Fleet vehicles

A Trust may decide that measures to improve the environmental performance of its vehicle fleet should be included as part of its travel plan.

Appendix on CD

A Trust may decide that measures to improve the environmental performance of its vehicle fleet should be included as part of its travel plan. A Trust may own vehicles outright, or it may lease vehicles. When the time comes for replacing the vehicles or for renewing the lease there is an opportunity for specifying replacements with improved environmental performance.

Information on auditing fleet vehicles is provided in section 3.15 of *A Travel Plan Resources Pack for Employers*.

8.1 The benefits of improving the performance of fleet vehicles

There is a range of cleaner, alternative fuelled vehicles that can reduce the environmental impact of a Trust's transport operations. Switching a fleet to cleaner fuels can help to reduce the impact on climate change and improve local air quality. In addition, running an alternative fuelled vehicle fleet can reduce transport costs for the Trust. Purchasing costs for clean fuelled vehicles can be reduced by taking advantage of Government grants, whilst operating costs can often be significantly lower due to lower fuel duty, vehicle excise duty and company car tax rates as well as exemptions from congestion charges where this applies.

There are a number of questions that must be taken into consideration before deciding upon the right cleaner fuelled vehicle for your fleet. These include:

- **Whole life cost**—How much extra will the vehicles cost to buy, hire or lease? Set against increased costs, how much will be saved in fuel costs, vehicle excise duty and national insurance contributions (where vehicles are provided as a benefit to employees)?
- **Operational requirements**—Will the vehicles have a reduced payload or is their range (the distance they can travel before they need to refuel) too limited?
- **Fuel availability**—Will it be possible to refuel the vehicle readily? For example, with dual fuel petrol/LPG vehicles will it be possible to run the vehicle on LPG all the time, or will petrol need to be used for most of the time thereby reducing potential cost and environmental benefits?
- **Environmental performance**—How much better is the 'clean' fuelled vehicle compared to its petrol or diesel equivalent?

8.2 Selecting the appropriate cleaner fuel option

This section provides information on the key factors to consider when selecting the best cleaner fuel option for a fleet. The fuels covered include:

- Liquefied petroleum gas (LPG)
- Natural gas (CNG or LNG)
- Electric vehicles
- Petrol-electric hybrid vehicles
- Biodiesel

For contact details of useful organisations dealing with cleaner vehicles see section 9.6 of *A Travel Plan Resources Pack for Employers*.

8.2 LPG Vehicles

LPG is produced as a by-product of oil refining and is also found as an associated gas in natural gas fields. It is stored as liquid under pressure. Vehicles can be set up to operate on LPG only or as bi-fuel. LPG is mainly used in cars and light vans, which to date have all been produced as bi-fuel vehicles. This means they have separate tanks for the LPG and petrol, and can operate on either fuel simply by flicking a switch. Most types of vehicle can be built or converted to run on LPG. A PowerShift approved converter should carry out conversions. This will ensure that they are safe and reliable, and that they meet strict emissions reduction criteria.

Compared to a diesel engine, LPG reduces emissions of particulate matter by 95% and nitrogen oxides (NOx) by 70–80%. Compared to petrol, LPG produces 20–30% lower NOx emissions and similar levels of particulates. In an urban area, where the impact of these emissions is highest, these represent very significant and important reductions. Carbon dioxide (CO_2) from LPG is 10–15% lower than petrol, but 5-8% higher than diesel. However, on a 'well to wheel' basis (i.e. taking into account the extraction, production, distribution and end-use of the fuel) LPG CO_2 emissions are 15–20% lower than petrol and similar to diesel.

New cars and vans powered by LPG are between £1,500 and £2,000 more expensive than conventionally fuelled vehicles. However, PowerShift grants worth £700 towards the cost of the vehicle are available. Full details of all vehicles that qualify for grant funding are available at **www.powershift.org.uk**. Converting an existing petrol car or van to run on LPG costs between £1,200 and £1,800. Again, a PowerShift grant of £700 is available for approved conversions. Converting a diesel is much more costly and at present grants are only available for converting black cabs.

