EXECUTIVE SUMMARY

February 2003
Summary

With the „Passenger Traffic Study 2010/2020,” conducted by the consortium INTRAPLAN-IMTRANS-INRETS on behalf of the International Union of Railways (UIC), the forecast of the national and international long-distance passenger traffic with special focus on the ongoing expansion of the High-Speed Network has been updated after 10 years.

The new results of the study deliver essential information to the European Railways and political decision-makers:

- Passenger traffic flows for 1999 throughout Europe
- The development of long-distance passenger traffic in the Western European Countries up till the year 2020 for alternative scenarios
- The impact of the ongoing extension of the High-speed Network in railways transport demand

The current study aimed to show the prospects of high-speed rail traffic within Europe but not to evaluate single projects within the future High-Speed Network. The advantage of this comprehensive study over national studies is the comprising presentation and the compatibility of the results, stemming from common methods of analyses and forecasts for all Western European Countries.

Previously in 1993, on behalf of the Community of European Railways and the Commission of the European Communities, the consortium INRETS-INTRAPLAN conducted detailed long-term traffic forecasts to show the impacts of the extension of the High-Speed Rail Network on passenger traffic in Western Europe. The study examined different states of development within the High-Speed Network for the years 2000 and 2010. The study from 1993 had to be updated firstly because the basic data from 1988 are now obsolete and secondly because the planned expansion of the EU will have a strong influence on the traffic flows between Western Europe and the Central and Eastern European Countries.

The study concerns the domestic and international long-distance passenger traffic of the 15 member states of the European Union plus Switzerland and Norway, denoted as "Western European Countries (W.E. Countries)" and the international traffic to and from the other European Countries (denoted as C.E.E.C.) and countries outside Europe. As in the 1993 study, only trips of more than 80 km are defined as long-distance passenger traffic.

To show the effects of different basic assumptions, five alternative scenarios, characterised as follows, were examined:

- „Basic Scenario“: continuation of the observable development with respect to transport policies and user costs
- „Favourable Scenario“: favourable development of transport policies and user costs with regard to rail traffic
- „Unfavourable Scenario“: unfavourable development of transport policies and user costs with regard to rail traffic
- „Tariff Scenario“: assuming an increase of rail tariffs by 0.5% p.a. in comparison to the „Basic Scenario“
- “Environmental Scenario": a favourable development of transport policies (with regard to rail traffic) with strong interventions in road traffic in light of an increasingly ecological orientation of transport policies
Methodology of Forecast

The traffic forecasts were made to reflect the overall growth in mobility and the interaction between the different means of transport, train, private car, bus and plane which are generated by external factors, such as growth in GDP, population and employment development, car ownership, market regulations, user costs, transport policies and the extension of road, rail and air infrastructure as well as new services in air and rail.

A complex forecasting approach was applied, based on detailed analyses of traffic flows in 1999. To reach a higher degree of validation, different forecasting methods were applied. The forecasts were calculated both with a macro model and with highly disaggregated micro models. The macro approach relies on projecting past pattern on the country level to the future by time series analyses, whereas the micro models calculate the demand effects on each origin-destination link, taking into account the development of structure in traffic zones and supply factors particular to each means of transport. The effects of new rail infrastructure and services were calculated with two different micro models, the German INTRAPLAN model and the French M.A.T.I.S.S.E. model developed at INRETS and applied by IMTrans.

Rail Network and Services

The rail network model for the analysis (1999) comprises about 76.685 km (47%) of the rail network in the W.E. Countries that totals to 162.714 km and 1,1 billion train-km (37%) of 3.0 billion train-km in total. Of that, 9.340 km of the infrastructure have been defined to be new or upgraded lines and more than 200 million train-km have been assigned to the category of High-Speed Services.

