	Provide consolidation centres/delivery lockers at which deliveries of online shopping for all houses/buildings in the development could be left, allowing deliveries to the area to be consolidated, reducing goods vehicle trips. Deliveries could then either be picked up or taken on by low emissions means (for instance cargo bike or potentially urban drones).
	Aim: to reduce delivery trips to the area and the carbon intensity of 'last mile' deliveries.
Provide high quality walking/cycling infrastructure	Provide high quality walking and cycling infrastructure both within the development and to key locations beyond (such as shopping areas, rail stations). Provision may include new, segregated routes or improvements such as crossing points, supported by roads with low speed limits and streets designed to give priority to cycling and walking. Infrastructure should be supported by secure storage at key destinations and for each housing unit built on the development.
	Aim: to encourage alternative mode use and travel within the local area, and thereby a shift away from car use.
Support high quality public and shared transport services	Support reliable core public transport services (combined where appropriate with demand responsive services) using high quality buses that link ideally to the station and other key destinations and routes and integrate well with walking and cycling provision.
	Work to ensure that existing services are adjusted to serve new developments effectively, with residents within 400 m of a bus stop.
	Provide high quality bus stops with good quality information on services and tickets.
	Ensure adjustments and improvements are in place as soon as the development starts to be occupied so that travel choices are influenced from the beginning.
	Aim: to encourage alternative mode and thereby a shift away from car use.
Establish mobility hubs	Provide attractive, visible, accessible interchange hubs providing access to a range of transport modes (including public transport, walking, cycling, e-biking and potentially car clubs) and other services. For instance the hubs could co-locate with the delivery hubs/parcel lockers and digital hubs and providing retail space. Ensure high quality walking and cycling routes provide easy access to the hub from across the new development, and beyond where relevant.
	Aim: to make the use of sustainable modes easier and more attractive and support other measures to reduce the need to travel.
Support Mobility as a Service app for transport access	Support wider measures to develop an integrated Mobility as a Service (MaaS) system to access and pay for use of transport of all types (including public transport, car clubs and associated bike and scooter hire). This measure would need to be implemented at a wider level but could be supported by new developments (potentially through trials).
	Aim: to encourage integrated use and pricing of different modes to improve convenience and reduce the relative benefit of car use.
Support travel planning	Support employers and other organisations in developing travel plans as they move to the new development to establish the full range of travel options available and decrease road vehicle use (incentivised by the limited parking space available).
	Aim: to ensure that the range of travel options available are understood and travel patterns are influenced from the start.

Measures	Strategy Actions for consideration
Creating a low traffic environment	
Prioritise walking and cycling	Design road space to prioritise and provide a safe environment for walking and cycling by all road users, including children. Measures to include low speed limits and design to deter through traffic movement with limited essential road access to the housing (including providing for accessibility needs). Approach in line with Planning Policy Wales guidance on placemaking, which includes default speed limits of 20mph or lower *Aim: to make walking and cycling easier and more attractive, whilst reducing the convenience and dominance of car so that walking and cycling become default choices for local journeys, reducing car use.*
Limit parking spaces and allocate in a separate area rather than at individual housing units/ adjacent to employment sites	Limit parking spaces (in line with the Planning Policy Wales suggestions of maximum parking allowances). Allocate parking spaces away from housing and employment and destinations such as schools (whilst allowing appropriate access for those with specific accessibility needs, such as drop off points). Priority parking for car club vehicles and multi occupancy vehicles (at employment sites). *Aim: to reduce dominance of car within the development, particularly in residential areas and to help to 'tip the balance' away from car use (by increasing inconvenience of car use, for instance if already walking to reach the car, people may choose to keep on walking or walk to the bus), reducing travel for personal and business purposes.*
Supply parking spaces separately to housing/commercial land and charge annually	Arrange that parking spaces are purchase separately from housing units so that residents need to make the conscious decision to buy parking space initially and then pay an annual charge for a parking space. *Aim: To reduce default position of car ownership and use and to help to tip the balance between private car use and alternative modes by increasing the cost of car use*
Supporting EV uptake	
Provide EV charging infrastructure	Provide appropriate charging points with parking spaces, including a mix of slow and rapid chargers (the latter to support car club vehicles in particular) that serve all relevant vehicle types. Where possible integrate chargers with local renewable electricity generation and ensure maximum advantage is taken of the potential of the batteries to provide storage. *Aim: to ensure effective use of EVs and their proper integration into the electricity system*
Support EV car club	Provide EV car clubs with multiple cars providing good access to electric cars for residents and businesses as an alternative to private car ownership. Specify hire rates to encourage the use of smaller vehicles and deter high annual mileages. Provide initial low hire rates for those moving into the site to encourage initial take up in preference to private car ownership. Ensure a range of vehicle sizes are available (as soon as the development is occupied) and are combined in with public transport and bike/e-bike provision. *Aim: to change the car usage model to move away from situation where owners pay significant up-front annual costs for access to a car that is large enough to meet the majority of their needs and then small incremental costs to use it for journeys throughout the year. The car club model would be intended to spread the costs of car use over all journeys i.e. pay per use, putting it on an even footing with public transport. It would also offer the opportunity to use smaller vehicles and low emission vehicles (provided by the car club) and to ride share to reduce costs and emissions.*

