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Strategy for Sustainable Freight Transport

Summary

by

Christoph Erdmenger
Martin Lambrecht
Michael Bölke
Anna Brinkmann
Kilian Frey
Andrea Kolodziej
Dorothea Salz
Hedwig Verron

Umweltbundesamt (German Federal Environment Agency)

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P.O.B. 14 06
06813 Dessau-Roßlau
Germany
Phone: +49-340-2103-0
Fax: +49-340-2103 2285
Email: info@umweltbundesamt.de
Internet: http://www.umweltbundesamt.de

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Martin Lambrecht, Christoph Erdmenger

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Developments in freight transport in Germany

Developments between 1960 and 2005

Freight transport performance in Germany has grown fourfold since 1960. The term transport performance – measured in tonne kilometres or passenger kilometres – describes the product of transported freight in tonnes or the number of passengers and the distance covered in kilometres.

Growth accelerated markedly in the 1990s and continued in the new millennium (see Figure 1).

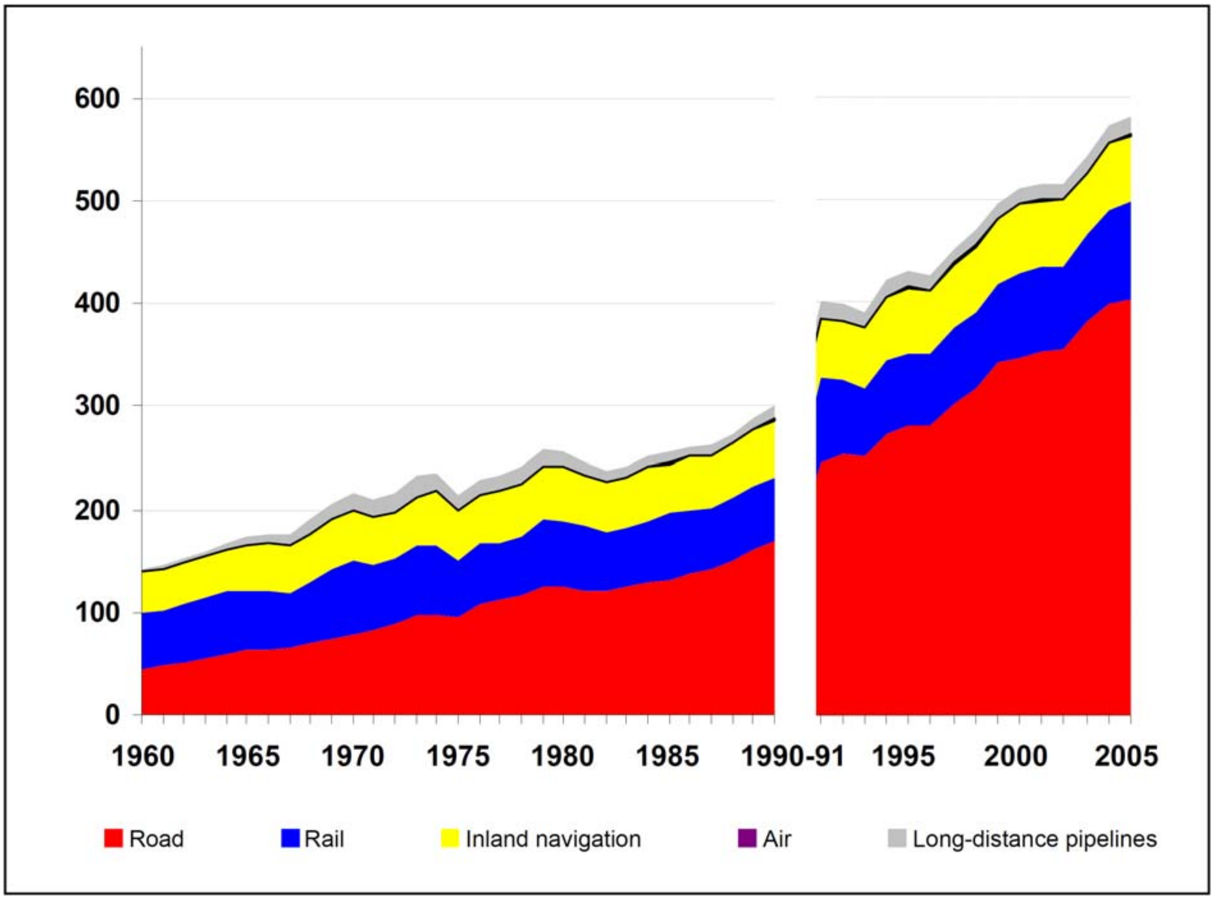

Figure 1: **Development of freight transport performance in billion tonne kilometres, in Germany, 1960-2005**[1] **(up to 1990 only in the former West Germany)**

