



Internalising the External Costs of Light and Heavy Goods Vehicle Transport in London

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IMPORTANT NOTE:

The Department for Transport is currently producing revised external costs for LGV and HGV activity. The estimates of the total external cost of LGV and HGV operations in Britain in 2006 presented in this report will be subject to revision when these revised external costs are made available by the Department for Transport.

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Further details of the Green Logistics project can be found at:

<http://www.greenlogistics.org>

Further details of the Transport for London Freight Unit can be found at:

<http://www.tfl.gov.uk/businessandpartners/freight/1284.aspx>

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List of abbreviations

| | |
|-------|--|
| DEFRA | Department for Environment, Food and Rural Affairs |
| DfT | Department for Transport |
| EC | European Commission |
| ECMT | European Conference of Ministers of Transport |
| EEA | European Environmental Agency |
| FTA | Freight Transport Association |
| FVA | Foreign vehicle activity |
| gvw | gross vehicle weight |
| HGV | Heavy Goods Vehicle |
| LGV | Light Goods Vehicle |
| ppl | pence per litre |
| PM | Particulate matter |
| VED | Vehicle Excise Duty |

1. Introduction

Greater London is the UK's capital city and covers an area of 1579 km² (609 square miles). The economic success of London is dependent on the efficient movement of goods and services as well as people. The businesses and services in London support an economy that was worth £192bn in 2005 (GLA Economics, 2006). The London Plan forecasts that by 2025 in London there will be an increase in population of 900,000 to 8.3 million people, together with the creation of more than 847,000 additional jobs (Greater London Authority, 2004). This growth of London will lead to an increase in goods and service vehicle activity in London.

London had 16 million square metres of warehousing in 2003. This represents about 11 per cent of the total warehousing space in England. The south east of England had an additional 18.5 million square metres of warehousing space, much of which is also used to handle goods to and from London (Roger Tym et al., 2004). In 2004, 111,400 (3.3 per cent of the London workforce) were directly employed in organisations whose main activity involves freight transport and logistics. An additional 1.9 per cent of the London workforce was employed in freight and logistics activities in other sectors in 2004. Therefore a total of 5.2 per cent of London's workforce was employed in freight and logistics activities (175,000 people) (TfL, 2008a).

Road is by far the dominant mode for goods transport in London in terms of the weight of goods lifted. It has been estimated that road was responsible for 88% of freight lifted to, from and within London in 2005 (TfL, 2008a). London is a net importer, meaning that far more freight is unloaded in London, than loaded.

All goods vehicles (i.e. light goods vehicles – up to 3.5 tonnes gross weight, and heavy goods vehicles – over 3.5 tonnes gross weight) travelled a total of 5.2 billion vehicle kilometres on roads in London in 2006. Seventy nine per cent of these kilometres were performed by light goods vehicles, 16 per cent by rigid goods vehicles over 3.5 tonnes, and 5 per cent by articulated goods vehicles over 3.5 tonnes. Between 1995 and 2005 light, rigid and articulated goods vehicle kilometres on London's roads increased by 18 per cent, 15 per cent and 8 per cent respectively (TfL, 2008a).

Vehicle kilometres performed by light goods vehicles (LGVs) and heavy goods vehicles (HGVs) on London's roads accounted for 6.4 per cent and 3.7 per cent respectively of all vehicle kilometres performed by these vehicles on British roads in 2006; and 17.3 per cent and 22 per cent of all vehicle kilometres performed by these vehicles on urban roads in Britain in 2006.

LGVs and HGVs were responsible for 12 per cent and 3 per cent respectively of the vehicle kilometres travelled by all motorised road vehicles in London in 2005 (TfL, 2008a).

Approximately 137 million tonnes of road freight, carried on journeys by UK-registered vehicles with gross weights of over 3.5 tonnes, had its origin and/or destination in London in 2005. The road freight carried on journeys to, from and within London represented approximately 8 per cent of the total freight lifted in Britain by weight in 2005. For all journeys within, into and out of London in 2005, 27.7 per cent of vehicle kilometres were run empty. This compares with an empty running percentage of 27.4 per cent for all goods vehicle kilometres performed in Britain in 2005 (TfL, 2008a).

The two business sectors with the highest share of vehicle kilometres performed by company-owned LGVs to, from and within London in 2005 were: i) construction, and ii) wholesale and retail trade and repairs and hotels (TfL, 2008a). Travelling to and from work accounted for almost 40 per cent of total vehicle kilometres performed by company-owned LGVs on trips to, from and within London in 2005. The collection and delivery of goods accounted for almost 30 per cent of LGV vehicle kilometres, and travelling between jobs (i.e. service-related work rather than goods collection/delivery) accounted for 23 per cent of LGV vehicle kilometres (TfL, 2008a).

There were approximately 238,000 goods vehicles licensed with keeper's addresses in London in 2006. The vast majority of these are LGVs (i.e. up to 3.5 tonnes gross vehicle weight).

The Transport for London (TfL) Freight Unit has identified a series of policy measures designed to make logistical operations in London more sustainable in economic, social and environmental terms (TfL, 2007a). It is very difficult to forecast the net impact of these measures both individually and collectively because of uncertainty about the extent to which the environmental costs of freight transport are currently

internalised by taxation and the amount by which taxes might have to rise to enforce the 'polluter pays principle' in the freight sector.

