

Low Carbon Vehicle Partnership response to Putting Passengers First

<p>This paper is the final version of the LowCVP submission to the Putting Passengers First consultation – it is provided for information only</p>
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Executive summary

The Department for Transport's (DfT) proposals for modernising the national framework of bus services is set out in "Putting Passengers First". Published in December 2006, the proposals have the objective of halting the decline in bus patronage outside London, in order that buses are able to play a key role in tackling congestion, sustaining future transport growth, and reducing the environmental impact of transport.

The Low Carbon Vehicle Partnership (LowCVP) was invited by DfT to respond to "Putting Passengers First" and in particular was requested to focus on issues in relation to the impact of the proposed regulatory change on the adoption of low carbon bus technology and the potential for reducing carbon emissions with current bus technology.

The LowCVP believes that all buses have the potential to be low carbon, on a passenger-kilometre basis, and that buses have a key role to play in reducing carbon emissions from road transport, by helping to reduce congestion and accommodating demand for transport growth while respecting the environment. However, the existing regulatory framework and the means by which buses are subsidised, with the exception of London, is not encouraging growth in bus patronage and is acting as a barrier to the adoption of low carbon technology.

In order for buses to play a more effective role in reducing carbon emissions from road transport, tackling congestion and accommodating transport growth the following issues must be addressed:

1. Reform of bus subsidy. The LowCVP believes there is a good case for reforming bus subsidy because although it provides an important means of keeping the cost of public transport down, patronage has declined while the total bus subsidy expenditure has been increasing. Further more BSOG provides a disincentive to the adoption of low carbon high fuel efficient buses.
2. Local and regional authorities should be given the resources and powers to influence the bus industry in their area. The LowCVP believes that the experience in London has shown this to be an effective solution.

3. Effective incentives are needed to encourage manufacturers to bring to market the next generation of low carbon vehicles, and stimulate the market for low carbon fuels.

The LowCVP is mindful of the conclusions of the “Putting Passengers First” that given the differing levels of local and regional political leadership, and transport conditions, it is likely that no single solution will be appropriate. With this in mind the LowCVP proposes that:

Bus subsidy is reformed

The LowCVP believes there is scope for reforming BSOG to tie this more directly to bus operators’ performance and/or environmental outcomes. The Partnership considered a number of options in which this could be done which reflect the degree to which BSOG is reformed. The three preferred options in order of preference are:

1. To replace BSOG with a subsidy based upon passenger-km which provides an incentive for increasing patronage.
2. Low carbon buses, as defined by the LowCVP and Powering Future Vehicles strategy, receive a 100% fuel duty rebate under the existing BSOG.
3. Low carbon buses receive a capital grant to supplement BSOG.

Empowering Local and Regional Authorities

Local and regional authorities have a crucial role to play in creating an environment conducive for increasing bus patronage and taking action to promote the uptake of low carbon buses and should be empowered and resourced to influence bus services more effectively. Specifically the LowCVP proposes:

4. Local authorities should be empowered to act on climate change in their transport policy and planning powers.
5. Competition law should not be used as a barrier to the better organisation of bus services in a locality.
6. Quality contracts should be made more effective.
7. Where an area has opted for a quality contract then we agree that it should be possible to devolve an amount equal to the value of the BSOG to the local authority, to be used for contract payments to bus operators against performance criteria.
8. Increased funding should be made available to regional and local authorities for capital projects and to pump prime new services for up to 3 years, for projects aimed at increasing bus patronage.

The LowCVP has concerns over the effectiveness of quality contracts and the extent to which they will play a significant role in shaping the bus industry.

Supporting the introduction of low carbon buses

The LowCVP believes that there are a number of significant barriers to the uptake of low carbon technology in the bus market. For the bus industry to play a full role in tackling the environment these barriers need to be tackled. Specifically the LowCVP believes that:

9. Government should adopt short, medium and long term targets for low carbon bus market uptake.
10. Greater use should be made of the Forward Commitment strategy¹ to stimulate both public and private procurement of low carbon vehicles.
11. A national demonstration of 100 low carbon buses is undertaken to prove the reliability and maintainability of these new technologies for a UK audience.
12. A market is created for low carbon bus technologies either through reform of BSOG, ensuring its social benefit is not eroded, or the provision of capital grant support.
13. The Government should encourage the purchase of low carbon vehicles by public bodies.
14. The framework for transport taxation should be amended to provide meaningful incentives for purchasers of low carbon vehicles and fuels.

Finally, the LowCVP believes there is little scope for reducing CO2 emissions and fuel consumption from the better selection of buses, whether based upon bus size or fuel consumption of existing buses. This is because there is sufficient commercial incentive to do this already and this has been exploited as well as is possible, given fluctuations in passenger volumes and route implications on fuel consumption. However, the LowCVP believes there is considerable carbon reduction potential from increasing patronage, particularly outside of peak demand periods, and the adoption of low carbon buses.

1. Introduction

This submission has been prepared by the LowCVP, at the invitation of the DfT, to provide a response to the Putting Passengers First strategy that will form part of the Bus Review.

The submission builds upon the LowCVP's response to the review of the Powering Future Vehicles (PFV) Strategy² which addressed the main barriers and issues hindering the development and implementation of low carbon vehicle technology in the UK. It includes outputs from a workshop LowCVP held specifically on this issue and specific inputs from the Partnership's Bus Working Group and Steering Group.

