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# LONGER AND HEAVIER ON GERMAN ROADS

## Do Megatrucks Contribute Towards Sustainable Transport?

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**Pressesprecher:** Martin Ittershagen  
**Mitarbeiter/innen:** Anke Döpke, Dieter Leutert,  
Fotini Mavromati, Theresa Pfeifer  
**Adresse:** Postfach 1406, 06813 Dessau  
**Telefon:** 0340/21 03-2122, -2827, -2250, -2318, -3927  
**E-Mail:** [pressestelle@uba.de](mailto:pressestelle@uba.de)  
**Internet:** [www.umweltbundesamt.de](http://www.umweltbundesamt.de)



## Longer and heavier on German roads: Do megatrucks contribute towards sustainable transport?

**They are a familiar sight on roads in Sweden and Finland. The Dutch are testing them, and on just a few routes in Germany they are also being tested. We are talking about so-called megatrucks. With a maximum length of 25.25 metres and a permissible maximum loaded weight of 60 tonnes these are noticeably larger than standard 40-tonners, whose maximum length is restricted to 18.75 metres.**

Hauliers are presently testing operation of longer and heavier truck-trailer combinations in Germany. Some *Länder* - for example, Baden-Württemberg, Bremen, Lower Saxony and Saxony-Anhalt - have issued exemptions for the trial operation of megatrucks on clearly defined routes. In Bremen, special coffee transporters of the 60-tonne class have been on the road since mid 2005 between the inland port and a major coffee roaster. Permits in Lower Saxony are restricted to three routes and expire in the summer of 2007. During this time, experience should be gained with this new and - on German roads - unusual type of truck. Early results are already available. In the meantime, logistics companies are thinking ahead: they want to start a field trial in the medium term throughout the country with a large fleet of megatrucks.

What are the implications for sustainable transport development of the introduction of longer and heavier vehicles (LHVs), which are up to 6.5 metres longer than standard heavy-duty vehicles (HDVs)? The Federal Environment Agency (UBA) addresses below a number of important questions concerning megatrucks from the environmental protection point of view:

What effect do they have on fuel consumption as well as on emissions of air pollutants and traffic noise?

What effects does their introduction have on other carriers?

Do megatrucks reduce the demand for roadspace and the risk of traffic congestion?

Is road infrastructure suitable for these longer and heavier vehicles?

Answers to these questions are then summarized in the conclusion.

## Environmental impact of megatrucks

### Effects on fuel consumption

**Megatrucks do not necessarily consume less fuel per load-tonne than standard HDVs. Fuel savings could arise, however, were their loading-capacity utilization to be markedly better than that of standard HDVs.**

Compared to a standard 40-tonner a megatruck consumes more fuel. The reason for this is that its deadweight is greater, due to its additional trailer, and it also has an additional two axles and

four wheels. On the other hand, it can carry an almost 50 per cent greater load, so that specific consumption - related to volume - falls. One measure of volume capacity is pallet-stacking space. While a standard 40-tonner can carry up to 34 pallets, a longer and heavier truck-trailer combination holds up to 52 pallets. Fuel consumption per pallet thus drops by up to 25 per cent.<sup>a</sup> These fuel savings assume, however, that the loading capacity of the megatruck is well utilized. Where less than 40 pallets are loaded, specific consumption is even higher than with standard HDVs.

Megatrucks are particularly suitable for high-volume goods and wide roads. Their use would therefore concentrate on the transport of particular goods on specific routes, for which above-average capacity utilization is to be expected. This is certainly the case with current trial operations, which are restricted to particularly suitable routes and goods. It is doubtful, however, whether this would be guaranteed in the case of general authorization of such vehicles. Around 40 pallets per haul are necessary for cost-covering operation of a megatruck, which is equivalent to capacity utilization of almost 77 per cent. As long as actual utilization is not clearly above this level, average fuel consumption per truck-load would not be appreciably reduced. Average truck-transport utilization currently amounts to around 64 per cent of carrying capacity.<sup>b</sup> The contribution of megatrucks to the more fuel-efficient transport of goods by road would therefore be insignificant.

## Effects on pollutant emissions and road traffic noise

### **Megatrucks make no contribution to the reduction of pollutant emissions with freight transport. Road traffic noise can also not be reduced with megatrucks.**

As in the case of fuel consumption, megatrucks have lower specific emissions of air pollutants per unit of freight than standard HDVs only when their capacity utilization is very high, and compared to rail transport they still emit considerably more. Standard trucks - even with the more demanding exhaust gas limits of the Euro 5 Standard - emit more than three times as much climatically harmful carbon dioxide (CO<sub>2</sub>) and about 2.9 times as much nitrogen oxide (NO<sub>x</sub>) per unit of freight as an average freight train<sup>c</sup>. In the case of diesel soot particles, which are particularly problematic for densely populated areas, road transport gives rise to double the level of emissions. Even with full volume utilization the pollutant balance of rail-freight transport per unit of freight is still considerable better.

