

## Cleaner Air for Scotland Review: Transport Working Group Draft Final Report

As was set out in the Cleaner Air for Scotland (CAFS) report in 2015, transport contributes just over one-sixth of Scotland's total PM<sub>10</sub> and over one third of the total emissions of nitrogen oxides (NOX). The majority of these emissions are caused by road transport<sup>i</sup> and road transport emissions are the largest source of kerbside concentrations and poor urban air quality. Transport sector emissions have risen slightly in recent years and it is the only sector whose emissions continue to grow. The Transport Working Group has identified key areas arising from which we make recommendations in the following sections. We (the Transport Working Group – see Appendix 1) ranked these key areas and some of the rankings are the same, [1] being the most important. They are addressed according to ranking. Most inter-relate to at least one other area. Overall, we have a consensus that nothing less than transformational change is necessary.<sup>ii</sup>

We also noted that the inter-relationship between air pollution and climate change, carbon reduction, and mobility is woven across the transport workstream and CAFS2 would be stronger with a clear opening statement regarding this inter-connectivity and not least the co-benefits associated between mobility choices, carbon emissions and air quality. We further noted that there are interlinkages across the four Working Groups which we recognise in general and hope that any repetitions of cross-cutting recommendations will simply add weight in helping the Steering Group make their overall set of recommendations.

**[1] Behaviour change: Recommendation 1: prioritise demand management and behaviour change measures above technological fixes, and to cease investment in damaging transport 'solutions'.**

With respect to air quality - behaviour change is “not a nice to have” or just an aspect that should be “encouraged”. A recent study, modelling pathways to lower emission futures in Scotland, indicates ‘lifestyle change alone can have a comparable and earlier effect on transport carbon and air quality emissions than a transition to EVs with no lifestyle change ... we cannot just wait for the ‘technology fix’’. Energy consumption and emissions from transport are influenced not only by technical efficiency, mode choice and the carbon/pollutant content of energy but also by lifestyle choices and socio-cultural factors. The most likely pathway to success will involve both changes to our travel demand patterns and technological improvement. Policies to change travel demand patterns can be implemented sooner, and will impact more significantly, to achieve emissions reductions. The most significant impact of lifestyle change on the transport-energy system is due to reductions in the overall demand for transport energy, particularly for fossil fuels.<sup>iii</sup> We note evidence that in terms of EVs 3 times as much PM10 is generated from tyre and brake wear than vehicle exhausts.<sup>iv</sup>

There is significant potential for active travel to substitute short car trips, with sizeable impacts on carbon emissions from personal travel. In research focused on Cardiff, half of all car trips were less than 3 miles long.<sup>v</sup> Taking into account individual travel patterns and constraints, walking or cycling could realistically substitute for 41% of short car trips, saving nearly 5% of CO<sub>2</sub> equivalent emissions from car travel. This was on top of 5% of ‘avoided’ emissions from cars due to existing active travel. However, the researchers concluded that the evolving high quality active travel infrastructure in the case study area was unlikely to promote a significant reduction in carbon emissions from (displaced) car journeys on its own. In addition, there are discernible trends in travel behaviour which are supporting lower emissions, not least ‘peak car’.

Young adults in Great Britain, men in particular, are driving less now than they did twenty years ago. It is important to understand why younger people born in the 1980s and 2004, often referred to as Millennials, have not taken up car use as much as predecessors. Driving licensing among young

people peaked in 1992/4, with 48% of 17-20 year olds and 75% of 21-29 year olds holding a driving licence. By 2014, driving licence holding had fallen to 29% of 17-20 year olds and 63% of 21-29 year olds. Between 1995-99 and 2010-14 there was a 36% drop in the number of car driver trips per person made by people aged 17-29 with a fall of 44% for men and 26% for women. The difference in the amount of car driving between young women and young men became negligible by 2010-14. Young people generally travel less now, with the total number of trips per person made by young men falling by 28% between 1995-99 and 2010-14, whilst the number of trips made by young women fell by 24%.<sup>vi</sup>

One of the six main conclusions from the above study was that for current generations of young people in terms of transport and mobility was that learning to drive and owning a car have become more difficult and costly. In areas where the availability of alternatives to driving, including reliable public transport and infrastructure for cycling and walking, has improved, cars are now less desirable or necessary for some young people. This begs the question the provision of supportive infrastructure in cities through which to meet their mobility needs without recourse to private transport and demand management, as noted above, that facilitates/supports this lifestyle behaviour. For example, the propensity for people to park bicycles at railway stations suggest that there may be significant demand for similar facilities at key nodes on the bus network, and at park and ride sites, particularly as an alternative to car use in charged zones. Cycle use has increased on certain corridors where infrastructure has been provided e.g. the South West City Way in Glasgow where there has been a 20% in the past year (207,013 to 240,134 in 2018).<sup>vii</sup> However, across the country trip rates have not risen noticeably and the 2020 target noted in the CAFS 2015 report only serves to provide an example of a policy-implementation failure.

