LONGER AND HEAVIER GOODS VEHICLES (LHVs): A MULTIDISCIPLINARY APPROACH TO THE ISSUE IN BELGIUM

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ABSTRACT

The Council Directive 96/53/EC, amended by the Directive 2002/7/EC, limits the maximum authorised weights and dimensions in Member States of the European Union. In Belgium, freight vehicles or vehicle combinations may not exceed the maximum length of 16.5 metres (articulated vehicles) or 18.75 metres (road trains) for the transport of dividable goods. Neither they may exceed the maximal weight of 44 tonnes (≥ 5 axles).

It is still possible for Member States of the European Union to allow vehicles or vehicle combinations exceeding those maximum authorised limits for the transport of dividable goods during a trial, but only for national traffic. Nevertheless the allowed vehicles or vehicle combinations may not significantly affect international competition in the EU. Nowadays freight combinations exceeding the European maximum weight and/or length limits are only allowed in Sweden and Finland and are tested in the Netherlands and Germany.

A transport system allowing such freight combinations could be more sustainable, but therefore many relevant aspects should be considered. In Belgium, a workgroup, composed of different Belgian road administrations and some research institutes, has been established in order to collect objective scientific information about such freight combinations and their possible impacts taken into account the specific Belgian limiting conditions. The outputs of this workgroup can feed the debate about the desirability of such freight combinations at national but even at international level.

This paper describes the different relevant (sustainable) aspects as examined by the workgroup in Belgium: International experience with such freight combinations; principal environmental, economic, social, legal and fiscal aspects and the impacts of such freight combinations on infrastructure, mobility and road safety.

1. CONTEXT

The demand for both goods and passenger transport has strongly increased over the past few decades. So far, this growth has benefited mainly road transport rather than rail and inland waterway transport. Since the development of such a transport system has adverse effects (considerable land take, high energy consumption, emission of harmful substances, etc.), alternative innovative (partial) solutions are being sought. The need for these alternatives will become more urgent in future, as it is expected that transport – mainly goods transport – will continue to increase in Europe in the next years. Hence the importance of taking measures to better manage or even control the demand for transport, to improve modal

split and to optimize the use of existing infrastructures. One of the possible measures is to allow the use of longer and heavier vehicles (LHVs) in goods transport.
Late in 2005, a Belgian working group was formed with Belgian Road Research Centre (BRRC) in the chair and with representatives of the road administrations, the Federal Government Service for Mobility and Transport and a few research institutes:

- AED/BUV: administration of infrastructure and transport (of the Brussels Capital Region);
- MET: ministry of infrastructure and transport (of the Walloon Region);
- MOW: department of mobility and public works (of the Flemish Region);
- FGS for Mobility and Transport: the Federal Government Service for Mobility and Transport.
- ISBR/BIVV: Belgian Road Safety Institute;
- ITR/IWT: Belgian Road Transport Institute;
- BRRC: Belgian Road Research Centre.

The object was to conduct an objective investigation into the various aspects involved in LHV traffic. These are the main legal, economic, fiscal and social aspects, the interest of carriers in LHVs, and the impacts of LHVs on mobility, infrastructure, the environment and road safety. A technoscientific approach to LHVs underpinned by foreign experience and trends and by results from domestic simulations, surveys and analyses may, indeed, contribute to a more objective debate on LHVs in Belgium.

Many LHV combinations can be devised. Some of them will deviate from regular heavy goods vehicles (HGVs) only by either their length or their weight, whereas others will deviate both in length and in weight. The above-mentioned working group has considered LHVs as vehicles composed of several standard modules not exceeding 25.25 m in overall length and 60 t in total weight. These are the maximum values most commonly adopted in Europe. Starting from these, many configurations are possible with varying numbers of axles, distances between axles, and compositions of the LHV combination itself.

Several scenarios for LHV traffic can be imagined as well:

1. allowing LHVs on a limited number of roads (well-defined routes);
2. servicing the immediate hinterland of ports (within a radius of e.g. 50 km), using specific roads (national transport);
3. allowing LHVs on a general basis to circulate on a specified part of the road network and, subject to a special permit, on a limited number of routes, for national transport;
4. allowing LHVs on a general basis to circulate on a specified part of the road network and, subject to a special permit, on a limited number of routes, for all transport operations (both national and international);
5. allowing LHVs on a general basis to circulate on a suitable part of the road network, for national transport;
6. allowing LHVs on a general basis to circulate on a suitable part of the road network, for all transport operations (both national and international);
7. etc.

A prerequisite for optimum implementation of the LHV concept is that these HGV combinations are able to reach trip origins and destinations as much as possible. That is why it was assumed in this investigation that LHVs can also be used locally, albeit mainly for servicing industrial areas and ports.

2. EUROPEAN EXPERIENCE WITH LHVs

As a result of the European regulation in force (directive 2002/7/EC amending directive 96/53/EC, [1] and [2]), the modular concept is used in European countries that allow LHVs on their road networks. Working with standard modules makes it easy to uncouple HGV combinations. This enables carriers in those countries:

- to use longer HGV combinations where deemed possible;
- to use shorter HGV combinations by disconnecting a module where it appears to be necessary (e.g. in city areas difficult of access).