The 'fair and efficient pricing' policy promoted by the European Commission (EC, 2001 and 2006) aims to ensure that all external damage caused by road traffic is fully internalised in the price of transport. It argues that pricing should be fair, meaning that 'polluters' are obliged to pay the marginal social cost of their activities, and efficient, giving them an economic incentive to reduce the negative effects of these activities (EEA, 2006). At an EU level, freight movement by all modes is responsible for a third of the total external costs of transport, with the movement of people accounting for the rest (INFRAS, 2004).

The purpose of this report is to estimate the total external costs imposed by LGV and HGV traffic in London and to measure the degree to which these externalities are currently internalised by duties and taxes paid by these goods vehicle users. An effort has also been made to include an estimate of the total cost of externalities imposed by foreign-registered HGVs operating in London.

Internal costs, sometimes referred to as market or private costs, are the costs borne directly by road freight transport operators. These costs consist of operating costs and capital investments in facilities and vehicles which eventually need to be replaced.

The adverse impacts of LGVs and HGVs impose external costs which are not borne by those who generate this freight traffic but by society as a whole. Hence, externalities are not normally taken into account in the decisions made by transport users. Internalisation measures aim to correct this anomaly by increasing the price of transport services in proportion to all the relevant social and environmental costs generated (Beuthe et al., 2002, Baublys et al., 2005). Placing an appropriate value on external costs of LGV and HGV activity is, therefore, fundamental to their internalisation.

External costs included in this calculation relate to the negative effects of air pollution, greenhouse gas emissions, noise, accidents and congestion. Goods vehicles' contribution to the cost of providing, operating and maintaining road infrastructure is not an externality as such, but has to be calculated to determine its share of road taxation. It is out of the remaining taxes that the environmental and congestion costs

should be recovered. For this reason, the calculation also includes LGVs' and HGVs' allocated share of infrastructure costs. See section 2 of the report by Piecyk and McKinnon (2007) for further discussion of these external costs. The results presented in this report have been derived using the same methodology that was developed as part of the Green Logistics project (Piecyk and McKinnon, 2007).

In order to produce this analysis, LGVs have been segmented into several categories based on three key attributes that affects the vehicle usage, fuel consumption, and emissions rates of the vehicles:

- Ownership (company- or privately-owned)
- Propulsion (petrol or diesel powered)
- Weight (car-derived – up to 1.8 tonnes gross weight, or 1.8 – 3.5 tonnes gross weight)

Please refer to another report produced as part of this project for further discussion of this LGV segmentation (Allen and Browne, 2008).

In the analysis presented in this report HGVs have been segmented into six categories of rigid and articulated vehicles based on gross vehicle weights:

- Rigid vehicles
 - Over 3.5 tonnes to 7.5 tonnes
 - Over 7.5 tonnes to 17 tonnes
 - Over 17 tonnes to 25 tonnes
 - Over 25 tonnes
- Articulated vehicles
 - Over 3.5 tonnes to 33 tonnes
 - Over 33 tonnes

Another report produced as part of the Green Logistics project has calculated the external costs of LGV operations in Britain, and compared these with the external costs of HGV operations (Allen, Piecyk and McKinnon, 2008).

2. Internalisation of the external costs imposed by British-registered freight vehicles in London

2.1. Taxes and charges borne by vehicle operators

A small proportion of LGVs run on petrol (approximately 3% of the British LGV fleet) while the vast majority run on diesel. HGVs are powered by diesel. In the UK ultra-low sulphur diesel and petrol are liable for fuel duty and for Value Added Tax (VAT) at a rate of 17.5% of the full retail price. Additionally, vehicle ownership incurs Vehicle Excise Duty (VED). Apart from one motorway link and a few tolled bridges and tunnels, there are no direct infrastructure charges in Britain.

The following calculations were based on the average bulk and retail diesel and petrol fuel prices at 1st July 2006 – 79.15 pence per litre (ppl) and 83.66 ppl, respectively for diesel, and 81.65 ppl and 83.32 ppl respectively for petrol (FTA, 2006). An assumption that 80% of fuel used will be purchased in bulk by drivers of HGVs and company-owned LGVs, and 50% purchased in bulk by drivers of privately-registered LGVs. A duty rate of 47.10 ppl for petrol and diesel at the 2006 level has been used to ensure the same base year for all calculations.

Although most LGV and HGV operators are VAT-registered and can recover this tax through VAT transactions, VAT passes along the supply chains and it is finally borne by one of the direct or indirect transport users. Hence, VAT is included in the estimate of the income generated by duties and taxes from LGVs and HGVs.

Estimates of the annual distance travelled by LGVs and HGVs in London obtained from TfL are based on road traffic counts (TfL, 2008), and have been used to calculate the amount of these taxes related to road freight activity in London. The vehicle kilometres travelled affects estimates of the total fuel duty and VAT on fuel collected from road freight operators. However, in reality these taxes are collected by the national government and do not accrue to London's government.

VED is paid nationally per vehicle per annum, and is therefore unaffected by distance travelled. In order to calculate VED for road freight in London, we have calculated the VED paid by road freight vehicles with keepers addresses in London (although this revenue accrues to the national government rather than London's government).