Buses as a demand management tool: There will be air quality improvement and concurrent benefits for users and non-users if buses can run quickly and reliably. The case for relatively inexpensive measures, such as bus lanes, signal priority and preferential access to city centre streets, is likely to be strong where there is an air quality problem. Consistent and strong enforcement is essential. Controls on older, more polluting cars should be more acceptable if there is a good bus service. Scotland operated a Bus Route Development Grant scheme over a number of years in the early 2000's, distributing several £Ms. A similar scheme that operated in England increased ridership on marginal bus services by more than 30% over two years, on average. There was a consensus, therefore, that there is not only a need to promote cleaner vehicles, but also to reduce the number of private cars on the roads in general. However, we note that buses need to be cleaner (Euro 6 Diesel), and, as of now, it is more cost effective to provide cleaner buses than the longer term task of changing current private car fleets along many urban transport corridors.

***Recommendation 2: Behaviour change science and a broader transformative transport plan should be based on robust science (peer reviewed).***

The science on air quality is developing. Nano-sized particles are a current and relatively new concern to start to reach out beyond academia. Current work funding by the British Heart Foundation, among others, at the University of Edinburgh, has suggested that the risk exposure to such tiny particles is of serious concern as the particles have been shown to travel through the lungs and into the bloodstream (particle translocation). The ability of diesel particles to generate free radicals, activate inflammatory cells and directly impair vascular function, suggest that such particles would cause disease in atherosclerotic arteries.<sup>viii</sup> This highlights the cross-cutting nature of air pollution as not only an environmental concern, but also as an issue which directly impacts upon public health, and CAFS2 should give consideration and prioritisation to measures which stimulate

public health improvements. In terms of specific research questions we recommend more research on joint exposure of NO<sub>2</sub> and PM<sub>2.5</sub> on health outcomes.<sup>ix</sup>

**[2] Funding and fiscal stimuli: Recommendation 3:** *There should be a permanent ‘bottom line’ for active travel and other sustainable road transport modes in the Scottish Government’s transport budget.*

The current funding level for active travel is insufficient to meet the need for transformative change, especially for infrastructure programmes and the associated behaviour change support work given the paucity of funding over many decades. Doubling the funding level again (since the 2017 doubling announcement) will signal the seriousness of the task and the need to upskill and expand the human resources needed. Short-term, stop-start sustainable transport programme must be replaced with permanent programmes.

**Recommendation 4:** *Additions to the existing Trunk Road and Motorway network should end by 2024 so that there is no further expansion of these networks which, at best do nothing to encourage behaviour change in supporting reduced emissions, and at worst increase emissions through continued infrastructure support for current travel behaviour.<sup>x</sup>*

There are perverse incentives in funding, and an overall funding regime which remains geared towards the maintenance of car use of the dominant mode. This includes the Scottish Roads programme of increasing trunk and motorway road network capacity. While T15 of the Progress Note on the existing targets/objectives within the current CAFS<sup>xi</sup> notes that Trunk road impacts of AQMA will be reviewed and implement mitigation where trunk roads are the primary contributors to air pollutants’ this fails to acknowledge that adding to the trunk road and Motorway network encourages more use. The Standing Advisory Committee on Trunk Road Assessment (SACTRA) noted that induced traffic, where new roads induce extra traffic, locks in motorised traffic growth. SACTRA reported that additional private motorised traffic growth creates a vicious spiral of increasing private motorised travel. Their logic was that more road space equals more car use equals less public transport use, and so fares go up and frequency goes down, with the result that more people transfer to cars and the new equilibrium point is a lower level of service in both cars and public transport.<sup>xii</sup> As Goodwin has noted, “further studies have found that the evidence has been consistent, recurrent, unchallenged by serious countervailing evidence, but repeatedly forgotten”.<sup>xiii</sup> There is majority support on the Working Group for ending adding to the Scottish trunk and motorway network.