In many countries LHVs have been part of the street scene for years – also in Europe, viz. In Sweden and in Finland. However, these Scandinavian countries not only have a land use pattern that differs widely from ours, but have in addition taken account of the dimensions of LHV combinations in designing their road infrastructure. The situation in those countries is, therefore, hardly comparable with the conditions prevailing in Belgium. Nevertheless, the interest in LHVs is expanding to other member states of the European Union.

For example in the Netherlands, after the promising results of a first limited trial (2001-2003) and a second trial (2004-2006) a “follow-up stage” is now in progress, in preparation of an “experience stage” (a sequel to the second LHV trial in the Netherlands, in which specific comments arising from the evaluation of the preconditions set for the trial will be further addressed. The conditions for participation in the experience stage will be adjusted to the results of this evaluation.) In Germany, LHV trials haven been initiated recently – without permission from the national German authority – in a number of federal states (Lower Saxony, North Rhine-Westphalia, Baden-Württemberg, and Thuringia) and in the industrial area of Hannover.

LHV circulation in the Netherlands and Germany are more comparable with Belgium, because these countries are also strongly industrialized Western European countries with high population densities and much congestion on their major transport arteries. To be allowed to participate in the trials, carriers must obtain a special permit for goods transport with LHVs, which is delivered only if they meet extensive requirements for vehicles, freight, drivers, routes and/or driving conditions. The requirements vary widely from one country or region to another.

In Sweden and Finland and in the Dutch trials, LHVs are considered as HGV combinations with a maximum authorized overall length and gross weight of 25.25 m and 60 t, respectively. Only longer (and not heavier) combinations have been permitted so far in the trials in the German federal states. The maximum authorized length in these trials is 25.25 m as well (figure 1).

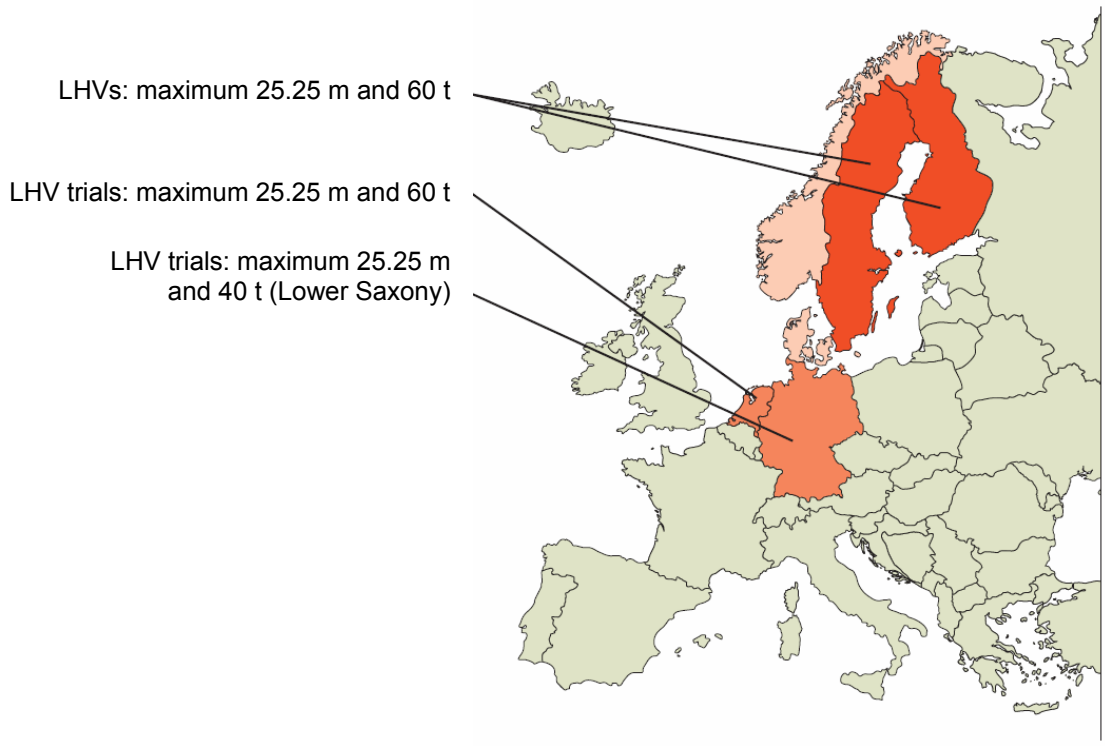


Figure 1 – Experience with LHVs in Europe, through trials or otherwise (source: BRRC)

In Norway, the circulation of LHVs is authorized on a few roads close the Swedish border, but these roads are limited in number and in length. Denmark has declared its intention to start a trial project in 2008, in which LHVs would be allowed on the Danish motorways and on the main transport arteries between the Danish ports.

3. LEGAL ASPECTS

Technical regulations in Belgium (royal decree of 15 March 1968, [3]) stipulate that vehicle combinations must not be heavier than 44 t and not be longer than 18.75 m (for road trains: lorries with a trailer) or 16.5 m (for articulated vehicles: motor vehicles with a semitrailer). In addition, an HGV combination must not be composed of more than two vehicles. Regardless of the type of vehicle considered, the technical requirements aim at ensuring the safety of both the driver of the vehicle and the other road users.