Measures	Strategy Actions for consideration
Reduce embodied carbon in construction	
Reduction of embodied carbon in transport infrastructure and supporting buildings	Carbon management of construction process to be undertaken for any transport infrastructure and supporting buildings required. The process will allow the elements that generate the most carbon emissions to be identified, allowing designer to focus attention on areas where greater carbon mitigation interventions are possible. *Aim: to reduce embodied carbon in construction.*

3.4. Carbon reduction targets in new developments

As outlined in previous sections, the detailed specification and impact of transport carbon reduction measures will vary between individual developments. Additionally, the impact of the interventions on transport mode share and mileage cannot be forecast in detail at an early stage as they will depend on the behavioural choices made by the residents, employees, employers and visitors associated with the development and on whether similar measures are implemented across the town and local travel region.

This means that, if transport related carbon reduction targets are to be set, they will need to be set in detail for each development site individually, taking account of the characteristics of the development. For instance, the combination of land use types and proximity of existing land use might influence views on the relative balance between trips by active modes and public transport.

Despite the variations, a number of common characteristics will apply to the relevant targets for each development:

- Targets will need to be ambitious to support the rapid change in default transport behaviour required to progress towards net zero, in line with CBBCs target.
- Targets relating to changing travel behaviour (by Avoiding and Shifting trips) should apply immediately as evidence suggests that sustainable mode alternatives need to be in place from the earliest occupation of the site, so that new behaviours are established as people and businesses move to the development. Evidence suggests that travel changes are most likely when people are changing other aspects of their life such as housing or job location.
- Targets relating to reduced emissions per kilometre are likely to need to build up through time as EVs become more available and the electricity supply decarbonises.
- Targets should focus on the two direct indicators of transport emissions i.e. number of vehicle kilometres travelled and average emissions per vehicle kilometre. However, supplementary targets would also be helpful in understanding the change in behaviour required e.g. increased public and active transport mode share and reduced average trip lengths.

Table 3-3 illustrates the potential form of targets that could be set for new development sites. As outlined, the percentages identified would need to be adjusted for individual developments to reflect the nature of the development being considered and the timescale for delivery of the development.

Table 3-3 – Indicative potential carbon reduction targets for new development sites

Mechanism	Indicative targets for consideration and reason
Reduce vehicle kms	**Seek to limit car vehicle kms per resident to 80% to 85% of national average**
	Seek to limit car vehicle commuting per employee to employment areas to 50% of national average.
	Reduce fuel/energy consumption and emissions per person by reducing overall demand, encouraging reduction in travel, improving car occupancy and/or mode shift to more efficient modes (public transport, demand-responsive transport, e-cycle/scooter, cycle, walk).
	Seek to limit road vehicle delivery trips per household to 50% of national average
	Reduce fuel/energy consumption and emissions by encouraging use of the consolidation/delivery hub and using alternative modes for last legs of deliveries such as e cargo-bikes (or potentially drone-based deliveries).

Mechanism	Indicative targets for consideration and reason
Reduce emissions per vehicle km	**Seek to limit average emissions per car km travelled per resident and per employee to 50% (or less) of national average** Reduce emissions by ensuring that efficient/low emissions vehicles are used for remaining mileage (i.e. the use of hybrid and EVs and smaller vehicles on average) This target could also be expressed in terms of a proportion of car mileage by EVs
	Seek to ensure all public transport services purchased for the development have the potential to produce zero tail-pipe emissions (electric or hydrogen)
Embodied carbon in construction	**Seek to achieve an increased reduction in embodied carbon emissions over time to achieve 100% reduction by 2050 for all new transport infrastructure.** Any residual emissions will need to be offset tying to a broader carbon offsetting strategy

3.5. Indicative costs of measures

The proposed measures to reduce transport emissions will have impacts on the costs of the developments with some measures bringing increased costs whilst others could bring savings. However, quantifying these costs is not straightforward for three main reasons.

- Firstly, several of the elements will require a change in design rather than additional elements and so will not necessarily increase development costs. For instance, reallocating road space to prioritise walking and cycling requires a change in road space design but would not necessarily increase cost. Similarly, reducing individual parking allocations opens up the scope to use the land for other purposes such as green space or additional development and could therefore increase profitability for developers.

- Secondly, car club, bike hire and digital hub aspects of the proposed measures have the potential to generate revenue and become financially self-sustaining once up and running.

- Thirdly, it is difficult to identify an appropriate scale for many of the measures as the size required will depend on the extent of behavioural response from all parties involved (the residents and employers and employees on the site). For instance, the scale of car club and the digital hub needed will depend on the extent to which each is used.

