

Hot Topic: "Sustainable transport planning's role in rebuilding the UK economy"

Do buses have a role in Britain's future low carbon economy?

It can be argued that a downturn in the economy signifies a downturn in public and political interest in environmental matters. The environment is said to take a backseat when economic recovery becomes number one priority, and comparing the news headlines of 2007, a year dominated by discussions on climate change, peak oil and 'carbon footprints', with those of 2009 would certainly indicate there is some merit in this sentiment. However, the recent publication of 'Low Carbon Transport: A Greener Future' would indicate the government are still very much committed (at least in principle) to reducing the negative impact of transport on the environment. This Department for Transport (DfT) strategy sets out how to reduce carbon emissions from domestic transport in the period to 2022, and looking forward in the longer term to 2050. It will be instrumental in meeting the carbon reduction targets set out under the Governments Climate Change Act (2008).

However, since publication in July 2009 the strategy has come under heavy criticism¹ from proponents of sustainable transport for its failure to maximise the role of initiatives such as the Smarter Choices programme and behavioural change in reducing the carbon output of Britain's transport system. By taking this as a starting point this paper shall demonstrate that buses, which are central to the Smarter Choices agenda, are being overlooked in the government's low carbon vision, and by drawing on various evidence, including the recent bus industry-led 'Greener Journeys' initiative, will seek to outline why they should be playing a larger part. Related to this, the paper will then consider buses within the context of the most pressing issue in the UK at present; that of the economy. Through focussing on the various 'merits' or benefits which buses can bring the second half of this paper will ascertain what contribution this form of public transport can make as our country moves to a low carbon economy over the coming decades.

A 'low carbon economy' is essentially an economy which has minimal output of greenhouse gas emissions, chiefly carbon dioxide, into the atmosphere. It's one of many phrases that encapsulate the urgent need to address and manage the global challenges of climate change, diminishing fossil fuel reserves, and finite natural resources whilst simultaneously considering the needs of an expanding global population and its increasing demand for resources². Importantly, the inclusion of the word '*economy*' reminds us that the above needs to be achieved whilst enabling 'less developed' countries to reach the levels of prosperity achieved by the 'developed' world, and allowing the countries of the 'developed' world to maintain healthy rates of economic growth³. Transport must be central to any discourse surrounding 'low carbon economies' both in the UK and overseas, with transport accounting for around a quarter of UK domestic emissions of carbon dioxide⁴. Furthermore emissions from UK transport are on the rise and have increased by 12% since 1990⁵

¹ Local Transport Today (31st July 2009) Letters to the Editor

² The Green Party, <http://www.greenparty.org.uk/policies/environment.html>, viewed 18/07/2009

³ This notion is subject to much debate and contention in itself

⁴ Committee on Climate Change, <http://www.theccc.org.uk/sectors/transport/>, viewed 20/07/2009

⁵ DfT (2009) Low Carbon Transport: A Greener Future, p22

indicating that urgent action is needed if we are to reverse the transport sector's damaging impact on the environment.

The Lower Carbon Transport strategy is one of three industry specific documents published in July 2009. The strategy, along with The Renewable Energy Strategy and The Low Carbon Industrial Strategy, complement the UK Low Carbon Transition Plan with the aim of reducing UK carbon emissions by 80% by the year 2050, and more specifically outlines how the government intends to act to achieve the much needed 'low carbon transport system of the future'. The actions outlined within can be broadly grouped into one of two categories: those which involve implementing low carbon fuels and technologies in order to reduce the greenhouse gas output of vehicles in our transport systems, and those which involve supporting a change in behaviour to reduce the number of vehicle and journey miles undertaken. Also outlined are the intentions to use market mechanisms to encourage a shift to lower carbon transport.

The strategy explores the role of buses in reducing carbon emissions in terms of both employing low carbon technology and promoting the mode as a 'public transport alternative'. Only two paragraphs (4.17 and 4.18) are dedicated to the role of bus provision as a lower carbon option and these fail to highlight the potential of buses to achieve modal shift and change travel behaviour. The focus is more on concessionary travel and ensuring bus travel 'remains within the means of those on limited incomes and those who have mobility difficulties'⁶.

The strategy goes into greater detail on the vehicle design and fuel consumption of buses, stating the short term goal as 'improving the overall environmental performance of the national bus... fleets'⁷. The £30 million Green Bus Fund (explored below) is proposed as a way of incentivising uptake of low carbon buses, with this expected to lead to the delivery of several hundred new vehicles over the next two years which will further strengthen the UK bus operating and manufacturing industry.

