

# HGV TRAFFIC TRANSITING THROUGH THE SWISS ALPS: MODAL SHIFT FROM ROAD TO RAIL?

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## ABSTRACT

In 2000 the number of heavy goods vehicles passing through the Alps was approximately 1.4 million, of which more than half were in transit. Almost 85 percent of these vehicles crossed via the Gotthard. In 2010 the number fell to around 1.257 million. This easing of the situation in the valleys of the Alps is the result of the federal government's policy to promote the transfer of goods transport from road to rail, which was introduced in 1994 after the Swiss electorate voted in favour of the initiative calling for the protection of the Alps, and has since been confirmed on a number of occasions. But there is still a long way to go before the target of a maximum of 650,000 heavy goods vehicles passing through the Swiss Alps each year can be reached.

## 1 THE ALPINE CROSSINGS - A SPECIAL CHALLENGE

Special situation of the narrow mountain valleys

Switzerland is a mountainous country in the heart of Europe. Though important transport links traverse the country from north to south, it is domestic goods traffic on the west-east axis that predominates. The heaviest traffic is to be found in the major agglomerations and on the motorways between the main urban centres of Zurich, Berne, Basle, Geneva and Lausanne. By comparison, the traffic flows on the north-south routes are of lesser importance. This is exemplified by the fact that - leaving aside peak holiday periods - the daily number of vehicles passing through the Gotthard road tunnel corresponds to only a sixth of the volume using the north Zurich bypass.

Nevertheless, the alpine crossings have remained a focus of concern for Swiss transport policy for many years. The reason for this is obvious - all of the traffic with all of its negative impacts must be squeezed through the narrow and particularly sensitive mountain valleys. Here, space is a commodity in very short supply. Considerable gradients have to be overcome. The many civil engineering structures required are expensive to build and to maintain. The built-up areas close to the road are highly sensitive to both noise and air pollution. In addition, there is a heightened risk of natural hazards.

Coping with the strong growth in north-south goods traffic represents a major challenge. The particular situation of the mountain valleys prompted Switzerland to adopt special measures to deal with this issue from very early on.

## 2 OVERVIEW OF GOODS TRAFFIC IN SWITZERLAND AS A WHOLE

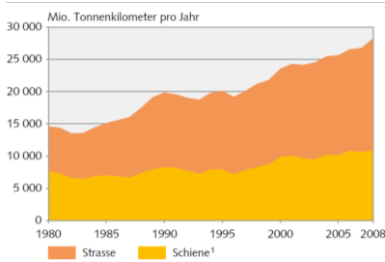


Figure 1 - Goods transport by road and rail

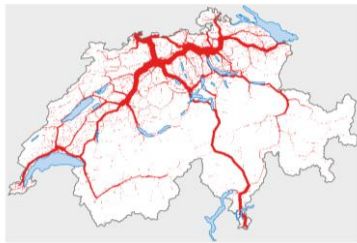


Figure 2 - Flows of goods traffic by road (2000)



Figure 3 - Flows of goods traffic by rail (2000)

In Switzerland, goods traffic has almost doubled between 1980 and the present day, rising from around 15 billion to around 28 billion tonne-kilometres. Traditionally, a large proportion of goods traffic in Switzerland has been carried by rail. However, between 1980 and 1995, the market share of rail contracted from a good 50% to around 40%. Since then, this percentage has stagnated despite all the efforts made to promote the rail alternative.

An important reason for this is the differences in transport structure, with short distances and small volumes tending to favour road traffic. This is characterised by the predominance of short-distance domestic traffic between the economic centres of Switzerland's central belt. This has not been materially altered by the strong growth in import, export and transit traffic resulting from progressive globalisation. The same cannot be said of freight transport by rail, which is focused mainly on longer distance transit traffic.

These effects are clearly reflected in the traffic load maps for road and rail (Fig. 2 and 3). Whereas goods traffic carried by road is particularly heavy between the industrial areas of the central belt, goods traffic carried by rail is concentrated on the north-south transit axis via the Gotthard tunnel. The amount of goods traffic carried by rail on the west-east axis is of minor importance.