Bearing in mind these uncertainties, the following table provides some **indications of the influences on cost** associated with each measure. The entries include indicators of scale of costs for the measures, whether they are likely to be additional to default development costs and whether the measure could be potential sources of revenue. The values are presented as ranges and broadly rounded numbers to illustrate the scale of uncertainty and **should be viewed as indicative only.**

The costs are a representation of the scale of costs likely to be incurred by developers. This has been assumed to be the upfront costs of delivery and the costs of supporting the first three years of operation as use of elements such as the car club and digital hub builds up. There will be ongoing costs of operation and maintenance beyond that point which are assumed to be covered by the revenue from operation or local government support.

Table 3-4 – Indicative costs to developers of transport carbon reduction measures

	Measure	Additional cost?	Revenue potential?	Indication of cost
A	**Avoid travel**			
1	Digital hub	Yes – building, and staffing	Yes – charges for hiring space and facilities. However, will need to be kept relatively low to encourage	Building ~ £2000/m^2 GFA[13] Assume ~ 10m^2 per person (generous office space[14]) with sufficient space for a peak demand of 1 person from between 5% and 10% of households on the development to be using digital services at any one time Assume ~ £50,000 p.a. for staffing (~1 staff member – assuming shared staffing across sites) and building operating costs (likely to be covered partly by hire charges)
2	Delivery hub (and deliveries)	Yes – building and initial (and potentially ongoing) support for staffing and onward delivery of parcels	Yes – minor potential from delivery charges – but would need to be kept low to make the option attractive	Building ~ £2000/m^2 GFA (part of same building as digital hub). Assume additional 10 m^2 + 5m^2 for every 100 households (for storage/sorting of parcels for households) Initial subsidy of e-cargo bike delivery (staff costs, eCargo Bike purchase, maintenance and replacement). Assume. approx. £50,000 per hub (assuming shared staffing and costs across sites)
3	Local service provision	Yes - additional building space	Yes – retail component should be self-sustaining and provide rental income.	Building ~£2000/m^2 GFA (part of same building as digital hub). Assume ~50m^2 for retail space for local convenience store/coffee point. Assume community activities occur within the digital hub space. (Assume operating and staffing costs covered by income from the shop)
B	**Shift Travel**			
3	Mobility hub	Yes – additional building space	No	Building ~ £2000/m^2 GFA (part of same building as digital hub). Assume additional 20m^2 for waiting space/facilities – in addition to the space for the digital hub.
4	Cycle lanes	No – within development Yes – beyond development	No	No costs assumed: Implementing cycle provision within the new developments will involve respecifying the scope rather than additional costs. Good connectivity for the developments will also require links beyond to the wider town/area. These links would involve additional costs. However, they have not been included in the indicative estimates as the scale would depend on the length of links needed and the nature of the infrastructure.

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[13] Costmodelling - Typical building costs – approx. cost for buildings such as 1 to 2 storey un airconditioned offices and community halls

[14] How much office space do I need? | Workspace - office space including allowance for other areas such as meeting rooms

	Measure	Additional cost?	Revenue potential?	Indication of cost
				A report for the Department for Transport[15] highlights that costs range considerably depending on the nature of infrastructure. *For instance: costs for high quality fully segregated cycle super highway can range from £1 m to £1.5 m to per km, whereas more lightly segregated cycle lanes might cost closer to £0.25 m per km and priority achieved through surface changes is likely to cost <£0.2m per km [16]*
5	Pedestrian provision/ public realm	No – within development Yes – beyond development	No	As for cycle provision, implementing pedestrian provision within the new developments will involve respecifying the scope of road space rather than additional costs. Additional links required to connect the developments to the wider area would be additional costs. These costs have not been included as, as for cycle provision, the scale would depend on the length of links needed and the nature of the infrastructure.
6	Cycle storage hubs	Yes – cycle storage required at mobility hubs	No	Assume space for 1 hire e-bike and 1 hire bike and 10 parked private bikes (used to access the hub) for every 50 households. Simple storage with cost level of approx. £5000 per 40 bikes[17] Assume charging points for 5 in every 20 bikes. Average cost £1500[18]
7	Cycle hire scheme	Yes – cycle hire required at mobility hubs	Yes – rental charges	Assume purchase of initial e-bikes – sufficient to provide 1 e-bike for every 50 households. Average cost of an e-bike ~£3500[19] Staff costs assumed to be incorporated with car club
7	Speed limits/ supporting road design	No	No	No additional costs should be incurred, changes have to do with design specification rather than extra feature. *Where changes are made to the existing network, they are estimated to be of the order of £10,000 to £15,000 per km[20]*
8	Parking constraints	No	Yes – increased charges and residential or workplace parking	No additional costs should be incurred, changes have to do with design specification.