These Belgian regulations are in keeping with the current European directive 2002/7/EC of the European Parliament and of the Council amending Council Directive 96/53/EC laying down for certain road vehicles circulating within the Community the maximum authorized dimensions in national and international traffic and the maximum authorized weights in international traffic [1]).

This directive states that: “Member States may allow vehicles or vehicle combinations used for goods transport which carry out certain national transport operations that do not significantly affect international competition in the transport sector to circulate in their territory with dimensions deviating from those laid down.” It furthermore stipulates that: “Member States may allow vehicles or vehicle combinations incorporating new technologies or new concepts which cannot comply with one or more requirements of this Directive to carry out certain local transport operations for a trial period. Member States shall inform the Commission thereof.” LHVs are within the scope of this waiver.

As soon as a vehicle or a combination of vehicles exceeds the aforesaid maximum values in Belgium, it is ranked under the category of “abnormal transport”. However, abnormal transport is intended only for indivisible loads and is subject to strict conditions. In view of the negotiations that have been going on for months with federated entities to develop a specific regulatory framework (with special permits) for abnormal transport on account of its particular characteristics, it appears to be wise not to change the present status of abnormal transport at this stage.

Since LHVs exceed the maxima and carry other loads than those considered for abnormal transport, it is recommended to introduce a separate category for these vehicles into the current regulations, with specific technical requirements (royal decree of 15 March 1968, [3]) and traffic rules (royal decree of 1 December 1975, [4]). In addition, it is advisable to allow these vehicles on the road only after a special transport permit has been issued. This possibility and its consequences (management of applications, delivery of permits, operational consequences, etc.) will, of course, be regarded differently depending on whether they are part of a trial project or have entered daily practice.

The technical requirements made on these vehicle combinations are crucial for road safety. If LHVs are to be permitted – under whatever constraints – in the Belgian territory, a thorough examination of the requirements laid down in the current technical regulations for the various components of these HGV combinations will be absolutely necessary. Current technical requirements (royal decree of 15 March 1968, [3]) and traffic regulations (royal decree of 1 December 1975, [4]) may have to be revised.

4. MOBILITY AND ENVIRONMENTAL ASPECTS

With their higher load capacities (tables 1 and 2) possibly enabling carriers to reduce the number of kilometres to be travelled and the costs per freight unit, LHVs could contribute to more efficient transport operations.

Technical vehicle characteristics	Lorry + trailer (18.75 m / 44 t)	LHV (25.25 m/ 60 t)	Gain in load capacity (%)
Deck length (m)	15.65	21.4	+37
Payload (t)	29	40	+38
Load space (m^3)	112	156	+39
Load space (europallets)	38	53	+39

Table 1 – Load capacity of a LHV compared to that of a lorry with a trailer (source: TLN, Transport en Logistiek Nederland – edited by BRRC)

Technical vehicle characteristics	Motor vehicle + semitrailer (16.50 m / 44 t)	LHV (25.25 m / 60 t)	Gain in load capacity (%)
Deck length (m)	13.6	21.4	+57
Payload (t)	29	40	+38
Load space (m^3)	97	156	+61
Load space (europallets)	33	53	+61

Table 2 – Load capacity of an LHV compared to that of a motor vehicle with a semitrailer (source: TLN – edited by BRRC)

While making road transport more effective, LHVs could contribute to a cleaner environment through a possible reduction in the emission of harmful substances (including CO_2). Fuel consumption measurements in the second Dutch LHV trial indicated an average saving of 33 % per tonne-kilometre. Depending on the load carried, the release of harmful substances would decrease by 10 to 25 % (Dutch Ministry of Transport, Public Works and Water Management [5]). In this respect it is worth noting that the maximum authorized gross weight of regular HGVs in the Netherlands is 50 t, as apposed to 44 t in Belgium.

No observable change in noise annoyance is expected from the introduction of LHVs.

The decrease in congestion – and in the resulting emission of harmful substances – would probably remain limited at the national level, but could nevertheless be considerable in a number of corridors carrying high volumes of HGV traffic. The final balance of external costs (the costs of side effects entailing a loss for society, caused, but not borne by the individual producer) would be affected by several variables, but the most important would probably be a possible modal shift from rail and inland waterway to road transport.

It is worth mentioning that LHVs could be an interesting alternative for servicing the immediate hinterland of ports – especially the ports in Antwerp and Zeebrugge, which are hampered in their development by increasing congestion on their access roads. Raising the capacity of rail and inland waterway transport and improving the performance of these alternative modes will probably not be enough to meet the expected growth in demand, at least not in the near future. Road transport could make a contribution here, albeit under strict constraints and for well-defined applications.