The reason for the growth in freight transport performance lies in the increase in transport distance. By contrast, freight transport volume – that is the volume of transported freight in tonnes – remained static. The average distance of a single trip with a heavy goods vehicle (HGV) in commercial freight transport increased between 1997 and 2005 by 32 per cent from 98 to 129 kilometres. In the case of rail freight, average transport distance increased in the same period by 31 per cent from 230 to 301 kilometres.[2]

In 1960, total freight transport performance in Germany was divided equally between road, rail and inland navigation. Rail and inland navigation transported smaller quantities, but they covered considerably longer distances.[3] In 2005, the share of road transport was 72 per cent.[4]

Growth in air freight and maritime transport has been even stronger. In this paper, however, we do not consider such transportation, which is primarily international.

Forecasts up to 2025

In the coming decades freight transport will in all probability continue to grow. A current forecast of the German Federal Ministry of Transport (BMVBS)[5] reckons with a 79 per cent increase in road transport performance by 2025, compared with 2004. The forecast for rail transport and inland navigation also shows strong growth, with 65 per cent and 26 per cent, respectively.

Indications are that forecasts of growth will continue to be relevant even in the current economic crisis. Firstly, the decline in freight transport in the current crisis is attributable to a downturn in economic performance. As soon as the crisis has been resolved there will again be a strong demand for the transportation of goods. Secondly, the economic crisis has no effect on the prime cause of growth in freight transport, namely, the increasing international division of labour. Thirdly, growth in freight transport performance in the past was also not constant from year to year; here, fluctuations and temporary downturns are a normal occurrence (see Figure 1). The German Federal Environment Agency (Umweltbundesamt, hereafter UBA) therefore expects further high rates of growth in freight transport in the period to 2025.

The increase in transport performance differs widely between different regions of Germany. While southern Germany, parts of western Germany and coastal regions record strong growth in transportation, North-Rhine Westphalia, Saarland and, above all, the new federal states of the former GDR – with the exception of the Metropolitan Region of Berlin – experience lower growth or even downturns.[6]

Transport flows between Germany and Western Europe account for the most significant proportion of transborder freight transport volume in 2025. Freight transport in a southerly direction – to Austria, Italy and Switzerland – remains in second position. Annual growth rates of 4 to 5 per cent in the flow of goods to and from South-Eastern and Eastern Europe are the highest; however, and by the year 2025 the volume of transborder transport will be at almost the similar level as that to and from Austria, Italy and Switzerland.[7]

Changes in freight transport required to protect the environment

Mobility in Germany has to meet the demands of sustainable development: The need for social contacts and communication should be fulfilled, and access to goods and services ensured. At the same time, this should neither endanger human health nor impair the efficiency and viability of the environment and nature. A pre-condition is that Germany achieves its objectives for climate protection, air pollution control, noise control, nature conservation and landscape preservation as well as for the quality of the living environment and the protection of resources.

The German Federal Government has set the following objectives in its sustainability strategy: In freight transport, transport intensity should fall by 5 per cent by the year 2020, compared to reference year 1999. Transport intensity is transport volume in billion tonne kilometres per 1,000 euros of gross domestic product (GDP). The interim objective is a 2 per cent reduction in transport intensity by 2010. In 2006, however, it was 114 per cent, compared to the 1999 reference value.

The share of rail transport in freight transport performance (modal split) – measured in tonne kilometres – should rise to 25 per cent by 2015 and that of inland navigation to 14 per cent.[8] In 2005, rail had a share of 17 per cent of domestic freight volume, and inland navigation a share of 11 per cent.[9]

The Federal Government has not yet formulated specific targets for realization of sustainable freight transport.

Protect the climate

Despite savings in specific fuel consumption and improved utilization of vehicle capacity, emissions of carbon dioxide from land-based freight transport have not fallen, but have rather levelled off at a high level. The reason for this is the substantial increase in freight transport performance, which has offset the success of vehicle-specific emission reductions.