The High-Speed Network for the time horizon 2020 was defined by the UIC in co-ordination with the railways. Until 2020, a yearly average of more than 1200 km of new or upgraded lines in the W.E. Countries and about 500 km of upgraded lines in the C.E.E.C. are supposed to be constructed. The European High-Speed Network length will more than double by 2010 and by 2020 it will nearly quadruple. Figure I shows the anticipated High-Speed Network for the year 2020.

Figure I: European High-Speed Network 2020
Travel Times 2010 and 2020

Travel times in rail passenger traffic are falling drastically as a result of the ongoing extension of the High-Speed Network and new High-Speed Services. The travel times are not only shorten due to higher speeds on the new and upgraded lines but also due to new direct services causing a reduction of transfer times and shorter travel times with High-Speed Trains on existing lines without upgrading (e.g. utilisation of tilting trains).

Figure II shows the average commercial speed in the rail networks (weighted by demand). In 2020, the average commercial speed in the W.E. Countries increases to 127 kph (on average for every traveller) compared to about 100 kph in 1999.

The share of long-distance rail traffic on High-Speed Lines (new and upgraded) reaches a value of about 77% on average for the W.E. Countries in 2020, compared with 33% in 1999 (Figure III). In several countries, almost all long-distance traffic will occur on High-Speed Lines as defined by the railways.

Mobility and Modal-Split in 1999

Data mining led to the overall result of transport performance (passenger-kilometres) in all W.E. Countries, including short-distance traffic, amounting to approx. 5100 billion pkm in 1999. This means an average per capita figure of 13200 pkm. The key value of mobility in long-distance traffic (only trips with a travel distance of more than 80 km) for the national and international traffic of the W.E. Countries amounts to approx. 1900 billion pkm if intercontinental traffic is not considered and about 2350 billion pkm if it is considered. Car transport performance in long-distance traffic comprises 62% of all modes, rail traffic adds up to about 10%, bus transport about 8% and air traffic (without intercontinental traffic) about 20%.
Long-distance rail transport performance is about 190 billion passenger-kilometres per year. The share of high-speed traffic out of that is slightly above 30% or 60 billion passenger-kilometres. This figure is quite independent of the specific definition of high-speed traffic, be it based on services (in High-Speed Trains) or infrastructure (on new or upgraded lines).

**Development of Transport Demand till the Year 2020**

Figure IV shows the development of the railway’s transport performance (passenger-kilometres) assuming the realisation of the planned High-Speed Network. In the Basic Scenario, rail transport performance grows by two-thirds from 189 billion pkm in 1999 to 315 billion pkm in 2020. If transport policies and user costs follow a favourable development path for rail traffic, the transport performance of railways will more than double and reach a value of 392 billion pkm. In the Environmental Scenario, the increase to 416 billion pkm (+120%), is even higher. If railways increase prices by 0.5% p.a. (real terms), they will lose about 7% of transport performance compared with the Basic Scenario, but compared with 1999, this is still an increase of transport performance by more than 100 billion pkm or 55%. Even if the assumption of the Unfavourable Scenario proves true, the railways attain an increase of transport performance by 36% or 69 billion pkm stemming from the ongoing expansion of the High-Speed Network.

In the Basic Scenario, the total long-distance transport performance of all transport means will increase by 58% from 1967 billion pkm in 1999 to 3111 billion pkm in 2020 (see Figure V). While the growth rate of private cars (+45%) and of bus traffic (+5%) are below average, transport volume of rail traffic grows by 67% and for air traffic it will more than double (without intercontinental traffic).
In the other scenarios (see Figure VI), the total transport performance deviates at a quite small extent. The lowest growth can be seen for the Environmental Scenario, where the cost increase lessens the total mobility. The transport performance (2972 billion pkm) ranges at 4.5% below the Basic Scenario, but still grows by 51% over 1999. The growth of total mobility in the Unfavourable Scenario (3142 billion) is the highest (60%). This ranges at 1% above the Basic Scenario.