## 3 A DIFFERENT SITUATION WITH TRANSALPINE GOODS TRAFFIC

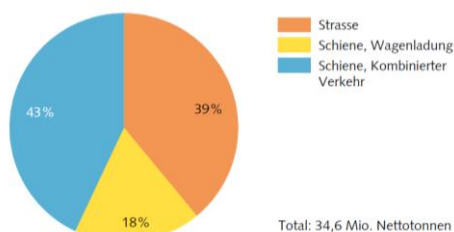


Figure 4 - Transalpine goods traffic volumes 2009

When it comes to transalpine goods traffic, the situation is quite different. On the north-south transit axis through Switzerland, around 61% of the volume is carried by rail, with the remaining 39% carried by road. The biggest market share is taken by intermodal transport, which accounts for around 43% of north-south goods traffic.

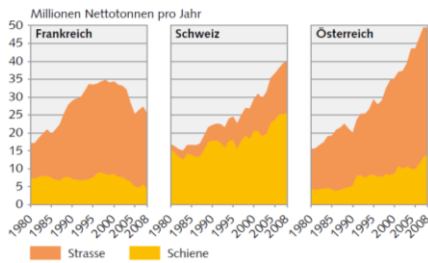


Figure 5 - Transalpine goods traffic volumes

By international comparison, the percentage of goods traffic carried by rail in Switzerland is very high. Both in France and in Austria, transalpine goods traffic is carried predominantly by road. Nevertheless, in volume terms, even in Switzerland, goods transport by rail has been steadily losing market share to road traffic over recent years. Whereas back in 1980, more than 90% of goods traffic was carried by rail, this figure now stands closer to 60%. In France and Austria, the market share of rail in transalpine goods traffic has been fluctuating between 20% and 30% since 1990.

In parallel with this development, there has been a massive increase in transalpine goods traffic throughout the whole alpine region. In Switzerland, the volume of transalpine goods traffic has grown from around 15 million net tons per annum in 1980 to around 40 million today. In Austria, transalpine goods traffic has risen to around 50 million net tons. The only exception is France, where the volume of goods traffic carried through the French Alps has fallen from around 35 million net tons in the year 2000 to around 25 million at the present time. In the alpine region as a whole, the quantities of goods transported between 1980 and the present day have risen from around 45 million net tons per annum to around 115 million.

All of the forecasts assume that there will be a further marked increased in transalpine goods traffic.

## 4 NEED FOR ACTION IN TERMS OF TRANSPORT POLICY

### 4.1 Various legislative measures

Back in the 1990s, the increasing burden of HGV traffic on the alpine crossings, the sharp increase in this traffic in conjunction with a falling market share of rail and the need to protect the particularly sensitive mountain regions prompted Switzerland to take far-reaching measures to find an acceptable solution to the problem of transalpine goods traffic.

- In a referendum held in 1992, the Swiss people approved the building of two base tunnels through the Alps. Efficient and attractive rail infrastructures were to improve the competitiveness of the railways and to create the capacities needed to cope with the transalpine goods traffic.
- In another referendum two years later, the Swiss people voted in favour of the adoption of an article for the protection of the Alps and its incorporation into the federal constitution. Among other things, this article provides for transalpine goods traffic in transit to be shifted from road to rail and for there to be no increase in the capacity of the transalpine road links.
- In a referendum in 1998, the Swiss people approved a bill for the financing of public transport. Since then, Switzerland has been financing four major railway projects through a fund. One part of the projects is the two base tunnels through the Swiss Alps on the Gotthard and Lötschberg routes. The fund has an investment volume of € 23 billion drawn from the HGV tax, the mineral oil tax and value-added tax

- In 1999, Switzerland ratified the land transport agreement with the EU. One aspect of this agreement was an increase in the weight limit for HGVs from 28 to 40/44 tons, as well as the introduction of the mileage-related HGV tax. Following the introduction of this tax, which applies throughout Switzerland and is based on the Euro classes, the average cost for a 40-ton truck to transit through Switzerland is now around € 200.
- In the year 2008, the Swiss parliament adopted the so-called Modal Shift Act (*Verkehrsverlagerungsgesetz*). This law provides, *inter alia*, for transalpine goods traffic to be restricted to a maximum of 650 000 trucks per annum until 2019.