Any increase in the purchase, contract or lease price for LPG vehicles compared to the diesel or petrol equivalent should be weighed against the operational cost savings that can be achieved. LPG is substantially cheaper than petrol or diesel due to a reduced fuel duty rate set by the Government. In the 2004 budget, the Government committed itself to maintaining a significant reduction in fuel duty for LPG compared to petrol and diesel until March 2007. Other financial benefits include reduced Vehicle Excise Duty rates and, where the vehicle is provided as a benefit to an employee, reduced income tax for the employee and, consequently, reduced Class 1a National Insurance contributions for the employer. The main financial saving will come from reduced fuel costs.

The table below provides some simple examples of the potential savings from using LPG vehicles. The examples shown are for LPG Vauxhall Astra and Zafira estates, which show that with an annual mileage of 20,000, fuel savings of £645 and £893 per vehicle per year respectively are achievable. However, this assumes that the vehicles run on LPG 100% of the time. The financial and environmental benefit will be reduced whenever the vehicle runs on petrol. The table summarises the main costs and benefits of the Astra and Zafira LPG vehicles, assuming outright purchase of a vehicle. If vehicles are financed through contract hire or leasing packages, the vehicle supplier should be approached to quote for LPG rates and these should be compared to the standard rates for the petrol or diesel equivalent.

These costs are indicative only. The additional purchase cost will depend upon the dealer and the time of purchase. Fuel savings depend upon annual mileage and how much of the mileage is run on LPG. Any changes in the relative costs of petrol and LPG must also be considered. The availability of grant funding must also be verified and agreed in advance of any purchase.

The availability of LPG is improving rapidly. There are now over 1,400 retail outlets in the UK. The locations of LPG outlets can be viewed at **www.cleaner-drive.co.uk**. If the space is available, and volume is likely to be significant, installing a bunkered LPG facility is relatively simple and cheap. This offers advantages in terms of security of fuel supply. Furthermore, bunkering, enables you to buy LPG at cheaper rates, perhaps up to 20% of the standard forecourt price.

LPG costs compared to the petrol equivalents	**LPG Vauxhall Astra**	**LPG Vauxhall Zafira**
Purchase Cost	c. + £1,500	c. + £1,500
PowerShift Grant	c. - £700	c. - £700
Total Additional Purchase Cost	c. **+ £800**	c. **+ £800**
Annual Fuel Costs (@20,000 miles)	- £645	- £893
Annual VED costs per year	- £20	- £20
Total annual savings	**- £665**	**- £913**
Payback (years)	c. **1.2**	c. **0.88**

8.3 Natural Gas Vehicles

Natural gas is a mixture of 92% methane and other natural gases. Natural gas vehicles have a dedicated gas engine, or they are dual fuelled, which means they burn diesel and natural gas simultaneously in the engine. When used in vehicles, natural gas can be stored under pressure or as a liquid. Compressed natural gas (CNG) is stored at a pressure of 200–250 bar whilst liquefied natural gas (LNG) is stored at -160 °C. Consequently the fuel tanks are heavier and bigger than those used for conventional vehicles, reducing space and payload.

Due to the size and weight of the tank, CNG has traditionally been used to power large trucks and buses. However, Volvo offers a range of CNG cars and Vauxhall offers a CNG Zafira. Compared to a diesel engine meeting the current Euro II emissions standard, a mono-fuel natural gas engine can achieve up to 70–80% lower NOx emissions, and about 95% lower emissions of particulate matter. Tailpipe carbon dioxide emissions are similar to diesel. For dual fuel vehicles, NOx is reduced by 30–40% compared to a Euro III diesel, and carbon dioxide is reduced by up to 20%. Dedicated natural gas vehicles are also significantly quieter than their diesel counterparts.

The additional cost of buying a new dedicated natural gas vehicle depends upon the type. A truck can cost between £20,000 and £40,000 more than a conventional vehicle. For cars and vans the premium is about £3-4,000. TransportEnergy grants are available for trucks, worth £2,100 for 3.5-7.5 tonne vehicles, £9,000 for 15-26 tonne vehicles, and £13,000 for vehicles greater than 26 tonnes.