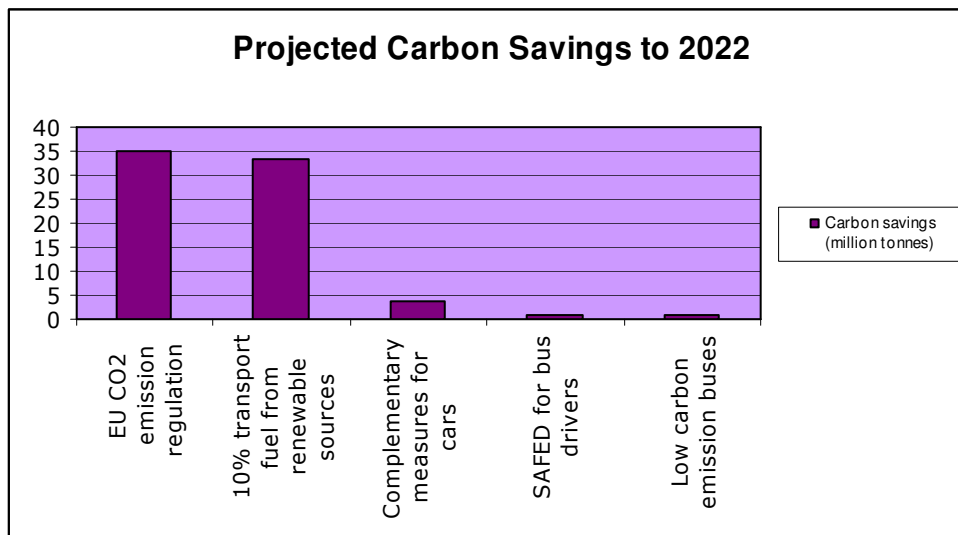
The strategy does not set any specific carbon reduction targets for the longer term to 2050. It does however project that the measures which are set out will save 85 million tones of CO₂ over the third carbon budget period from 2018 to 2022⁸, and domestic transport emissions are forecast to be around 14% lower by 2020 compared to 2008⁹. The following graph shows the carbon savings which are projected to be generated from the various measures, as outlined in the Cost Benefit Analysis in the Impact Assessment which accompanies the strategy:

⁶ DfT (2009) Low Carbon Transport: A Greener Future, p67

⁷ *ibid*, p47

⁸ *ibid*, p94

⁹ *ibid*, p99



As the above illustrates, the vast majority of savings are expected to come from changes to car vehicle technology, namely the EU-wide regulation to reduce CO₂ emissions from passenger cars, and the government's target set under the European Renewable Energy and Fuel Quality Directives that 10% of transport fuel is to come from renewable resources by 2020. Bus-related measures, namely driver education programmes and the introduction of low carbon buses, are projected to result in carbon savings of 1.0 and 0.9 million tonnes of CO₂ respectively.

There are no new commitments on travel behaviour change and the accompanying Impact Assessment report explicitly rules out the Committee on Climate Change's suggestion of a large-scale roll out of the Smarter Choices programme. The Assessment is critical of DfT's 2005 report 'Smarter Choices – Changing the Way We Travel', stating that the programme will only have an impact on trips within urban areas "because of fewer alternatives to the car in rural areas"¹⁰. There continues to be, asserts the DfT, "a lack of robust data on the effectiveness of smarter choices measures" (ibid), and the methodology used by the Committee on Climate Change to quantify the carbon savings of Smarter Choices measures is disputed. The Impact Assessment shows extension of the Smarter Choices programme to result in carbon savings of only 0.9 million tonnes to 2020, compared to the 2.9 million tonnes projected by the Committee on Climate Change. The contribution of Smarter Choices to achieving emissions targets are peripheral at best, and the measures appear to have been relegated to the broad raft of policy initiatives best implemented at local level.

Despite insistence by the transport minister Sadiq Khan that the government is serious about changing travel behaviour¹¹, the Low Carbon Transport strategy, along with other recent initiatives such as the used-car scrappage scheme, appears to be sending out a message that the government is seeking to 'green what is already there' rather than implement any bold new policies to get people out of their cars and onto sustainable transport modes. Given that unemployment is at its highest level in fourteen years¹² and all efforts are being focused on getting the country out of recession, it is perhaps understandable that the government is seeking not to push the issue of the environment in any way that might prove unpopular with the general public.

