Ministry of Infrastructure and the Environment

Monitoring Modal Shift

Longer and heavier vehicles
The follow-up measurement (2011)

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Contents

Summary

The Dutch Minister of Infrastructure and the Environment has promised the Dutch Lower House to monitor the authorisation of longer and heavier vehicles (LHVs), in particular the effects on traffic safety and the modal split during the third trial period, the so-called 'experience phase'. A monitoring study of the reverse modal shift effects as a result of using LHVs (zero measurement) was carried out in 2008. The Directorate-General for Public Works and Water Management[1], Traffic and Shipping Department (DVS) has commissioned the NEA to conduct the follow-up measurement. This study aims to give insight into shifts from rail transport and/or inland shipping to road transport as a result of the deployment of LHVs.

Fifty-one terminals, seven shipping companies and 30 container transporters participated in the study. Additionally, 10 logistics service providers that already had experience with LHVs participated. The study includes the results of in-depth interviews.

Based on economic, terminal and market analysis it can be concluded that no reverse modal shift effects have occurred following the introduction of LHVs in the Netherlands. According to expectations these effects will not occur in the near or distant future either. Both shipping companies and terminal operators appear to see inland shipping and rail transport as the preferred mode of transport between the sea and inland terminals. This is not only cheaper, but also easier to manage. It is easier to monitor multiple containers than it is to monitor individual trucks. Road transport costs have decreased as a result of the introduction of LHVs. However, various combined factors prevent the deployment of LHVs on a large scale on hinterland transport/the transport phase to and from the terminal. Transporting bulk goods via LHVs is generally not feasible because of the 60-tonne weight limit. Extra investments cannot be justified for use on short distances, and the possibilities to create combinations of 40ft and 20ft containers, or three 20ft containers are limited. This is due to the limited availability of 20ft containers (around 20% of containers) and the weight of 20ft containers that are often heavily loaded. Furthermore, LHVs require an exemption to transport containers to their final destination. This is not available for all locations. Lastly, it is the customer who decides whether or not to use LHVs. For example, the complete LHV transport process may involve many factors. Due to the complexity of factors involving the use of LHVs, other supply chain parties hardly shown an interest in using this mode of transport.

LHVs only travel to a limited number of terminals, this number has not increased since the zero measurement in 2008. LHVs only access some 25% of the terminals in the Netherlands. The terminals that receive LHVs are the same ones that received LHVs during the zero measurement. These terminals observed an increase in the use of LHVs, however this only concerns the replacement of regular road transport vehicles. The terminal operators have taken the initiative to offer LHV transport services. They consider the LHV to be an additional modality that will replace part of the regular road transport vehicles.

1 Rijkswaterstaat is the implementing body of the Ministry of Inrastructure and Environment, Rijkswaterstaat manages both the main inland waterways and the main water system in the Netherlands.

In terms of percentages, LHVs only play a limited role in domestic goods transport. In 2010 this percentage increased to 0.6%. Over the coming years, this increase is expected to continue, albeit on a relatively small scale. If LHVs will be permitted on international transport, this percentage is expected to grow more rapidly but will still remain limited, and will hardly or not affect the modal split. In the knowledge that ports are promoting the use of rail and inland shipping, this is expected to have a reverse modal effect.

Based on this study, it can be concluded that there is no cause to change the current policy on LHVs.

1 Introduction

1.1 Background

'LHVs' or longer and heavier vehicles have been driving in the Netherlands since 2001. Permitting combinations of vehicles with a length of 25.25 metres on the Dutch road network was then completely new. In view of the fact that it was thus not possible to build on previous experience, either nationally or internationally, LHVs were introduced in the Netherlands in a step-by-step process. Although LHVs have been driving in Sweden for many years, the road network and traffic densities there are not comparable to the busier Dutch situation.

In each phase in which authorisation was further expanded, the actual and potential undesirable effects were closely examined. A first trial period was carried out between 2001 and 2004. The authorisation of LHVs was extended in a second trial period between 2004 and 2007. After a transitional phase, the experience phase for LHVs commenced on 1 November 2007. This was the first time that LHVs were introduced on such a large scale. This experience phase will continue for a period of between three and five years. During the experience phase the transport businesses are not subject to a maximum number of vehicle combinations.

In 2008 ECORYS Nederland BV conducted a monitoring study into reverse modal shift effects (zero measurement) as a result of the use of LHVs. In the meantime there has been an increase in the number of LHV companies and corresponding LHVs, and the experience phase is in its final year. To gain better insight into the reverse modal shift effects the NEA was commissioned to conduct a new monitoring study (follow-up measurement).

1.2 Policy

LHVs can/are being deployed to overcome some of the negative effects (emissions, transport movements, shortage of drivers) of the future expected growth in goods traffic. The large-scale use of LHVs is broadly based on achieving various goals:

- Transport efficiency
- Reducing emissions
- Reducing traffic volumes

Longer and heavier vehicles are primarily intended for large goods flows to and from industrial sites, ports and transhipment areas. Further policy principles include: this may not have a negative impact on traffic safety; the authorisation of LHVs may not lead to a reverse modal shift; and with the exception of service areas there will be no modifications to infrastructure.

1.3 Objectives and formulation of the study

The study is aimed at ascertaining whether shifts in goods flows in 2011 compared to the year 2008 give cause to modify the policy on LHVs. The study should provide enough substantiated data based on which a policy decision can be taken.

This study focuses on the following key questions:

- Has a reverse modal shift (shift from rail transport and/or inland shipping to road transport) occurred, which was certainly or in all likelihood caused by the introduction of LHVs? (validate this statement with the help of data and arguments)

- Are there any developments that could give rise to a (further) reverse modal shift being expected in the future?
- Do the above-mentioned results give cause to adjust the policy on LHVs and, if so, what are the possible policy orientations, including consequences for government and the business sector?

Even if there have been no reverse modal shifts that are attributable to the introduction of LHVs, explain why this did not occur and whether this will occur in the future.

Sub-questions which should be included in answering the main questions:
Statistical and economic analysis
- How did the modal split develop with regard to domestic and international road freight transport, inland shipping and rail in the Netherlands until 2009 (or more recently if possible), and which factors played a role in this?
- Aggregate level (tonnes, tonne-km)
- Aspects per modality (type of modality, distance class and region)
- What are the substantiated arguments for the results of the analysis mentioned under the first bullet point? And how probable are these arguments? The extent to which the results in 2011 differ from the results of the 2008 study should also be taken into account. What are the reasons for this?

Survey of terminals
- What is the current division between rail transport, inland shipping and road transport for domestic and international transport at the terminals in the Netherlands?
- What are the differences and similarities with the results of the zero measurement in 2008?
- What are the substantiated arguments for the results of the analysis regarding the two aforementioned questions? And how probable are these arguments?

The following sub-questions must also be answered:
- Describe the characteristics of the surveyed terminals with regard to size, type of terminal, type of customers, type of goods/types of modalities, access, relation between goods arriving, leaving and transhipped goods, etc. The manner in which LHVs are deployed at the different terminals, and customers, goods, etc. should also be examined;
- Have investments in facilities for LHVs at the terminals been made or planned? This includes physical matters such as modifications to a terminal's logistics organisation;
- Are there any observable differences between the different type of terminals, or between different customers, type of goods/types of modalities, etcetera with regard to the aforementioned matters?

Common sub-questions on economic analysis, survey of terminals
- What influence do economic developments such as high fuel prices, the economic crisis or other matters have on the results of this study?
- What general experiences did experts have with regard to a modal split/shift? What are their expectations for the future? Both in the current situation (double the number of LHVs within five years), and in the scenario in which international transport is possible?

1.4 Reading guide

The report has been compiled as follows:
Chapter two examines the study design and progress of the study. Chapter three describes the economic analysis. Insight into the modal split development is offered on the basis of macro figures. Chapter four examines the situation on a micro level. This chapter describes the use of LHVs in container transport, and the reasons for their deployment. Chapter five and the final chapter include the conclusions and recommendations. Lastly, appendix A includes the survey of

terminals, appendix B the questions to shipping companies and transporters. Appendix C provides extra argumentation with the economic analysis. Appendix D includes the background tables on the market analysis. The last appendix, appendix E, lists the participants of the review group.

2 Study

The monitoring study aims to answer the research questions formulated in paragraph 1.3. This chapter outlines the method that was applied on behalf of gathering the data, and converting the data into research results.

2.1 Study design

The structure of the study comprises the following phases:

- Phase 1: boundaries and agreements
- Phase 2: economic analysis
- Phase 3: market consultation
- Phase 4: report

Phase 1: boundaries and agreements

In consultation between the commissioning party and the contracted party, and in consultation with the review group, the decision was made to make several adjustments to the follow-up measurement compared to the zero measurement. Various agreements were also made with regard to the study.

- Expand the economic analysis with international flows
- Determine the percentage of LHVs in the modal split
- The survey of terminals was conducted among the same participants that took part in the zero measurement.
- A participant on the review group suggested that the study should include shipping companies. This was achieved by conducting telephone interviews with seven shipping companies.
- An inventory was held among container road freight operators to gain better insight into whether or not LHVs access terminals.
- To gain better insight into the reasons why LHVs should or should not be used three case studies are included to illustrate which decisions are made, the grounds for these decisions, who makes them and why they are made.

Phase 2: economic analysis

The economic analysis of the zero measurement has been updated on the basis of data published by Statistics Netherlands (CBS) that dates up to and including 2009. Based on the available sector information and the NEA's short-term forecast the economic development was supplemented with figures from 2010 and 2011. This includes a forecast up to the year 2012.

Data from the monitoring study 'LHVs in practice' from October 2010 and updated figures from the Dutch Road Transport Directorate (RDW) have been used to estimate what percentage LHVs constitute in the total modal split. Lastly, unlike in the zero measurement, this study not only includes an analysis of the development of domestic goods transport, but also includes an analysis of the development of international transport.

Phase 3: market consultation

The third phase concerns the market consultation. Information was gathered via the following sources and techniques:

- Via the commissioning party, the Dutch Road Transport Directorate (RDW) provided information on companies that previously requested an LHV exemption.

- Three cases were worked out on the basis of 10 interviews with transport companies, inland terminals, sea terminals and shipping companies.
- Fifty terminals were contacted via a survey (see appendix A). The survey aimed to gain insight into the aspects mentioned in the sub-questions (paragraph 1.3)
- The survey was sent to the shipping companies to establish their influence on the deployment of LHVs.
- Container road freight operators were contacted to establish what proportion the journeys to the terminals constitute compared to journeys to recipients (customers).

Phase 4: report
The last phase consisted of writing the final report. During this phase the feedback from businesses, review group and commissioning party was processed, and resulted in the present report.

2.2 Research progress

The research was conducted with pre-determined throughput times. The pre-determined number of respondents were contacted via telephone instead of via a written survey. The draft results were tested by the review group, and by a broader group.

2.3 Organisation

The commissioning party was the Directorate General for Public Works and Water Management, Traffic and Shipping Department (DVS) on behalf the Directorate-General for Mobility (DGMo). NEA was the contracted investigative party.

The progress of the study was safeguarded through regular consultation between the commissioning party and the contracted party.

A review group was set up to critically asses the results and progress. For a list of names, please see appendix E.

3 Economic analysis

3.1 Modal split analysis

This paragraph examines goods transport by the three main overland modalities at an aggregate level. The modalities - road transport, inland shipping and rail transport are compared to each other on the basis of transported tonnes and transport performance expressed in tonne-kilometres. Insufficient statistical information was available to also make a comparison based on volume. The following figures give an impression of the size of the three modalities: inland shipping, rail and road in the Netherlands. The extent to which these modalities compete with each other is highly dependent on the origin, destination, and type of product. As a result, the choice of modality is often limited. Caution should therefore be exercised in drawing conclusions on the basis of shifts in the modal split. The descriptions in the following subparagraphs distinguish between domestic and international transport.

3.1.1 Historical development: Modal split reasonably stable

Historical development per modality - Modal split reasonably stable: as observed during all years around 75% is transported by road, 20% by shipping and only a small percentage is shipped via rail (see figure 3.1).

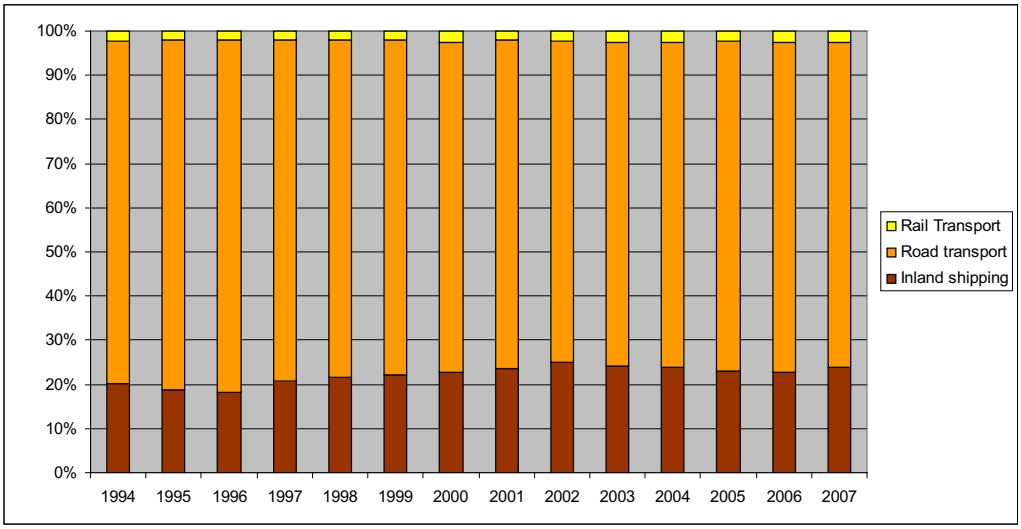


Figure 3.1 Modal split division in tonne-kilometres.

Source: Statistics Netherlands (CBS) publication data

The figures shown in this paragraph and appendix C are derived from CBS publication data on road transport, inland shipping and rail transport. The CBS publication data are available for the period 1994-2009[2]. In some cases, data was missing from certain periods. This is specifically mentioned in these cases. Road transport refers to both own-account transport ad commercial transport, and exclusively refers to Dutch transporters.

2 The rail transport figures are available for 1994-2007.

Figures 3-2 and 3-3 illustrate domestic transport for the period 1994-2009. In the Netherlands, most goods are transported by road. In 1994 the percentage of road freight amounted to 80% and 13 years later to 84% based on transported tonnes. The increase in the percentage of road freight occurred at the expense of inland shipping. Between 1994 and 2009 there was a 37% increase in the tonnes transported by road freight; during the same period, inland shipping saw a 6% decrease. Between 1994 and 2007 rail transport saw a 29% increase, however this only constitutes an extremely small share in the modal split (around 1%). The low percentage of rail transport is due to the fact that the combination of price and lead time on short distances make it difficult to compete with other modalities. As a result the Dutch rail transport sector focuses strongly on the international market. The decline in the volume of inland shipping is primarily due to a reduction in dry bulk volume. The inland shipping sector has started focusing more on shipping containers.

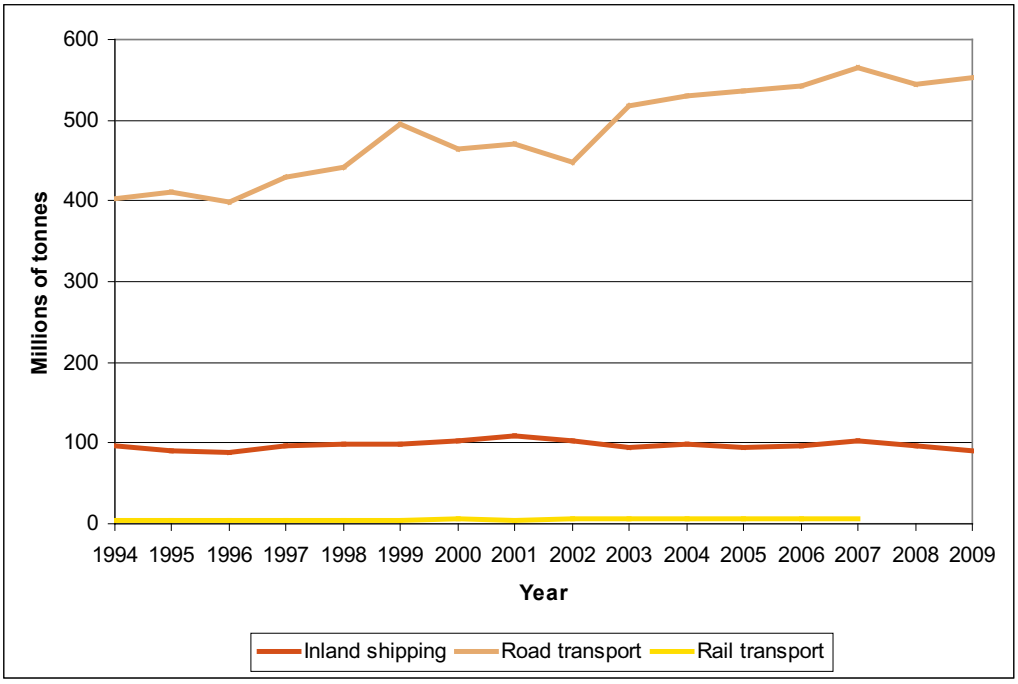


Figure 3.2 Domestic transported tonnage, in millions of tonnes (1994-2009)

Source: Statistics Netherlands (CBS) publication data

Road transport also constitutes the largest share in terms of transport performance (figure 3.3). In 1994, road transport (based on transport performance) accounted for 77% and 13 years later for 73% of tonnes transported. Looking at transport performance, the decline in the percentage of road transport was in favour of inland shipping. It is striking that between 1994 and 2009 inland shipping saw a 36% increase in transport performance, and road transport a 21% increase. In spite of moderate growth in terms of tonnage, over the past years, inland shipping did show a higher transport performance in comparison to road transport. This is due to the fact that inland shipping experienced growth in the transport of containers. These goods are lighter than bulk goods. This results in a decrease in tonnage, but an increase in transport performance. Table 3.1 shows the development between 1994 and 2007.