Natural gas is substantially cheaper than petrol or diesel due to a reduced fuel duty rate set by the Government. The fuel duty differential between CNG and petrol and diesel has been guaranteed by the government until at Least March 2007. Fuel costs for a small vehicle fuelled by natural gas are under 6 pence per mile, compared to around 10 pence per mile for petrol. Up to 30% savings in fuel costs can be obtained for large commercial vehicles compared to diesels. Tests on dual-fuel vehicles have demonstrated fuel savings of between 6–15%. Other financial benefits include reduced Vehicle Excise Duty rates and where the vehicle is provided as a benefit to an employee, reduced income tax for the employee and, consequently, reduced Class 1a National Insurance contributions for the employer. Vehicles over 3.5 tonnes may also qualify for a Reduced Pollution Certificate (RPC) and a subsequent reduction of up to £500 in annual road tax.

At present there are few public refueling stations for CNG.

8.4 Electric Vehicles

Electric vehicles use a battery and electric motor to power the vehicle. They have no emissions at the point of use and are very quiet. As they have no emissions at the point of use they are excellent for trips in urban areas. Due to the capacity of the battery, their range is limited to up to 60 miles between recharges. This makes electric vehicles more suited for vehicles with set journey patterns within a confined area, for example, operating between hospital sites.

There is currently a limited range of electric vehicles in the UK. However, Citroen now produce an electric version of their Berlingo van. The electric Berlingo can be fully

recharged from any 240V 13-amp socket in up to seven hours. It costs £15,345 compared to £9,295 for the petrol version. A grant of £1,500 is available from PowerShift. Savings in fuel costs and VED can offset the higher purchase cost or lease rates. The table below shows fuel savings for the electric Citroen Berlingo compared to its petrol counterpart. Assuming 10,000 miles per year, fuel savings of £870 per vehicle per year are possible plus a £155 per year saving in VED. The table below summarises the main costs and benefits of the electric Citroen Berlingo, assuming outright purchase.

It is stressed that these costs are indicative only. The additional purchase cost will depend upon the dealer and the time of purchase. Fuel savings depend upon annual mileage and actual performance. Any changes in the relative costs of petrol and electricity must also be considered. The availability of grant funding must also be verified and agreed in advance of any purchase.

Electric vehicles also qualify for an enhanced capital allowance rate of 100% in the first year. Some London boroughs also allow free parking for electric vehicles.

Electric costs compared to petrol equivalent	**Citröen Berlingo**
Purchase Cost	c. + £6,000
PowerShift Grant	c. - £1,500
Total Additional Purchase Cost	c. **+ £4,500**
Annual Fuel Costs (@10,000 miles)	- £870
Annual VED costs per year	- £155
Total annual savings	**- £1,025**
Payback (years)	c. **4.4**

The Whittington Hospital NHS Trust has had a Citroen Berlingo electric van in its vehicle fleet for 14 months. The van is primarily used by the hospital Porters and Estates Maintenance Team around the site, and has proved to be very useful and easy to drive. The vehicle has a 55 mile range and is charged overnight at a waterproof charging post which has been specially installed. The vehicle has reduced fuel costs for the Trust, costing about 50 pence to fully recharge. Vehicle maintenance has not been a problem, although the battery in particular needs to be serviced by an approved garage. The vehicle is very quiet—so quiet in fact that when driving around the site, drivers need to be mindful of pedestrians who may not hear the vehicle approaching.

8.5 Hybrid Vehicles

Hybrids use a combination of conventional fuel (petrol/diesel) with electricity to power the engine. In most cases, electric power is used at low speed (particularly for urban stop-start driving) and conventional fuels are used at higher speed (eg motorway). The vehicle's power need is split so that it can operate more efficiently and with lower emissions. Consequently, hybrids deliver substantial fuel economy and emissions benefits. The batteries are usually recharged by the petrol/diesel engine, so specific recharging is not necessary (unlike electric vehicles).

There are currently only three models on the UK market: the Honda Insight and Civic IMA and the Toyota Prius. These hybrid vehicles cost around £16,000–£17,000; about £3,000 to £4,000 more than a petrol equivalent. PowerShift grants of £700 are available to offset the additional cost. The additional purchase costs should be compared to the fuel savings that can be achieved. The table following shows an example for the new Toyota Prius compared to a Toyota Avensis. Assuming 20,000 miles per year, fuel savings of £860 per vehicle per year are possible plus an annual £80 saving in VED. The table summarises the main costs and benefits of the Toyota Prius, assuming outright purchase.

