
# Literature Review WM9:
# Part II - Light Goods Vehicles in Urban Areas

Carried out as part of Work Module 1
Green Logistics Project

Final version

Transport Studies Group
University of Westminster

Authors:

Prof. Michael Browne
Julian Allen
Dr Allan Woodburn
Marzena Piotrowska

January 2007

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# ABSTRACT

## Purpose

To provide a review of the light goods vehicle (LGV) fleet and its usage in the UK, with specific reference to operations in urban areas, and sustainability issues associated with the ever-growing use of LGVs.

## Design/Methodology/Approach

An attempt has been made to identify all relevant UK (and some overseas) literature pertaining to LGV operations and their impacts. This comprised searching both printed documents and web-based sources. Types of literature consulted include reports, conference papers, government statistical publications, and internet-based information.

## Findings

LGVs are of ever-greater importance in terms of the final delivery of many time-critical, high value goods and are also widely used in industries that provide a wide range of critical support services. There are almost five times as many LGVs as there are HGVs (goods vehicles over 3.5 tonnes gross vehicle weight) currently licensed in Britain. The LGV fleet in Britain is growing at a faster rate than the HGV fleet, and the LGV fleet travels more than twice as many vehicle kilometres each year than the total HGV fleet. LGVs perform a far greater proportion of their total distance travelled in urban areas than HGVs, and consume 25% of the total diesel and 3% of the total petrol used by all motorised road transport vehicles in Britain.

Many topics concerned with LGV activities especially in relation to urban operations, and the associated social and environmental impacts have received relatively little research attention.

## Research limitations/implications

There have been far fewer research projects and data collections exercises for LGVs than for HGVs in the UK. Relatively little of the literature identified is concerned with the social and environmental impacts of LGV operations. Also, published results of government surveys of van operators contain results at a national rather than urban scale. Possibilities for dissaggregation can be investigated.

## Practical implications

Some of the documents reviewed do provide advice for industry about topics including driver training, road safety, fuel economy, emissions standards, use of computerised routeing and scheduling, and vehicle specification and selection.

## Originality/value

There have been few previous attempts to bring together this type of material for LGVs.

# 1 LIGHT GOODS VEHICLES: AN INTRODUCTION

The importance of light goods vehicles (LGVs) in terms of the total volume of commodity flow that they move in the UK is relatively small compared with large rigid and articulated heavy goods vehicles. However, LGVs are very important for a number of reasons:

- LGVs are of ever-greater importance in terms of the final delivery of many time-critical, high value goods.
- They are also widely used in industries that provide a wide range of critical support services.
- There are many of these vehicles (there are almost five times as many LGVs up to 3.5 tonnes gross vehicle weight (gvw), as there are goods vehicles over 3.5 tonnes gvw currently licensed in Great Britain).
- In addition, the LGV fleet in Britain is growing at a faster rate than the fleet of goods vehicles over 3.5 tonnes.
- The LGV fleet travels more than twice as many vehicle kilometres each year than the total goods vehicle fleet over 3.5 tonnes in Britain.
- LGVs perform a far greater proportion of their distance travelled in urban areas than HGVs.
- The LGV fleet consumes equivalent to 25% of the total diesel and 3% of the total petrol consumed by all motorised road transport vehicles in Britain.

LGVs have tended to receive relatively little attention in terms of either official data collection or detailed research into their activities. However, this situation has begun to change a little in the last couple of years, with research carried out as part of the Review of Freight Modelling project for the Department for Transport (Allen, Browne and Wigan, 2002), the Department for Transport's Privately-owned and Company Van surveys (DfT, 2004a; DfT 2004b, DfT 2005a; DfT, 2006a), survey work at Nottingham Trent University (Cooke, 2003 and 2004) and recent work for the AA Motoring Trust as part of the Living with the Van project (AA Motoring Trust, 2006, Lang and Rehm, 2006; Land 2006).

# 2 TERMINOLOGY

We have referred to commercial vehicles up to 3.5 tonnes gross weight as "LGVs" (light goods vehicles). There are several different terms used by different organisations to describe these vehicles (including vans, light vans, light goods vehicles, light commercial vehicles etc).

It is important to note that there are also goods vehicles with gross weights over 3.5 tonnes that also have van-type bodies (typically these vehicles have gross weight between 3.5 and 7.5 tonnes) but fall into a different tax class than the LGVs described above, and are treated as heavy goods vehicles by the Department for Transport for the purposes of data collection and survey work.

Table 1 shows the difference in terminology and definitions used with respect to LGVs by various organisations (Allen et al., 2003)
.

**Table 1: Definitions and terminology related to LGVs used by different organisations**

| | |
|---|---|
| **Department for Transport (DfT)** | Sometimes refers to light vans, at other times to light goods vehicles.<br>In all cases these light goods vehicles/vans are defined as being up to 3.5 tonnes gvw. |
| **DVLA** | Refer to light goods vehicles. These are defined are being not over 3,500 kgs gvw.<br>Large goods vehicle (LGV) defined as goods vehicles over 3500 kg gvw (for purposes of driving licence). |
| **SMMT** | Refer to three categories of light commercial vehicles as shown below.<br>• Light vans, under 1.8 tonnes<br>• Medium vans (1.8-2.6 and 2.6-3.5 tonnes)<br>• Heavy vans and light trucks, 3.5 to 7.4 tonnes (or 3.5-6 and 6-7.5 tonnes) |
| **Fleet managers** | Often refer to light commercial vehicles. These often include all commercial vehicles up to 7.5 tonnes gross weight. |

Source: Allen et al., 2003.

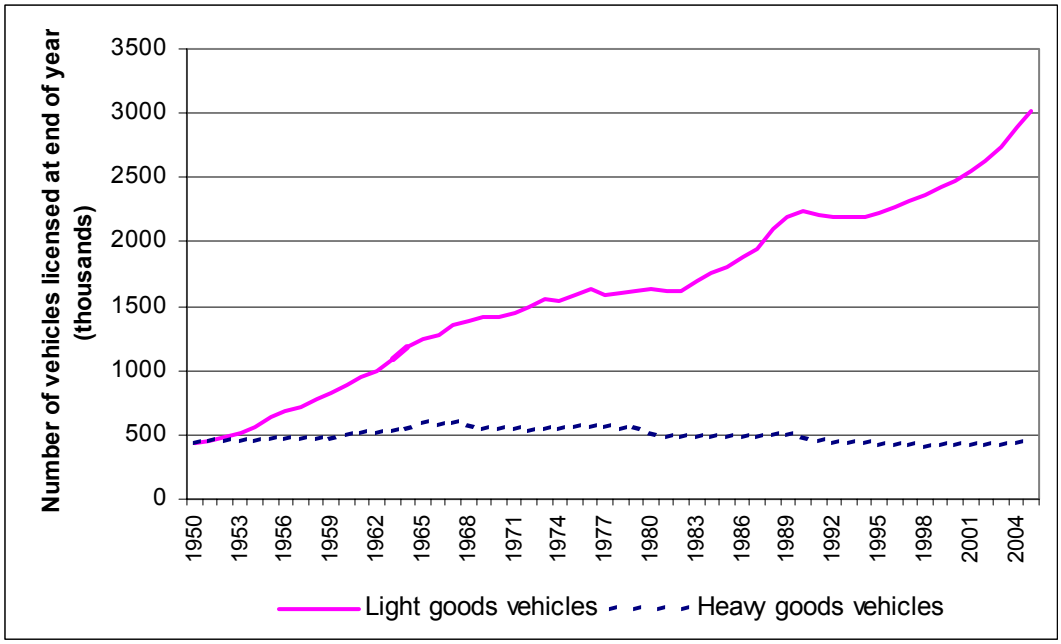
The term "White Van Man" is commonly used to refer to drivers of LGVs and is often used in a derogatory manner. The term is supposed to have been first coined in 1997 by radio broadcaster Sarah Kennedy (SIRC, 1998). It has "since entered the official lexicon winning a place in the Collins Concise Dictionary" (BBC, 2001). An online encyclopaedia provides two definitions of the term:

> "**1.** unruly road hog at the wheel of a light delivery vehicle who freely heckles other drivers for incompetent driving, hesitation pulling away from traffic lights or daring to drive any vehicle not a white van. **Alternatively, 2.**sage-like everyman, with finger on the pulse and accelerator foot on the zeitgeist pedal" (BBC, 2001).

# 3 THE LGV FLEET IN BRITAIN

Figure 1 shows the growth in the LGV and HGV fleet in Britain since 1950. This shows that since 1950 (when the number of LGVs and HGVs were the same) the LGV fleet has become ever larger than the HGV fleet.

**Figure 1: LGVs and HGVs licensed in Britain, 1950-2005**




Note: the LGV data also includes a relatively small number of other vehicles such as recovery vehicles, general haulage vehicles, farmer's and showmen's goods vehicles.
Source: DfT, 2006b

This growth in the LGV fleet has continued unabated in recent years, increasing by approximately 36% over the last ten years. This has far outstripped the growth in the HGV fleet during the last decade (the HGV fleet has only increased by 3%) - as shown in Table 2. In fact, the growth in the LGV fleet was greater than the growth in cars over this period (the number of cars increased by approximately 28% between 1995 and 2005) (DfT, 2006c).

**Table 2: Changes in LGV and HGV stock in Britain, 1995-2005**

| | 1995 | 2005 | % change 1995-2005 |
|---|---|---|---|
| Light goods vehicles | 2,217,000 | 3,019,000 | + 36.1% |
| Heavy goods vehicles | 421,000 | 433,000 | + 2.9% |

Source: adapted from DfT, 2006c

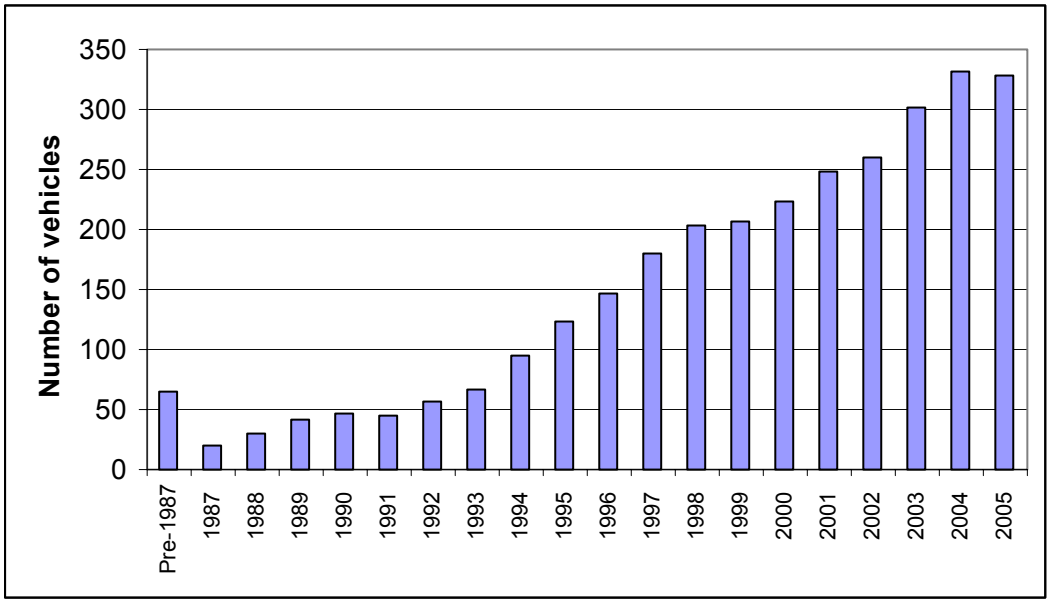
There was a total LGV fleet in Britain of 3.02 million vehicles in 2005. This compares with an HGV fleet of 433,000 vehicles (DfT, 2006c).

LGVs are manufactured with several different body types. The two most common body types for LGVs are: (i) car-derived vans (which from the outside are visually very similar to cars on which they are based but have no rear seats – these vehicles have gross weights of up to

3.5 tonnes) and (ii) panel vans (which are usually between 1.8 and 3.5 tonnes gross vehicle weight). Other LGV body types include pick-ups, Luton vans and box vans.

Figure 2 shows the LGV stock in Britain in 2005 by first year of registration. This shows that although approximately 30% of LGVs were registered in the previous 3 years, and approximately 50% of LGVs were registered in the previous 5 years, there are a significant number of LGVs that are older than 5 years (51%) and even 10 years (20%) (DfT, 2006c).

**Figure 2: LGV stock in Britain at end of 2005 by year of first registration**




Source: adapted from DfT, 2006c

Official data shows that 91% of the LGVs registered in Britain at the end of 2005 were diesel-powered, 8% were petrol-powered, less than 0.3% were gas- and diesel-powered, and less than 0.1% were petrol- and gas-powered, and electric-powered (DfT, 2006c).