At the national level there is also the economic valuation of motor vehicle occupants travel time more highly than other mode users. This is prejudicial and provides a perverse incentive for private motorised travel modes. Other perverse incentives include that local authorities can lose sorely needed funding revenues such as when removing car parking spaces to encourage modal shift. More generally there is concern about reducing incomes from car parking spaces and other sources with a move away from carbon intensive economy. Government support is needed to get out of this ‘catch-22 situation. Funds reallocated from road build and widening schemes would provide much greater Benefit to Cost Ratios, reflecting the improved health outcomes.

**Recommendation 5:** *Encourage the introduction of a workplace parking levy in LEZ areas. The evidence of benefit from the Nottingham is positive and can help to improve air quality. Authorities could use the funds generated, alongside sums from Scottish Government funding, for improvements to be ploughed back into sustainable transport provision.*

Workplace Parking Levies are being considered at Stage 2 of the Transport (Scotland) Bill. In its first three years of operation Nottingham's Workplace Parking Levy has raised £25.3m which is being invested back into transport improvements in the city – namely the expansion of Nottingham's tram network, the redevelopment of Nottingham Station and funding the city's Link Bus Network which serves key employment site, hospitals, and Park and Ride services. Following the successful approach applied in Nottingham results indicate that the introduction of the WPL as measured by the number of levies on WPP has a statistically significant impact on traffic congestion in Nottingham<sup>xiv</sup> and thus likely lowering air pollution levels.

**Recommendation 6:** *Transformation that brings about significant modal shift to walking and cycling will cost far more than the existing active travel budget. Reallocation of some trunk roads building/widening programme could provide substantive health benefits including to air quality. Studies of cost benefit analysis repeatedly show very high value to walking and cycling and bus use.*<sup>xv xvi</sup>

There are a number of areas which are highlighted where funding shortfall or risk of loss of funding means that local authorities currently do not pursue interventions which could contribute to improving local air quality and broader health co-benefits (e.g. loss of car parking funds). The promotion and modal shift towards active travel provides wider economic benefits too. In Denmark, for example, for every km travelled by bicycle instead of by car society gains approx. 1€ in terms of health benefits, with 1.1 million fewer sick days. As an example of health savings, the Odense National Cycling City project resulted in 248 million € in saved health cost.<sup>xvii</sup>

More broadly in terms of promoting every day cycling, there needs to be a hierarchy in providing funding for promoting modal shift through development of appropriate infrastructure. An example is Council's applying for Scottish Government funding to build long-distance segregated cycle paths. These long distance paths don't increase modal shifts in the daily commute, they are more fixed to leisure rides. The latter are not unimportant but we must first encourage routine active travel.

**Recommendation 7:** *Economic stimulus for scrappage of the most polluting vehicles with behaviour change focus including options for e-bikes, public transport season ticket contributions and other incentives which reduce car ownership.*

Scrappage of older and more polluting vehicles does not have to mean replacement with new motor vehicles. The Working Group noted the particular important role that e-bikes could have in attracting people to active travel and international evidence for the increasing take-up of e-bikes.<sup>xviii</sup> Behaviour change programmes would be helped by significant scrappage incentives including season commuter season tickets and funding for other aspects of sustainable travel.

[2] **Planning system:** **Recommendation 8:** *Spatial planning needs to be effective in ensuring local decision-making does not undermine national objectives for air quality.*

By way of background, the CAFS Strategy introduced the National Modelling Framework (NMF). The NMF provides the basis for a national approach to both local and regional modelling. The Local NMF model, implemented and delivered by SEPA has proven to be beneficial in developing the evidence for the four cities (Aberdeen, Dundee, Edinburgh and Glasgow) looking to implement Low Emission Zones (LEZs). This level of support has had a positive impact on the development of LEZs and on the delivery of Glasgow's LEZ. This approach should be expanded to include the Regional NMF – based on the Dutch Air Quality Cooperation Programme (Nationall Samenwerkingsprogramma Luchtkwaliteit, or NSL).<sup>xix</sup>

There needs to be a spatial and general landuse planning framework which is robust, clear and which ensures that, among other things, that “local actions” would not be allowed where they go against nationally sought after outcomes such as improve local air quality and decarbonisation.