Hybrid costs compared to petrol equivalent	Toyota Pruis
Purchase Cost	c. + £3,000
PowerShift Grant	c. - £700
Total Additional Purchase Cost	c. **+ £2,300**
Annual Fuel Costs (@10,000 miles)	- £860
Annual VED costs per year	- £80
Total annual savings	**- £940**
Payback (years)	c. **2.4**

Again, it is stressed that these costs are indicative only. The additional purchase cost will depend upon the dealer and the time of purchase. Fuel savings depend upon annual mileage and actual performance. The availability of grant funding must also be verified and agreed in advance of any purchase.

8.6 Biodiesel

Biodiesel is made from biomass rather than fossil fuels. Mixtures of not more than 5% biodiesel with conventional (mineral) diesel are acceptable with most vehicles manufacturers, provided the fuel meets British/European specification. Blends with greater than 5% biodiesel may affect the warranty of the vehicle.

Blends of biodiesel and mineral diesel can reduce emissions of particulate matter and hydrocarbons by around 20–30%. When blended at 5%, biodiesel may cause a slight increase in NOx emissions. Using biodiesel should reduce lifecycle emissions of carbon dioxide, as the carbon is absorbed by the biomass that is used to make the fuel.

Biodiesel currently has a fuel duty rate of 20 pence per litre less than ultra low Sulphur Diesel. The reduced duty rate applies only to the biodiesel component of blended fuels. For example, a 5% biodiesel blend will cost around 1 pence more per litre than standard diesel.

Blended fuel with 5% biodiesel should have a similar fuel economy to pure diesel. Blended biodiesel is available under brand names such as Greenergy's GlobalDiesel, made from rapeseed and RIX's Biodiesel, made from processed waste oils.

8.7 Specifying emissions standard and fuel consumption

If LPG and other alternative fuel vehicles are not considered to be appropriate for the Trust's operations, then attention could turn to specifying 'cleaner' diesel and petrol vehicles.

The emissions performance of petrol and diesel vehicles has improved significantly in the last few years, driven by the need to meet tighter EU emission standards. The emissions performance of a vehicle is defined by its Euro standard. Since 2001, all new vehicles have had to be produced to meet the Euro III standard. The Euro IV standard comes into force in 2006. However, some manufacturers are already producing vehicles that meet the Euro IV standard, more so for petrol vehicles than for diesel. Ideally, where petrol or diesel is chosen, a fleet should incorporate Euro IV vehicles. If this is not possible for some of the diesel vehicles, then retrofitting a particulate trap should be considered. These traps can reduce emissions of particulate matter, including the extremely damaging ultra fine particles, by around 95%. For vehicles over 3.5 tonnes GVW, the fitting of a particulate trap may qualify the vehicle for a reduced Pollution Certificate (RPC) which can lead to savings of up to £500 per year in Vehicle Excise Duty. For more information on RPCs, consult the Vehicle Inspectorate's leaflet INF64 (see **www.via.org.uk**)

Minimising fuel consumption is also an important environmental consideration and should be taken into account when choosing vehicles. Details of combined cycle fuel consumption, ie one that takes into account a range of driving conditions, should be requested. Where there is a choice between models for a particular class of vehicle, the most fuel-efficient model should be specified.

8.8 Improving fleet performance in other ways

Vehicle technology is just one factor amongst several that affects the environmental performance of a fleet operation. The way the vehicles are driven, how well they are maintained and how much they are driven all have a bearing on emissions, noise and congestion. Consequently, there are actions that can be implemented immediately to improve the environmental performance of the fleet, rather than relying upon the delivery of new 'green' vehicles. In broad terms the focus for improvement should be on improving fuel economy and reducing mileage. The sections below highlight the process and interventions for managing improvements in these two variables.

8.9 Improving Fuel Economy

Measurement, Monitoring and Targeting

The starting point for managing fuel economy is to establish a system for the systematic measurement and monitoring of fuel consumption and mileage for each vehicle. The fuel economy in miles per gallon or litres per 100 kilometres can then be calculated easily from this data. Information can be managed within a spreadsheet or a fleet management software package. For smaller fleets, simple spreadsheet systems are generally more efficient than sophisticated and expensive software packages that do not produce information in an easily understood format.

