Longer Semi-trailers Feasibility Study and Impact Assessment

Technical Report D4: Industry Evidence Gathering and International Review

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Department for Transport
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1. INTRODUCTION

In June 2009, the Freight and Logistics Division (FLD) of the Department for Transport (DfT) appointed a consortium led by consultants *WSP* and including freight specialists *MDS Transmodal* to undertake the Longer Semi-Trailer Feasibility Study and Impact Assessment. *Transport Research Laboratory (TRL*) and *Cambridge University* were also part of the consultant team, providing specialist inputs into the vehicle engineering, safety and performance components of the study.

The DfT commissioned the study to examine the feasibility and impact of allowing longer semi-trailers to operate within the British road haulage market. The study follows the outcome of previous work commissioned by the Department in 2006, and undertaken by TRL, which examined the likely effects of permitting longer and/or heavier Goods Vehicles (LHVs) in Great Britain[1]. This study highlighted a number of issues that would inhibit the introduction of LHVs on both a permanent or trial basis. Consequently, the Secretary of State ruled out their implementation.

However, the study did suggest that there might be worthwhile benefits from permitting a modest increase in the maximum length of articulated goods vehicles. An overall increase in the length of a semi-trailer by up to 2.05m is therefore being examined as part of this study. However, such a vehicle would have to comply with all other regulations, including those limiting the gross vehicle weight. This would consequently bring an articulated HGV broadly in-line with a rigid/draw-bar trailer combination (in terms of total vehicle length and the load-platform length). Providing an additional 2.05m to the length of a semi-trailer would allow an additional two rows of standard pallets to be conveyed (i.e. 4 pallets single-stack or 8 pallets double-stack given sufficient height availability). However, a longer semi-trailer is likely to have a heavier tare weight, potentially leading to a reduced carrying capacity for some weight constrained cargoes.

This document reports on an *evidence gathering exercise* undertaken with the logistics sector and other key stakeholders. In brief, it details the following:

- The methodology adopted;
- The main messages and key issues emerging from the dialogue undertaken with the logistics sector and other key stakeholders; and
- A summary of the supporting evidence subsequently provided by commercial operators (both evidence to demonstrate the benefits of longer semi-trailers or to support the case against).

An Annex to this report details the supporting evidence provided by commercial operators. However, the evidence was supplied on a 'commercial-in-confidence' basis, meaning that the Annex will not be published.

[1] A summary of the LHV study findings at http://www.dft.gov.uk/rmd/project.asp?intProjectID=12704

In addition, the project required a review of experience in other countries, within both the EU and elsewhere. This document also provides a short desk-based review of international experience and findings from studies of longer semi-trailers or other longer or heavier vehicles.

A main study report provides a summary of the overall project together with the key findings and conclusions. This document forms part of a series of technical reports which accompanies the main study report.

2. INDUSTRY EVIDENCE GATHERING – KEY OBJECTIVES

The research project's key aims and objectives divide broadly into three areas, namely:

1. Assessing industry benefits:

- Identifying and assessing potential industry benefits, particularly cost savings and efficiency improvements, resulting from industry adopting longer semi-trailer equipment; and
- Given benefits being identified, identifying the likely freight sectors and journey types which would adopt longer semi-trailer equipment together with the likely tractor unit/longer semi-trailer combinations which would be most used.

2. The economic impact:

- Examining the impact on the cost of transporting goods by road and rail freight, including an assessment of the capital costs and running costs of longer semi-trailer combinations; and
- Estimating the wider economic impact, taking into account any cost savings to industry and impacts on wider society;

3. Safety, performance and environmental impact:

- The overall environmental impact, including but not restricted to Carbon Dioxide (CO_2) emissions across freight modes as a whole and other externalities such as noise, air quality and congestion;
- The implications for vehicle design and performance;
- The effects on fatalities and serious injuries; and
- A review of experience in other countries.

To address the outlined aims and objectives, a significant amount of desk-top research, economic modelling and vehicle simulation testing has been undertaken, derived from the consultant team's extensive knowledge base covering the logistics sector and vehicle engineering. However, it was also necessary to conduct a wide-ranging *evidence gathering exercise* with the logistics sector and other key stakeholders.

The main objective of the exercise was to gather information and evidence which would further inform the project's aims and objectives outlined above and its emerging findings in four main areas, namely:

1. Identifying and assessing potential industry benefits through discussion with the logistics sector, both the shippers of cargo and the providers/suppliers of transport services. In particular, it addressed the following issues:

    - Identifying operations reaching cube capacity before the gross vehicle weight limits;
    - Whether or not longer semi-trailers will result in fewer HGV trips than would otherwise be the case and in cost savings;

- Validation of the assumptions and desk-top conclusions reached concerning the types of commodities, sectors and types of journeys likely to adopt longer semi-trailers; and
- Identification of likely vehicle combinations and assessment of potential switch rates to longer semi-trailer equipment.

2. To seek quantitative operational data and information to demonstrate industry benefits or to support the case against longer semi-trailers.

3. To seek cost and performance data to validate the base assumptions and costs utilised in the road and rail freight cost models developed for this project (see Deliverable 5: Economic Assessment report); and

4. To address other key issues and identify other factors which could influence the project's findings. In particular:

    - Why do operators not upgrade to rigid and draw-bar trailer combinations? The longest rigid and draw-bar combinations already provide an additional 2.05m (approx) load-platform length compared with existing maximum length semi-trailers; and
    - Why do operators not upgrade to double-deck semi-trailers? These are able to offer nearly double capacity, compared with a standard single deck semi-trailer, by their ability to double stack fully loaded pallets.

In addition, the exercise sought the views and opinions of other interested stakeholders. These included intermodal rail freight operators that, while not directly involved in the shipment or transport of cargo by road, could potentially be affected by the change. The Highways Agency was also made aware of the project and its key aims/objectives. TRL, as part of their project research, have also contacted and liaised with a number of semi-trailer manufacturers. The results of their research is reported in the Deliverable 3: Vehicle Specification Performance and Safety report.

It is important to note that a formal proposal (concerning a change to the current regulations limiting the maximum length of semi-trailers) has yet to be published by the DfT, and that this study is considered to be a *feasibility and impact study* which will subsequently inform Ministers when deciding on any legislative change. On this basis, the evidence gathering exercise was not considered to be a formal *consultation* process and participants in the process were informed of this position. Any formal legislative change subsequently proposed by Ministers will be undertaken in the normal manner.

3. METHODOLOGY

3.1 Identifying the Market

In order to focus the overall project, and the evidence gathering exercise in particular, the first task was to identify those sectors of the inland logistics market which potentially might utilise longer semi-trailer equipment (i.e. would derive cost and other benefits). This primarily involved desk-top research, but also involved discussions with the logistics industry during the early stages of the evidence gathering exercise.

The analysis indicates that it will be domestic shippers of lighter weight palletised consumer goods (including goods in roll cages), general cargo and mail/parcels as the market sectors which potentially would take advantage of the additional cargo capacity that longer semi-trailers will provide. This position has been arrived at by considering the analysis below.

1. *Liquid bulk commodities* e.g. petroleum. Liquid bulk cargoes are generally weight constrained within the current vehicle length restrictions i.e. they reach the maximum gross vehicle weight (gvw) before volume capacity. This can be deduced from the following table.

Table 3.1: Bulk Liquid Tanker

Length (of tank)	13.5 m		
Tank diameter	2.0 m		
Volume (capacity)	42.4 m^3		
Tractor tare weight	8,500 kg		
Semi-trailer tare weight	7,000 kg		
Combination tare weight	15,500 kg		
Product	Density (kg/m^3)	Mass of product at max gvw (kg)	Volume at max gvw (m^3)
Petroleum spirit	737	28,500	38.7
Gas Oil	850	28,500	33.5
Water	1,000	28,500	28.5
Beer	1,010	28,500	28.2

A bulk liquid tanker semi-trailer with a cylindrical tank (diameter of 2.0m and length 13.5m i.e. within existing length and width restrictions) would have a volume capacity of 42.4m^3. Typical products conveyed by bulk liquid tankers are shown in Table 3.1, together with their densities. Each commodity reaches the maximum gross vehicle weight before the tanker reaches its volume capacity. On the basis that there are no plans to increase the gross vehicle weight limits, operators are unlikely to purchase more expensive longer semi-trailers as they will not be able to convey additional cargo. Consequently, there is unlikely to be demand from this sector of the market for longer semi-trailers. In this case, it would be

possible within the existing regulations to increase the diameter of the tank by 0.5m without increasing the semi-trailer length, which would add around 24m^3 to the semi-trailer capacity.

As a result, we can also conclude that there is unlikely to be any impact on the rail freight industry within this sector of the market, given that the road haulage industry will not be gaining any commercial or competitive advantage.

2. *Dry bulk commodities* e.g. aggregates. Dry bulk cargoes are generally weight constrained within the current vehicle length restrictions. This can be deduced from the following table.

Table 3.2: Dry Bulk Tipper

Length (internal)	13.5 m		
Width (internal)	2.4 m		
Height (internal)	1.5 m		
Volume (capacity)	48.6 m^3		
Tractor tare weight	8,500 kg		
Semi-trailer tare weight	6,500 kg		
Combination tare weight	15,000 kg		
	Density (kg/m^3)	Mass of product at max gvw (kg)	Volume at max gvw (m^3)
Coal	1,105	29,000	26.2
Granite (crushed)	1,605	29,000	18.1
Gravel	1,522	29,000	19.1
Sand (dry)	1,602	29,000	18.1

A dry bulk tipper with an internal length of 13.5m, width 2.4m and height of 1.5m (i.e. within existing length restrictions) would have a volume capacity of 48.6m^3. Typical products conveyed by dry bulk tippers are shown in Table 3.2, together with their densities. Again, each commodity reaches the maximum gross vehicle weight before the tipper reaches its volume capacity. On the basis that there are no plans to increase the gross vehicle weight limits, operators are unlikely to purchase more expensive longer semi-trailers as they will not be able to convey additional cargo. Consequently, there is unlikely to be demand from this sector of the market for longer semi-trailers. In this case, extra cargo could be carried by increasing the height of the semi-trailer (compliant with regulations).

As a result, we can also conclude that there is unlikely to be any impact on the rail freight industry within this sector of the market, given that the road haulage industry will not be gaining any commercial or competitive advantage.

3. *Semi-bulk commodities* e.g. metals. Semi-bulk cargoes are generally weight constrained within the current vehicle length restrictions. This can be deduced from the following table.

Table 3.3: Flat-bed Semi-trailer

Length	13.6 m		
Width	2.5 m		
Height (notional)	2.9 m		
Volume (capacity)	98.6 m^3		
Tractor tare weight	8,500 kg		
Semi-trailer tare weight	5,000 kg		
Combination tare weight	13,500 kg		
	Density (kg/m^3)	Mass of product at max gvw (kg)	Volume at max gvw (m^3)
Steel	7,850	30,500	3.9
Aluminium alloy	2,800	30,500	10.9
Redwood	510	30,500	59.8
Canadian pine	560	30,500	54.5

A flat-bed semi-trailer with a length of 13.6m, width 2.5m and (notional) height of 2.9m (i.e. within existing length restrictions) would have a volume of 98.6m^3. Typical products conveyed by flat-bed trailers are shown in Table 3.3, together with their densities. Again, each commodity reaches the maximum gross vehicle weight restriction before the semi-trailer reaches its volume capacity. On the basis that there are no plans to increase the gross vehicle weight limits, operators are unlikely to purchase more expensive longer semi-trailers as they will not be able to convey additional cargo. Consequently, there is unlikely to be demand from this sector of the market for longer semi-trailers.

Again, we can conclude that there is unlikely to be any impact on the rail freight industry within this sector of the market, given that the road haulage industry will not be gaining any commercial or competitive advantage.

However, it is recognised that there are likely to be some niche exceptions within the three sectors outlined above. For example, low density industrial supplies of products like plastics, foam, upholstery, packaging materials (which tend to be volume constrained) may be suitable for movement by longer semi-trailers.

4. *International Traffics by Road (via roll-on roll-off ferry or Channel Tunnel).* Longer semi-trailers will be confined to domestic flows only. Consequently, there is likely to be no demand for longer semi-trailers from the sector of the market involved in international operations.