The Federal Government pursues the objective of reducing climate gas emissions by 40 per cent by the year 2020, compared to 1990. This implies a reduction of 225 million tonnes in energy-related CO_2 emissions, compared to 2005. On the basis of knowledge acquired by the UBA, it is estimated that the reduction contribution of the transport sector must amount to 40 million tonnes of CO_2 (direct emission only, excluding the upstream chain). Were freight transport to contribute to this reduction in proportion to its share of emissions of the transport sector as a whole, this would correspond to a reduction contribution of 10 million tonnes of CO_2. Taking into account that HGV-side reduction potentials have been better exploited than those of non-commercial road traffic, annual direct CO_2 emissions from freight transport should not further increase. This means, in precise terms, that direct CO_2 emissions from freight transport (2008: 43.9 million tonnes) have to be reduced by 2020 to the 2005 level (39.4 million tonnes). This is necessary, in order not to negate necessary emission reductions in passenger transport.

Reduce air pollutants

Around one-quarter of total nitrogen oxide (NO_x) emissions[10] and one-eighth of emissions of particulates[11] in Germany are attributable to freight transport. Thanks to more stringent exhaust-gas limits for new vehicles (Euro norms), emissions of NO_x and particulates from freight transport will drop to half the present-day level by the year 2015. An emission "socle" will remain, however, which will make a marked contribution to total emissions of both pollutants. Additionally, one-third of emissions of particulates is produced by abrasion from road paving, tyres and brake pads; factors that not affected by exhaust-gas treatment. These particulate emissions therefore increase in proportion to growth in transport, and counteract the positive effects of exhaust-gas treatment.

In many German inner cities the limit for nitrogen dioxide (annual average of 40 micrograms per cubic metre), which applies from 2010, will be clearly exceeded. NO_x emissions must rapidly decrease with a view to earliest possible compliance with this threshold.

The European Commission and the United Nations Economic Commission for Europe (UN-ECE) want in future to limit particulate emissions of Member States by means of national emission ceilings. Moreover, they also want to reduce emission ceilings for precursor substances of particulate matter (sulphur dioxide, nitrogen oxide and ammonia) to an even greater extent than laid down in NEC Directive 2001/81/EC.[12] The UBA regards this as necessary. The contribution of road freight transport to emissions of particulates in Germany should not increase. A pre-condition for decreasing particulate emissions is that emissions produced by tyre abrasion do not further increase.

Reduce noise exposure

Hardly anyone in Germany is spared noise. UBA calculations show that around 13 million people are exposed to sound levels that give rise to noise-related health risks and sleep disorders. Road traffic noise during the day affects five times as many people as rail traffic noise and at night around one-and-a-half times as many people. This is because rail freight transport – just like air freight transport – is largely conducted at night.

The UBA therefore urges that, in the near term, a noise level that poses a risk to human health – that is, an average noise level of 65 decibels during the day and 55 decibels at night – may no longer be exceeded. In the long term (up to 2030), the protection level for the avoidance of substantial exposure recommended by the World Health Organization – that is, an average maximum noise level of 55 decibels during the day and 45 decibels at night – should be guaranteed nationwide. Freight transport policy must be orientated towards these targets.

Noise levels at night are mainly attributable to freight transport, so that the above-mentioned night-time noise protection targets often apply directly to freight transport.

Conserve biodiversity and intact landscapes

Biodiversity profits from ambitious objectives for air pollution control, climate protection and noise control. Furthermore, spatial development is of decisive importance for biodiversity. This concerns areas available for nature conservation. The share of undissected areas with low traffic intensity, which at present amounts to 23 per cent of areas larger than 100 square kilometres, must be maintained. Beyond that, the UBA takes the view that small-scale landscape dissection should be limited as a matter of urgency.[13]

Not only is the protection of species important for the protection of biodiversity, but even more so abatement of the causes of harmful effects, such as pollutant emissions, land use, changes of use and landscape fragmentation – in particular through traffic.

With its sustainability strategy, the German Federal Government aims to reduce the utilization of land for transport infrastructure and settlement areas to 30 hectares per day by the year 2020. On a moving four-year average from 1997 to 2000, such utilization was around 129 hectares per day, and it decreased from 2002 to 2005 to 118 hectares per day. The construction and extension of federal motorways accounts for around 4 per cent of land utilization, and amounted in the period from 2001 to 2004 to around 3.5 hectares per day.

The motorway network grew in the period from 1991 to 2007 by 1,600 kilometres from 11,000 to 12,600 kilometres. This corresponds to an increase of around 15 per cent. The construction and maintenance of roads to cope with increasing freight transport should be planned in such a way that additional land sealing is completely offset by the unsealing of land at another location. Furthermore, new infrastructure projects should no longer intersect intact, undissected landscapes.