After a few months of data collection and monitoring, fuel economy benchmarks can begin to be developed. Different groups of vehicles and different types of operation will require different fuel economy benchmarks. The benchmarks allow you to identify poorly performing vehicles and/or drivers and to take corrective action. Having established the baseline performance of the fleet with

these benchmarks, targets for improving performance can be set. Ideally, a full year's worth of data is required before a true baseline of performance can be established. Data collected over a year smoothes out fluctuations in fuel economy brought about due to external factors such as the weather and traffic congestion.

Barts & The London NHS Trust has undertaken initial investigations into the opportunities for improving the fuel economy of its vehicle fleet. The Trust's fuel bill is approximately £200,000 per year. The Trust found that implementation of a few simple fuel management measures could result in savings of between 5% and 10%. Savings could be higher depending upon how fuel-efficient the fleet already is. So, not only would a 10% saving in fuel result in major environmental gains, it would also save the Trust £20,000 per year. Moreover, this could be achieved with only a modest investment in management time.

Having established fuel economy benchmarks and set targets, measures to improve fuel economy can be implemented and monitored. These are discussed in the following sections.

Driving Style

Driving style has a huge influence on fuel consumption. Aggressive driving can increase fuel consumption by up to 45%; a waste of money because it is unlikely to make a significant difference to journey times. It will also increase wear and tear on the vehicle, in particular brake pads, tyres, clutch and gears. Furthermore the driver that wastes fuel is also likely to be the driver that has more accidents. Actions that can be taken to improve driver performance are:

- Raising awareness amongst drivers.
- Formal driver training.
- Fuel economy bonus scheme.

Just by making drivers aware that fuel consumption is being monitored can have a significant impact. It is often sufficient to motivate drivers to adopt a more efficient driving style. This 'Hawthorne Effect' is well known in the freight transport industry and typically results in a 5% improvement in fuel economy. Awareness can be raised through staff briefings, posters, flyers, etc. It can also be useful to disseminate information on fuel-efficient driving, such as the driving tips shown in Appendix 8A .

Formal driver training can be even more beneficial than simply raising awareness. Ideally, this should be compulsory for all drivers, including a refresher course at least bi-annually so that improvements are sustained.

Barts and The London NHS Trust provides training for their drivers, which incorporates material on driving for fuel economy.

A fuel economy bonus scheme is a powerful motivator for drivers to try to conserve fuel. There are two possible approaches. The first is to offer a bonus to the top performing driver(s), say on a quarterly basis. This approach is only possible when drivers tend to use the same vehicles so that monitored improvements in an individual vehicle's performance can be attributed to specific drivers. It also requires that good benchmark data exists for each vehicle type and operation. The second approach is to offer a yearly group bonus for all drivers on attainment of a pre-determined group fuel economy target. This approach is easier to administer, but the amount drivers receive will be less, and may not be enough of an incentive for them to seek to achieve the target. The cost of the bonus scheme can be funded from the fuel savings made.

Maintenance

Vehicles with under-inflated tyres, or badly out of tune engines will use more fuel than vehicles in good condition. Poor performance can be identified from a fuel economy monitoring system. Consideration should be given as to whether corrective action needs to be taken before the next planned service.

Reducing Mileage

The 'greenest' mile of all is the one that is not driven. Reducing mileage reduces emissions, fuel consumption, the risk of accidents and the contribution to congestion. For an NHS fleet the opportunities for reducing mileage are limited—there is unlikely to be much waste. However, there are two areas that might be considered, if actions have not already been taken there. These are:

- managing the routing and scheduling of trips to minimise mileage; and
- managing the demand for patient transport services.

Optimising the routing and scheduling of vehicles can reduce mileage. This can be particularly important for Non Emergency Patient Transport (NEPT) which travel over a wide area with multi drops and pick-ups. There are a number of software packages available to help with this.

Many NHS Trusts are experiencing a significant increase in demand for NEPT services. One of the factors behind this growth is that the criteria for whether NEPT should be offered are ignored, not known or not understood. To reduce demand and costs some Trusts are reviewing their procedures for how NEPT is managed and requested.

UCLH NHS Trust has recently launched a communications campaign to educate the different departments about the criteria for using Non Emergency Patient Transport (NEPT). It has also devolved the NEPT budget to individual departments, helping to exert more control over its use.