Again, we can conclude that there is unlikely to be any impact on the rail freight industry within this sector of the market, given that the road haulage industry will not be 'gaining' any commercial or competitive advantage.

5. *Maritime containers.* Deep-sea maritime containers (up to length 40ft/12.2m) can already be transported by road within the current length regulations as they are slightly shorter than the existing semi-trailer length limits. In addition, there are currently no known plans to increase the internationally agreed dimensions of such units. Short-sea 45ft pallet wide containers (length: 13.72m) can also be transported by road within the current length regulation, albeit with a slight over-hang at the rear of the semi-trailer. Consequently, there is unlikely to be demand from this sector of the market for longer semi-trailers. Operators are unlikely to purchase more expensive longer semi-trailers when existing length equipment meets their requirements.

A semi-trailer length increase may permit 14.6m (48ft) length maritime containers to be shipped to Britain. However, most containers of this length are generally confined to North American markets. In addition, a 14.6m container could also be transported by rail using existing intermodal wagon equipment were they to be shipped to Britain. The cost impact in this case might also be to the benefit of the rail market, as rail operators could utilise existing rolling stock whereas road hauliers would have to purchase more expensive longer semi-trailers.

Overall, we can conclude that there is unlikely to be any impact on the rail freight industry within this sector of the market, given that the road haulage industry will not be gaining any commercial or competitive advantage.

6. *Operators of rigid goods vehicles and shorter single-axle semi-trailers*. Existing operations which utilise rigid goods vehicles or short length semi-trailers to transport palletised cargo can already upgrade to larger articulated or draw-bar combinations should the need arise to transport additional cargo in individual shipments. Rigid vehicles and combinations, which are significantly cheaper to operate, are therefore being used because the quantity of cargo being transported in one move does not demand a larger vehicle. In addition, there are sometimes specific operational requirements for using a smaller vehicle e.g. rigid HGVs often deliver into urban areas where there are access restrictions. Also, such vehicles are often utilised on multiple drop/collection rounds, meaning that the vehicle load (and hence capacity) is often constrained by the distance that can be travelled in a driver's shift (allowing for loading and unloading times). Consequently, there is unlikely to be demand from this sector of the market for longer semi-trailers.

The Identified Market

Having eliminated the above operations/markets, this effectively leaves shippers of lighter weight palletised consumer goods (including goods in roll cages), general cargo and mail/parcels as the market sectors which potentially would take advantage of the additional cargo capacity that longer semi-trailers will provide. Within this sector of the market, operators generally utilise existing maximum length goods vehicles, either curtain-sided, box-body (including reefer) and double-deck, as follows:

- 4x2 tractor unit and twin-axle semi-trailer (maximum 34 tonnes gvw);
- 4x2 tractor unit and tri-axle semi-trailer (maximum 40 tonnes gvw);
- 6x2 tractor unit and tri-axle semi-trailer (maximum 44 tonnes gvw); and
- Rigid and draw-bar trailer equipment (maximum 44 tonnes gvw).

Vehicles conveying these types of commodities are often volume constrained i.e. they reach their cube capacity well before the maximum gross vehicle weight limit. This is demonstrated by Table 3.4 below.

Table 3.4: Standard Box-body/Curtain-side Semi-trailer (4m height)

Length (internal)	13.5 m		
Width (internal)	2.4 m		
Height (internal)	2.8 m		
Volume (capacity)	90.7 m^3		
Tractor tare weight	8,500 kg		
Semi-trailer tare weight	6,500 kg		
Combination tare weight	15,000 kg		
	Density (kg/m^3)	Volume of product at max gvw (kg)	Volume at max gvw (m^3)
General cargo	200	29,000	145.0
General cargo	250	29,000	116.0
General cargo	300	29,000	96.7
General cargo	350	29,000	82.9

Mean cargo loads are around 600kg per pallet, meaning that if a pallet was stacked to 1.8m it would have a density of around 277kg per cubic metre. Even at 300kg per cubic metre a standard 13.6m semi-trailer (4m external height) would reach the cube capacity before the maximum gross vehicle weight limit. Taking the above into account, this implies increased vehicle length would benefit the following types of operations:

- Factories to National Distribution Centres (NDCs) and Regional Distribution Centres (RDCs);
- Flows between NDCs and RDCs;
- From NDCs to retail stores;
- From RDCs to retail stores;
- Mail/parcels;
- Palletline trunking operations; and
- Low density industrial supplies.

However, the shipment of lighter weight palletised consumer goods is also a key and growing market sector for the rail freight industry *i.e. domestic intermodal rail freight*. This is

particularly the case for flows between Midlands NDCs and RDCs in Scotland. As new rail-linked warehousing developments are delivered, shorter distance flows by rail within England and Wales are also likely to become more viable. Forecasts produced by the Freight Transport Association (FTA) / Rail Freight Group (RFG) and by the rail freight operators suggest that domestic intermodal rail freight is likely to be one of the largest growth sectors over the medium to longer term. If the road haulage sector were to gain significant competitive benefits from the introduction of longer semi-trailers, this may result in some intermodal traffics switching to road transport, or to traffics which would have transferred to rail remaining on the road. It is therefore vital that the study assesses fully the potential impact on the rail freight sector, including the cost and viability of rail freight services and modal shift.

The overall project has therefore focused on the above markets.

3.2 Quantifying the Market

In order to assist the economic assessment components of the project, the DfT supplied MDS Transmodal with the base data from the Continuing Survey of Road Goods Transport (CSRGT) for the combined years 2004 to 2007. The CSRGT differentiates road goods traffic by, among other categories, vehicle type, commodity and origin/destination. Table 3.5 below, taken from the CSRGT (average of years 2004-7), describes current road goods vehicle activity in Great Britain by vehicle type, in terms of tonnes lifted and tonne-kilometres, for all commodities.

Table 3.5: Current Road Goods Vehicle Activity

	000s tonnes lifted	million tonne-kilometres
2 axles, rigid	213,838	12,413
3 axles, rigid	189,720	7,870
4 axles, rigid	388,155	11,785
Other, rigid	6,851	248
2 axles lorry + 1 axle trailer	623	30
2 axles lorry + 2 axles trailer	7,871	1,034
2 axles lorry + 3 axles trailer	4,792	785
3 axles lorry + 2 axles trailer	10,045	1,136
3 axles lorry + 3 axles trailer	9,009	951
Other, lorry + trailer	4,085	464
2 axles road tractor + 1 axle semi-trailer, artic	4,204	291
2 axles road tractor + 2 axles semi-trailer, artic	51,595	6,255
2 axles road tractor + 3 axles semi-trailer, artic	146,921	18,292
3 axles road tractor + 2 axles semi-trailer, artic	14,449	1,433
3 axles road tractor + 3 axles semi-trailer, artic	730,984	91,231
Other, road tractor + semi-trailer, artic	9,700	1,217
Total	**1,792,840**	**155,436**
% Rigid	45%	21%
% Rigid and draw-bar	2%	3%
% Artic HGVs	53%	76%

Source: CSRGT 2004-7

The analysis shows that articulated tractor unit/semi-trailer combinations account for around 53% of the road haulage market in terms of tonnes-lifted and 76% of the market when expressed as tonne-kilometres. This suggests that semi-trailers have a significant part of the total market, particularly for the longer distance 'trunk' activities, as expected. It also highlights that rigid and draw-bar combinations currently occupy only a very small market share.

Taking the above conclusions into account, the CSRGT data was further filtered to extract only records of freight activity within the identified markets and sectors likely to adopt longer semi-trailers i.e. excluding liquid and dry bulk products, semi-bulk commodities and all goods moved in rigid HGVs and single-axle articulated combinations. This analysis also includes those niche bulk commodities which are volume constrained and not weight constrained. Table 3.6 below shows the result.

Table 3.6: Current Road Goods Vehicle Activity – Articulated and Rigid/Draw-bar

	000s tonnes lifted	million tonne-kilometres
2 axles lorry + 2 axles trailer	5,059	681
2 axles lorry + 3 axles trailer	955	162
3 axles lorry + 2 axles trailer	3,095	382
3 axles lorry + 3 axles trailer	598	56
2 axles road tractor + 2 axles semi-trailer, artic	41,701	5,364
2 axles road tractor + 3 axles semi-trailer, artic	93,780	12,029
3 axles road tractor + 2 axles semi-trailer, artic	10,160	1,064
3 axles road tractor + 3 axles semi-trailer, artic	275,487	41,163
Total	430,834	60,901
Rigid/draw-bar	9,707	1,280
Artic HGV	421,128	59,620
% Rigid/draw-bar	2%	2%
% Artic HGV	98%	98%
% all traffic lifted/moved	24%	39%

Source: CSRGT 2004-7

The analysis shows that lighter weight palletised, general cargo and mail/parcels currently comprise around 24% of the road haulage market in terms of tonnes-lifted and 39% of the market when expressed as tonne-kilometres. Again, it is obvious that rigid and draw-bar combinations currently occupy only a very small market share.

3.3 Approach to Evidence Gathering Exercise

At an early stage in the evidence gathering process, it was felt necessary that direct contact should be made with the two principal trade bodies representing the transport operators and shippers within the identified sectors i.e. the *Road Haulage Association (RHA)* and the *Freight Transport Association (FTA)*. This was for four main reasons, namely:

- To agree an appropriate approach that would satisfy the requirements of the consultant team, the DfT and the trade bodies i.e. the process would have 'buy-in' from all sides, including industry;
- It would ensure a co-ordinated approach across the logistics sector;
- The FTA and RHA would be able to provide access to relevant and willing organisations within their membership, thus ensuring that companies approached would be co-operative participants; and
- The FTA and RHA would each be able to publicise the study amongst its membership, and to emphasise the need to produce hard evidence and data (in order to maximise response rates).

The FTA represents the transport interests of large third-party logistics operators, shippers of cargo (essentially purchasers of transport services across modes) and other organisations with interests in the transport sector. The FTA contains some 12,000 member organisations which together operate over 200,000 HGVs and around one million light vans. Collectively they also consign over 90% of the freight moved by rail in Great Britain and they are responsible for over 70% of visible exports by sea and air.

The RHA is a member-based organisation representing the interests of road transport operators in the UK. It has 9,500 members, all of which are UK road transport companies. Membership ranges from small owner-operators and those with only a small number of vehicles in their fleet through to larger hauliers with thousands of semi-trailers.

Face to face discussions were subsequently undertaken directly with the FTA and RHA. In addition to receiving their initial views and opinions, the following approach to the evidence gathering exercise was agreed with both organisations:

- The consultant team would undertake two seminar style meetings in conjunction with the trade bodies and their invited membership i.e. one seminar with FTA members and one with RHA members. Senior policy managers from the respective organisations would also attend each seminar along with DfT representatives;
- Invited membership would be primed with a delegate pack before the event, explaining the background to the study and the key issues being examined;
- The seminar would include a presentation by the study team of the background and objectives of the study;
- The seminars would include a question and answer open forum session, with members invited to express their views, present examples from their own operations

where longer semi-trailers would generate benefits or (conversely) argue the case against the introduction of longer equipment (again by reference to operational examples);
- Each seminar would close with a request for quantitative operational data and information to support/demonstrate the case for or against longer semi-trailers and other cost data (to validate the economics assumptions), to be sent direct to the consultant team shortly after the event; and
- Where individual organisations/companies had directly approached the DfT, initial telephone conversations were to be conducted and follow-up face-to-face meetings organised where appropriate.

A wider ranging postal questionnaire or online survey was ruled out as they generally generate an extremely poor response rate.

It was deemed important that seminar attendees supplied actual operational data and information as evidence to underpin any views offered and examples presented on the day, in order to:

- Demonstrate that significant benefits would be generated following the introduction of longer semi-trailers; or
- Conversely, that the introduction of longer semi-trailers would not be beneficial; and
- Validate (or otherwise) the cost assumptions being adopted by the consultant team in their economic modelling.

It was stressed to the trade bodies and their membership that anecdotal evidence would not regarded as sufficient in this case. In particular, those advocating longer semi-trailers would be expected to demonstrate the case via actual operational evidence. However, it was acknowledged that while delegates would be willing to express views and share some operational experiences at the seminars, for reasons of commercial confidentiality they would not wish to present data or other confidential information on the day e.g. tonnage data or average loadings. They were therefore invited to submit detailed data/information to support their position direct to the consultant team (in confidence) shortly after the events.