Densification: Higher densities are generally associated with reduced travel distances, less driving and more travel by other modes. Compact urban places can reduce private motor vehicle miles travelled by around 30% for compact walkable settlements in comparison to lower density developments.<sup>xx</sup> Compact settlements on their own are likely to be insufficient without additional measures to promote sustainable transport, such as:

- complementary incentives to reduce trip length
- provision and encouragement of use of public and non-motorised transport
- and/or increase the adoption of lower emitting vehicle technologies<sup>xxi</sup>

As there is a major programme of housing development there should be a major focus on ensuring that new developments are designed to reduce emissions through good design which includes sustainable travel as the first option for local travel, as a *de minimus*. Plan by design” is critical from the start in terms of delivering a new development. Car use must be made less attractive (including through social marketing). This will include filtered permeability to ensure the most direct and pleasant routes are afforded to those travelling actively or walking to public transport stops.

**[2] Enforcement/Accountability: Recommendation 9: Make Supplementary Guidance on Air Quality mandatory.**

Supplementary Guidance on air quality is currently simply guidance. In view of the need to improve air quality it was the view of the Working Group that it should be made mandatory. This can help the Scottish Government to impose changes where local authorities lack ambition in relation to air pollution mitigation.

The Scottish Environmental Protection Agency (SEPA) has reserve powers under Section 85 of the Act (with the approval of Scottish ministers), to direct LAs to fulfil their duties under Section IV (e.g. review and assessment, declaration/revocation of AQMAs, action planning). Currently, SEPA must approach the Scottish Ministers on a case-by-case basis to seek approval for use of these powers and to date these have not been exercised, in part because of the collaborative approach taken and also as there are no legal penalties available for not complying with a SEPA Direction.

SEPA has an enforcement procedure in relation to using its reserve powers. This is a staged process of warnings, requests to Scottish ministers for use of reserve powers and issue of a Direction for the specific parts of the Act the local authority is not fulfilling. To date SEPA has only been required to issue warning letters to local authorities and these have mainly been for late submission of annual air quality progress reports rather than for any of their contents. This process has encouraged increased performance by local authorities in fulfilling their duties under the Act.<sup>xxii</sup> The Working Group wants stronger action from the national government – both funding and actions – in supporting all local authorities to take stronger actions to improve air quality – not least as a ‘hook’ by which to tackle climate change.

**[3] Public engagement and support for reduced car use: Recommendation 10: There is a need for long term social marketing to the general public, particularly around car use. Large scale marketing work on transport and air quality has been largely absent in intervention programmes which consequently risks adverse reactions as a result of mistrust, misinterpretation, and loss aversion.**

With heightened attention during the first half of 2019 at least to climate change and Low Emission Zones there is an opportunity to engage with the public on issues that have direct impacts at the household and community level. For example, the issue of in-vehicle air quality where under some urban driving conditions the vehicle cabin is the most polluted space needs to be explained as part of a sustained engagement over years with the public to discuss the reasons for the urgency of the need for changes in travel behaviour. A hard-hitting TV/internet video campaign highlighting the impact of vehicle emissions on children could be impactful in encouraging behaviour change. Economic and other pro-environmental choice stimuli could go alongside improved travel (e.g. lower bus fares, employer benefits for non-car users within defined areas where there is travel choices) which are economically advantageous and socially normative, as well as visible positive changes such as priority bus routes, and segregated cycle routes on roads with speed limits above 20mph.

**Recommendation 11:** *The revised CAFS should have the commitment to a nationally funded and coordinated programme of citizen science and community engagement developed to improve the understanding of air pollution and how citizens can make informed decisions to reduce their impacts on the environment and improve their health.*

Visualisation is critical in distilling messages and getting them ‘across’. We noted that the visuals effects combined with messages from Sir David Attenborough used in recent documentaries on plastics had a powerful effect on the public consciousness with surveys indicating concern for the effects of plastics and to need to reduce their usage is now a major public environmental concern. Citizen science could become an element of CAFS 2. Citizen science and public engagement campaigns are crucial to allow citizens to make informed choices and change behaviours in relation to transport and improving air quality and health. Many campaigns are currently underway which seek to achieve behaviour change at a variety of levels and also achieve multiple benefits across different policy areas. Organisations such as local authorities, SEPA, Living Streets and Cycling Scotland are involved in education and awareness-raising campaigns around improving air quality, carbon emissions, active travel and health, travel choices and planning, anti-idling, and pedestrianisation outside schools which seek to educate pupils and their families on the wider environmental and societal benefits of making better transport-use decisions. These campaigns should be continued and broadened to ensure the maximum coverage of Scotland’s population can be achieved and also extended into new policy areas where additional benefits can be gained.