¹⁰ DfT (2009) Low Carbon Transport: A Greener Future, p25

¹¹ Local Transport Today, http://www.transportxtra.com/magazines/local_transport_today/news/?id=17061&StartRow=1, viewed 01/11/2009

¹² BBC News, <http://news.bbc.co.uk/1/hi/business/8258405.stm>, viewed 20/09/2009

However there is doubt as to whether the carbon savings projected to arise from technological measures are enough to meet our climate change targets. A report by the UK Energy Research Centre which says the government has to tackle driver behaviour in response to climate change. Simply switching wholesale to electric cars will not be enough for the transport sector to cut its carbon emissions¹³, and as advocates of travel behaviour change acknowledge^{14,15}, if these measures are to be successful then a concerted effort to change the way people travel is required. The technological measures outlined in the strategy will involve considerable cost outlay if they are to be successful on even a local scale; a network of electric cars and plug-in hybrid models for example will require a network of charging points. It must be acknowledged that, given the critical need to reduce carbon emissions from private transport (and ensure that our economy remains competitive well into 2050), such large scale investment in technology and development of a greener vehicles sector is vital. However, the scale of the transition required is enormous and we are still very much in the early stages (e.g. electric cars and charging points are to be trialed in North East England) with no clear strategy for the future of the automobile industry in the UK.

Furthermore the strategy contradicts recent research commissioned by the Scottish Government into mitigating transport's climate change impact. This work posits Car Demand Management as the primary mechanism for tackling climate change in Scotland, and finds that in particular the potential for travel planning to reduce CO₂ emissions considerably exceeds that for all other policy options¹⁶. This research explores the carbon abatement potential of a broad range of policy options, and provides a useful comparator against the DfT research; the report forecasts that the widespread implementation of travel plans in Scotland would result in 0.66 million tonnes of carbon reduction to 2022, which is the largest saving generated of all the individual policy options. It seems therefore that Smarter Choices measures have an important role to play in reducing the carbon output of our transport system, and should be afforded greater priority within transport policy if we are to meet our the targets in the medium and long term.

The term 'Smarter Choices' encompasses a wide range of sustainable transport measures such as those to encourage walking and cycling as well as use of the public transport network. In recent years Smarter Choices has been used as the primary mechanism for encouraging modal shift from cars to buses, so it thus follows that deprioritising Smarter Choices will suppress potential growth in bus patronage and limit the development of bus networks which are attractive and well utilised. Despite Lord Adonis's assertion that a 'hair shirt approach to climate change will not work'¹⁷, and that it is unfair to expect people to travel less in order to help the environment, some kind of change in travel behaviour is necessary if we are serious about mitigating the carbon output of our transport system in the short to medium term and increasing the potential of Smarter Choices measures to reduce carbon dioxide emissions from transport.

Britain's biggest bus and coach operators certainly feel that greater consideration needs to be given to the role of the bus as an alternative to the private car, and have warned the government that it

¹³ Guardian, <http://www.guardian.co.uk/environment/2009/apr/21/electric-cars-carbon-emissions>, viewed 20/09/2009

¹⁴ Friends of the Earth, http://www.foe.co.uk/resource/press_releases/low-carbon_transport-strategy_15072009.html, viewed 04/11/2009

¹⁵ Monbiot, G (2009) The Flaws in the Electric Car Scheme, <http://www.guardian.co.uk/commentisfree/cif-green/2009/apr/16/electric-car-government-subsidy>, viewed 16/04/2009

¹⁶ Transport Scotland (2009) Mitigating Transport's Climate Change Impact in Scotland: Assessment of Policy Options

¹⁷ Telegraph, <http://www.telegraph.co.uk/earth/environment/6062131/Lord-Adonis-We-can-cut-greenhouse-gas-emissions-without--travelling-less.html>, viewed 22/08/2009

risks missing carbon reduction targets by failing to maximise the potential of buses and coaches to help tackle climate change¹⁸. Through the Greener Journeys campaign the UK's five biggest public transport groups have joined forces to launch a manifesto recommending a range of policy initiatives aimed at encouraging modal shift. These policies, it is claimed would deliver 50% more savings in transport CO₂ emissions than currently planned under existing Government policies and would take 1 billion car journeys off British roads over the next three years¹⁹.