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[15]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/742451/typical-costings-for-ambitious-cycling-schemes.pdf

[16]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/742451/typical-costings-for-ambitious-cycling-schemes.pdf

[17] BDS Shelter - 40 Space Enclosure & Toastrack (bikedocksolutions.com)

[18] https://turvec.com/product/electric-bike-charging-station/?gclid=EAIaIQobChMIuMvk9p_e6wIVSuvtCh0TDwqqEAAYASAAEgI7ZvD_BwE

[19] Looking at a range of ebikes https://www.evanscycles.com/buying-guides/electric-bikes

[20] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/742451/typical-costings-for-ambitious-cycling-schemes.pdf

	Measure	Additional cost?	Revenue potential?	Indication of cost
			charges could generate additional revenue	
C	**Improve vehicles**			
9	Car club	Yes – subsidising initial roll out of car club so that levels of vehicle availability are high and attractive i.e. greater number of vehicles than would be commercially viable	Yes – the car club should become largely commercially viable with time (although may be a need to subsidise some elements on an ongoing basis so that it remains attractive option)	Costs for additional space in hub building for staff to operate (assume 15m2) and initial subsidy for early running as numbers of members build Assumed staff costs of £25,000 p.a. – assuming shared staff costs across sites Assume that active support for car club membership (through parking charges, parking spaces, low car club costs etc) means that 65% of household choose car club membership rather than private car ownership. Assume that sufficient cars need to be provided for a driver from 1 in 5 of the 65% of non-car owning households to be using a car at any one time. For offices, assume 1 car club vehicle in vehicle pools for every 20 employees on average (will vary considerably with business type). Assume initial provision of more car club vehicles than commercially viable to encourage membership and that therefore the vehicle lease costs have to be subsidised as follows: 70% lease costs subsidised in Year 1, 50% in Year 2 and 25% in Year 3 (then 0%) Indicative average monthly lease cost for high mileage EV approx. £650/ month[21]
10	EV charging points	Yes – charging points required	Yes – charging for electricity use	Assume that the 35% of private car owning households own on average 1.5 cars with each vehicle needing a slow charger Assume the 65% households using car club car with 1 parking space for every 5 households. Assume 3 in every 5 chargers are slow and 2 in every 5 chargers are rapid (to support the car club turnover of vehicle use). Indicative costs: £4000 per slow charger[22]; £30000 per rapid charger

[21] Car Leasing | Personal & Business Lease Deals | LeaseCar UK considering range of electric vehicles and assuming 2 year lease and upper max mileage limit (30000 p.a). Similar costs from Electric Car Leasing | Find The Best EV Leasing Deals | RAC   A similar 3 year total cost of £24500 per vehicle is indicated by Car Clubs - RGP
[22] Source charger costs: Non-residential building car park, new build: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/818810/electric-vehicle-charging-in-residential-and-non-residential-buildings.pdf

	Measure	Additional cost?	Revenue potential?	Indication of cost
				For offices: assume provision of 1 slow charging point per every 3 employees

Table 3-5 provides an overall summary of the estimated building requirements for a residential site, summarising the building requirements for a residential site that are set out across the various entries in Table 3-4 above to provide an overall summary.

For non-residential sites, it is assumed that digital hub, delivery hub or local services would not be required.

Table 3-5 – Summary of all building requirements[23]

Requirement	Space required
Digital	Assume $10m^2$ per person (generous office space[24]) with sufficient space for a peak demand of 1 person from between 5% and 10% of households on the development to be using digital services at any one time
Delivery hub	Assume additional $10\ m^2$ + $5m^2$ for every 100 households (for storage/sorting of parcels for development)
Mobility hub	Assume additional $20m^2$ for waiting space/facilities
Local services	Assume $50m^2$ for retail space
Car club/cycle hire	Assume $15m^2$ for office space

3.5.1. Cost implications of measures on proposed site allocations

As noted, the costs set out in the table above are indicative, intended to illustrate the potential overall cost of transport measures associated with each with each development site. Table 3-7 below uses the figures from Table 3-4 with the details on the gross internal area and number of households information provided for each strategic site allocated in RLDP, to provide an indication of the potential additional cost of implementing transport measures for each site.

The following strategic sites have been considered in the analysis:

- Abergele: commercial office, retail (food), primary school
- Llanfairfechan: 250 homes, primary school
- Llanrhos: 200 homes, primary school
- Llanrwst: 200 homes
- Old Cowyn (Ty Mawr and Peulwys): 530 homes, retail (food)

The number of households and estimated number of jobs[25] in the sites are provided in

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[23] If 65% of households join the car club with 1 car per 5 households – on a 200 house development this means parking for 70 private cars and 26 car club cars – saving 104 parking spaces (= 1560m2 of parking space)

1560 – 250 (hub building) leaves 1310 m2 freed up space – which could be used for 2 or 3 more houses.

[24] How much office space do I need? | Workspace - office space including allowance for other areas such as meeting rooms

[25] Calculated based on gross internal area information provided by Conwy County Borough Council.

Table 3-6:

Table 3-6 - Number of households and jobs in each strategic site

	Abergele	Llanfairfechan	Llanrhos	Llanrwst	Old Colwyn
Jobs	747	18	18	0	14
No. of households	0	250	200	200	530

Utilising the indicative cost estimates in Table 3-4 and number of households and jobs presented in

Table 3-6

Table 3-6 estimates of additional cost requirements for each strategic site have been made, as illustrated in Table 3-7 below.