There is a need for Scottish Government funding to assist local authorities with city/town centre street closures to raise awareness of the benefits for air quality, pedestrian space and business. Edinburgh’s ‘Open Streets’ initiative, which began on May 5 should provide a template for this kind of activity. However, many smaller local authorities do not have the funding available to establish regular Sunday street closures. Overall, there is a need to directly engage with the public on car ownership but leadership from national government is needed (see below).

[3] **Beyond party politics – the need for leadership:** *Recommendation 12: Ministers need to provide clear leadership, not least through association with the climate emergency, and ensure fin de siècle change in funding, both to local authorities seeking to invest in sustainable transport interventions – some of whom feel blocked by perverse incentives and cannot afford to do move forward without Scottish Government support, and in moving away from damaging transport schemes.*

*Recommendation 13:* We recommend a review of progress in 2024/25 prior to a CAFS3 publication in order to keep abreast of changes in both societal attitudes and technology e.g. SMART cities and battery technology.

Overall, managing demand is seen to be politically difficult and it is demand which largely is increasing emissions through both motorised traffic volumes and congestion. It is not however, enough to ask local politicians to be 'brave'. There needs to be national leadership and funding for increased sustained growth in sustainable transport in order to address part of the root cause of road traffic-generated air pollution. The Scottish Government must therefore give clear advantages to the sustainable travel modes and therefore check on its own process of change.

[4] **Data: Recommendation 14:** *There is a need to ensure that Scotland is gathering data which matters so that we have the most appropriate and accurate measurements of pollutants and impacts. Current data capture should be reviewed.*

From the principle of count what you care about, a review of data capture, relevance and gaps is apposite now. It is important that interventions are based on the best possible data on current movement and mode choice. In particular, data derived from phone company records – as used by Google and Apple to give information on road congestion – can be acquired by authorities making plans, if necessary, possibly using money from Transport Scotland's Bus Partnership funding. Bus companies will be able to review this data in partnership and match it with their knowledge of their own networks.

The delivery of the local NMF for the four proposed LEZs were only possible by undertaking detailed traffic data collections. Good quality data is essential for making key decisions. To deliver on *Recommendation 8*, annual traffic data should be collected nationally for use at national, regional and local levels.

Data sharing with the NHS should be improved, including through the nascent Public Health Scotland.

#### [5] **Best practice/world leading examples**

**Car Sharing:** The rise of the concept of Mobility as a Service (MaaS) and the increase in the number of car-sharing, ride-sharing, and bike sharing schemes across major cities, indicates that the attitude towards private car ownership is changing.<sup>xxiii</sup> An analysis of Bremen's car sharing scheme in 2017 suggests that each car-sharing car replaced 16 privately owned cars.<sup>xxiv</sup> Reclaiming and reallocating road space will be essential if other sustainable transport modes, such as public transport, walking and cycling are to be encouraged. The Bremen study concluded that car-sharing has positive effects on the use of public transport and bicycles, and that 3 out of 4 trips previously taken with a private vehicle were now taken with more sustainable modes of transport.<sup>xxv</sup> Car-sharing can therefore be an effective tool to encourage behavioural change and can have a positive knock-on effect on air quality by encouraging people to rethink their travel choices and opt for more sustainable modes. For these reasons, car-sharing (including electric car-sharing) should be recognised as a form of sustainable transport and effective tool to improve Scotland's air quality.

#### **Denmark**

Copenhagen is home to the largest car-free area in Europe. The city has reduced carbon emissions by 40% since 1990, despite a population increase of 50%, and aims to be carbon neutral and fossil fuel free by 2050. This progress has been achieved through a combination of car-free policies and investment in active transportation infrastructure. A bike share system, segregated biking lanes, adequate bike parking facilities, and a "Green Wave Route" (cyclists traveling 12.4 mph will hit all green lights) have resulted in 35% of trips taken by bicycle within the city.<sup>xxvi</sup> Almost 50% of all trips

are completed via active transportation and further development of bicycle-exclusive lanes are expected to increase cycling by another 15–20%.