	Growth percentage 1994 -2007 million tonnes	Percentage in 1994	Percentage in 2007	Growth percentage 1994 -2007 billion ton-km	Percentage in 1994	Percentage in 2007
Inland shipping	5.0%	19%	15%	47.7%	36%	24%
Road transport	40.5%	80%	84%	18.2%	62%	73%
Rail transport	28.6%	1%	1%	40.4%	2%	3%
Total	33.5%			24.6%		

Table 3.1 Transport development between 1994 and 2007, and the percentage in 2007

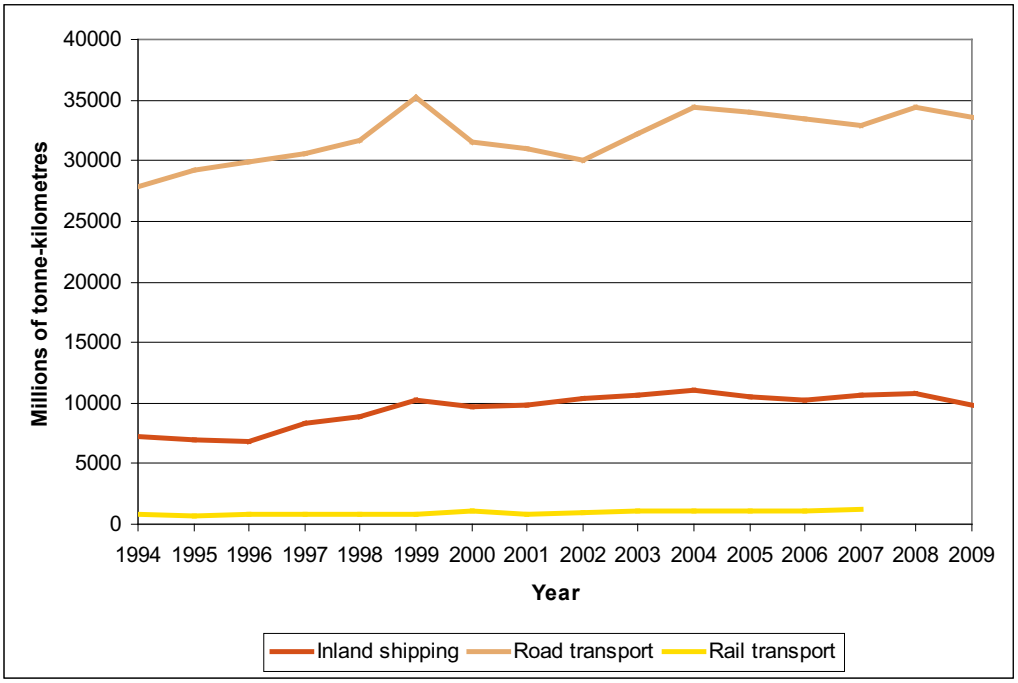


Figure 3.3 Transport performance in ton-km for domestic transport in millions of tonne-kilometres (1994-2009)

Source: Statistics Netherlands (CBS) publication data

Historical development per modality and type of product: strong increase in inland shipping as a percentage of container transport

The figure above shows that on a macro level no split occurred in the modal shift. Changes may cancel each other out however. Therefore, it is important to look more closely at the development by goods type. Appendix C shows the domestic tonnes transported and the transport performance per goods type. Four types of goods can be distinguished: container, dry bulk, liquid bulk and general cargo[3].

3 Efforts were made to ensure that the registration of the different types of goods occurred as carefully as possible. However, over the years not all information was stored at the same level of detail. As a result, the figures may show a trend that was purely caused by the data. Please be careful when drawing conclusions exclusively on the basis of these figures.

Dry bulk and liquid bulk are not really suited for transport via LHVs. Because of their specific gravity, the maximum weight limit of 60 tonnes is generally not sufficient.

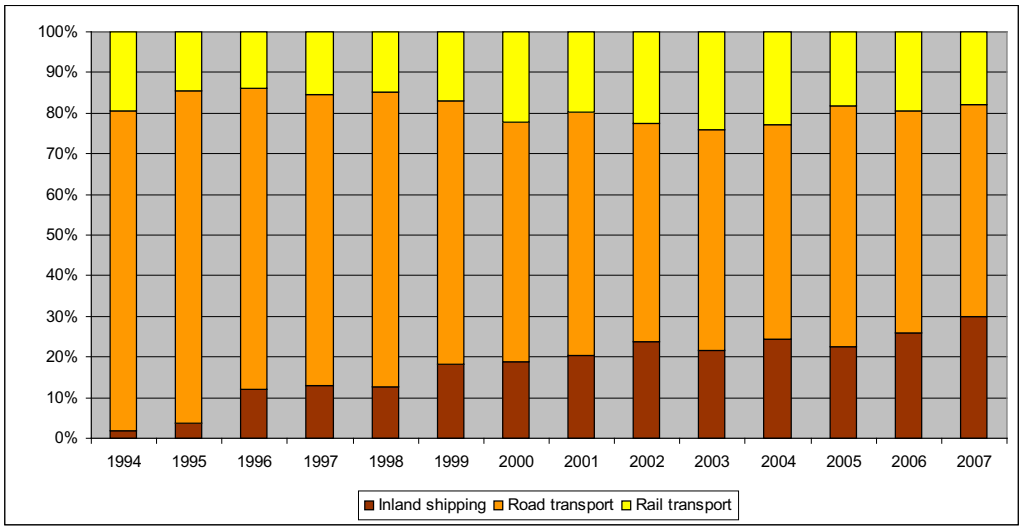


Figure 3.4 Development of the modal split in tonne-kilometres for containers

According to these figures (figure 3.4 and appendix C) the greatest competition between modalities potentially occurs in the container transport sector. Based on tonnes and tonne-kilometres this respectively amounts to 5% and 18% in 2007. Over the past decades, all three modalities have experienced an increase in container transport. For the other three goods types, the percentage of rail transport is zero. Road transport plays a dominant role in the transport of general cargo. Table 3.2 shows that, measured in tonnes, container transport constitutes a relatively small percentage of the total transported tonnage. In spite of this container transport plays an important role and, over the coming years, is expected to play an ever greater role in goods transport.

	Dry bulk	Liquid bulk	Container	General cargo	Total
Inland shipping	49	22	14	17	102
Road transport	159	21	36	349	565
Rail transport	0	1	3	1	5
Total	208	44	53	367	672

Table 3.2 Tonnes transported in the Netherlands per type of goods in millions of tonnes (2007)
Source: Statistics Netherlands (CBS) publication data

Liquid bulk saw a 50% increase in tonnes transported by road; the transport performance increased by 30%. The percentage of road transport (liquid bulk) compared to inland shipping is around 50 / 50 (based on weight). For dry bulk the percentages amount to 25 / 75, however based on tonne-kilometres the ratio is almost 1:1. Most general cargo that is transported within the Netherlands is transported by road. Over the past 15 years this situation has largely remained unchanged; however, part of the transport of general cargo has shifted to containers.

Historical development per modality and distance class: on short distances up to 50km road transport increased from 82% to 92%

The modalities were also compared on the basis of transported distance. The results are shown in appendix C, and table 3-3 includes a summary for the most recent year[4]. On distances up to 50km, inland shipping and rail transport hardly compete with road transport. Over the past decades, inland shipping saw an increase of several percentage points, amounting to around 25% for the distance class 50 to 200km. The percentage of rail transport on longer distances (over 150km) dropped by several percent in the period 1994 to 2006.

	Up to 50km	51km -100km	101km -150km	151km -200km	Over 200km
Inland shipping	28	30	17	11	12
Road transport	325	83	49	33	52
Rail transport	1	1	1	0	3

Table 3.3 Domestic tonnes transported per distance class in millions of tonnes (2006)

Source: Statistics Netherlands (CBS) publication data

Historical development of road transport: more use of tractor units at the expense of trucks

The description above compares the development of road transport to inland shipping and rail transport. However, it is also important to look at developments within road transport. For example, have there been any shifts regarding the type of equipment used, thereby increasing or lowering the threshold to using LHVs. Figure 3-5 shows the development per vehicle type. Over the past 15 years, there has been an enormous growth in transport by 'tractor unit and trailer'. During the same period the transport by trucks barely showed any growth, and transport by 'truck and trailer' even showed a decline. The increased use of 'light delivery vans' between 2002 and 2003 was due to a change in the applied methodology.

4 For rail transport is (in combination with data on distances) 2006 was the most recent year.

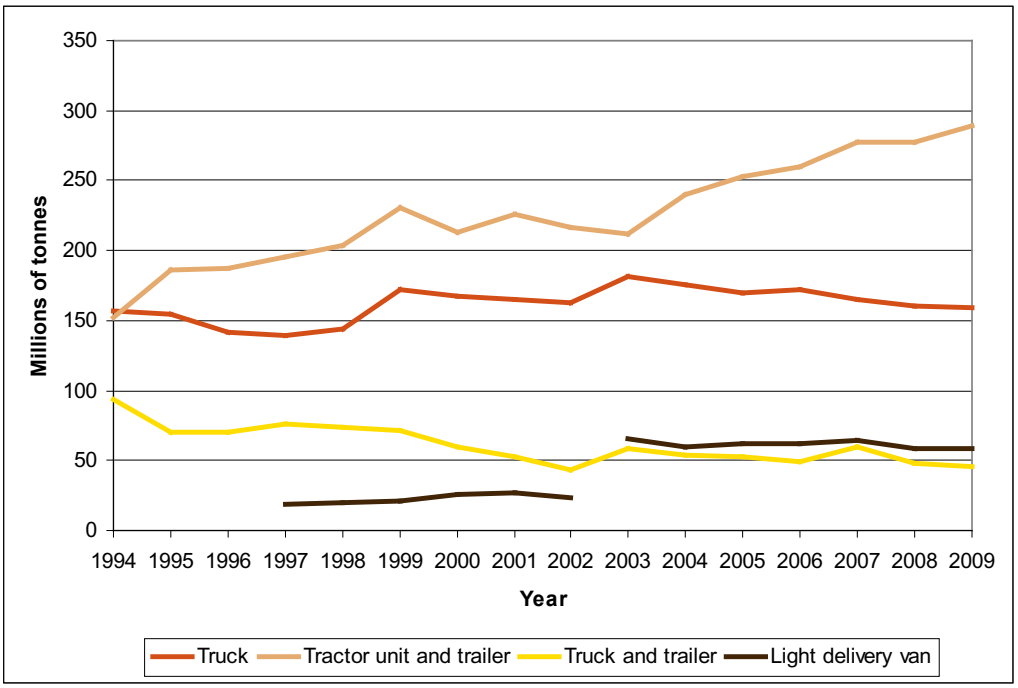


Figure 3.5 Tonnes transported per vehicle type in millions of tonnes (delivery vans as of 1997)

Source: Statistics Netherlands (CBS) publication data

Appendix C gives a breakdown of the tonnes transported by vehicle type per distance class. This shows that in 1994, compared to trucks, the 'tractor unit and trailer' transported less than half of all tonnes transported up to a distance of 50km. The year 2009 was the first time that 'tractor units and trailers' transported more than trucks on this distance. In view of the fact that transports via trucks on this distance have remained the same over the past 15 years, this gives a picture of the growth the 'tractor unit and trailer'. The increased use of the 'tractor unit and trailer' is in part due to the development of city trailers. This tractor unit/trailer combination can be even more manoeuvrable than a truck, making it the vehicle of choice for short distances. On top of that the equipment is also more flexible in terms of use, because the tractor unit can also be used on other trailers. On long distances, the 'tractor unit and trailer' was already the vehicle that was capable of transporting the heaviest loads. The 'tractor unit and trailer' also experienced strong growth on long distances (over 200km) within the Netherlands. LHVs are particularly used on these longer routes.

Figures 3-6 and 3-7 show the development of tonnes transported per vehicle type[5] for own-account transport and commercial transport. In the own-account transport segment, the truck has been the most used means of transport for 15 years, in the commercial transport segment the 'tractor unit and trailer' is used the most. The 'truck and trailer' suffered a strong decline in popularity (by around 50%), this applies both to own-account transport and commercial transport segments.

5 The measuring method for deliveries changed between 2003-2004. As a result, no pronouncements can be made on developments between 1994-2009.

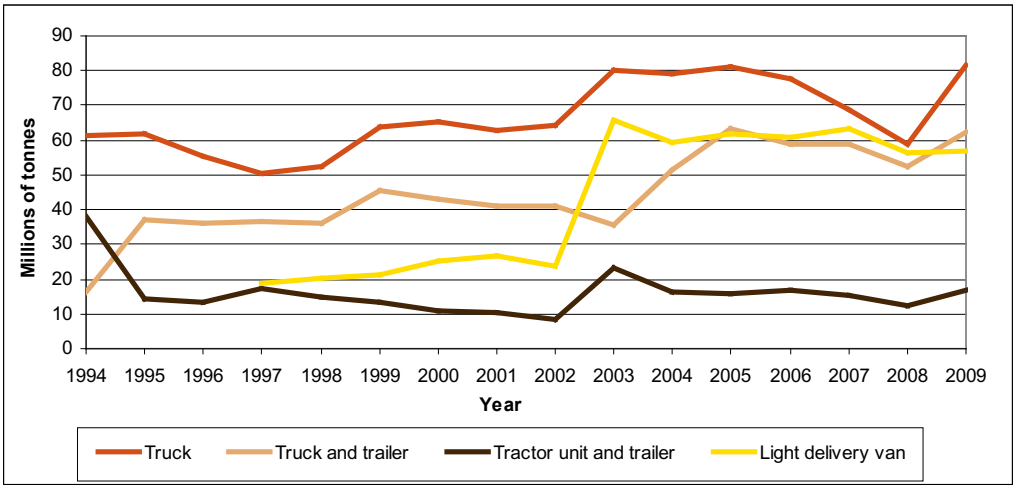


Figure 3.6 Tonnes transported in the own-account transport segment in millions of tonnes (delivery vans, own-account transport as of 1997)

Source: Statistics Netherlands (CBS) publication data

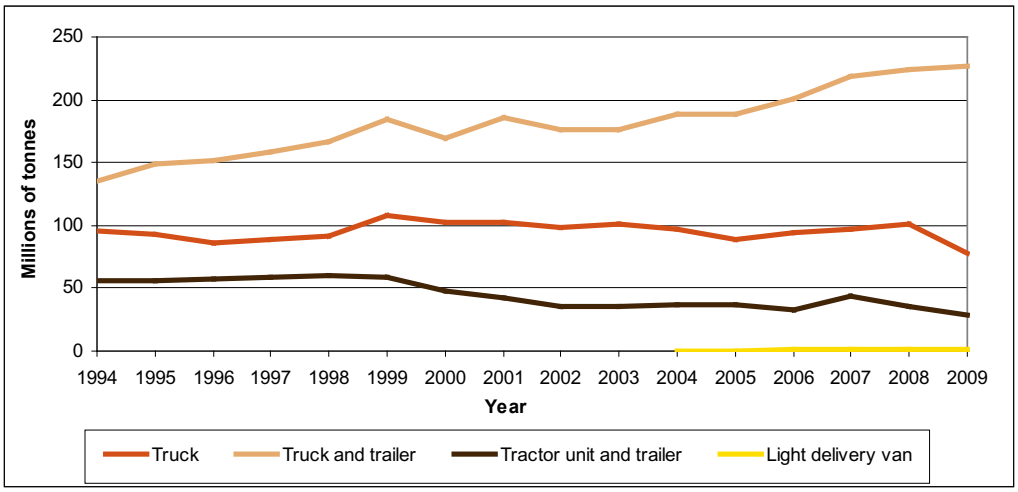


Figure 3.7 Tonnes transported in commercial transport segment in millions of tonnes (delivery van for commercial transport as of 2004)

Source: Statistics Netherlands (CBS) publication data

Historical development of international transport: decline in percentage of Dutch transporters in international transport

The majority of transporters ship goods within the Netherlands. The percentage of 'goods loaded in the Netherlands and offloaded abroad' and 'goods loaded abroad and offloaded in the Netherlands' are almost the same. Domestic road freight transport increased by 41%. This is primarily due to economic growth. The percentage of Dutch transporters in international traffic showed a slight decline. Due to international competition, a large part of the international goods transport is in the hands of foreign transporters. However, Dutch transporters still account for part of the goods transported in this segment. Figure 3-8 shows the tonnes transported by direction.

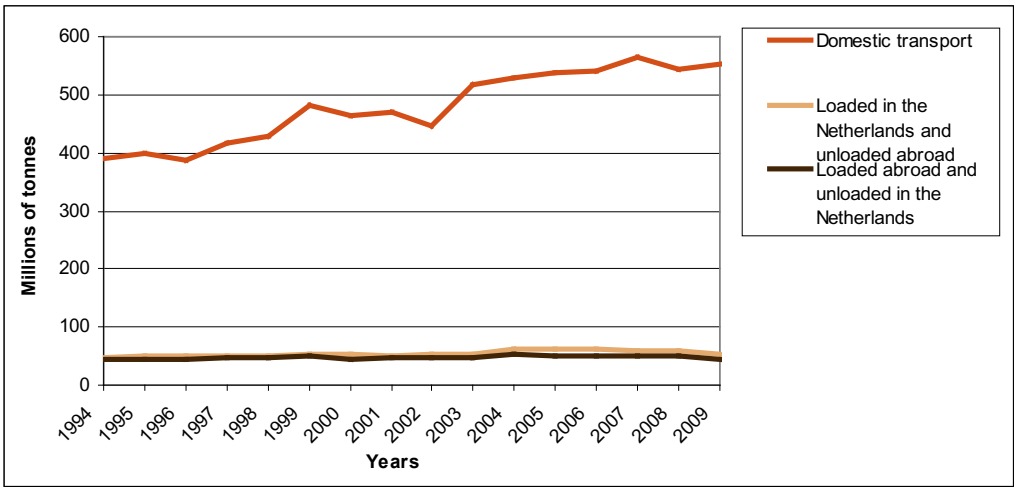


Figure 3.8 Tonnes transported, road transport by direction in millions of tonnes

Source: Statistics Netherlands (CBS) publication data

3.1.2 *Expected development: Modal split will remain stable for the foreseeable future*

This subparagraph shows the expected development of goods transport for the period 2008 to 2012. This subparagraph is based on the NEA's[6] short-term forecast. The values for the years 2008 and 2009 do not correspond with the tonnes and tonne-kilometres mentioned in paragraph 3.1.1. This is due to the fact that information in this paragraph is based on a different source, namely the sum of domestic transport and international deliveries and pickups. Figure 3.9 shows that the modal split remained stable.

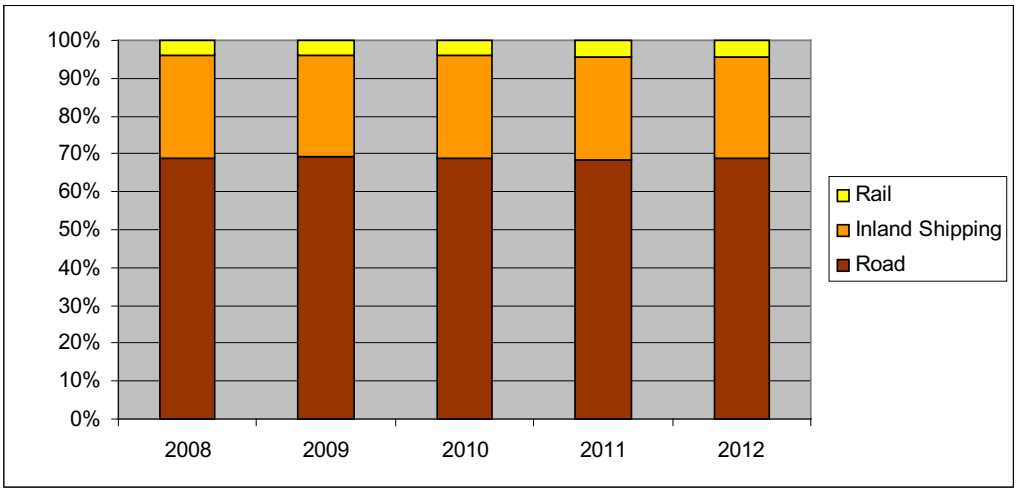


Figure 3.9 Expected modal split division of Dutch transport through 2012

Table 3.4 shows the transported tonnage for the three modalities between 2008 and 2012. It is striking that in spite of the economic crisis, which began in the autumn of 2008, no negative growth was observed in 2008. This is due to a high transport demand in the early part of 2008, as a result of which the total transport in 2008 was higher than in 2007.

6 NEA short-term forecasts for goods transport, published quarterly

The following table shows the total domestic and international transport in relation to the Netherlands, including international transporters.