1.1 Low Carbon Vehicle Partnership

The LowCVP was established in 2003, as an outcome of the PFV Strategy, to accelerate the shift to low carbon vehicles and fuels in the UK. It aims to help deliver carbon reduction targets and give commercial advantage to UK business. The Partnership is a multi-stakeholder forum with 250 members including many leading car manufacturers and fuel suppliers, major fleet operators, environmental and consumer groups, academics and government departments.

The Partnership undertakes activities to both encourage the supply and raise demand for low carbon vehicles and fuels. This includes providing guidance on the priorities to stimulate market development. Some of our recent key achievements and principal current activities include:

¹ Forward Commitment relates to the procurement of innovation defined by the Environmental Industries Advisory Group, Defra

² Powering Future Vehicles Review BOARD-P-06-34 (www.lowcvp.org.uk)

- Brokering a voluntary agreement with the UK motor industry to introduce colour-coded fuel economy labels in all new car showrooms. On-going studies are evaluating the effectiveness of the label through research into dealer and consumer attitudes and implementation rates.
- Input to the development of the Renewable Transport Fuels Obligation – focussed on the development of sustainability assurance and carbon certification.
- Oversight of the establishment of Cenex, a public-private centre of excellence for low carbon and fuel cell technologies. The LowCVP is represented on the Board of the company.
- The LowCVP Road Transport Challenge, a process initiated by the Partnership to bring forward innovative proposals for delivering carbon reductions from the road transport sector. The best entries were presented at a conference in June '06.

An important role of the LowCVP is to independently and constructively review and advise upon the various programmes and schemes run by Government to support market transformation as well as to highlight policy gaps and help ensure a coherent suite of interventions to accelerate the shift to low carbon vehicles in the UK. This submission has been prepared following extensive discussion throughout the Partnership and reflects the consensus view across the diverse membership.

1.2 Putting Passengers First

The LowCVP agrees with the assessment of the Putting Passengers First strategy that buses are a crucial part of the UK's transport system and a lifeline for many communities.

In developing this submission the LowCVP sought to answer five questions highlighted in "Putting Passengers First" to which the DfT required responses. These covered whether there is a good case for reforming bus subsidy, the role of quality contracts, how BSOG should be reformed to bring it in line with Government's policy and the role of local authorities. In addition, DfT put a number of specific questions regarding fuel efficiency of existing bus technology, the cost and potential of low carbon bus technology and how to encourage the introduction of these technologies into the bus market. The specific questions are set out in full in Annex 1.

2. The role of buses in reducing CO2 from road transport

Buses can have a direct impact on reducing CO2 through improving fuel efficiency, but can have a more significant impact through the replacement of private with public transport, through modal shift.

Public transport offers significant carbon reduction opportunities over private transport in the UK today. Based upon average occupancy rates for cars and buses, the average carbon dioxide emissions per passenger kilometre is 19% lower for a single deck bus than for a car for the UK as a whole, and 41% lower for single deck bus in London. A 20% increase in occupancy rates on buses would deliver a 33% and a 51% reduction in carbon dioxide emissions per passenger kilometre for the UK

and London respectively. The adoption of low carbon bus technologies would have the potential to increase this to 53% and 65% respectively. This compares to a reduction of 23% if the UK achieves the European Commission's target of 130 g/km average CO2 for cars by 2012.

Vehicle / Location	Carbon Emissions Urban (g/km)	Average Occupancy (people)	CO2 per passenger-km (g/km-person)	Percentage Change (%)
Car				
- UK avg 2006 (169 g/km)	225*	1.6	141	0%
- Target 2012 (130 g/km)	173*	1.6	108	23%
Single Decker Bus	1250			
- UK		11	114	19%
- London		15	83	41%
High Occupancy	1250			
- UK		13.2	95	33%
- London		18	69	51%
Low Carbon High Occupancy	875			
- UK		13.2	66	53%
- London		18	49	65%

* Assumes urban cycle is 25% higher than combined cycle CO2

Consequently, the LowCVP believes buses, on a passenger-kilometre basis, are low carbon and as such have a very significant role to play in reducing CO2 emissions from road transport.

However, there are a number of key issues considered in "Putting Passengers First" and barriers which must be overcome to ensure buses play a full role in reducing CO2 emissions from road transport.

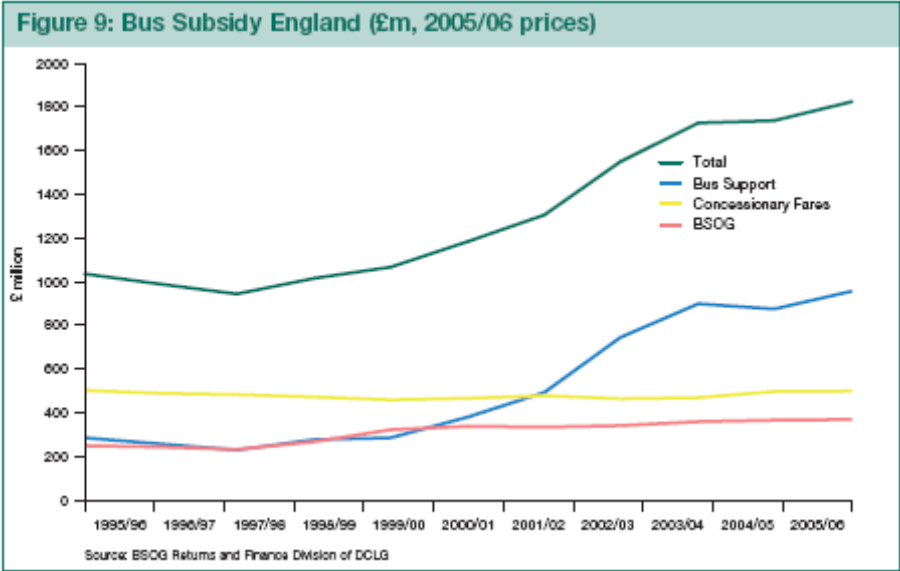
- Effectiveness of bus subsidy
- Potential to replace BSOG
- Reforming BSOG to make more effective
- Role of technology
- Operational issues
- Increasing patronage and encouraging modal shift