Again, it is important to note that these costs are illustrative only. The final additional cost associated with providing measures for each site would depend on a number of factors including:

- The balance of design changes needed as some potentially bring cost savings to offset the costs listed above. For instance, prioritising walking and cycling over car use could reduce some elements of costs and reducing parking provision would provide additional land that could be used for other, potentially more profitable.

- The potential for revenue generation, particularly from the car club, bike hire and digital hub which has the potential to offset some of the costs.

- Uncertainty over the scale of implementation needed for some measures (such as the car club and digital hub), as they are dependent on the scale of behavioural response from residents, employers and employees.

As noted above, the costs are assumptions of the potential costs to developers on the simple assumption that they would be expected to cover upfront costs of delivery and costs of supporting operation for the first three years.

Table 3-7 - Additional development costs of transport measures for each strategic site (Low and High scenarios refer to 5% and 10% of households on the development using digital services at any one time, respectively)

Capital costs		Abergele		Llanfairfechan		Llanrhos		Llanwrst		Old Colwyn	
		Low	High	Low	High	Low	High	Low	High	Low	High
Digital hub	Area (m2)	0	0	125	250	100	200	100	200	265	530
	Total cost	£0	£0	£250,000	£500,000	£200,000	£400,000	£200,000	£400,000	£530,000	£1,060,000
Delivery hub	Area (m2)	0		22.5		20		20		36.5	
	Total cost	£0		£55,000		£50,000		£50,000		£83,000	
Mobility hub	Area (m2)	20		20		20		20		20	
	Total cost	£40,000		£40,000		£40,000		£40,000		£40,000	
Local services	Area (m2)	0		50		50		50		50	
	Total cost	£0		£100,000		£100,000		£100,000		£100,000	
Car club	Area (m2)	15		15		15		15		15	
	Space cost	£30,000		£30,000		£30,000		£30,000		£30,000	
	No. of cars	38		34		27		26		70	
	Cost of cars	£429,780		£384,540		£305,370		£294,060		£791,700	
	Total cost	£459,780		£414,540		£335,370		£324,060		£821,700	
Cycle storage	No. of bikes	0		60		48		48		127.2	
	Storage cost	£0		7500		6000		6000		15900	
	No. of charging points	249		21		18		12		37	
	Charging point cost	£373,500		£31,500		£27,000		£18,000		£55,500	
	Total cost	£373,500		£39,000		£33,000		£24,000		£71,400	
Cycle hire	No. of e-bikes	0		5		4		4		11	
	Total cost	£0		£17,500		£14,000		£14,000		£38,500	
EV charging	No. chargers - slow	249		158		127		121		326	
	No. chargers - fast	0		13		11		11		28	
	Slow chargers cost	£996,000		£632,000		£508,000		£484,000		£1,304,000	
	Fast chargers cost	£0		£390,000		£330,000		£330,000		£840,000	
	Total cost	£996,000		£1,022,000		£838,000		£814,000		£2,144,000	

	Low	High	Low	High	Low	High	Low	High	Low	High
Total capital cost	£1,869,280	£1,869,280	£1,938,040	£2,188,040	£1,610,370	£1,810,370	£1,566,060	£1,766,060	£3,828,600	£4,358,600

Staff costs		Abergele	Llanfairfechan	Llanrhos	Llanwrst	Old Cowyn
Staff costs for 3 years	Digital hub	£0	£150,000	£150,000	£150,000	£150,000
	Delivery hub	£0	£150,000	£150,000	£150,000	£150,000
	Car club/ bike hire	£75,000	£75,000	£75,000	£75,000	£75,000
Total staff costs		£75,000	£375,000	£375,000	£375,000	£375,000

Total capital and staff costs

	Abergele		Llanfairfechan		Llanrhos		Llanwrst		Old Cowyn	
	Low	High	Low	High	Low	High	Low	High	Low	High
Total cost	£1,944,280	£1,944,280	£2,313,040	£2,563,040	£1,985,370	£2,185,370	£1,941,060	£2,141,060	£4,203,600	£4,733,600

As can be seen in Table 3-7 above, the indicative additional costs to developers of the transport measures for the sites range between £1.6m and £4.4m, based on the assumptions and caveats noted above. Several of the measures implemented will have the potential to produce revenue through time (e.g. car club, mobility hub). These income streams have not been included in this analysis.

4. Policy recommendations for the RLDP

The previous sections of this Technical Note set out the measures available to deliver transport decarbonisation, recommended a strategy and targets and provided an indication of additional costs of certain measures if they were to be implemented in new development. It has been concluded that the detailed specification and impact of transport carbon reduction measures will vary between individual developments.

Conwy's Replacement Local Development Plan (RLDP) Preferred Strategy published in 2019 sets out two strategic policies concerning sustainable transport:

- Strategic Policy 14 (SP/14) Sustainable Transport and Accessibility; and
- Strategic Policy 30 (SP/30): Transportation Infrastructure

These two policies have been considered as the starting point for the development of the various policy recommendations below.