Year	Road		Rail		Inland shipping		Total	
	million ton	% growth	million tonnes	% growth	million tonnes	% growth	million tonnes	% growth
2008	767	6.8%	45	22.9%	300	7.6%	1113	7.6%
2009	671	-12.6%	38	-17.1%	262	-12.7%	971	-12.8%
2010	692	3.1%	41	9.9%	274	4.5%	1007	3.7%
2011	705	2.0%	43	4.4%	280	2.0%	1028	2.1%
2012	720	2.1%	44	2.8%	284	1.5%	1048	2.0%

Table 3.4 Transport volume (million tonnes) per modality per year and percentage growth

Source: NEA Estimates are shown in italics, and have been adjusted based on recent macro data. For the years 2010, 2011 and 2012 (italics and bold) the estimates are based on (expected) economic developments.

The above figures show that the transport market experienced a low point in 2009 and experienced a strong recovery in 2010. The years 2011 and 2012 show a normal growth pattern. Similar growth figures were also observed after a recession. Unlike in previous recessions, the downward effect of this crisis was more severe and recovery in the year after the crisis was also stronger than in previous recessions.

The transported volume figures in table 3.4 include delivery vans as part of domestic transport. International shipments also include foreign transporters. The data on inland shipping includes all transport movements relating to the Netherlands (excluding transit without transhipment). The category 'rail transport' has been adjusted for missing data from private railway companies. Table 3.4 does not include data on cabotage and third-country transport.

Road transport: modest growth expected
In 2010 road freight transport experienced a 3.1% increase compared to 2009, amounting to a considerable increase in volume. During the first quarter of 2011 growth was also achieved, and is expected to continue over the coming quarters. However, huge differences have been observed per product group. There is uncertainty regarding both short- and long-term expectations because it is still unclear how the economy will develop as a result of an increase in energy prices following the uprisings in North Africa and the Middle East, and the downturn of the Japanese economy as a result of the natural disasters there.

In spite of the volume growth, rates are still low. However a recovery is expected. There are growing signs that, due to a decline in overcapacity in the market, transporters will initiate negotiations with shippers on an increase in rates. The outlook for domestic transport seems to be better than for international transport. Figure 3-10 shows that 2011 and 2012 quarters are expected to show modest growth compared to the same quarters in 2010. Even though one can speak of growth, the volumes are still much lower than prior to the crisis.

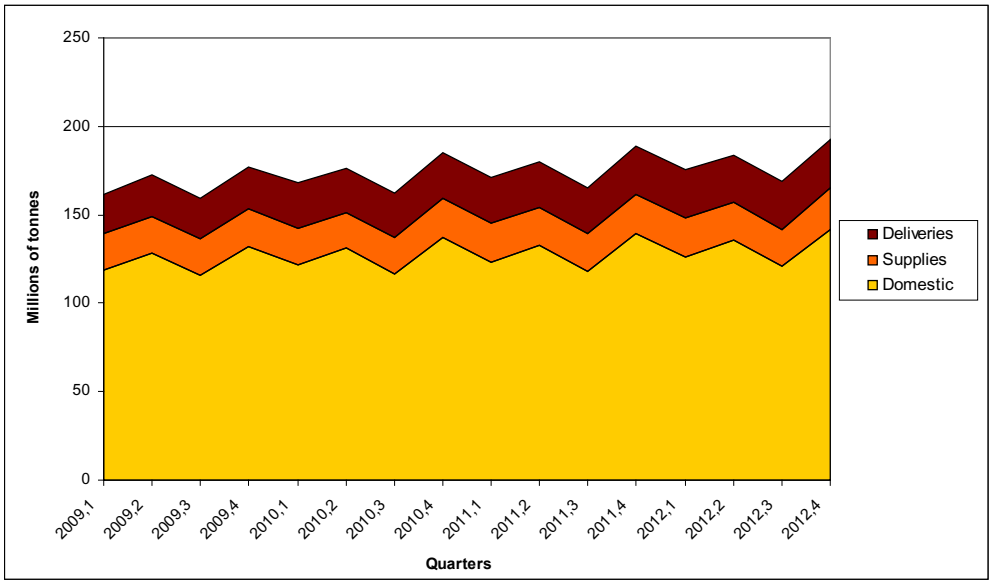


Figure 3.10 Development of transport volumes (in millions of tonnes per quarter) in road transport for domestic shipments

Source: NEA, KTV, 2011

In 2010 the total domestic road transport increased by 2.3% compared to 2009. For the year 2011, 1.6% growth is expected. This growth will primarily stem from the chemical sector, metal sector, and from final products & containers. In 2011 the transport of construction materials will also experience a decline.
In 2010 supply volumes increased by approximately 0.7%. In 2011 the growth is expected to amount to 2.5%. Expectations are that in 2011 all sectors will show volume growth. The total delivery for the whole of 2010 increased by 9.3% compared to 2009, and in 2011 the delivery volume will increase by 4.1%. This growth is generated in the same sectors as in domestic transport.

3.2 Percentage of LHVs

The previous paragraphs focused macro developments. This paragraph will take a closer look at what percentage LHVs occupy within domestic road transport, and how this percentage will develop over time. The size and growth give some idea of what impact LHVs have on the processing of goods flows. By comparing the percentage of LHVs against the total road transport and, in particular, expressing this as a percentage of container transport across all modalities this creates an idea of how important LHVs are. However, these figures do not say anything with regard to a modal shift. This information is derived from the market analysis. We will also attempt to give a judgement on the future number of LHVs and corresponding transport performance. We subsequently attempted to estimate the percentage of LHVs on international transport in relation to the Netherlands, on the assumption that this is permitted in the neighbouring countries or throughout Europe. To permit the use of LHVs in international transport, the European Directive on the measures and weights of trucks must first be adjusted.

3.2.1 Percentage of LHVs as part of domestic road transport: increases over the years but remains relatively small

LHVs have been deployed in the Netherlands since 2001. Their number has slowly increased. This growth process is described in the report "Longer and Heavier

Vehicles in practice". The maximum allowable vehicle weight is a key factor in the decision whether or not to deploy these vehicles. A maximum allowable weight of 60 tonnes has applied since 2008. Since then an acceleration in the growth of the number of LHVs has been observed. It is worth mentioning that not all road transport segments require a vehicle weight of 60 tonnes. It is mainly waste and container transport that benefit most from the 60-tonne limit.

The following table shows the number of transport companies that use LHVs and the number of LHVs that are deployed on the Dutch road network. This estimate is based on the survey that was conducted on behalf of the study "LHVs in practice". The Arcadis study on LHVs was also used as a reference point for the year 2006.

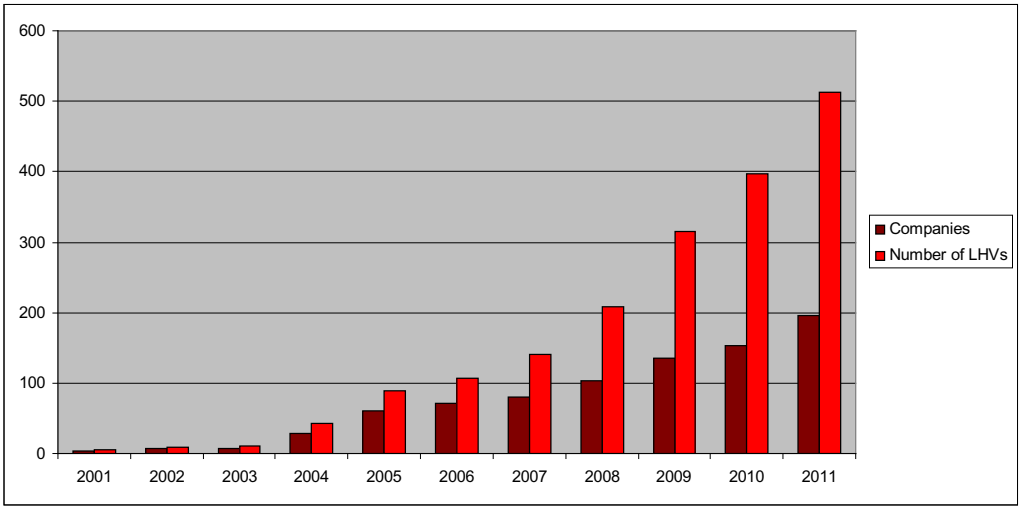


Figure 3.11 Number of companies with LHVs, and numbers of LHVs deployed from 2001 through 2011 (average year, and for 2011 the balance as at 30 April 2011)

Source NEA, 'LHVs in practice' report, 2010

According to figure 3.11, as of 2008 the number of LHVs increased more rapidly than in previous years. The increase in the number of LHVs also occurred more rapidly than the increase in companies operating LHVs. This means an increase in the average number of LHVs per company. The spread of the number of LHVs is limited, so on balance the same companies are making more use of LHVs.

The transported tonnage and tonne-kilometres per segment was derived for 2010 based on the average journey distance and the average load per market segment as derived from the study "LHVs in practice" and the number of days of use per year,.

	Number of LHVs	Tonnes	Tonne-km
Retail	158	1,261,987	656,233,113
Containers	80	962,265	500,377,748
Ornamental horticulture	58	451,160	234,603,338
Other	39	315,497	164,058,278
Volume	29	115,682	60,154,702
Waste/bulk	20	69,015	35,887,748
Packaging	13	31,550	16,405,828
Total	397	3,207,155	1,667,720,755

Table 3.5 Number of LHVs per market segment and the tonnage and tonne/kilometres for 2010

Source: NEA

The totals of this table were used to determine the number of tonnes per LHV and the number of tonne-kilometres per LHV. These were then used to calculate (based on the numbers of LHVs per year) the tonnes and tonne-kilometres per year as shown in table 3.6.

	Number of LHVs	Tonnes (1000)	Tonne-km (million)
2001	6	47	24
2002	10	78	40
2003	12	93	49
2004	42	343	178
2005	89	716	372
2006	106	856	445
2007	141	1,138	592
2008	208	1,683	875
2009	315	2,545	1,323
2010	397	3,207	1,668
2011	513	4,144	2,155

Table 3.6 Number of LHVs, tonnage and tonne-kilometres from 2001 through 2011

Source: NEA

Table 3.7 compares the transported tonnage via LHVs with a number of quantities concerning domestic road transport for the years 2001 through 2011. This is firstly compared to the tonnage of total domestic road transport. Secondly, the tonnage figures for tractor units and trailers is given. Lastly, the tonnage figures for tractor units and trailers on distances of over 150 kilometres is given, because LHVs are used on long distances. It should be noted that for the years 2008 through 2011 the domestic transport was based on NEA's Short-term Forecast.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LHV transport tonnage (1,000 tonnes)	47	78	93	343	716	856	1138	1683	2545	3207	4144
Total domestic road transport (millions of tonnes)	470.5	447.4	517.3	529.4	536.7	542.4	566	570.9	494.5	505.8	513.7
Of which tractor unit and trailer (millions of tonnes)	226.3	216.9	211.4	240.1	252.6	259.9	277.1	277.2	289.6	296.2	300.9
Of which tractor unit and trailer >150 KM (millions of tonnes)	47.3	50.1	55.7	62.5	61.5	63.2	59.4	65	62.2	63.6	64.6
%LHV/road transport	0.01%	0.02%	0.02%	0.06%	0.13%	0.16%	0.20%	0.29%	0.51%	0.63%	0.81%
%LHV/tractor unit and trailer	0.02%	0.04%	0.04%	0.14%	0.28%	0.33%	0.41%	0.61%	0.88%	1.08%	1.38%
%LHV/tractor unit and trailer >150 KM	0.10%	0.16%	0.17%	0.55%	1.16%	1.35%	1.92%	2.59%	4.09%	5.04%	6.41%

Table 3.7 LHV tonnage compared to total road transport, road transport by tractor unit/trailer and tractor unit/trailer>150 kilometres for the period 2001 through 2011 (Data from 2008 through 2011 is based on the NEA short-term forecast)

Source: NEA 2011

The conclusion is that the LHV tonnage shows an increase for all three indicators. In 2010 LHVs as a percentage of total domestic transport increased to 0.63%. In the domestic transport segment that is executed with tractor unit/trailers, the percentage increased to 1.08% in 2010. In the segment tractor unit/trailers on journeys of over 150 kilometres the percentage increased to 5.04% in 2010. In 2011 these percentages have thus far shown a further increase. Based on the fact that transport companies have started using more LHVs, it can be concluded that LHV have started to replace conventional trucks. Even during the economic crisis when the total transport volume experienced a decline, the number of LHVs continued to increase. In the study "LHVs in practice", companies indicated that this offered them the opportunity to keep revenues level. The road transport sector is currently experiencing growth, and the number of LHVs is also continuing to increase.

We can now gain a more detailed picture of LHVs as a percentage of total container transport in the Netherlands. Based on an extrapolation of the figures from the Netherlands Statistics (CBS), in 2010 an estimated 50 million tonnes of goods was shipped in containers, 0.9 million tonnes of which (see table 3.5) was transported by LHVs. This amounts to approximately 1.8%. According to the available information,

the number of LHVs that are used for container transport also increased (see LHVs in practice). However, it is not possible to derive from these figures whether or not growth occurred due to a modal shift. This should be ascertained from the market analysis.

In the "LHVs in practice" study, companies were asked to give their expectations regarding the number of LHVs in use five years from now. Asking companies that currently deploy LHVs appears to be a good indicator of the expected use. Figure 3.6 shows an increase in the average number of LHVs per company. The number of LHVs is expected to double within five years. Based on double the current number of LHVs, this amounts to around 1,000 LHVs in domestic transport in 2014/2015. Based on the same indices as in the analysis above, and around 2% annual growth in road transport, in 2016 the percentage of LHVs will increase to 1.2% of total domestic road transport (in 2011 this amounted to 0.81%).

3.2.2 Potential percentage of LHVs in international road transport: in every scenario a modal split change will remain limited

As laid down in EC Directive 96/53/EC of 25 July 1996, in the European Union the maximum length of trucks is currently limited to 16.5 metres for articulated vehicles and 18.75 metres for diesel combinations. The directive does not provide for a limit of the absolute weight, but indicates limits that guarantee the free traffic of goods vehicles within the EU. The permitted maximum weight for general EU traffic is 40 tonnes on a five-axle vehicle with a maximum height of 4 metres. However, countries deviate from these standards, like Belgium, for example, where the permitted maximum weight on a five-axle vehicle is 44 tonnes, and no height limit applies in the United Kingdom where some trucks are up to 4.9 metres high.

In accordance with the directive, vehicle or vehicle combinations that are used for national transport within the member states are permitted to deviate from the prescribed standard lengths as long as this does not a have significant impact on international competition within the transport sector. This is one of the reasons why longer vehicle combinations are assembled from existing vehicles, which is also referred to as the modular concept of the European Modular System (EMS).

The Commission has indicated that the economic effects of longer and/or heavier vehicles, and the technical implications on the road infrastructure, safety and the environment require further research. Previous studies (De Ceuster et al., 2008; Christidis and Leduc, 2009) that were conducted on behalf of the Commission have resulted in better understanding. The conclusions were positive with regard to the introduction of LHVs in international transport in the European Union. However, these studies did not specifically address a number of objections, namely:

- Only a limited number of the wide range of policy options were examined;
- The technical details of safety risks or damage to the infrastructure were not fully assessed;
- The economic analysis was executed at an aggregate European level and does not fully cover the effects on the different individual markets for goods transport or geographic regions;
- The effects on spatial planning have not been fully assessed, the introduction of LHVs could lead to a change in production locations in Europe.

The above-mentioned arguments together with the results of other studies have led to the conclusion that the Commission feels that further study is required. A study of the above-mentioned aspects is currently being executed on behalf of DGMOVE.

If the European Commission is going to permit LHVs for international transport by adjusting the directive, then the question still remains as to what the maximum allowable vehicle weight should be. A weight of 60 tonnes appears to be unfeasible because of the current permitted tonnages in the different countries and the EC's current policy. Expectations are that the maximum allowable weight will be set at 44 or 45 tonnes.

In view of the above there are various future scenarios for the deployment of international LHV transport for the Netherlands:

1. The Netherlands enters into a bilateral agreement with neighbouring countries on the use of LHVs with a vehicle weight of 44 tonnes in the container/intermodal transport and 40 tonnes in other transport.
2. The EC directive is modified and LHV transport is permitted within the EU and the maximum vehicle weight 44 tonnes applies to container/intermodal and other modes of transport.
3. The EC directive is modified as provided in point 2, and the Netherlands enters into a multilateral agreement with neighbouring counties, whereby LHVs are permitted to have a vehicle weight 60 tonnes for container/intermodal transport in the three countries in question.

These scenarios are combined with the results of the study "LHVs in practice" to outline the effects on the development of international transport for the Netherlands. The three scenarios are worked out below.

Scenario 1 bilateral agreement with neighbouring countries 40 tonnes generic and 44 tonnes container/intermodal transport

According to the survey that was conducted as part of the study "LHVs in practice", some 25% of companies that currently deploy LHVs can manage with the current vehicle weights (this concerns ornamental horticulture and retail). Of the companies that currently do not yet deploy LHVs, 42% indicated that they see opportunities to use LHVs. With regard to bilateral transport, compared to its neighbouring countries Belgium and Germany, the Netherlands accounts for almost 80% of international road transport. Transport companies that own multiple vehicles can deploy an LHV, and none of the companies exclusively use LHVs. To this end, only companies with five or more vehicles were surveyed.

According to this scenario, expectations are that the number of Dutch LHVs will reach a maximum of 1,310 vehicles (42% of 10,000 companies x 39% companies with five or more vehicles in international transport that will deploy one LHV x 80% on bilateral Belgium and Germany =42%x39%x80%x10,000[7]). Dutch transporters account for a 70% market share of international transport, so if German and Belgian transporters also deploy LHVs the total number will amount to around **1,872**.

Scenario 2 EC directive is modified, and a limit of 44 tonnes applies in the EU

If the directive is modified, then the NEA's expectation is that a maximum vehicle weight of 44 tonnes will apply to both intermodal and other shipments. The increase from 40 to 44 tonnes will have a stimulating effect, however does not exclusively concern LHV transport. In view of the large distances, intermodal transport will not be an option for LHVs.

7 The calculation method used, is that 42% of the companies is considering purchasing a Long Heavy Vehicle, however, this only concerns companies with more than five vehicles, being 39% of the total number of companies. 10,000 transport companies operate internationally, of which 80% carry out bilateral transport between Belgium and the Netherlands.

For countries that lie beyond Belgium and Germany, rail transport often remains more a more attractive alternative to LHV transport. Under this scenario, expectations are that the number of LHVs will amount to **2,340** (the same as Scenario 1 however now for all countries, so not 80% but 100% = 42%x39%x100%x10,000).

Scenario 3 EC directive is modified, but a bilateral 60 tonne-limit in container/intermodal transport
This scenario is the same as the previous scenario, however in this scenario there is an increase in intermodal transport. Under this scenario there are more possibilities to use vehicle combinations in intermodal transport. According to the estimates 500 extra LHVs will be deployed, primarily in container transport to Antwerp and Duisburg (Germany), and the nearby hinterland in Belgium and the Ruhr Area. LHVs will primarily be used here for containers that require rapid delivery. The number of vehicles (500 LHVs) was determined on the basis of an expert judgement. Intermodal transport (barge and rail) will also play an important role. Based on the proportionate percentage of Belgian and German transporters, this amounts to a total of 700 LHVs. This is additional to the number as mentioned in scenario 2, and therefore amounts to a total of **3,040**.