Thus, the legislation clearly marked out the transport policy framework for switching transalpine goods traffic from road to rail. At the same time, it was apparent that the achievement of this ambitious target would require a whole series of supporting measures.

#### 4.2 Need for a series of supporting measures

To achieve the desired modal shift from road to rail, Switzerland had recourse to a whole range of supporting measures:

- The construction of the two base tunnels on the Gotthard and Lötschberg routes is intended to create the railway capacities needed for the shift of goods transport from road to rail in Switzerland. The new level track should lead to a considerable increase in the speed of rail transport, to a reduction in operating costs and so to an improvement in the competitiveness of rail versus road. The Lötschberg base tunnel came into operation in 2007, while the Gotthard base tunnel is scheduled to enter service in 2017.
- Free access to the Swiss rail network increases competition in rail freight transport and encourages productivity. It permits forwarding agents to choose between different rail suppliers, puts pressure on the railways to improve their quality, punctuality and price and ensures an unambiguous assumption of responsibilities throughout the logistics chain.
- Operating subsidies paid to support combined transport and contributions for the construction and expansion of the combined transport terminals should further increase the competitiveness of goods transport by rail. In 2009 alone, Switzerland provided the combined transport services with financial contributions amounting to CHF 195 million. CHF 44 million was disbursed for the construction and expansion of combined transport terminals at home and abroad. Federal funds amounting to CHF 22 million were provided for the construction of sidings. The annual funding under this heading is in the same order of magnitude.
- Since the introduction of the HGV mileage tax in 2001, goods transport by road has covered all of its external costs, which again serves to increase the competitiveness of rail.
- The increase in the permitted weight limits for HGVs from 28 to 40/44 tons has resulted in a better utilisation of domestic road freight transport by reducing the number of journeys needed.

With regard to road safety, the intensification of HGV controls serves to ensure a level playing field between goods traffic by road and rail. To this end, Switzerland has built five HGV control centres and more are planned. These centres carry out spot checks to verify that HGVs are complying with the road safety regulations in force.



Figure 6 - Ripshausen HGV control centre

### 4.3 Stabilisation of HGV transport

The foregoing measures have not been without effect.

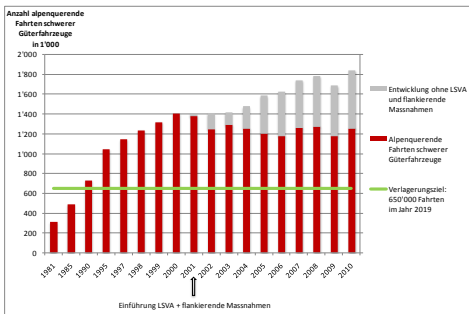


Figure 7 - Growth in transalpine HGV traffic

The introduction of the mileage-related HGV tax and the various supporting measures since 2001 have led to a stabilisation in transalpine HGV traffic at a level of around 1.2 million trucks per annum. Without these measures, the number of HGVs using Switzerland's alpine crossings would have attained a figure of around 1.8 million. Nevertheless, this result is still well above the modal split target of a maximum of 650 000 HGVs per annum.

