

# Beyond Electric Vehicles: THE DRIVE TO DECARBONISE URBAN TRANSPORT

A rapid transition to electric vehicles is seen as a cornerstone of the UK's strategy to meet CO<sub>2</sub> reduction targets mandated by the Climate Change Act. But what additional practical steps can local authorities and their private sector partners take to accelerate the decarbonisation of urban transport?

**Mark Sutcliffe** reports



## ABOUT THE AUTHOR

**Mark Sutcliffe** has a background in automotive journalism, specialising in the corporate fleet and company car sector. More recently, he has taken a special interest in electric vehicles and sustainable mobility. He launched the

#walk1000miles initiative in 2014 and authored a white paper on company car fleet uptake of electric vehicles in 2016 and writes for a number of transport and business publications.

**F**ollowing repeated warnings about the need to reduce CO<sub>2</sub> emissions much more quickly than previously anticipated from the Intergovernmental Panel on Climate Change, there is a renewed sense of urgency – some would describe it as an emergency – in Government and among local authorities.

This month, the Government's Committee on Climate Change made it clear that the UK should aim for a more ambitious 'Net Zero' greenhouse emissions target by 2050.

The committee's latest report said: "Policies will have to ramp up significantly for a 'net-zero' emissions target to be credible, given that most sectors of the economy will need to cut their emissions to zero by 2050."

"The committee's conclusion that the UK can achieve a net-zero GHG target by 2050 and at acceptable cost is entirely contingent on the introduction without delay of clear, stable and well-designed policies across the emitting sectors of the economy."

Transport is the single largest source of greenhouse gas emissions in the UK, accounting for 27% of domestic emissions and a new consensus spanning public and private sectors and the political spectrum is building behind more radical efforts to cut global warming emissions.

Simon Roberts, chief executive of the Centre for Sustainable Energy, explains the renewed sense of urgency in decarbonising urban transport: "The problem is not that we are unfamiliar with the actions which need to be taken to cut emissions. The problem is that the individuals, communities, businesses and organisations are not yet doing these actions in sufficient quantities to cut emissions fast enough."

"We need to scale up, speed up and start

up the things we know need to happen and know how to do. And to give up doing things which are incompatible with the local area becoming carbon neutral."

Ten UK mayoral combined authorities and city regions have been shortlisted for £840 million of Government investment under the Transforming Cities Fund, and the focus is shifting from trials and testing to delivery.

Local authorities and especially the new city- and region-focused transport agencies such as Transport for London (TfL) and Transport for West Midlands (TfWM) are increasingly expected to take the lead in decarbonising public transport, building active transport infrastructure and discouraging the use of internal combustion engine vehicles within the urban environment.

And while the accelerating shift to electric vehicles (EVs) will go some way to reducing transport's carbon footprint, the more widespread uptake of EVs will only get us part of the way there.

According to Transport for Quality of Life (TfQL), the scale and speed of carbon reduction needed by 2030 cannot be solved by switching to electric vehicles alone and must be accompanied by a sustained

programme of demand management.

TfQL further says decarbonising transport requires not only a switch to cleaner vehicles, but fewer vehicles on the roads, which will lead to additional health and economic benefits such as improved air quality, safer roads, a healthier population and happier drivers.

TfQL adds: "Even if all new cars are ultra-low emissions vehicles (ULEVs) by 2030, transport emissions are still likely to exceed what is needed to meet existing targets. If the transition is slower than this, more action will be required in other areas – for example, substantial reductions in traffic. We suggest the Government needs to investigate policy options for traffic reduction in the order of 20-60% between now and 2030."

In its Climate and Energy long-term policy framework, the European Commission makes it clear that electrification will not be the single 'silver bullet' for all transport modes: "With 75% of our population living in urban areas, city planning, safe cycling and walking paths, clean local public transport and Mobility as a Service (MaaS), including the advent of car- and bike-sharing services, will alter mobility. Behavioural changes by individuals and companies must underpin this evolution." ▶



► Over the long term, the shift to zero carbon urban transport has huge implications for urban planning. Cities of the future may exclude all but essential vehicles from their centres so humans can reclaim the heart of the city for work, accommodation and recreation.