It was agreed that data would be best presented in a case study format, perhaps focussing on individual flows within an organisation's overall supply chain where longer semi-trailer equipment would or would not be beneficial. In particular, it was requested that case studies show the following:

- HGV flows over a period of time (e.g. daily, weekly, monthly or annual) between particular origins and destinations, in terms of the number of HGV trips and distances travelled;
- The approximate percentage of HGV trips/km which are at full load and are at cube capacity below gross weight limits; and

- The estimate of savings/benefits (HGV trips, km and fuel costs) which would accrue on the basis that longer semi-trailer equipment is introduced to that operation.

In addition, the following data was requested to validate the cost model assumptions:

- Types of vehicles/combinations operated and fleet sizes;
- Average fuel consumption rates by vehicle type; and
- Capital (or lease) costs by vehicle type.

This data and information is summarised in Section 4. Similarly, where individual organisations/companies had directly approached the DfT and a face-to-face meeting undertaken, they were also asked to provide case study data to support views and opinions presented.

In conjunction with the DfT, a number of prominent operators and shippers were identified. When compiling the seminar delegate lists, it was requested (to the trade bodies) that these organisations were invited. The trade bodies were then asked to invite other organisations likely to be co-operative, so that the total attendance would consist of a broad cross-section of their membership.

Direct contact was also made with the *Rail Freight Group (RFG)*. The *RFG* represents the interests of rail freight operators, shippers of cargo who utilise rail freight within their supply chains and other organisations with interests in the rail freight sector. Membership includes a number of operators and shippers who use domestic intermodal services. It was agreed with the RFG that the consultant team could present a paper at their Autumn meeting of members. This would describe the background to the study and the key issues being addressed. RFG members would then be invited to respond in a similar manner to the FTA/RHA events i.e. views and general examples presented on the day during open discussion, with commercially confidential evidence supplied shortly after, where relevant.

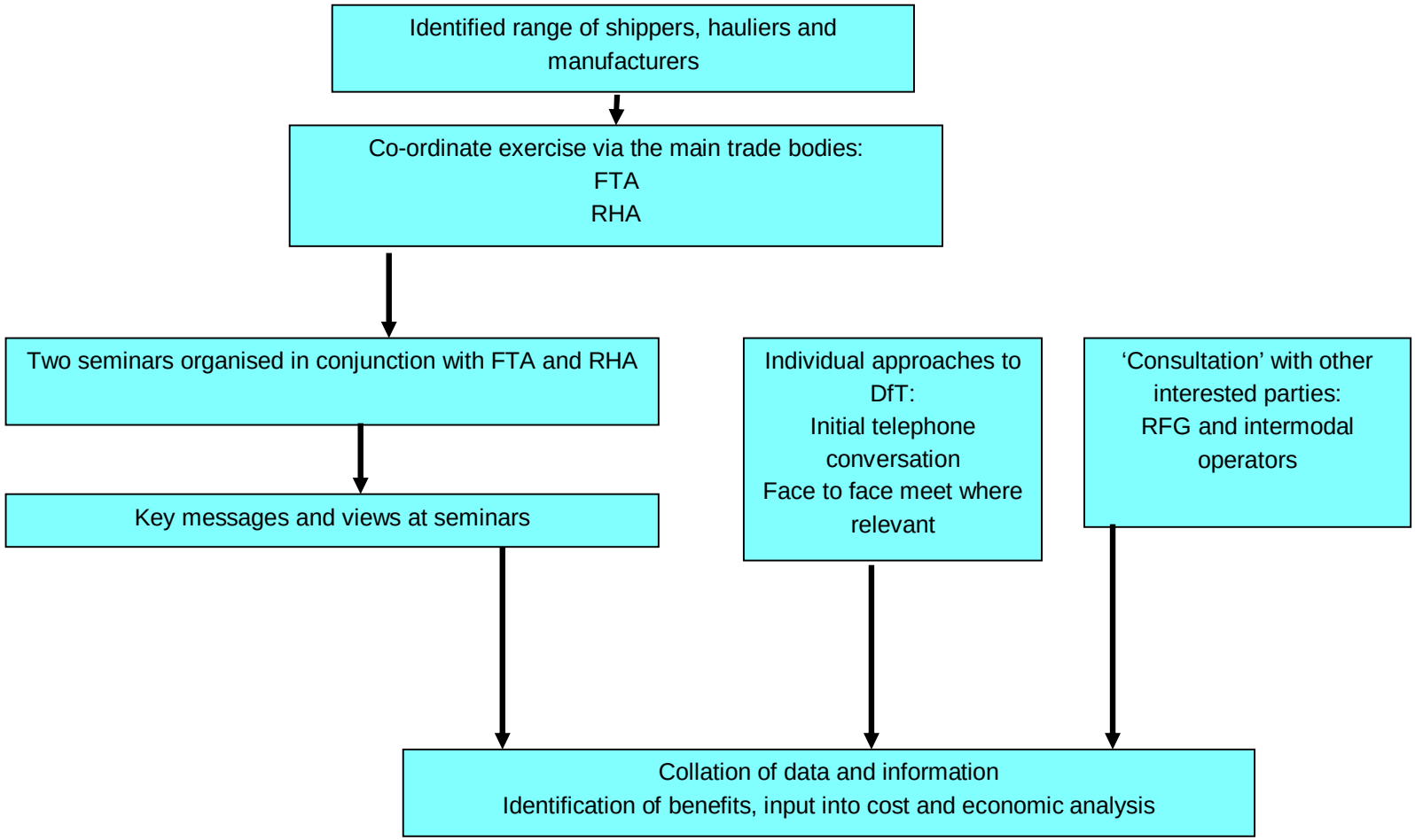
In addition, the exercise sought the views and opinions of other interested stakeholders. These included rail freight operators DB Schenker, Freightliner, GBRf and DRS. The Highways Agency was also made aware of the project and its key aims/objectives. TRL, as part of their project research, have also contacted and liaised with a number of semi-trailer manufacturers.

It should be noted that the process described above did rely, to a large degree, on the co-operation and willingness to participate of individual commercial organisations. Organisations were contacted (either directly or via the trade bodies) and invited to events, but subsequently did not respond to the invitations to participate and did not attend the events organised. Similarly, some organisations promised to supply data at the seminars, but subsequently little or no information was ultimately received, despite reminders from the consultant team and the trade bodies themselves. It perhaps should be appreciated that:

- As private sector commercial organisations, they could not be forced to participate and provide data and evidence; and
- Unlike the ports or railways sectors, the road haulage industry has traditionally been wary of and lacks a history of engagement with Government.

The flow chart below summarised the methodology adopted.

Evidence Gathering Methodology



4. RESULTS AND KEY FINDINGS

4.1 Freight Transport Association Seminar

The FTA seminar was held with a selection of their membership on Thursday 1st October 2009 at The Park Royal Hotel, Warrington. This was a positive meeting and well attended by a range of business organisations plus representatives of the consultant team, the FTA and the DfT.

The following table lists the commercial operators attending the seminar (18 in total).

Table 4.1: Attendees at the FTA Seminar by Business Type

Organisation	Main Business	Types of goods handed and mode of appearance
Tesco	Retail	Chilled, frozen and ambient cargo Pallets, hanging garments and roll cages
Asda	Retail	Chilled, frozen and ambient cargo Pallets, hanging garments and roll cages
Greggs	Retail	Chilled, frozen and ambient cargo Pallets and roll cages
Carlsberg	Beverages production	Pallets
Kimberly Clark	Paper products	Pallets
Warburtons	Bread production	Pallets
Dairy Crest	Dairy product production	Pallets
Nestle	Food production	Pallets
Abbey Corrugated	Corrugated board sheet production	Semi-bulk and pallets
Nynas	Bitumen production	Tankers
Wincanton	Third party logistics	Chilled
DHL	Third party logistics	Pallets
Hoyer	Third party logistics	Tankers
TDG	Third party logistics	Chilled
Stobart	Third party logistics	Chilled, frozen and ambient cargo Pallets, hanging garments and roll cages Intermodal operator
Malcolm Group	Third party logistics	Chilled, frozen and ambient cargo Pallets, hanging garments and roll cages Intermodal operator
Iveco	HGV manufacturer	NA
United Biscuits	Food production	Pallets

Overall, the longer semi-trailer concept was well-received by the audience, though some organisations did note that they would not be suitable for their operations (weight constrained). Most attendees stated their intention to provide the information requested after the seminar. A summary of their main points of argument and rationale is presented below.

1. Attendees were broadly supportive of the longer semi-trailer concept. Most organisations provided anecdotal evidence, based on actual product flows, describing how some/all of their operations reach cube capacity below gross weight limits, and that the introduction of longer semi-trailers would enable a reduction in vehicle trips and HGV kilometres. As a result, savings to the 'bottom line' would be achieved, in addition to any CO_2 emissions reduction.

2. The preferred option was for a 15.65m semi-trailer i.e. the full 2.05m length increase.

3. The introduction of longer semi-trailers would provide additional flexibility within their supply chains, in particular the ability to move extra cargo without need to use double deck semi-trailer equipment (which is not compatible with or suitable for some delivery operations).

4. Potential benefits for domestic intermodal rail operations were also noted by a number of attendees. The ability to operate 15.65m semi-trailers would also allow the introduction of 15.6m intermodal units. The Megafret intermodal wagon, used for most domestic flows, has a 15.6m loading deck so new rolling stock equipment would not have to be developed. Essentially, an additional 4 pallets (single stack) could be conveyed per unit, for the same cost as a train conveying existing length (13.6m) intermodal units.

A majority of the attendees subsequently supplied the case study data and information to support the examples and views presented at the seminar. In the case of Wincanton, the company supplied case study data across a range of their contracts (retail and manufacturing sectors). Operating cost data was also supplied by many attendees.

In addition, the FTA has produced an overall position paper setting out the view of the trade body on the introduction of longer semi-trailers. This is presented in Appendix A.

4.2 The Road Haulage Association Seminar

The RHA seminar was held on Wednesday 14th October 2009, at Palletline's Birmingham depot. Again, this was a positive meeting and well attended by a range of hauliers plus representatives of the consultant team, the RHA and the DfT.

The following table lists the commercial operators attending the seminar (11 in total).

Table 4.2: Attendees at the RHA Seminar

Organisation	Main Business	Types of goods handled and mode of appearance
Massey Wilcox	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes
Framptons	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes
CFT Services	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes
ABE (Ledbury) Ltd	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes
Malcolm Group	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes Domestic Intermodal
Woodall Transport	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes
Turners of Soham	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes
Tay Group	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes
Ceva Logistics	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes
Great Bear Distribution	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes
Canute Group	Road haulage operator	General haulage, including pallets, roll cages and semi-bulk cargoes

The attendees at the RHA seminar were virtually unanimous in arguing against the introduction of longer semi-trailers. However, as explained at the end of this Chapter, these attendees would not necessarily be representative of all decision makers in the road haulage industry. A summary of their main points of argument and rationale is presented below.

1. Customers would force the haulage operators to purchase and operate longer semi-trailer equipment.

Most operators stated that their largest customers (generally recognised to be the major retailers) would essentially force them to purchase and operate longer semi-trailers on their contracted operations. This would probably be included as contractual commitments, either as part of future contracts or through the re-negotiation of existing arrangements. Essentially, operators refusing to adopt longer semi-trailers would lose business.

As a result, existing fleets of 13.6m semi-trailer equipment would effectively become redundant. Operators would therefore be forced to dispose of these semi-trailers before the end of their economic/operational life i.e. before they had been fully depreciated. The second-hand market for semi-trailers would consequently be flooded with partially depreciated 13.6m semi-trailer equipment and re-sale values would fall significantly. Operators would be forced to partially write-off recent capital investments, as any disposal revenue would be significantly below the residual/book value of the semi-trailers being sold. Thus, the RHA seminar identified write-off costs associated with the introduction of longer semi-trailers.

New longer semi-trailer equipment is likely to be more expensive to purchase and operate compared with existing 13.6m semi-trailer equipment. The extra length and potential requirement to fit steering axles would result in the capital costs of longer semi-trailers being significantly higher compared with existing equipment. The additional weight and length would reduce fuel efficiency, leading to higher running costs. Some operators also suggested that, under the current economic climate, securing new capital funding would be difficult (and expensive).