Environment-compatible freight transport as envisaged by the UBA

Reduce specific emissions

Lower pollutant limits will continue to support the use of modern techniques for the aftertreatment of exhaust gases for effective reduction of emissions of nitrogen oxide and particulates from diesel engines. These efficient technologies include selective catalytic reduction (SCR) and exhaust-gas recirculation for the reduction of nitrogen oxide emissions. Particulate filters and particle reduction systems diminish particulate mass and particulate number in diesel engines.

Legislation on CO_2 threshold limit values for HGVs, which expedite the development and use of highly-efficient engines and lightweight construction, could make an additional contribution towards climate protection. According to UBA estimates, the energy-saving potential in the operation of HGVs amounts in the long term (to 2050) to around 30 per cent.

With rail transport, too, significant CO_2 savings by 2020 are possible with technological improvements. Deutsche Bahn (DB AG) plans to cut its specific CO_2 emissions in the same period by 20 per cent, compared to 2002 levels. It intends to achieve this target primarily through improved utilization of train capacity, enhanced energy efficiency of operation procedures, energy-saving, train-driving techniques and the reduction of conversion losses in traction power supply.

A range of measures can lessen noise exposure from freight transport. These include vehicle- and road-related measures, measures along the propagation path (for example, enhanced spatial separation of noise source and those exposed to noise) as well as constructional noise control at the point of exposure. Vehicle-related measures include changes in operating modes, such as speed reductions, whose cost-benefit ratio is often highly favourable.

In rail freight transport, the most effective measure for the lessening of noise in vehicles involves the conversion of freight waggons to brake systems that produce lower rolling noise than conventional brakes.

The German inland vessel fleet has an average age of around 40 years. In order that inland vessels emit fewer pollutants, new vessels are necessary that are equipped with modern engines and exhaust-gas aftertreatment systems. Moreover, conversion to more efficient engines and optimized vessel geometry enable higher energy efficiency and a reduction in pollutant emission.

Avoid freight traffic

The present volume of freight transport could be handled with lower kilometric performance – that is, with less traffic – were consignors and haulage contractors to make better use of existing road, rail and inland navigation capacities. An investigation carried out by the UBA[14] showed that an increase in HGV capacity utilization could reduce kilometric performance by up to 20 per cent, and optimization of tour planning by up to 10 per cent.

In order to avoid non-essential freight traffic, certain points should be observed in the promotion of regional and economic development, since the promotion of peripheral areas can have a traffic-inducing effect. It can encourage settlement in areas, for example, that is unfavourable from the point of view of distance to suppliers and customers. A positive development in recent years has been the focus on promotion of industrial competence centres, networks and clusters.

Efforts directed at regionalization and regional marketing could contribute towards curbing the growth in freight transport, not by acting against, but rather by going along with market trends, or by beginning at that point where the market encounters its limits.[15] Local markets have their greatest chance where long distances and delivery risks lead to losses in quality. A policy based on regional marketing should at the same time promote energy-efficient production on the part of regional producers, in order to avoid conflicts with climate protection and energy-saving objectives.

Measures to increase the cost of transport could also contribute towards traffic avoidance. The level of transport costs has a considerable influence on business decisions, such as the partial outplacement of production or the choice of suppliers. With higher transport costs, a reduction in vertical integration would be less worthwhile, and the chances of closer sources of supply and decentralized storage would improve. There would also be incentives for better utilization of vehicle capacity. Ultimately, the consumer could recognize the difference in the cost of transport in the price charged.

The extension of transport infrastructure often leads to induced traffic; that is, to additional traffic growth, which only occurs as a result of the construction or extension of infrastructure and would not have occurred without it. This includes additional trips to new destinations, more frequent trips to existing destinations and changes in the choice of destination and location.[16] The extension of transport infrastructure, and the traffic that makes use of it, have a direct influence on the environment, nature and the landscape. The Federal Government should therefore consider these aspects comprehensively and in good time in the planning of transport infrastructure.

Shift freight transport to inland waterway and rail

An inland vessel and a freight train produce, on average, two-thirds less CO_2 per tonne kilometre than a heavy goods vehicle. In addition, a freight train gives rise to considerable environmental relief as far as other air pollutants are concerned. An inland vessel additionally relieves the environment through its much quieter operation. Shifting freight transport from road to rail is therefore sensible, provided noise emissions from rail freight transport are reduced. Inland navigation should only be an alternative on already developed waterways.

Freight transport can be shifted if the most important factors influencing the choice of mode of transport are considered. Besides transport costs and transport time, transport quality has an effect on the choice of transport carrier. Characteristics of transport quality are, for example, temporal and spatial flexibility, adherence to schedules, ability to transport a large volume per single trip, networking capability, predictability, frequency of service as well as security and convenience.[17] Of key significance for the efficiency of a transport carrier is also the infrastructure it offers.