The following table, taken from the Greener Journeys website, indicates how these savings are to be achieved:

Journey purpose	No. car journeys pa (million)	% shift from car to bus	Car trips saved 2011 - 14 (million)	Car drivers changing their behaviour
Commuting/ Business	7,083	6	425	Just one extra commute by bus or coach a month
Education	1,320	3	40	Just three out of every hundred parents letting their children travel to school by bus
Shopping	4,671	4	187	Every couple of months taking the bus to town centre instead of the car
Other personal business	5,750	4	173	Every so often instead of driving to the bank or doctors for example, take the bus instead
Leisure	5,037	4	201	Once a month doing one leisure trip by bus or coach
TOTAL	23,861	4	1026	All we are asking is for car drivers to make just one in 25 of the journeys they previously made by car by bus instead

Source: Greener Journeys, <http://www.greener-journeys.com/>

These may seem like ambitious targets, but the Greener Journeys initiative is important as it highlights the potential of bus and coach travel to achieve a reduction in carbon emissions, and presents a vision of the environmental benefits which could be achieved if the policy were put in place. Policy is the key word here because, as Greener Journeys acknowledges, the implementation of measures such as bus and coach priority to improve journey times, travel plans, Park & Ride to increase accessibility to the bus network and integration with land use planning to ensure buses can serve the places people need to go is vital. As Davison and Knowles (2006)²⁰ assert, the potential of buses to play their part in modal shift and meeting carbon reduction targets is very reliant on having supporting infrastructure investment in place; without this it is highly unlikely that buses will be a viable or attractive alternative for most people.

As the above demonstrates, buses have considerable potential to reduce the carbon output of Britain's transport system. However the key question for the purposes of this paper is how this shift to a bus and coach-friendly society relates to the most pressing issue in the UK at present, that of the economy. This paper shall now consider the various 'merits' or benefits of buses as a form of

¹⁸ CPT, http://www.cpt-uk.org/index.php?PHPSESSID=9o8naurult8eqdq8n1e1trp8j3&fuseaction=newsevents.details_news&news_id=313, viewed 05/08/2009

¹⁹ Greener Journeys, <http://www.greener-journeys.com/>, viewed 04/08/2009

²⁰ Davison LJ and Knowles RD (2006) Bus quality partnerships, modal shift and traffic decongestion, *Journal of Transport Geography*, Volume 14 Issue 3, 177 - 194

sustainable transport, and how these can contribute to Britain's low carbon economy over the coming decades.

Firstly the subject of vehicle design will be explored, more specifically the notion that the introduction of low emission buses has the potential to benefit the UK vehicle manufacturing industry in the same way as the introduction of low emission cars does. As highlighted above, the Lower Carbon Transport strategy explores a number of technological solutions designed to reduce emissions from transport. In section 3, 'Supporting a shift to new technologies and cleaner fuels', the focus is not only on cars and vans but also the potential to 'de-carbonise' the bus industry through encouraging fuel efficient operation and incentivising adoption of low carbon buses. The Green Bus Fund is a £30 million fund introduced by DfT in August 2009 from which bus companies and local authorities in England can compete for funds to help them buy new low carbon buses. Its main purpose is "to support and hasten the introduction of hundreds of low carbon buses across England"²¹. The need to apply green technologies to buses is as great as the need to apply it to cars, but to date the high up-front costs of low carbon buses (e.g. hybrid buses) in comparison with a conventional bus has hindered uptake²².

However this isn't to say bus operators are not taking innovative steps to reduce the environmental impact of the bus; pilot initiatives such as the 'Kilmarnock Biobus' (Stagecoach vehicles run on 100% biodiesel manufactured from used cooking oil), 'Premier Route 17' (a fleet of double-deck buses run on bio-ethanol by Reading Buses) and the 56 hybrid powered buses in operation by TfL all go to illustrate the steps being made by the bus industry to introduce new technologies and reduce their carbon output. Introduction of new vehicles will also help to make bus travel a more attractive and desirable alternative for people who would not normally use buses, and may have been put off by the image of 'environmentally unfriendly' diesel buses in the past.

Furthermore Stagecoach have pledged to invest £70 million in 434 new 'ecobuses' designed to meet the European emissions standards which came into force in September²³. Just under 350 of these buses are to be built by the Falkirk-based manufacturer Dennis, showing that both the environment and the UK economy look set to benefit from this large scale investment.