2.1 Effectiveness of bus subsidies

Government provides significant funding support for the provision of bus services through a number of schemes, these are:

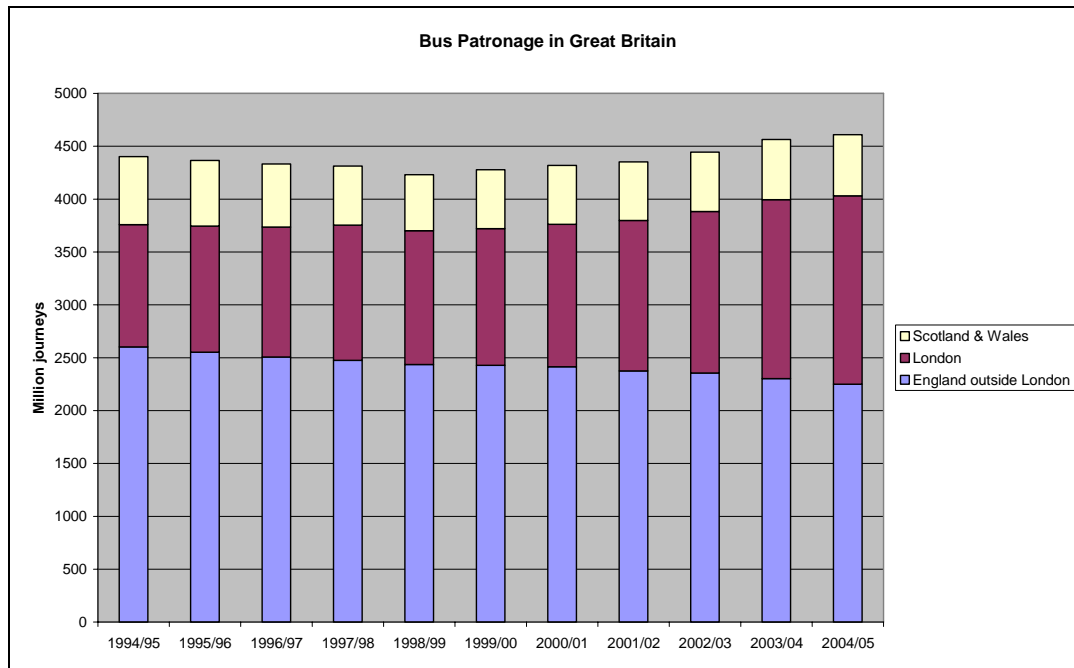
- Bus Service Operators Grant (BSOG) = £0.4 billion
- Local authority subsidy = £0.3 billion
- Re-imbursment of concessionary fares to operators = £1 billion
- Grant to TfL = £0.5 billion

Total support for bus operation in the UK currently runs at £2.2 billion per annum, the majority is channelled through the bus operators while the remainder is channelled through local and regional authorities. The level of funding support to the bus industry is not seen as a barrier but the manner in which the funding is delivered contradicts other Government policies, most notably fuel duty, and does not support Government objectives effectively.



Key objectives for Government in providing a subsidy for buses, highlighted in the Putting Passengers First report, include: supporting a strong economy, delivering better accessibility, protecting the environment and strengthening local leadership.

In supporting a strong economy, an efficient public transport system has a key role to play. To this end the bus subsidy should seek to deliver reduced fares, increased patronage, through encouraging modal shift, and to extend bus services. In the last decade the bus subsidy has nearly doubled in real terms. Although total bus



Source: DfT

patronage is increasing across the UK, this is being driven by the growth in London where, due to significant investment in the bus fleet and the introduction of the Congestion Charge, bus patronage has increased. In addition Scotland and Wales have also improved marginally in recent years, whilst elsewhere in England patronage has been in decline.

At the core of Government policy relating to buses is the need to encourage modal shift from private to public transport. To assist this bus services should be at a minimum cost and to this end the Government supports public service vehicles through the BSOG by rebating fuel duty paid by bus operators for the mileage which the buses are employed on public service routes. Currently the BSOG rebates 80% of fuel duty paid for diesel and this clearly helps reduce the cost of providing public transport.

In addition to environmental benefits through modal shift, emissions can potentially be reduced through operating more fuel efficient, lower carbon buses. Indeed the BSOG explicitly provides incentives for some clean fuelled vehicles. Currently the BSOG rebates 80% of fuel duty paid for diesel (0.392 ppl), while natural gas, LPG or biofuels receive 100% of fuel duty paid (0.108 ppl equivalent for gas). Unfortunately, this has the effect of mitigating the incentives provided through fuel duty by the Government to encourage low carbon fuels and more fuel efficient vehicles. As a result there is no effective incentive to encourage bus operators to purchase clean low carbon vehicles.

The LowCVP believe that the BSOG provides a disincentive to the adoption of low carbon buses due to it subsidising the operating cost of the vehicle through the fuel duty rebate, rather than the whole life cost of the vehicle.