The strengths of the heavy goods vehicle lie, among other things, in very good infrastructural conditions and the smooth conduct of transborder transportation. Since the HGV is not bound to a timetable, it offers the greatest flexibility in scheduling. The greatest advantages of the freight train are large transport capacity and negligible susceptibility to traffic holdups. Decades of track abandonment and the closure of rail sidings as well as low capital expenditure on the rail network have, however, damaged rail’s competitiveness. Inter-modal transportation – that is, the transport of freight by different carriers – combines the advantages of the freight train and inland vessel over long distances with those of the heavy goods vehicle for the “last mile”.

The UBA estimates potential shifting from road to rail between certain regions up to the year 2025 at 25 to 40 per cent of road transport volume. For this purpose, the political framework would need to change. The decades-long concentration of transport policy on the extension of the road network and, at the same time, expedited track abandonment and the closure of rail sidings are the basic reason why, in Germany, freight transport by rail is often not competitive.

The average minimum transport distance, which is often regarded as a pre-condition for the shifting of freight transport from road to rail, is also an outcome of existing infrastructure. With new focal points in transport policy, average minimum distance could be greatly shortened and a modal shift realized more easily.

How UBA objectives for environment-compatible freight transport can be achieved

The UBA recommends implementation of a scenario that enables the specified environmental objectives to be achieved. We propose implementation of seven packages of measures, whose substance and potential we detail below. The UBA scenario would lead to less freight transport and the shifting of a substantial proportion of freight transport performance to rail and inland navigation. With the aid of technical measures, the efficiency potentials of transport carriers could also be better exploited. The forecast of the German Federal Ministry of Transport (BMVBS) generally serves as reference for the quantification of instruments relevant to transport performance at the end of each chapter. Where not otherwise stated, the scenario is based on the period effect from 2008 to 2025.

Spatial structural instruments

A "transport impact assessment", which should be obligatory for all measures to promote economic development, could contribute towards a reduction in freight transport performance. The UBA estimates that such an assessment could lead to a reduction in transport performance of 2.5 per cent by 2025.[18]

The support and expansion of regional markets, above all with consumer goods such as agricultural produce, should prove successful. The UBA estimates the potential of possible transport avoidance through regional marketing at 2 per cent of road transport performance.

Maintenance of capacity at current levels as objective of the Federal Transport Infrastructure Plan

In transport planning and the use of forecasts, planning bodies must take into account that every new road induces traffic. They should therefore not attempt to create capacity for the forecast traffic volume through the construction and extension of transport infrastructure, but should rather at first fully utilize the existing transport network and identify possibilities for improving its linkage and capacity utilization. The UBA therefore expects from a planning instrument such as the Federal Transport Infrastructure Plan, that adverse environmental effects and induced transport be avoided as far as possible.

Absolute essential extensions of the road network should be accompanied, on environmental and fiscal grounds, by the scaling down or renaturalization of road networks at another location. The UBA estimates that the avoidance of induced traffic would reduce annual growth in transport performance by 17.5 per cent.

Further development of the HGV road charge

The inclusion of all external costs of road freight transport in the HGV road charge would lead to considerable traffic avoidance and shifting effects. External costs of road freight transport encompass, for example, the social costs of environmental damage as well as the costs of accidents, which have to be borne by the public health sector. The proposal of the European Commission for amendment of Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures[19] does not meet this demand. The Federal Government should work towards ensuring that at least the costs of climatic damage and accidents are included in the new directive, that the capping of different cost components is abolished and that implementation of the directive is made mandatory.

With ambitious interpretation – that is, inclusion of all external costs in the HGV road charge – the measures proposed by the UBA could lead to considerable avoidance and shifting of road transport. This was shown in a discussion paper prepared by the Gesellschaft für Wirtschaftliche Strukturforschung (GWS)[20] on behalf of the UBA, according to which a gradual increase to 37.4 cent per vehicle kilometre in the road charge (to cover total external costs), as well as broadening its scope to cover all HGVs over 3.5 tonnes weight and all roads by 2025, could lead to avoidance of 7.6 per cent of road freight transport and a 4.5 per cent shift to rail.

In addition, differentiated HGV road charges for periods with low traffic volume (09:00 to 15:00) and morning peak times could increase capacity on federal motorways by 5 per cent.