In principle, all above-mentioned scenarios could occur within a time frame of five years. According to our estimate, depending on which scenario applies, the number of LHVs driving daily in international transport to the Netherlands will vary between an average of **1,872 and 3,040** vehicles. This would result in a road transport tonnage of between 12 and 19 million tonnes annually. This amounts to between 6% and 9% of total international road transport to the Netherlands, which in turn amounts to a total of 200 million tonnes. It should be noted that this is the maximum tonnage within each of the three scenarios. A modal split change in international transport appears to be limited. Even though, according to the cost curves, the break-even distance of rail/road by an LHV is increased from 115 to 170 kilometres on the Rotterdam-Duisburg route (source: PRC/NEA Quick scan reverse modal shift effects of longer and/or heavier vehicles, 2007), in view of the distances travelled in international transport, daily transport will still enjoy a cost advantage. However, the cost aspect is less important in cases where containers require rapid delivery.

3.3 Conclusions of the economic analysis

The main conclusions of the economic analysis are:

Historical developments:
According to the macro figures the modal split remained reasonably stable over the years: based on tonne-kilometres in all years around 75% of transport occurred via road, 20% via shipping and only a small percentage was shipped via rail.

A comparison of the modalities per type shows that competition is potentially fiercest in the container transport sector. Over the past years, container transport experienced the greatest amount of growth. In 2010, LHVs as a percentage of the total container transport stood at around 1.8%. However, this percentage says nothing about a modal shift as this information must be derived from the market analysis.

However, there have been minor developments within various subareas:

- The percentage of LHVs in domestic road transport increased, but remains relatively small. Based on a percentage in tonnes, the use of LHVs in domestic goods transport shows the following picture:
  - In 2010, LHV tonnage as a percentage of domestic road transport increased to 0.6%.
  - As a percentage of domestic transport that is executed with tractor units-trailers, the LHV tonnage increased to approximately 1.1%.
  - As a percentage of domestic transport that is executed with tractor units-trailers on a distance of over 150 kilometres, in 2010 this increased to approximately 5%.
- Looking at domestic transport, *expressed in tonnes transported*, road transport increased most. Inland shipping showed a slight decrease. With a market share of around 1%, rail transport only played a modest role. In terms of volume, road transport has thus far withstood the crisis period the best.
- Looking at domestic transport, *expressed in transport performance*, road transport decreased by several percent in favour of inland shipping.
- Looking at the other modalities, the inland shipping sector saw a decrease in the transport of dry bulk, and an increase in the transport of liquid bulk via road and inland shipping was observed. The zero measurement also showed an increase in liquid bulk, albeit less strong. Developments in bulk flows, however, are not relevant to LHVs.
- In 2009 a much larger quantity of general cargo was shipped via road transport than in 1994, and the transport via inland shipping remained almost level.
- The modalities were also compared on the basis of distance. This showed that rail and inland shipping are only able to compete with road transport on distances of over 50 kilometres.
- Within the road transport sector, the use of tractor unit and trailer combinations increased, also on short distances.

The above-mentioned developments are in line with the zero measurement in 2008. A minor difference with the zero measurement is that in 2008 it was concluded that inland shipping, in particular, benefited from growth in the container transport sector. According to the latest figures, road transport also benefited strongly and, in absolute terms, it generated more growth. This growth was due to an increase in the supply of containers and problems involving the handling of inland shipping in the port in 2008. These problems have since been solved.

Expected developments:
Expectations are that the modal split will remain reasonably stable in the future.

According to expectations the number of LHVs in the Netherlands will increase from around 500 to around 1,000 in 2014.
If LHVs will be permitted for international transport, the number of deployed LHVs will definitely see a further increase. Depending on the scenario, between 1,800 and 3,000 LHVs would operate on international transport to and from the Netherlands. According to the NEA's estimates, this would amount to a maximum of eight times the current number of LHVs (500 vehicles), and amounts to a maximum of 1,000 LHVs in domestic transport and 3,000 in international transport. Based on these numbers it is unlikely that a modal split will occur.
The next chapter examines whether the results of the macro analysis correspond with data that was gathered from the terminals, and what the underlying reasons are regarding why the modal split remained and will continue to remain stable.

4 Market analysis

4.1 Survey of terminals, shipping companies and transporters

To gain better insight into developments regarding the use of LHVs for transport to terminals, 51 terminal operators were surveyed. The same terminal operators were contacted during the zero measurement as during the follow-up measurement. This ensures an accurate comparison between both measurements.

In addition to the inventory of terminal operators, seven shipping companies and 30 container road freight operators were contacted. This was done to provide insight into the use of LHVs, and to establish how LHVs effect the competition between modalities. Companies were surveyed via telephone interviews and not via web surveys. This made it easier to discuss and respond to arguments that respondents provided relating to the choice of modal split. These arguments were used in the description of the market as shown in paragraph 4.2.

4.1.1 Terminals: Modal split goods flows at terminals remains unchanged and 75% of the terminals do not receive LHVs

The same contact details that were used during the zero measurement were used in the survey of the terminal operators. A total of 26 respondents participated in the telephone survey. Some respondents served as contacts for multiple terminals. Of the 26 respondents, 15 respondents represented one terminal and 11 respondents represented multiple terminals. The collected data concerns 51 terminals in total. Of these 51 terminals, 78% are inland terminals and 22% are terminal locations in the seaport. Appendix D includes further details with regard to the terminals. This group of terminals is a reasonably accurate reflection of the market, both in terms of numbers and diversity.

The surveyed terminals were put forward a number of questions as listed in appendix A. The questions primarily pertain to the use of LHVs, and who makes the decision to deploy them. The survey also included several background questions.

Modal split goods flows at terminals

Terminal operators indicated that hardly any shifts in the modal split had occurred in at the terminal. The terminal's transport concept is generally based on transport via inland shipping and rail, and is supplemented by road transport where necessary.

LHVs at terminals

According to the survey, 75% of the terminals *do not* receive LHVs and 25% do receive LHVs. Terminals that do receive LHVs are primarily based in the port or are inland terminals whose operators also operate road vehicles and LHVs. All these LHVs are used in the place of regular road transport. Terminals that do not receive LHVs have different reasons for this:

- Because they specialise in bulk goods and these goods are normally processed via inland shipping or rail. The 60-tonne weight restriction constitutes a barrier to using LHVs.
- They do not consider road transport to be their core business, and try to make maximum use of vessels and trains. They only use road transport for transport to and from the terminal, or for urgent shipments.

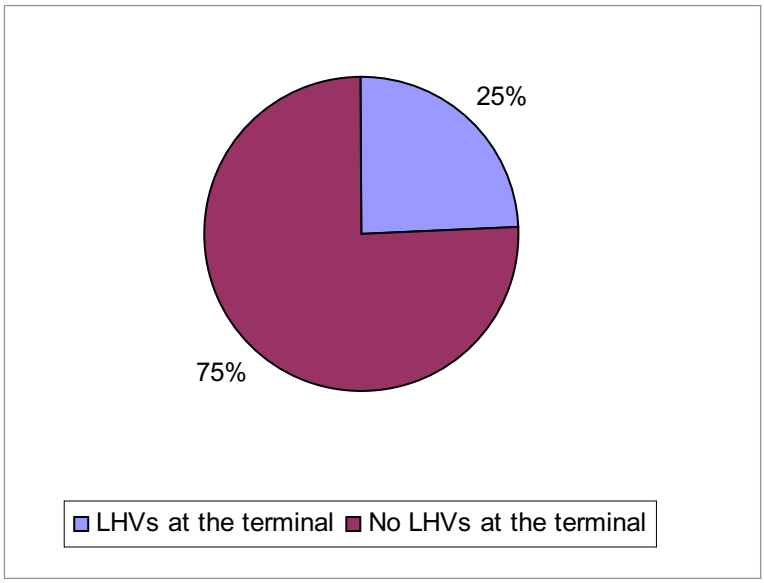


Figure 4.1 Percentage of terminals that receive LHVs

Compared to the zero measurement in 2008, no increase could be observed in the number of terminals that receive LHVs. The percentage of terminals that receive LHVs even showed a slight drop. This was partly due to the economic crisis, forcing several terminals to alter the primary function that they serve. It is safe to conclude that the number of terminals that receive LHVs has remained almost unchanged. Terminals that do receive LHVs indicated that, over the past years, the number of LHVs deployed at their terminal has increased. The use of LHVs is purely intended as a replacement for regular road vehicles.

Type of terminal	Intensity of the use of LHVs
Sea terminal	Daily, nearly all container LHVs start their journey at a sea terminal
Inland terminal with 'own wheels'	Daily, a limited number of LHVs
Inland terminal without 'own wheels'	Hardly any LHVs

Table 4.1 Intensity of the use of LHVs by type of terminal

The choice whether or not to deploy an LHV lies with the transporter who is responsible for organising the road transport. LHVs are deployed because this reduces the costs of transporting containers. Large sea terminals offer separate facilities for loading and unloading LHVs and are therefore better equipped to receive LHVs.

Future expectations are that there will be no drastic changes to the deployment of LHVs at terminals. Terminals that already receive LHVs are expected to see an increase in the number of LHVs, however this will not be at the expense of other modalities. Terminals that do not yet receive LHVs do not expect any drastic changes either. This is because, on the one hand, they generally prefer to operate

barge and rail transport. Terminals that currently focus on barge transport expect this to continue in the immediate and distant future. And, on the other hand, because regulations are in place that are aimed at stimulating barge and rail transport to the hinterland. One terminal did indicate that they expect to receive LHVs in the future. However, due to a railway crossing, this is currently still not yet possible.

Due to the low number of LHVs at inland terminals there are no current or future plans to invest specifically in facilities for LHVs. Large sea terminals have made these investments. At these terminals separate loading bays have been installed to process LHVs.

4.1.2 Shipping companies: the choice of modality lies with the client

At the suggestion of the review group, seven shipping companies were contacted to gain closer insight into their influence on the use of LHVs for container transport to the hinterland. The questions as shown in appendix B were put forward to the seven biggest container shipping companies via a telephone survey.

All shipping companies stated that they are responsible for consulting with the customer on the choice of modality and the container's delivery time. It is the customer who primarily determines the choice of modality. If the shipping company organises the hinterland transport, then, an intermodal solution with an inland vessel or train is chosen where possible. This is not only because this makes it cheaper to ship large volumes, it is also easier manage. It is easier to track a vessel /train with containers than it is to track lots of different trucks. The shipping company further only coordinates matters with the transporters, who are subsequently responsible for deciding what type of equipment they will use.

The transporter is the one who decides whether to use LHVs. And LHVs can only be deployed if the customer has opted for road transport. The choice of transport also depends on the time restrictions. Shipping companies only consider a limited number of container combinations to be suitable for transport via LHVs, and therefore do not want to exert any influence on the choice of modality. In other words, in incidental cases, shipping companies do see the added value of using LHVs, and transporters therefore opt to use LHVs where possible. However, because this only concerns exceptional cases, the shipping companies do not specifically focus their efforts on deploying LHVs.

4.1.3 Transporters: container companies primarily use LHVs from sea terminal to final customers

In addition to the survey among terminal operators and shipping companies, 30 container transporters were contacted and put forward the questions as listed in appendix B.

Based on this survey, it can be concluded that LHVs are used on four different types of journeys:

- From the sea terminal to the final customer
- From the sea terminal to the terminal
- From the sea terminal to a logistics service provider's location
- From the sea terminal to a decoupling point near the border

The vast majority (over 80% of the 30 container companies) deploy LHVs on journeys from one of the terminals in the seaport directly to the customer. In this

case a combination of a 40ft and a 20ft container is usually used. The option of using three 20ft containers hardly ever occurs in practice. This is mainly due to the fact that 40ft containers represent around 80% of the available containers. Because 20ft containers are generally heavily loaded, this makes it difficult to comply with the 60-tonne weight limit when deploying 3 x 20ft containers.

A small group of businesses (7%) do access the terminal. These companies often own the terminal. They use LHVs to transport containers that were already shipped to the terminal via road transport. The choice of using road transport is dependent on the lead time. In most cases, the lead time is short, and therefore requires the use of road transport. Examples of shipped products include clothing and furniture.

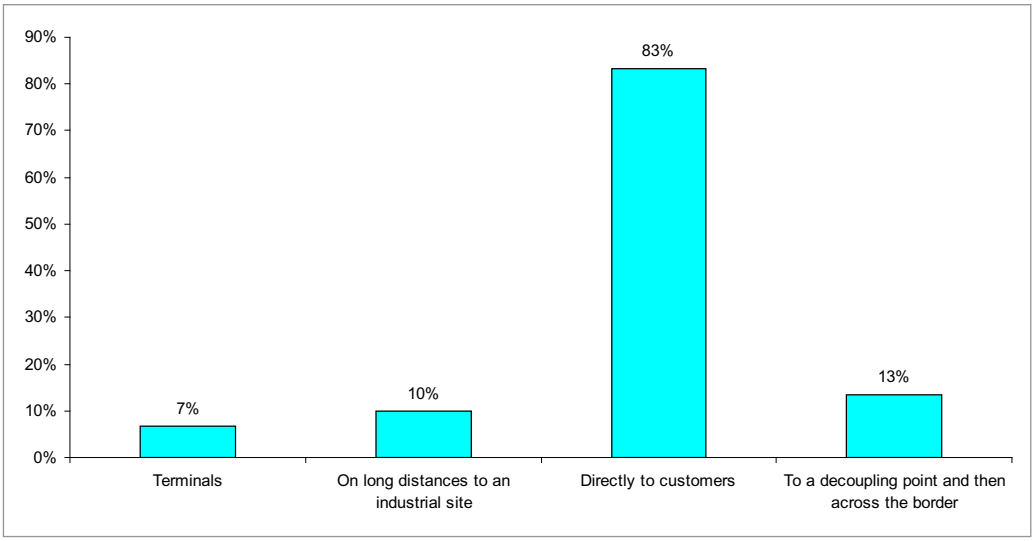


Figure 4.2 Use of LHVs to their final destination

A third category of businesses (14%) deploys LHV to regions that lie further in the hinterland. This concerns companies that are active in the provinces of Friesland or Limburg for example. They transport containers from the seaport to their own sites where these are transhipped onto regular trucks for delivery to the final customer. The industrial sites serve as a kind of mini terminal for road transport. This always concerns goods that were already shipped via road transport.

In some cases LHVs are used on the first part of an international journey. This concerns journeys to Germany. The company uses an LHV to transport cargo, and subsequently uses regular configurations to ship the cargo to the customer in Germany. These companies would prefer to use the LHV internationally. However, they consider this option to be highly unlikely, because they still require a maximum weight of 60 tonnes for the international part of the journey.

4.2 The market

According to the economic analysis in chapter 3 and the survey of terminals, shipping companies and transporters in the previous paragraph, no modal shift has occurred. Numerous factors evidently play a role in the choice of modality. This paragraph examines these factors more closely for specific cases in the container market. These cases are based on interviews with various companies. The reason for choosing the container market is, that based on volumes, the modalities in this market are the most competitive. All three modalities expect to see a growth in the

container transport. The development of the so-second Maasvlakte in the Port of Rotterdam will also have a significant impact on transport. Paragraph 4.2.1 illustrates how the container market is organised, and two cases are used to explain why it may or may not be interesting to use LHVs in the container transport sector. Paragraph 4.2.2. explains the benefits of using LHVs in container waste transport.

4.2.1 Container market

Over the past decades the goods traffic sector has undergone major changes. One of the most drastic changes was the introduction of containers. According to expectations, over the coming decades, the global container transport sector is expected to continue to show strong growth. Rotterdam, which is Europe's primary container port, annually processes over 11 million TEUs of containers.

In Rotterdam the modal split of containers is as follows: around 40% is shipped to the European hinterland via feeder vessels, and around 60% is handled via road transport, inland shipping or rail. Of this 60%, one third of the containers are shipped via inland shipping, 11% by rail and slightly more than half are shipped by road. Road transport is dominant in the transport of containers to the hinterland. Over the past years there has been an enormous increase in the number of feeder vessels.

The sea shipping company that loaded or unloaded the cargo in the seaport can decide to organise the hinterland transport. Alternatively, this process could also be, fully or partially, managed by a shipper, forwarder or logistics service provider. If the shipping company manages this process itself (carrier haulage) then it is responsible for handling both the sea and land side of the chain. In this case, the shipping company is responsible for handling all transactions between supply chain parties in the hinterland.

If the shipper, forwarder or logistics service provider is responsible for managing the hinterland transport (merchant haulage), then the transactions are managed via this party. The ratio between carrier- and merchant haulage is currently 30-70 percent. Around ten years ago was this ratio was the other way around. This means a huge increase in the number of companies that manage the logistics chain. They play a major role in how hinterland logistics are organised.

Selecting a modality: rail or inland shipping is the preferred choice, road transport is only chosen if there no other options

Organising hinterland transport via road transport is relatively simple. The container is loaded onto a truck and trailer in the port, and subsequently shipped and delivered to the destination at the customer's requested delivery time. If possible, the company will try to manage the transport outside of rush hours, for example early in the morning or late in the evening.

As figure 4.3 illustrates, transport via inland shipping or rail generally involves an intermodal transport chain. After being transhipped onto an inland vessel (or train) in the port, the vessel (or train) will travel to one of the inland terminals. There, the container is temporarily stored (varying from several hours to several days) and subsequently shipped via road transport to the customer.

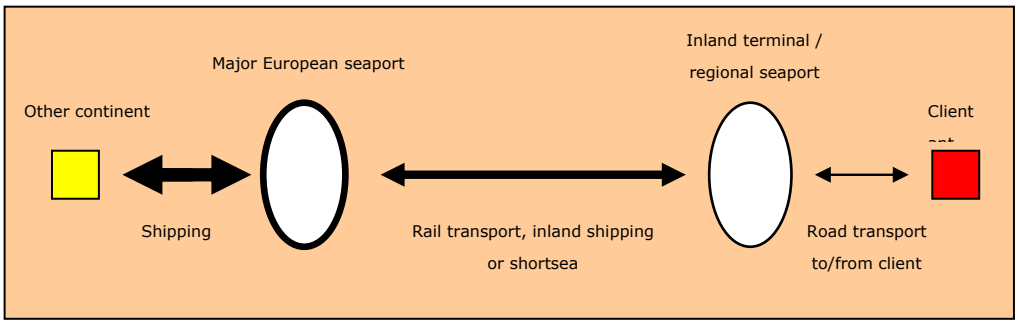


Figure 4.3 Diagram of an intermodal transport chain

The choice of modality depends on multiple factors, such as, who organises the transport, the requirements on the product, customer's requirements in terms of lead time of the hinterland transport, the transport costs, and can the customer be reached via different modalities? The requirements which a customer sets on hinterland transport is largely determined by the logistics possibilities. The ability/ willingness to temporarily store goods at a nearby terminal plays an important role in this process.

If the customer is considering using LHVs, several other factors should also be taken into account: compliance to the maximum weight limit of 60 tonnes. Are LHVs permitted to access the loading/unloading location? Is it possible to make optimal use of the LHV be using a combination of a 40ft container and 20ft container, or three 20ft containers? Is the journey long enough to justify the use of an LVV, and benefit from the advantages that this offers?