## **Germany**

Berlin and other German cities have used low-emission zones that restrict the use of vehicles which do not attain specific emission standards in certain areas. Some of the LEZs in Germany were studied and found to decrease measured annual mean PM<sub>10</sub> by an additional 2 ug/m<sup>3</sup> compared to the reductions in PM<sub>10</sub> outside the environmental zones. In a study of 25 German cities with LEZs, researchers reported significant decreases in urban PM<sub>10</sub> levels that can be attributed to their introduction.<sup>xxvii</sup>

This study reviewed the impact of LEZs across Germany. They found three types of LEZs:

- Type 1 LEZs only ban very high-emitting vehicles from entering the zone
- Type 2 LEZs ban high-emitting and medium emitting vehicles
- Type 3 LEZs only grant access to low-emitting vehicles

In all three stages of LEZs, certain exceptions apply, e.g. for vehicles on medical emergency calls, the police and fire brigades. The study found that more stringent (Type 2) zones reduced PM<sub>10</sub> concentrations more than three times as much as Type 1 zones. The researchers translated these changes in PM<sub>10</sub> levels into health impacts using a concentration response function, which they applied to the 3.96 million inhabitants of the 25 LEZ-cities of their sample. The mean health benefits amounted to £912 million in the year 2010 if all LEZ-cities are assumed to have implemented Stage 1 zones. The total mean health benefits are £2.8 billion for Stage 2 zones, if assumed to be applied in all 25 cities.

## **Seville, Spain**

Seville built a network of bike lanes which increased cycling and reduced car use in a few years in the first decade of the 21<sup>st</sup> century. The city cut air pollution and the number of days it exceeded EU regulations on air quality from 152 to 40 per year. Now a Bus&Bici scheme allows public bus passengers of the Seville Metropolitan transport consortium to use public bicycles for free. The Bus&Bici initiative started during the 2006 European Mobility week as a pilot project. Today, it is a service linked to the use of the public buses, whereby bus passengers in the Seville metropolitan area can also use a public bicycle for free. The only condition is that they have travelled on a bus on the same day and have a proof of this, e.g. a stamped bus ticket that they present with their ID card.

## **Urban Freight Consolidation: Bristol UK**

*Deliveries to Bristol City Centre from the Bristol Bath Urban Freight Consolidation Centre (BBUFCC) demonstrated a reduction of 74% of delivery trips in the city within the BBUFCC scheme.*

Since 2004 businesses in Bristol and Bath have been using Freight Consolidation to manage their deliveries more effectively through the BBUFCC. This consolidation service is a partnership between the courier service DHL, Bristol City Council and Bath and North East Somerset Council. An evaluation of the deliveries to Bristol City Centre from the BBUFCC between January 2011 and May 2012 showed that:

- for every 100 Heavy Goods Vehicle deliveries to the BBUFCC on 26 consolidated distribution trips were necessary. This equates to 74% of the delivery movements in the scheme being avoided altogether and the others made with a smaller, cleaner vehicle

- deliveries to Bath city centre from the BBUFCC showed a clear economic benefit for the freight operators in the scheme in terms of fuel costs avoided
- there is a health benefit to the wider public in terms of reduced emissions
- however, Urban Freight Consolidation is still a niche market e.g. construction sites, shopping malls, high density high streets.<sup>xxviii</sup>

**[5] Freight: Recommendation 15:** *Recent growth in cycle and electric cargo vehicle deliveries offer the prospect of low and no-carbon deliveries in urban centres. Further incentives are needed to accelerate greater use of these modes and other electric vehicles for last miles deliveries in reducing vehicle emissions. This will include supportive infrastructure.*

The international evidence base suggests a size reduction of the vehicles (and likewise capacity) used for last mile deliveries in urban areas as a more sustainable and efficient alternative for this type of operation.<sup>xxix</sup> However, for the final mile the paramount need is for the right vehicle for the delivery, so this will be best served by the use of smaller vehicles such as light goods vans in urban contexts, but in general if a larger vehicle can be used this should not be prevented in the right setting. Consolidation in this fashion reduces costs, lowers energy use and minimises use of the transport system. Electric vehicles are likely to become the main alternative for lighter commercial vehicles, however the cost of procuring these vehicles is prohibitively more expensive than their diesel counterparts currently (though this should change in time). As well as investment in supportive infrastructure for an electric fleet, the capacity of the grid needs to be assessed in each area and upgraded where required

New housing: There are concerns that new design housing needs to cater for freight deliveries and essential services while not encouraging or even enabling car-centric urban lifestyles. Moves to encourage more individuals to move away from private car ownership and use requires some new ways of designing for freight and other essential deliveries. This is a challenge needing a solution. This is being fuelled by increasing home deliveries, including free deliveries and return offers, and the continued rise of on-line food delivery orders, with estimates of between 13 and 14% of e-commerce deliveries failing first time adding extra costs,<sup>xxx</sup> air pollution and other environmental impacts.

