FreightBestPractice

Department for Transport

Key Performance Indicators for the Pallet Sector

Benchmarking Guide

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Foreword

Freight Best Practice is funded by the Department for Transport and managed by Faber Maunsell Ltd to promote operational efficiency within freight operations in England.

Freight Best Practice offers FREE essential information for the freight industry, covering topics such as saving fuel, developing skills, equipment and systems, operational efficiency and performance management.

All FREE materials are available to download from **www.freightbestpractice.org.uk** or can be ordered through the Hotline on **0845 877 0 877**.

KPIs are essential tools for the freight industry.

They provide a consistent basis for measuring transport efficiency across different fleets, comparing like with like.

This pilot benchmarking survey carried out in the pallet network distribution sector aimed to:

- Show participating companies how their own performance compared with that of others
- Highlight how the best operators in class are able to achieve their ratings

Operators in the pallet network distribution sector can use this benchmarking guide to identify real opportunities to maximise transport efficiency, reducing both running costs and environmental impact.

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Contents

1 Introduction

The pallet network sector has, in part, grown in response to operator pressures, allowing members to benefit from a degree of consolidation and pooling of resources around the UK. Network operation mirrors that of express parcel networks based around a central hub. As many as ten networks currently operate, with nightly throughputs of over 5,000 pallets through a single network now being achieved. The networks offer a range of service levels to customers that must be met by member companies, taking precedence over absolute efficiency and vehicle utilisation where necessary. However, belonging to a network opens up many ways to improve utilisation to members.

The sector offers a range of nationwide collection and delivery services to its customers, differentiating between next-day delivery and economy service (two or three-day delivery). Customers' consignments must be palletised and the maximum number of pallets per consignment is usually limited, typically to six pallets. Some networks differentiate further by offering consignment rates for half and quarter pallet loads, based on weight and/or height of the partly loaded pallet.

The main feature of the network is the hub through which all pallets are moved and transhipped. Each network comprises a number of individual freight transport companies, who belong to it through various contractual arrangements as members, licensees or shareholders.

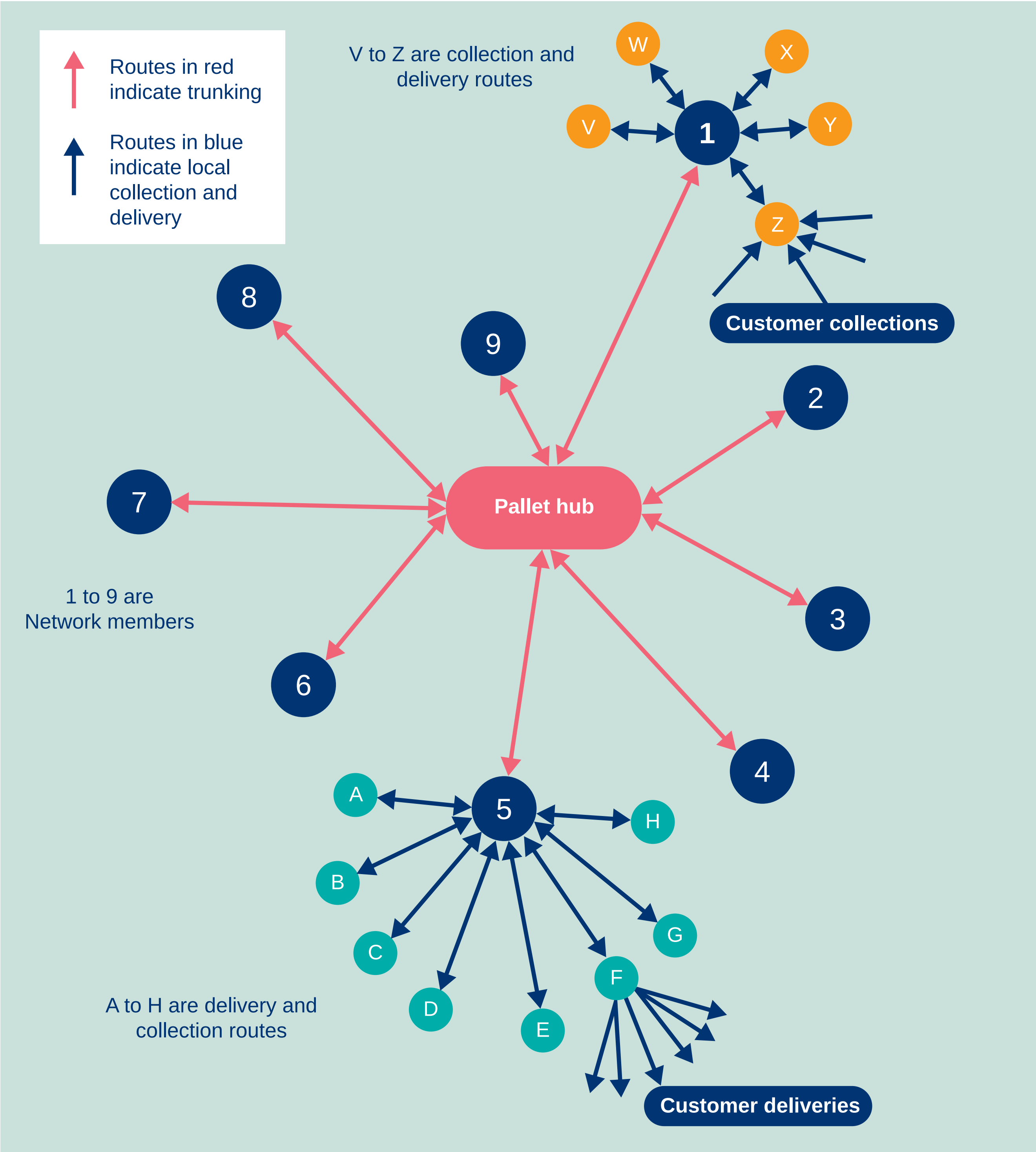
Companies tend to join and participate in a network to get extra throughput, and thereby improve their vehicle utilisation and efficiency. Vehicle utilisation is a key driver. By belonging to a network, companies benefit because:

- The network provides them with a cost-effective route for deliveries of their own consignments through other network members
- Network members generate delivery work for them that they would not otherwise get, contributing to improved fleet utilisation

Companies within a network collect palletised loads from their customers and make deliveries to network consignees within their designated delivery area, typically defined by a range of postcodes. Any consignments that they collect from their own customers for delivery outside their area are sent via the pallet network to the relevant delivery company, providing members with a more economical way of fulfilling their customer contracts. In the same way they also receive consignments from other member companies within the network for delivery within their area.

The hub and spoke working of a pallet network, showing how collections are routed through the hub to local delivery companies is illustrated in Figure 1 (overleaf).

Figure 1 Example of a Pallet Distribution Network



1.1 Study Steering Group

This benchmarking guide briefly describes how the survey was performed and the KPIs that were measured, as well as providing a detailed analysis of the results.

The survey was managed by The Logistics Business, on behalf of Freight Best Practice. A steering group, made up of representatives of three networks, Palletline Plc, Pall-Ex and The Pallet Network, guided the development of the study and agreed the KPIs to be measured. This ensured that the study met the needs of participating companies together with those of Freight Best Practice.

Full details of the survey methods, including a description of how pallet distribution networks operate can be found in 'Research Report: Key Performance Indicators for the Pallet Sector'. This can be downloaded from the Freight Best Practice website at **www.freightbestpractice.org.uk**

2 The Key Performance Indicators

The Five KPIs Measured During the Study were:	
1	**Vehicle Fill** - measured by the degree of loading against actual capacity by weight, volume (cube) and pallets carried
2	**Empty Running**
3	**Time Utilisation** - measured by seven categories of use, including being loaded or running on the road
4	**Deviations from Schedule** - covering any delay deemed to be significant, with causes such as congestion en route or hold-ups at delivery or collection points
5	**Fuel Consumption** - actual fuel used, correlated to factors such as loading and aerodynamic equipment

These KPIs were chosen because they meet a number of key requirements:

- Quantify energy use
- Relevant to operators
- Easily understood by those compiling the data
- Relevant to analysis of individual vehicles and fleets
- Relate to data already collected by operators to measure effectiveness
- Ease of comparison with other similar surveys

A range of additional data was collected in order to correlate actual energy consumption with other factors, including the use of delivery windows and use of aerodynamic equipment.

3 Survey Statistics

The survey was carried out over a continuous 48-hour period starting at 18:00 on 24th February 2004. A total of 17 fleets submitted data for analysis and comparison, although not all fleets provided data for all aspects. The results presented in this guide preserve the anonymity of the participating companies. Each company is given an individual survey report which highlights the data collected from their particular fleet on each KPI. This allows companies to benchmark their performance against others.