In this respect, public authorities should be vigilant for possible competition of LHVs with multimodal alternatives. A modal shift from inland waterway and rail to road could annihilate the beneficial impacts on mobility and the environment, although the Dutch experience indicates that the shift would remain rather limited: domestic inland waterway transport would lose only 0.2 to 0.3 % of its volume if LHVs were permitted on a general basis in the Netherlands, and domestic rail transport 1.4 to 2.7 % (Dutch Ministry of Transport, Public Works and Water Management, [5]). However, the favourable conclusions of the Dutch on mobility and environmental impacts stand only for national use of LHVs. Should it be decided

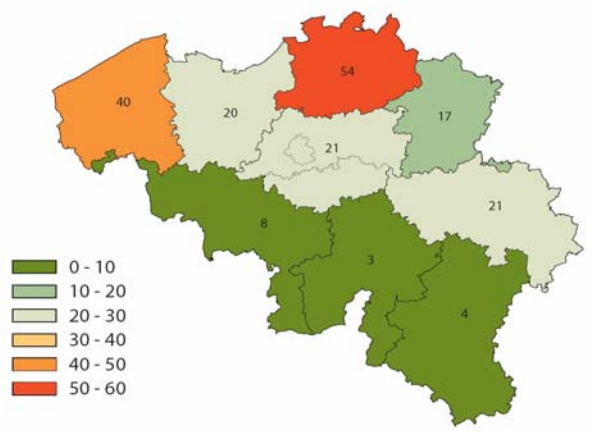
at the European level to allow such vehicles for international transport, the Dutch conclusions would probably be less favourable or at least have to be reconsidered.

Apart from that, the accessibility of destinations and road safety are decisive factors for the effectiveness of a possible introduction of LHVs in Belgium. Since LHVs involve a risk while providing an opportunity, the issue should be approached analytically and with an eye to the future. There is a need for a clear and well-based analysis at Belgian level.

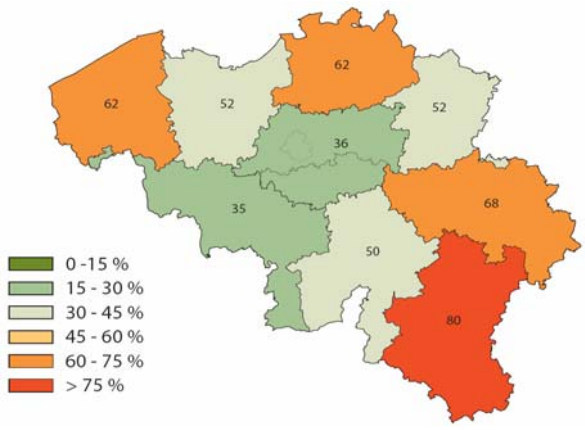
5. ECONOMIC ASPECTS

In 2006, a questionnaire was sent to all Belgian carriers transporting goods for hire with a fleet of at least six tractor units. Carriers transporting goods on own account were contacted as well, but the number of respondents in this group was too small to draw scientifically significant conclusions. The interest of Belgian carriers in LHVs was surveyed. 25 % of the contacted carriers transporting goods for hire replied (± 400 replies).

The interest in LHV combinations is clear: 53 % of the respondents consider that transport operations with LHVs would be feasible in their firms (figure 2). At the Belgian level, the interest of carriers in LHVs appears to be great in the provinces of West Flanders and Antwerp, where many transport and logistic enterprises are established (figure 2).



Legend:
Total: 207 (LHV is an alternative)
187 (LHV is no alternative)
Unknown place of business with interest in LHV: 17



Legend:
Total: 53 % (LHV is an alternative)
47 % (LHV is no alternative)
Unknown place of business with interest in LHV: 40 %

Figure 2 – Absolute and relative (Ratio between the number of respondents interested in LHVs and the total number of respondents) interest of carriers in LHVs, by place of business (source: BRRC)

The actual interest of carriers will eventually depend on the procedures prescribed and on the contraints placed upon the usage of LHVs.

Belgian carriers would like to use LHVs mainly to transport containers, cars and general commodities, and for transport operations at controlled temperatures (figure 3).

