Sustainable Public Transport: Position Paper

1 Introduction

1.1 Fuel costs are high and likely to remain so for the foreseeable future. Managing fuel costs has become a key aspect of the overall cost control of transport operators, and is now an important part of their business strategy. Various approaches, both technical and operational, are now widespread in the industries, and new ideas are continually emerging.

1.2 From the public policy perspective this is welcome, because it aligns well with pressure for sustainable transport and the global need to address the challenge of climate change. So it is unsurprising that some initiatives involve collaborative approaches by LAs and transport operators.

1.3 Passengers also respond well to the message that their transport modes are "eco-friendly". Some reports from bus operators even hint at patronage improvements from an explicitly "green" fleet.

1.4 This document presents RTIG's position on how private and public sectors can, separately or together, improve the sustainability of transport through management of fuel use and other measures.

2 Sustainability opportunities

2.1 The sustainability of transport may be improved at several points: operations, vehicle design and systems, and network design.

Operations

2.2 Basic sound servicing and management can help keep fuel usage down. For example regular vehicle maintenance to keeps the engines tuned and functioning more efficiently. In addition, operators are optimising driving styles as well as on-board systems to help reduce fuel consumption.

2.3 The most cost effective approach to improving fuel economy is to provide appropriate ongoing and focussed training for all drivers. This can significantly improve the fuel economy, while also reducing maintenance requirements of the vehicles. Examples are:

- Trying to maintain a steady speed to reduce the fuel consumed during acceleration and braking;
- Anticipating manoeuvres to reduce the need for harsh acceleration or braking;
- Avoiding excessive revving or idling of engine;
- Turning the engine off if the vehicle is expected to be stationary for more than two minutes;
- Only using air conditioners when necessary for passenger safety and comfort;
- Reducing the length of time doors are kept open to limit heat loss.

2.4 This kind of training programme can have significant measurable benefits. For instance Arriva has developed an eco-driving programme for its buses, which in its pilot fleet (Merseyside) has reduced fuel usage by an average of 12% per year, equivalent to a carbon emissions reduction of 6 tonnes per vehicle per year.[1] The eco-driving initiative was combined with a monitoring system, Ecomanager, which identifies driver performance characteristics as well as allowing Arriva to identify the optimum buses for each route.[2]

2.5 In the rail environment, First UK has employed a similar programme for First TransPennine Express, where training is combined with a driver advisory system (see below). The programme, Eco-Initiative, has reduced their fuel consumption by about 10%, and First have determined that this has saved "8000 tonnes of carbon each year".[3]

Vehicle design and systems

2.6 Operators are continually seeking to enhance passenger comfort and safety and minimise harmful exhaust emissions, which generally require installation of additional equipments increasing and increase vehicle weight. Unfortunately this tends to mitigate against the goal of minimising fuel consumption.

2.7 This redoubles the need to look at opportunities to improve fuel efficiency, such as:

- Looking at opportunities to reduce the overall weight of vehicles elsewhere;
- Redesigning to reduce energy lost to drag or rolling friction – particularly significant for trains and coaches travelling at high speeds;
- Onboard sustainable energy generation (eg solar panels on roofs) or energy recovery (eg regenerative braking) systems;
- Cruise-control, helping to maintain a steady speed;
- Vehicle acceleration management, reducing and controlling harsh acceleration;
- Automatic stop-start systems, reducing the idle time spent by engines;
- Thermostats, optimising the air-conditioning and heating cycles;
- Driving reporting systems, monitoring the fuel efficiency of individual drivers and allowing targeted training.

2.8 The choice of engine technology has a considerable impact on the overall running costs. Although sustainable technologies (such as fuel cells) and renewable technologies (such as biofuels) offer the benefits of significantly reduced harmful exhaust emissions, internal combustion engines (ICE) are cheaper to procure and diesel is 15-35% more energy efficient in comparison.[4]

---

1 Further details available at http://www.21stplc.com/latest-news/fuel-and-carbon-reduction-device.php.

2 Further details available at http://www.arrivabus.co.uk/content.aspx?id=10444.

3 Further details available at http://www.tpexpress.co.uk/about-ftpe/overview/community-and-environment/environment/.

4 Details available in Page 87, Report 38 of Guidebook for Evaluating, Selecting and Implementing Fuel Choices for Transit Bus Operations, by Transport Cooperative Research Program (TCRP).