The DfT undertook a review of the operation of BSOG in 2004/05 and concluded that whilst they understood concerns regarding of the conflict in objectives of BSOG and

Fuel Duty policy, it was decided that BSOG should remain in its current state as to change it would place too great a burden on bus operators. Since then, due to stakeholders experience of state aid regulation there is considerable fear of losing the subsidy if it is amended, and there is also concern that a change in the manner of support may render some current bus routes uncommercial, and will therefore be lost unless funding is provided from another source.

Whilst the existing bus subsidy provides an important means of financial support in a market with depressed margins and generally declining patronage, there is little to recommend it when considering the extent to which it delivers key Government objectives. Therefore, the LowCVP believes there is a good case for reforming bus subsidy.

Whilst change may be painful it will need to be undertaken at some point. What is vitally important to bus operators however, who are undertaking to invest in buses which will be in service in excess of 15 years, that change is clearly signalled in advance and change is progressive and predictable.

2.2 Replacement of BSOG

The Putting Passengers First strategy outlines an option for replacing BSOG in a locality where quality contracts are adopted. In this scenario, where regional or local authorities chose to introduce quality contracts and there is scope for greater efficiency and value for money by targeted spending on key outcomes, rather than subsidising fuel use the equivalent amount to BSOG could be channeled through the regional or local authority. This uses the provisions of the Transport Act 2000 whereby the Secretary of State can devolve the funding to local authorities. The regional or local authority would then provide contract payments to operators based upon performance against targets in that area's contract plan.

As far as the LowCVP is aware there is only one quality contract which has successfully been implemented in the UK, and that other local authorities which have considered or are attempting to set up quality contracts are finding the process burdensome and lengthy. The LowCVP has concerns as to whether quality contracts will be a successful delivery mechanism.

The proposal, to devolve an amount equal to the value of the BSOG to the local authority, to be used for contract payments to bus operators against performance criteria has the potential to make this funding more effective and targeted. It has the merit of decoupling a major proportion of the bus subsidy from subsidising fuel consumption, and has the potential to link it to the achievement of more appropriate criteria such as relieving congestion, protecting the environment and other key issues.

However, any changes to the way the bus subsidy is dispersed, whether nationally or locally, may have implications for the viability of routes with low patronage.

2.3 Reform of BSOG

While the Partnership believes there is scope for reforming BSOG it is mindful of the importance of the bus subsidy, and the potential for state aid requirements to undermine and/or threaten this important source of public support for public transport and the ability to deliver lower bus fares.

A key reason the Partnership believes there is scope for reforming BSOG is because in its current form it provides a disincentive for operators of diesel buses to switch to low carbon buses due to the reduced level of subsidy offered to low carbon buses.

Clearly a low carbon bus, offering fuel consumption savings of 30% would offer significant savings on fuel costs. However, the Partnership believes that due to higher capital costs, and potentially increased maintenance costs, low carbon buses would be unlikely to be commercially viable in the short term under the current regime. A low carbon bus, using 30% less fuel, would provide operating cost savings equal to £3228/year (for a distance of 50,000 kms) or £48,000 over its life. However, initially the additional capital cost of a low carbon bus is likely to exceed this, although with volume production a five year payback may be achievable.

At the same time a bus operator, by replacing a conventional diesel bus with a 30% more efficient drive-line, would receive a reduction in the BSOG of £2847/year which equates to £43,000 over the life of the bus or £14,000 over a five year time period.

Consequently the fuel savings will not be sufficient to recover the additional capital cost of a low carbon bus. This is further exacerbated by the level of bus subsidy being significantly reduced for a low carbon bus. Moreover the societal and environmental benefits associated with low carbon buses such as lower CO₂ and emissions of SO_x, NO_x, CO and particulates carry no monetary credit for the operator.

Specific measures to level the playing field for low carbon buses

The Partnership is aware of the issues involved in reforming bus subsidies and the BSOG in particular. In the Partnership's submission to the Powering Future Vehicles Strategy Review, it was argued that there was potential to amend or supplement BSOG, focusing on the latter option. In developing this response to "Putting Passengers First" the Partnership considered five options to reforming BSOG:

1. Mileage based subsidy
2. Subsidy per passenger-km
3. Low carbon buses receive full fuel duty rebate
4. Low carbon buses receive a capital grant to supplement BSOG.
5. Thresholds for BSOG based upon fuel consumption

The LowCVP's conclusions relating to each of the options considered is shown in the table below. The first two options relate the case in which BSOG is retained but the basis of the subsidy is changed, while the last three assume that BSOG is still based upon the fuel duty rebate and the measure proposed is to supplement BSOG.

Potential reforms to BSOG

<u>Criteria</u>	Mileage based subsidy	Subsidy per passenger-km	Low carbon buses receive full fuel duty rebate	Low carbon buses receive a capital grant + BSOG	Thresholds for BSOG based upon mpg
Provides a level playing field for low carbon buses	+	+	+	++	
Encourages reduced mileage	-	+	-/+	-/+	-/+
Encourages fuel efficiency	+	+			-
Requires no change in data collection	-/+	-/+	+	+	-/+
Incentive to maximise bus patronage	-	++	-/+	-/+	-/+
Encourages deployment of low carbon buses			+	++	-
Unintended consequences					---
Administration complexity	-/+	-/+	+	--	--
Clear cost signal	+	+	-	+	--

A key issue in replacing or reforming BSOG will be the level of administrative burden the new system imposes. Currently the returns made by the bus operators in claiming BSOG are based upon fuel consumed in operating a public service route, this is supplemented with a record of the mileage on the route as a cross reference. In addition the fuel duty rebate differs based upon the type of fuel with 80% of the fuel duty being rebated for diesel fuel and 100% of the fuel duty rebated for gaseous road fuels and biodiesel.