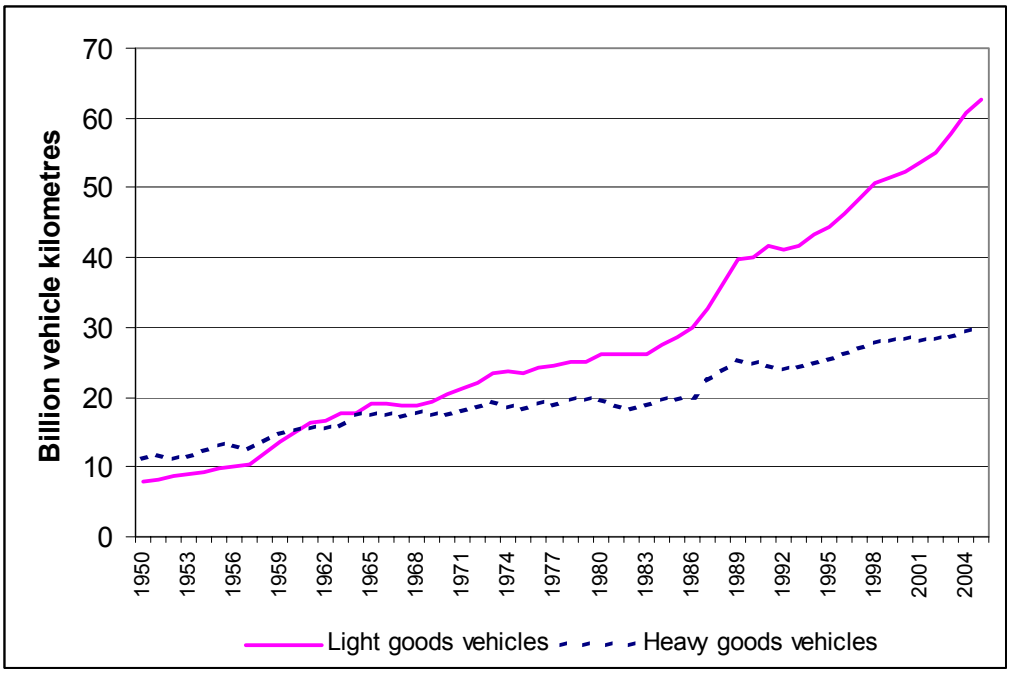
LGVs consumed approximately 4.8 million tonnes of diesel and 0.5 million tonnes of petrol in 2005. This is equivalent to 25% of the total diesel and 3% of the total petrol consumed by motorised road transport vehicles (DfT, 2006b).

# 4 LGV TRAFFIC

## 4.1 LGV traffic nationally

As the number of LGVs licensed in Britain has risen significantly in recent decades, so too has the total distance travelled. Figure 3 shows the increase in the distance travelled in Britain by LGVs and HGVs since 1950.

**Figure 3: Road traffic in Britain: Light vans and goods vehicles 1950-2005**




Source: DfT, 2006b

In total, the LGVs travelled more than twice as many vehicle kilometres than HGVs in Britain in 2005. Growth in vehicle kilometres travelled by LGVs between 1995 and 2005 was far greater than the growth in HGV vehicle kilometres. The growth in LGV vehicle kilometres over this period was also considerably greater than that for cars and taxis – see Table 3.

**Table 3: Billion Vehicle Kilometres Travelled in Britain, 1995 and 2005**

| | 1995 | 2005 | % change 1995-2005 |
|---|---|---|---|
| Cars and taxis | 351.1 | 397.2 | + 13.1% |
| LGVs | 44.5 | 62.6 | + 40.7% |
| HGVs | 25.4 | 29.0 | + 14.2% |

Source: adapted from DfT, 2006b.

Using this data it is possible to calculate the average distance travelled per year for LGVs and HGVs. The average for LGVs was approximately 21,000 kilometres during 2005, compared with an average of approximately 67,000 kilometres for HGVs. (It should however be noted that there are significant variations in average annual distance travelled among different weight categories of HGVs. Differences in the average annual distance travelled by LGVs and HGVs are related to the type of activities that they are used for. LGVs are typically

used for local delivery work and service activities, while the larger HGVs are predominantly used for moving goods over long distances.

The most recent traffic statistics show a further significant growth in LGV traffic in Britain. LGV traffic was up 8 per cent between Q1 2005 and Q1 2006, up 4 per cent between Q2 2005 and Q2 2006, but down 2 per cent between Q3 2005 and Q3 2006 (DfT, 2006d, 2006e and 2006f).

Although LGVs comprised only 13 per cent of total motorised vehicle kilometres in Britain in 2005, the growth in LGV between 2004 and 2005 was 1.8 billion kilometres, while at the same time both car traffic and heavy goods vehicle traffic fell (by 0.9 and 0.4 billion vehicle kilometres respectively) (DfT, 2006b). This is despite the fact that there are approximately nine times more cars than LGVs) (DfT, 2006b).

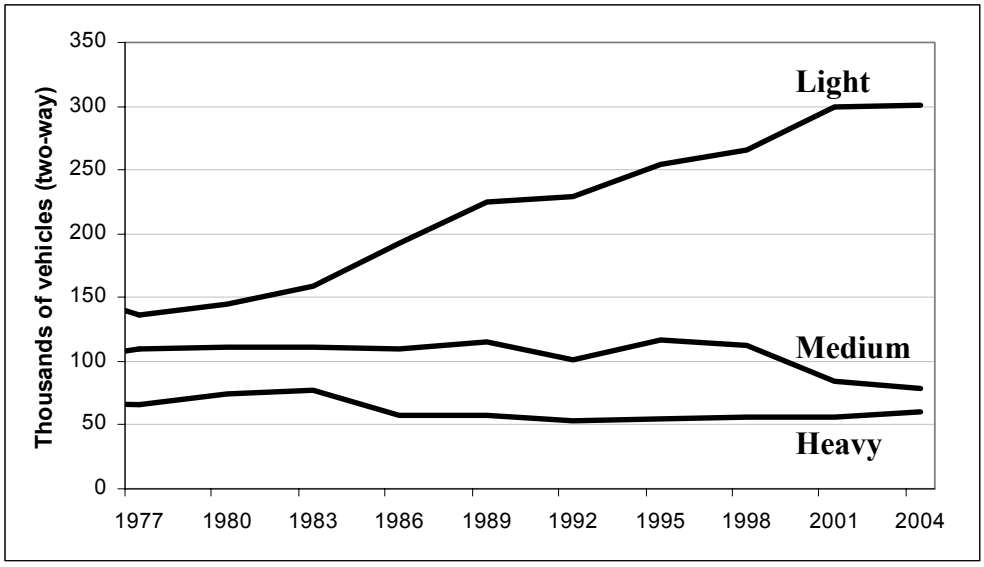
A 2004 survey of LGV operators showed that only 31% of responding companies had a strategy in place to reduce LGV mileage. The two most common approaches to achieving this were route planning and the use of telematics (Cooke, 2004).

## 4.2 LGV traffic in urban areas

Because of the types of activities that LGVs are used for, they perform a far greater proportion of their vehicle kilometres in urban areas than HGVs. In 2005, LGVs performed 37% of their total distance travelled on urban roads. This compared with 17% on urban roads for HGVs (DfT, 2006g).

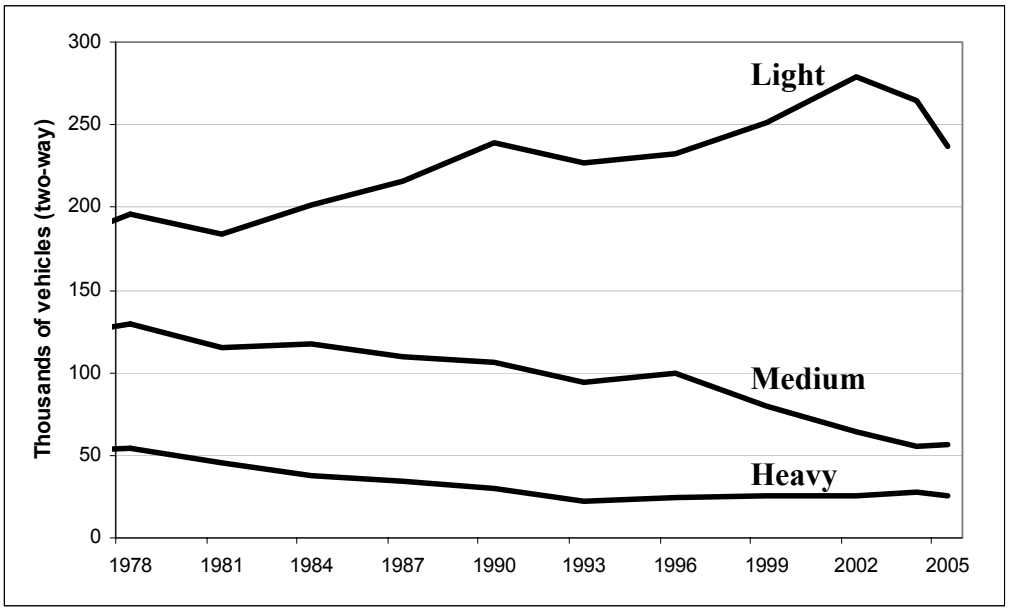
The example of LGV trips into and out of London help to indicate the scale of LGV activity in an urban area. Figure 4 to 6 shows the changes in commercial vehicle traffic volumes crossing the boundary, inner and central cordons in London in both directions over a 24-hour period on a typical weekday between 1977 and 2005. These figures show that LGVs are by far the most common form of commercial vehicle crossing each cordon, followed by medium goods vehicles (rigid vehicles over 3.5 tonnes gvw), and heavy goods vehicles (defined in this dataset as articulated vehicles over 3.5 tonne gvw) (TfL, 2006).

**Figure 4: Greater London boundary daily crossings – freight vehicles: 24 hour flows**



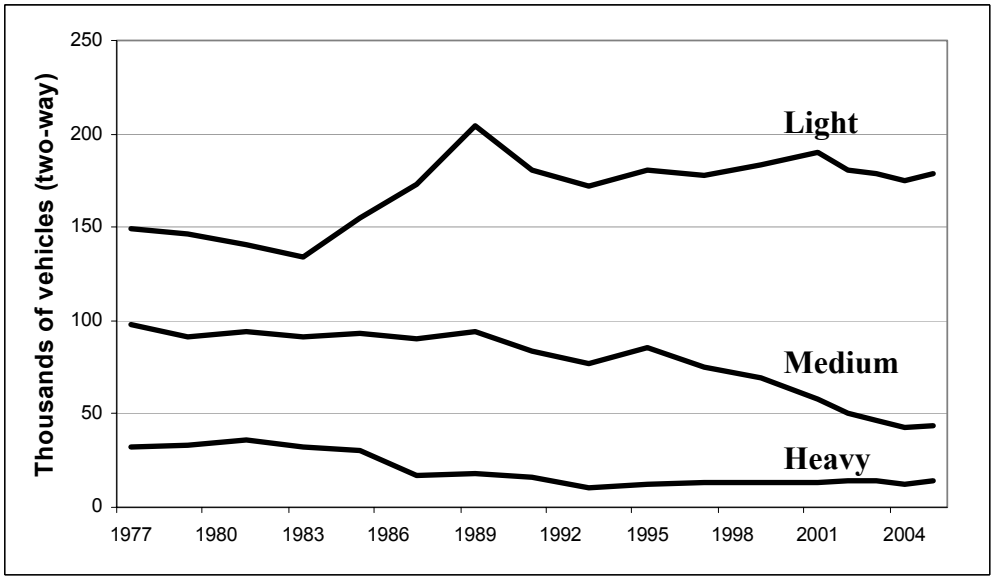

Source: adapted from TfL, 2006.

**Figure 5: Inner London cordon daily crossings – freight vehicles: 24 hour flows**




Source: adapted from TfL, 2006.

**Figure 6: Central London cordon daily crossings - freight vehicles: 24 hour flows**

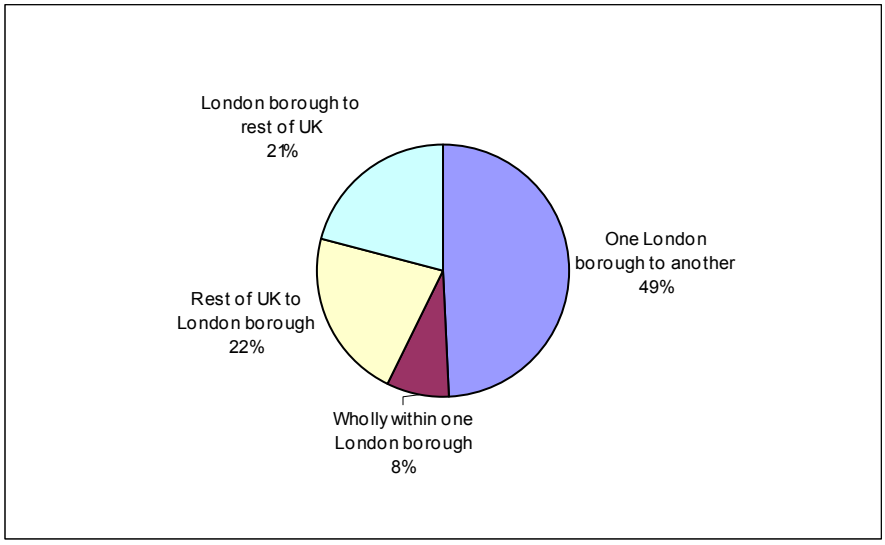



Source: adapted from TfL, 2006.