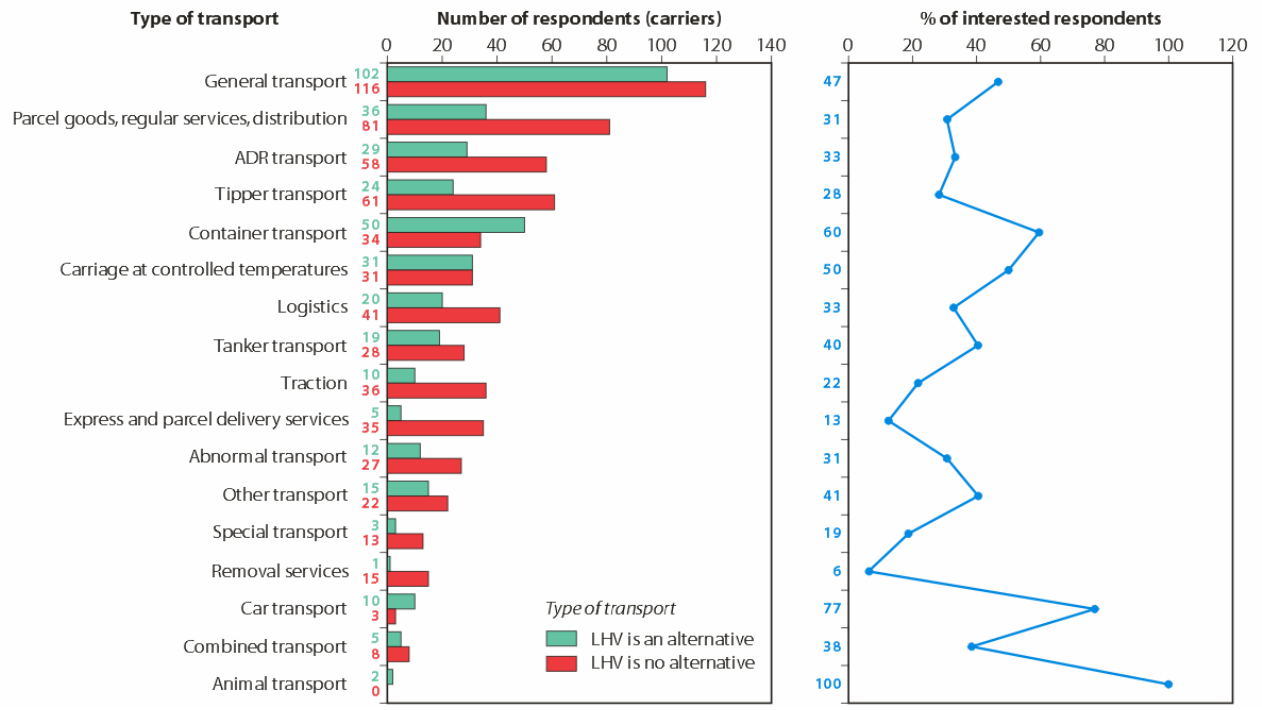
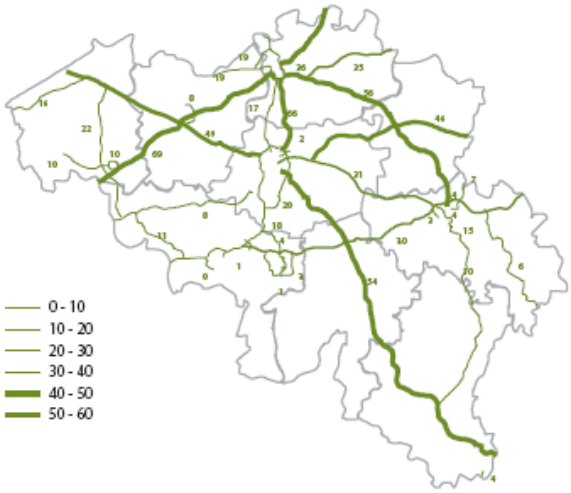


Figure 3 – Interest of carriers in LHVs, by type of transport (source: BRRC)

The interest is greater among carriers who provide international transport services. However, current European legislation allows the use of LHVs in member states only for national goods transport and during a trial period. The European Commission has recently discussed the need for a thorough investigation into this matter, but so far has not gone beyond recognizing the existence of the LHV trials in progress in a number of member states and the need to monitor their results.

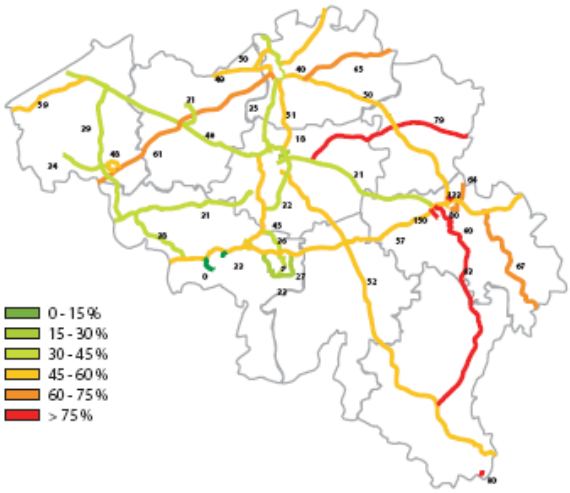
It also appears from the analysis of the replies that it is hard to differentiate levels of interest in LHVs by type of goods to be carried (NST/R classification).

Furthermore, it is striking that the transport arteries important for current activities would most often remain important for LHV transport operations. Carriers are very interested in routes to and from Antwerp (figure 4).



Legend:

Total: 286 valid replies
157 (55 %): LHV is an alternative



Legend:

Total: 286 valid replies
157 (55 %): LHV is an alternative

Figure 4 – Transport arteries considered by the respondents (carriers on own account operating a fleet of at least six tractor units) as most important in absolute and relative (Ratio between the number of respondents who consider this transport artery as important for LHV transport and the number of respondents who consider the same artery as important for current transport operations) terms for LHV transport (source: BRRC)

The lack of interest among the uninterested respondents can be explained mainly by infrastructural and enterprise-specific features.

The benefits in using LHVs derive mainly from savings on the numbers of kilometres travelled, since the per-kilometre operating cost of LHVs is higher as a result of their purchase price and fuel consumption. In the present state of knowledge it is impossible to quantify the possible benefits. Only an LHV trial can be conclusive in this respect. The trial period must be long enough and sufficient goods transport kilometres must be saved before an LHV can become cost-effective to a carrier.

Constraints (requirements) limiting the usage of LHVs will determine the actual interest of carriers. On the one hand, such constraints may increase the cost of LHV transport and may also result in transport volumes dropping below the minimum required for a carrier to organize LHV operations in an optimum (and profitable) way. On the other, these constraints to be placed remain necessary to provide for the unknown effects of LHVs among other things on road safety.