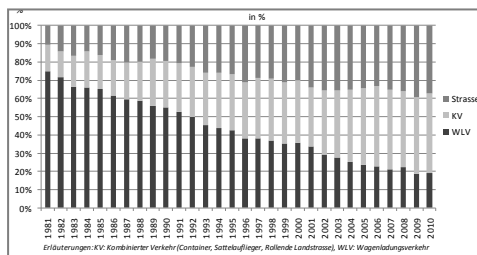


Figure 8 - Modal split in transalpine HGV traffic

Combined transport has been the main beneficiary of these measures. Between 2001 and 2010, its market share of transalpine HGV traffic increased from around 30% to over 40%. This growth has been achieved primarily at the expense of wagonload transport, the market share of this segment having decreased during the same period of time by around 15%. The market share of road transport has fluctuated between 32% and 40% and, in 2010, it still stood at around 37.3%.

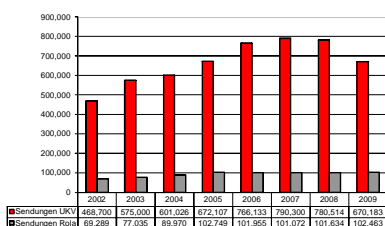


Figure 9 - Development of combined transport

Between 2002 and 2009, the number of combined transport consignments increased from around 570 000 to around 770 000 (+44%).

On the roads, the most effective measure was the increase in the HGV weight limit from 28 to 40/44 tons. Not long after its

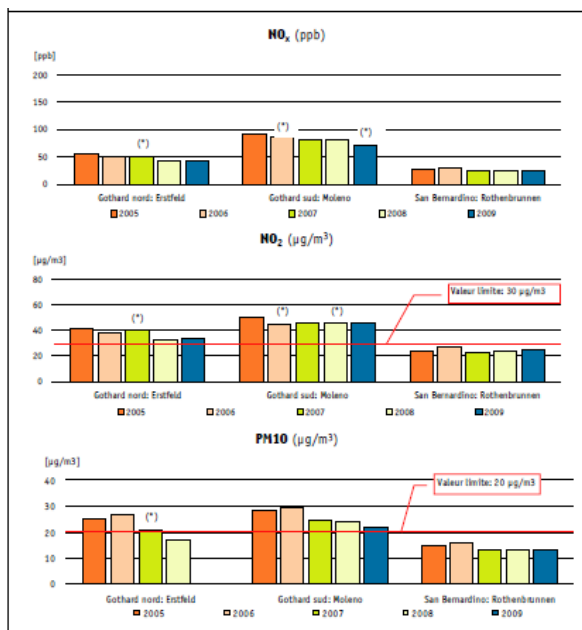


Figure 10 - Air pollution along the north-south transit axes (annual averages)

introduction, this measure had already resulted in considerable gains in productivity. The higher weight limit meant that fewer journeys were needed to carry greater quantities of goods.

The figures show that there has been a certain improvement in relation to NO<sub>x</sub>, NO<sub>2</sub> and PM<sub>10</sub> pollution along the San Bernardino and Gotthard routes, the two main north-south crossings through Switzerland. The improvements are primarily attributable to the use of low-emission vehicles.

South of the Gotthard road tunnel, the NO<sub>2</sub> and PM<sub>10</sub> limits continue to be massively exceeded. North of the Gotthard road tunnel, PM<sub>10</sub> pollution has been reduced below the limit.

On the San Bernardino axis, air pollution represents no problem. The NO<sub>2</sub> and PM<sub>10</sub>-limits had already been met before the introduction of the supporting measures.

#### 4.4 Critical assessment

Overall, the measures adopted have resulted in a stabilisation of the number of road journeys made by transalpine HGV transport. If these measures had not been taken, the annual total for HGVs using Switzerland's north-south alpine crossings would have been around 1.8 million rather than today's figure of around 1.2 million.

This remarkable overall success comes with a considerable price tag. The construction of the two base tunnels on the Gotthard and Lötschberg routes has cost the Swiss economy billions of francs. In addition, the operation and maintenance of these once-in-a-century structures will require substantial expense. Finally, the annual subsidy for combined road-rail transport remains a heavy charge on the budget.

