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Transforming public transport

Free bus travel should be offered in the UK to the under 30's as a stepping stone to free bus travel for all.

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Summary

Transport is now the UK's largest source of greenhouse gases.

Friends of the Earth asked the transport consultancy, Transport for Quality of Life, to produce a series of papers on what changes are needed in transportation and transport policy if the UK is to deliver its fair share of global emissions reduction.

The first paper identified that the level of traffic reduction needed by 2030 could be anywhere between 20% and 60%, depending on factors including the speed of the switch to electric vehicles and how fast the electricity powering them is decarbonised.

This second paper looks at public transport.

It suggests that local authorities need to be empowered, emboldened and required to deliver a world class public transport service (particularly buses) that provides a good alternative to driving.

It shows that this will require bus services to be regulated as they are in most of the rest of Europe.

It also argues for a step-change in funding for local public transport, both from government and from new funding streams such as a local public transport payroll levy which has enabled large scale investment in local public transport in France.

Friends of the Earth is happy to endorse the recommendations, including that the current older people's concessionary travel scheme (free bus pass) should be extended to young adults (e.g. those 30 and under) and in time local authorities should consider making bus travel free to all.

Free bus travel is already happening in around 100 towns and cities worldwide, including more than 30 in the USA and 20 in France, as well as in Poland, Sweden, Italy, Slovenia, Estonia, Australia and elsewhere. Before this can happen the public transport system has to be reregulated and funding streams put in place.

Introduction

In order to limit global temperature rise to no more than 1.5°C above pre-industrial levels, in line with the aspiration of the Paris Agreement, we will need to make large-scale changes to our transport system. The scale of the necessary reduction in carbon emissions is such that shifting from petrol and diesel to electric vehicles will not be enough on its own, and we will also need to reduce the distance travelled by car¹.

Even with the most optimistic scenario (involving a much more rapid shift to an all-electric fleet than envisaged by the UK government in its strategy paper 'Road to Zero'²), we have estimated that government needs to plan for reducing car mileage by at least 20% between now and 2030. Under a scenario in which the shift to an all-electric fleet is in line with 'Road to Zero', much larger reductions in car mileage, of the order of 60% between now and 2030, will be needed to stay within the transport sector's carbon budget³.

This paper looks at local public transport, focusing mainly on buses, but also trams, underground and metro rail services in cities, towns, and their surrounding suburbs and rural areas³. In a world with much less travel by car, we will need very much better local public transport than we have now, equivalent to the very best that exists elsewhere in Europe. The section below describes what this 'world-class' local public transport system would look like. The following section explains what reforms to governance and management are needed to achieve it, and then the paper looks at how it might be funded. Alongside other policy measures discussed in other papers⁴, the changes we describe would deliver substantial reductions in carbon emissions. However, because the scale of the challenge is so large, simply replicating what other countries are already doing may not be enough. Finally, therefore, we discuss a radical policy option to deliver a larger shift from cars to public transport, and larger reductions in emissions.

What would a world-class public transport system look like?

Previous research has defined a world-class public transport system as one that provides an excellent experience for passengers; forms part of a town or region's strategic vision; and is managed and governed so as to ensure cost-effective use of public money⁵. From the perspective of passengers, the main features of a world-class public transport system would include a comprehensive network; frequent, reliable and affordable services; a single ticketing system, valid across all modes; new low-emission vehicles; and high quality waiting facilities⁶. This is very far from the type of public transport system we currently have in most of the UK, outside London.

To attract a significant proportion of people's travel, and hence save significant carbon emissions, a world-class public transport system must extend beyond urban areas to the much larger 'travel to work area' of suburbs, smaller towns and villages around each city or large town. For this, the public transport systems of German, Austrian and Swiss cities provide an excellent model. The public transport systems of Munich, Hamburg, Berlin, Vienna and Zurich each cover land areas that are 10-

30 times bigger than the built-up area of their respective main city⁷.

For example, the geographical area covered by the Munich public transport system is comparable to the area of the West Midlands Combined Authority⁸ plus the counties of Warwickshire and Worcestershire⁹. Across this whole area, public transport functions as a single system: buses, trams and underground and suburban trains are planned together to provide 'one network, one timetable, one ticket'¹⁰. Most bus services are operated by a municipally-owned transport company¹¹ but some suburban and rural bus services are operated by small private bus companies. However, all public transport services, whoever the operator, are coordinated by a public transport governing body or Verkehrsverbund (VV)¹². The VV plans public transport service levels, routes and timetables; is responsible for the ticketing system; awards contracts to operators; and sets and monitors service quality standards¹³. City, district, and regional government all play a role in the VV.

The VV model for governance and delivery of integrated public transport was so successful that it spread across most of Germany and all of Austria in the 1990s¹³. It resulted in high and growing levels of public transport use¹⁴. As public transport use went up, car mode share went down – partly because of the improved public transport 'offer', and partly because good public transport was accompanied by complementary policies that discouraged car use¹⁵.

Levels of public transport use in the VVs are strikingly higher than in similar areas of England, as illustrated in Figure 1¹⁶.