A megatruck is much louder on the road than standard HDVs due to its larger number of axles and greater motorization. Related to the quantity of goods transported, the noise balance is heavily dependent on the capacity utilization of the vehicles. Were megatrucks to be operated with a capacity utilization similar to that of standard HDVs they would make no contribution towards reducing road traffic noise.

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<sup>a</sup> Computation of the Federal Environment Agency.

<sup>b</sup> According to information from the *Kraftfahrt-Bundesamt* KBA (Federal Motor Transport Authority), average carrying-capacity utilization of road transport in Germany in 2005 amounted to 63.8 per cent (statistical information of the KBA and BAG (Federal Freight Transport Office) Series 8, December 2005).

<sup>c</sup> Comparison based on TREMOD data of the Federal Environment Agency.

## Effects of megatrucks on other transport carriers

**The introduction of megatrucks would have the effect that a lot of freight would no longer be transported by rail or inland waterway, but rather by road. A large proportion of so-called combined transport would be wholly shifted to the road.**

Due to the greater payload opportunity, haulage companies could cut their costs per load-tonne. Authorization of longer and heavier truck-trailer combinations would therefore affect the competitive situation between road, rail and inland waterway transport. The competitive advantage of rail networks and inland waterways with regard to goods with a relatively low value per tonne (for example, building materials) and point-to-point transport would shrink. A proportion of freight previously consigned most economically by freight train or inland navigation vessel would be shifted to the road.

Rail currently enjoys an advantage over road transport with regard to high-volume freight, due to new high-capacity wagons. With a load volume in excess of 140 cubic metres and a maximum payload of 27 tonnes, a rail wagon is clearly superior to standard truck-trailer combinations with their maximum 105 cubic metres and 26 tonne payload.<sup>d</sup> These truck-trailer combinations that weigh up to 40 tonnes and are 18.75 metres long are mostly used for the transport of voluminous goods. Megatrucks, with their volume of over 150 cubic metres and a payload of up to 40 tonnes - with a total weight of up to 60 tonnes - are much larger than standard truck-trailer combinations. As a result they fare better in direct comparison with high-capacity rail wagons, which, incidentally, are themselves a response to standard truck-trailer combinations on the road.

The following example illustrates the possible consequences. The logistics department of a large manufacturer of household appliances relies on rail freight for the transport of large appliances such as washing machines and refrigerators. With older wagons, 160 standard units can be transported, with standard truck-trailer combinations, however, 180 units. With high-capacity wagons rail operators are able to load 253 units. Megatrucks would enable haulage companies to surpass high-capacity rail wagons with up to 279 units.<sup>e</sup>

Besides large household appliances rail transport by new high-capacity wagons mainly concerns subcontracted products for the automobile industry as well as for consumer goods, food and pharmaceutical industries.<sup>f</sup> In recent years there has been an overall increase in freight transport by rail in Germany. It is to be expected that this trend will end, however, with the introduction of megatrucks, above all as a direct competitor for depot-to-depot transport by rail. The result would be the shifting of a great deal of high-volume freight from rail to road.

Megatrucks could reduce the transport costs per load-tonne by 20 to 25 per cent compared to standard HDVs.<sup>g</sup> The increased volume of these trucks could reduce the need for vehicles: Two megatrucks would then be required to transport the load of three standard 40-tonners. This would involve less personnel and operating costs and would force down freight charges. Many years of market observation show that a fall of 1 per cent in road-freight transport results in a 1.8 per cent decline in demand for rail freight transport and a 0.8 per cent reduction for inland navi-

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<sup>d</sup> [www.stinnes-freight-logistics.de](http://www.stinnes-freight-logistics.de), [www.krone.de](http://www.krone.de), Internationales Verkehrswesen 11/2005.

<sup>e</sup> Deine Bahn 8/2000, Cargo Aktuell 2/2002, Heidenheimer Zeitung April 2000, BDI: Das innovative Nutzfahrzeugkonzept, Juli 2005.

<sup>f</sup> Ibid.

<sup>g</sup> Internationales Verkehrswesen 11/2005 and computations by the Federal Environment Agency

gation.<sup>h</sup> Were freight charges for road transport with megatrucks to fall by 20 per cent, rail would stand to lose up to 38 per cent in relevant market segments and inland navigation up to 16 per cent of its freight transport. A report on the Netherlands calculated that the introduction of megatrucks would result in a decline in rail-freight transport of up to 5 per cent.<sup>i</sup> A report on Germany prepared for the Kombiverkehr logistics company concluded that the authorization of longer and heavier vehicles would markedly reduce intermodal transport - that is the combined transport of standardized units by several carriers (as a rule, rail and road). Up to 55 per cent of present-day intermodal transport would be wholly shifted to the road. As far as seaport hinterland transport with containers is concerned, experts expect that 44 per cent of national and 17 per cent of international rail transport would be shifted to the road.<sup>j</sup>