The two discrete activities of a network; local collection and delivery work and trunking to and from the central hub (see Figure 1), were monitored separately, as in most cases these activities involved different fleets. The results are reported in separate sections of this guide. Where vehicles were loaded with consignments received from the pallet network and others that had been generated locally, the full load and trip details were recorded to give an accurate picture of what the vehicles actually did.

A total of 183 vehicle combinations were monitored by the survey. This covered seven different vehicle types, ranging from 7.5-tonne rigid trucks to 44-tonne articulated vehicles, with the majority being curtain-sided. The most common vehicle types for collection and delivery work were rigid trucks up to 18-tonne gross vehicle weight (GVW), while most trunking work was carried out using 44-tonne articulated vehicles with double-deck trailers.

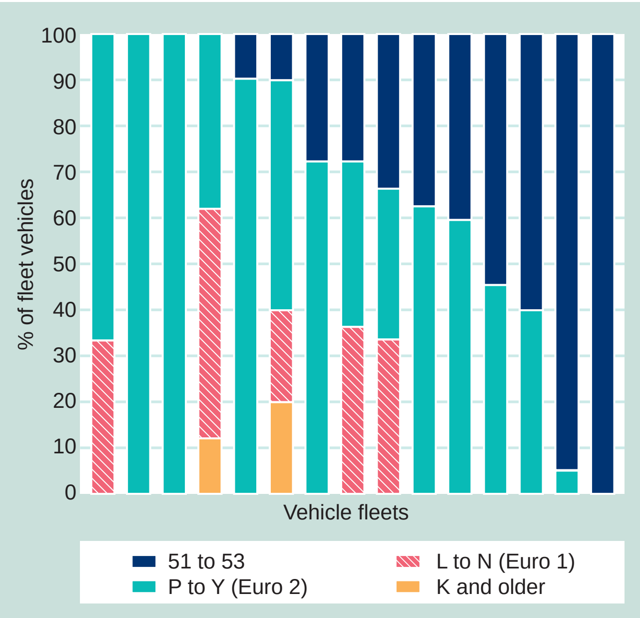
Over both network activities, a total of 295 trips were monitored, covering an overall distance of 65,880 kilometres in 2,450 individually monitored legs. The detail of vehicle numbers, legs travelled and pallets carried is shown in Table 1 (overleaf, page 4). The percentage of throughput moved by participants that originated from the pallet networks ranged from 20% to over 50%. As in many other sectors operators have noticed a trend towards smaller, more frequent deliveries. This can affect utilisation, but also make more consignments suitable for pallet networks. By monitoring these trends, their impact on operational effectiveness can be evaluated.

Table 1 Survey Statistics

Survey Data	Collection and Delivery	Trunking
Total vehicles	118	31
Tractor units	8	26
Rigid vehicles	105	0
Drawbar vehicles	0	2
Articulated trailers	13	29
Double-deck vehicles	2	19
Trips	238	57
Legs	2,273	177
Average legs per trip	9.55	3.11
Kilometres travelled	36,565	29,315
Average kilometres per leg	16	177
Average kilometres per trip	157	549
Pallets delivered	3,373	4,297
Pallets collected	1,465	2,474

The age of vehicles was determined by collecting their registration year index; grouped to correlate broadly with the various Euro engine specifications. The spread of vehicle age is shown in Figure 2. The total fleet comprised 41 vehicles registered since Euro III was introduced, 78 vehicles corresponding to Euro II specifications, 19 vehicles corresponding to Euro I specifications and 3 vehicles registered before the Euro engine specifications were introduced.

Figure 2 Age Profile of Survey Vehicle Fleets Grouped by Registration



4 Collection and Delivery Results

4.1 Vehicle Fill

Vehicle fill or utilisation was calculated from data relating to legs where vehicles were actually laden.

Vehicle fill was measured by comparing what each vehicle carried on each leg against its capacity, using weight capacity and deck length (represented by unit loads on industry standard pallets 1,200 mm x 1,000 mm in size). Both sets of results were weighted by the distance travelled for each leg. In previous Freight Best Practice surveys, fill was also measured by cubic capacity, but no participants in this survey recorded load cube. Generally, consignees do not provide this information, only details of the number of pallets and total consignment weight.

The limiting factor for most operators is the number of pallets that can be carried, with vehicle planning based on the capacity of each vehicle deck. Sometimes pallets can be stacked, if safety and type of goods allows, but there is usually insufficient prior knowledge of loads to plan for this. In addition, stacking could cause problems if any deliveries are refused, because space and accessibility will be restricted for the remaining collections and deliveries on the trip.

Although most vehicles start the day with a full load in terms of pallets, they are significantly under-utilised in terms of weight capacity. This reflects the fact that the average consignment is relatively light and non-stackable, either for reasons of safety or because of the possibility of damaging consignments.

The utilisation for each fleet is shown in Figure 3, with average utilisations of 32% by weight and 49% by deck length. If a vehicle was loaded to the maximum by weight or volume at the start of the trip and empty at the end, then, with reasonably consistent consignment sizes and uniform length legs, the average utilisation would be 50%. As vehicles are planned to be full on despatch, and as much as 60% full on return, the actual average ought to be higher. Closer examination of first and last legs (from an average of nearly 10 legs per trip) shows average utilisation by deck length of 78% and 40% respectively, and weight utilisation on first legs of 46%.

Figure 3 Percentage Vehicle Utilisation Across Vehicle Fleets for Collection and Delivery Work

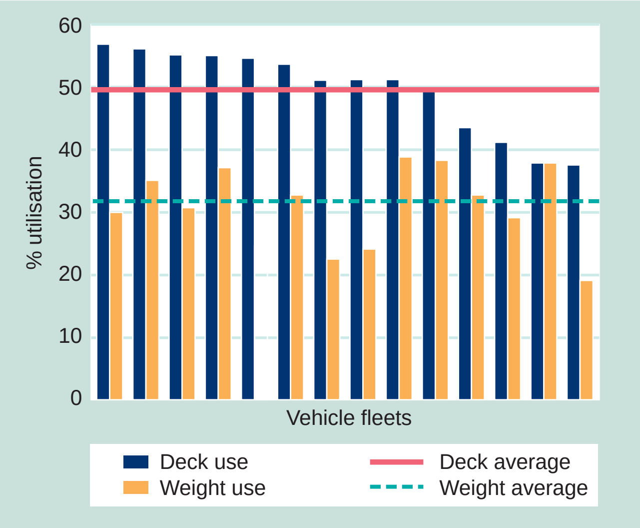
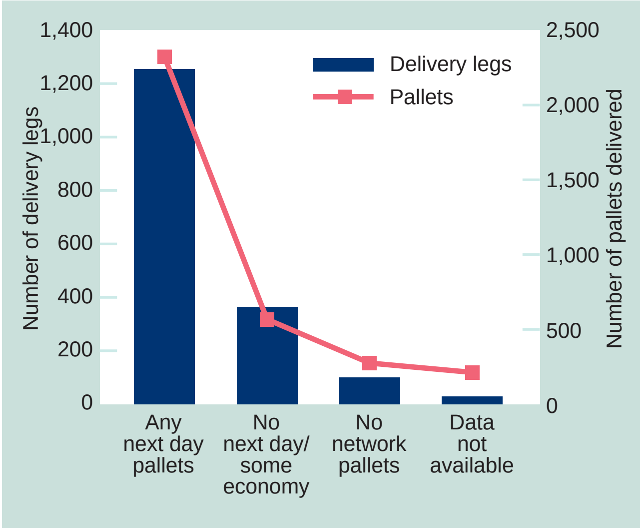


Figure 4 Delivery Legs and Pallets Delivered by Service Requirement and Source - Collection and Delivery



One limiting factor on utilisation for delivery and collection trips is the time taken to complete the schedule. In some operations this may limit what can be loaded, as can the finite length of a driver's shift.

Service requirement can also affect vehicle utilisation. Next-day consignments have to be delivered on the day they are received from the hub, which may result in vehicles being sent out with a lower fill. There is, however, some flexibility when delivering economy consignments with a two or three-day lead time, with pallets being loaded to suit the fleet operator and improve vehicle fill, as long as targets are met. In total 93% of deliveries made and 86% of pallets collected were on behalf of a network. Of 1,744 deliveries, 1,252 (or 72% of the total) included a next-day consignment, amounting to 2,325 pallets out of 3,373 (or 69% of the total), with the proportions varying considerably by fleet. The detail is shown in Figure 4.

A further factor affecting vehicle fill is that load planning is carried out on the basis of notified consignments. Sometimes these consignments do not reach the operator, for a variety of reasons, leaving space on the vehicle. Some re-scheduling may be possible, but there is usually little time for this without compromising other collections and deliveries.