The introduction by the government of the car scrappage scheme in April 2009 was intended primarily to boost the flagging UK car manufacturing industry and safeguard jobs in the face of the recession²⁴. As the above shows large scale investment in buses can also help to boost the vehicle manufacturing sector, although the monetary benefit is bound to be far less than that generated by the manufacture of cars. It is estimated that around 212,000 people are directly employed in the bus industry²⁵ (not including vehicle manufacturing) showing the importance of this sector as an employer, but although the industry is an important source of jobs in the UK figures for the automotive industry are considerably higher with 552,000 people employed in around 67,000 businesses in the retail and service/maintenance sector; last year this sector generated some £24 billion value added to the UK economy²⁶. Add to this the revenue generated from other sources

²¹ DfT, <http://www.dft.gov.uk/pgr/regional/buses/greenbusfund/>, viewed 05/08/2009

²² DfT (2009) Low Carbon Transport: A Greener Future, p49

²³ The Scotsman, <http://thescotsman.scotsman.com/stagecoach/Dennis-lands-major-part-of.5506822.jp>, viewed 05/09/2009

²⁴ Department for Business, Innovation & Skills, <http://www.berr.gov.uk/whatwedo/sectors/automotive/scrappage/page51068.html>, viewed 05/08/2009

²⁵ Go Skills, www.goskills.org/download.php?fileid=2850, viewed 04/08/2009

²⁶ Department for Business, Innovation & Skills, <http://www.berr.gov.uk/whatwedo/sectors/automotive/index.html>, viewed 05/08/2009

related to automobiles (e.g. from vehicle sales and export, UK car taxation) and it becomes apparent that the UK car industry is of significant importance to the UK economy. Given the nature of bus travel as a shared public mode of transport, its economic importance can never be as high as that of the automobile, but as demonstrated technological innovation is as important for the bus industry as for the car industry.

This paper will now consider congestion, an issue which although very important to the UK economy is largely overlooked in the Low Carbon Transport strategy. It is estimated that congestion costs the UK economy billions of pounds a year. Though there is no clear agreement on what the actual cost is (estimates range from a rather conservative £2 billion a year to the often quoted CBI estimate of £20 billion a year²⁷) delays and unreliability on the road network have direct costs to people and businesses, increasing business costs and affecting productivity and innovation²⁸. Buses have the potential to be instrumental in easing this congestion as illustrated by the following picture indicating the amount of roadspace required to transport the same number of people by car, bus or bicycle:



Source: John Whitelegg Inaugural Lecture 18th May 2009, Stockholm Environment Institute, University of York

And the following table which shows the amount of roadspace taken up per person per mode:

Transport mode	Amount of roadspace required per person (m ²)
Pedestrian	0.8m ²
Cyclist	3m ²
Fully occupied car (travelling at 40mph)	20m ²
Car with one person (travelling at 40mph)	60m ²
Fully occupied bus (travelling at 30mph)	9.4m ²
Bus 1/3 full (travelling at 30mph)	28.1m ²

Source: ibid

²⁷ Grant-Muller S and Laird J (2007) The Cost of Congestion. Paper presented at the European Transport Conference 2007

²⁸ Eddington Sir Rod (2006) The Eddington Transport Study Summary Report, p5

As the above figures illustrate, the amount of roadspace required for a fully occupied bus is much less than that required for a car. Given that the vast majority of cars in the peak commuting periods are single occupancy, the amount of roadspace which could be freed up were modal shift to be achieved is quite considerable. More roadspace means improved traffic flow, and thus reduced congestion.

Furthermore, the fuel efficiency of buses is strongly influenced by load factors, i.e. the greater the number of people travelling by bus the lower the emissions per passengers²⁹, so achieving the aforementioned modal shift would mean the impact of occupants on the environment would be reduced. Combining an increased loading with low carbon emission vehicles would mean that the carbon savings realised would be even greater. Estimates on the CO₂ emissions from buses vary, ranging from around 60g/km³⁰ to 160g/km³¹. The 2009 Defra publication on Passenger Transport Emission Factors calculates the average CO₂ emissions from UK buses as 103.5g/passenger km assuming that the average passengers per bus are 9.4³². In comparison the CO₂ emissions from the average petrol car are calculated as 205.7g/vehicle km. This relates purely to fuel usage and does not take into account the energy used, for example, in the construction of vehicles and the construction and maintenance of roads. It is estimated that the introduction of low carbon emission buses reduce emissions by 30% in comparison to the average Euro 3 diesel bus of the same total passenger capacity³³ so taking this into account the carbon savings per passenger km are further reduced and the environmental case for buses is strengthened considerably.