The London Area Transport Survey (LATS) which was carried out in 2001 provides further information about LGV trips in London. The data was obtained from roadside interviews that were took place in over a 16-hour period (06.00-22.00) from Monday to Thursday in neutral months between Autumn 2001 and Autumn 2002, so can be taken to represent a 16-hour average weekday in 2001. The data relates to each leg of a trip from the last origin to the next destination, so can be thought of as one-way journeys per day.

The LATS 2001 survey indicates that there were 512,000 light goods vehicle trips to, from and within London on a 16-hour average weekday in 2001 (approximately five times as many trips as those reported for HGVs) (LATS, 2001). However, this is likely to be underestimates of daily LGV trips to, from and within London, as the survey captures information about drivers' previous and next stopping location only, whereas many LGVs carry out more than one trip per day. Figure 7 provides details about the types of LGV trips reported in the LATS 2001 survey (LATS, 2001).

**Figure 7: LGV London trip types on a 16-hour average weekday, 2001 (vehicles up to 3.5 tonnes gross weight)**




Source: adapted from LATS, 2001.

Estimates of vehicle kilometres travelled by goods vehicles in London can be derived from traffic count data. These estimates show that all goods vehicles (i.e. LGVs andHGVs) travelled a total of 3.2 billion vehicle kilometres on major roads in London in 2005. Seventy two percent of these kilometres were performed by LGVs (up to 3.5 tonnes gross weight), 20% by rigid goods vehicles over 3.5 tonnes, and 8% by articulated goods vehicles over 3.5 tonnes (TfL, 2006).

The vehicle kilometres travelled by goods vehicles in London in 2005 is equivalent to approximately 16% of all vehicle kilometres performed by all motorised traffic on major roads in London (3.2 out of 20.0 billion vehicle kilometres). Seventy two percent of these kilometres were performed by LGVs and 28% by HGVs (TfL, 2006).

It has been estimated that all goods vehicles (i.e. LGVs and HGVs) travelled a total of 1.8 billion vehicle kilometres on minor roads in London in 2005. This is equivalent to 15% of the vehicle kilometres travelled by motorised road vehicles on minor roads in London in 2005. Eighty nine percent of these goods vehicle kilometres on minor roads were performed by LGVs, and 11% by HGVs (TfL, 2006).

## 4.3 Freight moved by LGVs

The DfT Company Owned Van Survey estimates that company LGV activity accounted for an annual average of 11 billion tonne kilometres between 2003 and 2005. This is equivalent to approximately 7% of all freight activity on British roads by British-registered vehicles (DfT, 2006a).

# 5 FACTORS INFLUENCING THE USE OF LGVS

There are a number of factors that are likely to be partly responsible for the growth in the size of the LGV fleet and the total vehicle kilometres it travels in Britain in recent years.

In terms of transporting goods the following are likely to have encouraged the use of LGVs (Allen et al., 2002):

- Reduction in stockholding levels/move to JIT distribution systems – as companies have moved towards logistics systems which aim for stock reduction there have been reductions in delivery quantity and therefore encourages the use of smaller vehicles;
- Increase in same day and time-critical parcel deliveries – in the parcels sector the demand for faster services has resulted in greater use of LGVs;
- Shortage of heavy goods vehicles (HGV) drivers/Changes in driving licence legislation requiring drivers to pass additional driving tests for HGVs – companies are finding it increasingly difficult to recruit HGV drivers and some are therefore opting instead for LGVs which can be driven on standard car driving licences, thereby significantly expanding the potential driver base to select from;
- Increase in operating restrictions on HGVs in urban areas – restrictions imposed by local authorities on the routes available to HGVs may be having an effect on companies' vehicle selection policies;
- Growth of home delivery sales – home shopping and delivery has become increasingly popular in the last few years and the majority of these deliveries that involve groceries and parcels are made by LGVs which are ideally suited to the products and residential driving conditions (E-commerce and other remote sales are rising rapidly each year in many European countries. Mintel estimate the total home shopping market in Europe was worth €67.2 billion in 2003 (Mintel, 2005). Home shopping market is expected to continue to grow rapidly in the coming years);
- Growth in number of households - reduction in average household size (due to people living longer, changes in family composition and people choosing to live alone is resulting in more households and hence more residential delivery addresses for home deliveries;
- Growth in home improvements – the increase in home extension and improvement is resulting in greater flows of building products to homes with many builders using LGVs;
- Increase in value density, especially of consumer goods will emphasise small vehicles at the ends of the supply chain.

In terms of service operations the following are likely to have encouraged the use of LGVs (Allen et al., 2002):

- Outsourcing of service functions to specialist companies during the last decade - this has tended to result in a wide range of services provided to buildings and to homes that require vehicle trips;
- Increase in rapid response servicing (e.g. computer repairs etc.) – this has resulted in increases in LGV trip making in order to rectify such problems;
- Development and use of more technological and communications equipment that requires installation, planned servicing and emergency repairs – these sectors primarily use LGVs for their engineers and servicing staff;
- The installation and maintenance of new telecommunication networks (e.g. cable networks);
- Growth in the number of households has led to greater trip-making in order to meet these servicing needs many of which will take place in LGVs.

In addition, LGVs have become popular due to their flexibility, allowing them to be used for a range of tasks (both work and leisure), and their use may have also been encouraged by tax incentives which have made them attractive compared with company cars.

# 6 RESEARCHING LGV USE

Given the significant growth in the number and activity of LGVs it is important to understand the uses to which these vehicles are being put. Adding to the difficulty in studying the use of these vehicles is that they can be used for a wide range of different purposes including goods movement, service activities and personal trips. Many of the vehicles are unmarked so provide no clear visual information about the use to which they are being put.

It is therefore difficult, and often impossible, to distinguish trip purpose (e.g. parcels delivery, plumber visiting customer, computer field engineer driving to next job etc.) by observation, and also to distinguish whether trip is taking place for commercial or personal reasons. Even when the vehicle has a company livery this does not necessarily mean the vehicle is engaged in a commercial trip (for instance, the driver could be using the vehicle to go shopping or visit friends and relatives). It is therefore necessary to use a wide range of research techniques to study the activity of LGVs. Table 4 indicates a range of different techniques available depending on the information required.

**Table 4: Possible techniques for gathering LGV information**

| Information required | Possible Techniques |
|---|---|
| LGV traffic levels* | Manual or automatic counts |
| LGV trip purpose, trip patterns, origin and destination data | Trip diaries, personal travel surveys, roadside interviews and in-vehicle monitoring equipment |
| LGV performance and utilisation | In-vehicle monitoring equipment, manual records kept by companies, vehicle track testing |
| Company fleet decisions | Questionnaires, interviews and focus groups |
| Likely reactions of companies and drivers to policy measures/new initiatives by companies | Interviews and focus groups |
| LGV trip generation and attraction rates | Land use surveys |

Note: *LGV traffic levels are difficult to obtain from automatic counting because it is not possible to distinguish on vehicle length between and LGV and a car. Manual counting is also subject to a high degree of error as visually distinguishing a large LGV from a small HGV is not easy. This is usually done by determining whether the rear axle has single of double tyres, but with fast moving and/or high volume traffic this is not always possible.

As Table 4 indicates, in order to investigate trip purpose and trip patterns for LGVs it is necessary to conduct survey work. Techniques commonly used to study other types of travel behaviour such as trip diaries and roadside interviews could be used, and there is also the potential to use in-vehicle monitoring equipment and satellite tracking systems as these become more commonly used by companies.

There have been relatively few studies of LGV activity and use, and LGV trips have typically been ignored in freight data collection and modelling. There is therefore little existing data available about LGV use. However, there are two sources which provide some insight into this issue: i) a recently-completed UK government survey into LGVs and ii) qualitative research that the authors have carried out in several sectors in which much use is made of LGVs.

# 7 LGV ACTIVITY PATTERNS

## 7.1 Research into LGV activity

The UK Department for Transport carried out surveys of LGV activity in Britain in 1987, 1993 and 1998/99[1]. However, the latter survey suffered from non-response and under-reporting. These difficulties were thought to be due to attempting to collect information on the activity of both company and privately owned LGVs in a single survey. The decision was therefore taken to carry out separate surveys of company and privately owned LGVs in future.

Separate surveys of both company owned and privately-owned LGVs were carried out by the DfT in 2003. A LGV is defined as company-owned "if the registered keeper is a Company or Company (Messrs)", while it is considered to be privately owned if "the registered keeper is any other category i.e. Mr, Mrs, Miss, Rev, Dr, Between keepers" (DfT 2006a).

The results of the occasional Survey of Privately Owned Vans were published in 2004 (DfT, 2004a). The Survey of Company Owned Vans started in April 2003 and was continued in 2004 and 2005. From 2005 the Company Van survey will not be carried out on a continuous basis, and in future will be carried out on an ad hoc basis.

Both the DfT company and privately owned van surveys collected information about the vehicle itself and the journeys it makes in Britain over a two-day period.

The University of Westminster carried out a project into van use and activity in Southwark and Lewisham for the two London Boroughs during 2005 (Browne et al., 2005). This involved obtaining and analysis traffic data on van activity in Southwark and Lewisham, making site visits to locations in Southwark and Lewisham, and carrying out survey work with a range of different types of locally-based companies operating vans.

The results of both of these surveys, plus other survey work into LGV activity where relevant, are summarised below. Much of this data focuses on national LGV operations, while a limited amount is specifically about LGV activities in urban areas.

## 7.2 LGV fleet sizes

LGV fleet sizes vary widely from a single vehicle to many thousands. However there likely to be far more companies and private individuals operating small LGV fleet sizes than is the case for HGVs.

Survey work among LGV operators in the London boroughs of Southwark and Lewisham in 2004/5 suggested that there are many companies that operate small fleets of LGVs (i.e. 1 to 3 vans). Respondents' LGV fleets range from 1 to 60 vans. A small number of companies operate a large proportion of all the vans, with one quarter of respondents operating two-thirds of the LGVs. Approximately one-third of all the vans operated by the respondents are car-derived vans, while two-thirds are larger Ford Transit-style vans (Browne et al., 2005).

Table 5 contains information about LGV (and HGV) fleet sizes for major express and parcels companies, the Royal Mail, grocery home delivery, and selected retailers, manufacturers

[1] The DfT refer to "vans" rather than "LGVs" in their operator survey work. However, only LGVs (i.e. vehicles not exceeding 3.5 tonnes gross weight) are included in this survey. Any goods vehicles with van bodies with gross weights of more than 3.5 tonnes are surveyed in the DfT's Continuing Survey of Road Goods Transport.

and construction companies taken from a 2003 research study (Allen et al., 2003). The Royal Mail operates the largest LGV fleet used for distribution that was identified, comprising approximately 1% of all LGVs in Britain (Allen et al., 2003).

**Table 5: Goods vehicle fleet sizes (including LGV fleet) for selected UK distribution companies, 2003**

| | Goods Vehicle Fleet size (inc. LGV & HGV) | LGV fleet size | Number of UK consignments per year | Comments |
|---|---|---|---|---|
| Amtrak Express Parcels | 1,075 | | | |
| ANC | 1,500 | | 17 million plus | |
| APC | 600+ | | 1.9 million | |
| Apex | 500 | | 3.4 million | |
| Business Express | 2,550 | | 65 million | Mostly vans[i] |
| Business Post | 1,400 | | 18.2 million | |
| DHL International | 1,600 | | 11 million | |
| FedEx | N/A | | | |
| Guilbert – office products company[ii] | 700 | | | |
| Hellmann Parcels Systems | 550 | | 3.6 million | |
| Hermes/Parcelnet (Grattans/Freemans)[iii] | 355 | | | 46 million parcel deliveries and 12 million collections per year. Uses 4,000 couriers (local agents) |
| Iceland[iv] | | 1,000 | | |
| Initial City Link | 1,875 | | | |
| Interlink Express | 735 | | 12 million | |
| John Lewis[v] | 1,600 | 400 | | |
| Lynx Express | 1,500 | | 40 million | |
| | | | | |
| NCN Express Parcels | 500 | | 5.5 million | |
| Nightfreight | 900 | | 6. 3 million | |
| Nightspeed | 550 | | 8.5 million | |
| Parcelforce | 10,000[vi] | 3,600 | | 3.5 t vehicles cover 15,000 miles per year, have a 4 year life, and average 120 drops per day[vii] |
| Parceline | 1,800 | | 30 million | |
| GUS/Reality[viii] | 1,825 | 1,500 | 110 million | Uses 4,000 local agents |
| Royal Mail | 30,000[ix] | | | Vast majority are vans[x]. 5,000 vehicles operating in city centres[xi]. Vans cover about 40,000 miles over a 3 year period[xii]. |
| Sainsbury/Ryder home delivery operation[xiii] | | 100 | | Within M25 and 25 city locations. |
| Securicor Omega Express[xiv] | 5,200 | | 100 million | |
| Securicor Cash Services[xv] | 1,800 | 1,500 | | |
| Target Worldwide Express | 700+ | | | |
| Tarmac | | 750 | | |
| Tesco home delivery | 1,320[xvi] | 600[xvii] | | 3.7 million home delivery orders per year[xviii] |
| TNT International | 325 | | | |
| TNT Express Services | 3,200 | | | |
| Tufnells Parcels Express | 500 | | 6.2 million | |
| UPS | 1,500 | | | |

Notes: Blank spaces in Table 5 - data not available.
All data in Table 5 from Distribution Business January/February 2002 unless otherwise stated.
Endnote references in the table to other sources can be found at the end of this paper.