This implies a more joined-up approach to urban planning in which transport, housing, economic development, licensing and environmental services work more closely to achieve truly integrated solutions to getting goods and people into and around urban centres.

Data-driven behavioural insights combined with the connectivity built into next generation real-time geolocation APIs such as Mapbox are likely to drive a revolution in shared transport services over the next decade. But, as with any cultural shift, it will take time for commuters to feel comfortable with adopting new modes of shared mobility such as car-sharing or responsive bus-taxi hybrids.

In the shorter term, a whole spectrum of more rapidly implementable measures are under consideration in cities across the UK and further afield.

In Manchester, Transport for the North (TfN) has published a 30-year plan to transform the region's chronically underinvested rail infrastructure, but the architects of the Strategic Transport Plan stress the importance of securing some "quick wins" to inspire public confidence in the medium term – ideally before 2025.

Published by the Northern office of the Institute for Public Policy Research (IPPR), the Quick Wins report says: "Transport networks take a long time to develop – the economic transformation that this can enable takes generations. TfN is rightly focusing on setting out a long-term package of investment. But, significant changes can be made relatively quickly and easily, and long-term plans benefit from demonstrating early success."

IPPR North says the quick wins case studies must be able to deliver and demonstrate real-time "net environmental gain" rather than simply protection and demand reduction on the most polluting forms of transport – ideally by 2020, and by 2025 at the latest.



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Simon Roberts'  
Centre for Sustainable Energy

In Nottingham, which has successfully introduced a Workplace Parking Levy (WPL) to fund a raft of green transport initiatives, head of transport strategy Chris Carter says: "I think the key factors that underpinned the city's ability to make these charges are a clear vision of what we want to achieve and a long-term political will to make it happen. We were very clear about what we wanted to achieve and how we were going to spend the money, which, perhaps, made it easier to communicate the benefits of the WPL more effectively." Of the multitude of green transport trials and pilot projects happening around the UK, the majority focus on four

well-defined areas: active travel, demand management, cleaner public transport and integrated planning.

#### ACTIVE TRAVEL

Active travel – walking and cycling – have moved up the urban transport agenda since the turn of the millennium and are now regarded as an essential component in decarbonising urban transport.

Building safe walking or cycling infrastructure offers a relatively cheap means of creating multi-modal links between public transport hubs without the need for heavy engineering and the city centre disruption this usually entails.

The Department for Transport's (DfT's) £15 million Sustainable Travel Towns (STT) initiative offered advice to local authorities on encouraging residents to make more journeys on foot or by bike in Darlington, Peterborough and Worcester.

All invested heavily in pedestrianisation, cycling infrastructure, improved public

## Copenhagen's cycling superhighways put Denmark on the fast track to carbon-neutral urban transport

Nine out of 10 people in Denmark own a bike and Danes cycle an average of 1.6km (about a mile) every day, with cycling accounting for a quarter of all personal journeys of less than 5km – and women making more journeys than men. The country has more than 12,000km of cycle route with 400km in the capital Copenhagen alone.

Bike journeys reduce Denmark's CO<sub>2</sub> emissions by 20,000 tonnes a year and Copenhagen's cycle commuters take a combined million fewer sick days off work than their non-cycling colleagues.

According to a 2018 survey by the Confederation of Danish Industry, if the number of cycle journeys increased by a further 10%, the number of sick days would fall by another 267,000, while traffic congestion would reduce by 6%.

And, while the Danes have a strong cycling culture, the growth in cycling in Copenhagen is due to a sustained investment of government

funds and political will over the past 35 years.

Between 2009 and 2014, Denmark invested €268 million (about £230m) on 338 infrastructure projects to make cycling more attractive, frequent and safe. This is believed to have resulted in an increase in cycle journeys of 24% on the new, cycle-friendly sections of road.

Urban planners introduced dedicated cycle paths and bridges as part of a nationwide network of 'cycle superhighways' – giving cyclists priority over cars – especially in towns and cities. These improvements resulted in 63% of cyclists surveyed saying they felt cycling was safer on the cycle routes.

According to Denmark's Office for Cycle Superhighways, the Copenhagen City Region's cycling infrastructure investment has resulted in a modal shift in which 25% of new cyclists previously used their cars.