Obviously, far more road freight vehicles visit London to perform work than are kept in London. Therefore an alternative method for calculating London's VED is to calculate the proportion of all national road freight activity that takes place in London and allocate this same proportion of national road freight VED to London. This method was also used and produced similar results to the first method used (£27.4 million compared with £31.2 million for LGVs, and £13.0 million compared with £11.6 million for HGVs).

In 2006, it is estimated that £236 million was collected from LGV fuel duty, VAT and VED in London. Fuel duty, VAT and VED were responsible for 67%, 20% and 13% of this revenue respectively (Table 1).

| 2006 (£ million) | LGVs up to 1.8 tonnes gvw | | | | LGVs 1.8 – 3.5 tonnes gvw | | | | All LGVs |
|----------------------|---------------------------|------------|------------------|------------|---------------------------|------------|------------------|------------|--------------|
| | Company- owned | | Privately- owned | | Company- owned | | Privately- owned | | |
| | Diesel | Petrol | Diesel | Petrol | Diesel | Petrol | Diesel | Petrol | |
| Fuel duty (47.1 ppl) | 20.9 | 1.0 | 11.9 | 1.3 | 84.3 | 3.0 | 29.0 | 5.9 | 157.3 |
| VAT (17.5%) | 6.2 | 0.3 | 3.6 | 0.4 | 25.1 | 0.9 | 8.8 | 1.8 | 47.1 |
| VED | 2.7 | 0.2 | 3.9 | 0.4 | 10.3 | 0.5 | 11.2 | 1.9 | 31.2 |
| Total | 29.8 | 1.5 | 19.4 | 2.1 | 119.7 | 4.4 | 49.0 | 9.7 | 235.6 |

Table 1. Duties and taxes paid by LGV operations in London in 2006.

In 2006, it is estimated that £202 million was collected from HGV fuel duty, VAT and VED in London. Fuel duty, VAT and VED were responsible for 73%, 21% and 6% of this revenue respectively (Table 2).

| 2006 (£ million) | Rigid HGVs | | | | Articulated HGVs | | All HGVs |
|----------------------|----------------|---------------|--------------|-------------|------------------|-------------|--------------|
| | Over 3.5-7.5 t | Over 7.5-17 t | Over 17-25 t | Over 25 t | Over 3.5-33 t | Over 33 t | |
| Fuel duty (47.1 ppl) | 42.2 | 14.6 | 17.0 | 32.0 | 5.9 | 34.7 | 146.5 |
| VAT (17.5%) | 12.6 | 4.4 | 5.1 | 9.5 | 1.8 | 10.3 | 43.6 |
| VED | 1.7 | 0.7 | 1.9 | 3.6 | 0.3 | 3.4 | 11.6 |
| Total | 56.4 | 19.7 | 24.0 | 45.2 | 8.0 | 48.3 | 201.7 |

Table 2. Duties and taxes paid by HGV operations in London in 2006.

2.2. External cost of LGV and HGV operations in London

A spreadsheet has been constructed based on freight and traffic data from the government's Company Van Survey (DfT, 2004a), Survey of Privately-Owned Vans (DfT, 2004b), the National Road Traffic Survey (NRTS) (DfT, 2007a), traffic data from TfL (TfL, 2008b) and Vehicle Licensing Statistics data (DfT, 2007b; DfT 2008). It models the relationship between UK-registered LGV and HGV activity in London and a series of freight transport-related externalities, including climate change, air pollution, noise and congestion.

The estimates of congestion, noise and infrastructure costs are based on valuations provided by the DfT and used in a recently published report on the external costs of food distribution in the UK (DEFRA, 2007) (Table 3). The infrastructure, noise and congestion cost values were originally expressed in 2002 prices and have been inflated to 2006 values using the Retail Price Index (RPI). The cost of accidents was given in 2005 prices and RPI was again used to re-base it to the 2006 level.

| | External costs on urban roads (pence per km) |
|---|---|
| INFRASTRUCTURE | |
| LGV | 0.09 |
| Rigid HGV: over 3.5 tonnes to 7.5 tonnes | 2.44 |
| Rigid HGV: over 7.5 tonnes to 17 tonnes | 5.27 |
| Rigid HGV: over 17 tonnes to 25 tonnes | 7.53 |
| Rigid HGV: over 25 tonnes | 13.08 |
| Articulated HGV: over 3.5 tonnes to 33 tonnes | 9.46 |
| Articulated HGV: over 33 tonnes | 16.92 |
| NOISE | |
| LGV | 0.32 |
| Rigid HGV | 1.25 |
| Articulated HGV | 2.38 |
| CONGESTION | |
| LGV | 19.82 |
| Rigid HGV | 43.58 |
| Articulated HGV | 72.89 |
| ACCIDENTS | |
| LGV | 2.01 |
| Rigid HGV | 6.80 |
| Articulated HGV | 5.47 |

Table 3. Infrastructure, noise, congestion and accident costs on urban roads.