If the shipping company organises the hinterland transport, it will generally opt for an intermodal solution via inland vessel or train. This reduces the costs of shipping large volumes, and also makes it easier to manage the transport process. This is because it is easier to track a vessel/train with containers than to track different trucks. The choice of modality is decided in consultation with the customer. They will receive one invoice for the combination of sea and hinterland transport.

If, at the customer's request, the shipping company opts for road transport as hinterland modality, then their role is limited to making agreements with the customer. In this case the hired road transporter decides whether to use an LHV or other type of truck. Although shipping companies are unable to say with certainty, they presume that LHVs are only deployed on a limited scale for hinterland transport. They do not expect to manage this process in the future either, because this is presumed to involve a complicated planning process, and compared to the total costs the benefits are limited.

In the case of merchant haulage, the shipper, terminal operator or logistics service provider decides on which mode of hinterland transport is chosen. In this case, road transport is the preferred mode of transport. However, due to the increase in

containerisation and number of inland terminals, more and more locations have facilities to receive intermodal solutions. The interviews with inland terminals show that the preferred mode of transport is inland shipping or rail. Road transport is mainly used on the last section of the journey to the final customer. Companies only opt for road transport on the route between the sea terminal and the terminal under special circumstances. There are three arguments for using road transport:

- To meet a closing: a closing concerns an export flow from the hinterland to the port. In this case it involves an urgent delivery, and the container must reach the port on time to ensure that it can sail on schedule. In this case, road transport is the only feasible option.
- The customer requires rapidly delivery of the goods: this refers to a situation that is the reverse of a closing. This concerns an import flow and the customer want the goods to be delivered to him as soon as possible. In this case, because of flexibility and urgency, the client also opts for road transport.
- A limited number of containers for one location in the port: this concerns an export flow. This concerns various locations in the port, because different shipping companies and destinations are involved. If only a few containers must be delivered to one location in the port, then an intermodal solution like inland shipping is not a feasible option. In this case the costs of road transport are lower, this is partly due to waiting times in the port.

Each of the above situations concerns exceptional situations whereby rapid delivery is needed. These are usually not optimal situations (because in these cases decisions are taken at the last minute) to deploy LHVs. And therefore LHVs are hardly or not used in these situations.

Initial and final transport: mainly regular transport
LHVs are not used in the initial and final phases from the terminal to the final customer. In this case a combination of factors prevent the optimal use of LHVs. This concerns the following factors:

- The short distances, up to a maximum of 50 kilometres.
- The 60-tonne weight limit. An LHV requires three 20ft containers or a combination of a 20ft container and a 40ft container. Twenty foot containers are generally loaded to maximum capacity. This means that only combinations with 40ft containers will suffice.
- There is an imbalance between 20ft and 40ft containers in the market. Some 20 to 25% are 20ft containers, so the majority consist of 40ft containers. This means only limited number of vehicle combinations are possible.
- The supply and demand for sea containers has a strong influence on the amount of time that containers can remain in the hinterland. In general, containers need to be returned to the shipping companies' depots as quickly as possible. This makes it difficult to find suitable combinations for transport via LHV.
- The customer's location requires an exemption for LHVs. Although the number of locations is increasing, many locations are unable to accommodate LHVs. For example, many customers lack the facilities to simultaneously process three 20ft containers.

The above-mentioned points illustrate why LHVs are not frequently used on transports to inland terminals. According to the surveyed terminals, LHVs do regularly access terminals in the seaport. This was confirmed by road transporters that specialise in container transport.

LHVs are primarily used for two situations: to transport containers on long distances between the port and the hinterland. In this situation the logistics terminal's industrial site is used as mini terminal. The LHVs commute between the port and the industrial site. From the industrial site the containers are shipped via regular trucks to the final customer.

The second situation concerns direct distribution from the port to final customers. Some transporters can use LHVs for transports to a combination of customers in the hinterland. This involves customers that are located relatively close to each other. Expectations are that these situations will continue to arise in the future. However, businesses do not expect an extreme amount of growth in the use of LHVs in container transport.

Case 1: Rotterdam – Amsterdam, inland shipping versus road transport (containers)

A sea container that arrives in the Port of Rotterdam and is transported to a customer in the Amsterdam area will be processed via inland shipping and road transport in the above-mentioned manner.

The costs of intermodal transport via inland shipping on the Rotterdam – Amsterdam route, including 10 kilometres in initial and final transport, is 29% lower than via regular road transport. If the goods would be processed via an LHV, instead of via regular road transport, the benefits to inland shipping would decrease to around 14%. As a result, this would mean that the inland shipping terminal would serve a smaller catchment area. However, in reality a large number of practical arguments play a role in the choice of modality. The LHV is used as a substitute for goods flows that are already processed via road transport.

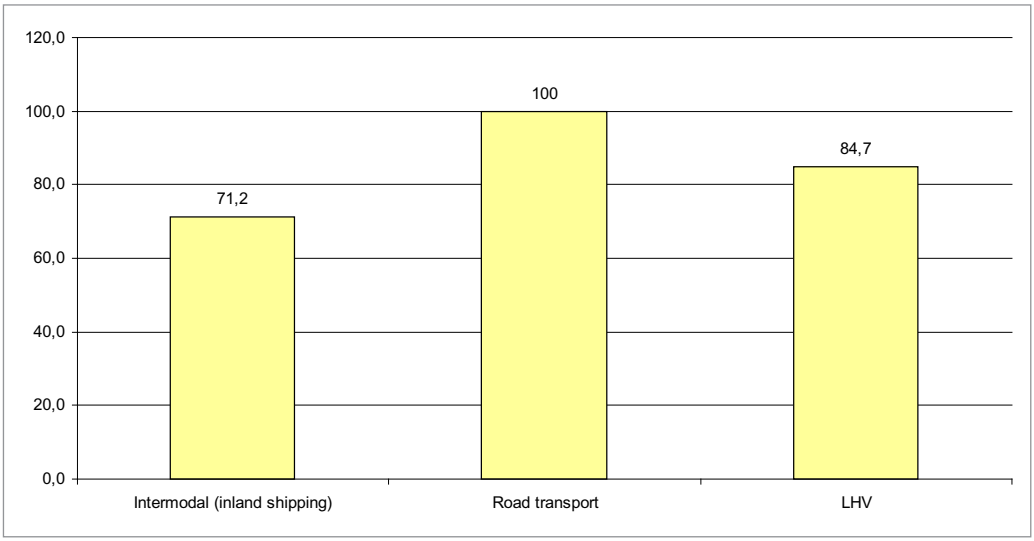


Figure 4.4 Cost difference of road transport, LHVs, intermodal via inland shipping and 10 kilometres in initial and final transport, based on indices

Source: NEA

Case 2: Rotterdam – Coevorden, railway versus road transport (containers)

The factors that apply to inland shipping, also apply to rail transport on long routes. The costs of rail transport are lower than those of road transport. In the case of urgent deliveries, road transport is generally the preferred choice. If feasible, companies will consider using an LHV.

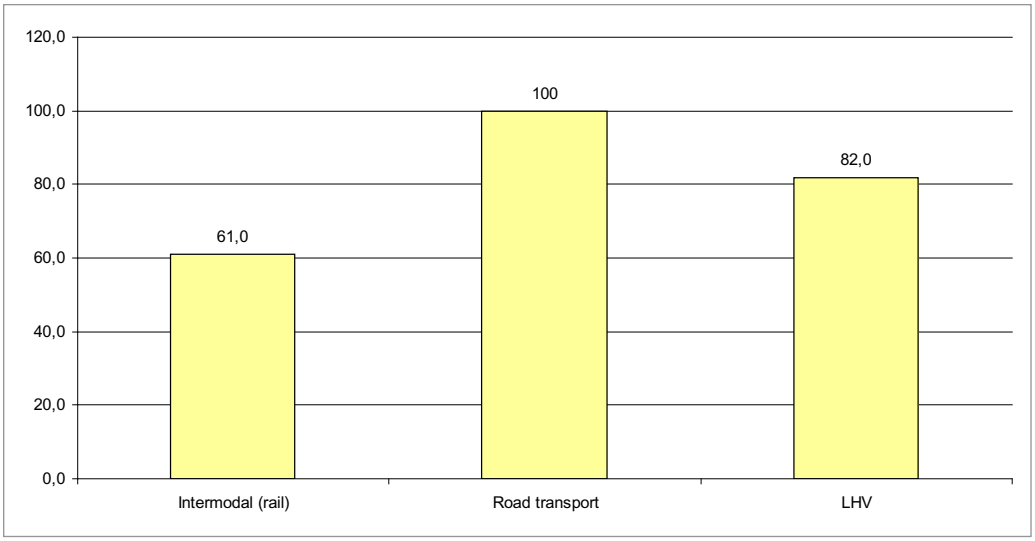


Figure 4.5 Cost difference of road transport, LHVs, intermodal via rail and 10 initial and final transport kilometres, based on index

Source: NEA

Effect of a higher fuel price?
A higher fuel price has a greater effect on the costs of road transport than in the total supply chain costs of an intermodal chain. In the intermodal chain, the percentage of fuel costs is considerably lower because other costs, such as transhipment costs at the terminal, constitute a higher percentage of total costs. So a higher fuel price leads to greater differences between the intermodal chain and road transport. This could lead to an increase in the catchment area that the inland terminal serves.

4.2.2 *Waste market*

In the Netherlands, some 30 million tonnes of waste is transported annually. A large share of this waste comprises building waste that is frequently re-used in ground and road construction, and hydraulic engineering. Household and industrial waste also constitute a large share of the waste. There has been an overall decline in the amount of waste that is deposited at dump sites. In addition to recycling, waste is burned in waste incineration plants (or AVIs Dutch). This case aims to provide insight into competition between modalities for the transport of waste that is incinerated. In the Netherlands 6,333 kilo tonnes of waste was incinerated in 2009.

Over the past years, numerous rounds of consolidation have taken place in the industrial waste collection market. The main players in the Dutch waste market are currently: AVR / Van Gansewinkel, Essent, SITA and Shanks. They collectively cover around 40% of the market.

Monday 30 March, 2009

On March13th of this year the the North-Holland Daily newspaper reported that Huisvuilcentrale (HVC) Alkmaar would be discontinuing the delivery of household refuse by ship in the Province of Flevoland. Currently the Felvotrans docks three times a week at the container port on the North-Holland canal. Each time 880 tonnes of refuse in 80 containers is discharged to be processed. Up until a year ago the refuse of Province Flevoland was loaded at the container port on the EPON island near Lelystad, but the power plant needed this space for its own purposes. Since then Flevoland's refuse has been being taken to Harderwijk in container trucks to then be shipped from there to Alkmaar. The circumlocution Lelystad, Harderwijk, Alkmaar is inefficient and is becoming too costly. **Therefore, HVC wants to start using long and heavy freight lorries of more then 25 metres long that will transport 27 tonnes of refuse in three containers.**

The example above illustrates the possibility of using LHVs for the intermodal transport of waste between the provinces of Flevoland and North Holland. The waste was transported via inland shipping. The owner of the land in Flevoland needed the land on behalf of his own operations. This meant there was no longer a good loading and unloading facility in Lelystad to tranship waste to inland shipping. As a result businesses had to revert to using road transport. As an alternative to regular road transport, the companies opted to deploy LHVs. In the future a new loading and unloading facility could possibly be built as part of the Flevokust (Flevoland coast) project. This would allow businesses to switch back to inland shipping. This shows that in addition to price, other factors can also effect the choice of modality.

In the Netherlands around 2.1 million tonnes of industrial waste is incinerated. This corresponds with around 100,000 fully loaded truck combinations. Not all incineration plants are accessible via intermodal transport. Road transport will therefore continue to play an important role. Incineration plants such as the ones in Rozenburg (Van Gansewinkel/AVR), Amsterdam (AEB) and Alkmaar (HVC) are based directly along the waterways. Rozenburg and Alkmaar already receive 20ft compactors via water. Amsterdam does not, and AEB does not have a dock that can be used for this purpose. However, Amsterdam does have facilities for receiving waste via rail.

Inland shipping and rail transport
Household/municipal waste has long been transported via water and rail. Examples of transport via water include municipal waste flows from The Hague, Delft and Utrecht. These are transported to the incineration plant in Rozenburg with the help of ISO-20 compactors. Waste transport via rail, among others, occurs between the Bergen op Zoom transhipment location and the incineration plant in Moerdijk.

As most incineration plants are located near the water, they prefer the waste to be shipped in via the waterways; this allows them to spread the waste deliveries. It is easier to plan deliveries via rail and inland shipping, which, in principle, can be delivered 24/7. This helps to guarantee the continuity of the incineration process and energy generation.

Case 3: Inland shipping versus road transport (waste containers)

To illustrate the differences between modes of waste transport, a comparison has been made between road transport via open waste containers and loosely deposited waste in an inland vessel. In addition, to loosely deposited waste, it is also possible to transport waste via bales or compactors. Both alternatives are more expensive than loosely deposited waste. Figure 4.6 shows that the transport of waste per tonne is significantly cheaper via inland shipping. However, the costs of inland shipping do not include the transhipment costs at the incineration plant. This is because the incineration plant bears these costs. Even if these costs are included in the transport via inland shipping, then this mode of transport is still cheaper than using LHVs.

The reason why LHVs are not much cheaper than regular trucks is due to the weight of the containers which the waste is transported in. These containers weigh between 3.5 and 4 tonnes. This means that compared to regular vehicles, LHVs can only carry a relatively limited extra amount of weight; around 6 tonnes instead of 10 tonnes. Because of the limited cost benefit, in many cases it is simply not feasible to transport waste via LHVs. The LHVs that are currently deployed to transport waste are mainly used for relatively light goods such wood chippings. LHVs are also used on fixed routes where these vehicles offer added value compared to regular trucks.

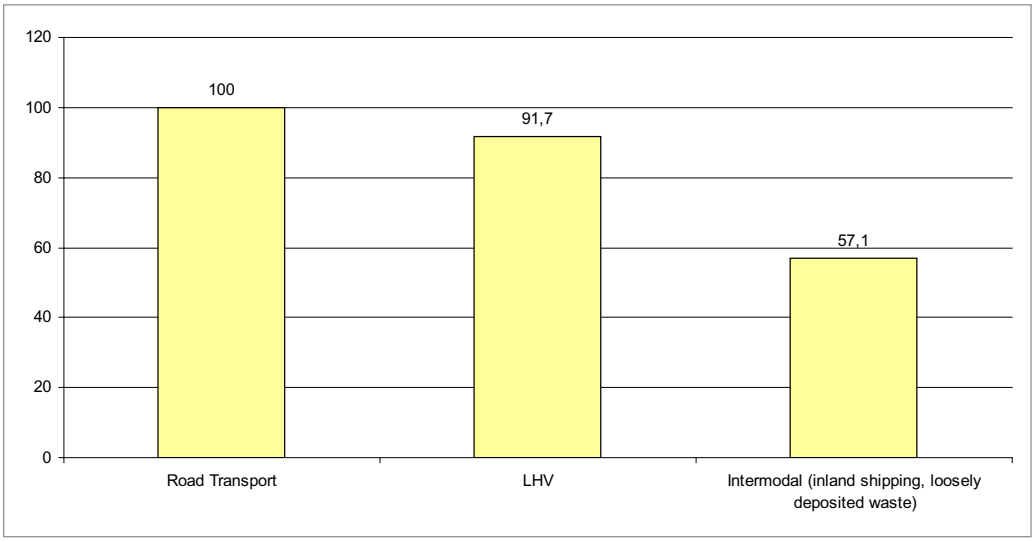


Figure 4.6 Cost differences between road transport, LHVs and inland shipping for the transport of waste between Rotterdam and Amsterdam, based on index

Source: NEA

4.3 Conclusions from survey of terminals, shipping companies, transporters and the market analysis

There are three main conclusions. The most important conclusion is that the modal split development has not changed at container terminals, and there are no reasons to assume that this will change. Because LHVs are less flexible, they can only be deployed on a limited scale. Lastly, there are several other factors that have a positive effect on intermodal transport.

4.3.1 Modal split development at terminals remains unaltered

According to the market analysis, the modal split at container terminals has not changed in comparison to the situation in 2008. Some 75% of terminals do not receive LHVs, and the number of terminals that do receive LHVs has not increased since the zero measurement in 2008.

Expectations are that, for the foreseeable future, there will be no changes to the modal split at container terminals. There are several reasons for this:

- A terminal's logistics process is equipped to process goods based on a pre-determined concept. This means it is not easy to replace one type of modality by another.
- Companies prefer to use inland shipping or rail for transports to the terminal, or from the terminal to the seaport. Road transport is only used if there are no other options, for example because of a short lead time.
- Terminals that received LHVs during the zero measurement saw an increase in the number of LHVs. In this case regular road transport was replaced by LHVs.
- LHVs for container transport are mainly used on journeys between the seaport terminals and final customers/shippers in the hinterland.
- If LHVs are used on routes between terminals, this only serves as a replacement of regular road transport vehicles.
- Inland terminals did not require any specific investments to process LHVs. No future investments are expected to take place.

4.3.2 LHVs are cheaper but much less flexible than regular road transport vehicles

Although road transport has become cheaper as a result of the introduction of LHVs, there is a combination of factors that prevent LHVs from being deployed on a large scale. There are several reasons for this:

- When transporting bulk goods, it is generally difficult to remain within the 60-tonne weight limit. The difference between 50 tonnes for a normal road vehicle and 60 tonnes for an LHV is too limited to justify the use of LHVs.
- On short distances, because of longer loading and unloading times, the extra investment in an LHV would not be justified.
- In practice, there are only limited possibilities to use combinations of 40ft and 20ft containers, or three 20ft containers. This is due to the limited availability of 20ft containers, and due to the heavy weight of 20ft containers because these are usually heavily loaded.
- LHVs require an exemption to transport containers to their final destination. Many locations do have an exemption.
- Customers and shippers are sometimes unable to handle all the aspects that are involved in the processing of an LHV. For example, a logistics facility may be equipped to receive one 20ft container, but not three 20ft containers.
- Due to time restrictions, it is sometimes not possible to combine cargo for transport in containers via an LHV. In some cases the containers must be quickly returned to the shipping companies.

4.3.3 Other general factors that determine the modal split

Other factors also have an effect on regular road transport:

- It is easier to monitor goods flows via inland shipping and rail than via road transport (LHVs).
- These are separate markets, terminals that focus on inland shipping or rail will not be quick to choose road transport (LHV).
- The final customer is usually the one who chooses the modality.
- Higher fuel prices work to the advantage of intermodal transport because fuel costs constitute a smaller part of costs in the intermodal chain than in the unimodal chain via road transport.

5 Conclusions and recommendations

5.1 Conclusions

The key questions of this study are:

- Did a reverse modal shift occur that was caused or, most likely caused, by the introduction LHVs?
- Are there any developments that indicate that a reverse modal shift might be expected in the future?

Thus far, the main conclusion is that no reverse modal shift effects have occurred, and these effects will not occur within the foreseeable future either.

Although the introduction of LHVs has led to a decline in road transport costs, there are several factors that stand in the way of deploying LHVs on a large scale. This is primarily due to the weight restriction of 60 tonnes, and the imbalance between the number of 40ft and 20ft containers. According to the market analysis, LHVs can only be deployed on a limited number of journeys, and with the exception of road transporters, other supply chain parties hardly show any interest in using LHVs.