The Cycling Embassy of Denmark, which is dedicated to helping other cities around the world implement learnings from the Danish cycling model, is clear about the benefits.

The Embassy's 2018 annual report concludes: "While the cost of cycling infrastructure is often much lower than that of other modes of transportation, the benefits of cycling are substantial for both the individual and society as a whole.

"The bicycle plays a crucial role in the smart city, and new, intelligent solutions should allow for and accelerate increase in cycling as part of an integrated transport system. Cycling contributes to humanising and democratising our cities and securing a good quality of life for future generations. Designing cycling-friendly cities means designing people-friendly cities characterised by vibrant urban life and social interaction."



transport and publicity campaigns to promote more sustainable transport choices.

Between 2004 and 2009, walking journeys in all three increased substantially against a national decline on journeys on foot. Car use also fell – both in terms of the number of trips and journey length. In Peterborough, for example, planning officers embedded sustainable travel planning and promotion in the planning process to oblige developers and employers to incorporate sustainable transport

considerations within the planning process.

The latest report into Sustainable Travel Towns, produced by the Transport Research Laboratory in 2016, found that shifts to more sustainable travel choices were sustained over the long term: "Higher levels of walking and cycling have generally been maintained and/or enhanced in all three 'towns' since the STT period. Complementary infrastructure improvements in walking and cycling in Worcester and Darlington... will have helped to sustain the initial growth that was achieved, and the underlying national trend has also been positive."

Only around 29% of urban journeys happen on foot or by bike in the UK – compared with 44% in Berlin, 48% in Copenhagen and 67% in Amsterdam.

Studies in Denmark, which has the planet's most advanced cycling infrastructure (see panel above), points to a virtuous cycle of positive outcomes as a result of its sustained investment in pedal-powered transport. ►

► At the most fundamental level, switching from cars to bikes reduces congestion. The Danes have estimated that if all their cycle commuters switched to cars, traffic volumes would increase 30% – creating thousands of tonnes of additional CO<sub>2</sub> emissions.

But the benefits extend further than reducing congestion and CO<sub>2</sub>. Employers report fewer sick days among their cycling commuters and cyclists themselves say their commute enables them to integrate daily exercise into their lives more easily.

Although it has been on the increase in recent years, commuter cycling in UK cities – especially London – accounts for only 1.3% of journeys nationwide.

Since 1994, the number of bike commuters in London has doubled, yet, despite the ready availability of rental bikes across the central zone, cycling remains a poor relation compared with many European capitals. According to TfL, fewer than 3% of journeys defined as ‘cyclable’ are undertaken by bike in London.

A look at the accident statistics offers an insight into why this might be the case: there are more crashes involving cyclists in London (peaking at 16 in 2011) than almost any other European capital. Around 75% of serious or fatal cyclist accidents occur in urban areas.

According to the European Cyclists Federation, countries with a higher proportion of cyclists on their roads experience fewer cycling casualties. So while the Netherlands has many more active cyclists than the UK, the numbers of cycling fatalities are around the same (2016 cycling fatalities: NL 101; UK 105).

Accidents involving cyclists are much lower in Amsterdam and Copenhagen – the two cities which top the league tables for cycle journeys. This is attributed to the provision of high-quality segregated cycle highways and an established ‘cycling culture’ in which drivers afford higher priority to cyclists than in the UK.

Gains made in cities like Copenhagen have taken decades to achieve, but the climate change emergency means the UK needs to accelerate the establishment of a walking and cycling culture much more quickly.



TfQL suggests an initial investment of £10 per capita per year should rise to £50 to coordinate the establishment of a strategic cycleways programme for every town and city in England.

### CLEANER PUBLIC TRANSPORT

The UK Government’s Urban Mobility Strategy makes it clear that mass transit must remain fundamental to an efficient transport system. And while the per capita CO<sub>2</sub> emissions of a journey by bus are much lower than in a private car, without investment in cleaner hybrid or pure electric buses or trams, current modes of public transport do have a significant carbon footprint, as well as making a significant contribution to particulate emissions.

Planning for a large scale public transport powershift is already underway. Under the Green and Healthy Streets Declaration, 26 cities worldwide – home to some 140 million residents – have committed to buying only zero-emission electric buses from 2025.