The estimates of emissions of carbon dioxide (CO₂), hydrocarbons (HC), nitrogen oxide (NO_x) and particulate matter (PM10) were derived from the National Atmospheric Emissions Inventory (NAEI)¹. In the NAEI spreadsheet “emission factors for CO₂ refer to 'ultimate CO₂', referring to all the carbon in the fuel emitted at the tailpipe as CO₂, CO, unburned hydrocarbons and particulate matter which ultimately have the potential in forming CO₂”. Carbon monoxide (CO) emissions were not, therefore, modelled separately. The cost of carbon emissions was

¹ Available online at: http://www.naei.org.uk/datachunk.php?f_datachunk_id=8

calculated using the values quoted by Clarkson et al. (2002). This cost was updated to the 2006 level in accordance with the Green Book (HM Treasury, 2003). The 'Air Quality Damage Cost Guidance' report (DEFRA, 2006b) was used to calculate the cost of PM10, NO_x and SO₂ emissions while the 'Damage Cost for Air Pollution' report (DEFRA 2006a) was the source of cost data on volatile organic compound (VOC) emissions (Table 4).

| Air pollution costs (£ per tonne) | LOW | MEDIUM | HIGH |
|-----------------------------------|-------|--------|--------|
| C | 45.85 | 85.27 | 164.10 |
| PM motorway | 11118 | 13627 | 16136 |
| PM rural | 11118 | 13627 | 16136 |
| PM urban | 74749 | 91618 | 108487 |
| VOCs | 0 | 1 | 2 |
| NO _x | 1407 | 1728 | 2050 |
| SO ₂ | 2290 | 2780 | 3269 |

Table 4. Air pollution costs (2006 prices).

The full external costs of LGV activity in London are shown in Table 5. These include environmental, infrastructural and congestion costs. The total external costs have been estimated at £979 million, £990 million and £1004 million in 2006 using, respectively low, medium and high emission cost values. This was equivalent to approximately 15% of the total external costs of LGV operations in Britain. The results indicate that a relatively small proportion of the total external costs of LGVs are accounted for by emissions costs (6-9% of total external costs). Company-owned diesel LGVs with a weight of 1.8 - 3.5 tonnes can be seen to be responsible for the highest proportion of total external costs, followed by company-owned diesel LGVs with a weight of up to 1.8 tonnes. This is due to the fact that these categories of LGVs are responsible for the majority of vehicle kilometres performed by LGVs.

| 2006 (£ million) | LGVs up to 1.8 tonnes gvw | | | | LGVs 1.8 – 3.5 tonnes gvw | | | | All LGVs |
|------------------|---------------------------|--------|------------------|--------|---------------------------|--------|------------------|--------|-------------|
| | Company- owned | | Privately- owned | | Company- owned | | Privately- owned | | |
| | Diesel | Petrol | Diesel | Petrol | Diesel | Petrol | Diesel | Petrol | |
| Low estimate | 168 | 6 | 97 | 8 | 495 | 12 | 170 | 24 | 979 |
| Medium estimate | 169 | 6 | 97 | 8 | 502 | 12 | 173 | 24 | 990 |
| High estimate | 170 | 6 | 98 | 8 | 510 | 12 | 175 | 24 | 1004 |

Table 5. Total external costs of LGV operations in London

The full external costs of HGV activity in London are shown in Table 6. The total external costs have been estimated at £773 million, £783 million and £795 million in 2006 using, respectively low, medium and high emission cost values. This was equivalent to approximately 15% of the total external costs of HGV operations in Britain. The results indicate that a relatively small proportion of the total external costs of HGVs are accounted for by emissions costs (7-9% of total external costs). At a national level, the heaviest articulated vehicles (with gross weights of over 33 tonnes) carry 72% of all road tonne-kms (DfT, 2007c) but are responsible for only around 47% of all the external costs of road freight transport. Conversely, rigid vehicles account for 48% of the total external costs while carrying only 24% of total tonne-kilometres. These differing proportions show how larger / heavier trucks have lower external costs per tonne-km, assuming loading factor and empty running figures at current levels.

| 2006 (£ million) | Rigid HGVs | | | | Articulated HGVs | | All HGVs |
|------------------|----------------|---------------|--------------|-----------|------------------|-----------|------------|
| | Over 3.5-7.5 t | Over 7.5-17 t | Over 17-25 t | Over 25 t | Over 3.5-33 t | Over 33 t | |
| Low estimate | 243 | 68 | 74 | 114 | 39 | 236 | 773 |
| Medium estimate | 246 | 70 | 76 | 115 | 39 | 238 | 783 |
| High estimate | 249 | 71 | 77 | 118 | 39 | 241 | 795 |

Table 6. Total external costs of HGV operations in London

The total external costs of all LGV and HGV operations in London have been estimated at £1.75 – £1.8 billion using, low, medium and high emission cost values (Table 7). As already mentioned, the external costs of LGV activities in London are estimated to be equivalent to 15% of the total external costs of LGVs in Britain, while the external costs of HGV activities in London are estimated to be equivalent to 11% of the total external costs of HGVs in Britain. This can be contrasted with the fact that LGVs and HGVs perform 6.4% and 3.7% of their total vehicle kilometres in

Britain on London's roads. The explanation for the disproportionate level of external costs these vehicles impose in London relative to their level of activity is due to the higher external costs imposed per vehicle kilometre in an urban area.

| 2006 (£ million) | LGVs | HGVs | Total |
|------------------|------|------|-------------|
| Low estimate | 979 | 773 | 1752 |
| Medium estimate | 990 | 783 | 1783 |
| High estimate | 1004 | 795 | 1799 |

Table 7. Total external costs of LGV and HGV operations in London.