4.2 Empty Running

With deliveries and collections being made during the same vehicle trip, there are few empty legs. Just 183 were recorded, or around 8% of the total, and, with an average of nearly 10 legs per trip, this is equivalent to approximately one empty leg per trip. This value compares favourably with empty running recorded for non-food retail fleets of 11%, where loaded return legs included those of only returnable assets or waste. It was rare for the surveyed fleets in the pallet sector to carry anything other than loaded pallets.

The distance run with no load added up to 4,664 km across all fleets, or 12.8% of the total distance run. Again, this compares favourably with the results from the 2002 food retail survey showing 19% of distance run empty, and with the average empty running of 26.5% recorded for the UK truck fleet as a whole in 2003 ('Transport of Goods by Road in Great Britain 2003', Transport Statistics Bulletin, Department for Transport (2004)).

4.3 Time Utilisation

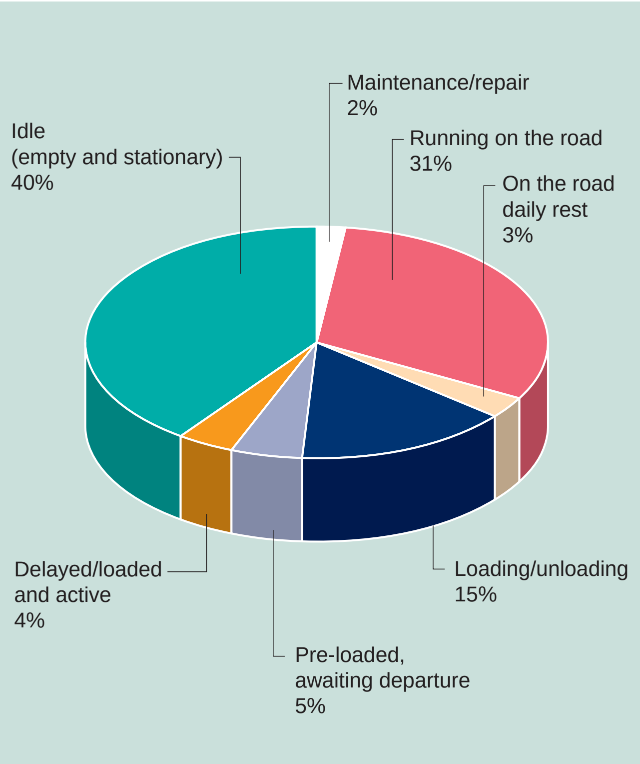
From an hourly audit of what vehicles were doing during the survey period, they were productive (i.e. in the process of being loaded/unloaded or running on the road) for only 46% of the time. Although this may at first sight look low, it reflects the fact that most operators are necessarily restricted by various factors to operating mainly between 07:00 and 18:00.

Allowing for safety inspections/maintenance (2%) and breaks from driving taken on the road (3%), vehicles were unproductive for 49% of available time. This suggests 12-hour working days, including the loading each morning and unloading for trunking to the hub each evening. In addition, most of these fleets generally work a five-day week, with most of the weekends spent idle, unless operators have additional uses and customers for their fleets.

Vehicles were idle and stationary for 40% of the time, as they are generally used during the standard working day, when customers require their service. This percentage is twice that for non-food retail fleets and nearly 50% more than that for food retail fleets. The balance of 9% covered delays and time spent pre-loaded or awaiting departure, which compares well with the 33% and 19% figures for non-food and food retail fleets respectively.

The various categories of use are summarised in Figure 5.

Figure 5 Summary of Typical Use of Collection and Delivery Vehicles During the Survey



The hourly audit is summarised in Figure 6. It is unlikely that the working day could be extended for most operators. The nature of hub and spoke networks means that consignments have to be at the hub for the same core time, and most of the operators' customers work within the 07:00 to 18:00 period. Using collection and delivery vehicles at night for trunk work would be inefficient, as three 18-tonne trucks would be needed to replace each 44-tonne double-deck trailer, as well as requiring two additional drivers. Operating costs would therefore rise, recruitment of suitable drivers may not be possible and overall fuel consumption would increase.

There may, however, be other work that fleet operators could find for the vehicles during the night, but vehicle availability must be guaranteed for the following morning otherwise the integrity of the network would be at risk.

4.4 Deviations from Schedule

Survey participants were asked to record delays affecting schedules against six possible reasons. Participating companies could attribute delays on each leg to more than one cause. The findings are summarised in Table 2 (on page 7).

Delays affected 833 legs, or 35% of all legs run, but included 929 instances of delay, giving an average of 1.1 delays per leg affected by a delay. Delays at delivery points or resulting from traffic congestion accounted for 75% of this total. These factors are outside the operators' control, although most will try to

Figure 6 Time Utilisation Profile for Collection and Delivery Vehicles

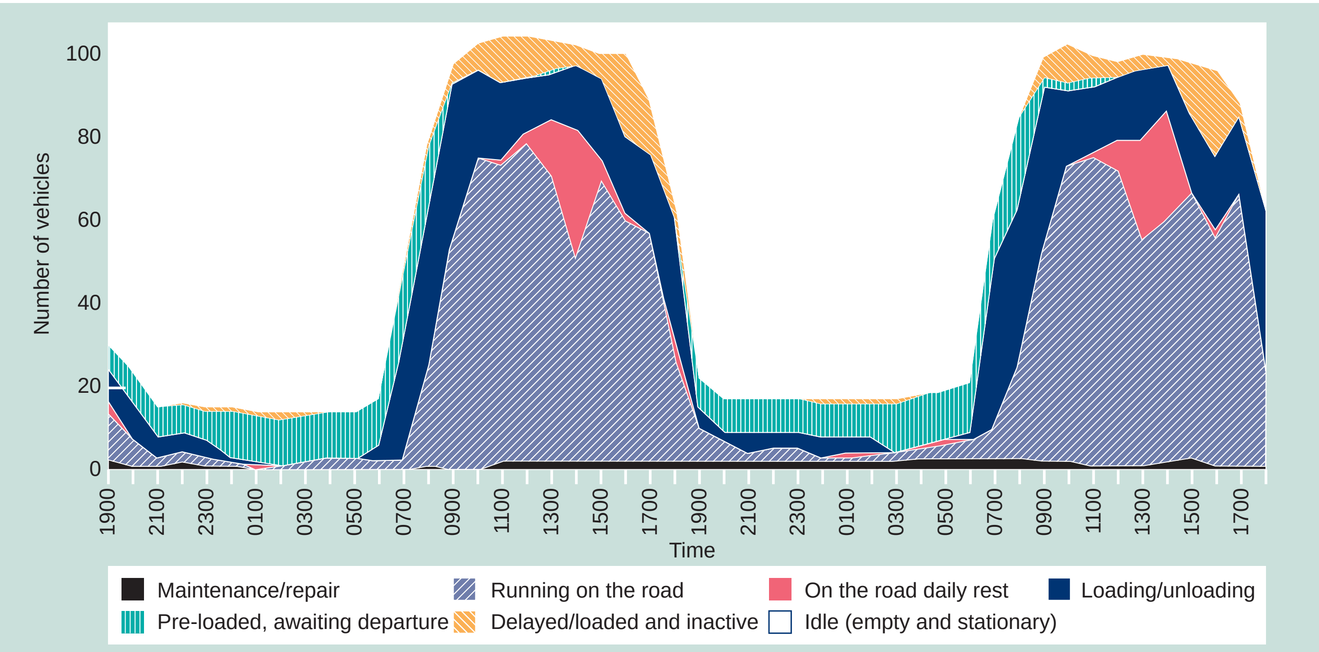


Table 2 Cause of Delay and Time Lost (where known)

	Cause of delay					
	No driver	Own company action	Collection point delays	Delivery point delays	Traffic congestion	Vehicle breakdown
Number of delays	6	70	152	381	316	4
Delays as % of all legs	0.26	3.08	6.69	16.76	13.9	0.18
Delays as % of delayed legs	0.6	7.5	16.4	41.0	34.0	0.4
Average delay (minutes)	24	22	23	16	11	68
Total delay (minutes)	142	1,541	3,522	5,983	3,530	270

avoid known congestion spots or make allowance within schedules for difficult delivery points, to 'hide' the cost of delay.

Each truck averaged nearly four delays per day, of 16 minutes each. In total, delays amounted to 250 hours during the survey period. With an average operating cost of £25 an hour, this is equivalent to £6,250 of wasted expenditure by the operators within the 48 hours. Over a year this would cost £6,886 for each vehicle or £812,500 for the entire sample fleet.

Collection and delivery vehicles make an average of nine calls per trip, so a delay early on in the schedule could impact on all those that follow. One typical plan allows 20 minutes per call irrespective of size, and another allows one hour per call including travelling. By monitoring the actual timings operators can find out whether delays are improving or getting worse, and identify difficult delivery locations for further action.