The LowCVP believes that basing the BSOG on passenger-kilometres is most inline with Government objectives while not requiring a significant change in the administration of BSOG. While introducing 100% fuel duty rebates and capital grants for low carbon buses supplements the existing BSOG to encourage investment by bus operators in low carbon bus technology.

Other fiscal incentives which might be deployed by central Government are:

- Enhanced capital allowances for the purchase of low carbon buses,
- Grant support of research and development of low carbon bus technology,
- Grant support for field trials and demonstration projects of low carbon bus fleets,
- Renewable transport fuel obligation, and
- Emission trading scheme for transport
- Tax incentives for the regular use of public transport

These measures could be used in combination, along with the replacement or reform of BSOG, to produce a more effective package of incentives to encourage the adoption of low carbon buses.

The introduction of thresholds could create perverse incentives

The use of thresholds was felt to be unlikely to result in reductions in fuel consumption or the procurement of more fuel efficient buses. Instead it is felt it would provide a perverse incentive to reduce auxiliary equipment and features adding weight, which affects passenger comfort, and measures such as the removal of air conditioning.

The Partnership's view is that bus operators have an incentive to reduce fuel consumption when procuring new buses. Fuel cost accounts for 14% of the cost of bus operation and as such bears considerable scrutiny. Furthermore operators still pay 20% of the duty on the fuel consumed, and there is a clear financial incentive in reducing the fuel consumption and so duty paid.

In addition the Partnership feels that thresholds would be complicated to administer and wouldn't send a clear price signal and so its impact would be reduced as a result.

Managing change in BSOG to minimise risk

The Partnership recognises the need for bus subsidy to reinforce wider Government policies rather than simply subsidising the operating cost of public service vehicles. However, we also recognise the importance of providing a predictable process of transition to allow bus operators to adjust to the new regime. To this end, changes in BSOG and the bus subsidy should be announced in advance and be introduced in a progressive manner over a period of time.

Any changes to the way the bus subsidy is dispersed, whether nationally or locally, will have implications for the viability of routes with low patronage. As a consequence, routes may be lost unless supported in another form via local authority intervention.

2.4 Role of Technology

Technology base

In the Partnership's view there are three core technology types which are capable of achieving the low carbon target of a 30% reduction in carbon dioxide compared to Euro 3 buses, these are:

1. Internal combustion engines using renewable fuels (bio-diesel, bio-gas or renewable hydrogen)
2. Hybrid vehicles (using internal combustion or fuel cell as the prime mover)
3. Battery electric (using renewable electricity or hydrogen)

Such systems may be either series or parallel hybrids.

- The *series* configuration is simpler to install and operate but achieves lower fuel savings due to conversion from mechanical to electrical energy.
- *Parallel* configuration has more components and is more difficult to package and programme but will have be more efficient.

The greater the efficiency, the higher fuel savings, the lower the environmental emissions and the shorter the payback time for a given premium price.

There are also a number of enabling technologies which by themselves could deliver a significant reduction in carbon dioxide. These include; stop-start, continuously variable transmissions, regenerative braking, energy storage devices and some forms of SCR. This offers the opportunity to define a lower level of achievement, for instance a 10% reduction in greenhouse gases at lower premium cost.

Cost and volume relationship be for various bus driveline technologies

The market for low carbon buses (primarily hybrid at this time) is limited since the numbers ordered are very small and components are being sourced on a one-off basis. In addition the components are not optimised because they are off the shelf items developed for other uses. As a result the drive line, of which these components comprise, is also not optimised so fuel savings are not as high as might be possible. The outcome is a pay back time which is well outside the life of the bus.

Currently Sciotech, a member of LowCVP, is revising a paper on the economics of bus drive lines which will form part of the TRUS project submission to the European Commission for FP7 funding. This paper will be made available in due course. In the meantime LowCVP's view is that low carbon buses in small fleet demonstrations (volumes of ~5) currently will have a minimum 75% capital cost premium. While in series production low carbon buses (volumes greater than 1,000) are expected to have a capital cost premium of between 25% - 30%.

If low carbon buses offer packaging / design options which lend themselves to achieving greater patronage then this extra capital cost made be rationalised by the market. As an example, the introduction of low floor buses made buses more attractive to parents with young children, the elderly and infirm and lead to increased patronage outside peak hours when introduced into service.

Is the current definition of a low carbon bus still appropriate?

The Powering Future Vehicles (PFV) Strategy, published in July 2002, included a specific target relating to low carbon buses: by 2012, 600 or more buses coming into operation per year will be low carbon, defined as 30% below current average carbon emissions. This has been further refined by the Partnership's Bus Working Group to define a low carbon bus as:

Producing at least 30% fewer greenhouse gas emissions than a current Euro 3 equivalent diesel bus of the same total passenger capacity. The greenhouse gas emissions are expressed in grams of carbon dioxide equivalent measured over a standard test and covers Well-to-Wheel performance therefore taking into account both the production of the fuel and its consumption on board.

This definition was developed specifically to determine the eligibility of a bus to receive grant support which was intended to be made available through the proposed Low Carbon Bus Programme. This programme was abandoned prematurely during the process of seeking state aid approval from the European Commission in 2006.

However, the definition still has currency in that it is the basis of the Government's target in the Powering Future Vehicle strategy for the adoption of low carbon technology within the bus market.

The recommendation of the Partnership in its submission to the Powering Future Vehicle Strategy Review was that the target for low carbon buses in 2012 be retained, and supported by appropriate incentives. In addition LowCVP recommended the target be supplemented by a short term milestone target for 2009/10 and a long term target for 2020.