Yet, despite all this expenditure, Switzerland still remains a long way short of achieving its modal shift target of 650 000 HGVs per annum. Indeed, the country will not even be able to attain its interim target of 1 million HGVs by the end of 2011. There are many reasons for the shortfall:

- As in the past, the apportionment of rail transport between passengers and freight remains very much to the disadvantage of goods traffic. In long distance and regional transport, priority is still given to the passenger. The two base tunnels on the Lötschberg and Gotthard routes were and are being built primarily to cope with the ever increasing flows of freight on the north-south axis. The 34.6 km base tunnel on the Lötschberg, built at a cost of CHF 4.3 billion, has now been in operation for three and a half years. However, the current transport policy debate clearly shows that, despite the modal shift policy enshrined in the federal constitution, fast and reliable passenger connections continue to carry greater weight than the provision of

attractive connections for goods traffic. Overall, therefore, the benefit of the base tunnel for goods traffic remains in dispute. Given that the access approaches to the tunnel still have considerable gradients, there is no escaping the fact that the ideal of a level track has still not been achieved. In short, the growth in capacity remains modest. The story with the Gotthard base tunnel is much the same. With six years still to go before the tunnel comes into operation, here too, it is the time-savings that can be achieved for passenger traffic that are the focus of the transport policy debate.

- A fundamental problem is obtaining the necessary rail freight capacities on the northern and southern approaches to Switzerland. Today, it is already clear that such capacities are not going to be available on time whether in Germany or in Italy.
- And, finally, there is the question of whether the potential for modal shift has been correctly estimated and whether a restriction of transalpine road freight to 650 000 HGVs per annum is in fact feasible. Is there still traffic on the road that could not just as well be carried by rail or are the railways already carrying everything they possibly could? For various types of goods and transport needs, the competitiveness of rail freight transport is likely to reach its limits in the medium to long-term. This applies particularly to short-distance goods traffic within Switzerland.

Given this situation, it is hardly surprising that there are increasing doubts as to whether the target can be achieved without supplementary market and/or regulatory measures. In this connection, there is increasing discussion at European level concerning the introduction of a so-called "alpine crossing exchange" (*Alpentransitbörse*). Various approaches are proposed.

In accordance with the "Cap and Trade" principle, HGV journeys across the Alps should be treated as a capped commodity and made subject to quantity restrictions. The cap may relate either to the *number* of journeys or to the *emission quantities* resulting from them.

In the narrower sense, the alpine crossing exchange stands for the model proposed by the Alpine Initiative Association, whereby a fixed number of crossing rights would be distributed either free of charge or at a fixed price or by auction. After the initial allocation, the rights could be traded freely.

The emission tax method developed by Austrian scientists for controlling traffic through the Alps is also a "Cap and Trade" system. Instead of a ceiling for HGVs, what it proposes is a restriction of emissions, with emission certificates being traded rather than transit rights. However, as an emission restriction would still permit a further growth in traffic volumes through technical progress in the future, this would represent only a limited solution to the safety and capacity problems on many transit routes through the Alps.

Another subject being discussed is a voluntary system with negotiable reservation rights. This "slot management" system would permit transits to be made within a specific time window. The objectives here are a better use of scarce road capacities and a reduction in tailbacks and waiting times, as well as incentives for improved planning and logistics. Vehicles without reservations would have to wait longer. However, slot management would not lead to any reduction in traffic volumes. Other models seek to make the most efficient use of road capacity through incentives (e.g. flexible toll charges depending on the time of day).

#### 4.5 Still a long way to go

In short, it may be concluded that there is still a considerable need for action to achieve an acceptable and environmentally friendly solution to the fast growing volumes of HGV traffic on the roads throughout the alpine region. Switzerland's modal shift policy is showing the way forward for the whole of Europe. A certain measure of success has undoubtedly been achieved by the measures thus far adopted. Nevertheless, experience to date indicates that more far-reaching measures will be necessary to achieve the modal shift target. It remains to be seen whether the proposed alpine crossing exchange represents a system that is both appropriate and capable of securing the support of a political majority.