Strategic Policy 14 (SP/14) Sustainable Transport and Accessibility
An integrated, accessible, reliable, efficient, safe and low carbon transport network for all in line with the Sustainable Transport Hierarchy will be achieved by:

- Creating well designed, people-oriented new development that maximise accessibility by walking, cycling and public transport, by prioritising the provision of on-site infrastructure and, where necessary, mitigating transport impacts through the provision of offsite measures, including active travel routes, green infrastructure networks, bus priority infrastructure and financial support for public transport services.
- Influencing how people chose to travel by taking a design-led approach to new development which ensures an appropriate level of car parking is integrated in a way which does not dominate the development. Car parking provision will be informed by the local context, including public transport accessibility, urban design principles and the objective of reducing reliance on the private car and supporting the modal shift to walking, cycling and public transport and the use of Ultra Low Emission Vehicles (ULEVs).
- Prioritising sustainable transport hierarchy through the promotion of Active Travel and the Council's Integrated Network Map. The Plan will identify, safeguard and support delivery of the active travel routes and networks.

Strategic Policy 30 (SP/30): Transportation Infrastructure
The council will support the delivery of improvements to transport infrastructure to provide an integrated transport system which improves accessibility within Conwy and supports the proposed levels of development. Transport schemes that facilitate the delivery, decarbonisation, and improvement of sustainable transport infrastructure in a way which reduces the need to travel, particularly by private vehicles, and facilitates and increases active travel choices, will be supported. The transport schemes will be compatible with the Wales Transport Strategy whilst improving links within and between different types of transport, education, health, employment and social uses.

The following will be supported, subject to environmental impact assessment where appropriate:

- Making the best use of existing transport infrastructure through improvement and reshaping of roads and junctions where required to improve accessibility and connectivity and assist regeneration and place shaping.
- Land required for the implementation of transport proposals will be safeguarded to enable their future provision. Corridors with the potential to serve as future routes for walking, cycling and public transport will also be safeguarded. Appropriate existing transport facilities such as transport depots will be safeguarded where required.
- New transport schemes associated with new development as justified in planning applications.

Development Management Policy T1: Integration of sustainable transport and new development
The Council will support development proposals which minimise the need to travel, especially by private car, and maximise opportunities for the use of walking, cycling and public transport. Proposals should create places and streets where traffic and other activities are integrated and where buildings, spaces and the needs of people shape the area.

Developers must show how they applied the Sustainable Transport Hierarchy through the preparation of a Transport Plan for the development site which should promote in order of priority:

a) high quality, accessible walking, cycling, scooting routes both within the development and with key destinations outside the development such as health centres, schools, areas of retail and employment and other AT routes.

b) good quality public (or shared) transport network within new development through the provision of clear, safe, direct and attractive active travel routes to bus stops in the development and adjustments to public transport services to serve the development.

c) creation of focal points for transport and other services (mobility hubs), connecting people to multiple modes of public or shared transport as well as acting as consolidated delivery points for parcels or freight where appropriate.

d) creation of a low traffic environment (with low speeds and limited traffic movement) to achieve mode switch away from car use

e) demand management of road vehicles by limiting car parking spaces generally and creating priority parking for car club vehicles and multi occupancy vehicles at employment sites.

f) provision of appropriate charging infrastructure to support EV uptake and support confidence amongst drivers alongside supporting the roll out of EV car clubs to provide affordable access to EVs when required.

All the above to be supported by behaviour campaigns providing people with incentive and encouragement through, for example, the use of smartphone apps to incentivise particular forms of travel behaviour with digital rewards or scores.

Development Management Policy T2: EV infrastructure in new development

All major new developments to undertake an appraisal of the anticipated future EV infrastructure needs as part of a planning application (recognising that it is cheaper to include charging infrastructure as developments are built than as retrofit). These appraisals need to consider the number and type of appropriate charging points both at individual building level and for the wider development and the impact of such measures on the local electricity grid.

Development Management Policy T3: Broadband connection in new development

All major new development to undertake an appraisal to ensure high quality broadband connection to all homes and businesses and provide digital hubs to be used by local residents to allow them to work locally to avoid commuting or to access other activities/opportunities online (such as medical appointments).

Development Management Policy T4: Carbon emissions associated with transport in new development

Developers will be required to calculate embodied and operational carbon emissions associated with their transport development proposals and show how these have been minimised. These will be included in a Carbon Statement accompanying the planning application in accordance with Policy EN/6 GHG assessment for new development.

==NOTE THAT THE POLICY BELOW CUTS ACROSS POLICY RECOMMENDATIONS FROM TECHNICAL NOTES ON BUILDINGS, TRANSPORT, SEQUESTRATION AND CARBON OFFSET FUND==

Development Management Policy EN/6: GHG emissions assessment for new development

Developers will need to prepare a GHG assessment to drive down all identified GHG emissions at every stage of the proposed development and ensure that emissions are minimised as per relevant RLDP policy provisions.

Developers will be required to calculate whole life embodied, construction and operational carbon emissions associated with their development proposals through nationally recognised methodologies, and actions taken to reduce lifecycle carbon shall be demonstrated.