Optimization of traffic flow through a general speed limit

A general speed limit alleviates the adverse effects of road traffic on the environment, leads to a reduction in noise and pollutants, and lessens the impact on the climate. Beyond that, a speed limit for passenger cars could contribute towards an increase in traffic safety and road capacity. A clear indication of this is the capacity of speed-regulated motorways in the USA, which, with the same number of traffic lanes, is more than 10 per cent higher than that of comparable German roads.[21] This additional capacity could absorb a proportion of strong HGV growth without necessitating the construction of new roads.

While traffic flow could also be optimized, dependent on traffic density, through temporary speed control with flexible systems, a general speed limit is much more appropriate for the reduction of accident risks and adverse effects on the environment. A general speed limit has an immediate effect and costs nothing. The UBA estimates that a general speed limit on federal motorways would increase overall motorway capacity by five per cent.

Increase in the capacity of rail infrastructure

The most important challenge for rail infrastructure development is the expansion of network capacities. In order to achieve this, an extensive survey is necessary not only of present capacity bottlenecks, but also of bottlenecks that are to be expected in the medium term. The UBA expects, as a result of this analysis, that a large number of railway lines in Germany will have to be re-commissioned, renovated, modernized and extended. The construction of new freight lines could also become necessary. In order to open up bottlenecks, existing secondary lines will have to be upgraded in the near term to provide an alterative to overloaded main lines. The UBA assumes that with implementation of the proposed measures route capacity in Germany could grow by 50 per cent by the year 2025.

Besides constructional measures, operational optimization of rail transport could additionally increase specific capacity by 30 per cent by the year 2025. This applies, in particular, to the shortening of distances between trains in operation (block density)[22] and the operation of longer freight trains. In all, route capacity of rail freight transport could grow by 80 per cent by the year 2025.

The promotion of inter-modal transport and rail sidings could provide important stimuli for the shifting of road transport to rail. Through the planned expansion of inter-modal transport and rail sidings, a total of around 49 billion tonne kilometres could be shifted to rail and inland navigation.[23]

Reduction of noise exposure

An important pre-condition for a marked increase in rail freight transport performance is a rapid reduction in the noise emissions it gives rise to. The overall strategy is orientated towards exposure, and introduces mandatory maximum exposure levels. Measures for emission reduction in vehicles and on track systems, such as the conversion of freight waggons to brake systems that cause less rolling noise than convention brakes, complete this strategy.

The most important instrument for noise reduction – apart from the regulatory provisions already mentioned – is therefore the introduction of emission-related track access charges. The basic principle of this system is that rail vehicles with low emissions pay a lower track access charge. According to UBA estimations, this results in a reduction of 6 to 10 decibels in noise exposure from rail freight transport.

Preferential regulations for low-noise HGVs in noise-sensitive areas could reduce noise exposure by 3 to 5 decibels in road freight transport. Low-noise HGVs can be conventional vehicles that, with the aid of a speed limiter, drive with very little noise in designated zones or at specified times.

Vehicle-related exhaust gases and CO_2 limits for HGVs, trains and inland vessels

The above-mentioned, vehicle-related technical measures for the reduction of specific harmful environmental effects must be consistently implemented in HGVs, trains and inland vessels. Besides implementation of these measures in new vehicles, it is particularly necessary in the case of inland vessels and diesel locomotives, which have a long service life, to retrofit as many vehicles in the existing fleet as possible with technology to reduce emissions of nitrogen oxide and particulates. Government financial support would in this case be sensible, since no statutory regulations as yet exist that prescribe modernization of diesel engines.

In the medium to long term, apart from further development of classic pollution legislation for effective reduction of emissions of nitrogen oxide and particulate matter, legislators should also introduce mandatory CO_2 limit values. Only this way can efficiency potentials with transport carriers be fully exploited.

Conclusion

In its sustainability strategy, and within the framework of international agreements, the German Federal Government aspires to attain important environmental objectives. Were forecasts of the Federal Ministry of Transport (BMVBS) concerning the further development of transport to come to pass, these objectives would only have been reached in the area of freight transport in the case of emissions of particulates. Instead of decreasing, CO_2 emissions would increase even further. NO_x emissions, too, would not diminish to the necessary extent. Besides an increase in the use of land and landscape fragmentation through expansion of the road network, noise emissions would also further increase in the period to 2025.

In order for Germany to achieve its environmental objectives, growth in freight transport must turn out to be lower than currently forecast. Moreover, the shift of a large proportion of freight transport volume from HGVs to freight trains and inland vessels must be accomplished. Where transport cannot be avoided or shifted to more environment-compatible carriers, its harmful effects must be reduced to a greater extent.