6. INFRASTRUCTURE

Another fundamental aspect investigated are the impacts of LHVs on road infrastructure, more particularly on road pavements, road geometry (roundabouts and crossroads), and engineering structures (bridges). The conclusions apply to the following four LHV combinations, which were tested in comparison with regular HGVs (figure 5):

- MST_{33}: motor vehicle (three axles) – semitrailer (three axles) – trailer (two axles);
- MST_{23}: motor vehicle (two axles) – semitrailer (three axles) – trailer (two axles);
- LDS: lorry (three axles) – dolly (two axles) – semitrailer (three axles);
- LTT: lorry (three axles) with two trailers (two axles each).

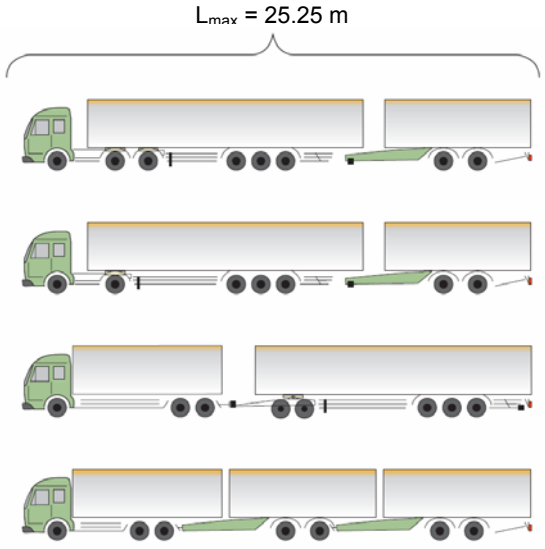


Figure 5 – LZV configurations considered in the analysis of impacts on road infrastructure (source: BRRC)

6.1 Manoeuvrability of LHVs

From an analysis of manoeuvres with the tested LHV combinations as simulated with the TRAC© software programme it appears that LHVs hardly behave differently from regular HGVs on grade-separated interchanges and on entry and exit slip roads of motorways. However, manoeuvrability problems may occur on lower-category access roads, where certain parts of the infrastructure, especially roundabouts and crossroads, may not meet the relevant requirements. That is why each potential LHV route should be thoroughly surveyed to assess whether the road infrastructure is suitable for LHVs.

Figure 6 illustrates the simulation of a circular movement of an MST_{33} combination with TRAC©. The radius of the inner circle of the path followed by this combination in describing a circle with an outer radius of 12.5 m proves to be too small. The test run with the outermost forward point moving along a circle 12.5 m in radius is a procedure included in both the European directive 96/53/EC [2] and the Belgian technical regulations (royal decree of 15 March 1968, article 32 bis 3.3 [3]) . The radius of the inner circle must not be smaller than 5.30 m. None of the LHV combinations tested (MST, LDS and LTT) meets this requirement.

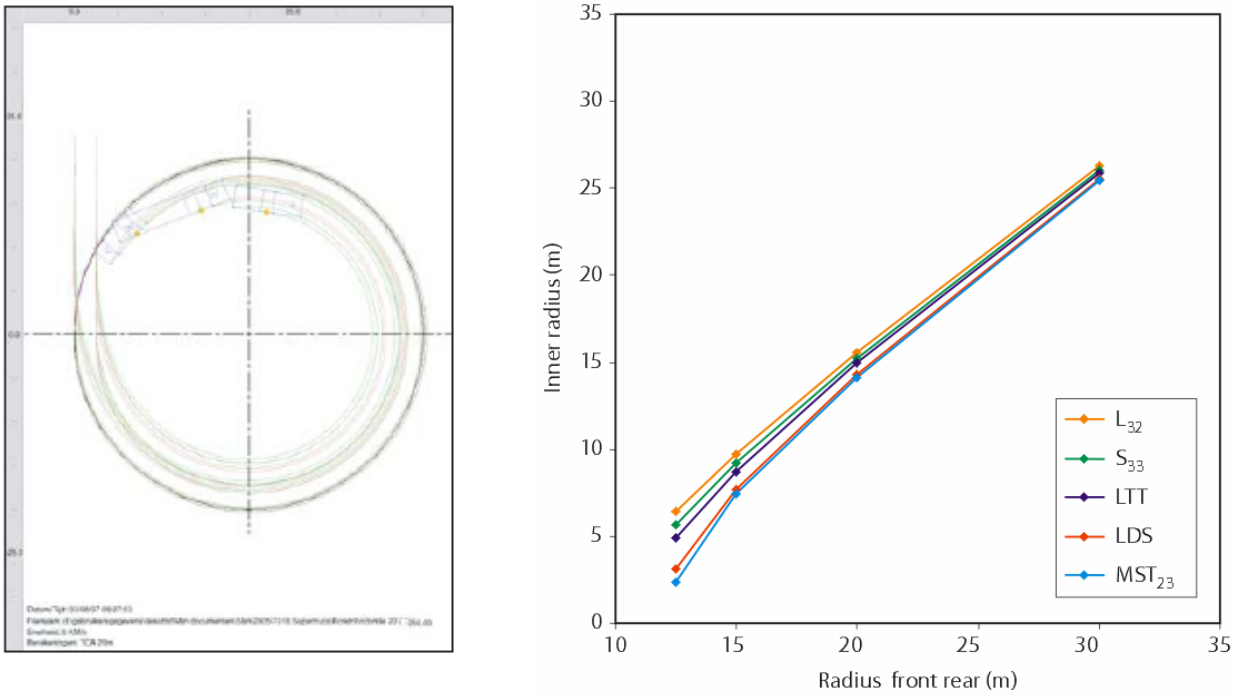


Figure 6 – Manoeuvrability test of an MST combination and summary of results for the circular movement for different tested LHVs (source: MOW, Traffic Engineering Department)