**[6] Equity and social inequalities: Recommendation 16:** *Greatly increase bus-based Park and Ride provision alongside Clean Air Zones with charges for cars.*

This is almost certainly the most cost-effective way to support people who have no viable alternative to car travel for the main part of their journey but cannot afford to upgrade their car in order to drive without charge into a charged zone. Park and Ride provision is more effective if it is complemented by relentless attention to minimising the effect of congestion on the bus routes that serve it. This means making sure that bus lanes and bus stops are not blocked by cars and vans, for example.

More generally, there were concerns among the Working Group to ensure that measures implemented do not have unintended consequences which exacerbates inequalities. Yet it remains that the poorest income groups, often with no or limited access to cars, are over-represented such as through residential location or occupational exposure (e.g. taxi drivers) to air pollution. This may be an issue for scrutiny by the Just Transition Commission.

Professor Adrian Davis May 6<sup>th</sup>, 2019 on behalf of the CAFS2 Transport Working Group.

## Appendix 1

### Attending Members of the CAFS2 Transport Working Group

Graham Applegate, SEPA

John Bynorth, Environmental Protection Scotland

Adrian Davis, Transport Research Institute, Edinburgh Napier University

Chris Day, Transform Scotland

Richard Dixon, Friends of the Earth Scotland

Andy Eastlake, Low Carbon Partnership

Gloria Esposito, Low Carbon Partnership

Tom Flanagan, SCOTS

Colin Gillespie, SEPA

Stuart Hay, Living Streets

Alan Hills, SEPA

Daniel Jones, British Heart Foundation

George Mair, Confederation of Passenger Transport

Vincent McNally, Glasgow City Council

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## References

- <sup>i</sup> Cleaner Air for Scotland. The road to a healthier future. 2015. Edinburgh: Scottish Government.
- <sup>ii</sup> The definition of transformational change is the emergence of an entirely new state prompted by a shift in what is considered possible or necessary which results in a profoundly different structure, culture or level of performance. Source: Kings Fund.
- <sup>iii</sup> Brand, C., Anable, J., Morton, C. 2019. Lifestyle, efficiency and limits: modelling transport energy and emissions using a socio-technical approach, *Energy Efficiency*, 12: 187-207.
- <sup>iv</sup> <http://content.tfl.gov.uk/technical-note-21-what-is-air-quality-on-the-road-network.pdf> accessed 2nd May 2019.
- <sup>v</sup> Neves, A., Brand, C. 2018. Assessing the potential for carbon emissions savings from replacing short car trips with walking and cycling using a mixed GPS-travel diary approach, *Transportation Research Part A*, 123: 130-146.
- <sup>vi</sup> Chatterjee, K., Goodwin, P., Schwanen, T., Clark, B., Jain, J., Melia, S., Middleton, J., Plyushteva, A., Ricci, M., Santos, G. and Stokes, G. (2018). Young People's Travel – What's Changed and Why? Review and Analysis. Report to Department for Transport. UWE Bristol, UK. [www.gov.uk/government/publications/young-peoples-travel-whats-changed-andwhy](http://www.gov.uk/government/publications/young-peoples-travel-whats-changed-andwhy)
- <sup>vii</sup> Data provided by Glasgow City Council
- <sup>viii</sup> Miller, M. et al, 2017. Inhaled nanoparticles accumulate at sites of vascular disease. *ACS Nano*, 11: 4542-4552.
- <sup>ix</sup> Roberts, S. et al, 2019. Exploration of NO<sub>2</sub> and PM<sub>2.5</sub> air pollution and mental health problems using high resolution data in London-based children from a UK longitudinal cohort study, *Psychiatry Research*, 272, 8-17. Open access.
- <sup>x</sup> We highlight that the Freight Transport Association did not support this recommendation.
- <sup>xi</sup> Progress Note on the existing targets/objectives within the current CAFS strategy and an assessment of their status. Internal Paper, Transport Scotland.
- <sup>xii</sup> SACTRA, 1994. Trunk roads and the generation of traffic. Standing Advisory Committee on Trunk Road Assessment. London: HMSO.
- <sup>xiii</sup> Goodwin, P. 2006. Induced traffic again. And again. And again. *Local Transport Today*, 450 (24<sup>th</sup> August) 17.
- <sup>xiv</sup> Dale, S., Frost, M., Ison, S., Quddus, M. Warren, P. 2017. Evaluating the impact of a workplace parking levy on local traffic congestion: The case of Nottingham UK, *Transport Policy*, 59: 153-164.
- <sup>xv</sup> Davis, A. 2014 Claiming the Health Dividend. London: Department for Transport. <https://www.gov.uk/government/publications/economic-case-for-active-travel-the-health-benefits> accessed 2nd May 2019.
- <sup>xvi</sup> ITS, Leeds, 2014. KonsULT. Decision maker's guidebook and knowledgebase. Leeds: ITS.
- <sup>xvii</sup> <http://www.cycling-embassy.dk/facts-about-cycling-in-denmark/statistics/>
- <sup>xviii</sup> Fishman, E., Cherry, C. 2016. E-bikes in the Mainstream: Reviewing a decade of research, *Transport Reviews*, 36(1): 72-91.
- <sup>xix</sup> The NSL is a statutory programme that coordinates the governments work on air quality. It requires all levels of Dutch government (national, provinces, municipal) to work together to carry out air quality improvement duties. The objective of the NSL is to deliver compliance with air quality standards and to ensure that development does not adversely affect current and future compliance. The NSL has created a national model of air quality, similar to the planned regional NMF set out in CAFS, however the NSL approach also coordinates the collation of traffic data, which is the big limitation to the development of the regional NMF. In addition the NSL identifies early in the planning process any spatial developments that could potential make a significant contribution to air pollution through scale and increased traffic-related effects. This results in direct requirement of the plan to include mitigation measures to maintain or improve air quality before approval can be granted. The model used within the NSL is developed and maintained centrally, built using robust traffic data, emission and air quality monitoring data. The model is updated annually to take account of new monitoring (air and traffic) data and developments/mitigation measures.
- <sup>xx</sup> Ewing, R. et al (eds) 2007. Growing cooler: The evidence on urban development and climate change. Washington: Urban Land Institute.
- <sup>xxi</sup> Mansfield, T. et al 2015. The effects of urban form on ambient air pollution and public health risks: A case study in Raleigh, North Carolina, *Risk Analysis*, 35(5); 901-917.
- <sup>xxii</sup> Graham Applegate email to Professor Adrian Davis, 18<sup>th</sup> April 2019. Clarification of SEPA powers.