The UBA recommends achievement of environmental objectives in accordance with the scenario presented in this background paper. Figure 2 shows the overall potential of measures for the control of freight transport performance. This overall potential takes into consideration the overlapping effects of such measures. This means that tonne kilometres already avoided or shifted as a result of a particular measure are taken into account in calculating the effect of another measure (sequential computation). The total potential of all measures is therefore lower than the sum of all isolated potentials.

[All data in billion tkm]	Road	Rail	Inland navigation	Total
Reference year 2008	**474**	**117**	**64**	**655**
BMVBS Forecast 2025	**704**	**152**	**80**	**936**
Reduction potential of instruments (sequential computation)				
Spatial structure	-32	-4	-2	-37
No road extensions	-35	0	0	-35
Rail promotion	-49	+38	+11	0
HGV road charge	-71	+26	+0	-45
Total	*-187*	*+61*	*+9*	*-117*
	▼	▼	▼	▼
UBA Scenario 2025	**518**	**213**	**89**	**819**
Comparison of growth in transport performance compared to reference year 2008				
BMVBS Forecast 2025	**230** (+49%)	**35** (+30%)	**16** (+25%)	**282** (+43%)
UBA Scenario 2025	**44** (+9%)	**96** (+82%)	**25** (+39%)	**165** (+25%)

Figure 2: **Reduction in transport performance pursuant to UBA Scenario 2025 in billion tonne kilometres (tkm)**[24]

The German Federal Ministry of Transport (BMVBS) assumes in its forecast an increase of 49 per cent in road transport performance by 2025, compared to 2008. Of this forecast increase of 230 billion tonne kilometres, in the UBA scenario 186 billion tonne kilometres could be shifted to rail and inland vessel or completely avoided. In the UBA scenario, on the other hand, growth in road freight transport amounts to just 9 per cent (44 billion tonne kilometres), and this could be absorbed by the existing road infrastructure, accompanied by measures to increase motorway capacity. Total freight transport performance increases in the UBA scenario by 25 per cent, compared to 2008, by 2025, while the BMVBS foresees growth of 43 per cent.

Were growth as forecast by the BMVBS to become reality, direct CO_2 emissions from freight transport would markedly increase from 39.4 million tonnes in 2005 to 47.6 million tonnes by 2020. The Federal Government's climate protection objectives would then be thwarted, since instead of the necessary stabilization of CO_2 emissions from freight transport by 2020 there would be an increase of more than 8 million tonnes of CO_2 compared to 2005.

In the UBA scenario, by contrast, annual direct CO_2 emissions from freight transport – related to the year 2020 (an important years for climate protection policy) – would decrease by 2.7 million tonnes compared to 2005. Compared to the BMVBS forecast, this is equivalent to a saving of 10.9 million tonnes (see Figure 3). The UBA freight transport strategy could meet the climate protection objectives of the Federal Government. A major step towards environment-compatible freight transport is thus possible.