Table 8 shows the proportion of total external cost accounted for by emissions, infrastructure, noise, congestion, and traffic accidents for LGV and HGV operations in London based on the medium emissions cost values. Congestion comprises a greater proportion of total external costs in London for LGVs than for HGVs (but it is also by far the greatest cost category for HGVs). Infrastructure costs are the second most important cost category for HGVs, but the least important for LGVs. Focusing on CO₂ emissions, climate change costs represent approximately 2.5% of the total external costs of both HGV and LGV operations in London (compared with 8% for HGVs and 4% for LGVs nationally).

| 2006 (proportion of total external cost) | LGVs | HGVs |
|--|------|------|
| Emissions | 7% | 8% |
| Infrastructure | 0% | 11% |
| Noise | 1% | 2% |
| Congestion | 83% | 70% |
| Accidents | 8% | 9% |
| Total | 100% | 100% |

Table 8. Importance of external cost categories for LGV and HGV operations in London (using medium emission cost values).

2.3. External cost of road freight operations in London

However, whereas HGVs are used almost entirely for the collection and delivery of goods, LGVs perform a wide range of other activities in addition (this includes providing a wide range of commercial services to establishments, for commuting to and from work, and for personal trips). LGV trips can therefore be subdivided into

categories based on the trip type (i.e. whether the trip is primarily carried out for to collect or deliver goods or not – “freight” or “non-freight”) and the trip purpose (i.e. whether the trip is for commercial or personal reasons). This classification is more fully described in another report written as part of this project (see Allen and Browne, 2008). Using this LGV trip type/purpose approach LGV trips can be divided into four options: i) Commercial freight trips, ii) Commercial non-freight trips, iii) Personal freight trips, and iv) Personal non-freight trips. Commercial non-freight trips can be further disaggregated into commuting trips (i.e. journeys to and from work) and all other commercial non-freight trips ((including service-related trips, the carrying of personnel, and empty trips by goods carrying vehicles), giving a total of five types/purposes for LGV trips. Table 9 provides an estimate of the proportion of total LGV vehicle kilometres associated with each of these LGV trip types/purposes for company- and privately-owned LGVs in Britain. .

| Trip type/purpose | Company-owned LGVs | Privately-owned LGVs | All LGVs |
|--|--------------------|----------------------|----------|
| Commercial: non-freight (i.e. service) | 30% | 15% | 25% |
| Commuting | 32% | 45% | 36% |
| Commercial: freight (i.e. delivery/collection) | 34% | 23% | 30% |
| Personal: freight and non-freight | 4% | 17% | 8% |
| Total | 100% | 100% | 100% |

Note: Company-owned LGV data is average for 2003-2005. Privately-owned LGV data is for October 2002- September 2003.

Table 9. Estimate of the proportion of total LGV vehicle kilometres accounted for by trip type/purpose.

Table 9 shows that LGV commercial freight trips (i.e. those involved primarily with the collection and delivery of goods) only account for 34% and 23% of LGV vehicle kilometres for company- and privately-owned LGVs respectively. Commuting accounts for 36% of all LGV vehicle kilometres, while commercial non-freight trips account for 25% of all LGV vehicle kilometres. Personal trips account for 8% of all LGV vehicle kilometres.

Table 10 shows the estimated LGV external cost estimates for London operations associated with these five LGV trip types/purposes for company- and privately-owned LGVs, using medium emission cost values. This estimate has made use of the national proportions of total LGV vehicle kilometres for each of the five trip types/purposes shown in Table 9.

Analysis of trip types/purposes for company-owned LGV trips in London from the 2003-2005 Company Van Survey indicate that using this national data for producing the London external cost estimate is acceptable as, in the case of company-owned LGVs, the proportion of kilometres accounted for by different trip types/purposes is broadly comparable. This analysis shows that specifically for trips to, from and within London by company-owned LGVs, commuting trips accounted for 38% of vehicle kilometres (compared with 32% nationally), and commercial freight and commercial non-freight trips each accounted for 29% of vehicle kilometres (compared with 34% and 30% of vehicle kilometres nationally).

| 2006 (£ million) Trip type/purpose | Company- owned LGVs | Privately- owned LGVs | All LGVs |
|---|--------------------------------|----------------------------------|-----------------|
| Commercial: non-freight (i.e. service) | 206 | 45 | 250 |
| Commuting | 223 | 136 | 360 |
| Commercial: freight (i.e. delivery/collection) | 232 | 69 | 302 |
| Personal: freight and non-freight | 27 | 52 | 79 |
| Total | 688 | 302 | 990 |

Table 10. Total external costs of LGV operations in London by trip type/purpose and vehicle ownership (using TfL road traffic count estimates of vehicle kms and medium emission cost values).

The results in Table 10 indicate that LGV commuting trips (to and from work) were responsible for external costs in London of £360 million in 2006, followed by LGV commercial freight trips (approximately £300 million), LGV commercial non-freight trips (£250 million) and personal trips in LGVs (approximately £80 million).