Figure 1: Annual per capita

public transport trips in six continental Verkehrsverbände, the English Combined Authorities, and London

In the English Combined Authority (CA) areas shown in Figure 1 (Greater Manchester, Liverpool City Region, Peterborough and Cambridgeshire, Tees Valley, West Midlands, West of England, Sheffield City Region, West Yorkshire, North East and North of Tyne¹⁷), we calculate that the average person makes about 50-115 trips by public transport per year (bus, tram and train)¹⁸. In six case studies of the largest VVs, per capita public transport trips are three to four times higher, at 168-442 trips per year¹⁹. This is despite the fact that gross population densities in the Combined Authority areas are similar to, or greater than, those in the VV areas²⁰.

Lack of effective governance of local public transport

The problems caused by bus deregulation

The UK is unique in Europe in having a deregulated system for its buses²¹, and this deficit of governance lies at the core of the poor performance of our local public transport networks. In a deregulated system, decisions about where and when to run services are made by individual operators, based primarily on criteria related to profitability rather than on environmental, social or public interest criteria. There is no 'guiding mind' to oversee the planning, management and delivery of public transport services across a whole town or city and its surrounding suburbs and villages. This makes it far less likely that a comprehensive network of services will be offered, and makes it extremely complex (and in practice, impossible) to coordinate timetables and services across all

public transport modes.

It is illuminating to contrast this again with the continental VVs. For example, in the Zurich city-region²², the regional transport body (Zürich Verkehrsverbund, ZVV) is responsible for planning public transport timetables and networks. The result is the epitome of a comprehensive, coordinated network. ZVV defines three levels of service for buses: level 1 is hourly, and is for settlements above 300 people; level 2 is half-hourly, and is on corridors where flows from multiple settlements combine to give strong demand; and level 3 is every 15 minutes (or more frequent where there is demand), and is for large dense settlements. Services operate between 6am and midnight. Connections are given high importance, with buses arriving before trains and departing after, and services run to clock-face timetables (i.e. repeating hourly) on regular intervals that maximise the potential for connections²³. Effective regional governance is able to deliver the comprehensive, coordinated network of services that the British deregulated system cannot provide.

A further consequence of deregulation is that operators are able to withdraw or vary services with just eight weeks' notice, which creates uncertainty for passengers and makes it difficult and resource-intensive for local authorities to keep even the most basic timetable information at bus stops up to date. In contrast, a world-class example is provided by the Dutch province of Friesland, where the bus concessionaire (Arriva) may only change the timetable once a year, on the same date as the timetable change for rail services²⁴.

Bus deregulation also makes a single, simple, multimodal ticketing system impossible to achieve. While local authorities and bus operators can work together to create 'multi-operator' tickets that are valid on more than one bus company's services, it is a requirement of competition law that these must not replace single-operator tickets for which fares are set by individual operators. Instead, multi-operator and single operator tickets must exist alongside each other²⁴. The rationale for this is that it creates competition between operators, which is regarded as being in the interests of passengers. However, the practical result is that it is impossible to establish a single ticketing system (like London's Oystercard or Contactless) anywhere in the UK outside London or Northern Ireland. This leads to a confusing mix of different fares for the same trip. Multi-operator tickets are typically about 25% more expensive than the tickets of individual operators²⁵.

Finally, deregulation makes it much more difficult for local authorities to invest in new tram systems, which are environmentally desirable both because they are more effective at attracting people out of cars and because they can easily be powered by green electricity. Under the deregulated system, it is much harder to demonstrate a sound business case for a new tram route, because the local authority can do nothing to stop bus operators running competing services on the same corridor once the tram service is completed.

Opportunity to move towards a better governance model in main cities

In 2017 the UK government changed the law so that some local authorities in England (Combined Authorities with directly elected mayors²⁶) now have the power to re-regulate bus services, plan the bus network, and let contracts or 'franchises' to commercial operators to run services, as in London.

If buses in these areas are re-regulated, the features of the Swiss, German and Dutch local public transport systems described above will become possible:

- Local authorities will be able to work together, in the same way as the Verkehrsverbünde, providing a 'guiding mind' to design the optimum timetable and a comprehensive network of services, and to ensure buses and trams connect with trains.
- The local public transport network could be stable from one year to the next, with the 'guiding mind' able to plan for the long term.
- London-style Oystercard and Contactless payment could be introduced everywhere, with 'capping' of the maximum daily or weekly payment by passengers.

With bus regulation, there will also be less leakage of profits out of the system, as dividends paid by commercial operators to their shareholders will be more modest²⁷. Improved network design and simplified ticketing will provide increases in patronage and hence in revenue. A shift from a deregulated system to one in which bus services are regulated will deliver financial gains which can be reinvested in better services and lower fares²⁷.