Delivery windows existed for 23% of consignments, and additionally it is accepted that the next-day service means delivery by midday. On average, operators suggested that 20% of their deliveries are timed, usually to customers such as grocery wholesalers. Of those timed deliveries, 37 (7.2% of the total) were late and 48 (9.3% of the total) were early. Failed deliveries totalled 11 (0.48% of the total), and six of these were refusals by consignees.

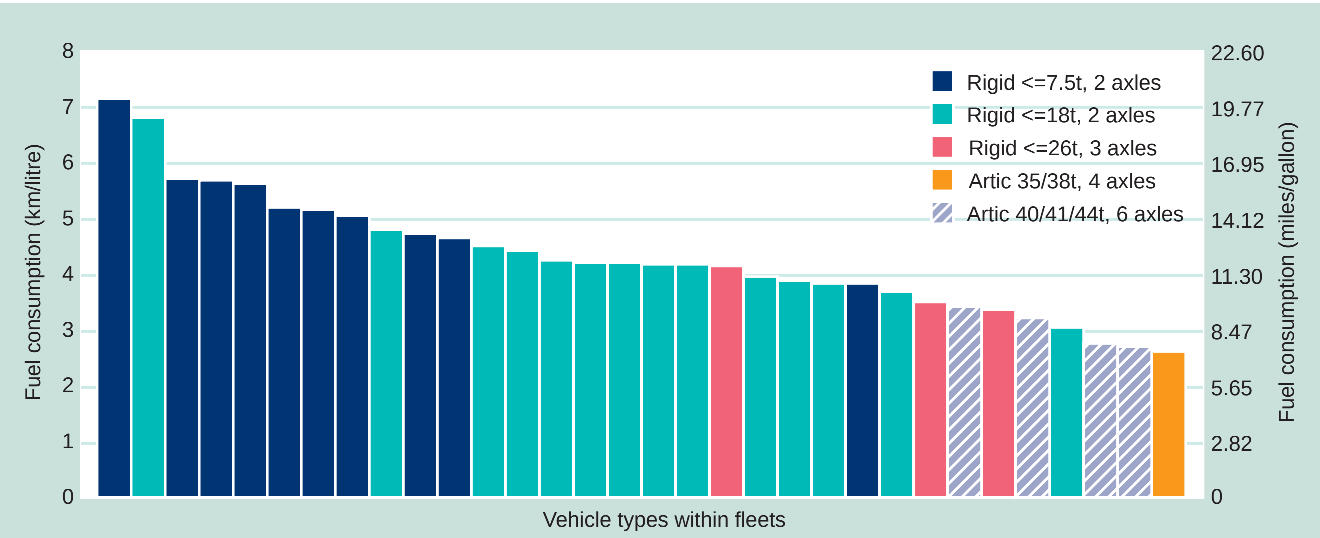
4.5 Fuel Consumption

Fuel consumption, measured in kilometres per litre, was recorded by vehicle type (tractors and rigids) for each fleet during the survey period.

The rate at which vehicles consume fuel is affected by a range of factors, including:

- The weight of vehicle and load
- The nature of the driving conditions and frequency of stops
- Driving technique
- The specification of the vehicle, including airflow management equipment and wheel rim sizes

Figure 7 Fuel Consumption by Vehicle Type within Each Fleet

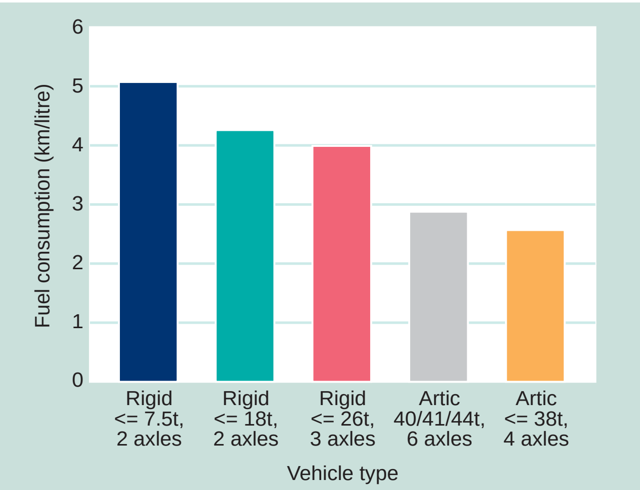


As expected, this range of factors led to a large variation in consumption rates recorded for each vehicle type in the different fleets. An analysis by vehicle type is shown in Figure 7.

The average figures for each vehicle type, across all fleets, are summarised in Figure 8. There are considerable variations in the rates achieved within the most popular vehicle types. Improving fuel consumption benefits companies by lower fuel costs and reduced vehicle emissions. For example, if a truck within the worst performing 18-tonne GVW fleet was able to improve its consumption from 3.03 km per litre to 4.28 km per litre (matching the average consumption), the resulting benefits would be:

- Cost savings of £3,084 a year, based on a total distance travelled of 40,000 km per year, and fuel costs of 80p per litre

Figure 8 Fuel Consumption by Vehicle Type



- Reduced CO_2 emissions of 10.2 tonnes per year, based on a reduced fuel consumption of 3,855 litres a year

The survey also studied the impact of fitting aerodynamic styling kit to vehicles. Where fleets had such kit, it was fitted to at least 25% of vehicles. A total of 21 combinations of vehicle type and fleet had the equipment fitted in all cases. The improvement ranged from 5.3% to 9.4%, relatively low compared with the improvement range from 3% to over 22% in the non-food retail distribution survey. The low result probably reflects the local delivery work performed by many vehicles in this sample, where aerodynamic drag is less of a factor. Fitting airflow management equipment could still be worthwhile. If a 9.4% improvement were achieved by fitting the equipment to a truck within the worst performing 18-tonne GVW fleet, the cost saving per vehicle would be £748 a year, with CO_2 emissions reduced by 2.47 tonnes a year, based on the criteria quoted earlier.

For more information on aerodynamic styling kits see Freight Best Practice guide, 'Truck Aerodynamic Styling' and 'The Streamlined Guide to Truck Aerodynamic Styling', both available **FREE** of charge through the Freight Best Practice Hotline on **0845 877 0 877**.

The productivity of the fuel consumed by each vehicle was measured by energy intensity. This is defined as the millilitres of fuel consumed to carry a standard pallet one kilometre. The results by individual fleet show that the best performing fleet gets twice as much 'work', per unit of fuel consumed as the worst performer, as shown in Figure 9.