Most contracted haulage rates are on a 'per semi-trailer' basis, meaning the incentive is with the customer to fill the semi-trailer. Most operators stated that there is unlikely to be any associated rate increase, to compensate for the additional costs, following the introduction of longer semi-trailers. Consequently, most operators felt that all the costs associated with the introduction of longer semi-trailer equipment (i.e. the write-off costs of existing equipment, together with the higher capital costs of purchasing new trailers and the additional running costs) would be incurred by road haulage operators. All the benefits would be realised by their customers (being able to move more cargo at the same per semi-trailer rate).

2. There is no operational need for longer semi-trailers.

Most operators stated that existing 13.6m semi-trailer equipment is not fully utilised to the maximum potential and that there is scope for operating these semi-trailers more efficiently, thereby mitigating any operational or commercial need for longer equipment.

It was stated that many distribution centres do not accept double-deck (i.e. 4.9m tall) semi-trailers – these could be utilised to convey more cargo per unit load ahead of introducing longer equipment.

In particular, many operators stated that distribution centres do not accept 'double-stacked' pallets (i.e. one pallet loaded directly onto another loaded pallet within a single deck trailer) and mixed commodities on a single pallet. Even where pallets are

partially/lightly loaded, distribution centre operators do not accept pallets holding two or more product-lines. One example provided was on a drinks contract, where pallets of beer or soft drinks are normally fully loaded but more expensive lines, such as Champagne or Cognac, were usually lightly loaded (say 3-4 cases). However, the receiving distribution centre does not permit the lightly loaded pallets to be stacked onto the fully loaded pallet (even though there is height available in the vehicle) or the consolidation of small volume cargo onto one pallet. It is understood that these arrangements reduce discharge times at distribution centres and produce other operational efficiencies (e.g. vehicle can be unloaded and cargo stored by one operative/fork-lift truck).

As a result, on many vehicle trips, the semi-trailer deck 'foot-print' is full but it is well below the volume capacity of the semi-trailer i.e. not loaded to roof. The ability to double-stack and mix pallets would generate extra space in existing 13.6m semi-trailer equipment, thereby allowing more cargo to be conveyed per trip. The introduction of longer semi-trailer equipment would consequently exacerbate this problem.

3. Longer semi-trailers would become 'the norm'.

   Many operators cited the previous length increase from former 40ft (12.19m) length semi-trailer to the existing 13.6m semi-trailer. Trailer manufacturers simply ceased producing 40ft equipment and concentrated on only building 13.6m semi-trailers. Even on operations where a longer semi-trailer was not required, operators had to purchase them because they were the only equipment available. Many operators felt the same situation would happen following the introduction of longer semi-trailer equipment.

4. There will be no associated increase in gross weight limits to compensate for the additional trailer tare weight.

   Longer semi-trailers will be heavier due to the extra length and/or requirement to fit steering axles. As a result, longer semi-trailer equipment will convey less cargo on those operations that do reach gross vehicle weight. Consequently, additional vehicle trips may be required, the opposite of the intended purpose of introducing longer semi-trailers.

   If longer semi-trailer equipment was introduced it should at least be on a 'payload neutral' basis.

5. Rigid and draw-bar combinations are not suited to the general haulage market, and operators prefer to utilise articulated semi-trailers.

   The operators provided three principal reasons:

   - They have higher capital and running costs compared with tractor unit/articulated semi-trailer combinations;
   - Two loading docks are required at distribution centres – 'health and safety' issues do not allow a rigid and draw-bar combination to occupy one loading dock, with goods discharged by means of folk-lift trucks running through trailers and into the rigid vehicle loading deck (by means of ramps); and

- The preference of British drivers for articulated HGVs.

6. Double-deck semi-trailers are not suited to the general haulage market.

The operators provided four principal reasons:

- The higher capital costs associated with their purchase;
- They are uneconomic to operate when partially loaded – higher fuel consumption;
- They are not accepted at many distribution centres – semi-trailer equipment needs to be flexible (effectively 'go anywhere') when used in general haulage; and
- They are effectively niche equipment confined to dedicated flows. They are therefore difficult to dispose of before the end of their economic life.

Again, attendees promised to supply the required information to support the arguments described above.

4.3 Rail Freight Group Seminar

A representative of the consultant team presented a paper at the RFG's autumn meeting in Telford on 11th November 2009. Around 30 delegates attended this meeting from a range of member organisations. The aim of the presentation was to provide an overview of the study, its key objectives, together with an initial assessment of the likely impact on the domestic intermodal rail freight sector.

In addition, the presentation was intended to start a debate around the concept of operating longer intermodal units (a concept which had previously been raised at the FTA seminar). The rationale behind this argument was as follows:

1. The ability to operate 15.6m semi-trailers means that we can also operate 15.6m intermodal units

2. The Megafret intermodal wagon (used for most domestic intermodal flows) has a load platform length of approximately 15.6m. They are currently conveying 13.6m intermodal units or 45ft (13.7m) pallet-wide containers. Therefore, they currently convey approximately 2.00m of 'fresh air' per wagon.

3. A 15.6m intermodal unit in the height range 2.59-2.90m (8ft6-9ft6) would be able to convey 30 pallets single-stack. Total train costs would be the same for a train conveying 13.6m or 15.6m intermodal units i.e. the same wagons, traction, terminals, etc. Track Access Charges may be slightly higher (larger and heavier box), though that could be offset by better fuel consumption (less drag as units are closer together). As a result, being able to convey an additional four pallets per unit for affectively the same train costs would subsequently produce lower per pallet costs.

4. On W10 cleared routes e.g. DIRFT-Coatbridge or Barking-Trafford Park, a bespoke intermodal unit at 3.075m external height (+0.825m deck height of Megafret = 3.900m) could potentially allow 60 pallets double-stack per intermodal unit (2 x 1.45m height pallets).

The attendees at the RFG meeting expressed concerns in their response to the study. Many delegates at the conference appeared to accept the broad thrust of the longer intermodal unit concept. However, a number of points were made, including:

1. Longer semi-trailers should be confined to moving longer intermodal units between warehouses and the nearest suitable intermodal terminal. This would provide rail freight with a significant cost benefit over road haulage, allowing it to win traffic on key long distance routes (and provide significant environmental benefits).

2. This would be the thin end of the wedge again. Every time the road haulage industry has been provided with a gross vehicle weight increase or length increase, it has been followed up shortly after with further increases e.g. 32 tonnes to 38 tonnes to 40 tonnes to 44 tonnes. It will only be a matter of time before a further increase of some type is provided again. All regulatory changes in future must provide rail freight with significant benefits over road haulage.

The RFG has since supplied the consultant team with a letter setting out a number of concerns raised by members following the Telford presentation. This letter is produced in Appendix B; the main points are as follows:

- The double-stack loaded pallet option may not be feasible and therefore should not be included in the overall analysis;
- The longer intermodal units would need to be cheap to procure, have the ability to be used flexibly and not create operational constraints which make rail use more difficult;
- Intermodal units need flexibility to operate over diversionary routes with a less generous loading gauge profile;
- Many existing intermodal units were partly funded through FFG, and must therefore run throughout the commitment period without replacement. Replacing these units would generate additional costs for operators; and
- Some cranage equipment at terminals might not be suitable for longer intermodal units.

Following the RFG meeting, Freight on Rail have subsequently supplied their own position paper. This is also produced in Appendix B.

4.4 Direct Contacts

A number of organisations, who either had become aware of the study or were already promoting the longer semi-trailer concept, had made direct contacts with the DfT

independently of any trade body. In these cases, the consultant made direct contact with the organisations/individuals concerned, initially by telephone or e-mail. Face to face meetings were arranged where appropriate: These organisations were:

- Stobart
- Tesco;
- Wincanton;
- Sainsbury;
- DHL Express;
- Malcolm Group
- BSW Timber; and
- Stardes Haulage.

The following rail freight operators were also contacted and face-to-face meetings conducted[2]:

- DRS;
- DB Schenker; and
- Freightliner.

The Highways Agency was also contacted. A face-to-face meeting was conducted with the HA, which described the project and its key aims/objectives.

4.5 Summary of Participation

The table below presents a summary of overall participation in the evidence gathering exercise.

Table 4.3: Summary of Exercise Participation

Organisation/Company Type	Meeting undertaken (either at FTA/RHA seminar or face-to face)	Detailed data/case study or submission supplied
Trade Body	3	3
Retailers	4	5
Manufacturers	10	11
Hauliers/Logistics Operators	18	5
Intermodal Operators	2	2
Rail Traction Providers	4	1
Others	2	0
TOTAL	**43**	**27**

[2] GBRf also attended the RFG meeting.

4.6 Key Findings – Industry Benefits

Industry broadly confirmed the analysis undertaken in Section 3.1 with respect to the markets and sectors likely to adopt longer semi-trailer equipment.

The cost and performance data supplied by the industry responses validated the base assumptions and costs utilised in the road and rail freight cost models developed for this project.

Data and evidence has been supplied by industry which shows that, for goods which are not weight constrained, cost and efficiency benefits will be generated as a result of the introduction of longer semi-trailers. Overall, the evidence suggests a significant switch to longer semi-trailers on inter-depot trunking movements i.e. flows between factories, distribution centres and mail/parcels. On retail store delivery operations, take-up is likely to be less, given access restrictions and load volumes.

Inter-depot trunking movements (i.e. not deliveries to retail outlets) are generally over medium to long distances, being from production sites nationwide or from Midlands based NDCs to depots in other regions. Also, such flows tend to be multiple full-load movements undertaken on existing maximum length goods vehicles, principally 13.6m semi-trailers, both standard height and, increasingly, double-deck equipment (between facilities which can accommodate such vehicles) e.g. some food producers can often despatch 10-15 full-length semi-trailers per day into a single supermarket RDC.

As a result, the evidence gathering responses suggest that goods being moved on inter-depot trunking operations are prime candidates for transfer to longer semi-trailers, while utilisation on retail store deliveries is likely to be more varied (see below). Traffic data supplied by shippers suggests that most inter-depot trunking operations are multiple full-load movements and will therefore benefit greatly from the introduction of longer semi-trailers, principally through a reduction in total HGV trips. A switch to longer equipment, perhaps over a 18-24 month period, is likely to be wide-spread. Overall, a reduction of around *10-15% of HGV trips and HGV kilometres* can be expected on such operations given the introduction of longer semi-trailer equipment.

In addition, some retail outlets have a high throughput of trade and could physically accommodate a larger vehicle e.g. a *Tesco Extra* type store on an out-of-town retail park. Again, evidence supplied suggests that such flows will benefit greatly from the introduction of longer semi-trailers and that a switch to longer equipment will occur.

However, many town centre retail outlets and smaller *metro* or *express* store formats cannot accommodate existing maximum length HGVs or their trade volumes do not warrant the use of a large vehicle. Such stores are therefore served by shorter single-axle artics or rigid vehicles. In such cases, the use of longer equipment is less likely. As a result, the introduction of longer semi-trailers on retail store deliveries is likely to be more varied. Data

supplied by retailers suggests that, on average, only around 40-50% of HGV trips would be suitable for a longer semi-trailer.

Summary of Industry Responses

An Annex to this document details the data and evidence provided by commercial operators to demonstrate longer semi-trailer benefits. However, the evidence was supplied on a 'commercial-in-confidence' basis, meaning that the Annex will not be published. The following is therefore a short summary of each detailed data submission.

Company 1: Inter-depot trunking operation for packages and parcels
- A 16% reduction in daily HGV trips;
- 27,840km less travelled per day; and
- 8,100 litres of fuel saved per day.

Company 2: Inter-depot trunking operation of food products
- Annual HGV trips saving of 6,305 – a 13% reduction; and
- 792,000km less travelled per annum;

Company 3: Inter-depot trunking operation of household products
- Annual HGV trips saving of 3,470 – a 13% reduction.

Company 4: Inter-depot trunking operation of food products
- Weekly HGV trips saving of 120 – a 15% reduction.

Company 5: Inter-depot trunking operation of household products
- Weekly HGV trips saving of 34 – a 13% reduction.

Company 6: Inter-depot trunking operation of food products
- Weekly HGV trips saving of 14 – a 14% reduction.

Company 7: Inter-depot trunking operation for industrial supplies
- Annual HGV trips saving of 410 – a 13% reduction;
- 95,000km less travelled per annum; and
- 31,000 litres of fuel saved per annum.