The Partnership proposed the establishment of a long-term target for ultra low carbon buses to drive the next generation of technology development. The Partnership would now suggest the target be elaborated on the basis of a definition of a low carbon bus based upon a reduction in the order of 60% in well-to-wheel greenhouse gas emissions. Further detailed analysis is required to ensure this target is achievable in a cost effectively.

There is also the opportunity to create a new definition based upon a number of environmental factors, such as green house gases, air quality and noise. Whilst this option has its merits, on balance it was felt appropriate to stay with the existing definition and to deal with other environmental issues through other means.

2.5 Reductions in CO2 from operational changes

Variation in fuel consumption experienced

In 2005 the Confederation of Passenger Transport (CPT) surveyed member companies to provide typical fuel consumption figures to assist with testing the validity of reimbursement to operators using the new concessionary fares schemes. The following information has been drawn from confidential data supplied by various bus companies to give an industry average and range for each vehicle type. The low end of the range reflects that achieved in intensive urban operation.

Vehicle type	Typical Fuel consumption (mpg)	Min (mpg)	Max (mpg)
Articulated bus	4.3	3.9	4.6
Double deck bus	6.0	4.5	7.3
Single deck bus >11m	6.9	5.2	8.0
Midi bus	8.8	6.3	11.2
Small bus <22 passengers	13.0	8.9	20.5
Single deck coach	8.4	7.0	10.0

Source: CPT survey of members 2005

In addition the survey provided evidence of the reasons for the range in fuel consumption reported. This appeared to be due to three primary causes:

- a) The make and model of bus makes a difference to the typical fuel consumption for a particular vehicle type. The amount seems to be between 4 and 8%.
- b) The Euro level (Euro 1, 2, 3 or 4) makes a difference to the typical fuel consumption for a particular vehicle type. Evidence suggests that Euro 3 is worse than Euro 1 and 2 (by between 2.5% and 11% respectively). Fitment of SCR to Euro 3 seems to improve the fuel consumption by about 10% (although trial was limited).
- c) Theoretically the number of passengers makes a difference to the typical fuel consumption for a particular vehicle type. The amount is thought to be about 4% per tonne, but there was no evidence to support this.

Despite the BSOG, there is still a strong incentive for bus operators to seek to minimise the fuel consumption of their buses as it represents the largest cost of operating a bus, after the cost of employing the driver.

Due to the number of factors influencing fuel consumption it remains difficult for bus operators to explicitly specify low fuel consumption buses as part of their procurement process. However operators are good at monitoring fuel consumption amongst a batch of similar vehicles and identifying rogue high fuel consumption vehicles and resolving the problem.

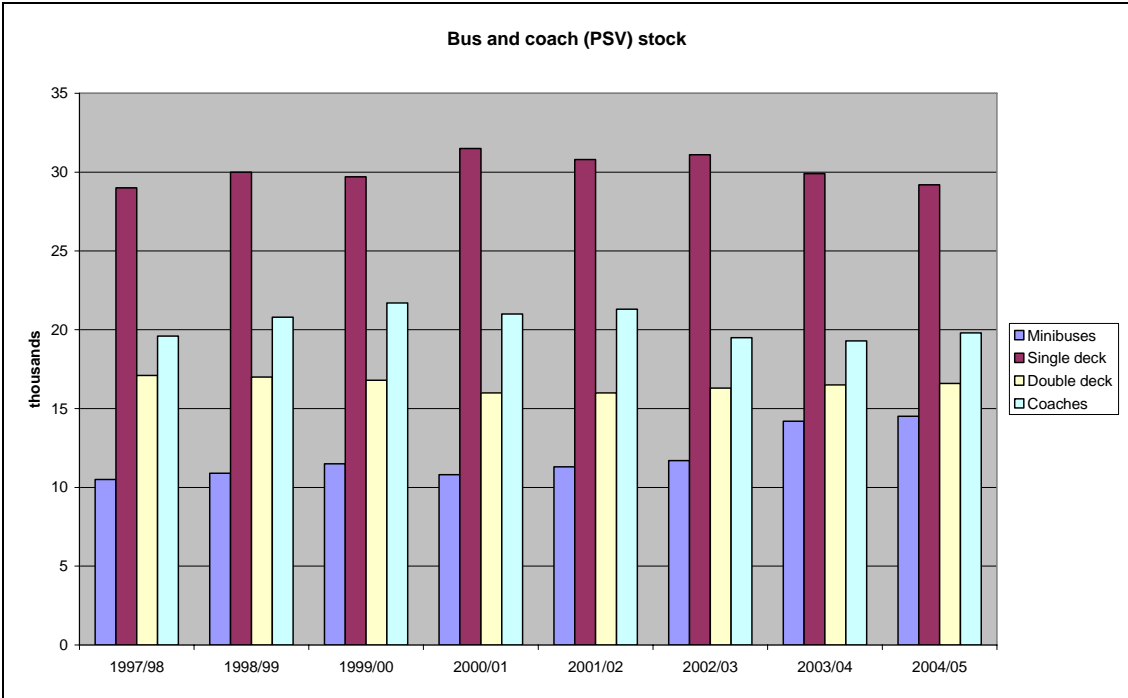
There have been factors driving up average fuel consumption of new buses in recent years, such as increased weight and space, additional equipment such as air conditioning, and tightening Euro standards. As a consequence the average Euro 3 bus is a relatively high fuel consuming vehicle compared to older bus designs such as the Route Master which was light but offered a much lower level of comfort and regulated exhaust emissions.