Figure 9 Energy Intensity by Vehicle Fleet

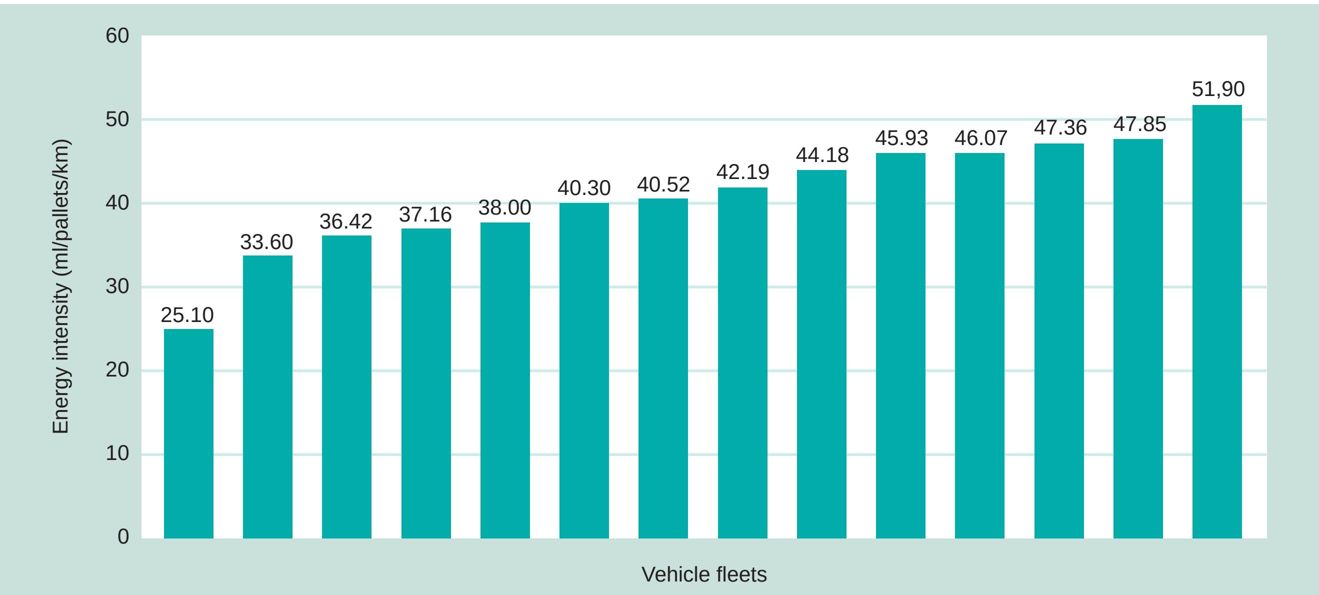
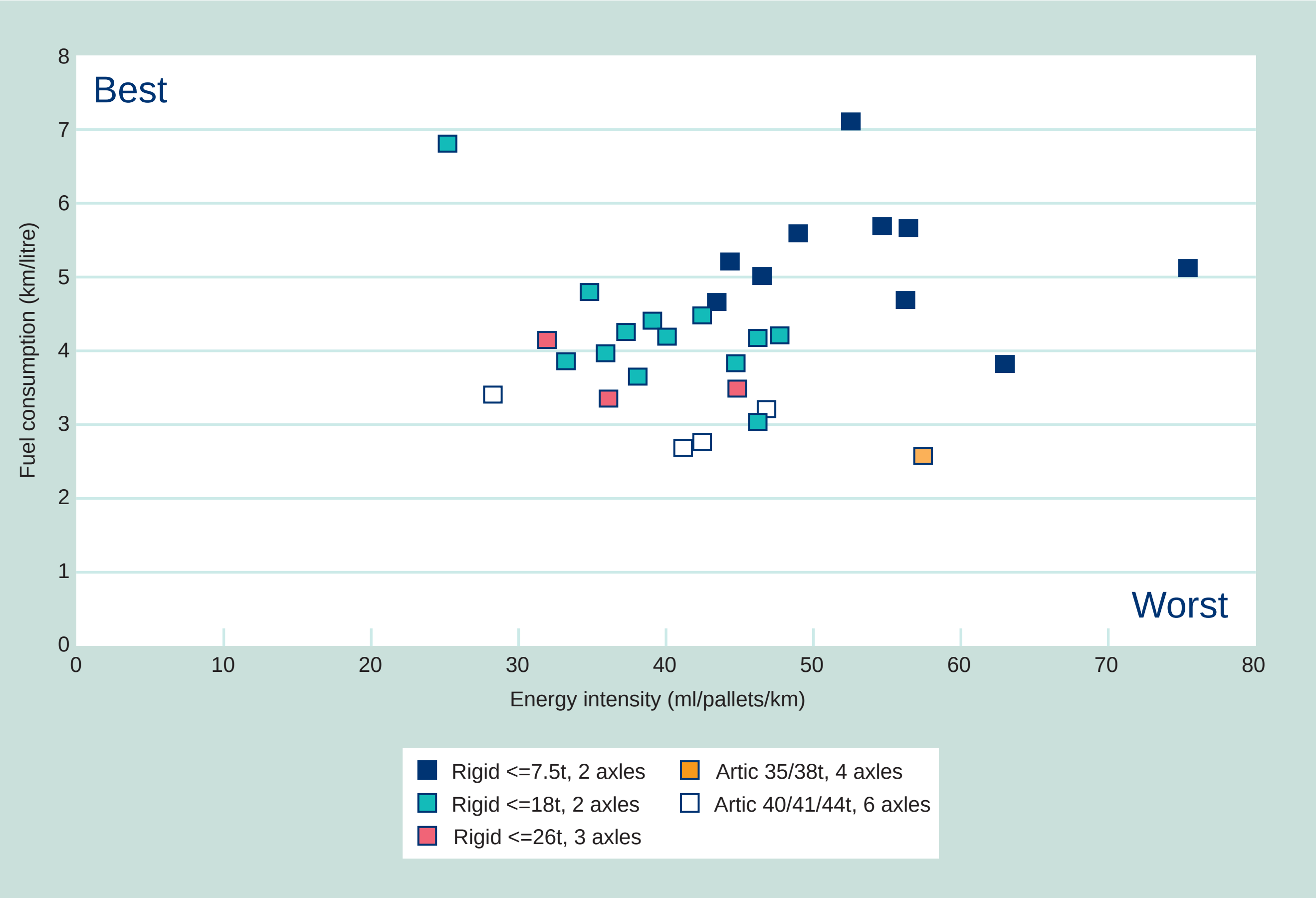


Figure 10 Relationship Between Fuel Consumption Rates and Energy Intensity for Collection and Delivery Vehicles



The best operators will achieve both good fuel consumption and low energy intensity. Figure 10 plots the results for these two factors from the survey. The better results are those towards the top left-hand corner. Points lower down the left-hand side use more fuel to travel the same distance, while those to the right have a worse load or distance rate for the same amount of fuel consumed.

5 Trunking Results

The overall statistics for the trunking activity are shown in Table 3.

Table 3 Summary of Trunk Fleet Activity Data

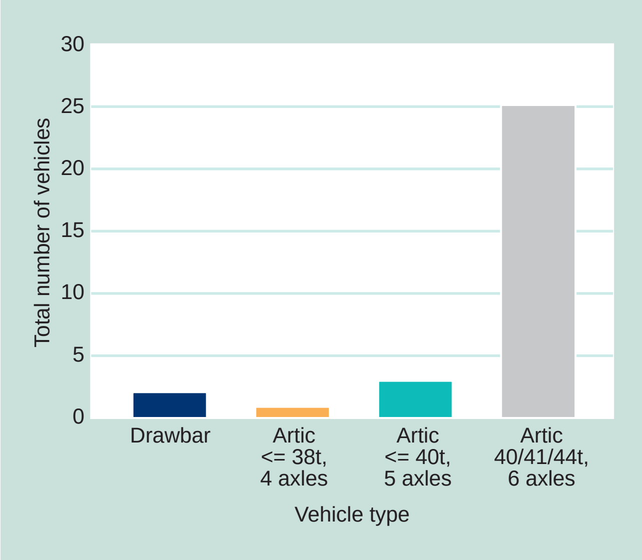
Number of vehicles used	31
Trips	57
Legs	177
Average legs per trip	3.11
Kilometres travelled	29,315
Average kilometres per leg	177
Average kilometres per trip	549
Pallets delivered	4,297
Pallets collected	2,474
Delivery only legs	74
Collection only legs	27
Collection and delivery legs	57
Legs with no collection or delivery	19

Trunking activity takes place mostly during the evening and overnight, when consignments collected during the day are taken to the hub. Economy consignments may be held back for 24 hours if the scheduled trunk vehicles are full, or they may be sent early to fit with other vehicle requirements.

During the day many trunking vehicles are used for other, non-pallet network work, or in some cases for the delivery and collection of pallet network consignments. All other work performed by trunking vehicles during the survey period was recorded to give a complete picture of vehicle activity.

The dominant vehicle type used for trunking work was the six-axle articulated combination, up to 44-tonne GVW, as shown in Figure 11. All but three trailers used were curtain-sided, as side loading is used at hubs. Increasingly trailers are double-deck to improve utilisation. Consignments per pallet space are generally relatively light but, while it may not generally be good practice to double-stack pallets, double-deckers enable each pallet to be given a deck location, making them all equally accessible and protected. Double-deck stacking may also facilitate cross-docking of urgent consignments at the hub if there has been a delay and a critical trunk vehicle is scheduled to leave. A total of 21 double-deck trailers took part in the survey.

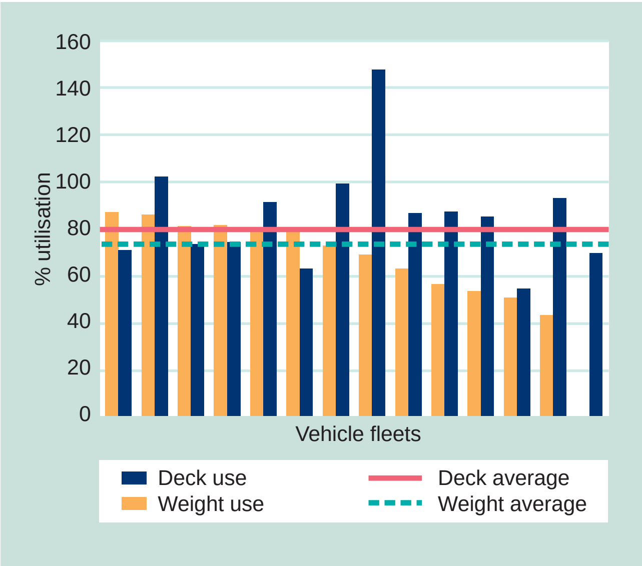
Figure 11 Number and Type of Vehicles Used for Trunking Work



5.1 Vehicle Fill

For the trunks to and from hubs, the utilisation of each vehicle and trailer will depend entirely on the flow of consignments collected by that fleet, or received from their network partner companies. The range of vehicle utilisations by weight is shown in Figure 12. An average utilisation by weight of 72.8% was achieved, which is considerably higher than that in the surveys for food and non-food retail at 53% and 54% respectively. This indicates the productivity benefits of double-deck (or even triple-deck) trailers.