There are other sectors of the distribution industry that are likely to operate LGVs such as general haulage and light removals but it was not possible to obtain fleet data on these. Other sectors likely to have sizeable LGV fleets for goods transport include the construction

and building sector (one company's fleet is included in the table), office products (one fleet included), wholesalers, medical/pharmaceutical deliveries, cash delivery and collection and newspaper and magazines deliveries (with 14 million newspapers and 36,000 magazines delivered to 55,000 retailers daily in 2003).

It would therefore seem likely that many LGVs used primarily for goods distribution are operated by companies with relatively small vehicle fleets.

Table 6 shows the LGV fleet size of selected service companies and local authorities (and HGV and cars in some cases - taken from the same source as the previous table: Allen et al., 2003). Adding together all the vehicles in Table 6 provides a total of approximately 80,000 vehicles which include HGVs (goods vehicles over 3.5 tonnes gvw) and cars as well as LGVs). Eighty thousand vehicles represented less than 4% of the total LGV fleet in the UK in 2003.

**Table 6: Vehicle fleet sizes (inc. LGV fleet) for selected UK service companies, 2003**

| | Total fleet size (inc. all goods vehicles, LGVs, cars & plant vehicles) | Goods Vehicle Fleet size (inc. LGV & HGV) | LGV and car fleet size | LGV fleet size | Comments |
|---|---|---|---|---|---|
| BT | | 38,000[xix] | | | Mostly vans. The fleet travelled 569 million km in 2000/2001. |
| British Sky Broadcasting[xx] | | | | 1,000 | This is the installation and service fleet. The vehicles will cover 40,000 miles over 2 years. |
| Ntl[xxi] | | | | 2,000 | Used for installation, maintenance, cabling. Acquired on a 48 month arrangement for approx. 20,000 miles per annum. |
| Severn Trent Water[xxii] | 2,500 | | | | |
| Wessex Water[xxiii] | 200 | | | | |
| South West Water[xxiv] | 500 | | | 250 | |
| Yorkshire Water[xxv] | | | | 850 | Car-derived vans and panel vans |
| Pipeway (water utility contractor)[xxvi] | 330 | | | | |
| Transco[xxvii] | 10,000 | | | | Approx. 70% commercial vehicles |
| East Midlands Electricity[xxviii] | 1,015 | | | | |
| McNicholas (construction and utilities)[xxix] | | | 590 | | |
| ADT Fire and Security[xxx] | | | | 1,300 | |
| Cannon Hygiene (property support and cleaning)[xxxi] | | | | 400 | |
| HSS tool and equipment hire[xxxii] | | | | 500 | |
| Autoglass[xxxiii] | | | | 1,100 | Three year fleet life covering 90,000 miles. |
| Kwik-Fit Hometune and Silver Shield Windscreens[xxxiv] | | | | 600 | |
| Rank Leisure[xxxv] | 1,200 | | | | |
| Barlow Handling - Lift truck and material handling equip suppliers[xxxvi] | | | | 700 | |
| Siemens Metering Services[xxxvii] | | | | 93 | |
| AA[xxxviii] | 6,000 | | | | 2,500 specialist breakdown vehicles, 1,000 driving school cars. |
| RAC (inc. Auto Windscreens) | 2,100 | | | | |
| Metropolitan Police Force[xxxix] | 3,991 | | | | |
| Nottinghamshire Police Force[xl] | 450 | | | | |
| Newham Council[xli] | | | | 100 | Transits, dropside vans, tippers and pick-ups |
| Swindon Borough Council[xlii] | | | | 68 | All alternatively-fuelled vehicles |
| NHS Ambulances[xliii] | | | | 3,000 | |

Notes:
Blank spaces in Table 3 - data not available.
Endnote references in Table 3 to sources can be found at the end of this paper.

Although Table 6 probably omitted out several major LGV fleets operated by service companies, it would seem that, as in the case of LGVs used primarily for goods distribution, there are many service companies with relatively small LGV fleets.

## 7.3 LGV drivers

Analysis of the Spring 2004 Labour Force Survey (carried out by the Office of National Statistics (ONS, 2004), shows that there are “an estimated 187,000 people in the UK would describe themselves as dedicated van drivers as opposed to 314,000 truck drivers” (Lang and Rehm, 2006). Approximately 90% of these van drivers are employees, and 10% are self-employed (Lang and Rehm, 2006). However, it is noted in the publication that, “Health and Safety Executive economists (HSE, 1999) reckon that the Labour Force Survey considerably underestimates the number of professional dedicated van drivers. They argue that drivers of vans owned and operated by large manufacturing, wholesale and retail organisations might often be given a different occupational description and they estimate the number of dedicated drivers to be around 10% of the actual number of these vehicles. This would result in 290,000 dedicated van drivers for 2004. The same economists estimated in 2001 that the majority of light goods vehicles is driven by approximately 4 million occasional drivers”. (Lang and Rehm, 2006).

Studies have indicated that the vast majority of LGV drivers in the UK are male (96% in the 1998 Renault Master White Van Man Study (Social Issues Research Centre, 1998) and 94% in the Labour Force Survey data (Lang and Rehm, 2006).

Research has indicated that while LGV drivers may be more accommodating on the road to other LGV drivers, they do not interact very much with each other (in the high street or at motorway service stations for instance). This has been explained as being due to the fact that LGV drivers work in such a wide range of industries and sectors and perform so many different roles that “the only thing which really unites them is the fact that they drive vans. And this is not sufficient to establish tribal bonding in itself” (Social Issues Research Centre, 1998).

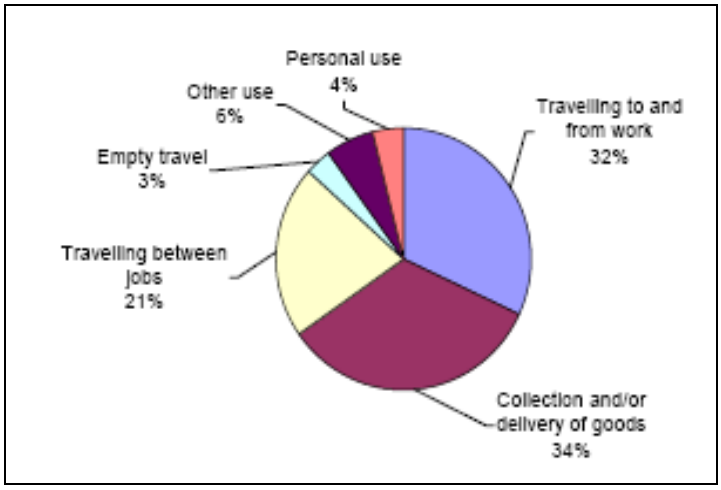
One study has suggested that there are four distinct categories of LGV drivers in terms of the relationships that they have with their vehicles (Social Issues Research Centre, 1998):

- drivers who view the vehicle simply as a work tool with little personal feeling for it.
- drivers who “positively loathe” their vehicles (usually the fleet delivery drivers who often drive a different vehicle each day)
- drivers who “express something akin to affection” when talking about their vehicles
- drivers who “are in love with their vehicles”

## 7.4 Reasons for LGV trips

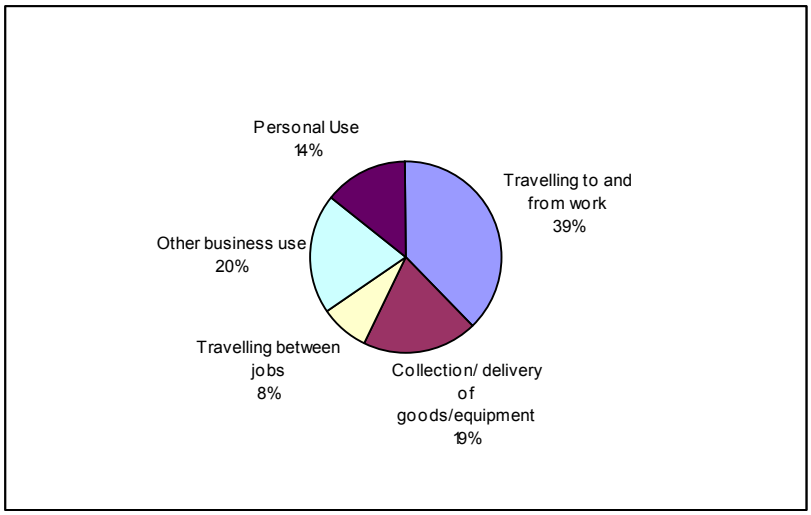
Figures 8 and 9 (taken from the DfT Company and Privately Owned Van Surveys) show the reasons for company and privately-registered LGV trips (DfT, 2006a; DfT, 2004a). This shows that use of LGVs for personal use is greater for privately owned LGVs than company owned LGVs.

**Figure 8: Vehicle kilometres by company-registered LGVs by reason for use: annual average 2003-2005**




Source: DfT, 2006a.

**Figure 9: Vehicle kilometres by privately-registered LGVs by reason for use, 2003**




Source: DfT, 2004a.

In survey work among LGV operators based in the London Boroughs of Southwark and Lewisham almost 50% of respondents used LGVs solely for delivery and collection work, approximately 30% used them only for service-related activities, while the remaining 20% of respondents used them for both collection/delivery and service activities (Browne et al., 2005).

Other research suggests that the extent to which LGV drivers used their vehicles for personal trips (such as leisure and shopping) increased between 1998 and 2003 (Social Issues Research Centre, 2003).

## 7.5 Average trip lengths for LGV trips

Table 7 (taken from the DfT Company and Privately Owned Van Surveys) shows the average trip distances by reason for vehicle use. The results show that average trip lengths tends to be greater for company owned LGVs than for privately owned LGVs. Personal trips

by company and privately owned LGVs tend to be shorter in distance than business trips (DfT, 2004a; DfT, 2006a).

**Table 7: Average trip distances by LGVs by reason for use**

| | Average trip distance (vehicle kilometres) | |
|---|---|---|
| **Reason for use** | **Privately owned LGVs, 2003** | **Company owned LGVs, Annual average 2003-2005** |
| Travelling to work from home | 21 | 33 |
| Travelling to home from work | 21 | 33 |
| Collection of goods | 14 | 31 |
| Delivery of goods | 22 | 61 |
| Collection and delivery of goods* | | 92 |
| Travelling between jobs | 17 | 49 |
| Empty travel | 25 | 34 |
| Other business use | 11 | 29 |
| Personal Use | 13 | 21 |
| TOTAL | 18 | 44 |

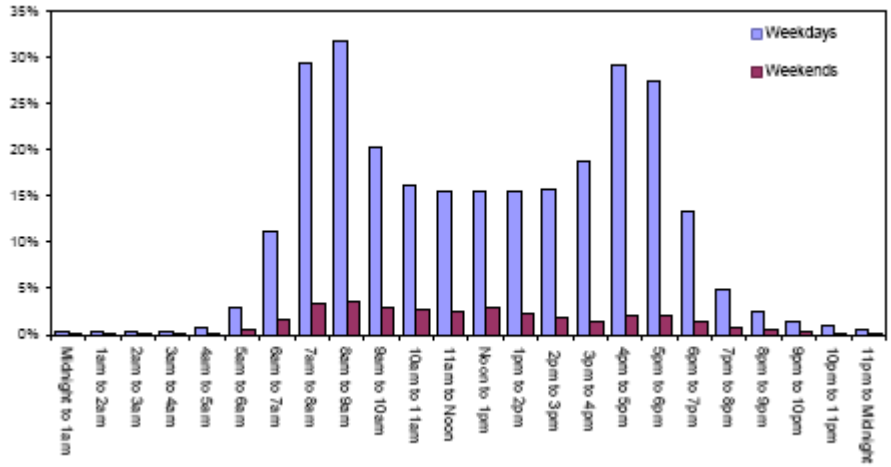
Note: Data for trips combining collection and delivery of goods not available for privately owned LGVs
Source: DfT, 2006a; DfT, 2004a.

## 7.6 Times at which LGVs are used

The DfT Company and Privately Owned Van Survey results show that the peak periods for LGV travel during the week was 0700 to 0900, and 1600 to 1800 when approximately 30% of company owned LGVs and 20-25% of privately owned LGVs were in use (see Figures 10 and 11).