Part of the answer can be explained on the basis of the statistical and economic analysis. And an important part of the answer and substantive arguments were based on the market analysis.

5.1.1 Conclusions from the statistical and economic analyses

The main conclusion is that road transport increased in terms of tonnage, but showed a slight decline in terms of transport performance (tonne-kilometres). This picture is in line with the zero measurement and does not show any significant changes following the deployment of LHVs. LHVs as a percentage of road transport did increase. A look at tonnes transported and road freight transport, gives the following percentages:

- In 2010 the percentage of tonnes transported by LHV in domestic road freight transport increased to 0.6%.
- As a percentage of domestic transport that is conducted with tractor units-trailers, the percentage of LHVs in this category increased to 1.1%.
- In 2010 the percentage of LHVs used in domestic transport and conducted with tractor units-trailers on distances of over 150 kilometres increased to 5%.

A comparison of the modalities per type reveals that the heaviest competition occurs in the container transport sector. In terms of size, container transport showed the greatest amount of growth over the past years. In the zero measurement it was concluded that inland shipping, in particular, benefited from growth in the container transport sector. According to the latest figures, the road transport sector also benefited, and generated more growth in absolute terms. However, this has not had any significant influence on the modal split.

In the future, there will be greater emphasis on the modal split because seaports modal have formulated targets that are aimed at ensuring that rail and inland shipping will increase at a higher pace than road transport.

A look at the other modality types shows a decrease in dry bulk transport via inland shipping, and an increase in liquid bulk transport via road and inland shipping. The

increase of liquid bulk in the zero measurement was still observed, although it was less strong. LHVs do not play a significant role in the transport of bulk goods.

In 2009 the road transport sector shipped a much larger quantity of general cargo than in 1994, and transports via inland shipping remained almost level. This is in line with the zero measurement.

The modalities were also compared on the basis of distance. This showed that on distances of over 50 kilometres rail and inland shipping will compete with road transport. This is in line with the zero measurement.

The starting principles in this study are not completely the same as in the zero measurement[8], in spite of this it was possible to compare the measurements of both studies. As previously established in the zero measurement, not all observed changes are, by definition, caused by goods transport, these could also have been caused by inconsistent data. It should be noted that, a more detailed assessment of the data revealed a higher level of inaccuracy of this data.

The NEA estimated the number of LHVs that could be used if LHVs would be permitted on international transport. This resulted in the following insights:
- Depending on the scenario, between 1,872 and 3,040 LHVs would be deployed in international transport to and from the Netherlands.
- LHVs are used on a daily basis, compared to the current situation (currently some 500 LHVs on the road) the number of LHVs could increase by a maximum of a factor 8. In this case around one thousand LHVs would be used for domestic transport, and a maximum of 3,040 LHVs for international transport.

Based on these numbers it is unlikely that any significant changes to the modal split will occur within the foreseeable future.

5.1.2 Conclusions of the market research

An inquiry among market parties revealed that, since the zero measurement in 2008, there has been no increase in the number of container terminals that LHVs access. Market parties did indicate that regular transport vehicles are being replaced by LHVs, but no reverse modal shift has occurred.

LHVs are mainly used to transport goods between seaports and customers in the hinterland. Companies only choose to use road transport, if rail and/or inland shipping is not feasible, for example if short lead times apply. LHVs are hardly used in the initial and final transport phase. Expectations are that this will not change in the foreseeable future.

LHVs do not seem to fit in with the logistics situation in practice. It is relatively difficult to compile suitable combinations of containers for transport via LHV (three 20ft containers, or a combination of 20ft and 40ft). Twenty-foot containers only constitute a small percentage of available containers, and these are often heavily loaded. Because of limited market potential, logistics parties barely show any interest in deploying LHVs for container transport.

8 The difference between the zero measurement and this study is that for road haulage delivery vans and companies that transport their own goods have been included. Also, the distance classes that have been used vary.

Furthermore, various factors have had a positive impact on intermodal transport. For example, intermodal transport has benefited from the impact of a higher fuel price. This is because fuel costs constitute a smaller percentage of total costs in the supply chain than in the case of road transport. In the long term, seaports will focus on modal split targets to limit road congestion, and effects on the environment.

5.2 Recommendations

Based on the present study, the results do not give any cause to alter the policy on LHVs.

If another impact assessment on the effects of LHVs on the modal split choice is to be conducted in several years time, then it is recommended to expand the monitoring study with a survey among customers.

Because LHVs only constitute a small percentage of total road freight transport, the use of macro figures is not very useful to make modal split analyses. The NEA recommends that, when conducting future measurements, the emphasis should shift from an economic analysis to a market analysis.

Bijlage A Survey of terminals

LHV reverse modal shift questionnaire (telephone survey)

1. Do longer and heavier vehicles[9] (LHVs) access your terminal?
   ☐ Yes -> Please continue with question 2
   ☐ No -> Please continue with question 17

2. Does your company use LHVs?
   ☐ Yes, we have our own LHVs
   ☐ Yes, we hire the services of LHV companies
   ☐ No, the containers are picked up and delivered by third parties

3. On what type of journeys do you use LHVs?
   ☐ Sea terminal – terminal/ terminal - Sea terminal transport
   ☐ Initial or final transport
   ☐ To transport empty containers between terminals
   ☐ Other, namely …

4. What is the most common LHV configuration?
   ☐ 3 x 20ft
   ☐ 1 x 40ft + 1 x 20ft

5. On average, how many LHVs access your terminal every week?
   ☐ Less than 1 LHV a week
   ☐ 1- 5 LHVs a week
   ☐ 6- 10 LHVs a week
   ☐ 11- 20 LHVs a week
   ☐ Over 20 LHVs a week

6. How did the use of LHVs at your terminal develop since 2008?
   ☐ It increased
   ☐ It remained the same
   ☐ It decreased

7. Who determines whether or not to use LHVs?
   ☐ The transporter
   ☐ The shipping company
   ☐ The shipper
   ☐ The terminal operator
   ☐ Other, namely…

8. In your opinion, why are LHVs used? (More than 1 answer possible)
   ☐ Because LHVs are cheaper
   ☐ Because the use of LHVs means shorter lead times
   ☐ Because it is better for the environment
   ☐ Other, namely

9 LHVs are vehicles with a length of 25.25 metres and a maximum weight of 60 tonnes.

9. Do you know of a concrete situation whereby the transport of cargo shifted from inland shipping or rail to LHVs? This refers to the situation that cargo used to be shipped via inland shipping and rail, and is now shipped by an LHV.

   ☐ Yes -> please continue with question 10
   ☐ No -> please continue with question 11

10. If so, could you please describe this situation? Please indicate the reason for choosing to use an LHV.

11. Do you know of a concrete situation whereby LHVs are deployed as an alternative to inland shipping or rail? This refers to the situation whereby an LHV is chosen in spite of the fact that the goods can be transported via inland shipping and rail.
    ☐ Yes -> please continue with question 11b
    ☐ No -> please continue with question 12

11b If the answer is yes, could you please describe this situation? Please state the reason for choosing the LHV.

12. Are there any barriers (thresholds) that prevent the use LHVs in container transport?
    ☐ Yes -> please continue with question 13
    ☐ No -> please continue with question 14

13. If the answer is yes, what are the main barriers to deploying LHVs in container transport?

14. What opportunities are there to use LHVs for intermodal transport?

15. Do you think that LHVs could be used during the initial and final transport phases of intermodal transport?

16. In your opinion, what role will LHVs play in international transport, for example between terminals? (please continue with question 18)

17. Why don't LHVs access your terminal?

18. Do you expect to be using LHVs at your terminal in the future?

19. What kind of terminal is it?
    ☐ Inland terminal
    ☐ Sea terminal
    ☐ Regional transhipment centre

20. What type of goods are transhipped? And, of the total transhipments, what percentage do the following segments represent (if you are unable to give an exact figure, please give an estimate)?
    ☐ Containers: ……..%
    ☐ Bulk (liquid and dry): ……%
    ☐ Other goods: ……..%

21. Which modes of transport does the terminal offer access to?
    - ☐ Road
    - ☐ Inland shipping
    - ☐ Rail
    - ☐ Sea

22. In TEU/tonnes, how much goods were transhipped at your terminal in 2010, Please indicate how the different modes of transport are divided.
    - ☐ arriving by vessel:……TEU/ton
    - ☐ leaving by vessel:……..TEU/ton
    - ☐ arriving by train:…….TEU/ton
    - ☐ leaving by train:……TEU/ton
    - ☐ arriving by truck:…….TEU/ton, what % do LHVs represent:…….TEU/ton
    - ☐ leaving by truck:……TEU/ton, what % do LHVs represent:…….TEU/ton
    - ☐ arriving by ocean-going vessel:…….TEU/ton
    - ☐ leaving by ocean-going vessel:……TEU/ton

23. What proportion do 20ft and 40 ft containers represent?
    - ☐ Percentage of 20ft containers:…….%
    - ☐ Percentage of 40ft containers:…….%

24. Do you have any suggestions and/or comments with regard to LHVs?

Bijlage B Survey of shipping companies and transporters

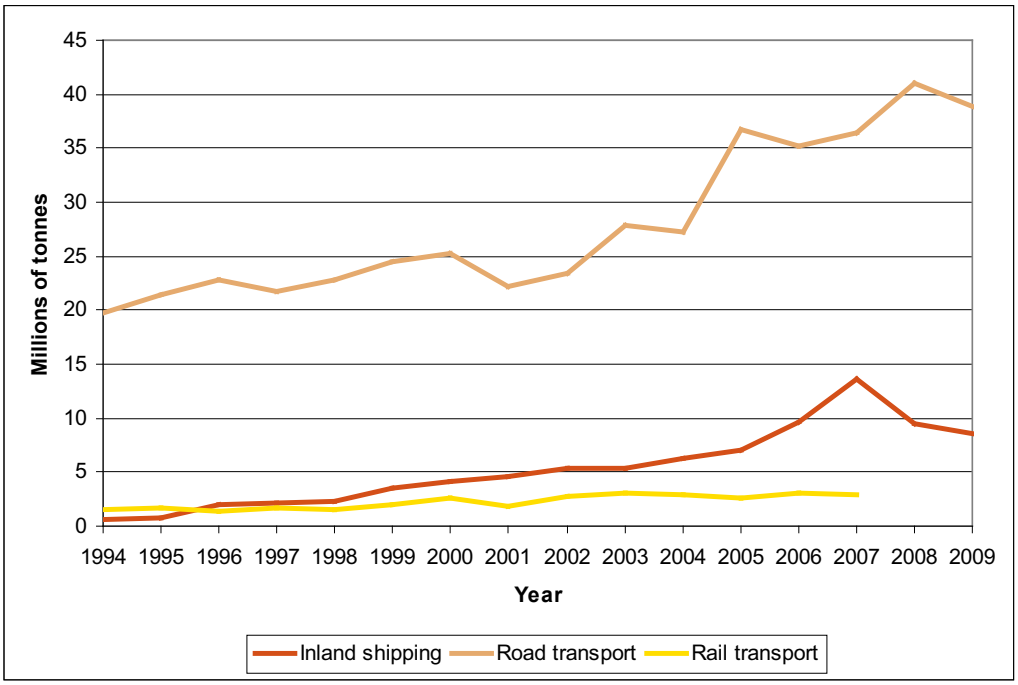
Telephone survey of shipping companies:

1. If you are responsible for hinterland transport, which factors play a role in the choice of modal split?
2. As a shipping company, are you involved in choosing the type of equipment for transport to the hinterland, or do you leave this up to the transporters?
3. In the case of road transport, would you consider using LHVs?
4. Do you use LHVs for transport to the hinterland?
5. When do and do you not opt to use LHVs?

Telephone survey of transporters:

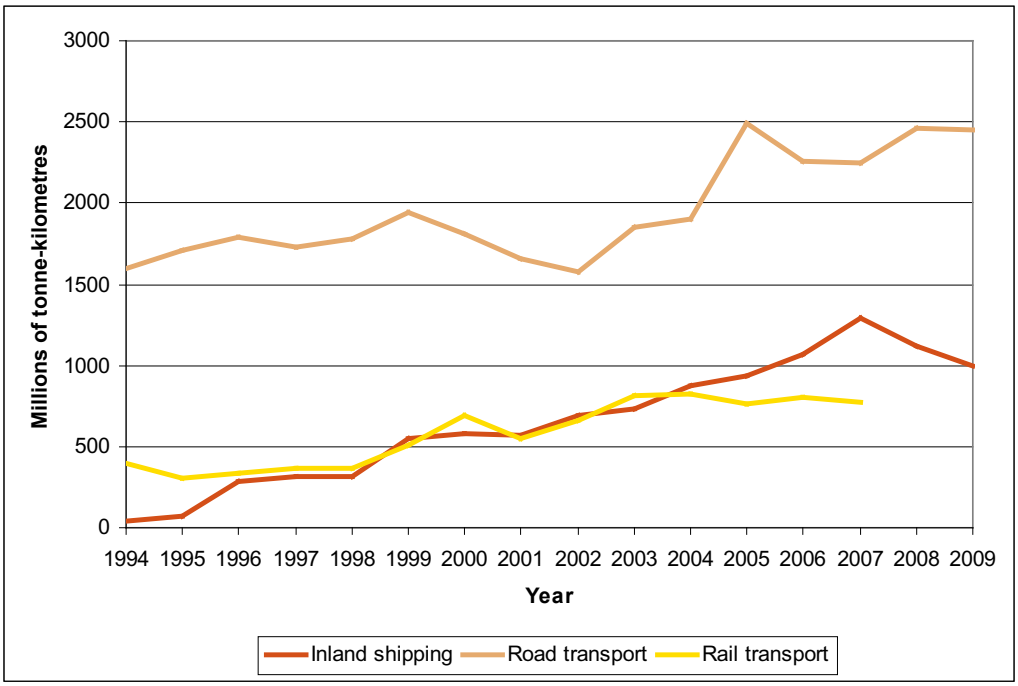
1. Do you use LHVs for container transport?
2. How do you use LHVs?
3. Do you travel to terminals, if so, what type of terminals?
4. Do you expect to keep using LHVs for transport to terminals in the future?
5. Would you be able to use LHVs for international transport?

Bijlage C Economic substantiation



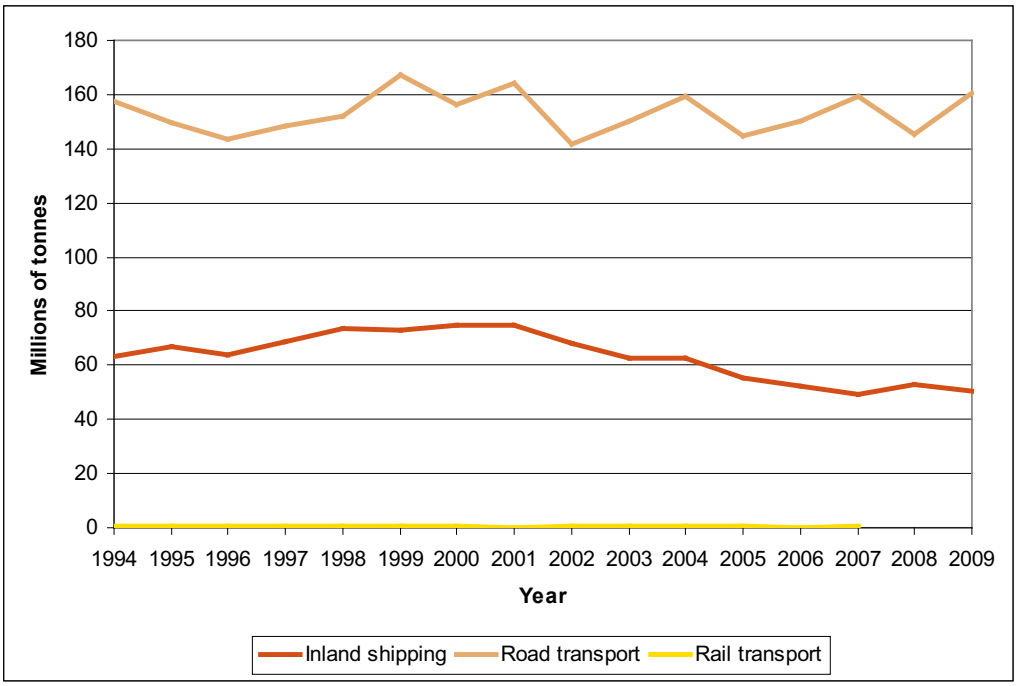
Appendix C.1 Containers, tonnes transported on domestic transport in millions of tonnes (1994-2009)

Source: Statistics Netherlands (CBS) publication data



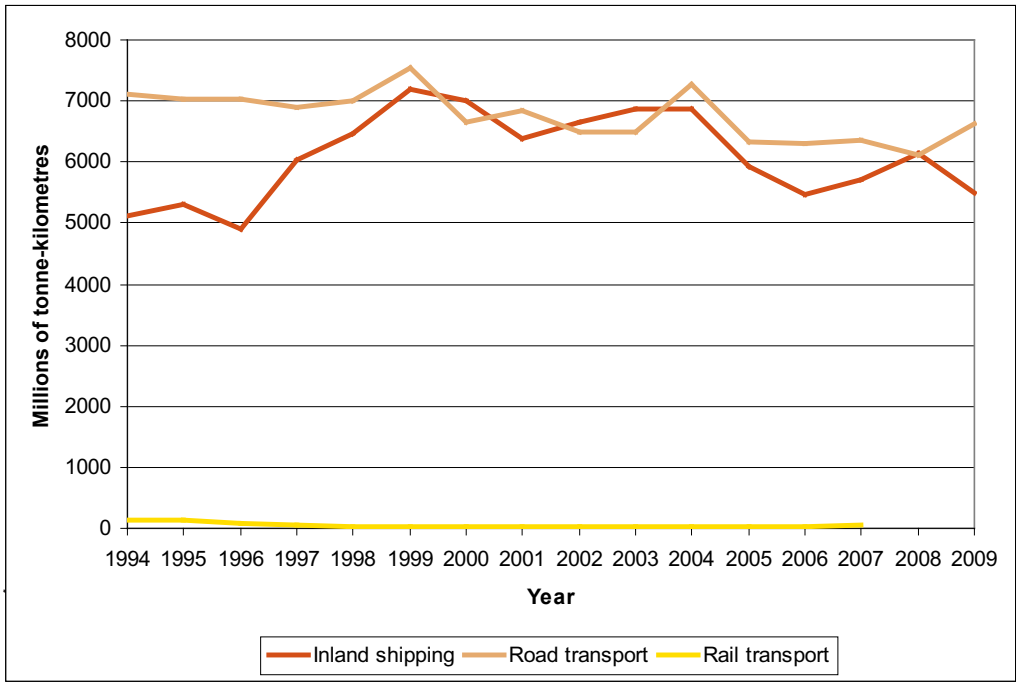
Appendix C.2 Containers tonne-kilometres on domestic transport in millions of tonne-kilometres (1994-2009)