Company 8: Inter-depot trunking operation for clothing
- Annual HGV trips saving of 316 – a 13% reduction;
- 60,000km less travelled per annum; and
- 19,700 litres of fuel saved per annum.

Company 9: Inter-depot trunking and store delivery operations for clothing
- Annual HGV trips saving of 3,120 – a 13% reduction;
- 1.55million km less travelled per annum; and

- 456,494 litres of fuel saved per annum.

Company 10: Inter-depot trunking operation for grocery supplies
- Weekly HGV trips saving of 12 – a 6% reduction;
- 4,150km less travelled per week; and
- 65,000 litres of fuel saved per annum.

Company 11: Inter-depot trunking operation for grocery supplies
- Weekly HGV trips saving of 8 – a 6% reduction; and

Company 12: Inter-depot trunking operation for electronics
- 159,000km less travelled per annum; and
- 45,000 litres of fuel saved per annum.

Company 13: Inter-depot trunking operation for industrial supplies
- Weekly HGV trips saving of 5 – a 15% reduction.

Company 14: Inter-depot trunking operation for household products
- Annual HGV trips saving of 187;
- 723,000km less travelled per annum; and
- 236,000 litres of fuel saved per annum.

Company 15: Inter-depot trunking operation for industrial supplies
- 471,000km less travelled per annum; and
- 147,000 litres of fuel saved per annum.

Company 16: Inter-depot trunking operation for household goods
- Annual HGV trips saving of 1,320; and
- 59,000 litres of fuel saved per annum.

Company 17: Retail store deliveries
- Weekly HGV trips saving of 111 from one RDC – a reduction of 5.5%;
- Weekly HGV trips saving of 385 from second RDC – a reduction of 13%; and
- Weekly HGV trips saving of 26 from one NDC – a reduction of 9.5%.

Company 18: Retail store deliveries
- Weekly HGV trips saving of 96 from RDC – a reduction of 4.5%.

Company 19: Specialist road haulage services
- Typical contract requires services of at least 8 semi-trailers;
- Use of longer semi-trailers would reduce this to 7 semi-trailers.

4.7 Key Findings – The Case against Longer Semi-trailers

Detailed data and evidence to support the arguments against the introduction of longer semi-trailer equipment (see Section 4.2) were not forthcoming from those operators arguing such a case. However, the RHA did supply some anonymous high level examples to support the views expressed by some of their membership. These are presented below.

Example 1

A firm based in the rural West Country (Gloucestershire) runs a diversified transport and distribution service. As part of the operation, the firm operates a fleet of ten artics, mostly running at 44-tonnes.

The pattern of operation for these trucks varies throughout the year but has at its core: the year-round haulage of bottled water with, typically, six trucks; haulage of seasonal fruit, such as apples, blackcurrants and hops; and a dedicated artic for a pharmaceuticals customer. Deliveries of these three types of traffic are of full-load and part-load to destinations from the far North-east of England to Kent; and subsequent loads, after the initial outward leg, vary markedly. The trucks provide a flexible and responsive service to customers who commonly give less than two days' notice.

Outward deliveries of bottled water are, in the summer when demand for the product is strongest, often full-load shipments to a single point. Depending on the receiving supermarket or wholesaler's requirements, such full loads are either by weight or by length. For example, one receiver always requires 63 unusually-small pallets that weigh in total a little over 20 tonnes and such loads could make use of extra length. Others, with more conventional 26 pallets-loads, weigh out at 44-tonnes and those loads would be unable to make use of the additional length. If an extra length trailer were to be used, at least one pallet less could be shipped in order to remain legal within 44 tonnes.

Consignment sizes of bottled water drop, often to half-trailer or less by weight/volume. However, the receiving company requires regularity of delivery, regardless of consignment size. The transport company retains good haulage efficiency by putting other freight on the truck to take up available space/weight. Around one third of the time the resulting mixed load weighs out; around one third of the time the load uses up all the available length but could use more length; and the remaining third, there is a degree of spare capacity by both weight and volume - but it is considered rare that this unused capacity, together with the extra length, would lead to the adding of a further consignment. Extra length would therefore penalise some of the traffic, benefit other traffic and make little difference to the rest, in respect of the operations where bottled water made up the core outward journey.

With produce, most shipments weigh out and therefore the increased trailer weight would reduce the legal carrying capacity by one or two pallets. One exception is fresh-cropped hops, which are light and would use extra length.

The trailer dedicated to a pharmaceuticals customer never weighs out and rarely uses the available deck length. However, the full trailer length is used sometimes and extra length could be used on perhaps 10% of deliveries. The extra weight would simply add slightly to the cost of the remaining operations. Mixed loads are not possible, due to the particular requirements of the customer.

The pattern of deliveries after the outward load is hard to generalise. From the north of England, the most common backloads are, in equal number, extremely light material on the one hand and timber, which weighs out at a full 44 tonnes.

Before returning to the West Country, this hauliers' trucks often make relatively local runs, sometimes of full loads but more often of part-loads of, say, 10 or 12 pallets. Customers who frequently use the service demand the extra capacity, which they may or may not use depending on their business need at the time. The haulier then works to find a load to return to close to its West Country depot. There is no hard-and-fast pattern of loading but half the loads fail to use the capacity by weight or volume and 10% are empty or near-empty.

In addition, a little under 10% of the vehicles' mileage is empty running to reposition for the next load.

The haulier has no doubt that he would be required progressively to refleet with longer trailers within 12-18 months of any increase in permitted lengths in order to maintain the flexibility to serve a diversified range of customers – and varying needs of individual customers. Historically, the industry has generally retained a standard length of trailer, as this has allowed a high degree of flexibility and therefore efficiency, and this haulier believes the same pattern would be followed again.

The haulier identifies particular concerns in relation to the longer trailer on rural roads, which make up a significant and essential proportion of his operation. The visual impact of the longer trailers would, he believes, bring added hostility towards the company and particularly its drivers. Were the turn-in or swing-out performance of the artics to be more intrusive than the current standard artic with 13.6 metre trailer, the hostility in rural areas would increase further. He has similar concerns in respect of deliveries to towns and cities.

Concerns are also raised about achieving appropriate weight distribution with part-loads or full loads made up of two contrasting consignment types – for example, bottled water, which is relatively heavy, and light material, such as toilet rolls. Additional length could, he believes, raise significant issues in respect of axle loads and driveability.

Concern is also expressed in respect of steering axles. While they may be advantageous for rural road use, he would wish research to be available on their performance under hard, slow-speed cornering in depots and distribution centres.

Example 2

A haulier has, as part of his operation, a contract that requires the delivery, typically, of six trailer loads a day to six wholesalers, supermarket RDCs and similar. The journey lengths range from between 40 miles and 150 miles. The loads are already consolidated on his premises –such that they comprise a number of product lines, all on pallets.

After making the delivery, each vehicle normally returns to the general area of the haulier's depot with a load. The customers and exact origin and destination of these loads vary widely – reflecting the efficiency and flexibility of the service to UK business. The trailers are all single-deck.

The impact of an increase in trailer lengths would be as follows. For the outbound journey, it is unlikely that many of the loads would be able to make use of the extra length. Already, 50% of the loads reach the 44 tonne gross weight and therefore no more could be added. Very occasionally – one or two a week – reach 26 pallets with weight to spare, because the pallets are only partially laden with a single product line, as required by the company receiving the delivery. It is unlikely that many of the remaining loads, around 50%, would use the extra space, as they already have load space and weight to spare.

The transport company seeks to minimise the empty running, which averages around 10 miles. This mileage is unaffected by the trailer, other than the slight increase in fuel use caused by increased weight.

Most return legs are freighted – it is rare to run empty. Half the return loads load bagged aggregates to the 44 tonne maximum capacity. The efficiency of the load for these customer sites would therefore be reduced.

Of the remaining 50% of the return leg traffic, the loading is by length rather than weight. Half of this 50% makes full use of the trailer length and would load extra pallets were longer trailers allowed. Indeed, they would require the longer trailers. The remaining loads tend to be half-full, with around a dozen pallets. There has been some reduction in the size of these last consignments during the current recession.

The transport company involved believes he would be required quickly to re-equip his fleet, in order to be able to continue to offer flexibility to his customers. This flexibility is carbon-effective, as it strikes a balance between weight and length. Were the length to be increased, there is a risk of fragmentation of the standardised trailer length between the current length and the new, which would reduce that flexibility and create new commercial risk.

Example 3

One company, as part of its operations, moves around 20 loads a day on an outward journey of 200 miles to make a delivery using temperature-controlled trailers with two loading decks.

The vehicle then typically runs empty for 65 miles, where it picks up a load running 150 miles to deliver close to the initial starting point of the round trip. The customers involved are unrelated.

Were the length increased sufficient to allow an additional four pallets (two extra pallets on each deck), the impact on this work would be as follows:

The efficiency of the first leg of the trip would be increased by up to four pallets. The gross weight would increase to almost 44 tonnes when the vehicle was fully loaded, which is the case at least 80% of the time. However, not infrequently - between 10 and 20% of the runs - the vehicle is not fully loaded, with, say, ten pallets on board. There would be no increase in loading efficiency on such runs and a slight decrease in overall efficiency, due to the increased fuel consumption caused by the extra weight of the trailer.

The short relocation run, on which the vehicle is empty, would be unchanged other than the slight increase in fuel consumption caused by the increased trailer weight.

The third leg of the journey, of 150 miles, is already normally running at 44 tonnes. The increased weight of the longer trailer would reduce the legal payload by at least one pallet, based on a trailer weight increase due to the extra length of 250-300kg. The payload reduction would increase further, were there extra weight due to steering axles being required. On the infrequent occasions where the trailer is less than fully loaded, the only impact would be a slight increase in fuel consumption due to the extra weight.

The operator adds that, were a single-decked trailer to be used on this run, the efficiency gain from the same trailer length increase would be to a maximum of two pallets on the outbound leg, rather than four; the efficiency reductions would be unchanged.

Vehicle Operators and Vehicle Owners

The responses that were gathered from the RHA attendees at the workshop focussed particularly on the perspective of vehicle owner/operators and on the problems that might confront the large number of small to medium sized operators. However, the market structure also contains other important players.

A significant proportion of the semi-trailers used for retail outlet deliveries are actually owned/leased by the retailers themselves, even when they are hauled by the 3PLs on their behalf on a dedicated contract basis. These chains will directly control the semi-trailer replacement strategy and hence exert a strong influence on the longer semi-trailer adoption rate. In general, these chains foresaw clear benefits from use of such vehicles on the routes where they were appropriate.

In contrast, the semi-trailers used to collect goods from suppliers (for delivery into distribution centres) and for inter-depot trunking generally are owned by the small to medium sized

operators represented by the RHA. The past experiences of these operators regarding the impacts of previous changes in vehicle weights and regulations had caused most of them to be quite apprehensive about the impacts of allowing the introduction of longer semi-trailers.

5. INTERNATIONAL EXPERIENCE

5.1 Background

This study considers an extension in the currently allowed UK maximum 13.6 metre semi-trailer length by up to an additional 2.05m, leading to an overall maximum semi-trailer length of 15.65m and total vehicle length of 18.55m, while remaining within the existing maximum permitted gross vehicle weight (gvw) of 44 tonnes. This section provides a short desk-based review of international experience and findings from studies of longer semi-trailers or other longer or heavier vehicles. The aim is to understand what is relevant to the longer semi-trailer type of this study. However, experience in other countries does not necessarily correspond exactly to either the existing UK benchmark or the longer vehicle option.

This section provides a review of the relevant vehicle types in use in Europe and in selected other countries around the world. It also provides background to the studies of their usage. It then reviews in more detail two specific trials of longer semi-trailers that have been underway in Italy since May 2009 and in Germany, plus some adjacent countries, starting in 2006. The structure of the review is around the principal studies identified. This includes the EC study by TML into the potential impacts of the use across Europe of longer and heavier vehicles, together with other similar studies.

The output from this international review is to ascertain the level of take-up of longer vehicles; the main logistic markets that they serve; their impacts on competing modes; the increased movements / lengths of haul they may induce; and their environmental, infrastructure cost and safety impacts.