According to global climate change leadership group C40 Cities, each electric vehicle that displaces a conventional car saves approximately 1.5 tonnes of CO<sub>2</sub> per year. This represents a 62% reduction compared with a petrol-powered car and a 53% reduction compared with a diesel-powered one.

So each zero-emission electric double decker of the type due to be launched in London this summer could potentially reduce the UK carbon footprint by almost

150 tonnes without producing any tailpipe emissions itself.

Newly installed tramways in Manchester, Nottingham and Sheffield have proved popular with residents – evidenced by soaring journey volumes – but the costs and timescales to build from scratch are significant.

According to the Campaign for Better Transport, the UK needs to build on its six fully operational urban tramways (Manchester, Sheffield, Nottingham, Edinburgh, Croydon and Blackpool) to reduce urban congestions and cut greenhouse emissions.

However, tramways require private sector involvement and the Private Finance Initiative terms often make them an extremely expensive option which – as Edinburgh’s experience demonstrates – takes years to deliver.

It’s also critical that new transport infrastructure dovetails seamlessly with existing provision, facilitating frictionless shifts between transport modes.

TfL’s Oystercard transformed the capital’s public transport landscape and paved the way for another huge step in simplifying ticketing: the introduction of contactless card payments for all journeys.

However, in a global survey of urban public transport prices conducted by Deutsche Bank in 2017, London’s fares were identified as the highest in the world – outstripping those of New York, Tokyo and Sydney by more than a third.

Much of the available evidence suggests that access to clean, safe, reliable and affordable public transport increases uptake.

The solution to a rapid increase in public transport utilisation could lie in a more radical approach. Building on the success of the Over-60s Now Card – some experts suggest cities should move to completely free public transport provision.

After evaluating fare-free public transport in more than 100 towns and cities worldwide, Friends of the Earth recommends funding such a radical transformation from a local business taxes (as used in France) or revenues from road or congestion charging designed to discourage car use in cities. ►

## Nottingham’s Workplace Parking Levy pays for a raft of green transport initiatives to reduce congestion and CO<sub>2</sub> emissions



Introduced in 2012, Nottingham’s Workplace Parking Levy (WPL) was the first of its kind in Europe. The scheme levies a charge of £402 per annum on each parking space provided by city businesses for their employees. Emergency services and other essential users are exempt.

The scheme is designed to discourage workplace parking provision and encourage more sustainable forms of commuting into the city centre, but it has also raised millions of pounds which is ring-fenced for spending exclusively on enhanced public transport provision.

Since its introduction, the WPL has raised £53 million directly and unlocked three times that amount in terms of additional match-funding investment in public transport.

This has helped pay for an extension to the incredibly popular tramway and one of Europe’s largest fleets of biogas and electric buses. WPL revenue also contributed to a wholesale redesign of the city’s railway station.

While there are some in business who continue to question the imposition of additional costs for doing business, WPL is accepted by the majority of companies and employees subject to the levy as a fair way to shoulder the burden of reducing congestion and – increasingly – improving air quality in the city centre.

WPL service manager Nigel Hallam says: “The beauty of this scheme is that we took a licensing rather than

enforcement approach, which would have involved much more expensive physical infrastructure such as the cameras associated with schemes like the London Congestion Charge.

“The principal costs are associated with admin and communications – because we invested heavily in a comprehensive programme of publicity and consultation with the city’s business community.

“As a consequence, compliance with the WPL is 100% while the cost of operating the scheme is only around 5% of the revenue yield,” says Hallam. “To date, no employer has received a sanction due to the focus on compliance as opposed to enforcement.”

Because the charges are relatively low, many employers – some of whom pass on the costs to employees – opt simply to pay the charges. Nevertheless, the WPL package of improvements will take 2.5 million cars off the roads and reduce traffic growth by around 7% – helping to reduce pollution and carbon emissions.

“We were never going to solve Nottingham’s congestion issues, but independent research has demonstrated we have certainly slowed the growth of traffic in the city,” says Hallam.

Where the scheme has had a pronounced impact is in funding additional public transport provision to encourage modal shift. The trams the WPL has helped to fund are proving hugely popular with city residents, with a million additional

passengers using them since the network was extended in 2015.