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<sup>xxiii</sup> Wixey, S. 'Why mobility as a service holds the key to better air quality in cities' (*airqualitynews.com*, 2 April 2019) available at: <https://airqualitynews.com/2019/04/02/why-mobility-as-a-service-holds-the-key-to-better-air-quality-in-cities/>

<sup>xxiv</sup> Schreier, H. et al., 2017. 'Analysis of the Impacts of Car-Sharing in Bremen, Germany' available at: [https://northsearegion.eu/media/5724/analysis-of-the-impact-of-car-sharing-in-bremen-2018\\_team-red\\_final-report\\_english\\_compressed.pdf](https://northsearegion.eu/media/5724/analysis-of-the-impact-of-car-sharing-in-bremen-2018_team-red_final-report_english_compressed.pdf)

<sup>xxv</sup> Schreier H. et al., 'Analysis of the Impacts of Car-Sharing in Bremen, Germany' (Team-red, 2017) available at: [https://northsearegion.eu/media/5724/analysis-of-the-impact-of-car-sharing-in-bremen-2018\\_team-red\\_final-report\\_english\\_compressed.pdf](https://northsearegion.eu/media/5724/analysis-of-the-impact-of-car-sharing-in-bremen-2018_team-red_final-report_english_compressed.pdf)

<sup>xxvi</sup> <http://www.cycling-embassy.dk/facts-about-cycling-in-denmark/statistics/> accessed 9<sup>th</sup> May 2019.

<sup>xxvii</sup> Malina, C., Scheffler, F. 2015 The impact of Low Emission Zones on particulate matter concentration and public health, *Transportation Research Part A*, 77: 372-385.

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[https://www.polisnetwork.eu/uploads/Modules/PublicDocuments/22\\_bristol\\_method\\_how\\_to\\_reduce\\_traffic\\_and\\_its\\_impacts.pdf](https://www.polisnetwork.eu/uploads/Modules/PublicDocuments/22_bristol_method_how_to_reduce_traffic_and_its_impacts.pdf) accessed 9th May 2019.

<sup>xxix</sup> De Oliveira, C. et al, 2017. Sustainable Vehicles-Based Alternatives in Last Mile Distribution of Urban Freight Transport: A Systematic Literature Review, *Sustainability*, 9, 1324; doi:10.3390/su9081324

<sup>xxx</sup> Commission on Demand Management, 2018. All change? The future of travel demand and the implications for policy and planning. ISBN: 978-1-899650-83-5.