5.2 Usage or Trials of Heavy Goods Vehicles

There appears to be no country that has recently introduced a directly comparable longer semi-trailer for widespread usage in a context similar to that relevant to the UK. First, many European countries have a 4 metre height limit whereas the *de facto* limit in the UK is 4.9 metres. This has enabled the UK to gain additional cubic capacity vertically, reducing the need for lengthening. Second, much greater use is made of drawbar trailer combinations (up to the 18.75m length limit) in other European countries, with proportionally less use of semi-trailers. Third, there has been much greater development of hub-satellite pallet-load networks in the UK than in other European countries. Although double-deck trailers are widely used in overnight trunking between regional satellite depots and central hubs in these networks, there may be significant demand for LSTs on some routes. For these and for other reasons explained below for individual studies, none of the studies/trials that are discussed here will match exactly to the situation under consideration for the UK.

Nevertheless, there are a number of countries where vehicles are already in widespread use or have recently commenced trials that have broad similarities to the changes being considered for the UK. The current usage of longer semi-trailers by country is summarised in

Table 6.1. This also lists some longer heavier vehicles (LHVs) currently allowed in a selection of countries, together with comments on their availability. Column 2 lists the maximum allowed length and maximum gvw of the combination.

Table 5.1: Summary of Semi-trailer and Selected other Vehicle Combinations in Use

Countries	Total vehicle length (metres) / gvw (tonnes)	Comments on vehicle
		Semi-trailer vehicles
EU	16.5 / 40	Standard allowed across the entire EU.
UK, Ireland	16.5 / 44	UK domestic standard
UK	18.55 / 44	The longer vehicle being considered in this study
Germany, (Poland, Czech, Russia, Ukraine, Belarus)	17.8 / 40	Trial that started in Germany in 2006 with 300 semi-trailers and more recently extended to these other countries. Example: Kögel Big-MAXX.
Italy	18 / 44	Trial of a limited number of longer semi-trailers; started in May, 2009.
Canada	21.55 / 46.5	Widely used across the country.
USA	19.77 / 41.9	Widely used across the country.
Australia	19 / 45.5	Widely used across the country.
		Trailer combination vehicles
EU	18.75 / 40	Standard allowed across the entire EU.
UK	18.75 / 44	UK domestic standard.
Sweden, Finland	25.25 / 60	European Modular System (EMS) - broadly similar combinations have been in use since the 1970s; allowed on most of the road network.
Netherlands	25.25 / 60	Limited intra-national trials of EMS initiated firstly in 1999. EMS vehicles of 60 tonnes are allowed since 2008 on the major road network.
Norway, Denmark, Belgium (France)	25.25 / 60	Limited intra-national trials of EMS recently initiated. France had planned to start in 2010 with a 57 tonne limit but this has recently been cancelled.
Germany	25.25 / 50	Trials solely within some Länder are underway with a 50 tonne limit, though at the Federal level the government position is to forbid LHVs.
Canada, Australia, USA	-	Very large vehicle combinations (up to 117.5 tonnes in Australia!) are allowed on parts of the road network for certain operations.

The EU standard vehicles of Directive 96/53/EC represent in broad terms types allowed on most of the road network in all EU countries. However, individual countries or parts of countries[3] may decide, under certain conditions, to allow longer and / or heavier vehicles within their jurisdiction, some of which are listed in Table 5.1.

In those European countries with low population densities and long distances between settlements, such as Sweden, Norway and Finland, there has been a long history of usage of vehicle combinations of around 60 tonnes gvw. This has led to the current European Modular System (EMS), which comprises, for example, an EU standard tractor and semi-trailer coupled to a standard rigid drawbar trailer. Trials of EMS are being planned or carried out in a number of EU countries, including Netherlands, Belgium, Denmark and France. In contrast, the UK has rejected the use of such LHVs and the Austrian government and many Swiss cantons have also opposed them (UNECE WP24 Secretariat, 2010). Although the German Federal Transport Ministry had in October 2007 rejected at the national level the introduction of LHVs, trials of EMS have continued in some federal states. On 1 July 2010, the German Federal Transport Ministry announced plans to undertake trials with LHVs as of 2011.

This long-term use of LHVs in Northern Europe is similar to the situation in other large countries such as Australia, Canada and the USA, where very large vehicles are allowed on certain parts of the road network. In these latter countries, the semi-trailers available in standard use across the entire road network are somewhat longer than the current EU (and UK) standard trailer length of 13.6 metres (Australia - 14.6m, Canada - 16.2m, USA - 14.6m). However, the regulations in individual states may allow vehicle combinations well above these lengths on some or on all of their road networks.

In the rest of this Chapter, we review the examples that are most relevant to the proposed 15.65/18.55 maximum trailer/vehicle length for the UK. There are two sets of European trials currently underway: in Germany plus countries to its east, and in Italy.

5.3 German / Eastern European Trials of Longer Semi-trailers

In Germany there have been trials for the last three years of a 17.8 metre semi-trailer vehicle, which increases the available load volume by about 10% above the EU standard but leaves the gvw unchanged at 40 tonnes. In August 2006, the trailer manufacturer Kögel initiated its trial of 300 Big-MAXX[4] semi-trailers using special permits that covered the whole of Germany. There is no patent for this semi-trailer so that other trailer manufacturers are free to build it. Kögel charges an additional 5,000 euro for this longer semi-trailer. Around 40 different companies used these semi-trailers and the results of the trials were analysed by the Institute for Automotive Engineering (ika) at the RWTH Aachen who, it is claimed by

[3] A complete list of the permissible maximum weights and vehicle dimensions in Europe are published at http://www.internationaltransportforum.org/europe/road/pdf/weights.pdf and http://www.internationaltransportforum.org/europe/road/pdf/dimensions.pdf

[4] http://www.big-maxx.com/en/history

Kögel, have "confirmed that the Big-MAXX will not have any impact on the road safety of other road users"[5].

In 2007 a number of variant semi-trailer types were introduced, such as:

- The refrigerated Big Cool-MAXX in which the extended semi-trailer offers space for three more pallets than a normal standard cooler, i.e. 36 instead of the usual 33, as well as providing 100 millimetres of additional space for air circulation which should improve the effectiveness of the refrigeration systems.
- The Big Cargo-MAXX rail with a slanted frame at the back and a hinged underride protection that is suitable for use on the flatcars commonly used today for unaccompanied shipment by rail.
- The Big Cargo-MAXX steel, a flatbed semi-trailer especially designed for safely transporting steel reinforcing mesh, bars, pipes or other long fabricated products. This extra length avoids the potential danger of overhang of the cargo at the back of the vehicle.

The trials of a 17.8m vehicle have been extended to a number of countries in the east. In 2007, the Czech government approved their use with special permits for nation-wide transport. The permit has to be renewed every three months and costs the equivalent of approximately 220 Euro for each three month period. The number of permits is unlimited and there are no restrictions on routes within the country.

More recently, the Polish government has approved the use of longer semi-trailers with 300 special permits for nation-wide transport[6]. Kögel will receive 150 of these permits for the supply of Big-MAXX semi-trailers to Polish transport companies while the remaining 150 will go to the Polish manufacturer Wielton. These special permits for longer semi-trailers will cost 800 euro per year, per vehicle. Similar semi-trailers can be licensed in Belarus, Ukraine and Russia without any limits as to semi-trailer numbers.

This initiative has been strongly led by the trailer manufacturer itself, rather than being an independent study audited by government. In this way it contrasts with the Italian study now described.

5.4 Italian Trial of Longer Semi-trailers

The other major European trial is "Progetto Diciotto / Project Eighteen" in Italy which is introducing longer semi-trailers with a resulting vehicle length of 18 metres. The project[7] is a collaboration of several entities:

[5] http://www.big-maxx.com/en/benefits/4-safety/4-safety

[6] http://www.roadtransport.com/blogs/big-lorry-blog/2009/07/big-maxx-now-available-in-pola.html#more

[7] http://www.fastrasporti.com/documentazione/progetto18.pdf provides a detailed specification in Italian of the aims and the main steps in this Project 18.

- The Italian Ministry of Transport;
- ANFIA, the Italian automotive industry association, is the owner of the project, responsible for coordinating the trial, for the operational plan and for the communication plan;
- The vehicle manufacturer IVECO, in coordination with ANFIA, is responsible for monitoring the implementation of the project;
- The survey of the operators will be carried out by CSST (Centre for Studies on Transport Systems), which will compile a database of the longer semi-trailers' performance against standard 16.5 metre units, based in part on satellite tracking of the units involved;
- The trailer manufacturers, who are responsible for the design and construction of the semi-trailers;
- The transporters / logistics operators are key actors in the experiment; the firms will operate the vehicles in a standard commercial environment but only within Italian territory.

The proposal is for use of a standard tractor together with a specially designed semi-trailer that is 1.5 metres longer than the current EU standard, producing an 18m vehicle. It would not entail any change from the current standard maximum gvw or axle loadings. It does not envisage any added restrictions on routes nor extra equipment nor restrictions on the design or use of the vehicle, beyond those that apply to the current standard 16.5 metre vehicle combination. However, it will be necessary to confirm that the manoeuvrability of the longer vehicle will meet the requirements within Directive 97/27/EC. One of the rules laid down for the trial by the Ministry of Transport, is that these vehicles are driven exclusively by well-trained and experienced truck drivers.

The duration of the trial is fixed at 36 months. This provides the opportunity to extend the experimentation, to cover a maximum period of 5 years, comprising 3 years of experimentation plus a maximum of one two-year renewal of authorization. The latter is to provide the possibility to explore and confirm the solutions to any issues that may emerge within the experiments.

The advantages envisaged from its introduction include:

- Ability to load more than the current standard 16.5 m semi-trailer vehicle (37 euro-pallets instead of 33);
- Ability to carry two 7.45 m swap bodies, rather than one at present;
- Ability to load 48' containers.

There are six logistics operators taking part in the trials themselves, which commenced in May 2009 conducting on-road trials of eight semi-trailers. Initially four different transport

companies (Arcese, FAS, CTA and Brivio & Vigano) were running a total of five trailers from four different manufacturers (Acerbi-Viberti, Omar, Merker and Rolfo) with another two hauliers, Conserva (Merker) and Koine (Cardi) due to add another three trailers to the test before long.
In fact, Gruppo Arcese has to date ordered 14 longer semi-trailers, comprising 4 box-bodied versions and 10 curtain-sided. Their experience so far suggests[8]:

- They have not seen any problems as yet, except for those caused by the increased length of the trailer: essentially manoeuvrability and the approach to narrow loading ramps;
- Additional costs are low; these costs could increase if a steering axle was added though; this kind of system would also add to the trailer's weight, and would therefore decrease the loading capacity.

Because this Italian demonstration project has only been underway for a short period, it is too early to expect detailed results from it at present. However, its relatively close similarity to the proposed UK option implies that these results should be of particular interest to this study when they eventually emerge. The form in which this trial has been designed to monitor the results from the use of a variety of trailer manufacturers and of transporters, has the potential to provide valuable information to inform future decisions. It would also provide a potential model for similar trials in the UK should there be a future decision that practical experience with longer vehicles is needed.

Any lessons for the UK from the Italian trial of 18m LSTs will need to be cautiously interpreted because their road haulage industry is quite different from that in the UK. It is more fragmented, large logistics service providers have a much smaller share of the freight market, there is greater development of regional haulage co-operatives, large retailers exert much less influence over the supply chain and there is likely to be lower compliance with regulations on vehicle loading, drivers' hours, etc.

Moreover, the vehicles being tested are 5-axle combinations with a gvw limit of 44 tonnes, in keeping with Italian regulations. Within the UK, 5-axle combinations would be subject to a 40 tonne limit.

5.5 Review of International Studies

The following sections review recent desk studies, mainly within the European Union, from which factors and experience affecting the potential introduction of longer semi-trailers into the UK can be derived. Although these studies were mainly focused on LHVs, they nonetheless provide broad indications of the types of issues that would need to be addressed for the successful introduction into the UK of longer semi-trailers. In particular, related to issues such as safety, road wear and transfer to rail, observations of experience

[8] http://www.allbusiness.com/transportation/road-transportation-trucking-trucking/12813779-1.html

with LHVs can provide evidence to determine the worst case scenario that is unlikely to be reached in the case of the more modest vehicle length extensions being considered in this study.
It does not review the major study "Longer and/or Longer and Heavier Goods Vehicles (LHVs) – a Study of the Likely Effects if Permitted in the UK" carried out for DfT by TRL and Heriot-Watt University in 2008, though many of the results from this earlier study continue to be relevant. Because its authors are also part of the current team, these findings will flow directly within the ongoing work.