The move to Euro 4 emission standards and the adoption in particular of SCR appears to offer the potential to reduce fuel consumption, albeit from a high base. The evidence for this is based upon a limited number of vehicles. This should be investigated further and if it proves to be the case then early or rapid adoption of Euro 4 would present a means of reducing carbon emissions in the bus fleet and this should be incentivised.

A move to higher blend biodiesel would be a matter for each bus fleet to consider and is complicated by the existing vehicle fleet and refuelling infrastructure. Bus engine manufacturers are moving towards warranting their engines to run on B30, however no warranty will be offered for existing engines. As a result the bus fleet will comprise of a mixture of B30 warranted and unwarranted engines which, coupled with bunkered refuelling, will represent a potentially significant management issue if it is to be exploited and the potential to exploit B30 is likely to be depot specific. It is also important to ensure in switching to higher blend biodiesel that sustainability and good green house gas savings are achieved on a well-to-wheel basis.

Potential for bus size to better match operating requirements

Clearly bus loading factors have a significant impact on CO2 per passenger-km and hence the selection of an appropriate sized bus for the level of demand is important. The key issue, however, remains the variation in the level of demand and providing the appropriate level of service to accommodate the demand.



The challenge for management is to provide the total number of seats demanded along a route over a period of time. This will vary during the day: the average loading in London is 15 passengers whilst the average rush hour loading in London is 42.6. Loading factors will also vary by direction along the route, for example during the rush hour passenger loads during the direction commuters are travelling will be high, whilst conversely low on the return trip. As a consequence it is very difficult to manage passenger loading through bus size selection.

In the opinion of the LowCVP, optimising bus size is extremely difficult to manage and is unlikely to be improved through better targeted bus subsidies. A more promising approach, rather than focusing on bus size selection, is to focus on increasing bus usage during off peak times in the day in order to level the load.

There is undoubtedly scope for improving fuel efficiency in the existing bus market however, whether this could be significantly encouraged through the bus subsidy is questionable. The most likely measures to deliver improvements in fuel consumption are likely to be through bus priority measures, driver training and maintenance of buses.

2.6 Increasing patronage

Could local authorities provide support?

Local authorities can have a significant impact in co-ordinating action and marshalling resources in their area. However, there is no direct and simple power

which allows a local authority to directly influence the market for low carbon buses. The powers that local authorities have are spread across a number of pieces of legislation, each of which has limitations.

The 1985 Transport Act generally precludes local authorities from operating regular bus services. Although Section 7 of the Act does give the local authority the power to ask the Traffic Commissioner to place conditions on an operator's licence, local authorities do not have any powers to declare low carbon zones (unlike air quality or noise abatement zones). Recent amendments have added environmental factors to the grounds that can be used to request Traffic Regulation Conditions but this does not include CO2 emissions and so could be subject to judicial review.

The Transport Act 2000 introduced the concept of Quality Partnerships, allowing for a partnership approach to improve services by in kind action between bus operators, local authorities and users. Whilst a number of voluntary Quality Partnerships are in place, only one statutory Partnership has so far been established. The objective of such partnerships is to improve local bus services rather than to tackle climate change issues. However, in theory a Statutory Quality Partnership could be used to bar all but low carbon buses from enhanced facilities provided by an authority.

The Local Government Act 2000 gives local authorities the power to do anything which they consider is likely to achieve the promotion or improvement in one or more of the following:

- The economic well being of their area,
- The social well being of their area, and
- The environmental well being of their area.

This, in theory, should allow local authorities to incur expenditure on low carbon buses provided it is consistent with other primary legislation and benefits all residents and conforms to state aid regulations. However, in reality this power is not backed up with sources of funding.

Section 106 under the Town and Country Planning Act allows local authorities to enter into legal agreements with developers by which a local authority can require a developer to undertake specific actions or make contributions to the provision of services. This could be used in principle to support the introduction of low carbon buses, but is more likely to be used to develop communal facilities for new developments and ensure that public transport is available.

The powers given to local authorities are primarily focused on air quality, social deprivation, economic development and integrated transport planning. These powers need to be enhanced to require local authorities to develop local transport plans which include provision of low carbon public transport.

Typically local authority contracts for the provision of bus services are too short to amortise the cost of procuring buses specifically for these contracts. As a consequence the buses used to fulfil these types of contracts are older vehicles. Long-term contracts for bus services are required in order for local authority let

contracts to influence procurement of buses. In addition these contracts would need to be binding with no termination other than for major failure.

The Partnership notes the success achieved in London in demonstrating low carbon buses, committing to introducing low carbon buses, increasing patronage, reducing congestion and carbon emissions from road transport. In providing powers to local authorities the Partnership would encourage wider application of the London model in other regions of the UK.

Increased support for local authorities for capital investment

The most significant action to reduce CO2 emissions is via encouraging a modal shift to buses and away from cars. In terms of the encouraging passengers to ride on a bus route the key issues are the frequency of buses and that the buses are punctual. While a bus operator can determine the frequency of service however, punctuality is dictated by the road conditions and the degree of congestion on the route. The introduction of measures to allow local authorities to give priority to buses will be very important in securing a punctual bus service and in turn developing confidence in citizens. In addition, flexibility to allow local authorities to support new routes while they become commercial will be important.

The Partnership believes there is a good case for providing local authorities with increased support for capital investment and establishing new routes to help develop the right environment for public transport to prosper.

The Partnership notes the success of the regulatory and funding model in London, which has seen a successful increase in bus patronage coupled with a reduction in congestion, air quality and carbon dioxide emissions.