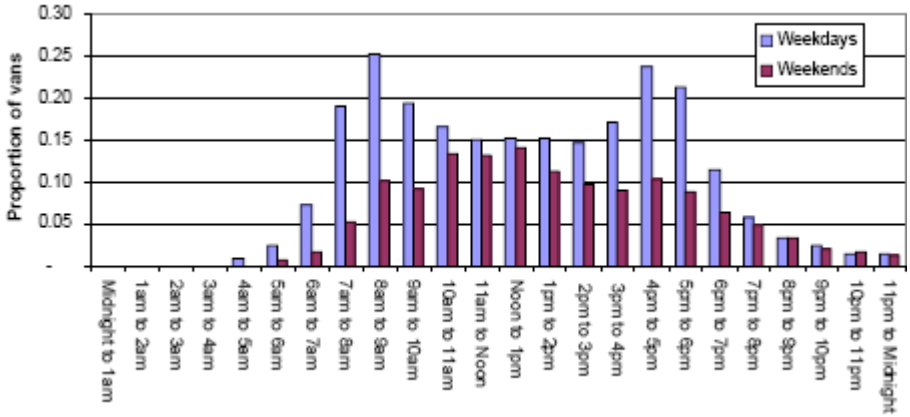
At weekends, no more than 4 per cent of company owned LGVs were in use during any one hour period. However the situation is different for privately owned LGVs with almost 15% of them in use at weekends during the middle of the day. This is explained by the greater use of privately owned LGVs for personal trips (DfT, 2004a; DfT, 2006a).

**Figure 10: Company owned vans: Proportion of vans in use by time of day: Annual Average 2003 – 2005**




Source: DfT, 2006a.

**Figure 11: Privately owned vans: Proportion of vans in use by time of day, 2003**




Source: DfT, 2004a.

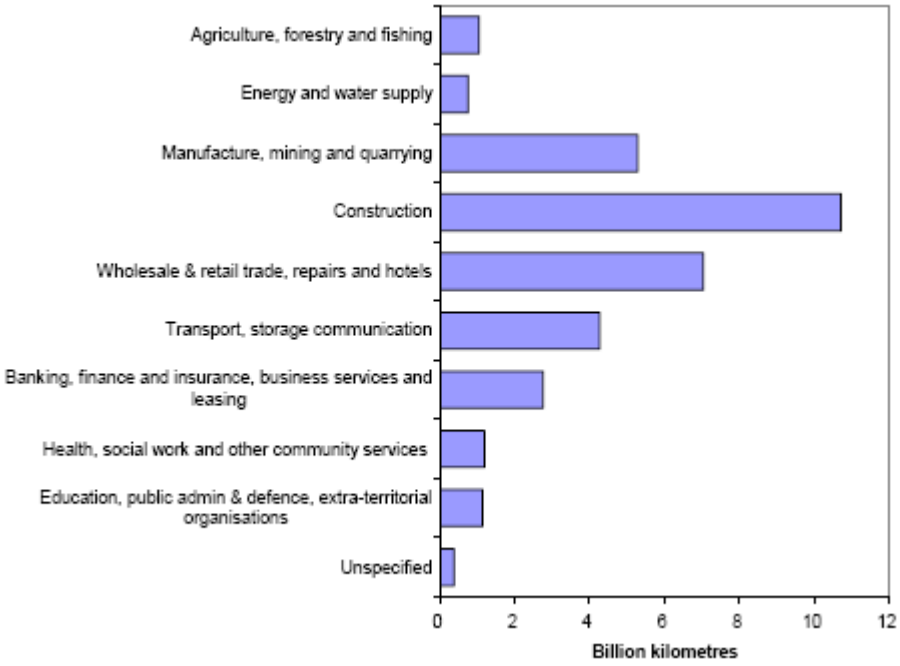
Survey work among LGV operators in the London boroughs of Southwark and Lewisham in 2004/5 suggested that the majority of respondents' LGVs start operations between 06:00 and 09:00 and finish between 16:00 and 19:00. However, ten of the 82 respondents use their LGVs 24-hours per day. On average LGVs leave and return to their base in Southwark or Lewisham 4 times per day (Browne et al., 2005).

## 7.7 Industrial and commercial sectors using LGVs

As already discussed LGVs are used for both goods trips and service trips. In addition LGVs, unlike HGVs, are also used for private trip purposes such as personal shopping trips, visiting friends and relatives and leisure trips.

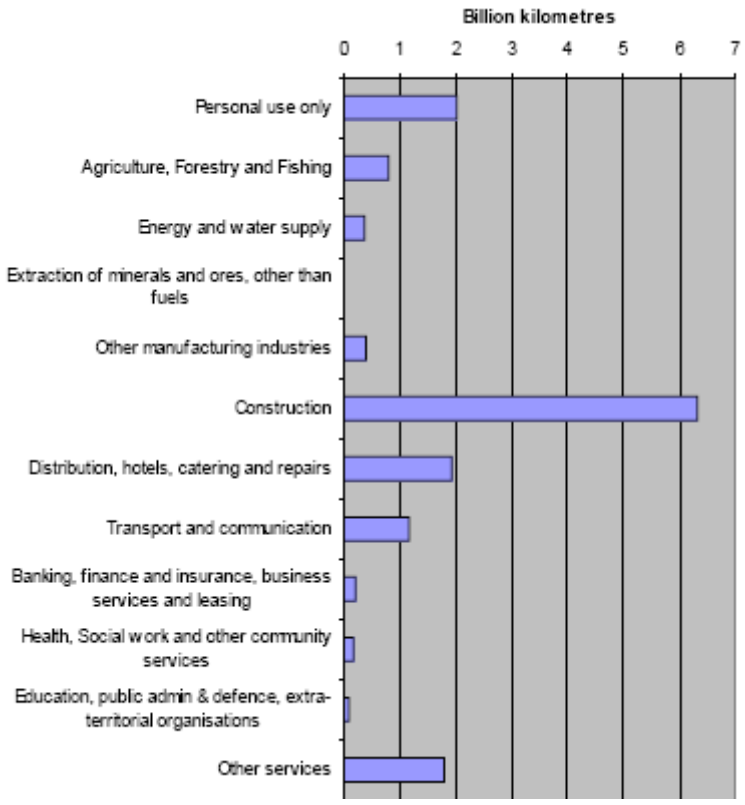
Figures 12 and 13 (taken from the DfT Company and Privately Owned Van Surveys) show the vehicle kilometres performed by company and privately owned LGVs by type of business the vehicle undertakes. The construction industry accounted for the greatest proportion of vehicle kilometres travelled in the case of both privately owned and company owned LGVs (accounting for approximately 50% and 30% of total vehicle kilometres travelled for business purposes respectively). The wholesale and retail trade accounts for approximately one fifth of vehicle kilometres travelled by company LGVs (DfT, 2004a; DfT, 2006a).

**Figure 12: Company owned LGVs: Estimated vehicle kilometres by type of business LGV undertakes: Annual Average 2003 - 2005**




Source: DfT, 2006a.

**Figure 13: Privately owned LGVs: Estimated vehicle kilometres by type of business LGV undertakes, 2003**




Source: DfT, 2004a.

A wide range of industrial and commercial sectors make use of LGVs. A study in the London Boroughs of Southwark and Lewisham identified types of businesses that appeared to make substantial use of LGVs (this list is shown in Table 8 (Browne et al., 2005). As can be seen from Table 8 many of these businesses are using LGVs for service trips (that may also involve the movement of goods), rather than solely for goods transport. The main exceptions to this are the parcel carriers.

**Table 8: Types of businesses in Southwark & Lewisham that appear to make substantial use of LGVs**

| | |
|---|---|
| ▪ vehicle repair centres<br>▪ vehicle/van hire<br>▪ building contractors<br>▪ textile businesses<br>▪ carpet/flooring businesses<br>▪ joinery businesses<br>▪ plumbing and piping businesses<br>▪ drain cleaning<br>▪ plumbing and drain businesses selling to the trade<br>▪ glazing businesses<br>▪ windscreen suppliers/repairers<br>▪ paint suppliers<br>▪ tile and ceramics suppliers<br>▪ metal fabrication<br>▪ welders<br>▪ woodworking<br>▪ paper merchants<br>▪ office furnishing | ▪ laundries<br>▪ parcel carriers<br>▪ shipping companies<br>▪ storage businesses<br>▪ news and print distributors<br>▪ florists stores<br>▪ lighting and design<br>▪ theatre storage<br>▪ cleaning services<br>▪ music businesses<br>▪ printing, and graphics businesses<br>▪ charities and aid organisations<br>▪ medical supplies couriers<br>▪ catering companies<br>▪ food suppliers<br>▪ bottled water suppliers<br>▪ catering equipment hire businesses<br>▪ lift and escalator maintenance |

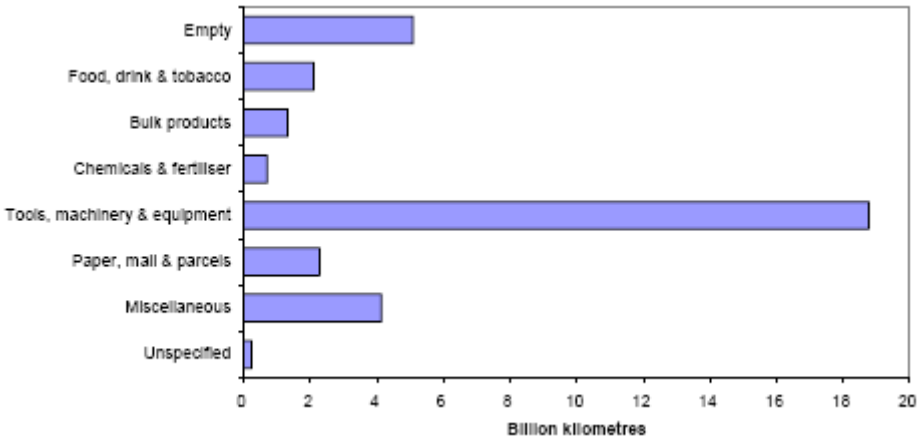
Source: Browne et al., 2005.

The above study found a concentration of businesses that use LGVs in locations where a considerable quantity of light industrial, office and warehousing space is located.

## 7.8 Type of goods carried by LGVs

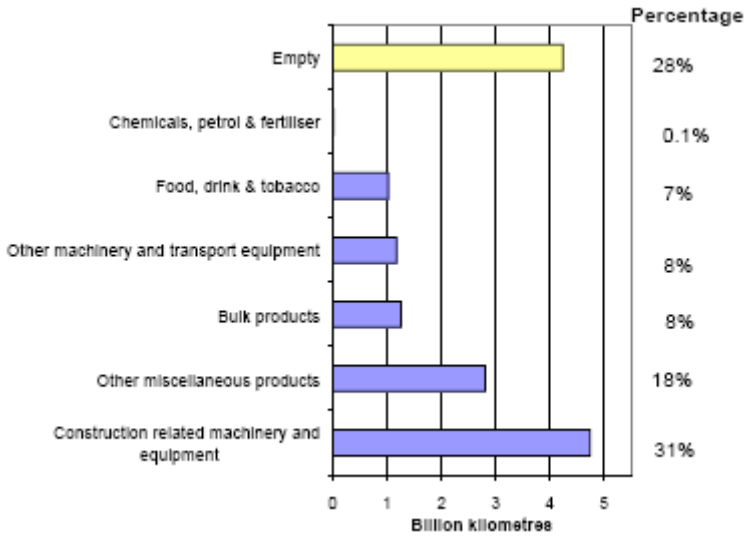
The DfT Company and Privately Owned Van Survey results show that the transport of tools, machinery and equipment accounted for almost 50% of all travel by company owned LGVs and approximately 40% of travel by privately owned LGVs. Company owned LGVs were empty for 15 per cent of total distance travelled, compared with 28% of distance travelled by privately owned LGVs (DfT, 2004a; DfT, 2006a) (see Figures 14 and 15).

**Figure 14: Company owned LGVs: Estimated annual vehicle kilometres by type of goods carried, annual average 2003-2005**




Source: DfT, 2006a.

**Figure 15: Privately owned LGVs: Estimated annual vehicle kilometres by type of goods carried, 2003**



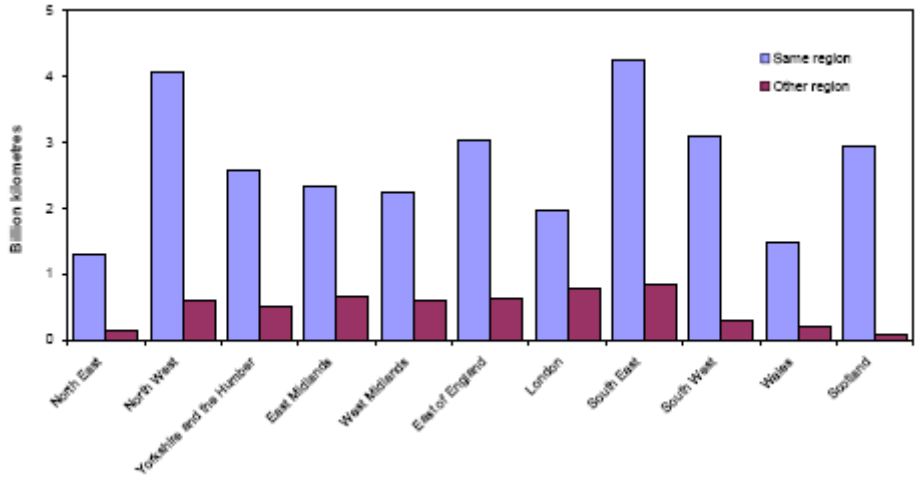

Source: DfT, 2004a.