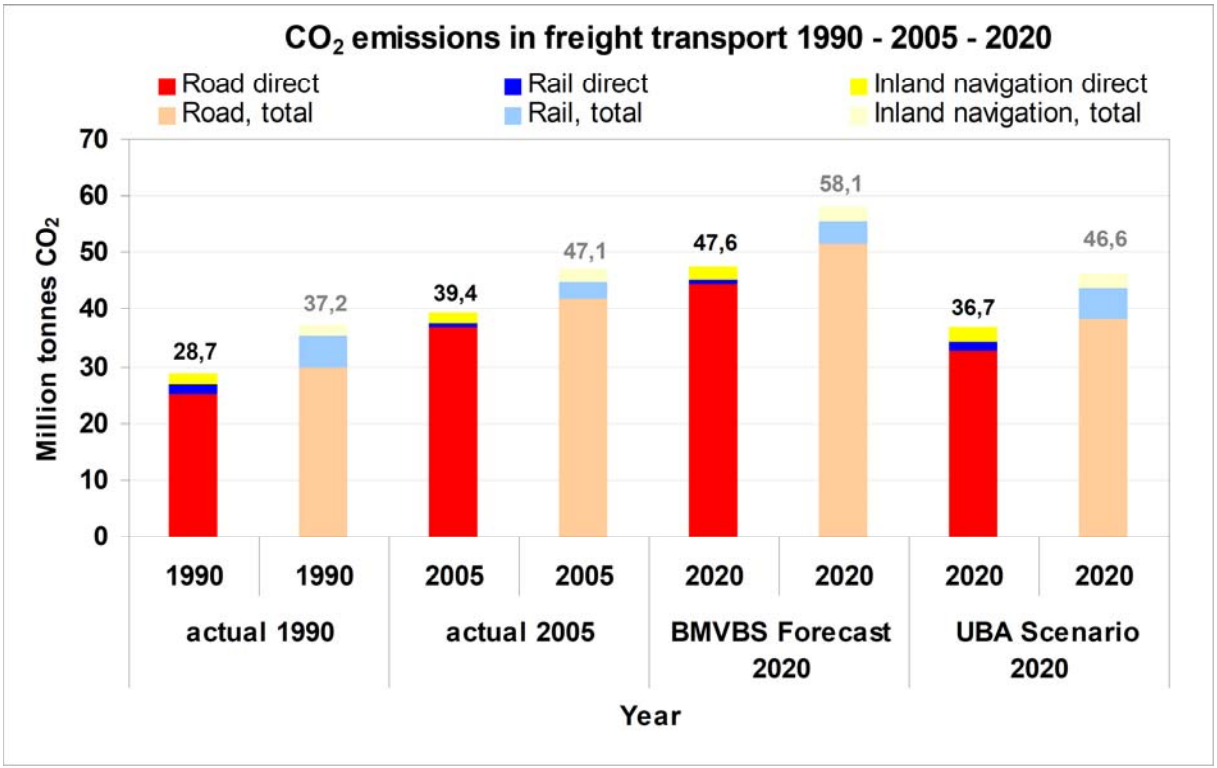

Figure 3: CO_2 emissions in freight transport – development and comparison of BMVBS forecast and UBA scenario for the year 2020[25]

Sustainable mobility serves the fulfilment of social and economic needs within the framework of existing environmental demands. Germany has the opportunity to attain the Federal Government's essential objectives by the year 2025.

Footnotes

[1] BMV (1991): Verkehr in Zahlen 1991; Bonn / BMVBS (2007a): Verkehr in Zahlen 2007/2008; Hamburg.

[2] BMVBS (2007): Verkehr in Zahlen; Hamburg; p. 245 und 252.

[3] BMV (1991): Verkehr in Zahlen 1991; Bonn; p. 345.

[4] BMVBS (2007): Verkehr in Zahlen 2007/2008; Hamburg; p. 243.

[5] ITP/BVU (2007): Prognose der deutschlandweiten Verkehrsverflechtungen 2025 (im Auftrag des Bundesministeriums für Verkehr, Bau und Stadtentwicklung); München/Freiburg; p. 220.

[6] Acatech (2006): Mobilität 2020 – Perspektiven für den Verkehr von Morgen; Berlin/München; p. 26 ff.

[7] ITP/BVU (2007): Prognose der deutschlandweiten Verkehrsverflechtungen 2025 (im Auftrag des Bundesministeriums für Verkehr, Bau und Stadtentwicklung); München/Freiburg.

[8] Bundesregierung [Hrsg.] (2008): Fortschrittsbericht zur nationalen Nachhaltigkeitsstrategie 2008. – Entwurf vom 5.5.2008, Berlin. p. 77 / 79.

[9] BMVBS (2007): Verkehr in Zahlen 2007/2008; Hamburg; p. 243.

[10] Umweltdaten online, eingesehen am 08.05.2008, Güterverkehrsanteil nach TREMOD 4.17 (2006).

[11] Jörß et al. (2006): Emissionen und Maßnahmenanalyse Feinstaub 2000-2020 (UBA-Texte 38/07); Berlin.

[12] Directive 2008/50/EC on ambient air quality and cleaner air for Europe lays down air quality objectives for the avoidance, prevention or reduction of harmful effects on human health and the environment.

[13] UBA (2003): Reduzierung der Flächeninanspruchnahme durch Siedlung und Verkehr (Materialienband 90/03); Berlin; p. 283 / 301.

[14] UBA (2000): Verkehr im Umweltmanagement, Anleitung zur betrieblichen Erfassung verkehrsbedingter Umweltwirkungen; Berlin.

[15] Demmeler, M. (2008): Ökologische und ökonomische Effizienzpotenziale einer regionalen Lebensmittelbereitstellung (Dissertation TU München); München.

[16] UBA (2005): Determinanten der Verkehrsentstehung (UBA-Texte 26/2005); Berlin; p. 46ff.

[17] Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR) et al. (2003): CargoRail – Verlagerung; Braunschweig; S. 69 / Bühler (2006): Verkehrsmittelwahl im Güterverkehr; Heidelberg; p. 59f.

[18] This implies that within ten years 25 per cent of all businesses will carry out such a transport impact assessment, which would lead to a 10 per cent reduction in the volume of freight transport of the respective company. This would result in an average 2.5 per cent reduction in the total volume of freight transport.

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