A wealth of research exists on congestion analysis, and it is worth noting that the relationship between reduction in car volumes and reduction in congestion is not quite as simplistic as the above suggests. However, the key principle to draw out for the purposes of this paper is that the strategy (and the general discourse which surrounds low carbon vehicles) fails to seriously address the question of congestion and how this would be tackled (or not) by the shift to cars with low emissions. The Low Carbon Transport strategy briefly mentions congestion, citing predictions outlined in the Eddington Report that if left unchecked congestion could cost the economy around an extra £22 billion every year by 2025³⁴. It then goes on to explicitly rule out a national system of road pricing; yet again it seems it is up to the local authorities to address this issue on a local scale. Is it not surely in national interests to address this given the loss of productivity which will ensue if no steps are taken to tackle congestion?

To date the potential of the bus in easing traffic congestion is yet to be fully realised in many urban areas, having been limited by the extent to which bus priority measures have been implemented. In order for bus lanes and other measures to have a substantial impact on urban congestion, adequate levels of priority need to be afforded to enable the bus to compete with the private car. Until this happens bus operators and passengers are likely to continue counting the costs of congestion (in terms of unreliability, delays, bunching and the expense of providing extra buses to cater for congested routes³⁵), and the congestion cycle will not be reversed.

²⁹ DfT (2009) Low Carbon Transport: A Greener Future, p47

³⁰ National Energy Foundation, <http://www.nef.org.uk/greencompany/co2calculator.htm>, viewed 04/11/2009

³¹ Hillman M (2006) Personal carbon allowances, *British Medical Journal*, **332** 1387 – 1388

³² Defra (2009) Guidelines to Defra's GHG Conversion Factors: Methodology Paper for Transport Emission Factors, p34

³³ Low Carbon Vehicle Partnership, <http://www.lowcvp.org.uk/lceb/what.asp>, viewed 04/11/2009

³⁴ DfT (2009) Low Carbon Transport: A Greener Future, p92

³⁵ Trent Buses, <http://www.trentbuses.co.uk/company/congestion.html>, viewed 01/08/2009

Finally this paper will consider buses in relation to a non-economic but equally important consideration, that of accessibility and ensuring that transport is available for all members of society in the coming years. The cost of developing the technology and offering it to the market are obstacles to successful implementation, and is one key reason for the government providing financial incentives (around £400 million) to encourage development and uptake of ultra-low carbon vehicles³⁶. However even with financial incentives there will always be people unable (or unwilling) to own a car, and for whom public transport is an essential part of life. In the interests of social inclusion, and to ensure that every member of society has the opportunity to access opportunities (both employment and socially), it is vital to promote and ensure provision of bus services well into 2050.

There is a wealth of research exploring the relationship between public transport and social exclusion. A study by Carson (2003)³⁷ for example into several deprived areas in England revealed that a significant proportion of the most socially excluded people in society were very reliant on buses and had difficulty getting to job opportunities, healthcare and 'quality of life' destinations. Those people looking for work felt that lack of transport prevented them from accessing work opportunities, and this is further backed up by a number of studies cited in a 2001 DfT report³⁸ into social exclusion and public transport provision which demonstrate a clear link between travel barriers and employment possibilities. There is little consideration of social exclusion and accessibility in the Low Carbon Transport strategy, and whilst the topic may be outwith the remit of the strategy the above research indicates that future transport policy cannot fail to consider the needs of those unable to have access to a car. This is important not only economically, in ensuring that people have the means necessary to access a wide range of employment opportunities, but also socially to provide the links which are vital to enable people to participate fully in society.

Through drawing on recent government strategy this paper has sought to examine the role of buses within the future low carbon economy. Private transport, chiefly in the form of the car, has to play a major role in our transport system of the future. The car is culturally, economically and (thanks to the way in which land use planning has evolved) logistically ingrained in our society to such an extent that the 'greening' of the automobile industry will be a central feature in the low carbon economy of the future. However, as demonstrated in this paper the potential of buses is not being emphasised enough in current governmental policy, particularly their ability to tackle the problem of increasing congestion in urban areas and improve accessibility for those who are seeking to access the jobs market. This can only be achieved with greater government buy-in though, and the implementation in earnest of policy which favours sustainable transport; providing the will is there it appears the bus most definitely has a role to play in our country's future low carbon economy.

³⁶ DfT (2009) Low Carbon Transport: A Greener Future, p41

³⁷ Carson G (2003) Reducing Social Exclusion by Improving Transport – Assessing the Problems and Appraising the Options. Paper presented at the European Transport Conference 2003

³⁸ DfT (2001) Social Exclusion and the Provision of Public Transport