Table 11 compares the external costs associated with LGV commercial freight trips (i.e. collection and delivery of goods) with HGV trips in order to provide an estimate of the external costs associated with freight transport activity by LGVs and HGVs.

| 2006 (£ million) | LGVs | HGVs | Total |
|--------------------------|------|------|-------|
| Commercial freight trips | 302 | 783 | 1085 |

Table 11 . Total external costs of LGV and HGV commercial freight activities in London in 2006 (using Van Survey and CSRG estimates of vehicle km and medium emissions cost values).

It is estimated that the total external costs of road freight activity in Britain in 2006 was £1.1 billion (when using medium emissions cost values - see Table 11). HGVs account for 72% of these external costs and LGVs for 28%. This compares with the estimate of the total external costs of all LGV and HGV activity in London in 2006 of £1.8 billion.

2.3. Degree of Internalisation of external costs by LGV and HGVs in London

The duties and taxes paid by British-registered LGV and HGV operators covered, on average, 27 per cent and 26 per cent respectively of the total external costs (i.e. environmental, noise, accidents, congestion and infrastructure costs) they imposed in London in 2006 (Table 12).

If congestion costs are excluded, LGV operators paid 55% more in duties and taxes than their allocated infrastructural and environmental costs in London. Meanwhile, HGV operators paid 85% of their allocated infrastructural and environmental costs in taxes and duties in London in 2006 if congestion costs are excluded (i.e. they still do not cover these allocated infrastructural and environmental costs).

| 2006 | LGVs | HGVs | Total (LGVs + HGVs) |
|--|------|------|---------------------|
| Total external costs | 27% | 26% | 26% |
| Environmental and infrastructural costs* | 155% | 85% | 115% |

Note: * Environmental and infrastructural costs is defined as total external costs excluding congestion costs

Table 12. Proportion of external costs covered by duties and taxes for LGVs and HGVs in London in 2006 (using medium emission cost values).

The extent to which the duties and taxes paid by each category of LGV covered the total external costs, and the allocated infrastructural and environmental costs (i.e. excluding congestion costs) imposed in London are shown in Figure 2. LGVs

covered from 21 - 42% of total external costs in London, and from 142 – 290% of allocated infrastructural and environmental costs depending on LGV category. The latter results reflect the importance of congestion costs in the total external costs that LGVs impose in London.

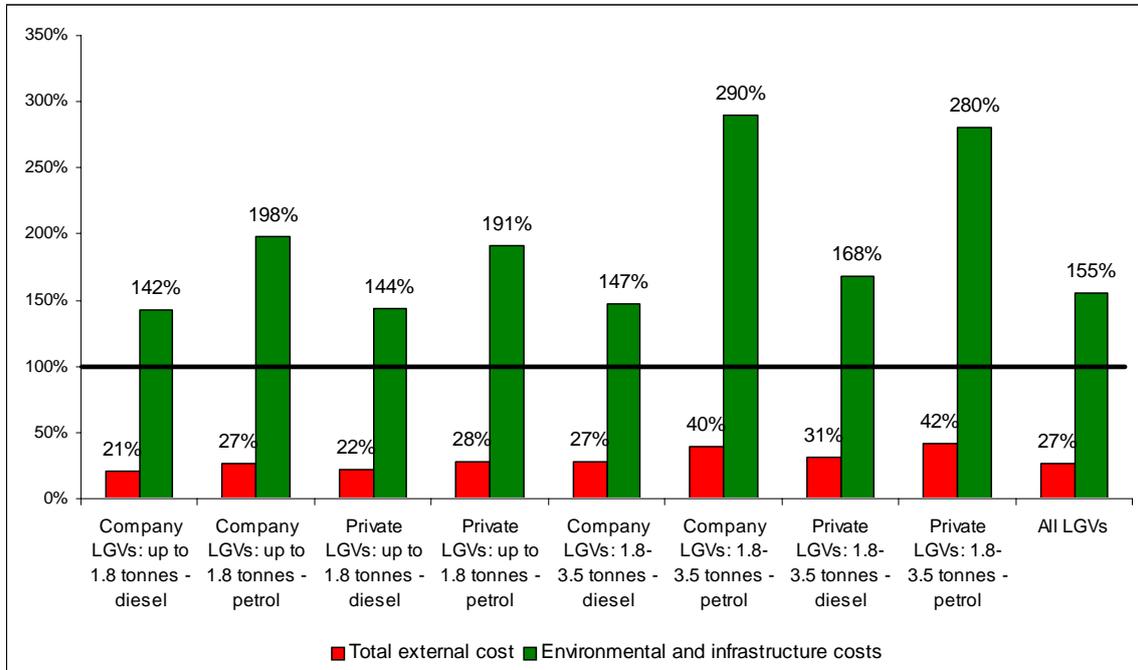


Figure 1. Internalisation of external costs by LGVs in London in 2006

The extent to which the duties and taxes paid by each category of HGV covered the total external costs, and the allocated infrastructural and environmental costs (i.e. excluding congestion costs) imposed in London are shown in Figure 2. HGVs covered from 21 - 39% of total external costs in London, and from 68 – 99% of allocated infrastructural and environmental costs depending on HGV category.