## 7.9 Locations of LGV activity

The DfT Company Van Survey results show that more than 80% of distance travelled by company owned LGVs was for trips that started and ended in the same Government Office Region. Company owned LGV trips starting and ending in London accounted for approximately 70% of distance travelled on all trips that start in London (DfT, 2006a) (see Figure 16).

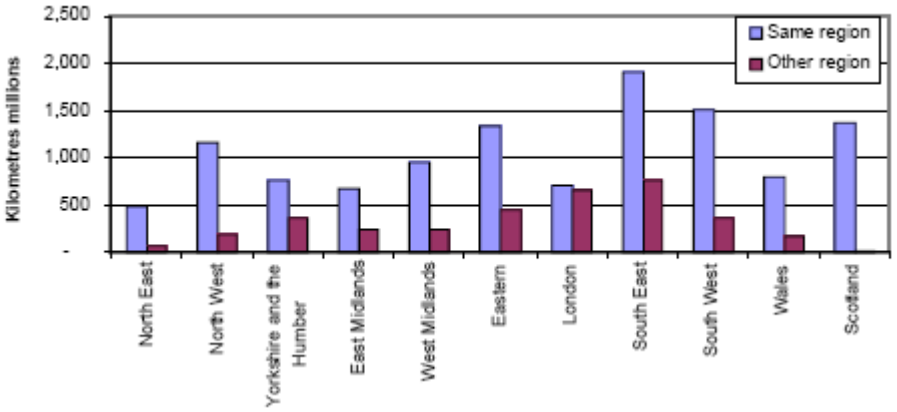
For privately owned LGVs almost 80% of distance travelled is on trips that both start and end in the same Government Office Region. Approximately 80% of privately owned LGV trips that start in London also finish in London (DfT, 2004a) (see Figure 17).

**Figure 16: Company owned LGVs: Estimated vehicle kilometres by origin and destination Government Office Region: Annual Average 2003 - 2005**




Source: DfT, 2006a.

**Figure 17: Privately owned LGVs: Estimated vehicle kilometres by origin and destination Government Office Region, 2003**




Source: DfT, 2004a.

The Company Owned Van Survey (DfT, 2006a) shows that residential destinations account for the greatest proportion of distance travelled (accounting for 37% of total distance), followed by storage and warehousing destinations (13%), industrial destinations (11%), offices (9%), retail sites (8%), and construction sites (8%).

The 1998 Renault Master White Van Man Study indicated that majority of LGV drivers (around 75%) carry out trips relatively close to home, and in urban environments (Social Issues Research Centre, 1998).

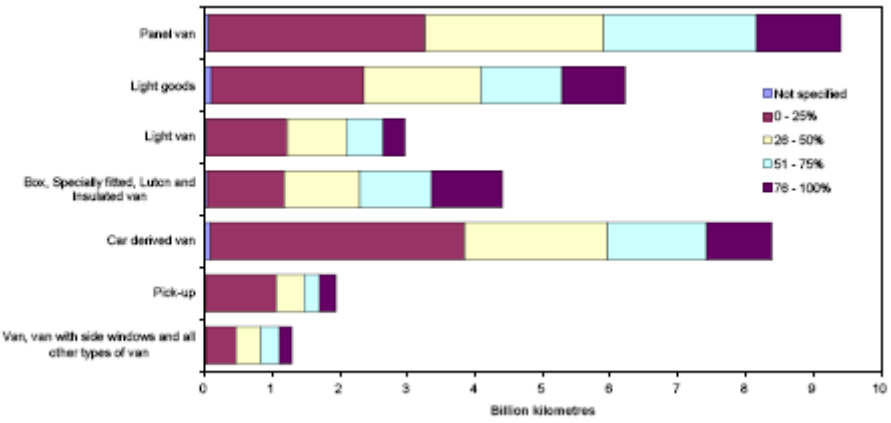
It has been argued that the fact that many LGV drivers know the local areas in which they operate so well makes them feel very territorial and provides them with confidence, leading to a perception of ownership on such roads (Social Issues Research Centre, 1998).

## 7.10 LGV capacity utilisation

The results of the DfT Survey of Company Owned LGVs showed that 38% of total distance was travelled with LGVs less than one quarter full, 27% was travelled with LGVs between one quarter and a half full, 20% was travelled with LGVs between a half and three quarters full, and that 14% was travelled with LGVs over three quarters full, and 38% with vans less than one quarter full (DfT, 2006a).

Pick-ups are the LGV body-type most likely to be travelling less than one quarter full; half (54 per cent) of the distance they travel was at this level of utilisation. While box, specially fitted, Luton and insulated LGVs are most likely to be travelling at least three quarter full; a quarter (24 per cent) of the distance they travel was at this level of utilisation (DfT, 2006a) (see Figure 18).

**Figure 18: Company owned LGVs: Estimated vehicle kilometres by type of LGV and utilisation of capacity: Annual Average 2003 – 2005**




Source: DfT, 2006a.

## 7.11 LGV fleet age and replacement cycles

Survey work among LGV operators in the London boroughs of Southwark and Lewisham in 2004/5 suggested that the majority of vans operated by respondents are less than five years old. Most respondents replace their LGVs every 3-5 years. However, 20% of respondents replace their LGVs according to mechanical condition rather than at a particular time interval (Browne et al., 2005).

Another survey in 2004 showed that “time and mileage” is the most widely used method of determining when to replace LGVs (70% of respondents), followed by “time only” (23%) (Cooke, 2004). For respondents replacing LGVs either wholly or partly based on time, 23% replaced vehicles every three years, 24% every four years, and 28% every five years. Fourteen per cent of respondents replaced their LGVs after six years or more (Cooke, 2004).

This 2004 survey of LCV operators found that outright purchase was the most popular acquisition method, followed by contract hire, and finance lease. There is a growing trend among operators to use several different acquisition methods for the same fleet (Cooke, 2004). Approximately 30% of respondents to this survey purchase used LGVs, especially those with fleet sizes of less than 20 vehicles.

## 7.12 LGV fuel consumption

Survey work among LGV operators in the London boroughs of Southwark and Lewisham in 2004/5 suggested that the majority of respondents felt that the rate of fuel consumption of their LGVs had not changed in the last five years. Eleven out of 78 companies surveyed operate LGVs powered by alternative fuels (Browne et al., 2005).

## 7.13 Overnight parking of LGVs

Survey work among LGV operators in the London boroughs of Southwark and Lewisham in 2004/5 suggested that very few of the LGVs operated by companies participating in the survey are parked on-street at the premises overnight. Approximately twice as many LGVs are taken home by drivers at night, compared to vans that are parked off-street at premises (Browne et al., 2005).

## 7.14 LGV theft

Research has shown that the theft of LGVs is common and represents a major problem for LGV operators (Brown and Saliba, 1998). The research involved analysis of stolen vehicle data, and a random survey of LGV owners. The results indicated that LGVs accounted for one in nine of all stolen vehicles in 1994/5 and that LGVs were three times more at risk of being stolen than HGVs. The recovery rate of LGVs was 41%, which was considerably less than the 59% recovery rate for all types of vehicles (but far greater than the 12% recovery rate for HGVs). Greater London was the region most affected by LGV thefts. London and the South East accounted for almost 30% of total LGV thefts. Two-thirds of LGV were found to be stolen from residential areas, while industrial estates accounted for 12% and shopping areas for 10% of thefts. Two thirds of stolen LGVs were parked in locations with no security. The total loss for unrecovered LGVs was estimated to be £122 million per annum, and the loss of their loads was calculated to account for a further £30 million per annum (which comprised tools and work equipment as well as goods). In addition other costs associated with LGV theft were the cost of buying a new vehicle, increased insurance premiums and the cost of hiring a replacement vehicle. Three per cent of companies were found to have ceased trading as a direct result of having the LGV stolen (Brown and Saliba, 1998).

## 7.15 Operational difficulties experienced by LGV operators

Survey work among LGV operators in the London boroughs of Southwark and Lewisham in 2004/5 showed that the three most significant problems they experience when driving are (in order of importance): bus lanes, the Congestion Charging Zone and traffic levels. The three most significant problems experienced by van operators when their vehicles are loading/unloading or parked are (in order of importance): lack of parking/loading bays, finding a legal parking place, and inconsistent or poorly trained parking attendants (Browne et al., 2005).

# 8 LGVS AND TRANSPORT POLICY

Existing policy measures for LGVs and HGVs operated in the UK differ in several ways. The key differences are summarised in Table 9.

**Table 9: Differences in policy measures for LGVs and HGVs in the UK**

| Policy area | Difference in treatment between LGVs and HGVs |
|---|---|
| Driving licence requirements | LGVs up to 3.5 tonnes can be driven with a standard car driving licence (Category B vehicle licence). Rules differ for driving vehicles over 3.5 tonnes gvw depending on when the category B driving licence was acquired. |
| Drivers' hours legislation | Drivers of LGVs are not subject to EU Drivers' Hours Regulations. As part of British Domestic legislation in the Transport Act 1968 the driver of an LGV when engaged in most professional activities should not drive for more than 10 hours per day and should not be on duty for more than 11 hours on driving days. Tachographs are not fitted in LGVs, thereby making the legislation difficult to enforce. |
| Operator licences | No requirement for an operators' licence (O-licence) for LGV (and therefore no need to demonstrate good repute, appropriate financial standing or professionally competent) |
| Speed limits | There are different speed limits for car derived vans up to 2 tonnes gvw, other LGVs and vehicles up to 7.5 tonnes gvw, and goods vehicles over 7.5 tonnes gvw |
| Operating restrictions (especially in urban areas) | LGVs not always subject to same time and access restrictions as imposed on HGVs. |

Source: Allen et al., 2003.

Some of these differences in transport policy may have actively encouraged the acquisition of LGVs. Policy makers have tended to pay very little attention to LGVs in comparison with HGVs.

However, with the growth in LGV traffic and the relative inefficiency of LGVs compared with HGVs when used to carry goods (in terms of road space and energy requirements per unit of product) it may be necessary for policy makers to reconsider whether such policy differences need to be reconsidered.

Some recent and further changes to LGV policy in the UK are discussed below.

## 8.1 Speed limiters

The range of vehicles requiring a road speed limiter was widened from 1 January 2005 to include newly registered goods vehicles over 3.5 tonnes up to 7.5 tonnes gross vehicle weight (previously these had only been compulsory for vehicles above 7.5 tonnes). This therefore includes goods vehicles between 3.5 and 7.5 tonnes that have van bodies. For 3.5-7.5 tonnes goods vehicles that are used solely for UK journeys speed limiters will become compulsory from 1 January 2008. Diesel-powered goods vehicles over 3.5 tonnes registered between 1 October 2001 and 31 December 2004 (inclusive) will also need to be fitted with a road speed limiter.

The limiter will restrict the maximum powered speed to 56mph (90km/h) for goods vehicles. Vehicles required to be fitted with a road speed limiter are prohibited from using the offside lane on 3 or more lane motorways. Once all the changes to vehicles requiring road speed limiters have come into force (i.e. after 1 January 2008), the national motorway speed limit for goods vehicles over 3.5 tonnes is likely to be lowered. This will result in all goods vehicles over 3.5 tonnes being restricted to the same speed limit, and will thereby reduce

any competitive advantage of older vehicles (which are not required to have speed limiters) (VOSA, 2004).

As mentioned in the UK Government Consultation document on these new speed limiter requirements," The costs and benefits of fitting speed limiters to the 'lighter' categories of vehicle covered by this Directive were fully debated at the time the Directive was under discussion in Europe. The UK – alone - took the view that the Directive would not be cost-beneficial" (DfT, 2003a). The Consultation document also noted that operators of vehicles affected by the new speed limiter legislation will feel three cost implications through (DfT, 2003a):

- "potentially marginally higher costs of new vehicles (although the additional cost is likely to be small, if anything at all);
- the cost of retrospectively having to fit speed limiters to existing vehicles (which in the main will probably simply involve 're-chipping' an engine) and,
- the additional costs arising due to longer journey times consequent upon the lower running speeds dictated by limiters".

## 8.2 Drivers' hours and tachographs

Drivers of goods vehicles not exceeding 3.5 tonnes gross weight are exempt from the EC drivers' hours rules and from the tachograph rules when operating anywhere in the European Community. Therefore, all LGVs are exempt from these EC regulations but goods vehicles over 3.5 tonnes with van bodies are subject to them (VOSA, 2005). All goods vehicles over 3.5 tonnes gross weight that first enter service from 1st May 2006 have to fit and use the new digital tachographs rather the old analogue equipment (DfT, 2006b).

LGVs are subject to UK Domestic Drivers' Hours Rules. These rules restrict a driver to not driving for more than 10 hours in a day (this limit applies to time spent at the wheel, actually driving). In addition, there is also a "daily duty limit". This states that "a driver must not be on duty for more than 11 hours on any working day. A driver is exempt from the daily duty limit on any working day when he does not drive. A driver who does not drive for more than 4 hours on each day of the week is exempt from the daily duty limit" (VOSA, 2005). The differences between the UK domestic rules and the EC rules are shown in Table 10.