The 'guiding mind' in a regulated local public transport system will also be able to shape and improve the local public transport network in other ways. It could drive an ambitious programme of investment in low- or zero-emission buses (hybrid, biogas, battery electric and fuel cell). It could invest in trams or rail services on main public transport corridors (powered by green electricity) without the risk that their profitability would be undermined by bus operators running competing services on the same corridors. It could decide to keep fares low, and to raise revenue for public transport from other sources. It would be motivated to invest in public transport infrastructure (trams, bus lanes, bus waiting facilities, real-time information etc.) because of the direct benefit these would offer in increased patronage and fare revenues. These changes would not be inevitable: they would require funding and ambition, but all would become much more possible than they are with the current deficit of governance. It is worth noting that all of these actions are currently taking place in London, where the governance arrangements are closer to those elsewhere in Europe, whereas they are rare elsewhere in the UK.

Potential effect of better governance on carbon emissions and air quality

If bus franchising is introduced in Combined Authority areas, it will become possible to provide coordinated, comprehensive bus and tram networks, with London-style simple integrated ticketing, for 15.2 million people²⁸, or over a quarter of the English population.

Because population densities in Combined Authority areas are similar to or higher than those in the six VV areas shown in Figure 1, the new franchising powers should enable them over time to achieve per capita levels of public transport use that are at least as good as in the VV areas. If this happened, car use would go down, and we conservatively calculate that annual car mileage in all ten Combined Authorities would decrease by 7.8 billion km²⁹. This would represent a reduction in car traffic in these areas of just over 9%. Carbon emission savings would be less than this, because it would be necessary to increase public transport services, and hence bus and tram vehicle distance. However, a shift from conventional diesel buses to zero emission buses, coupled with investment in trams to replace buses on major corridors, would more than offset the increased carbon emissions from expansion of the public transport network. Modal shift from cars to clean public transport would also improve air quality.

The potential car mileage savings suggest that the Bus Services Act offers a significant opportunity to reduce carbon emissions. Combined Authorities that are currently considering whether to use the new powers offered to them by the Act should therefore be encouraged to do so, as part of their climate change strategy.

Duties and responsibilities of local government outside the main cities

However, this still leaves most parts of the country without fit-for-purpose governance structures for public transport. Under the Bus Services Act, other local authorities (those that are not part of Combined Authorities with elected mayors) can seek special permission from the Secretary of State for Transport to re-regulate buses. Cornwall has done this as part of its 'Devolution Deal' with government. We believe that all local authorities should seek these powers, as a key element of their local strategy to combat climate change.

Unfortunately, many local authorities lack the knowledge, confidence and capacity to take control of re-regulated local public transport. Remedial action is required to enable them to plan and deliver world-class public transport services, like Transport for London. Given the need for large reductions in car mileage by 2030 to meet climate targets, we cannot wait for local authorities to gradually learn from one another. We therefore suggest that the UK government should establish a new body called 'Local Public Transport for England' (with an equivalent established by devolved governments elsewhere in the UK) to provide training, advice and funding to local authorities for the work needed to re-regulate and establish effective governance of local public transport.

Alongside this support, a statutory duty should be placed on all local transport authorities to improve public transport and increase local public transport use. Local Public Transport for England should measure how well local authorities are meeting this new duty.

Larger local authorities (or Combined Authorities) might manage and develop their public transport network and infrastructure on their own³⁰, but smaller local authorities should combine with

neighbouring authorities, in exactly the same way as in Germany and Austria, to set up a public transport governing body. These bodies should have the power to plan and deliver comprehensive area-wide public transport networks; to invest in new infrastructure such as tram networks; to create unified fares structures across all modes of local public transport; to coordinate timetables and services; and to provide integrated travel information across all public transport modes.

Local authorities should also be able to set up their own municipal public transport companies. The few remaining municipal bus companies in the UK (e.g. in Reading, Nottingham and Edinburgh) are some of the best bus operators in the country, regularly winning prizes for innovation and good service in the UK Bus Awards. In Germany, nearly 90% of local public transport trips are made on publicly-owned buses, trams and local trains³¹. In France, legislation now makes it easier for local authorities to set up municipal bus companies, and many (both left and right-wing administrations) are doing this, as it enables them to provide a better service at lower cost³². Municipal public transport companies are able to plough all profits back into the public transport network, giving larger potential financial gains than re-regulation alone. It has been estimated that a shift from a deregulated system to municipal bus operation could deliver financial gains of about £500 million per year³³ across the UK (excluding London and Northern Ireland). But beyond this, municipal companies can and should be driven by an ethos of local public service – that is, of providing the best possible public transport for the community that the municipal company serves. It is not hard to see that this ethos will result in different decisions at both strategic and operational levels, compared to a perspective shaped by a geographically-remote head office focused on commercial factors.

It is difficult to estimate what the car mileage and carbon savings might be if these measures were implemented, and effects would vary from place to place depending on the degree of rurality and the effectiveness of the improvements that were made. However, to a first approximation it is plausible that total car mileage reductions in the rest of England (excluding the Combined Authorities and London) could be comparable to those estimated for the Combined Authorities, that is, of the order of about 7 billion km³⁴.