As a general rule, LHVs make the following demands on infrastructure:

- bends: radii not smaller than 15 m;
- roundabouts: at least 18 m (preferably 20 m) for a straight-through movement and at least 20 m (preferably 22 m) for a three-quarter movement.

These values are only rules of thumb for checking infrastructure. Other parameters play an important part in vehicle movements, such as widths of turning lanes, radii of curvature at roundabout entries and exits, and travelled way widths on roundabouts.

6.2. Effects on road pavements

An LHV is generally less “aggressive” towards road pavements than an HGV of type S_{23} (semitrailer with three axles, towed by a motor vehicle with two axles), i.e., the vehicle combination most commonly used for carrying goods by road (table 3). The “aggressivity” of vehicles is a determining factor for the construction and maintenance costs of road infrastructure.

The aggressivity of road traffic is evaluated from the equation:

$$K = \overline{n} \cdot \alpha \cdot \sum_i f_i \times \left(\frac{P_i}{P} \right)^{\gamma}$$

where fi = number of occurrences of load P_i in the spectrum of loads;

$\overline{n}$ = number of axles per goods vehicle;

α = 0.143 for flexible pavements;

α = 1 for other road pavements.

	Relative aggressivity (in comparison with an S_{23})			
	LDS	**MST_{23}**	**MST_{33}**	**LTT**
Flexible pavement	0.96	1.24	0.79	1.26
Semirigid pavement	0.09	1.00	0.0003	0.09
Rigid pavement	0.49	1.02	0.06	0.59

Table 3 – Relative aggressivity of LHVs in comparison with an S_{23} combination (source: BRRC)

LHVs are more "road-friendly" in all cases when considering that two LHVs carry the same amount of goods as three regular HGVs (of type S_{23}). The aggressivity of an HGV also appears to depend strongly on the type of road pavement.

6.3. Effects on bridges

The computer programme ROUTING© (developed with Map Info© MapBasic) of the Belgian FGS for Mobility and Transport was used to verify whether the four LHV types tested (LDS, LTT, MST_{23} and MST_{33}) complied with the requirements for the stability of existing bridges, i.e., if the forces they induced in bridge structures remained smaller than those allowed in the design standard for bridges under conventional traffic loading.

In most cases, the forces appeared to remain within the limits set in NBN 5 of 1969 (4th edition – ref. 6), the standard to which most existing Belgian bridges were built. It may, therefore, be concluded that such vehicle combinations can be permitted on bridges, provided that for bridges or components of bridges with short span lengths (< 12 to 16 m) they meet the requirements laid down in the technical regulations of 1968, royal decree of 15 March 1968 [3], as amended in 1985.

For MST_{33}s and MST_{23}s there may be a problem on bridges or bridge components with a span length of about 21 m. To enable these vehicle combinations to pass at normal speed, the bridge structure must:

- either not belong to a type for which this sort of loading has to be considered in the design process (e.g. cantilever bridges with long cantilevers or viaducts with wide bridge deck slabs).
- either have been designed for a convoy of 60 t by standard NBN 5 of 1952.

If neither of both requirements is met, a speed limit has to be imposed on these two types of LHV. No such problems were found with LDS's and LTTs.

If the speed of MST_{33}s and MST_{23}s were limited, design by standard NBN 5 of 1969 [6, 4th edition] would do for the bridge structure, but reducing commercial speed is no option when introducing LHVs. Moreover, such a limitation would be hard to enforce for example on motorways.

The foregoing means, among other things, that LHVs do not have to be relegated systematically to routes for abnormal transport.
In conclusion, the selection of suitable routes for LHVs requires a good knowledge of the road infrastructure (construction standards, structural design, condition, all sorts of factors relating to road safety, etc.) By conducting audits it is possible to assess which routes are suitable and what restrictions will have to be imposed and infrastructural adaptations made before authorizing LHVs in Belgium. LHV routes must in any case be approved by the various road-managing authorities.

7. ROAD SAFETY

Data is lacking at this stage to permit a scientific assessment of the impact of LHVs on road safety in Belgium. We can only refer to a few trial projects abroad. The potential effects of allowing LHVs on the various road safety factors in Belgium are hard to express in figures.