Nottingham’s head of transport strategy Chris Carter adds: “Initially, the WPL was very much a means to an end. We really wanted to extend the tramway system and we needed to raise revenue to unlock the matched funding to do that.

“But, as well as helping fund the tramway, we have used some of the revenue to complete a significant upgrade to the railway station and upgrade the bus fleet to cleaner diesels, biogas and one of the largest fleets of fully electric buses in the UK.

“We’ve also put some funding into helping employers encourage their staff to use sustainable transport and given grants to install facilities such as cycle shelters and showers.

“So the WPL has unlocked the funding to pay for a whole range of initiatives that, as well as reducing the growth in traffic, has reduced CO<sub>2</sub> emissions and improved air quality.

“Nottingham was one of five UK cities facing the imposition of a Defra Clean Air Zone, but the package of measures the WPL has helped fund will reduce NO<sub>2</sub> levels below the levels required by the Government.

“In terms of CO<sub>2</sub> emissions, we met our target of reducing emissions by 26% two years early and Nottingham now wants to build on the progress it has already made to become the UK’s first carbon-neutral city by 2028.”



## York: putting people first through pedestrianisation

As one of England's oldest cities demonstrates, it is possible to 'retrofit' more people-friendly environments within historic settings.

The recent opening of a new footbridge across the River Ouse, connecting the station with York's historic city centre is emblematic of a concerted scheme to reduce traffic congestion by making York a more pedestrian-friendly city for residents and the millions of tourists who visit every year. The 65-metre long bridge replaces an older structure and is three times as wide as the original Scarborough Bridge – built by Robert Stephenson in 1845.

The £4.4 million scheme is part-funded by the West Yorkshire Combined Authority's £60m CityConnect programme which aims to encourage cycling and walking across the region.

### LARGEST IN EUROPE

The new bridge is the latest initiative in a long line of pedestrian-friendly schemes introduced since 1987 that have made the medieval heart of York one of the largest pedestrianised zones in Europe.

More recently, the city's pedestrianised zone was extended in 2017, with the incorporation of the Fossgate to the city's growing number of 'Footstreets', where vehicle access is restricted or completely prohibited.

According to Visit York, the city welcomes seven million visitors each year and in 2018, city centre footfall grew 2% compared with a national decline of the same margin.

The 'general ambience' of the city is the main reason to visit for most visitors, with shopping and eating being the fastest growing areas of tourism spend.

Two-thirds of visitors travel by car – with 13% using the park and ride and exploring the city centre on foot. Just under a third of visitors arrive by train – a figure which increased 20% between 2010 and 2015.

Research into the perceived value of pedestrianisation in 2011 found that: "York residents are familiar with Shared Space-type improvements in the city centre and are therefore, we believe, less resistant to them. York already has an extensive area in the city centre which has features of shared space and limited vehicle access, which is widely perceived to be successful."

York's former head of transport Dave Merrett was instrumental in implementing the pedestrianisation project in the face of fierce opposition from traders.

"City centre businesses honestly believed pedestrianisation would put them out of business, but within a couple of years, they could see that footfall had actually increased and the shops and cafés were prospering as a result," he says.

"But without the park and ride schemes – which, again, were subject to fierce opposition from residents – I doubt the pedestrianisation would have been so successful.

"Strong political will, winning arguments with common sense and a long-term strategic approach are critical in implementing ambitious schemes.

"Today, the extension of the pedestrian zone to Fossgate is supported by most businesses in the area, but there is still an awful lot more we could do. Further pedestrianisation would allow the buses to flow more easily in and out of the city and we need to do more to improve cycling infrastructure, because only the installation of truly segregated super cycle highways achieves the sort of uptake we need."

▶▶ Head of science, policy and research at Friends of the Earth Mike Childs says: "Free bus travel could be transformational – particularly extending free travel to others beyond the over-60s. It could be done quickly and sensibly coupled with measures to discourage car use. This really should be a stepping stone to free bus travel entirely, coupled with high charges for car use such as road-user charging and higher parking rates in town centres."