Funding for local transport

Alongside governance changes, and other reforms such as changes to the appraisal system for transport projects³⁵, a substantial increase in funding for local public transport services is also necessary. To build a world-class public transport network requires capital investment (for example, to build tram systems and bus priority schemes, and to invest in new low-carbon buses) and revenue investment (to increase the frequency of services as a way of stimulating patronage growth).

We need to move away from the narrow idea that funding for public transport can only come from fares and government grants³⁶, and explore ways that local authorities could also raise funding locally³⁷. Local revenue-raising powers would not remove the need for government funding, particularly for economically disadvantaged areas where the ability to raise local revenue might be less, and there is still a strong case for increased national funding to achieve large-scale capital investment in local

public transport networks (such as trams) within the short timescales necessary to reduce carbon emissions. However, local taxes earmarked for local transport investment could command local support, increasing the total quantum of investment that was available, and would provide an ongoing revenue stream for public transport operating costs.

Looking internationally, there are at least 16 different ways in which local authorities raise funding for public transport, including payroll taxes, local sales taxes, property taxes, visitor taxes and others⁵. The French public transport payroll levy (Versement Transport, VT) is one excellent example. VT is controlled by local authorities, and levied on businesses with 11 or more employees. Businesses support it because it pays directly for public transport improvements, and they recognise that good public transport benefits their employees and increases the economic health of their town. It has the advantage of being a relatively stable income stream. More than 80% of France's 300+ urban transport authorities levy VT, and more than half of their infrastructure investment and operational subsidy is funded by it.

VT has been a prime source of funding for the large number of tram systems that have been built in French cities in recent years (one study lists 20 French cities that built tram schemes between 2000 and 2015^{38 39}). These tram systems are widely seen as catalysts for a 'reimagining' of the city, and often go hand in hand with increased space for walking and cycling, public realm enhancements, and closure of roads to car traffic.

VT is also being used to fund major improvements to bus networks. For example, in 2012 the small town of Dax (with a population of 56,000) set up a municipal company to run all its buses, and at the same time raised its VT from 0.6% to 1%, which provided an extra €2m/year. This enabled a complete redesign of the bus network, with new routes, higher frequencies and lower fares; construction of dedicated busways; a demand-responsive service to 18 rural settlements; a new bus / rail interchange; and new park and ride services⁴⁰. This sustained level of funding of about €5m/year for a town of just over 50,000 people would be unimaginable for local authorities in the UK, but it is what will be required if we are to create the excellent public transport that is needed as part of a plan to cut car use.

A radical policy: fare-free public transport

Re-regulation and effective governance structures coupled with powers to raise local funds for local public transport from all its beneficiaries (businesses, retailers, property owners and visitors as well as residents) would provide the foundation to enable local public transport in the UK to become world-class. But in taking the actions described in this paper, we would simply be playing 'catch-up' with established good practice elsewhere. There remains the question of what else we could do, learning from the most innovative, but currently small scale, experiments in urban transport.

One idea that has been a focus of popular campaigning in several countries is that local public transport should be 'fare-free'⁴¹. Although the idea of free local public transport for all might sound

radical and unaffordable, it is already happening in around 100 towns and cities worldwide⁴², including more than 30 in the USA⁴³ and 20 in France⁴⁴, as well as in Poland, Sweden, Italy, Slovenia, Estonia, Australia and elsewhere⁴⁴. The rationale is often social and ethical (if we believe that museums, parks and libraries should be free for all, surely local public transport should also be free so that everyone, rich or poor, can access everything their town or city has to offer). But the case for free public transport is also environmental. Could a high quality, comprehensive, free public transport service make road user charging politically possible? And if so, might the combination of free public transport and road user charges tied to vehicle emissions of carbon dioxide and local pollutants have a large impact on carbon emissions from transport?

In the USA, places with free public transport are typically small towns, tourism areas, or university towns⁴⁵. They meet the cost of bus services through local sales taxes, payroll taxes, parking fees, visitor charges or student tuition fees. In France, most of the places that offer fare-free public transport are also small (population <45,000). But there are eight medium-sized areas (population 70,000-200,000)⁴⁶, of which the biggest to date, Dunkerque, introduced free buses in September 2018⁴⁷. At the same time the Dunkerque bus network is being completely redesigned, so that more people have a bus service close to their home, and service frequencies are much enhanced. One of the reasons French towns are able to contemplate introducing free local public transport is that the payroll levy (VT) already meets a high proportion of the cost of their bus networks: in Dunkerque, around 90% of costs were already met by VT before the start of free public transport⁴².

The largest city in the world to have made its public transport (buses and trams) free is Tallinn, Estonia (population 440,000). Tallinn has actually profited from this: the €12m loss of fares income to its municipal public transport operator was more than offset by a €14m increase in municipal revenues, as more people moved to the city, increasing its tax-base⁴⁸.

In summer 2019, Luxembourg (which has a population of 600,000) may become the first country in the world to make all public transport fare-free, according to the recently-elected coalition government⁴⁹.