Figure 12 Percentage Vehicle Utilisation Across Vehicle Fleets for Trunking Work



The average utilisation by deck length was 80%, which compares well with 69% in the latest food retail survey and 74% in the non-food retail survey. Where double-deck trailers are used, the deck length is the sum of both decks, so these fleets have a higher capacity and are using more of it. (A double-deck trailer can carry about 77% more pallets.) This extra deck space enables vehicles to be run close to their maximum weight capacity. The fleet registering deck use of above 100% was double stacking pallets on single-deck trailers.

5.2 Empty Running

Trips to and from the hub would normally be loaded both ways, with vehicle and trailer utilisation dependent on the balance of consignments collected against those delivered. Where the imbalance is significant, operators either allow for one leg to be run empty or plan a one-way trip for pallet network consignments, with the other leg(s) in the trip used for other company work. Some empty running will have occurred during daytime operations, when trunking vehicles may be used to make deliveries and collections for pallet networks, or on other company business.

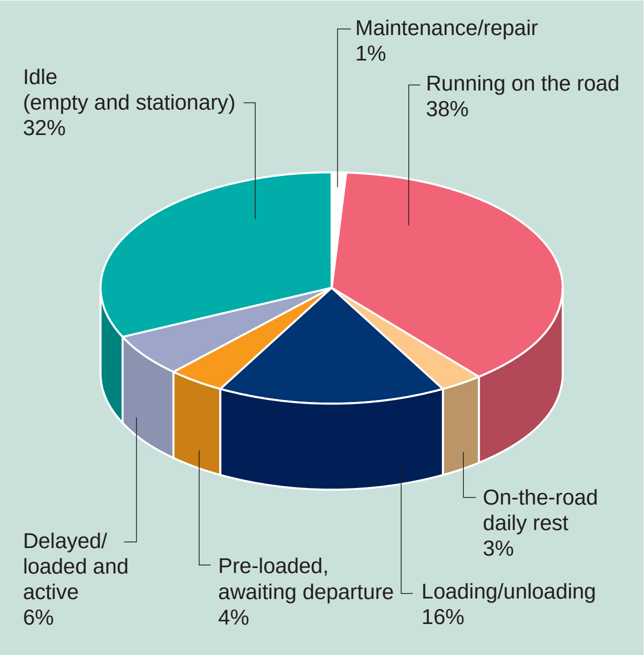
Empty running totalled 1,315 kilometres (4.5% of the total distance run), giving an average empty leg of 55 kilometres compared to an average length across all legs of 154 kilometres. There were 24 empty legs (13.5%) which compares well to the UK truck fleet as a whole in 2003 when empty legs accounted for 26.5%.

5.3 Time Utilisation

There is a greater ability to use the trunking vehicles throughout a 24-hour day, compared with the collection and delivery fleet. Trunking vehicles can be used during the daytime either for pallet delivery and collection work, or for non-network work. Daytime use is more likely for tractor units, although details were not collected as part of the survey. Other uses may involve standing trailers at customers' premises for loading throughout the day, although there were no examples of this happening during the survey period.

This increased availability was reflected in the survey findings. From the hourly audit of what trunking vehicles were doing during the survey period, they were idle for just 32% of the time, compared with 40% for the delivery and collection fleet. Across all trunk vehicles in the 48-hour period, productive work accounted for 54% of the time, compared to 46% for collection and delivery. This compares with figures of 38% for non-food and 44% for food retail fleets. The various categories of use are summarised in Figure 13.

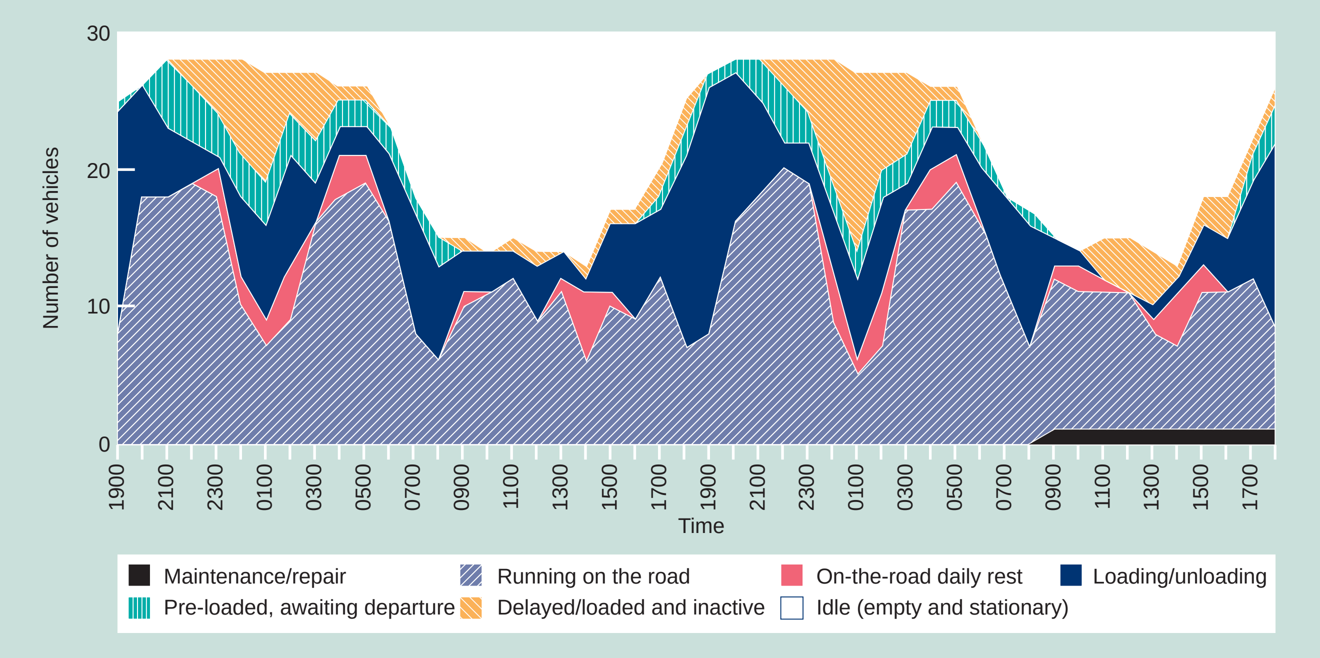
Figure 13 Summary of Typical Use of Trunking Vehicles



The hourly audit is summarised in Figure 14. A dip in activity can be seen quite clearly at around 01:00, when trailers are at the hub for loading and unloading, although even at this time 20% of the fleet was in use, running on the road. Some vehicles will spend more time waiting at the hub: those travelling the furthest will need to be despatched first (and may arrive last), so that pallets can be unloaded at local depots for delivery the next day.

Utilisation could be higher, but it is not always appropriate to use double-deck trailers on non-pallet work due to potential difficulties with access and load handling. In addition, the vehicles must be available for loading with collected pallets for trunking to the hub, a factor that particularly affects vehicles at depots farthest from the hub. Operators must therefore strike a balance between improving capacity utilisation and avoiding any negative impact on time utilisation.

Figure 14 Time Utilisation Profile for Trunking Vehicles



5.4 Deviations from Schedule

Survey participants were asked to record delays against the same reasons as those used for collection and delivery data. The findings are summarised in Table 4.

A total of 82 instances were reported, but across only 73 legs (i.e. some legs had more than one delay). Delays affected 44% of all legs, with an average length of 44 minutes, giving a total lost time of 60 hours during the survey period. At an estimated operating cost of £40 an hour, this is equivalent to £2,400 of wasted expenditure by the operators within the 48 hours. Over a year this would cost £10,065 per year for each vehicle or £312,000 per year for the entire sample fleet.

The biggest contributor to the delays was time lost at the network hubs, accounting for some 75% of all lost time, as shown in Figure 15. Since all trailers have an arrival and a departure time, it is in the interests of each operator and the network to monitor actual performance against these times.