5.6 EU Study by TML

The final report of the study on The Effects of adapting the rules on weights and dimensions of heavy commercial vehicles as established within Directive96/53/EC by Transport & Mobility Leuven (TML) and others was published on 6 November 2008. This was a major study commissioned by the Directorate-General for Energy and Transport in the European Commission to assess positive and negative implications of a possible revision of the rules in force on weights and dimensions of heavy commercial vehicles. The findings of this study prompted significant reaction from the industry, rail and environmental lobbyists and the flavour of these responses is also discussed below.

The study objective was to review Directive 96/53/EC that regulates weights and dimensions of heavy commercial vehicles and to investigate the possible effects of changing the directive to allow for longer and/or heavier vehicles in international transport, including the modular concept.

The TML study summarised the current situation in the EU:

The current regulation permits trucks of maximum 16.5 m (1 point of articulation) or 18.75 m (1 or 2 points) in length, 40 tonnes in weight and 4 m in height to circulate across European borders. For intermodal traffic, 44 t is the current maximum. The directive also sets limits for axle loads and overhangs. Countries are allowed to set the maxima at higher levels, but only on their own territory. The modular concept, with limits of 25.25 m and 60 t, has been in use for years in Sweden and Finland. Many countries have set their maximum load at 44 t instead of 40 t (TML, 2008).

The options in the current study are confined to longer semi-trailers with a limit of 44 tonnes and a lengthening by up to 2.05m to within the 18.75m permitted by the existing EU directive. Although the TML study considered options larger and heavier than these constraints, the study does nevertheless highlight some of the positive and negative issues of relevance. Any assessment of impact must make assumptions regarding the technology and economic trends in demand in the future (2020 in the TML study). The TML study considered four options, including a base reference of 'business as usual' with no changes to current regulations. The second scenario allowed longer/heavier vehicles (LHVs) up to 25.25 m and 60 t on all European motorways (and some other roads). Scenario Three was a hybrid of

the Reference Case and Scenario Two, with some countries restricted to the current regulations, whilst six others (Sweden, Finland, Denmark, Germany, The Netherlands and Belgium) would allow the LHVs defined in Scenario Two. The fourth scenario considered a 10% incremental increase in vehicle size and capacity Europe-wide with LHVs up to 20.75 m and 44 tonnes.

The study found that all scenarios were more cost effective than the reference case, with the greatest benefit arising from Scenario 2. The LHVs carry more freight tonne-km (+1%) but with reduced road vehicle-km (-12.9%). However, confusingly, the report cites 'positive effects on society' of a mode shift from both rail (-3.8 % tonne-km) and inland waterways (-2.9 % tonne-km). Based on reduced LHV vehicle-km, the safety and emissions impact was also positive, although the individual vehicles are more harmful per vehicle-km. These benefits were deemed to outweigh the additional infrastructure and maintenance costs.

In Scenario Three a mixed picture emerges. As expected, those countries with the larger vehicles gain the benefits of Scenario Two, whilst others are predicted to have negative impacts. Scenario Four (apparently specified with car transporters and the chemical industry in mind) is, in principle, most akin to the present study with an incremental increase in size and capacity, is less efficient than Scenario Two and is less beneficial for safety and emissions, whilst infrastructure costs remain high.

Perhaps most tellingly, the study revealed that whist there are generally positive effects, there are wide variations between the 27 member countries as the result of potential introduction of LHVs, reflecting the widely varying geographies (distribution of economic activity and availability of in scope rail and inland waterway alternatives) and freight markets. The impact on road vehicle-km for each country (excluding Malta and Cyprus) was illustrated graphically in the TML report (Figure 19) which is reproduced in Figure 5.1 below.

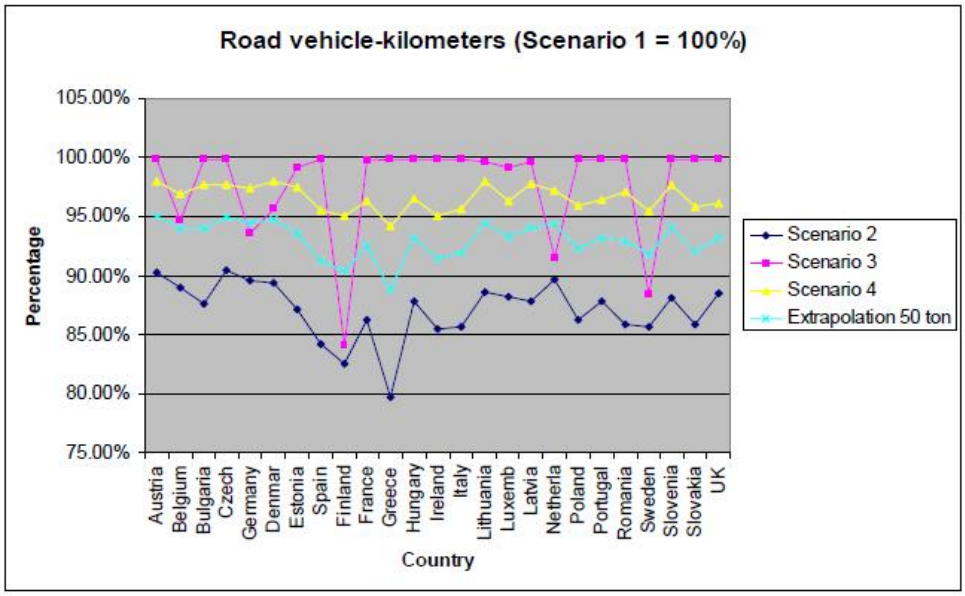


Figure 5.1: Percent reductions in road vehicle kms by country for each scenario
Source TML (2008)

The study concluded that:
As a result, road tonne-km volume grows, while vehicle-kms go down. Rail volumes can also be expected to decrease, although it is very unlikely that any decline will occur: growth will merely be somewhat slower (TML, 2008).

The report also highlighted the stakeholders involved in the market. The study found that potential beneficiaries of the expected decrease in transportation costs resulting from LHVs included hauliers and manufacturers. Opponents of such a change included governments of large countries such as France, Germany and United Kingdom, while Alpine and Eastern European countries are reluctant. Operators of rail and inland waterways, which are at risk of losing volume, and environmental organisations, are generally opposed, as are authorities in charge of road infrastructure.

The study concluded that:
Northern European countries are rather in favour of LHVs. If not already users of LHVs, they (Denmark and Norway) are considering trials in a close future. Certain German regions and the Netherlands have already gathered experience concerning LHVs, thanks to their experiments and could therefore be associated to this first group of countries.
Central and Western Europe countries seem to be much more cautious regarding LHVs. Certain countries such as Austria and Hungary have made official statements to show their opposition to any adaptation of directive 96/53. Some Länder in Germany have experimented with longer and/or heavier vehicle combinations but on a Federal level, Germany has clearly expressed its opposition to LHVs on the German roads. For this reason, Germany also fits in the group of countries with reservations about LHVs. Since France has not yet made a decision on organising trials, it may be regarded as part of the group of "the cautious". (TML, 2008).

As may be expected, there have been polarised responses and reactions to the TML report. These may be characterised by reference to the report by the European Commission Joint Research Centre Institute for Prospective Technological Studies (JRC) dated 2009, and a study for the Community of European Railway and Infrastructure Companies (CER) conducted by The Fraunhofer-Institute for Systems and Innovation Research (ISI) and others, dated May 2009.

The ISI study, '*Long-Term Climate Impacts of the Introduction of Mega-Trucks*' considered two concepts of Mega-Trucks: 25.25m of either 60t or 50t gross weight with a time horizon of 2025. The stated aim of the study is to point to possible long-term threats associated with the introduction of Mega-Trucks, in particular with regard to European climate policy and to the market position of the railways. By means of market reviews, case studies and modelling, the study sought to provide evidence on the long-term environmental impacts entailed by the introduction of Mega-Trucks.

The ISI study suggested that:

..experience from German field tests reveal that Mega-Trucks may take 20 % of HGV goods volumes. If allowed on all roads, this share may increase to 30 %. While simulations for the UK arrive at lower values, the modelling finds a total replacement of conventional trucks in high quality logistics markets in long distances above 1000 km concentrating on major corridors. These findings are confirmed by the two European case studies. Moreover, current studies suggest a share between 10 % and 30 % of long distance rail container shipments may be shifted to road in case of a general permission of Mega-Trucks in the EU (ISI, 2009).

The ISI report rejected the claim that (60 tonne) LHVs are a suitable element of a climate protection policy, and asserted that a reduction to 50 tonnes would actually be worse. The study found that there would be strong mode shift from rail to road: 'Across all unitised goods and container markets the study arrives at a risk for rail container shipments to be shifted to road between 10 % and 30 %', with a lower shift for bulk commodities, and that 'Mega-Trucks appear a strong competitor rather than a supplement to combined rail-road transport' (ISI, 2009).

The stated aim of the EC-funded JRC study "*Introducing Mega-Trucks: A review for policy makers"* was to recognise the differences in, and sensitivity to, the technical and economic assumptions made in the TML and ISI (and TRL) studies and to try and reduce the uncertainty. This included Monte Carlo simulations of the key variables.

The main conclusion of the analysis was that:
....the introduction of LHVs would be beneficial for the EU economy and - under certain conditions - environment and society as a whole. LHVs can increase the efficiency of the EU transport system and reduce friction. From an EU policy point of view, facilitating the introduction of LHVs is in line with the objectives of the Common Transport Policy and would help improve the internal market. Naturally, improving road transport would worsen the competitive position of other modes, but a balance can be found through investments and improvements in the other modes as well. Limiting the use of LHVs to specific member states or corridors would pose practical obstacles and greatly reduce the uptake and positive impacts of LHVs (JRC, 2009).

The study made the following recommendations to maximise efficiency gains and minimise the external costs:

- Improvements in vehicle design to reduce fuel consumption, environmental damage and accident risks.
- Enforcement of minimum load limits and/or maximum percentage of empty trips.
- Standardisation of vehicle sizes and loading units.
- Suitable charging systems to internalise external costs and minimize the impact on other modes.
- Common infrastructure design specifications for Trans-European Transport Networks. (JRC, 2009).

One of the key points of debate regarding the conflicting results from the different forecasting studies relates to the embedded demand elasticities within the models that were used. There is clearly great uncertainly about which values to use to model both the impact of LHVs on the demand for road freight services and on freight mode split. Different studies, including the TRL / H-W study, have used different elasticity values derived in different ways. These are likely to be country-specific reflecting conditions in national freight markets. This further frustrates any attempt to extrapolate the results of LST or LHV studies from one country to another.

The Commission has recently funded a further study to consider the possibility of making amendments to Directive 96/53/EC on heavy vehicle dimensions and weights in light of proposals from stakeholders and practice in various Member States. An inception report has been produced by the team led by the TRL (2010) which describes the approach that will be adopted to assess the options considered.

5.7 Sweden and Finland

LHVs have been operating in Sweden and Finland for over 30 years. The substantial amount of new road capacity constructed over this period has been designed to accommodate 25.25 metre vehicles running at 60 tonnes. At the time of these countries' accession to the EU in 1996, special provision had to be made to allow them to continue to operate these vehicles which were much bigger and heavier than those permitted elsewhere in Europe. An EU Directive (96/53) was approved which granted all EU member states the right to operate longer vehicles so long as they conformed to the standard modular dimensions in existence at that time.