Findings from the second LHV test (2004-2006) in the Netherlands by the Dutch Ministry of Transport, Public Works and Water Management [5] are as follows:

- for objective road safety: under the conditions adopted in the trial, there is no reason to assume that an LHV has a higher safety risk than a regular HGV combination. Since LHVs reduce the number of vehicles and the number of kilometres travelled, traffic safety can be expected to remain equal or even to improve. The expected decrease in fatal accidents is 4 to 7 a year, while the decrease in injury accidents would be in the range of 13 to 25. Experience in the Netherlands suggests that the potential number of LHVs would range from 6,000 to 12,000, which means that 7 to 31 % of the regular HGV trips with a load capacity of over 20 t could be replaced by LHV trips;
- for subjective road safety: motorists report little difference in safety perception between an LHV and a regular HGV combination.

These findings are, however, premature. The calculations are based on a short trial period (data in the second trial were collected till 1 December 2005) with a limited number of LHVs (66 transport enterprises with about one hundred LHV units).

Nevertheless, the Dutch experience and the first Belgian estimates indicate that, with the proviso that strict safety conditions are imposed, LHVs would not compromise road safety and could even slightly improve it. The effect on balance is difficult to evaluate and depends partly on chance and on future developments. That is why this partial analysis still needs to be complemented by a thorough analysis of technical points of interest such as blind sector and braking system; manoeuvrability on roundabouts, on entry and exit slip roads and in changing lanes; rear-end collisions; improper distribution or loss of cargo, etc.

In view of the present uncertainty, any trials undertaken should be conducted under strict safety conditions imposed by public authorities. We emphasize that these safety conditions are closely related to the constraints to be placed when allowing LHVs to participate in traffic, with various conceivable scenarios. LHVs seem to be out of place – in principle – in built-up areas. Safety audits can reveal whether suggested LHV routes would be acceptable from the road safety point of view.

With this in mind, the full report gives recommendations for strict (safety) conditions under which LHVs could be allowed to circulate. These conditions relate to infrastructure; driving conditions; the selection, (special) training and in-service training of drivers; and the technical requirements for vehicles. Additionally, like for any subject connected with road safety, communication with the other road users is of paramount importance. An extensive multimedia campaign should be set up to inform the other users and to familiarize them with the phenomenon.

If an LHV trial is opted for in Belgium, it should be conducted for a number of years and under strict constraints. After a thorough evaluation of this trial, the competent authorities would be able to make a final decision on authorizing LHVs or not and, where possible or necessary, on the conditions for this authorization (adjustment of the constraints and of road safety audits).

8. FISCAL AND SOCIAL ASPECTS

Adjustments to fiscal regimes would probably be desirable as well. For example, it should be investigated how the current rates in vehicle tax can be adapted for vehicles or vehicle combinations with a gross weight between 45 and 60 t. This is perfectly possible from a regulatory point of view, as the European directive 93/89/EC [7] on which the Belgian legislation is based does not set maximum rates for this vehicle tax.

On the other hand, charging for the use of certain infrastructures (the eurovignette) in Belgium is based on European directive 1999/62/EC [8], which sets maximum rates according to the number of axles and the eurostandard applicable to the engine of the vehicle. The maximum rates permitted in the current directive are already in force in Belgium, leaving no margin for further action. This margin will not increase in the near future, even if the recent European directive 2006/38/EC [9], which is to be converted into national law by 10 June 2008, raises the maximum charge rates. Belgium will adopt the maximum rates laid down in the European legislation.

Changes would also be necessary in the social sphere. More particularly, the training of LHV drivers should be expressly tailored to the specific features of driving these vehicle combinations. A harmonized European framework would be desirable, since the training schemes and experience requirements for LHV drivers vary very widely with the country in which LHVs are circulating. In Finland LHV driving is included in the basic training package, whereas in the Netherlands specific training is provided for LHV drivers. In view of the declaration recently made by the European Commission and already referred to in this paper, no harmonization in this field is to be reasonably expected in the short or medium term.

The transport industry is urging for further flexibilization of the sector, to avoid (daytime) congestion problems. LHVs could play a part in the further flexibilization of professional goods transport (LHVs for carrying goods at night). Of course, many factors (such as safety, the health of personnel, etc.) must be considered in this debate and the various parties involved need to consult with each other. The transport sector has difficulty in finding skilled

and motivated personnel. Especially jobs for category CE drivers remain vacant. Operators of LHV combinations will be well-advised to look (in the first resort) for experienced professional drivers whose license has not been withdrawn for a number of years.

9. BALANCE AND PROSPECTS

In view of the contrasted picture presented above and the lack of data on fundamental aspects such as road safety, mobility and the environment, it would be premature to pass a final judgment on LHVs at this stage.

A trial conducted under strict constraints would enable us to collect more information, to gain a better understanding of the issue. But it would certainly not yield the answers to all the questions raised in this paper and in the full report.Such a trial may be expected to afford a clearer insight into the possible savings for carriers, which would, of course, depend on the constraints. It should also make it easier to draw conclusions on the advantages and disadvantages for traffic in general. If the trial is representative and can be extrapolated, it should even become possible to make a well-founded assessment of road safety impacts under the conditions imposed. On the other hand, long-term impacts on mobility and the environment are more difficult to predict from a trial, as the introduction of LHV may cause a modal shift. Further investigations could, however, clarify a number of fundamental points.

With these reservations, and in spite of its intrinsic limitations, a trial appears to be the best way – to be travelled with the necessary caution and circumspection – to get hold of the necessary data for making a decision in the light of durable mobility.

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