**Table 10: Differences between the UK domestic rules and the ED rules on drivers' hours**

| Type of duty | UK Domestic rules | EC and AETR rules |
|---|---|---|
| Cumulative or continuous driving | None | 4½ hours |
| Daily driving | 10 hours | 9 hours (but this can be increased to 10 hours twice a week) |
| Weekly driving | None | Not specified |
| Fortnightly driving | None | 90 hours (weekly rest period must be taken after 6 consecutive daily driving periods – see question 17) |
| Maximum working day/duty time | 11 hours | Normally 13 hours (but see table at question 16) |

Source: VOSA (2005)

The differences between hours driven by LGV and HGV drivers were shown in a 2001 survey in which 53% of LGV driver respondents drove between 5-10 hours per day, and 2% drove more than 10 hours per day (Lex, 2001).

## 8.3 Euro engine emission standards

Emission standards for new light duty vehicles (i.e. cars and other passenger vehicles with up to 9 seats and LGVs of up to 3.5 tonnes weight) are currently defined by mandatory European Directive 70/220/. These standards are generally referred to as "Euro" standards. Different standards apply to petrol and diesel vehicles and LGVs are subdivided into three weight classes. The standards are defined as “performance requirements in terms of the maximum permissible mass of pollutants which may be emitted per kilometre travelled when a vehicle is tested on a specified driving cycle” (DfT, 2006h). These Euro standards have been progressively tightened over the last decade and from 1 January 2006 newly registered cars and car-derived LGVs had to comply with Euro 4 standards. Larger (class II & III) new LGVs currently have to meet Euro 4 standards from 1 January 2007. The pollutants regulated by these standards are carbon monoxide, hydrocarbons, oxides of nitrogen (NOx) and, in the case of diesel-engined vehicles, mass of particulate matter (PM). A proposal for Euro 5 standards also exists.

Table 11 shows the proposed Euro 5 emission standards for cars and LGVs, together with the percentage reductions relative to Euro 4 standards that these represent.

**Table 11: Proposed Euro 5 emission standards for cars and LGVs**

| | HC (mg/km) | NOx (mg/km) | PM (mg/km) |
|---|---|---|---|
| **Petrol Car & class I van** | 75 (25%) | 60 (25%) | 5[6] (N/A) |
| **Petrol class II van** | 100 (25%) | 75 (25%) | 5 (N/A) |
| **Petrol class III van** | 120 (25%) | 82 (25%) | 5 (N/A) |
| **Diesel Car & class I van** | (0%) | 200 (20%) | 5 (80%) |
| **Diesel class II van** | | 260 (20%) | 5 (88%) |
| **Diesel class III van** | | 310 (20%) | 5 (92%) |

Source: DfT, 2006h

It is expected that the emissions reductions for petrol vehicles “could be achieved via used of improved three way catalysts and/or engine measures such as internal Exhaust Gas Recirculation (EGR)”, and that the diesel PM requirements “are aimed at forcing the adoption of Diesel Particulate Filters (DPFs) on all vehicles” (DfT, 2006h). It is expected that Euro standards would be introduced in 2011.

The predicted annual emissions savings for the Commission proposal in the year 2025 in thousand tonnes and as a percentage of the baseline light-duty vehicle emissions inventory are shown in Table 12, assuming that the total car and LGV vehicle fleet is fully compliant with the new emission standards.

| Vehicle Type | Urban | Total UK | |
|---|---|---|---|
| | PM ktonnes (%) | NOx ktonnes (%) | PM ktonnes (%) |
| Petrol Cars & Vans | 0 (0%) | 8.4 (5%) | 0 (0%) |
| Diesel Cars & Vans | 4.86 (78%) | 24 (16%) | 10.95 (71%) |

**Table 12: Annual UK emission savings in 2025**

Source: DfT, 2006h.

Adopting these Euro 5 standards are expected to result in increased vehicle costs due to the need for more advanced technology. Cost estimates for petrol-powered LGVs are expected to range from £9 to £24 and for diesel-powered vans from £110 to £1047 (DfT, 2006h).
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# 9 IMPACTS OF LGV OPERATIONS

LGV operations are responsible for economic, social and environmental impacts in the same way as HGV activity. Negative impacts include contributions to congestion, involvement in traffic accidents, and a cause of noise disturbance, fossil fuel consumption, and pollutant emissions.

## 9.1 Economic impacts

As shown in section 4, LGVs are responsible for a greater proportion of vehicle trips and vehicle kilometres performed in the country as a whole and especially in urban areas than HGVs. This results in LGVs making a greater contribution to congestion than HGVs.

However, there are also positive economic impacts of LGV operations. These vehicle activities provide both goods and service flows that are fundamental to the economic vitality and competitiveness of industrial, trade and leisure activities. These vehicles play a key role in the successful functioning of a wide range of urban premises (both commercial and residential). In addition, a large number of people are employed in the operating, manufacturing, and maintenance of LGVs, as well as in various other support roles.

## 9.2 Social impacts

An LGV is less responsible than an HGV for noise disturbance, road damage and vibrations leading to building damage due to the lower gross weight of an LGV.

### 9.2.1 LGVs and traffic accidents

Given the large number of LGVs operated in the UK, and the total distance they travel, they are involved in many traffic accidents each year.

Analysis of STATS 19 accident database has shown that approximately 8% of all road casualty accidents in the UK had van involvement between 1999 and 2003 (including all vehicles with van-type bodies above and below 3.5 tonnes gross weight) (Lang and Rehm, 2006).

LGV accident rates in the UK have decreased by a greater proportion than the accident rates for all vehicles over the last decade. There was a 43% reduction in the accident rates per billion km for LGVs between 1993 and 2003. The accident rate for all vehicles decreased by 21% over this same period (Smith and Knight, 2005). However, since 1999 there was an increase in fatal accident rates involving LGVs between 1999 and 2003, resulting in LGVs being overrepresented in fatal accidents in the UK (Smith and Knight, 2005).

For accident involving vans and non-vans (the majority of which are cars), the percentage of slight, serious and fatal casualties between 1999 and 2003 were substantially lower for van occupants than non-van occupants (Lang and Rehm, 2006). Lang and Rehm (2006) note that, “This asymmetry can be attributed to the differences in mass between cars and vans….In effect, crash incompatibility between cars and vans tends to mean that risk is transferred from van occupants to car occupants in frontal collisions between the two types of vehicle.”

In terms of van driver age in accidents involving vans between 1999 and 2003, the 26-35 year old category accounted for the greatest proportion (32% of all van drivers), followed by 36-45 year olds (24%), 46-55 year olds (15%), and van drivers of 25 years of age or younger (18%) (Lang and Rehm, 2006).

Half of all causalities resulting from accidents in which vans were involved between 1999 and 2003 occurred on roads with a speed limit of 30 miles per hour (Lang and Rehm, 2006). Many of these roads are in urban areas (i.e. towns and cities).

Research into accident statistics in Germany suggest that van drivers were more often responsible for road traffic accidents than other drivers (Schepers & Schmid, 2004; Berg et al., 2004).

However, a UK survey of fleet managers in 2004 showed that 41% of respondents had lower accident rates for their LGVs than their car fleets, while 29% had the same accident rates for car and LGV fleets, and 29% had worse accidents for their LGVs than cars (Cooke, 2004).

Many LGVs are involved in urban collections and deliveries that require short distances between stopping points. As a result, up until March 2005, several EU Member States including the UK had introduced exemptions to seat belt use requirements for LGV occupants to assist the efficiency of their operations. However, since March 2005 these exemptions are only available for LGV drivers who are travelling less than 50 metres between stopping points (RoSPA, 2005).

A UK study in April 2002 found that only 64% of van drivers and only 51% of van front-seat passengers wore seat belts (PACTS, 2003). Another UK study found that only 47% of light commercial vehicle drivers involved in accidents were wearing a seatbelt when the accident occurred (Fay et al., 2002), while another UK study of 87 LGV driver fatalities found that approximately 50% were not wearing seatbelts (Smith and Knight, 2005).

### 9.2.2 LGV maintenance and operational safety

Official data suggests that an important proportion of LGVs are not well maintained and operate when overloaded. These can be important factors in accident involvement.

Annual MOT fail rates for LGVs are substantial. VOSA data shows that in 2004/5 MOT fail rates for LGVs of 3-3.5 tonnes gross weight were 33% (VOSA, 2006). The most common defects that resulted in these MOT failures were lights, steering, brakes and tyres.

In addition VOSA roadside roadworthiness tests on LGVs in 2004/5 resulted in 39% of LGVs examined being prohibited for mechanical defects (the main defect being tyre-related). Also, 7% of diesel-powered LGVs and 13% of petrol-powered LGVs failed roadside exhaust emission checks (VOSA, 2006).

Correct loading of LGVs is also important in terms of vehicle safety. In combination with low tyre pressure or excessive wheel load because of incorrect loading, the risk of a sudden blow-out is increased. The weight and distribution of the load also affects a van's handling characteristics (AA Motoring Trust, 2006). VOSA data shows that 30% of LGVs examined were prohibited for overloading offences in 2004/5 (VOSA, 2006). A German study has shown that 20% of LGVs involved in accidents on motorways were fully loaded or overloaded (Gwehenberger et al., 2004).

## 9.3 Environmental impacts

As discussed in section 3 the overwhelming majority of LGVs (more than 99%) run on either diesel or petrol, and consumed approximately 4.8 million tonnes of diesel and 0.5 million tonnes of petrol in 2005 (DfT, 2006b). As well as consuming this quantity of fossil fuel, it also results in the release of large quantities of pollutant emissions at the point of vehicle use. Table 13 shows the range of pollutants emitted and the relative quantity of each pollutant emitted per kilometre travelled in urban conditions by age of LGV. Table 13 also reflects the impact that Euro engine emission standards are having on LGV pollutant emission rates.

**Table 13: Emissions for LGVs (per vehicle kilometre) in urban conditions (Index: car without three-way catalyst pre 1993 = 100)**

| Type of LGV & Year | Carbon monoxide | Hydro-carbons | Oxides of nitrogen | Particulates | Carbon dioxide |
|---|---|---|---|---|---|
| **Petrol LGV** | | | | | |
| pre 1994 | 136 | 96 | 94 | 19 | 111 |
| 1994-1997 | 20 | 3 | 19 | 2 | 140 |
| 1998-2000 | 5 | 2 | 16 | 1 | 143 |
| 2001- | 4 | 1 | 7 | 1 | 136 |
| **Diesel LGV** | | | | | |
| pre 1994 | 10 | 19 | 81 | 187 | 143 |
| 1994-1997 | 5 | 9 | 63 | 51 | 143 |
| 1998-2001 | 5 | 9 | 60 | 53 | 143 |
| 2002- | 3 | 7 | 45 | 37 | 131 |

Note: Petrol LGVs pre 1994 were without three way catalysts. Petrol LGVs have had three way catalysts since 1994.
Source: Department of Transport, 2006b.

LGV use is also responsible for the consumption of large quantities of materials in the manufacture, maintenance and disposal of the vehicles.

# 10 APPROACHES TO REDUCING THE NEGATIVE IMPACTS OF LGV OPERATIONS

## 10.1 LGV driving behaviour

There has been relatively little research into LGV driver behaviour and company attitudes and actions towards driver behaviour.

A recent study has been carried out that involved in-depth interviews with four categories of LGV drivers to find out about how they operate and their attitudes towards road safety. (Lang, 2006). The four categories of LGV driver were:

- Employed dedicated LGVs drivers
- Employed tradesmen driving LGVs
- Self-employed dedicated LGVs drivers
- Self-employed tradesmen driving LGVs

The survey worked comprised detailed, qualitative interviews with a total of 18 LGV drivers. The results for the employed drivers and tradesmen interviewed indicate that most were unaware or uncertain of the existence of a written safety policy in their company. Employed drivers from smaller companies tended to feel that “they were not up to date with current legislation and guidance on driving and were not provided with information by their managers.” Driver training was not provided in any of the companies. The self-employed LGV drivers and tradesmen interviewed did not have written safety policies and did not carry out driving risk assessments.

A 2001 survey of 103 LGV drivers showed that they rated their driving behaviour as better than both HGV and car drivers (Lex, 2001).

## 10.2 LGV driver training

In terms of their driving behaviour, one study has found that LGV drivers tend to think of their driving skills as good and non-aggressive, but 'assertive'. The same study also found that approximately 10% of LGV drivers “confess to the odd motoring misdemeanour” (such as driving through red traffic lights, exceeding the speed limit, especially in urban areas (Social Issues Research Centre, 1998).

In terms of LGV drivers’ views of other road users, one study found that almost half felt that other motorists deliberately obstruct them or behave in an antisocial way towards them because they are driving an LGV (Social Issues Research Centre, 1998). LGV drivers felt that they received “better treatment from lorry drivers….but taxi drivers are perceived as a particular menace” (Social Issues Research Centre, 1998).

A 1998 study found that only approximately 5% of LGV drivers have received advanced driving instruction. These LGV drivers “were proud of their certificates…took their job more seriously and were more likely to distance themselves from other van drivers as a result (Social Issues Research Centre, 1998).