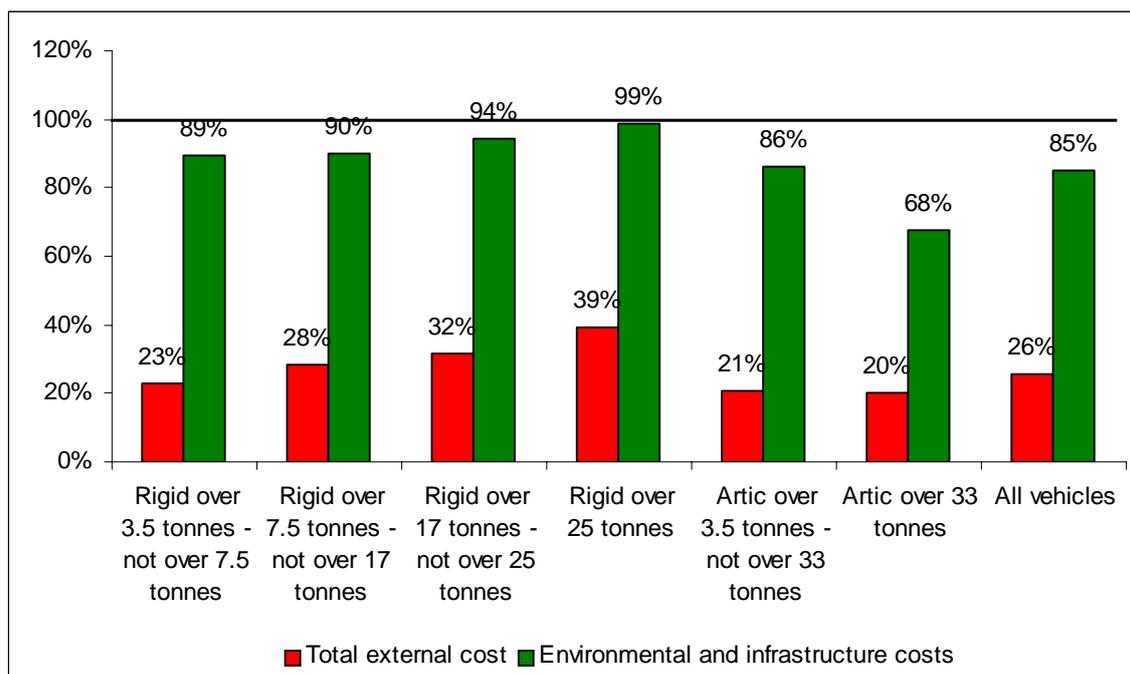


Figure 2. Internalisation of external costs by HGVs in London in 2006

In the light of recent re-assessments of the impact of climate change, these estimates of the degree of internalisation may turn out to be too optimistic. New research on the economics of climate change suggests that this element of external costs may have a significantly higher value than previously assumed. If so, the tax-to-cost ratio would be lower than calculated, reinforcing the case for sustainability measures to reduce the environmental damage done by road freight transport. The Stern report suggests that the cost of carbon should be around £265 per tonne in 2006 prices – roughly three times higher than the medium value of the social cost of carbon factored into the above calculations.

3. External costs imposed by foreign registered vehicles

The estimates of the external costs and their internalisation reported in Section 2 are based solely on the activities of UK-registered LGVs and HGVs. A significant proportion of HGV activity in the UK is undertaken by foreign-registered vehicles and this share has risen sharply over the past decade. According to recent estimates compiled by the DfT, the number of foreign-registered goods vehicles travelling each year between Britain and mainland Europe grew from 268,200 in 1985 to over 1.5 million in (DfT, 2007d). This foreign HGV activity imposes an additional burden on

the UK environment and transport infrastructure. This negative impact needs to be evaluated and included in the estimates of the external costs associated with road freight transport in London. As foreign trucks pay no vehicle excise duty in the UK and very little fuel duty, the degree to which their external costs are internalised in London is likely to be very much lower than that of UK-registered goods vehicles.

This section estimates the external costs imposed by foreign-registered HGVs (i.e. goods vehicles over 3.5 tonnes) travelling in London (both vehicles making collections and/or deliveries in London, and transit traffic). The methodology and cost estimates were the same as those used for the earlier analysis of British-registered HGVs. Foreign-registered LGVs have been omitted from the estimates as no data is available about the penetration of these vehicles. However, the proportion of foreign-registered LGVs operating in London is expected to be far smaller than is the case among HGVs.

A roadside vehicle number plate survey in December 2005 carried out on behalf of TfL, at 36 sites across the capital identified that, on average, 2% of HGVs were foreign-registered (results sites ranged from 0.1% to 4.7% - TfL, 2007b). It has been assumed that 2% of foreign-registered goods vehicles carry out 2% of road freight vehicle kilometres in London. This represented 21.4 million vehicle kilometres of HGV activity by foreign-registered vehicles in London in 2006.

The Survey of Foreign Vehicle Activity in Great Britain (FVA) carried out by the DfT in 2003 (DfT, 2003) provided data about the kilometres travelled by different weight categories of foreign HGVs in Britain. This survey showed that the vast majority of the total kilometres travelled by foreign-registered HGVs were performed by vehicles over 38 tonnes gw. The proportion of total distance travelled by foreign HGVs in Britain by the various weight categories used in the FVA survey was applied to the estimated foreign vehicle kilometres for London. It was then necessary to convert the HGV weight categories used in the FVA survey to the weight categories used in this study. This produced an estimate that foreign-registered rigid goods vehicles over 25 tonnes gw performed 0.7 million kilometres, and foreign-registered articulated goods vehicles performed 20.7 million kilometres in London in 2006.