Alongside, GHG emissions reductions developers should look for opportunities within the proposed development to embed nature -based or technological solutions to capture or offset any residual emissions in accordance with separate RLDP Policies on Carbon Offsetting and Carbon Sequestration.

All information should be presented in a Carbon Reduction Statement accompanying the planning application.

Appendix A. Technological Developments in Transport

A.1. Introduction

The following paragraphs outline some key areas of technological development that will influence transport and transport emissions in coming years

A.2. Electric Vehicles

There are three main types of vehicle which qualify as ULEV. These include:

- Electric Vehicles (BEV) – these run solely on electricity, and require recharging from a chargepoint; and
- Plug-in Hybrid Electric Vehicles (PHEV) – these have both an internal combustion engine in addition to an onboard electric battery and motor which can be recharged from a chargepoint.
- Fuel Cell EVs – uses an electric only motor, powered by hydrogen fuel cells.

Currently just 0.17% of vehicles used in Wales are electric. Increasing the number of electric cars on roads is part of efforts to achieve a major reduction in carbon emissions from the transport network - as outlined in the draft transport strategy.

There are three main types of chargepoints:

- Rapid – these deliver the fastest rate of charge. Most of these chargers are Direct Current (DC), and deliver 50 kW, 100 kW or up to 350 kW for Ultra-Rapid chargers. There are some Alternating Current(AC) rapid chargers, with 43 kW AC being the most common size.
- Fast – these are AC only and commonly deliver power at 7 kW to 22 kW, depending on the unit.
- Slow – these AC units deliver the slowest rate of charge and deliver power at 3 kW to 6 kW.

A.3. Hydrogen-Fuelled Vehicles

A potential alternative to EVs is the development of a hydrogen-fuelled vehicle industry. Hydrogen potentially has an important role to play in decarbonising the transportation sector, while it also assists with progress against other key priorities for Local Authorities, such as improving local air quality.

Hydrogen vehicles store hydrogen gas in pressurised storage containers, which feed the gas into a fuel cell unit. The fuel cell combines the hydrogen with oxygen from the air in a non-combustion electro-chemical reaction that produces electricity. This electricity is then used to drive an electric motor.

Hydrogen usually exists in a compound state with other elements, for example in water (H_2O). In order to attain hydrogen for use in a fuel cell, the hydrogen needs to be separated from other elements in order to produce a pure elemental gas (H_2). One way of producing hydrogen is by splitting water, using a technique known as electrolysis (where an electric current is passed through water), into its component elements: hydrogen (H) and oxygen (O).

Hydrogen is considered a low carbon and renewable fuel if this electrolysis is powered by renewable and low carbon electricity.

While the EV market is expanding quickly and is considered further along its development than the hydrogen vehicle market, there are important advantages which hydrogen vehicles possess when compared to EVs. These include, most significantly, the ability to cover long distances with a 'tank' of fuel and refill the vehicle rapidly. The refilling infrastructure would also be comparable to that used at existing centralised gasoline refilling stations.

However, there remain only a small handful of hydrogen refilling stations in the UK, and a very significant expansion of this infrastructure would be needed to support a hydrogen vehicle market. However, there are many more planned across the country. While it remains to be seen whether a hydrogen vehicle market will compete fully with the EV market, there may be a selective requirement for hydrogen vehicles in niche uses (potentially for heavy goods vehicles, haulage as well as buses). It is therefore recommended that CCBC continue to note the hydrogen vehicle markets as they continue to develop.

A.4.   Urban Air Mobility

NASA define this as 'safe and efficient air traffic operations in a metropolitan area for manned aircraft and unmanned aircraft systems'. In an urban environment this mainly refers to Vertical Take-off and Landing aircraft (VTOLs) which do not require a runway and are therefore much more space efficient. The suggestion would be that existing land could be repurposed with the intention of providing origin hubs for these aircraft e.g. garage roofs, existing helipads, land between road interchanges in order to make the most of the available space.

As more people move into cities, the capacity of the network is stretched. VTOLs can alleviate the pressure by removing light freight (e.g. postal service and couriering), as well as some passenger journeys, to the air.

VTOLs could also be used for medical evacuations, rescue operations, news gathering, ground traffic flow assessment, weather monitoring, package delivery etc.

Airbus has begun to develop the concept of UAM to include MaaS and shared transport opportunities (Voom), low-carbon mass transit (CityAirbus) and package delivery (Skyways).

A.5.   Autonomous Vehicles

Autonomous vehicles are those which can operate and perform necessary functions themselves without the need for human intervention. They must respond to all external conditions which a human would normally manage.

There are five levels of autonomy:

1 – Driver assistance: driver assistance systems support the driver, but do not take control.

2 – Partly Automated Driving: systems can also take control, but the driver remains responsible for operating the vehicle.

3 – Highly Automated Driving: in certain situations, the driver can disengage from the driving for extended periods of time.

4 – Fully Automated Driving: the vehicle drives independently most of the time.

The driver must remain able to drive but can, for example, take a nap.