## Do megatrucks reduce the demand for roadspace?

**Megatrucks would not contribute to decongestion of roads. Due to expected modal shift effects from rail to road, road-freight transport would be likely to require more road-space.**

Current traffic forecasts, based on the period from 2004 to 2010, assume that without effective countermeasures road freight transport could increase by a quarter - from 392 billion tonne-kilometres per year at present to 488 billion.<sup>k</sup> More trucks mean greater traffic density, more congestion and an increased risk of accidents. Were the volume of freight transport to be distributed over fewer vehicles, this could ease bottlenecks on roads. Theoretically, with optimum capacity utilization two megatrucks could replace three standard 40-tonners. With a minimum safety distance of 50 metres this would thus reduce the need for roadspace by 44 per cent.<sup>l</sup> As a result, it is hoped that the authorization of megatrucks could reduce vehicle density on roads and improve traffic flow.

Unfortunately, this hope is deceptive. It does not take into account that, due to reduced transport costs, much more freight transport would be shifted from rail and inland navigation to the road. As a result, following the introduction of megatrucks not fewer but rather more vehicles would be on the road. Even with much higher vehicle capacity utilization it could happen that three standard HDVs would be replaced by three megatrucks. This would result in a greater need for road-space as well as rest and service areas, where parking capacity would be reduced by around 20 per cent with the introduction of 25-metre-long trucks.<sup>m</sup>

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<sup>h</sup> CE Delft: Inzet van langere en/of zwaardere vrachtautos in het intermodaal vervoer in Nederland, 2000.

<sup>i</sup> TIM CONSULT: Wettbewerbswirkungen der Einführung des Gigaliners auf den Kombinierten Verkehr. Präsentation anlässlich einer Pressekonferenz, Frankfurt, 05. September 2006.

<sup>j</sup> Kombiverkehr, UIRR: Wettbewerbsbedingungen des Gigaliners auf den Kombinierten Verkehr, Pressekonferenz, Frankfurt, 05. September 2006.

<sup>k</sup> BVU/DLR/ISL: Gleitende Mittelfristprognose für den Güter- und Personenverkehr - Mittelfristprognose Winter 2006/2007 on behalf of the Federal Ministry for Transport, Building and Urban Affairs, January 2007.

<sup>l</sup> Computation by the Federal Environment Agency

<sup>m</sup> Bundesanstalt für Straßenwesen (BASt): Auswirkungen von neuen Fahrzeugkonzepten auf die Infrastruktur des Bundesfernstraßennetzes, study commissioned by the Federal Ministry for Transport, Building and Urban Affairs, Bergisch Gladbach, December 2006.

## Is road infrastructure suitable for megatrucks?

**Increased use of megatrucks will have an adverse effect on the useful life of bridges and on road safety. In towns and cities, as well as on some major roads and the minor road network, operation of longer and heavier truck-trailer combinations is out of the question.**

A study commissioned by the Federal Transport Ministry and prepared by the Federal Highway Research Institute (BAST) came to the conclusion that megatrucks would, in particular, have a much greater impact on bridges and traffic infrastructure on the motorway network, with an adverse effect on their useful life and maintenance. Due to their greater weight, accidents involving megatrucks would have much more serious consequences than collisions with standard truck-trailers. Megatrucks therefore make much higher demands on safety facilities on motorways and, above all, in tunnels. Existing road safety systems are not designed for longer and heavier truck-trailer combinations. Certain traffic infrastructure - for example, small roundabouts - pose a major problem for megatrucks. The BAST study comes to the conclusion that the use of longer and heavier vehicles in towns and cities, minor roads and on many major roads is out of the question.<sup>n</sup>

## Conclusion: Megatrucks make no contribution to sustainable transport development

**On the whole, megatrucks do not contribute towards sustainable development of freight transport. Their use relieves neither the environment nor road infrastructure. On the contrary, additional risks to road safety have to be expected as well as the environmentally unfavourable shifting of freight transport to the road.**

Were the capacity utilization of megatrucks to be less than 80 per cent, the result would be an even greater impact on the environment from exhaust gas emissions than before. Rail's existing competitive advantages with regard to certain freight transport would diminish. Special offers for the transport of voluminous goods by rail have existed for some considerable time. The introduction of megatrucks would result in more vigorous competition and lead to a shift back to road transport with longer and heavier vehicles to the detriment of the environment. This would offset possible volume-related advantages of longer and heavier vehicles compared to standard HDVs.

The Federal Environment Agency therefore recommends that better use be made of existing opportunities in freight transport by road and rail, and that further efforts be made to improve capacity utilization of standard HDVs. It is up to hauliers and shippers to better implement existing concepts, for example concerning route planning and the avoidance of empty runs.

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<sup>n</sup> ibid.