The estimates of the total external costs of foreign HGV activity in London are presented in Table 13. These external costs range from £22.0 – £22.4 million depending on the whether the low, medium or high emissions cost values are used.

| 2006 (£ million) | Foreign-registered HGVs |
|------------------|-------------------------|
| Low estimate | 22.0 |
| Medium estimate | 22.1 |
| High estimate | 22.4 |

Table 13. Total external costs of foreign-registered HGV operations in London in 2006.

Based on medium cost emission values for foreign-registered HGVs, congestion constitutes 70% of their external costs, followed by infrastructure wear (16%), air pollution (6%), accidents (5%) and noise (2%).

Eighty-three per cent of foreign HGVs spend less than two days in Britain per visit and 93% of visits last three or fewer days (DfT, 2003). Given the average distance travelled per visit (640 km), foreign-registered HGVs can undertake almost all their haulage work in the UK using fuel purchased outside the country. As the average price of diesel fuel in France, Belgium and the Netherlands was 28% lower in 2006 than in Britain (McKinnon, 2007), foreign carriers have a strong financial incentive to fill their tanks before entering Britain. As a consequence, hardly any of the external costs imposed by foreign trucks in Britain (and London) are currently internalised. It is not known what proportion of the fuel consumed by foreign HGVs in Britain is actually purchased here. As this is likely to be very low, however, it can be safely assumed that the level of internalisation is minimal. If the estimated 21.4 million vehicle kilometres run by foreign-registered lorries in London in 2006 had been run using diesel fuel purchased in Britain at an average level of fuel efficiency, an extra £3.5 million in duty would have been raised for the UK Exchequer. Full internalisation of the external costs of foreign-HGV activity in London would have raised around £23 million in taxes.

4. Conclusions

This report has provided estimates of the total external costs of LGV and HGV operations in London. In 2006, total LGV and HGV activity imposed external costs of approximately £1.75 – £1.8 billion using, low, medium and high emission cost values. About 27 per cent of these costs were internalised by duties and taxes paid by LGV operators, compared with 26% in the case of HGVs. If congestion costs are

excluded, taxes and duties paid by LGV operators are estimated to be 155% of LGVs' allocated infrastructural and environmental costs, compared with 85% in the case of HGVs.

When using the medium emission cost values, LGVs accounted for 56% of these external costs in London and HGVs for 44%. However, analysis suggested that approximately 70% of LGV vehicle kilometres performed nationally does not involve the commercial delivery and collection of goods. Other important LGV trip types include commuting and performing services at customers' establishments. The total external cost of LGV commercial freight (i.e. collection and delivery of goods) trips has been estimated to be approximately £0.3 billion in 2006 (based on medium emission cost values). This compares with HGV external costs in London of approximately £0.8 billion, giving a total external costs of road freight activity in Britain in 2006 of £1.1 billion. Therefore, when only goods delivery and collection is taken into account, HGVs are responsible for a far greater proportion of total road freight external costs than LGVs (72% of the total external costs of £1.1 billion).

The duties and taxes paid by London-registered LGV and HGV operators covered on average 27 per cent and 26 per cent respectively of the total external costs (i.e. environmental, noise, accidents, congestion and infrastructure costs) they impose in London. In total (i.e. LGVs and HGVs combined) operators cover 26% of their total external costs.

If congestion costs are excluded, LGV operators paid 55% more in duties and taxes than their allocated infrastructural and environmental costs in London, while HGV operators paid 85% of their allocated infrastructural and environmental costs in taxes and duties in London in 2006.

Although, the monetary estimates of external costs vary widely at an international level (Walter et al, 2000), it seems likely that in 2007 the UK is still much closer to fully internalising the total external costs of its domestic road freight sector than most other EU countries.

Fuel duties and taxes on LGV and HGV use in Britain are very high by international standards. However, LGV and HGV duties and taxes would still need to be increased substantially to fully internalise all the externalities generated in London. Moreover, London-registered LGVs currently pay significantly more tax than required

to cover their environmental costs and share of road infrastructure costs (while HGVs only meet 85% of their environmental costs and share of road infrastructure costs).

The gradual upgrading of the LGV and HGV fleet to higher Euro emission standards and steady improvements in fuel efficiency will reduce the total value of emission-related externalities. Increases in official estimates of the social cost of carbon and in the level of traffic congestion in London, however, will tend to counteract this downward pressure on external costs. It is difficult to predict what the net effect of these conflicting cost pressures will be on the future degree of internalisation. The issue would be further complicated by the inclusion of road freight operations in the European Emissions Trading Scheme as has been recently discussed by Raux and Alligier (2007).

Awareness of the full costs of freight transport and service operations should help businesses to plan and manage their requirements in a way that achieves longer term sustainability. This may involve greater use of alternative modes, more localised sourcing, improved vehicle utilisation and even some relaxation of current just-in-time scheduling. If the higher freight costs associated with greater internalisation are passed down the supply chain, the purchasing behaviour of final consumers should also become more sensitive to the environmental impact of the distribution operations that keep them supplied with goods and services.

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