Survey work among LGV operators in the London boroughs of Southwark and Lewisham in 2004/5 showed that fifty-eight out of 79 companies responding to the survey do not provide driver training. Approximately half of the respondents do have specific policies for dealing

with instances of poor driving behaviour (Browne et al., 2005). A 2001 survey of LGV drivers found that 83% said they did not receive any driver training as part of their job (Lex, 2001).

A 2004 survey of LGV operators in the UK found that 48% of companies provided "some sort of training" to their drivers, the most commonly offered types of training were "defensive training", "in-house training", and "driver assessment" (Cooke, 2004).

The situation appears to be similar in Germany, with less than one third of LGV drivers stating in a survey that they had received driver training, and training for loading their LGVs and securing the load (Berg et al., 2004)

Additionally, a UK survey has shown that only one third of companies operating LGVs give their drivers any input into vehicle selection (Cooke, 2004).

The UK Department for Transport has recently established "SAFED for Vans". This is a driver training course that is "aimed at improving the safe and fuel efficient driving techniques of LGV drivers…It provides training and development for existing LCV drivers through instruction relating to vehicle craft and road craft" (DfT, 2006j). The proposed training course was also piloted with 25 LGV drivers in November 2005 to check the content and record its achievements. The results from this pilot study showed that "on average, the fuel economy improved by 9%, the drivers felt in more control of their vehicles and less stressed. The time the route took to complete was the same or shorter and the wear and tear on the vehicle reduced as a result of fewer stops and less gear changing (DfT, 2006j).

## 10.3 Company strategies to reduce the impacts of LGV operation

A 2004 survey of LGV operators in the UK suggested that 96% of respondents checked the driving licences of newly recruited drivers, 88% of respondents had a formal policy on LGVs and alcohol abuse, 85% of respondents had a formal policy on LGVs and drug abuse, and 80% of respondents had a formal policy on LGVs and mobile phone use. In addition, 74% of responding companies expected drivers to pay LGV parking fines themselves (Cooke, 2004).

A 2006 research study has indicated that there are some major differences between the views of LGV drivers and managers on LGV safety and training issues. Differences included the existence and communication of company driving safety policies, over which aspects of driving records were regularly monitored by the company (such as time, fuel consumption, accidents/incidents, penalty points and parking tickets), about whether time pressures were imposed on drivers by managers, and over driver induction and training (Lang, 2006). This is reiterated by the survey results presented in the previous section about driver training.

As previously mentioned, a 2004 survey of LGV operators showed that only 31% of responding companies had a strategy in place to reduce LGV mileage. The two most common approaches to achieving this were route planning and the use of telematics. Only 13% of the respondents used a telematics system in their LGVs, with higher penetration rates among larger fleets (Cooke, 2004).

## 10.4 Good Practice Material

Good Practice Material has been produced by the UK Government and freight transport trade associations to assist LGV (and HGV) operators and drivers with issues concerning: vehicle selection, fleet management, fuel management, driving behaviour, parking and loading, theft prevention, and the use of IT (for example see FTA, 2006; DfT, 2006j; DfT,

2005b; DfT, 2005c; DfT, 2005d; DfT, 2004c; DfT, 2003b; DfT, 2003c; DfT, 2001; DETR, 1998).

Survey work among LGV operators in the London boroughs of Southwark and Lewisham in 2004/5 suggests that the vast majority of LGV operators are not aware of, and do not make use of, such good practice material related to freight transport. Therefore, although there are national programmes that address good practice it would seem they are not reaching many LGV operators participating in the survey (Browne et al., 2005).

Research has been conducted into the operational efficiency of LGV operations of participating companies in three urban areas (Allen et al., 2003). His work studied the effiency of current operations of both LGVs and HGVs in several supply chains in different parts of the urban area, and then estimated the effects of potential policy measures on these operations.

A recent DfT Freight Best Practice Benchmarking project examined company operations in the next-day parcels sector (DfT, 2006k). Approximately two-thirds of the vehicles participating in this survey were LGVs, which are likely to have had greater involvement in collection and delivery work than in trunking operations. Key Performance Indicators (KPIs) were used to measure the operational and environmental efficiency of both collection and Delivery work and trunking operations.

## 10.5 Environmentally Friendly Vehicles

Most European cities are confronted with problems of air- and noise-pollution caused by road traffic. Air pollution is linked to a range of health problems including premature mortality, aggravation of respiratory and cardiovascular disease, asthma, bronchitis, and decreased lung function. Many studies also link exhaust gases to increased incidence of lung cancer. Noise is also becoming a major problem in urban areas (BESTUFS, 2005).

The introduction of environmentally-friendly vehicles (EFV) into urban transport is most common in Western European countries at present. Public authorities have made resources and financial support available to encourage innovative freight transport and logistics concepts including EFV and new vehicle technologies in urban areas, by a mix of incentives and regulations.

Main types of EFV include: (i) alternative fuels (including LPG, CNG, Bio-Fuels and Hydrogen-based-technology technologies and fuels already exist but significant market penetration has yet to be achieved), (ii) Diesel and petrol (Euro engine emissions standards for goods vehicles are helping to significantly reduce emissions particulate traps can be fitted to vehicles to capture particulates before they enter the atmosphere, (iii) electric and hybrid vehicles (electric vehicles are especially suitable to reduce noise emissions and produce no exhaust emissions), (iv) vehicle and loading equipment can also contribute to lower emissions and fuel consumption by improving the vehicle loading capacity. (this can reduce vehicle trips and total distance - equipment that can be of relevance includes container technology, trailer design or hold design). (BESTUFS, 2005).

The promotion and usage of EFV in urban freight transport has been encouraged by several urban authorities and national governments. Many municipal and national activities have started to encourage the use of EFV in urban freight transport. National programmes like the PIEK-programme (PIEK, 2003) or the French “National Programme on Goods in Cities” (Gerardin, 2005) have shown that national programmes and support measures can lead to successful results. Table 13 shows the types of EFV initiatives that exist or have been trialled in urban freight transport (BESTUFS, 2006).

**Table 13: Environmentally-friendly vehicle initiatives in urban freight transport**

| EFV initiatives in urban freight | Examples |
|---|---|
| 1. Informal partnerships: urban authorities, transport operators and urban businesses have come together to set up sustainable solutions based on a more environment-friendly form of urban freight transport | – The PIEK and DEMO programmes in the Netherlands, and night deliveries using silent vehicles and equipment in Barcelona |
| 2. Tax reductions and advantages for the use of EFVs, alternative fuels, and the installation of modern filter technology on diesel vehicles | – Lower rates of vehicle tax for goods vehicles that meet the required emissions criteria in UK & France<br>– Lower tax rates for alternative fuels in the UK & France |
| 3. Freight transport operators that have used EFVs for urban deliveries, often as part of research projects co-funded by public authorities | – Hermes Versand Service in Germany<br>– La Petite Reine in France<br>– L'Oreal/Gefco/EDF experiment with electric vehicles<br>– Monoprix/GEODIs experiment with CNG vehicles |
| 4. Special permission to access parts of the urban area such as shopping and business districts for vehicles that meet certain emission standards | – Environmental zone (Low Emission Zone) scheme in Sweden<br>– ELCIDIS project in La Rochelle Urban Consolidation centre in France which uses electric vehicles<br>– the Copenhagen trial in Denmark<br>– CUDE project in Malaga, Spain |
| 5. Road pricing schemes that provide discounts and exemptions for goods vehicles that meet certain emissions standards | – the London Congestion Charging Scheme in the UK<br>– the Heavy Vehicle Fee (LSVA) in Switzerland |
| 6. Funding of innovative research projects and trials in the field of urban freight transport by using EFV | – Programme National Marchandises en Ville in France (experiments of electric and CNG delivery vehicles in French cities)<br>– "Green truck experiment" under financial support of the ADEME-project and promotional support of the city of Paris |

Source: BESTUFS, 2006

Euro engine emission standards have played an important role in reducing the emissions of LGVs per kilometres travelled since the early 1990s. As discussed in section 8.3, future Euro standards for LGVs will help to continue to reduce emissions per kilometres travelled.

Alternative fuels that are less polluting than diesel are available for specially-designed or adapted LGVs. These include liquefied petroleum gas (LPG), natural gas (CNG/LNG) and electricity. Examples of UK companies that have adopted these fuels for LGVs are provided below.

Joynson Bruvvers Ltd (JBL) is a family-owned independent office supply company based near Oxford. They have a fleet of six LGVs, three of which run on LPG. The vehicles are used for multi-drop work around Oxfordshire, with a typical route involving 40 drops per day and a total monthly mileage of around 1,500 miles per vehicle. The LPG vehicles are used on all routes. The LPG vehicles emit 9% less $CO_2$, 46% less CO and 57% less HC and $NO_x$

than the comparable petrol vehicle. There is a small loss in payload volume and weight due to the additional LPG tanks. The total running costs of the LPG vehicles are similar to those of the diesel vehicles (DfT, 2002).

Sutton and East Surrey Water operate 21 bi-fuelled LPG/petrol-powered vehicles (3 cars and 18 LGVs) in their fleet of 156 vehicles. The 18 LPG Vauxhall Astra vans travel approximately 270,000 miles per year in total and it is estimated that using LPG will result in a total emission saving of nearly eight tonnes of $CO_2$ when compared to the petrol-fuelled vehicles. The LPG vans emit 11% less $CO_2$, 39% less CO and 33% less HC and $NO_x$ than the comparable petrol vehicle. The fleet manager, has estimated that the annual fuel cost savings are £17,000. The total additional purchase cost for the fleet of 21 LPG vehicles was £21,150 (compared to the petrol version). The company received a 75% grant from TransportEnergy PowerShift. The company therefore had to pay £5,290 in additional purchase costs, or an average of £250 per vehicle (DfT, 2003d).

There are currently several obstacles to wider use of EFVs. The main failure factors include: higher operational costs of EFV, an insufficient filling station (loading station) infrastructure, and reliability problems and defects resulting in high maintenance requirements of EFV (BESTUFS, 2005)

Most EFV projects are currently supported by public financial budgets. Private operators tend to only change their fleets if: there is a clear financial benefit for the company, there is an adequate alternative fuel station network, there are marketing benefits for the company, the company has a strong commitment to environmental issues, and suitable vehicles are available.

While some EFV initiatives have addressed LGVs, the majority have focussed on HGVs to date. A 2004 survey of LGV operators showed that only 23% of responding companies had a policy towards alternative fuels. Respondents with larger LGV fleets were more likely to have such a policy than those with smaller fleets. In addition, of those companies with no policy on alternative fuels, one third have not even considered the alternatives (Cooke, 2004).

# APPENDIX

**Uncertainty/Variance**

Demand for LGV trips can be highly unpredictable due to the nature of the work some of these vehicles carry out in terms of emergency supplies of goods and parts, and repair work performed by service personnel.

LGV drivers face uncertainty related to parking in urban areas. This has an impact on total journey time and hence response/delivery times.

The relative lack of data about LGV operations, especially in urban areas, leads to gaps in understanding and hence difficulties in developing suitable strategies and policy measures.

**Trends**

The LGV fleet and its usage have been increasingly relatively rapidly over a long period of time in Britain. Much of this growth in activity is taking place in urban areas.

**Measures**

Some performance measures were identified in the research reviewed.

Government data collection regarding LGV operations has included information about total distances travelled, average trip lengths, times of operation, and capacity utilisation (DfT, 2006a; 2005a, 2004b).

In the next-day parcels KPI study, KPIs were used for Collection and Delivery work and for Trunking Activities (DfT, 2006k). Approximately two-thirds of the vehicles participating in this survey were LGVs, which are likely to have had greater involvement in collection and delivery work than in trunking operations.

Collection and Delivery KPIs used were:
- Vehicle Fill (based on volume)
- Time Utilisation (over a 24-hour period)
- Fuel Consumption

Trunking Activity KPIs used were:
- Empty Running (percentage of miles run empty)
- Deviations from schedule

In a study that involved both LGV and HGV operations in urban areas the following performance indicators were used (Allen et al., 2003):

- <u>Operational indicators</u>
- Number of collections and deliveries per round;
- Time taken (per round and per collection/delivery);
- Vehicle fill at start of round;
- Time utilisation of the vehicle;
- Driving time and stationary time as % of total round time;
- Speed per round (including and excluding stops);
- Distance travelled;
- Proportion of deliveries on-street and off-street.

- Financial indicators
- Vehicle operating cost to distribution company of the vehicle rounds.

- Environmental indicators
- CO emissions;
- $CO_2$ emissions;
- $NO_x$ emissions;
- PM10 emissions.

**Methods/Techniques/Tools**

Much of the previous research into LGVs has involved the use of questionnaires and other surveys (such as trip diaries) to collect data about operations.

Some in-depth interviews have taken place with LGV drivers and operators.

**Sectors**

Much of the previous research and data collection has taken place with LGV operators in a wide range of sectors, rather than focusing on specific sectors. Sample sizes in existing data collection efforts make it difficult to dissaggregate this data for specific sectors.

**Geography**

Much of the material consulted in the literature review refers to LGVs at a national scale. However, some of the survey work reviewed has taken place at an urban scale.

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