"European Modular System for road freight transport – experiences and possibilities" (TFK, 2007) was financed by the Swedish Road Haulage Association, Volvo Trucks and Scania. The aim of this study was to evaluate Swedish and Finnish hauliers' experiences of using longer and heavier vehicle combinations according to European Modular System (EMS) with dimensions of 25.25m and 60 t. The study was performed by conducting interviews with hauliers and authorities. Results from this study indicate that the following generalised effects regarding increased vehicle dimensions according to EMS (shown in Table 5.2 below extracted from the report):

Table 5.2: Survey Views on the Effects of EMS

Area	Most positive	Most negative	Result
Environment	Less fuel consumption per transported cargo unit.	May increase the market share of road transports	+
Economy, micro level	Reduced transports costs	Increased fuel consumption and maintenance per vehicle	+
Economy, macro level	More efficient transports, lower total costs	May need infrastructural adjustment	+
Congestion	Fewer vehicles transporting the same amount of goods	May increase the market share of road transports	+/-
Traffic safety	Fewer vehicles transporting the same amount of goods	Characteristics of the vehicles may increase the accident rate	+/-
Consequences on other transport modes	Facilitates intermodal transports	May increase the market share of road transports	+/-

Source: TFK, (2007)

The TML (2008) study (pp21-22) explains that 'in Sweden, when introducing the LHVs, the government set up a tax on all the lorries to collect money and reinforce the bridges. Over a 10 year period (1996-2005), 400 million euro were collected and used for bridge reinforcement'. However, the study also notes that the system would be more difficult to introduce into other countries with more international traffic.

The Swedish Government commissioned a study "*The Effects of Long and Heavy Trucks on the Transport System"* published by VTI (2008). This examined the economic consequences of removing the option for EMS vehicles and so hypothetically allowing only EU standard 40 tonne vehicles not longer than 18.75 metres. It found that the dominant effect is that national transport costs in total would increase. This policy would also generate significant net external cost increases in terms of congestion, road safety and increased noise emissions, which would outweigh the reduction in carbon emissions that would result from the switching of significant freight volumes to rail. Even with major investment in the rail network to increase its capacity for rail freight and passengers, the costs to society from removing EMS would be significant.

No evidence has been found by VTI in Sweden that shows that accident costs per vehicle km are different between EMS and EU standard combinations when operating in a similar environment. Accordingly, their modelling deduces that the extra road vehicle-km that arise when EMS are forbidden would generate significant extra safety costs due to extra deaths and accidents per year. Even when it is assumed in a sensitivity case that the EMS has a 10% worse safety record than the EU standard, there are still extra deaths and safety costs from removing EMS.

The experience in Sweden and Finland is for LHVs of much greater dimensions than that under examination in this study. Furthermore, the geography of the Scandinavian countries, together with the relatively high importance in Sweden of raw material related industry based on timber, paper and minerals, is very different to that applicable in the UK. It is worth noting however, that rail freight in Sweden has continued to maintain a strong presence, despite the long term competition from LHVs. Although the rail share of the domestic overland freight

transport market has reduced from 45% in 1985 to 39% of tonne-km in 2005, rail has nevertheless grown by 25% in this period of growth in the freight market. In particular, for the high-value products sector the reduction in rail share was only from 27% to 25% by 2005.

5.8 Netherlands

TfK (2007) state that since 2000, the Netherlands have been carrying out trials with longer and heavier vehicle combinations according to EMS with a trial that involved 77 hauliers and some 150 EMS combinations with access to the entire Dutch expressway system. These EMS combinations allow a maximum gross mass of 60 tonnes (currently allowed by Dutch law: 50 tonnes, so a 20% increase) and a maximum length of 25,25 metres (currently allowed by Dutch law: 18,75 metres, a 52% increase in volume). According to de Kievit & Aarts (2007) the EMS road access conditions were:

- Where possible to remain on the main roads and avoid use of the secondary road network;
- Not to enter city-centres, 30 km-zones, pedestrian areas;
- Not to use railway crossings if trains are allowed > 40 km/h;
- Only to use roads with separated pedestrian/bicycle lanes (5 km exception).
- TfK note that no infrastructural adjustments on road had to be made in order to carry out the trial.

The ISI (2009) report also described these trials (quoting 155 vehicles in 71 carrier companies) feeding and discharging intermodal terminals. Interestingly, the report also listed some further preconditions to the usage of EMS:

- No vehicle employment under certain weather conditions (in winter - snow/ice);
- Minimum driver experience and qualification higher than normal truck drivers;
- Special security equipment;
- No overtaking.

The ISI review concluded:
No security impeachment was reported in the Netherlands. Traffic jams were reported to have fallen by 0.7 – 1.4%. CO2 emissions fell by 11% for heavy duty and 22% for volume critical transports. Saving potential on the carrier side for vehicles above 20 tonnes was reported between 7 and 31 % with an average of 25%. Substantial modal shift was not observed due to the geographical restrictions (ISI 2009).

The paper '*Introduction of Longer and Heavier Trucks on Dutch Roads'* by E.R. de Kievit & L. Aarts (2007) described the objectives of the trials as being to gain insight to safety, modal shift, infrastructure, competitiveness, and savings in fuel, mileage and emissions. Based on monitoring the results of the trial it was found that the EMS:

- Can absorb part of the expected future growth in (road) transport;

- Can help in attaining goals, lowering costs and increase transport efficiency;
- Is more interesting for goods with low weight density, than heavy goods;
- Is especially interesting for longer distance hauls.
- From the trials it was found that the average payload carried was in the region of 16-35 tonnes, which is well below the maximum.

The results of the more recent trial were considered sufficiently positive to justify the general legalisation of EMS in the Netherlands up to 25.25 metres long with a maximum gross weight of 50 tonnes initially in autumn 2007. This weight was then subsequently returned back up to 60 tonnes in spring 2008 after an investigation into potential damage to bridges, which had been commissioned from TNO by the Dutch transport minister, concluded that the EMS did not damage the bridges.

A recent Dutch government report (Rijkswaterstaat, 2010) summarises experiences with LHV's in the Netherlands from 1995 to 2010, including an overview of thirty Dutch reports, leading to the following finding.
The conclusions confirm that the use of LHVs in the Netherlands has several benefits, while showing at the same time that potential downsides of LHV use have not materialized. … By replacing regular large trucks, LHVs have a positive effect on the reduction of overall vehicle mileage, operating costs and emissions. In short, LHVs have both economic and environmental benefits.

The relevance of Dutch experience to UK is probably greater than that in Scandinavia owing to greater similarities in geography and population density. Even though the EMS combinations are much larger than the longer semi-trailer changes considered in the current study, it appears safe to assume that these EMS related findings would be of considerable relevance to longer semi-trailers. In particular, the proliferation of payloads below the maximum weight supports the view that it is the volume extension rather than the weight extension that was particularly attractive to operators in the Dutch experiment.

5.9 Germany

According to McKinnon, ‘following a more limited trial in several Germany länder between 2006 and 2007, the federal government rejected the case for allowing LHVs to operate on German roads, ostensibly on safety grounds, though it is reckoned that this decision was also strongly influenced by plans to privatise half the country’s rail system’ (McKinnon, 2008).

5.10 OECD/JTRC Working Group

The Joint Transport Research Centre (JTRC) of the OECD and the International Transport Forum (ITF) have formed an international working group to conduct a study on the productivity improvements achievable by heavy goods vehicles. The working group comprises experts from twenty one countries including the UK and from the European Commission. It has reported its findings in OECD/ITF JTRC (2010).

The study includes an evaluation of how changes to vehicle weight and dimensions affect needs of society and industry, and the relationship with the need to improve safety and reduce emissions. It places emphasis on the use of 'performance based regulations' of the type now applied in Australia and Canada. These examine the actual performance of the vehicle on the road, rather than the approximation of a vehicle's behaviour through the enforcement of prescriptive standards.

In particular the study carried out international benchmarking of HGV safety, performance and productivity effects. It analysed 39 HGVs from working group nations, including both the standard (workhorse) vehicles in common use, contrasting these with longer and / or heavier vehicles with higher capacities. This benchmarking includes vehicle dynamic simulation, using tools developed by ARRB. It used eight performance based standard (PBS) measures to examine the on-road safety of each vehicle:

- Tracking ability on a straight path;
- Low speed swept path;
- Steer tyre friction demand;
- Static rollover threshold;
- Yaw damping coefficient;
- Rearward amplification;
- High speed transient offtracking; and
- Load transfer ratio.

A total of 23 of the 39 vehicles met all of the PBS safety requirements, including existing longer semi-trailers in regular use in Australia, Canada, South Africa and the US that are broadly similar to but not the same as those considered in this study. This provides support for the safety performance of longer semi-trailers, noting that the performance standards that were tested are not identical to those in use in the UK and that some of these longer semi-trailers in use abroad performed better than existing UK draw-bar vehicles.

5.11 Review of Trials

This review has considered the vehicle trials underway and the published sources of studies in a range of countries to see what lessons can be gained by the UK from international experience.

There appears to be no country in which a directly comparable longer semi-trailer has recently been introduced for widespread usage in a context similar to that relevant to the UK. Nevertheless there are a number of EU countries that have recently commenced trials that have broad similarities to the changes being considered for the UK.

In Germany since 2006 and more recently in Poland and the Czech Republic, there have been limited trials of a 17.8m semi-trailer with special permits covering the whole of the

country. The Bavarian trailer manufacturer Kögel has been a major driving force for these trials, which have mainly used variants of their Big-MAXX semi-trailer. The results of the trials were analysed by the Institute for Automotive Engineering (ika) at the RWTH Aachen, who it is claimed by Kögel have "confirmed that the Big-MAXX will not have any impact on the road safety of other road users".

A much more structured trial, Project 18, has been initiated in May 2009 across Italy. This is a collaboration of the Italian Ministry of Transport with a number of vehicle and trailer manufacturers and with logistics operators. It uses a standard tractor together with a specially designed semi-trailer that is 1.5m longer than the current EU standard, so producing an 18m vehicle.

Because this Italian demonstration project has only been underway for a short period it is too early to expect detailed results from it at present. However, its relatively close similarity to the proposed UK option implies that these results should be of particular interest to this study when they eventually emerge. The form in which this trial has been designed to monitor the results from the use of a variety of trailer manufacturers and of transporters has the potential to provide valuable information to inform future decisions. It would also provide a potential model for similar trials in the UK should there be a future decision that practical experience with longer vehicles is needed. However, differences in the operation of the Italian freight market from that in the UK would need to be taken into account.

5.12 Review of Studies

There have been a number of recent research studies that have used modelling and analysis to investigate the impacts of allowing LHVs, or in the case of Sweden and Finland of removing them. In these published studies, the main short-coming in relation to the current study is their primary focus on 60 tonne, 25.25m LHVs / EMS. These contrast with the relatively modest increase in length to 18.55m (and no increase in gross weight from 44 tonnes) under consideration in the current study. Accordingly, many of the most contentious issues surrounding LHVs relating to impacts on infrastructure, competition with rail, safety, etc. would have much reduced impacts for the longer semi-trailers under consideration here. Nevertheless, some useful pointers can be ascertained from previous experience.

- EMS vehicles have been in use in Sweden and Finland for many years and on the main interurban road network within the Netherlands since trials were completed in 2007. Trials of EMS have recently been initiated in Denmark, Norway and Belgium.
- The results from the Dutch trial showed that many of the EMS vehicles were operating below their maximum payload tonnage which suggests that the increase in volume more than in weight was a major benefit from allowing EMS. It is volume increases that would arise from the UK semi-trailer length extension under consideration.
- Long-term experience of competition with LHVs on domestic movements within Sweden has demonstrated that rail freight has continued to grow and to retain a

significant presence for many freight types but that the growth in rail freight had been slower than that on road.

- Allowing the use of larger vehicles generally leads to economic benefits and to safety benefits through reductions in the number of road vehicles needed to carry the same goods.
- The forecast benefits are strongly dependent on the elasticities of mode shift induced from rail to road but the appropriate elasticity level for use in models is subject to considerable uncertainty.
- Whether there would be corresponding reductions in carbon emissions is less clear cut, given the indirect impacts of the associated switching of some freight movements from rail to road, so that detailed market studies are needed on this issue.
- In general, the debate is highly political so that the same evidence has been interpreted in rather different ways, depending on whether the protagonists are connected on the one hand to the road or wider logistics industry or on the other hand to its competitor rail or to green groups.

The OECD/ITF JTRC (2010) working group study has carried out international benchmarking of HGV safety, performance and productivity effects for 39 types of HGVs. These include the longer semi-trailer workhorse vehicles in current use in the USA, Australia, South Africa and Canada that are broadly similar to but not the same as those considered in the current study. These vehicles all met all of the performance based safety standards required, which provides support for the safety performance of longer semi-trailers, noting that the performance standards that were tested are not identical to those in use in the UK and that some of these longer semi-trailers in use abroad performed better than existing UK draw-bar vehicles.

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