5 – Full Automation: the vehicle assumes all driving functions, the people in the vehicle are only passengers.

As fully autonomous vehicles become more common may be able to reduce congestion and remove safety by removing the human behaviours which cause blockages on the road. They are also often more efficient (likely electric) and bring flexible (private) travel to those who cannot access it currently through disability, age or cost.

Appendix B. Transport for New Homes: Checklist

B.1.

Version: October 2019

TRANSPORT FOR NEW HOMES

Checklist
For New Housing Developments

This **Checklist** sets out the things that make new housing areas good to live in without dependence on cars. It has been compiled in the context of the need for radical change in the way new homes are provided. The Transport for New Homes aim is to promote new housing that is well located, well designed, and with good sustainable transport links, as set out in the Transport for New Homes Charter (see website). A suggested system for scoring the Checklist is provided at Annex A.

Source: Checklist for new housing developments - Transport for New Homes

Name of development	Name of assessor	Date of assessment

LOCATION and CONTEXT

1. The location avoids car dependency	
- Within or well connected (by walking, cycling, and public transport services) to an **existing** settlement that has a clear central destination?	
- Not promoted on the benefits of major road (car) access?	
- There is no major road building triggered by the scheme, or being justified by the scheme?	
- Car use to residents' main destinations is discouraged (e.g. by town centre parking charges, bus priority routes)?	

-	Development supported by clear commitments to walking, cycling and public transport in plans and policies, including mode-share targets (e.g. in Travel Plan)?	
2.	**Walking, cycling and public transport to the wider area and key destinations are well planned**	
-	Logical, direct walking routes exist or will be provided to connect the development?	
-	Logical, direct cycle routes exist or will be provided to connect to the development?	
-	The development is connected to key destinations by excellent public transport (as set out in item 9) or there are confirmed plans for this?	
-	The development has clear potential to improve public transport, benefiting residents of existing settlements as well as those living in the new homes themselves?	

DESIGN & LAYOUT

3.	**Attractive and healthy place to be in**	
	A welcoming environment, for example not dominated by parking?	
-	Greenery part of the design, not just leftover spaces?	
-	Space to sit, and for children to play?	

4.	**Density of homes** (i.e. at least 35-50 dwellings per hectare, gross)	
-	Sufficient to support high quality public transport (bus/rapid transit/tram/rail)?	
-	Highest density housing is sited closest to public transport stations/stops?	
-	Density sufficient to support some local facilities?	

5.	**Mix of uses** *(extent to be judged in relation to size of scheme, and what is available in adjacent areas)*	
-	A mix of uses adds vitality to streets, spaces and places?	
-	A mix of housing types is provided (to suit different needs)?	
-	Includes affordable housing?	

6. **Local facilities and employment**	
- Facilities available (or committed) within 10 minutes without a car? (including nursery, primary school, convenience store, cafe, small business service hub, community centre, GP practice, sport/leisure facilities, playground)	
- Major employment reachable within 30 minutes without a car?	
- All new homes have access to superfast broadband?	

TRANSPORT PROVISION

7. **Pavements and paths**	
- Join up with existing streets, paths and adjacent areas with no major barriers?	
- Attractive and direct routes to local facilities/town centre?	
- Safe to use (overlooked and/or well used)?	
- Low traffic speeds / separated from heavy traffic?	
- Pavements uninterrupted across side streets, driveways?	
- Layout avoids having to walk in the road?	
- Layout makes it easy to find your way around?	

8. **Cycle routes and cycle storage**	
- Safe and attractive cycle paths and/or low traffic streets?	
- Direct, easy to follow, routes?	
- Cycle (and pedestrian) routes shorter than routes for cars?	
- All dwellings have secure cycle parking?	
- Cycle racks on-street for visitors to the area?	

9. **Public transport services at the development** (providing credible 'turn up and go' services attractive to car users, which can be buses, bus rapid transit, tram, or rail)	
- All services operate 7 days a week and evenings?	
- At least one frequent public transport service? (12 minute intervals or better)	
- From Day 1 of occupation?	
- Provision is certain, including in the long term?	
- All areas of development within easy walking distance of stops/stations? (Maximum 300m for bus; 800m for rail)	

- Street layout provides unhindered movement of buses.	
- Stops prominently and conveniently located?	
- Priority over other traffic provided (including off-site)?	
- Direct services available to key destinations from the development?	
- Services well-advertised and/or branded, with easy ticketing?	
- Services affordable and with discounts? (e.g. for youth, unwaged)	

10. Parking	
- Ground level parking provision does not dominate the street scene?	
- Most parking spaces communal (available to all residents and visitors)?	
- Parking only in defined spaces or purpose-built bays on-street?	
- Car parking organised to avoid negative impact on walking, cycling and bus operation? (e.g. avoiding frequent driveway crossovers and segregated parking courts with no other uses)	
- No parking taking place/allowed on pavements?	
- Provision for shared "Car Club" vehicles?	
- Electric vehicle charging points provided?	

Total score for the 10 headings	
Maximum possible score	
The total score as % of maximum possible	