### DEMAND MANAGEMENT

Encouraging active travel and improving public transport are essential components in decarbonising urban transport, but cities are increasingly looking to the other side of the supply curve in search of a more sustainable model.

In addition to enhancing public transport options and promoting sustainable journey choices, some cities are actively discouraging car use within the city limits.

Amsterdam recently announced proposals to remove 11,000 parking spaces to create more space in the city centre for pedestrians, bikes and trees.

Starting this summer, the city's transit authority will start removing around 1,500 parking spaces a year currently used by parking permit holders. The price of the permits will also increase.

Rather than cancelling permits, administrators will cut availability through natural wastage – by not replacing those surrendered when drivers leave the city, give up their cars, or die.

In the UK, Nottingham has led the way with an environmental levy that – in addition to stemming rises in traffic and congestion, has raised millions of pounds in revenue to reinvest in enhancing the city's public transport system (see panel, page 25).

### INTEGRATED PLANNING

Reducing car use, enhanced public transport, active travel and the associated health dividends require a serious commitment to joined up thinking and an integrated approach – not just to transport – but to the way we design our cities.

Momentum is gathering behind a clear-cut concept that should shape

urban design and transport planning for the foreseeable future: putting people first.

Prioritising people ahead of cars and trucks would transform our cityscapes so walking and cycling become the dominant forms of travel for short journeys – or transferring between different forms of public transport on longer journeys.

Director of the Urban Transport Group Jonathan Bray says: "Transport is the largest source of CO<sub>2</sub> emissions and it's been growing. But, in some ways, the problem of decarbonising urban transport is out of our hands, because it hinges upon how cheap batteries become and how quickly we can decarbonise power generation.

"Cities don't build cars or power stations, but they do have the ability to control their highways.

"We need to focus more on creating better connections between transport and other sectors – for example between transport, smart technology and local energy supply. The biggest challenge is making people aware of these connections and stepping away from the siloed thinking of the past.

"Land use and travel demand are two areas where cities can influence how and why people travel. But I don't think proscribing one particular mode of transport is a particularly wise course of action.

"Parking control and charging is one way to manage demand which is less politically sensitive than congestion charging. But it's just one of many tools transport planners need at their disposal in order to arrive at a combination of measures that works according to local circumstances."

The National Institute for Health and

Care Excellence (NICE) recently called for a fundamental rethink of transport priorities in the urban environment. As part of a major consultation process, the institute is recommending that priority is given to pedestrians, cyclists and public transport, whenever roads are built or upgraded within city centres.

According to NICE, more widespread adoption of this would produce multiple benefits, including: improving health, reducing demand on the NHS, cutting CO<sub>2</sub> emissions and improving urban air quality.

The DfT's Walking and Cycling Investment Strategy aims to double cycle journey 'stages' by 2025 and achieve significant increases in the number of walking 'stages' and the proportion of children aged 5-10 walking to school.

The Government's Local Sustainable Transport Fund (LSTF) has made good progress in some regions, but the implementation of its projects – such as Local Cycling and Walking Infrastructure Plans – tends to be piecemeal and patchy.

For new development The Urban Transport Group advocates a principle of 'transit-oriented development', which is guiding London, Leeds and Cambridge.



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Mike Childs, Friends of the Earth

Transit-oriented development places public and active transport front and centre of new commercial and residential projects.

Integrating public transport, walking and cycling into new developments can help move us away from an approach to new housing which locks residents into car-based lifestyles and exacerbates the challenges of congestion and poor air quality in our cities.

In Leeds, a new railway station at Kirkstall Forge is part of a new transit-oriented development which will provide more than 1,000 new homes, 300,000 sq ft of office space and 100,000 sq ft of retail, leisure and community facilities – including a school – all just a six-minute train journey from the city centre.

The Urban Transport Group's Jonathan Bray says: "Another factor that is beginning to have a beneficial by-product in reducing traffic is the appetite for place-making in city centres. In many cities around the world, vehicles are being pushed out of the city centre to make more room for places that people want to spend time in.

"Obviously transport authorities have a challenge in reconciling place and movement, and city centre businesses still need to have the goods they sell delivered to them, but the triumph of place over movement is a pretty powerful force." **ST**

**TURN OVER FOR THE PEER REVIEWS**