Free local bus services would not be feasible or affordable under the current deregulated privatised regime in Britain. However, the big changes to governance and funding discussed earlier in this paper would make it possible: re-regulation, so that local authorities could plan their bus network as a whole; powers to establish municipal bus companies, so that all profits were reinvested; and powers to raise funds from local taxation.

In Britain, public money already accounts for over 40% of bus operator revenues⁵⁰. In order to make bus services entirely free in England outside London, we would need to spend an extra £1.8b per year⁵¹. For London, the equivalent figure is £1.2b. Additional funding would be needed for more bus services, to cater for the increase in demand, and local authorities that operate trams would lose some fare income from these due to abstraction if fares continued to be charged. But it would be entirely achievable for a public transport payroll levy that generated about the same income as VT in

France (£5 billion per year) to support free bus services across the country, and still have very substantial resources left over for investment in improving bus services, supporting cheaper (or zero) fares on local trams, or building tram networks⁵². Even more achievable would be extending free public transport from older people to other groups – for example, young people, to encourage them to establish a habit of using public transport rather than learning to drive and becoming car-dependent. For comparison, we spend £10 billion per year on roads⁵³, which are free at the point of use.

Conclusions

The following are ‘must do’ actions to enable us to create a world-class local public transport system and hence reduce carbon emissions:

- Combined Authorities with elected mayors should take up the new powers offered by the Bus Services Act to re-regulate bus services.
- Other local authorities should seek special permission from the Secretary of State for Transport under the current Bus Services Act to re-regulate bus services. The law should be changed to make this automatic in future.
- The UK government should establish a new body, ‘Local Public Transport for England’, to help local authorities skill up, so they can govern, plan and manage local public transport in an effective way. Equivalentents should be established by devolved governments elsewhere in the UK.
- The law should be changed so that local authorities that believe they could provide better local public transport by establishing a municipal public transport operator are able to do this.
- Local authorities should be given wider powers to raise funding for local public transport, for example from a local public transport payroll levy. This should be in addition to increased national funding for local public transport.
- Local authorities that re-regulate bus services should extend the current older people’s concessionary travel scheme to young adults. Once local revenue-raising powers are in place, they should consider making services free to all.

Acknowledgements

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A [PDF version of this briefing](#) with full references including hyperlinks is available on the Transport for Quality of Life website.

Notes

- 1** [a](#) [b](#) Hopkinson L. and Sloman L. (2018) More than Electric Cars: why we need to reduce traffic to reach carbon targets. Transport for Quality of Life paper for Friends of the Earth
- 2** Department for Transport (2018) Road to Zero. July 2018 <https://www.gov.uk/government/news/government-launches-road-to-zero-strategy-to-lead-the-world-in-zero-emission-vehicle-technology>
- 3** In larger urban areas, train services are also part of the local public transport network. These are not considered in this paper because reform of the local rail network has to be done within the context of the much larger issue of reform of the national rail network.
- 4** This is the second in a series of eight papers which will also cover active travel, planning, traffic restraint, funding and governance.
- 5** [a](#) [b](#) [c](#) Taylor I. and Sloman L. (2016) Building a world-class bus system for Britain. <http://www.transportforqualityoflife.com/policyresearch/publictransport/>
- 6** Taylor and Sloman (2016) Building a world-class bus system for Britain. <http://www.transportforqualityoflife.com/policyresearch/publictransport/> identifies the following features of a world-class public transport system from a passenger perspective: a) A comprehensive network, serving all destinations, both at busy times and quieter times such as in the evening and on Sundays, with stable timetables from one year to the next; b) Timetables and services coordinated between all public transport modes, with bus, tram and train departure times evenly spaced on a 'clock-face' timetable (e.g. every 5, 10 or 20 minutes); c) A simple, single ticketing system, valid across all local services (i.e. buses, trams, ferries, regional trains), with fares for multiple trips capped so passengers automatically receive the best deal; d) Affordable fares, that are cheaper than driving for most trips; e) Services that are reliable, and run quickly and on time; f) Easy-to-find comprehensive information; g) Good quality low-emission vehicles; h) Professional, passenger-friendly staff; i) Good quality waiting facilities.
- 7** Buehler R., Lukacs K. and Zimmerman M. (2015) Regional Coordination in Public Transportation: lessons from Germany, Austria and Switzerland. <http://www.mautc.psu.edu/docs/VT-2013-04.pdf>
- 8** Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall and Wolverhampton.
- 9** The area covered by the Münchner Verkehrs- und Tarifverbund is 5,500 km², and has a population of 2.7 million. The West Midlands Combined Authority plus Warwickshire and Worcestershire has an area of 4,600 km² and a population of 3.9 million.
- 10** Münchner Verkehrs- und Tarifverbund GmbH (MVG) (2013) Sustainable mobility for the greater Munich area. https://www.mvv-muenchen.de/fileadmin/mediapool/07-Ueber_den_MVV/02-Dokumente/Infofolder_MVV_160513_en.pdf
- 11** Munich Transport Corporation (MVG) Sustainability Report 2014/2015. <https://www.mvg.de/dam/mvg/ueber/nachhaltigkeit/mvg-nachhaltigkeitsbericht-eng.pdf>
- 12** Munich Transport and Tariff Association (Münchner Verkehrs- und Tarifverbund, MVV).
- 13** [a](#) [b](#) Buehler R., Pucher J. and Dümmler O. (2018) Verkehrsverbund: the evolution and spread of fully integrated regional public transport in Germany, Austria and Switzerland. International Journal of Sustainable Transportation. DOI: 10.1080/15568318.2018.1431821
- 14** For example, annual public transport trips per capita increased by 30% (1990-2015) in Hamburg; 14% (1990-2015) in Munich; 34% (1990-2015) in Vienna; 31% (2000-2015) in Berlin; 38% (1990-2015) in Zurich; and 38% (1990-2016) in Rhine-Ruhr Verkehrsverbund, according to Buehler et al. 2018) Verkehrsverbund: the evolution and spread of fully integrated regional public transport in Germany, Austria and Switzerland. International Journal of Sustainable Transportation. DOI:

10.1080/15568318.2018.1431821

15 Car trip mode share fell from 48% to 42% in Hamburg; 40% to 33% in Munich; 40% to 27% in Vienna; 35% to 30% in Berlin; and 39% to 30% in Zurich, presumably (although not stated) over the same period as the reported increases in public transport, according to Buehler et al. (2018) Verkehrsverbund: the evolution and spread of fully integrated regional public transport in Germany, Austria and Switzerland. International Journal of Sustainable Transportation. DOI: 10.1080/15568318.2018.1431821

16 Source data: Verkehrsverbünde data from Buehler et al. (2018) Verkehrsverbund: the evolution and spread of fully integrated regional public transport in Germany, Austria and Switzerland. International Journal of Sustainable Transportation. DOI: 10.1080/15568318.2018.1431821.; English Combined Authority and London data from authors' own calculations.

17 The North East and North of Tyne Combined Authorities are shown as one data point in Figure 1 because changes in authority boundaries mean that bus passenger trip data in DfT statistics BUS0110a cannot be disaggregated for the two Combined Authorities

18 Bus data from Department for Transport statistics BUS0110a <https://www.gov.uk/government/statistical-data-sets/bus01-local-bus-passenger-journeys>; rail data from Office of Rail and Road Estimates of Station Usage 2016-17 www.orr.gov.uk/statistics/published-stats/station-usage-estimates; and tram / light rail data from Department for Transport Statistical Release (2017) Light rail and tram statistics: England 2016/17 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/623366/light-rail-tram-ending-march-2017.pdf

19 Hamburg, Munich, Rhine-Ruhr, Vienna, Zurich and Berlin-Brandenburg, as reported by Buehler et al. (2018) Verkehrsverbund: the evolution and spread of fully integrated regional public transport in Germany, Austria and Switzerland. International Journal of Sustainable Transportation. DOI: 10.1080/15568318.2018.1431821

20 The case study VV areas typically include a large suburban and rural hinterland, covering land areas of 2000-9000km² or more, resulting in gross population densities of about 200-1000 people per km². Most of the English Combined Authorities cover a smaller area (typically 800-3500km² although North of Tyne CA is larger) but have rather similar gross population densities of about 250-1100 people per km². However, three of the English CA areas (Greater Manchester, Liverpool City Region and West Midlands) are more urban in character, and this is reflected in their relatively higher gross population densities of 2100-3100 people per km²

21 The only places in the UK where bus services remain regulated are London and Northern Ireland. Transport for London oversees buses, the Underground, Overground and Docklands light rail as a single system. In Northern Ireland, state-owned company Translink runs buses and trains.

22 The Zurich city-region covered by ZVV has a population of 1.3 million and includes the cities of Zurich and Winterthur plus a number of smaller towns and suburban / semi-rural areas.

23 Taylor I. and Sloman L. (2016) Taylor I. and Sloman L. (2016) Building a world-class bus system for Britain. <http://www.transportforqualityoflife.com/policyresearch/publictransport/> summarising findings from Petersen (2009) Network planning, Swiss style: making public transport work in semi-rural areas, http://atrf.info/papers/2009/2009_petersen.pdf and Regulation 740.3 from ZVV: Verordnung über das Angebot im öffentlichen Personenverkehr (Angebotsverordnung) 1988 <http://www.zvv.ch/zvvassets/ueber-uns/gesetze/740.3.pdf>. The ZVV standards are treated as an aim subject to funding, rather than as a legal right. Nevertheless, the final result is very good coverage even for the most rural areas.

24 Competition and Markets Authority (2016) The public transport ticketing schemes block exemption CMA53 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/553470/cma53-public-transport-ticketing-schemes-block-exemption...

25 Taylor I. and Sloman L. (2016) Building a world-class bus system for Britain. <http://www.transportforqualityoflife.com/policyresearch/publictransport/> compared the price of a 1-week multi-operator bus ticket in five towns and cities in England with the price of the equivalent 1-week bus ticket for the two largest operators in the same area. The multi-operator ticket was 15-30% more expensive than the average cost of the single operator tickets in the same area. The towns and cities were Bristol (25%), Leicester (15%), Southampton (31%), Southend-on-Sea (25%) and the

West Midlands (25%).