2.9 Diesel-electric hybrid technology, which is costlier than ICEs, offer better fuel economy with considerably reduced carbon emissions compared to diesel.[5] Several local authorities are supporting operators in the move towards hybrid technology. For example, Strathclyde Partnership for Transport (SPT) found that the combination of diesel-electric hybrid bus engines with regenerative braking systems has reduced fuel usage by an average of 30% within a year of the pilot fleet launch.[6]

Network design

2.10 Several operators and local authorities are collaborating in an attempt to improve the sustainability of public transport by optimising the network design and travel space available. Some of the plans that can be beneficial, but not always possible, are:

- Alternative routes for buses during rush hours;
- Review timetables to reflect the patronage differences at rush hours and quiet periods, not only to minimise low-occupancy running but also to take advantage of smoother off-peak network conditions;
- Persuading travellers to time-shift journeys around rush hours, so that fewer vehicles are required to operate when conditions are congested;
- Re-planning routes to reduce travel over steep inclines and uneven terrains;
- On roads, prioritising buses by either designating a lane on the road exclusively for buses, by introducing intermittent bus lanes or by using triggered signal priority;
- For long distance bus journeys, services on segregated bus lanes where speeds can be kept more consistent.

2.11 An Intermittent Bus Lane (IBL) system deployed in Lisbon, Portugal found that bus speed had increased by 20% on average, and 50% at peak hours.[7] Furthermore, the impact on general traffic was found to be insignificant.

Other sustainability opportunities

2.12 A large number of vehicles, bus shelters and ticket vending machines are currently being manufactured with components which incorporate recycled and/or recyclable material. Bus shelters and ticket vending machines can be further designed to generate their own energy with the use of solar panels where possible, while illumination can be provided by energy efficient LED lights, coupled to sensors which switch off or dim lighting when no one is present.

2.13 Energy Management Systems are increasingly used within depots to control heating and lighting. Stagecoach has implemented a system which has reduced gas and electricity usage in over 100 bus depots across UK. Gas reductions of 35% (equivalent to an annual reduction of 7000 tonnes of CO_2 emission), and electricity use of UK Bus Division of 11.5% are reported, and the company is now upgrading the system for all of its UK depots. [8]

---

5 Details available in Page 10, Report 132 of Assessment of Hybrid-Electric Transit Bus Technology, by Transport Cooperative Research Program (TCRP).

6 Further details available at http://www.spt.co.uk/news/080815_hybrid.aspx.

7 Further details available at http://www.uitp.org/mos/PTI/2007/03/09-en.pdf.

8 Further details available at http://www.stagecoachbus.com/pressreleasesdetails.aspx?Id=817.

3 RTIG's position

3.1 It is clear that there are many steps that can be taken, which have both a commercial benefit for operators and an environmental benefit for the public. RTIG believes that local transport sustainability is being, and will continue to be, substantially improved by these steps.

3.2 Steps which are under the direct control of one stakeholder (operator or LA) can obviously happen now. There may however be benefit in the sector doing more to share its experiences and good-practice solutions.

3.3 Knowledge is key, and on-board vehicle systems will develop to provide the sort of focussed information that allows rational, evaluated decisions on environmental matters – fuel efficiency vs emissions or comfort, appropriate vehicles for each service journey, and so on.

3.4 Some of the greatest benefits arise where public and private sectors work in collaboration, to optimise whole networks for environmental factors, without disrupting their ability to respond efficiently to travel demand. These should be explored more widely, especially in dense networks.

3.5 Not all sustainability improvements will yield a financial return for operators. LAs need to consider whether, and where, public investment for network sustainability might be justified. This is a difficult question and one where further research may be required.