Figure 15 Delays by Cause in Trunking Activity

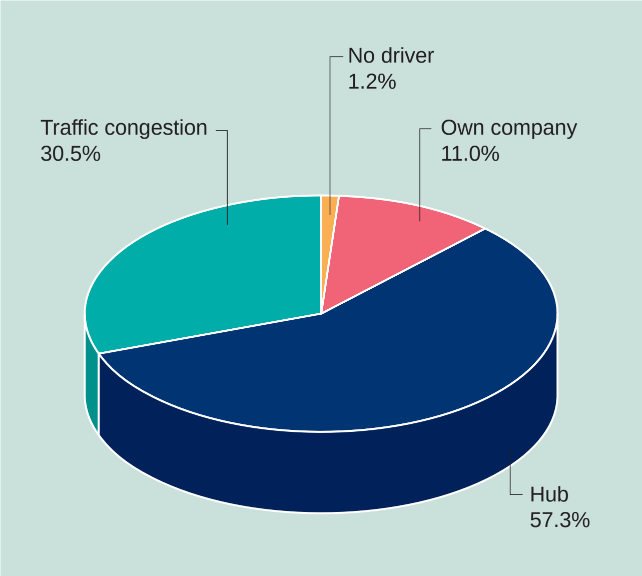


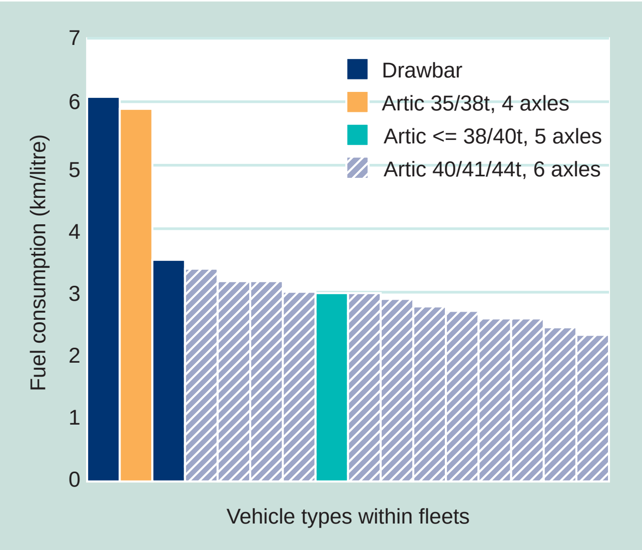
Table 4 Cause of Delay and Time Lost (where known)

	Cause of Delay					
	No Driver	Own Company Action	Delays at the Hub	Delivery Point Delays	Traffic Congestion	Vehicle Breakdown
Number of delays	1	9	47	0	25	0
Delays as % of all legs	0.5	4.8	25.3	0	13.4	0
Delays as % of delayed legs	1.2	11.0	57.3	0	30.5	0
Average delay (minutes)	31	39	58	–	20	–
Total delay (minutes)	31	352	2,736	–	505	–

5.5 Fuel Consumption

As for collection and delivery activity, fuel consumption measured in kilometres per litre, was recorded by vehicle type for each fleet during the survey period. The range of achievement is shown in Figure 16.

Figure 16 Fuel Consumption by Vehicle Type within Each Fleet Used for Trunking



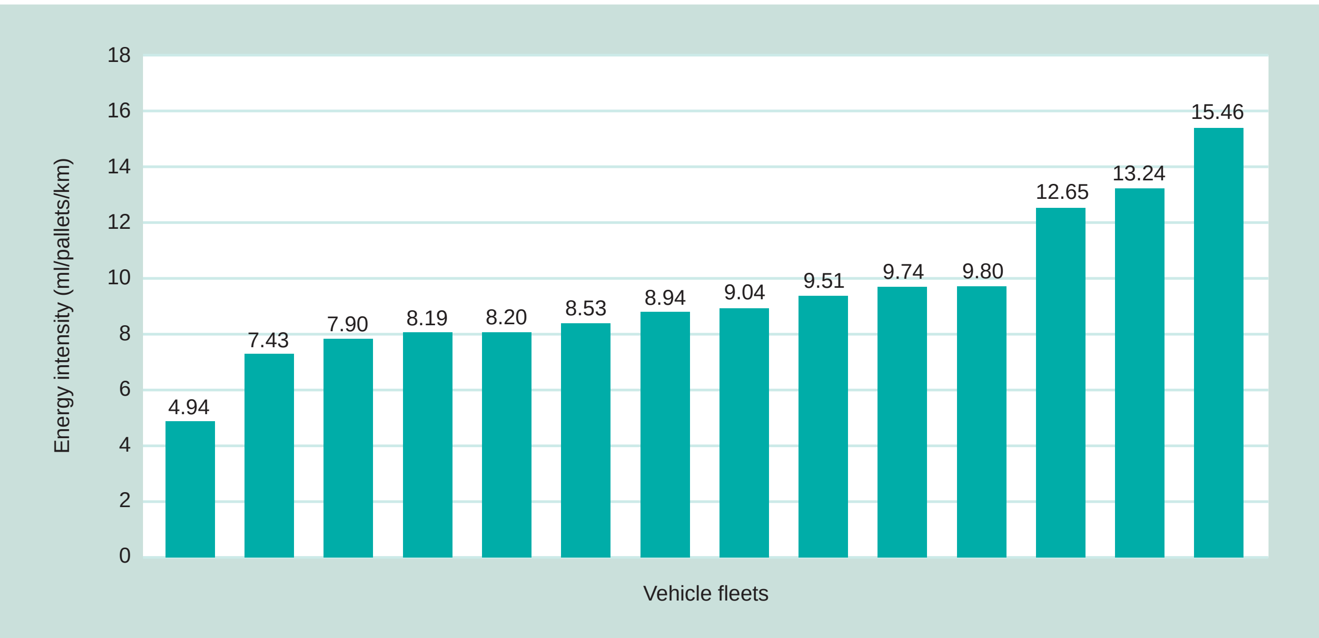
There are considerable variations in consumption rates within the most popular vehicle types. For example, fuel consumption for the fleets up to 44-tonne GVW ranged from 2.37 to 3.4, with an average of 2.89 km per litre, showing a 44% difference between the worst performance and the best. If an articulated truck within the worst performing 44-tonne GVW fleet was able to match the best consumption, the resulting benefits would be:

- Cost savings of £12,271 per year, based on a total distance travelled of 120,000 km per year and fuel costs of 80p per litre
- Reduced CO_2 emissions of 40.46 tonnes per year, as well as a corresponding reduction in other damaging emissions

The differences between various articulated vehicle types highlight the advantage of using lighter vehicles. The dimensions are similar but some costs will be less, including excise duty and initial capital cost. However, the higher weight capacity does give operators more flexibility for a wider range of work. Larger vehicles are also better suited to pulling the physically larger multi-deck trailers, and may well have lower running costs because they are less stressed operationally.

As for collection and delivery fleets, the productivity of the fuel consumed by each vehicle was measured by energy intensity. This is defined as the millilitres of fuel consumed to carry a standard pallet one kilometre. The results by individual fleet are given in Figure 17 and show that the best performing fleet gets three times as much 'work' per unit of fuel consumed as the worst. This compares to an equivalent ratio of 2:1 for delivery and collection fleets.

Figure 17 Energy Intensity by Trunking Vehicle Fleet



6 Summary

This survey has highlighted a variety of opportunities within the pallet network sector for operators to improve both fleet utilisation and energy efficiency. Many operators find being part of a network is an aid to improvement in itself, even though they may need to meet tighter service targets.

Vehicle fill in trunking work averaged nearly 73% by weight and 80% by deck length. The benefit of double-deck trailers was clearly demonstrated, with 40% more deck space allowing operators to improve weight utilisation.

Most trips for pallet network members include making collections and deliveries, so there was comparatively little empty running: it accounted for just 4.5% of trunking kilometres and 12.8% of collection and delivery kilometres.

Time utilisation of vehicles in the collection and delivery fleets in particular could be significantly improved, since they generally only operate during a standard working day and there is little weekend working.

Delays affected 44% of all trunking legs and 35% of all collection and delivery legs. If these results were typical, over a whole year the wasted expenditure would cost £10,065 per vehicle per year and £6,886 per vehicle per year respectively. For trunking, the majority of delays occurred at hubs, because each part of a network is dependent on the rest. In collection and delivery work, delays were caused in equal proportion by delays at delivery points and by traffic congestion.

Accurate measurement is the key to assessing existing performance and to enable improvements to be monitored. By measuring the KPIs used in this study, individual fleet operators can identify key areas in need of attention and maximise the benefits of any changes implemented.

6.1 Actions Taken by Participants

Benchmarking with the results elicited various comments from participants, including views that the information needed more careful analysis before the organisation could decide what action to take. One participant, who is new to the industry, reported that the information helped him to identify a number of areas for investigation.

One respondent said that the results confirmed his suspicions about the company's operational efficiency and that he intended using the data to instigate a further review. Another participant expressed an interest in finding out more about fitting an aerodynamic kit to his vehicles.

Operators who participated in this KPI survey have already taken some action to improve their energy use and vehicle utilisation, in part due to the results of the survey.

- **Monitoring** - efficient operators already monitor fuel consumption and driver behaviour. Some participants rotate vehicles and drivers between routes to get a full picture of their impact and others employ driver trainers, to improve driving techniques
- **Operations** - some participants are now monitoring delays and their impact more closely, reorganising trunk runs to cover multiple departure points, changing the use of specific vehicles, and investigating how vehicles can be used for a greater part of each 24-hour day
- **Vehicle Specifications** - following trials, one operator has made a 10-15% improvement in fuel consumption by fitting aerodynamic styling kit, and is planning to fit the kit to its whole fleet as each vehicle is replaced. Another operator is using three-axle rigid vehicles to improve flexibility in use, while yet another has improved its trunk fleet fuel consumption by fitting larger engine sizes than those normally specified

6.2 Actions for Operators

The opportunities for operators in the pallet network sector to improve performance are also applicable to all regional and small fleet operators. Up to ten pallet networks currently operate in the UK, with an average of around 50 members or franchisees per network. So there are some 500 companies with a shared interest in performance measurement who could use the indicators collected in this survey. Many other fleet operators will have similar needs.