26 The relevant areas are Greater Manchester, Liverpool City Region, Peterborough and Cambridgeshire, Tees Valley, West Midlands, Sheffield City Region and the West of England Combined Authorities. The recently-created North of Tyne Combined Authority will elect a mayor in 2019. The North East and West Yorkshire Combined Authorities do not currently have an elected mayor.

27 [a](#) [b](#) Analysis for the House of Commons Transport Select Committee by the House of Commons Scrutiny Unit (tweeted by the Committee on 29.11.2018) found that in 2017, Stagecoach and Go-Ahead made profits of 11.9% and 12.5% respectively on their bus operations in the UK outside London (where services are unregulated). Their profits on bus operations in London (where services are regulated) were 7.0% and 8.3% respectively. Sources were Stagecoach (2017) Annual Report p 17, 19 and 20; and Go-Ahead (2017) Annual Report p24 and 27.

28 At present, only those Combined Authorities that have directly-elected mayors have this power. However, other Combined Authorities could seek bus regulatory powers, and there is no good transport policy reason why they (or any other group of local authorities) should be denied these powers by the UK government.

29 Estimate assumes: (a) the Combined Authority areas achieve public transport patronage of 282 trips per annum per person (average of the figure for the six case study Verkehrsverbünde); (b) 35% of new public transport trips would otherwise have been made by car, in line with DfT-recommended diversion factors for bus interventions (adjusted to exclude rail and light rail) as given in Dunkerley F., Wardman M., Rohr C. and Fearnley N. (2018) Bus fare and journey time elasticities and diversion factors for all modes: a rapid evidence assessment Report to Department for Transport; (c) trips that switch from car to public transport have an average trip length of 4.9 miles, in line with average bus passenger journey length from National Travel Survey NTS0303 for 2016; (d) car mileage in Combined Authority areas is as given in Department for Transport statistics TRA8905; (e) population is constant.

30 For example, Transport for Greater Manchester (TfGM) manages, maintains and develops the public transport and infrastructure for Greater Manchester, including Metrolink, the largest light rail system in the UK. However, more than 40 bus operators run services in Greater Manchester, and no single organisation is responsible for planning the bus network or setting fares. TfGM is now preparing an assessment of a proposed bus franchising scheme for the whole of Greater Manchester. TfGM (undated) The future of bus services. Webpage. <https://www.tfgm.com/future-travel/bus-reform>. accessed 04.12.2018.

31 Taylor I. and Sloman L. (2016) Building a world-class bus system for Britain. <http://www.transportforqualityoflife.com/policyresearch/publictransport/> (section 5.5.1), citing evidence (in German) from Reim U. and Reichel B. (2014) Öffentlicher Personenverkehr mit Bussen und Bahnen 2012, Statistisches Bundesamt, Wirtschaft und Statistik https://www.destatis.de/DE/Publikationen/WirtschaftStatistik/Verkehr/OeffentlicherPersonenverkehr2012_022014.html

32 Taylor I. and Sloman L. (2016) Building a world-class bus system for Britain. <http://www.transportforqualityoflife.com/policyresearch/publictransport/> (section 5.5.1).

33 Taylor I. and Sloman L. (2016) Building a world-class bus system for Britain. <http://www.transportforqualityoflife.com/policyresearch/publictransport/section> 5.5.3 calculates this as follows: (a) savings of £217m per annum in Britain (excluding London) because all profits would be reinvested in the public transport system (based on average dividend payments over a ten year period); (b) estimated revenue increase of £168m per annum as a result of patronage increases following unified network design and simplified ticketing, using a mid-range assumption for patronage growth derived from Booz & Co. (2009) The benefits of simplified and integrated ticketing in public transport; (c) estimated £118m savings because of efficiencies in delivery of socially necessary services that currently have to be procured by local authorities through contracts with bus operators that may be reactive and inflexible (assuming efficiency savings of 30%).

34 Some local authority areas (e.g. Nottingham, Bournemouth) have very similar geographical characteristics to the Combined Authorities, and so it is plausible that public transport improvements could have a similar proportionate impact on car mileage. Other local authority areas are much more rural (e.g. Dorset, Cumbria) and in these areas public transport improvements would have less impact on car mileage. If, overall, public transport improvements in non-Combined Authority areas of England outside London were half as effective as in the Combined Authority areas, the reduction in car mileage

would be 11 billion vehicle km. If they were only one-third as effective, the reduction in car mileage would be 7 billion vehicle km.