4. Conclusions

The LowCVP believes that the following issues must be addressed if Government's aspiration that buses should play a more effective role in reducing carbon emissions from road transport, tackling congestion and accommodating transport growth.

1. Reform of the bus subsidy. Although BSOG provides an important means of reducing the cost of public transport, patronage has declined while the total bus subsidy expenditure has been increasing. BSOG also provides a disincentive to the adoption of low carbon high fuel efficient buses.
2. Local and regional authorities are given the resources and powers to influence the bus industry in their area. The LowCVP believes that the experience in London has shown this to be an effective solution.
3. Effective incentives are needed to encourage manufacturers to bring to market the next generation of low carbon vehicles, and stimulate the market for low carbon fuels.

The LowCVP is mindful of the conclusions of the "Putting Passengers First" that given the differing levels of local and regional political leadership, and transport conditions, it is likely that no single solution will be appropriate. With this in mind the LowCVP proposes that:

Bus subsidy is reformed

The LowCVP believes there is scope for reforming BSOG to tie this more directly to bus operators' performance and/or environmental outcomes. The Partnership considered a number of options in which this could be done which reflect the degree to which BSOG is reformed. The three preferred options are:

1. To replace BSOG with a subsidy based upon passenger-km which provides an incentive for increasing patronage.
2. Low carbon buses, as defined by the LowCVP and Powering Future Vehicles strategy, receive a 100% fuel duty rebate.
3. Low carbon buses receive a capital grant to supplement BSOG.

Empowering Local and Regional Authorities

Local and regional authorities have a very important role to play in creating an environment conducive for increasing bus patronage and taking action to promote the uptake of low carbon buses and should be empowered and resourced to influence bus services more effectively. Specifically the LowCVP proposes:

4. Local authorities should be empowered to act on climate change in their transport policy and planning powers.
5. Competition law should not be used as a barrier to the better organisation of bus services in a locality.
6. Quality contracts should be made more effective.
7. Where an area has opted for a quality contract then we agree that it should be possible to devolve an amount equal to the value of the BSOG to the local authority, to be used for contract payments to bus operators against performance criteria.
8. Increased funding should be made available to regional and local authorities for capital projects and to pump prime new services for up to 3 years, for projects aimed at increasing bus patronage.

The LowCVP has concerns over the effectiveness of quality contracts and the extent to which they will play a significant role in shaping the bus industry.

Supporting the introduction of low carbon buses

The LowCVP believes that there are a number of significant barriers to the uptake of low carbon technology in the bus market. For the bus industry to play a full role in tackling the environment then these barriers need to be tackled. Specifically the LowCVP believes that:

9. Government should adopt short, medium and long term targets for low carbon bus market uptake.
10. Greater use should be made of the Forward Commitment strategy³ to stimulate both public and private procurement of low carbon vehicles.
11. A national demonstration of 100 low carbon buses is undertaken to prove the reliability and maintainability of these new technologies for a UK audience.

³ Forward Commitment relates to the procurement of innovation defined by the Environmental Industries Advisory Group, Defra

12. A market is created for low carbon bus technologies either through reform of BSOG, ensuring its social benefit is not eroded, or the provision of capital grant support.
13. The Government should encourage the purchase of low carbon vehicles by public bodies.
14. The framework for transport taxation should be amended to provide meaningful incentives for purchasers of low carbon vehicles and fuels.

Annex 1 – Questions from Putting Passengers First

In developing this submission the LowCVP sought to answer five questions highlighted in “Putting Passengers First” to which the DfT wanted responses from stakeholders, and in addition specific questions which were put to the LowCVP’s Bus Working Group by the DfT. The questions we sought to answer were:

1. Whether there is a good case for reforming bus subsidy to focus it more closely on the Government’s priorities, such as congestion, the environment and accessibility.
2. Where local authorities opt to introduce Quality Contracts there would be scope for greater efficiency and value for money by targeted spending on key outcomes through the design of bus networks, rather than subsidising fuel use. One option would be to use the provisions in the Transport Act 2000 whereby the Secretary of State can devolve funding to local authorities in such a way that areas which adopt Quality Contracts could receive a sum equivalent to BSOG. Contract payments to operators could then be related to performance against targets in an area’s contract plan and/or the local authority could use other means to target subsidy locally.
3. Whether there is scope for reforming BSOG to tie this more directly to bus operators’ performance and/or environmental outcomes, and the practical issues that would be involved.
4. Whether there is a good case for local authorities to receive increased support for capital investment – such as bus priority infrastructure – that helps to develop the right environment for public transport to prosper.
5. Any potential adverse impacts or ‘unintended consequences’ of reform, and how to manage any risk of service disruption that might be associated with subsidy reform. Ways of managing and reducing these risks, in particular the links with regulatory developments and governance, would be crucial if we were to make any changes. We will be considering these issues further with stakeholders.

Additional specific questions posed by DfT included:

- What would the potential premium cost and volume relationship be for various bus driveline technologies?
- Is the current definition of a low carbon bus still appropriate?

- What is the scope for improving fuel efficiency in the existing bus market? For existing bus models, what is the extent of the variation in fuel consumption experienced?
- What scope is there to change the size of buses to better fit operating requirements? How could this be encouraged?
- If you want to make a significant impact on carbon dioxide emissions from buses can you do it in any other way than introducing low carbon buses?
- Assuming BSOG isn't changed fundamentally, how useful / practical would the introduction of thresholds for different routes/vehicle types be?
- If you wanted to provide a specific measure to level the playing field for low carbon buses what would be the options?
- Could local authorities provide support?