Source: Statistics Netherlands (CBS) publication data



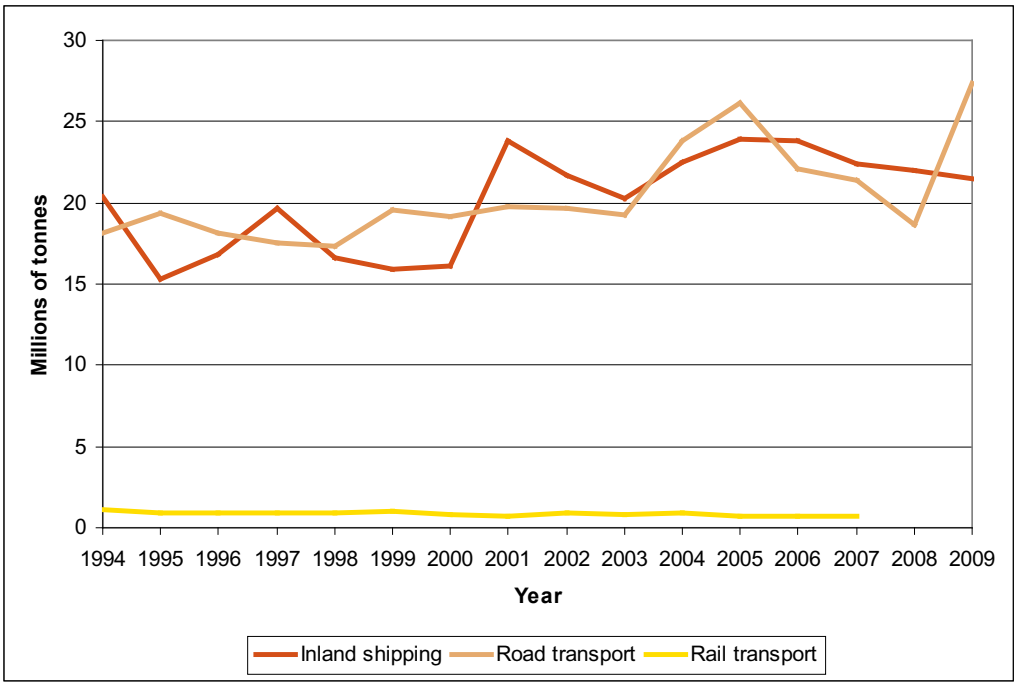
Appendix C.3 Dry bulk, tonnes transported on domestic transport in millions of tonnes (1994-2009)

Source: Statistics Netherlands (CBS) publication data



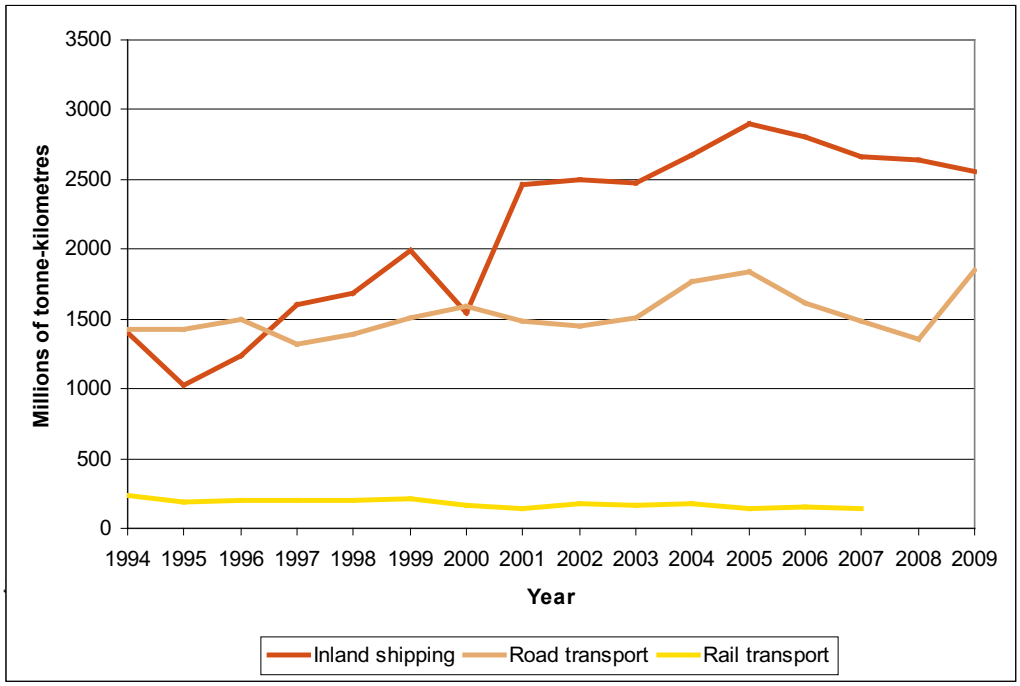
Appendix C.4 Dry bulk, tonne-kilometres on domestic transport in millions of tonne-kilometres (1994-2009)

Source: Statistics Netherlands (CBS) publication data



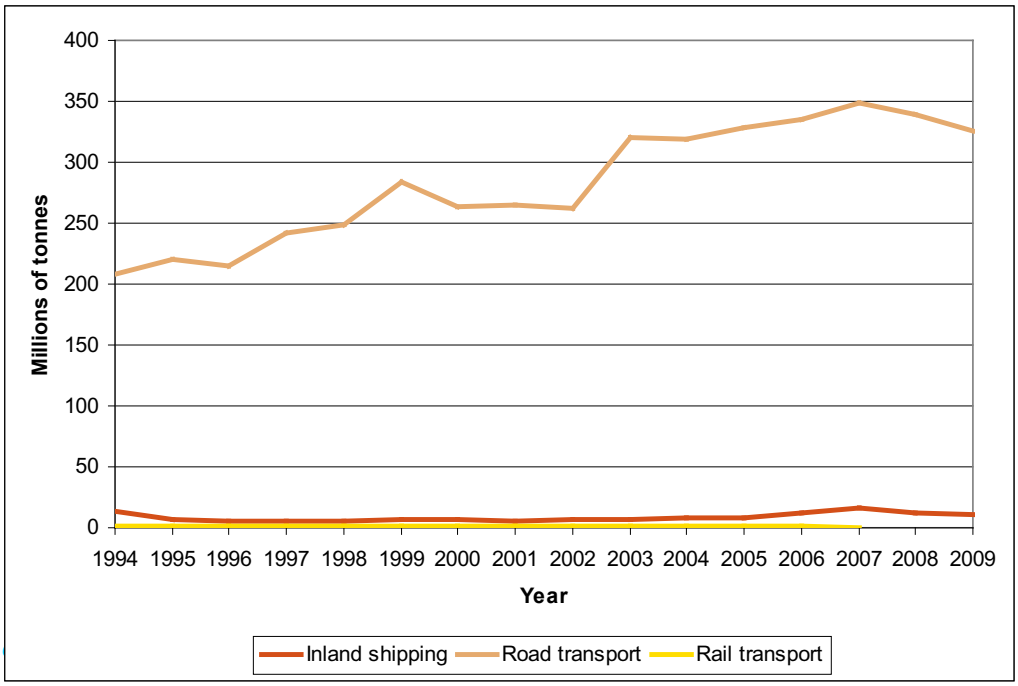
Appendix C.5 Liquid bulk tonnes transported on domestic transport in millions of tonnes (1994-2009)

Source: Statistics Netherlands (CBS) publication data



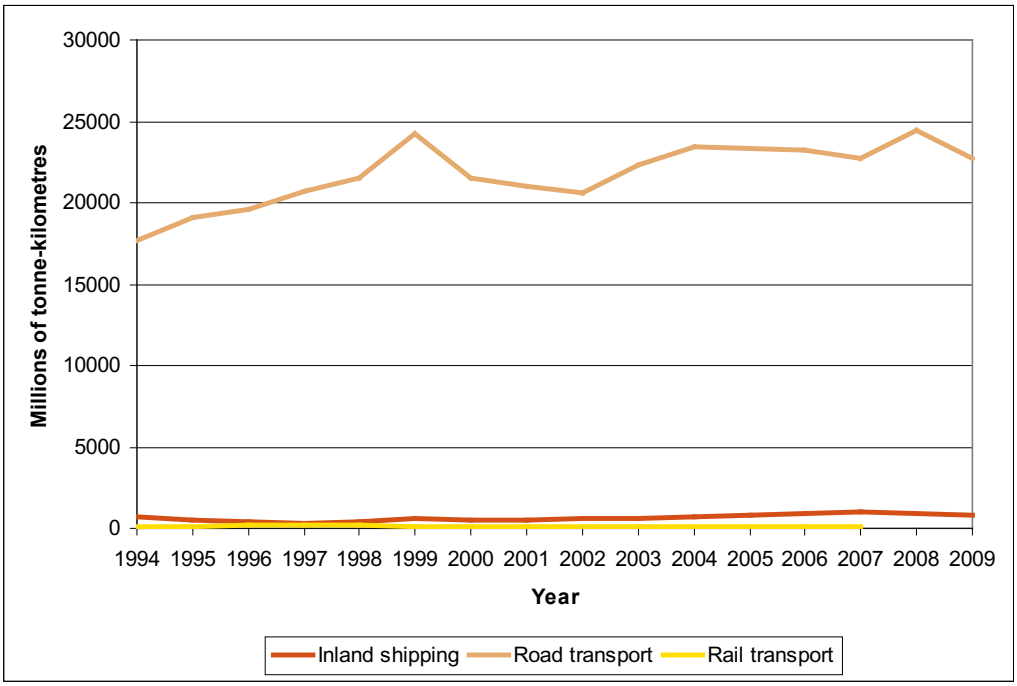
Appendix C.6 Liquid bulk tonne-kilometres on domestic transport in millions of tonne-kilometres (1994-2009)

Source: Statistics Netherlands (CBS) publication data



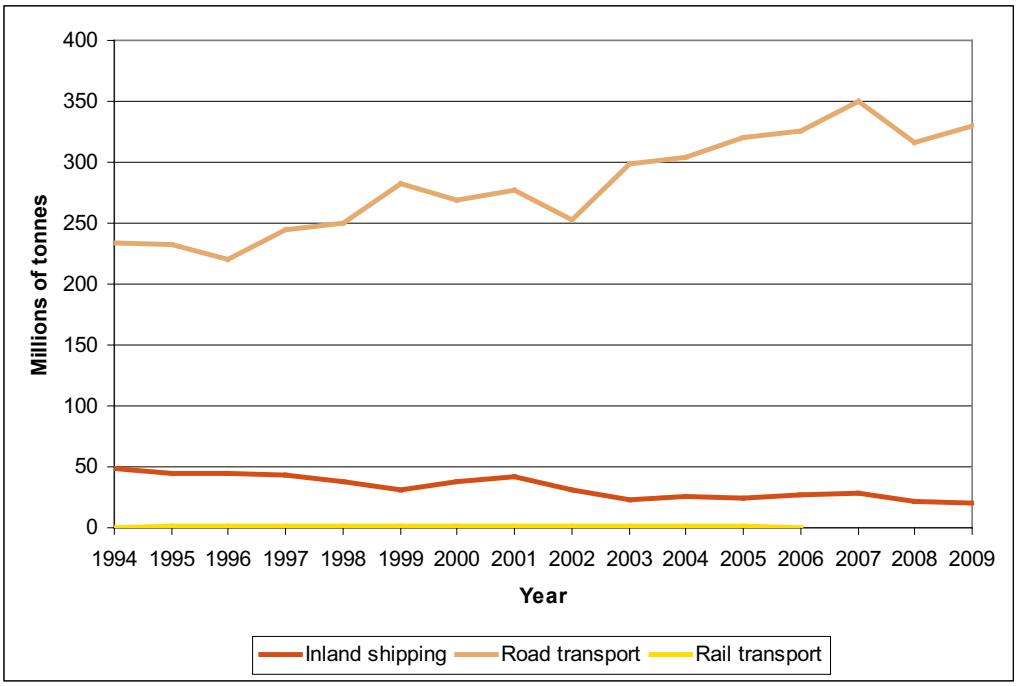
Appendix C.7 General cargo tonnes transported on domestic transport in millions of tonnes (1994-2009)

Source: Statistics Netherlands (CBS) publication data



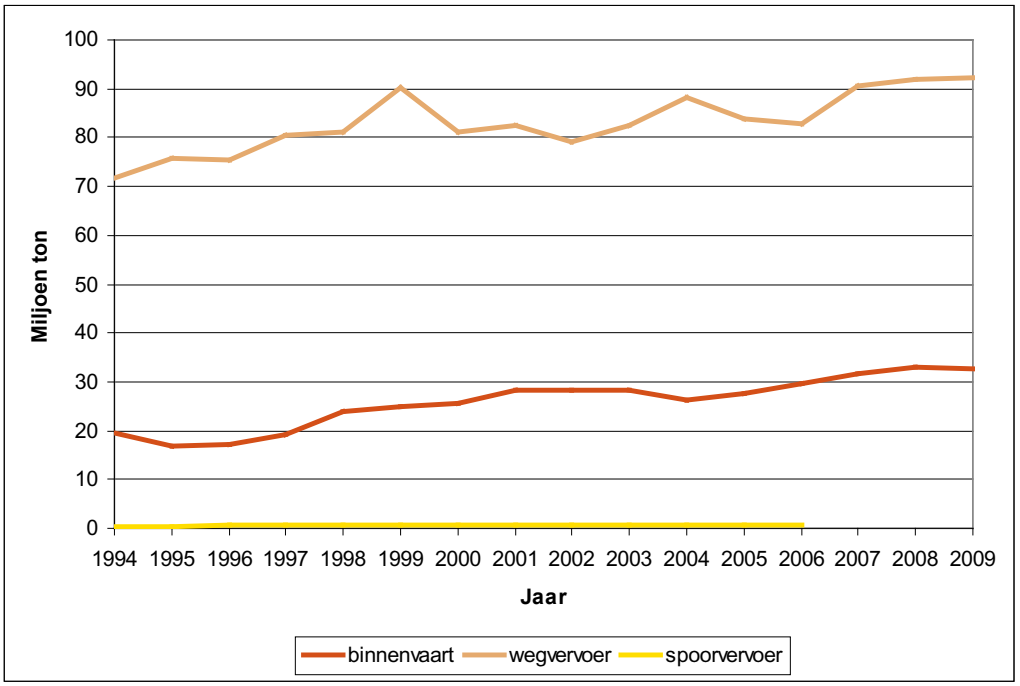
Appendix C.8 General cargo tonnekilometres pm domestic transport in millions of tonnes-kilometres (1994-2009)

Source: Statistics Netherlands (CBS) publication data



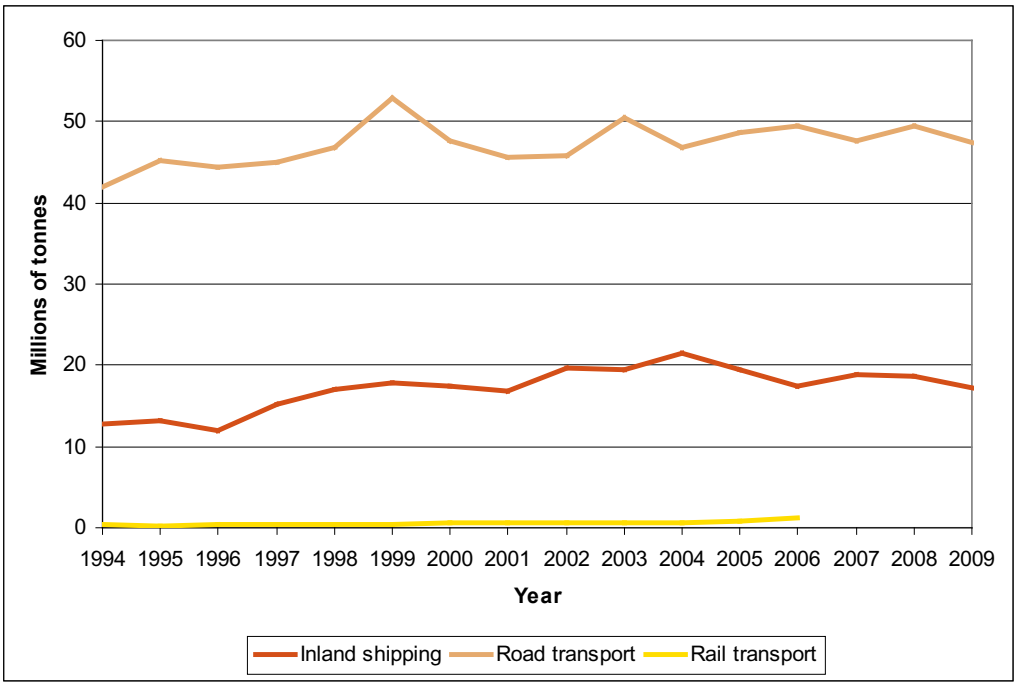
Appendix C.9 Up to 50km, tonnes transported on domestic transport in millions of tonnes (1994-2009)

Source: Statistics Netherlands (CBS) publication data



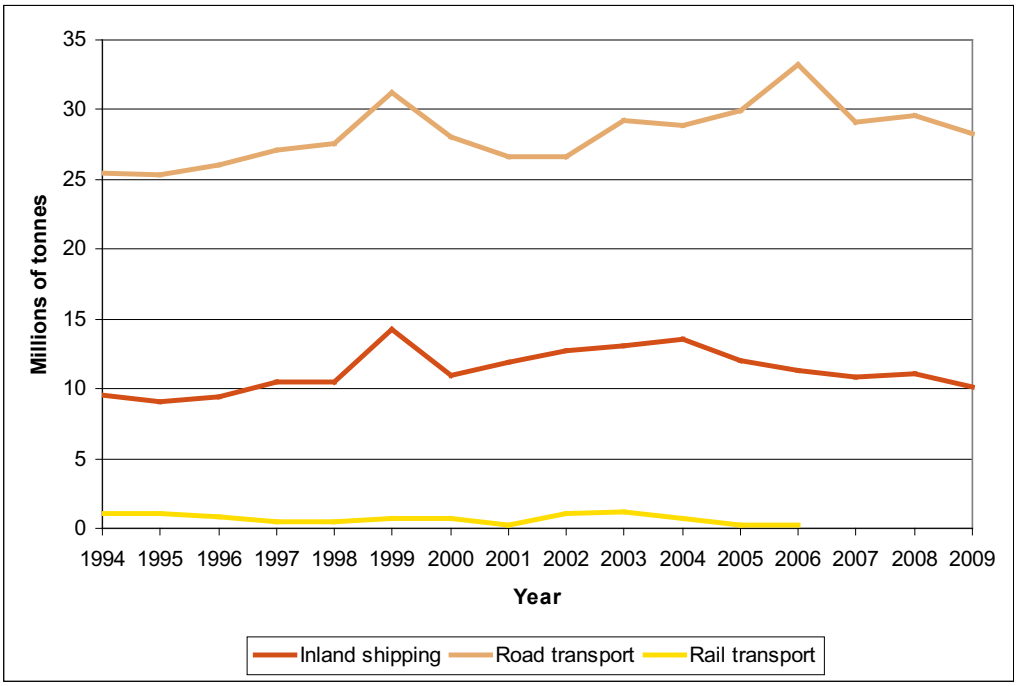
Appendix C.10 51 tot 100km tonnes transported on domestic transport in millions of tonnes (1994-2009)