35 The UK's appraisal system for transport projects is also constraining the development of tram-based projects which can improve the connectivity to poorly-connected areas, an issue which will be explored in a future paper on governance. Hickman R. and Osborne C. (2017) Connecting European Regions using Innovative Transport. Summary report for SINTROPHER. May 2017. <https://sintropher.eu/publications/sintropher-project-results-summary-report>

36 The UK also uses development charges (e.g. the Community Infrastructure Levy and Section 106 agreements) and business property taxes (e.g. the temporary supplement to business rates that was used for Crossrail in London) to fund public transport capital upgrades. However, these sources of funding offer little towards subsequent operating costs. More information on development charges can be found in Paper 3 in this series

37 The reliance on government funding is a major barrier to local public transport improvements. For example, Leeds, one of the fastest growing cities with chronic road congestion, has had bids for trams turned down twice by Government. Railway Technology webpage. <https://www.railway-technology.com/projects/leeds/>, accessed 04.12.2018.

38 Boquet Y. (2017) The renaissance of tramways and urban redevelopment in France. *Miscellanea Geographica – Regional Studies on Development* 21(1) 5-18.

https://www.researchgate.net/publication/316573692_The_renaissance_of_tramways_and_urban_redevelopment_in_France

39 According to Boquet Y. (2017) The renaissance of tramways and urban redevelopment in France. *Miscellanea Geographica – Regional Studies on Development* 21(1) 5-18.

https://www.researchgate.net/publication/316573692_The_renaissance_of_tramways_and_urban_redevelopment_in_France, some cities have (so far) built only one tram line, while others have two or three. Towns and cities with tram networks of 30km or more include Lyon, Montpellier, Bordeaux, Nantes, Strasbourg, Grenoble and Valenciennes. The Paris / Ile-de-France area is served by nine lines, with a network of 104km, mainly in the Paris suburbs.

40 Taylor and Sloman (2016) Building a world-class bus system for Britain.

<http://www.transportforqualityoflife.com/policyresearch/publictransport/>

41 Sloman L. et al. (2018) Radical Transport Policy Two-Pager #1: We need fare-free buses! It's time to raise our sights.

http://www.transportforqualityoflife.com/u/files/180317%20Fare-free%20buses_%20time%20to%20raise%20our%20sights.pdf

42 [a b](#) Briche H. and Huré M. (2017) Dunkerque, nouveau «laboratoire» de la gratuité des transports 30/05/2017.

Metropolitiques.eu <http://www.metropolitiques.eu/Dunkerque-nouveau-laboratoire-de.html>, accessed 18.02.18

43 National Academies of Sciences, Engineering, and Medicine (2012) Implementation and Outcomes of Fare-Free Transit Systems. Washington, DC: The National Academies Press. <https://doi.org/10.17226/22753>

44 [a b](#) Koblowski W. (undated) More than just riding without a ticket? Exploring the geography of fare-free public transport. *Cosmopolis Working Paper*, Centre for Urban Research.

https://www.researchgate.net/publication/320300147_More_than_just_riding_without_a_ticket_Exploring_the_geography_of_fare-free_public_transport

45 National Academies of Sciences, Engineering, and Medicine (2012) Implementation and Outcomes of Fare-Free Transit Systems. Washington, DC: The National Academies Press. <https://doi.org/10.17226/22753>.

46 Koblowski W. (undated) More than just riding without a ticket? Exploring the geography of fare-free public transport. *Cosmopolis Working Paper*, Centre for Urban Research.

https://www.researchgate.net/publication/320300147_More_than_just_riding_without_a_ticket_Exploring_the_geography_of_fare-free_public_transport

47 Niotraggio website (2017) <http://www.niotraggio.fr/fr/details-de-lactualite/le-reseau-tanlib-sadapte-7930/index.html>, accessed 18.02.18.

48 Taavi Aas (2015) Free public transport as a growth factor in Tallinn.

http://www.tallinn.ee/eng/freepublictransport/Tallinn_FFPT-2 accessed 18.02.18

- 49** Boffey D. (2018) Luxembourg to become first country to make all public transport free. Article in The Guardian, 05.12.2018. <https://www.theguardian.com/world/2018/dec/05/luxembourg-to-become-first-country-to-make-all-public-transport-free>
- 50** Through local authority contracts, reimbursement for trips made by concessionary pass-holders, and government grants. Taylor I. and Sloman L. (2016) Building a world-class bus system for Britain. <http://www.transportforqualityoflife.com/policyresearch/publictransport/>
- 51** Replacing non-concession fare-box revenue of £2b, less £220m in dividend payments if all services were municipally operated. Taylor I. and Sloman L. (2016) Building a world-class bus system for Britain. <http://www.transportforqualityoflife.com/policyresearch/publictransport/>
- 52** For example, the Nottingham Workplace Parking Levy, a charge on workplace parking spaces, has raised about £9 million each year, helping to fund extension of the tram network, redevelopment of the train station and creation of an all-electric park and ride. Nottingham City Council (2018) Workplace parking levy wins praise from independent bodies. News article, 30 January 2018. <https://www.transportnottingham.com/workplace-parking-levy-wins-praise-independent-bodies/>, accessed 04.12.2018.
- 53** DfT (2018) Transport Expenditure. Table TSGB1303: UK public expenditure on transport by function. <https://www.gov.uk/government/statistical-data-sets/transport-expenditure-tsgb13>, accessed 09.01.2019