From the analysis of the survey results and the subsequent discussions with participants, a number of opportunities have been identified that fleet operators can pursue for themselves. Within networks, opportunities and experience could be shared where there are no commercial issues between the participating companies.

So what can fleet operators do to improve their efficiency?

- **Measure Key Elements of the Operation** - there is scope to collect more detailed data about an operation. Clearly, data collection must not be too onerous and the findings must be acted upon or their credibility will be lost. It is most important to monitor fuel consumption by vehicle and driver against the type of trips they are making
- **Monitor Vehicle Utilisation** - although pallet space is the key controlling factor in this sector, it would be worthwhile monitoring cube and weight factors to get a fuller picture of how well vehicle capacities are actually being used
- **Evaluate Vehicle Capacity** - while trunk vehicles seem to be well utilised in terms of cube and pallet space, collection and delivery vehicles are space-limited, with most holding a maximum of 14 pallets. This level of loading may suit the time available for a vehicle trip, but there could be scope for introducing some double-deck designs. The role of each vehicle and the need for flexibility should be considered, along with the fact that many customers do not have their own mechanical handling equipment

Consider Vehicle Specification - key aspects of the vehicle must be considered, such as engine size, use of aerodynamic styling kit and factors like wheel rim diameter, although the impact of this latter item was not measured in this survey

Consider Driver Training and Monitor Fuel Consumption - with fuel still accounting for up to a third of operating costs, the importance of correct driving techniques must not be underestimated. A programme that monitors not only consumption against individual drivers, but also their driving techniques through observation or analysis of records, such as tachographs, will show where improvements are possible

Maintain Vehicles Effectively - correctly maintained vehicles return better fuel consumption and are less likely to break down

Consider Telematics - while many fleet operators find it difficult to justify the investment in telematics, there is a large variation in what can be fitted. Potential users need to make sure that they have identified all of the potential benefits, especially the opportunity to correlate all the information made available to them. In a pallet network, there may be scope for fleets to get together in an investment programme. There could also be some commercial gain through having installations that can also support the tracking of consignments and providing electronic signatures

Evaluate Services Offered to Customers - Customer service is a key driver in the pallet distribution network, and having a reputation for good customer service offers distinct commercial advantages. However, many operators could benefit by gaining a better understanding of the profitability resulting from the service given to each customer. Any profit generated will be affected by the distance a customer is from the previous delivery/collection point, how often the site is visited and the size of each consignment. These and other factors, such as typical turnaround times, will have an impact on vehicle utilisation. It may be possible to negotiate a change to the level of service that each customer receives, perhaps by reducing the frequency of deliveries to outlying districts, without impairing relations. In extreme cases, operators may find it more profitable to stop working with certain customers

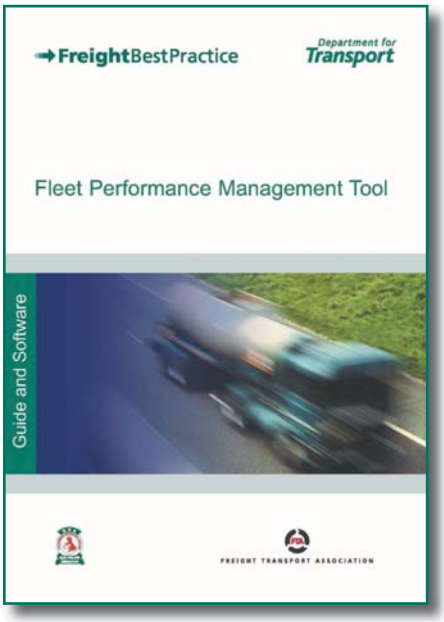
Consider Computerised Vehicle Scheduling - those responsible for scheduling the vehicle fleet are usually very experienced in the job. However, as notifications of deliveries for the next day tend to be received relatively late (often only being confirmed when pallets are unloaded from the hub), there could be some benefit in using vehicle scheduling software. This approach would allow the scheduler to try a number of different schedules in a very short space of time, especially where the program was linked to a download from the network hub. The software could also aid performance monitoring. Clearly the benefits are greater for larger operations, but there are many vehicle scheduling applications to choose from, some of which are aimed at smaller fleets

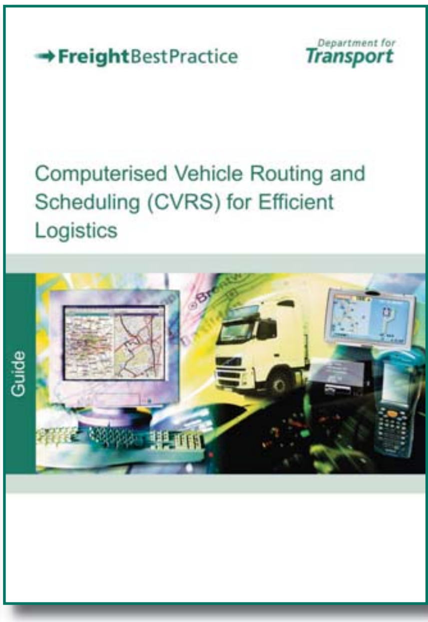
7 Further Reading

The FREE Freight Best Practice publications give more information on what can be achieved by encouraging a culture of fuel efficiency within an organisation and by implementing best practice. The publications include:

- ‘Fleet Performance Management Tool’ - Excel-based tool to help small to medium sized fleet operators improve their operational efficiency through the management of KPIs. Consists of a CD and accompanying manual
- ‘Truck Specification for Best Operational Efficiency’ - provides a step-by-step review of the stages involved in the decision-making process in specifying a new truck
- ‘Fuel Management Guide’ - covers many aspects of fuel efficiency, including data collection and analysis, vehicle specification and driver training
- ‘Streamlined Guide to Truck Aerodynamic Styling’ - provides a brief introduction to aerodynamic styling and its benefits
- ‘Truck Aerodynamic Styling’ - a comprehensive guide for truck operators on aerodynamically effective trucks and appropriate add-on features
- ‘Computerised Vehicle Routing and Scheduling for Efficient Logistics’ - two guides (full and pocket-sized), introduce CVRS and provide an overview of the systems and capabilities available
- ‘Telematics Guide’ - provides details of the basic elements of telematics systems as well as providing advice on what you should consider when buying a system
- ‘Key Performance Indicators for the Food Supply Chain’ - discusses the results of the 2002 benchmarking survey in this sector
- ‘Key Performance Indicators for Non-food Retail Distribution’ - discusses the results of the 2002 benchmarking survey in this sector
- ‘SAFED for HGVs: A Guide to Safe and Fuel Efficient Driving for HGVs’ - outlines the elements of the SAFED programme and explains the content of the one-day SAFED training course
- ‘Companies and Drivers Benefit from SAFED for HGVs: A Selection of Case Studies’ - contains case studies showing what organisations have achieved by undertaking SAFED training

All these guides are FREE and can be ordered via the Freight Best Practice Hotline **0845 877 0 877** or downloaded from the website at **www.freightbestpractice.org.uk**





Freight Best Practice publications, including those listed below, can be obtained FREE of charge by calling the **Hotline** on **0845 877 0 877** or by downloading them from the website **www.freightbestpractice.org.uk**

Saving Fuel

Fuel Saving Tips

This handy pocket book is ideal for drivers and managers looking for simple ways to reduce fuel consumption.

Operational Efficiency

Working Together to Improve the Operational Efficiency of Regional Distribution Centres (RDCs)

This guide shows how RDC operators and their partners can improve efficiency, meet their customer service obligations and minimise environmental impact.

Developing Skills

SAFED for HGVs: A Guide to Safe and Fuel Efficient Driving for HGVs

This guide outlines the elements of the Safe and Fuel Efficient Driving (SAFED) scheme and explains the content of the one-day SAFED training course.

Performance Management

Performance Management for Efficient Road Freight Operations

This guide explains the process of measuring performance effectively. It includes advice on how information is best collected and interpreted to allow informed decision making in order to achieve operational efficiency improvements.

Equipment and Systems

Information Technology for Efficient Road Freight Operations

This guide provides an overview of the available and relevant systems, covering their uses, likely benefits, issues to consider and associated costs.

Public Sector

Freight Quality Partnership Guide

This guide provides step-by-step guidance on how to set up and run an effective Freight Quality Partnership.

May 2007.

Printed in the UK on paper containing at least 75% recycled fibre.