Source: Statistics Netherlands (CBS) publication data



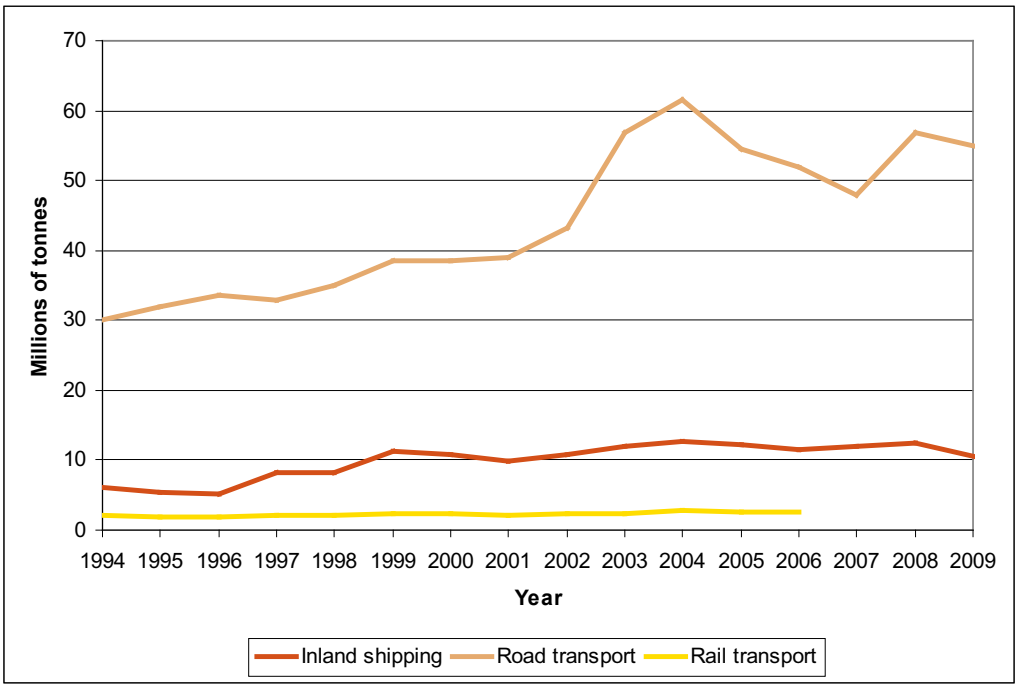
Appendix C.11 Van 101 tot 150km tonnes transported domestic transport 1994-2009 in millions of tonnes

Source: Statistics Netherlands (CBS) publication data



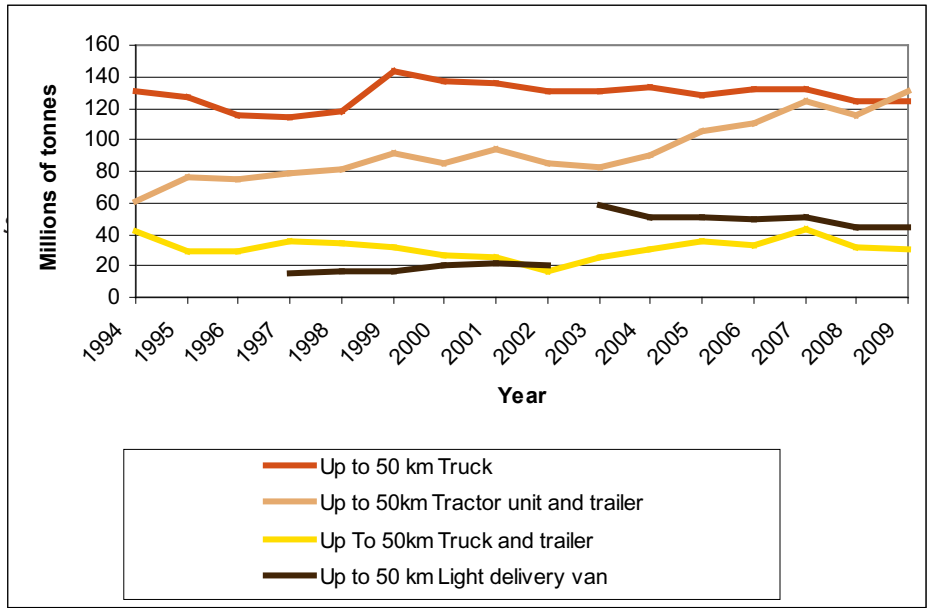
Appendix C.12 151 to 200km tonnes transported on domestic transport, in millions of tonnes (1994-2009)

Source: Statistics Netherlands (CBS) publication data



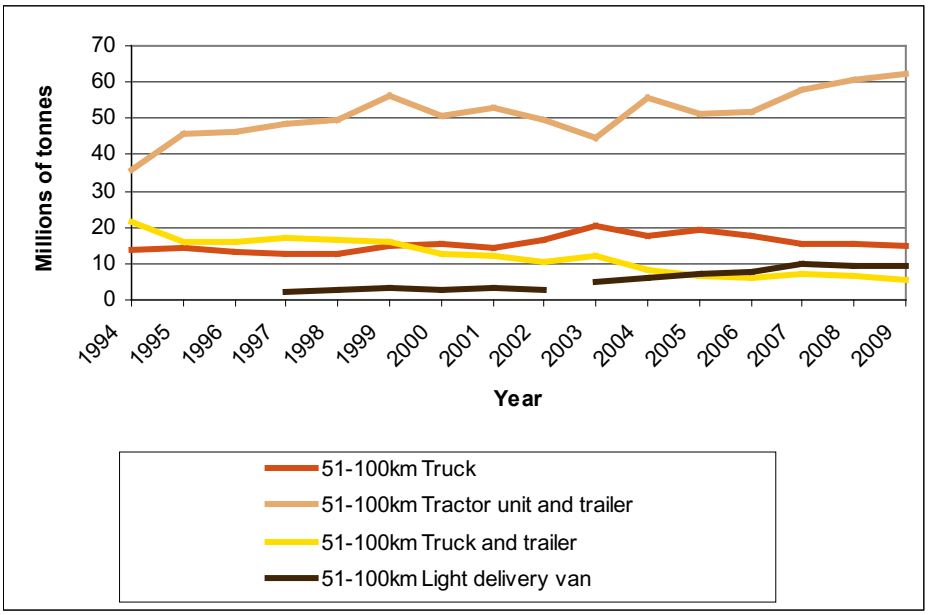
Appendix C.13 Over 200km tonnes transported on domestic transport in millions of tonnes (1994-2009)

Source: Statistics Netherlands (CBS) publication data



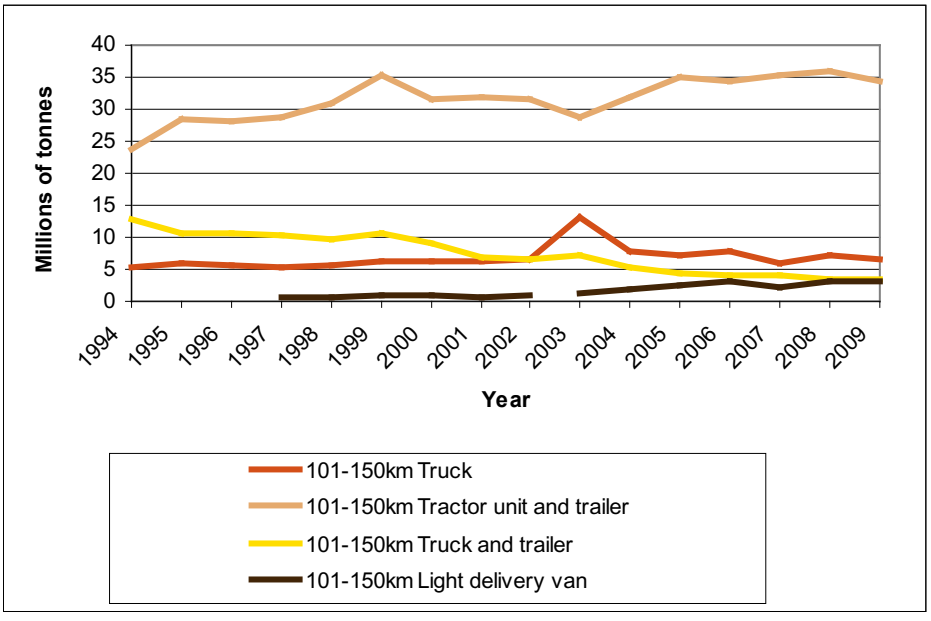
Appendix C.14 Tonnes transported per vehicle type in millions of tonnes up to distances of 50km (data on delivery vans from 1997)

Source: Statistics Netherlands (CBS) publication data



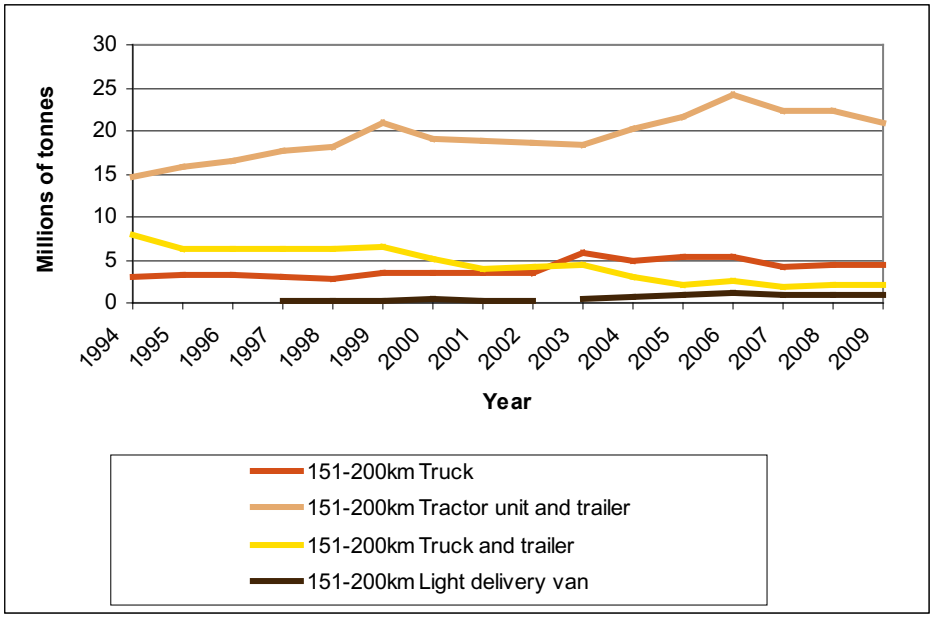
Appendix C.15 Tonnes transported per vehicle type in millions of tonnes for the distance class 51km - 100km (data on delivery vans from 1997)

Source: Statistics Netherlands (CBS) publication data



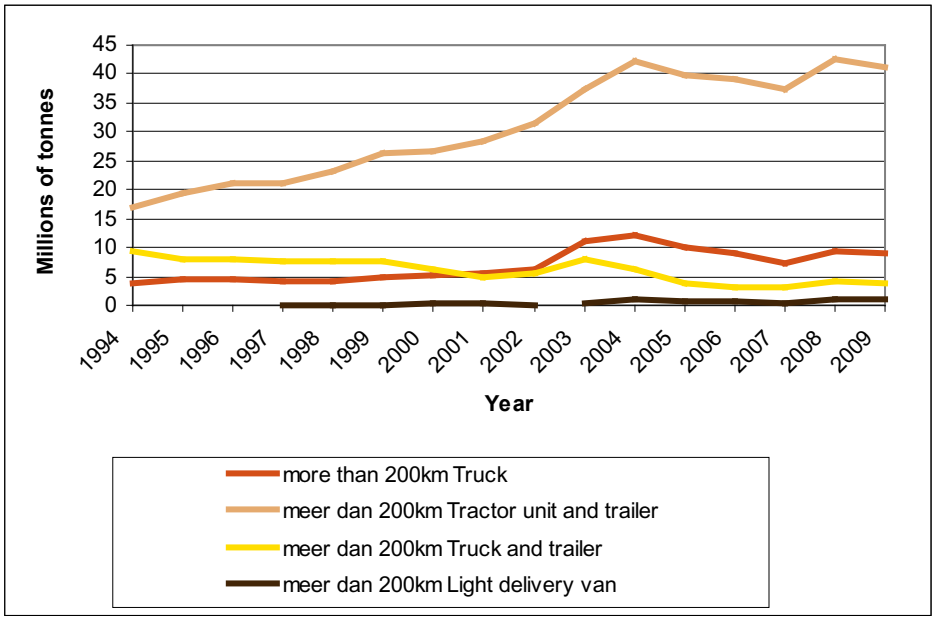
Appendix C.16 Tonnes transported per vehicle type in millions of tonnes for the distance class 100km - 150km (data on delivery vans from 1997)

Source: Statistics Netherlands (CBS) publication data



Appendix C.17 Tonnes transported per vehicle type in millions of tonnes for the distance class 151km - 200km (data on delivery vans from 1997)

Source: Statistics Netherlands (CBS) publication data



Appendix C.18 Tonnes transported per vehicle type in millions of tonnes for the distance class over 200km (data on delivery vans from 1997)

Source: Statistics Netherlands (CBS) publication data

	1998	2000	2002	2004	2005	2006	2007	2008	2009
Road transport (a) (b)	29.5	27.6	26.2	29.4	29.1	29.3	26.3	23.9	21.0
Inland shipping	23.1	21.8	22.5	22.1	22.2	22.1	22.1	21.8	18.0

Appendix C.19 Number of tonne-kilometres (x 1 million) bilateral transport to foreign territory by Dutch transporters per modality (1998-2009)

Source: Statistics Netherlands (CBS) publication data

(a) Assumption: average of 105 kilometres per journey on Dutch territory, see appendix A
(b) Between 2003 and 2004 a new measuring method was introduced, which caused a break in the trend. See appendix A

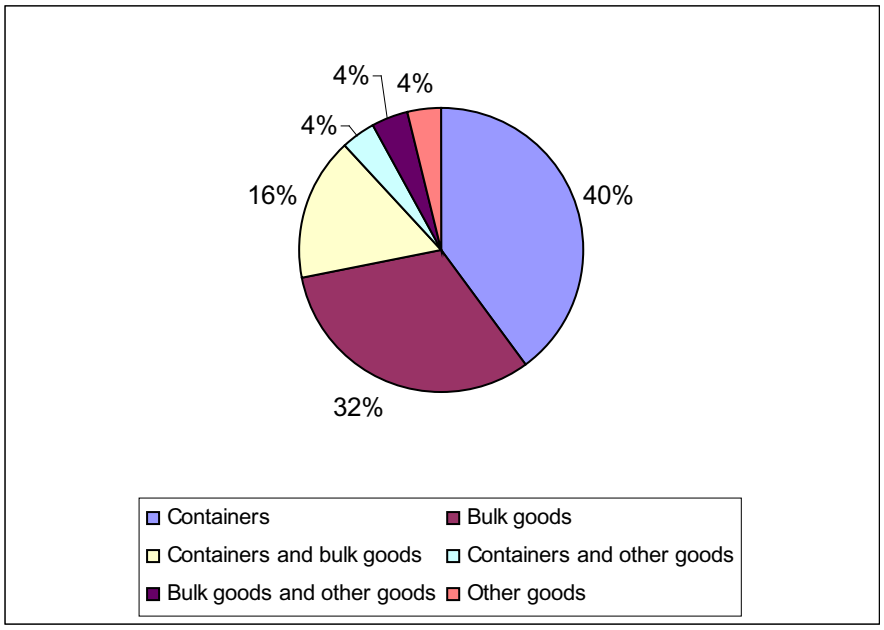
	1998	2000	2002	2004	2005	2006	2007	2008	2009
Road transport (b)									
Cabotage	1,468	1,691	1,805	2,933	2,788	2,275	2,147	2,661	2,357
Third-country transport	8,125	8,480	8,578	10,720	8,836	9,023	7,412	7,394	6,910
Inland shipping									
Transit without transhipment	6,967	7,858	6,659	7,618	7,464	7,025	8,506	7,999	6,500

Appendix C.20 Tonne-kilometres (x 1 million) abroad – interational transport in foreign territory by Dutch transporters per modality between 1998 and 2009 (a)

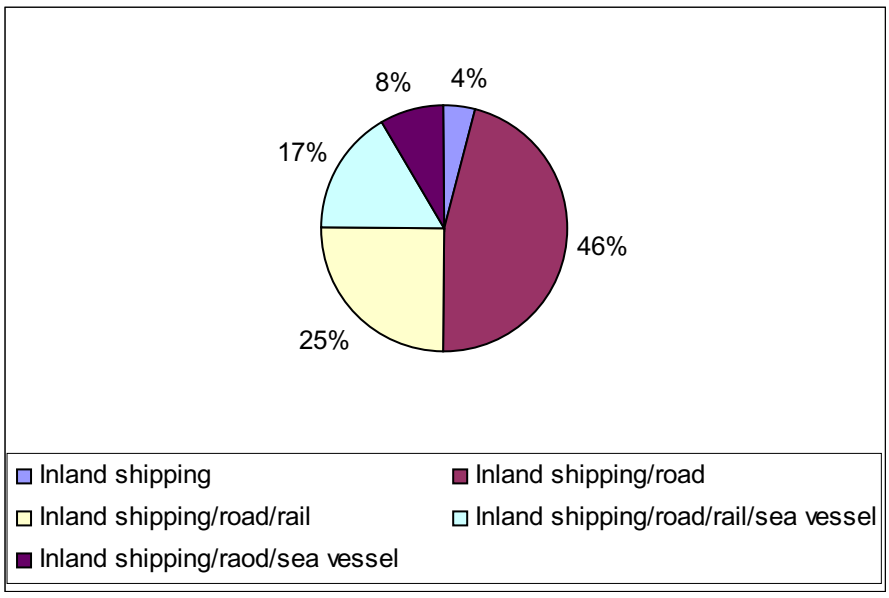
Source: Statistics Netherlands (CBS) publication data, CBS statline

(a) The table does not include all tonne-kilometres on foreign territory. In the case of road transport, transit without transhipment is missing, and in the case of inland shipping cabotage and third-country transport is missing.
(b) Between 2003 and 2004 a new measuring method was introduced, causing a break in the trend. For further information please see appendix A.

Bijlage D Market analysis



Appendix D.1 Type of transhipped goods



Appendix D.2 Method of access to the terminal

Bijlage E Review group

The review group consisted of the following parties:

- Binnenlandse Container Terminal Nederland (BCTN) - *(Netherlands Domestic Container Terminal)*
- Kennisplatform voor infrastructuur, verkeer, vervoer and openbare ruimte (CROW) - (*Knowledge platform for infrastructure, traffic, transport public areas)*
- EVO - *(Network Organisation for Logistics and Transport)*
- Inspectie Verkeer and Waterstaat (IVW) - *(Transport, Public Works and Water Management Inspectorate)*
- Korps Landelijke Politie Diensten (KLPD) - *(National Police Services Agency)*
- Koninklijk Nederlands Vervoer (KNV) - *(Royal Netherlands Transport)*
- Rijksdienst voor het Wegverkeer (RDW) - *(Government Road Transport Agency)*
- Stadsregio's in het kader van Verkeer and Vervoer (SKVV) - *(Urban regions within the framework of traffic and transport)*
- Stichting Wetenschappelijk onderzoek Verkeersveiligheid (SWOV) - *(Independent Scientific Institute for Traffic Safety)*
- Transport and Logistiek Nederland (TLN) - *(Netherlands Transport and Logistics)*
- Veilig Verkeer Nederland (VVN) - (*Dutch Traffic Safety Association)*
- Vereniging van Nederlandse Gemeenten (VNG) - *(Association of Dutch Municipalities)*

The following parties also partipated in the last review group consultation:

- Rail Cargo Information Netherlands
- ROC Vereniging Nederland - Dutch *Association for Regional Transport Centres*

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