Effect of the Extension of the High-Speed Network 2020

The extension of the High-Speed Network leads to a significant increase of rail demand. Without the extension of the High-Speed Network (network remains in the state of 1999), in the Basic Scenario 2020, demand of long-distance passenger rail traffic would amount to 228 billion pkm (see Figure VII). With the extension rail demand rises to about 319 billion pkm per year, that is an increase of about 40% or 91 billion pkm compared to the case without extension.

As already shown before, the range of transport volume of railways in 2020 differs from about 260 billion pkm in the Unfavourable Scenario to 392 billion in the Favourable and 420 billion pkm in the Environmental Scenario. This spreading with a deviation in relation to the Basic Scenario of about -- 18% in the Unfavourable Scenario and 24% in the Favourable Scenario is also apparent in Figure VII. But the spreading in growth of railway demand as an impact of the extension of the High-Speed Network ranges only between -7% in the Unfavourable Scenario in comparison with the Basic Scenario and +7% in the Favourable Scenario. That will say, the transport political context plays a major role for absolute volume of rail transport demand but the considerable advantages of the extension of the High-Speed Network are rather uninfluenced by it.

About two thirds of the gains and losses of rail transport stem from substitutions from or to other transport modes.
Figure VIII shows the effects of the ongoing expansion of the High-Speed Network on the railway’s market share of long-distance passenger traffic in the Western European Countries in the years 2010 and 2020. Without ongoing extension of the High-Speed Network, the railway’s share would average about 7.7% in 2020 (8.5% in 2010), which is considerably below the value of 1999 with 9.9%. The highest share can be seen for France and Switzerland.

With realisation of the planned High-Speed Network, the railways can increase their market share by 3.9 points to 10.6% in 2020 (2.0 points to 10.5% in 2010). Railways of all countries benefit from the gain of market shares, although to a different extent due to different amounts of new and upgraded lines. France and Switzerland will keep their top position in Western Europe.

Table I shows the rail market share in the cases with and without further extension of the High-Speed Network for several OD-Relations.
Table I: Rail Market Share in the Cases With and Without Further Extension of the High Speed Network on Selected Relations (Basic Scenario, 2020)

<table>
<thead>
<tr>
<th>OD-Relation</th>
<th>Without Extension</th>
<th>With Extension</th>
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<tbody>
<tr>
<td>Berlin - München</td>
<td>12%</td>
<td>41%</td>
</tr>
<tr>
<td>Madrid - Lisboa</td>
<td>6%</td>
<td>48%</td>
</tr>
<tr>
<td>Madrid - Barcelona</td>
<td>12%</td>
<td>49%</td>
</tr>
<tr>
<td>Stockholm - Malmö</td>
<td>25%</td>
<td>51%</td>
</tr>
<tr>
<td>Paris - Milano</td>
<td>18%</td>
<td>54%</td>
</tr>
<tr>
<td>London - Bruxelles</td>
<td>48%</td>
<td>65%</td>
</tr>
</tbody>
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It is remarkable, that on individual origin-destination links railways can reach market shares up to 65% in the case of a high quality of rail supply: very short travel times, direct services and short access.

Development in the C.E.E.C.

The rise of the total traffic from the C.E.E.C. to Western Europe (166%) is distinctly higher than the W.E. average (54%). This is not only due to the higher GDP growth, but also to the fact that the international traffic generally grows at a higher extent. Furthermore, the decrease of border resistance is heavily stronger between the C.E.E.C. and Western Europe than within Western Europe. The railway’s market share in that transport demand segment shows a similar development to that in the W.E. Countries (see Figure IX) but in general on a lower level.

Without the extension of the High-Speed Network, the railway’s market share would diminish from 2.9% to 1.9%. With extension it will rise to 3.2%, a growth of 70% in comparison to the case without extension.

Conclusion

The results of the study deliver essential information to the European Railways and political decision-makers. The ongoing expansion of the High-Speed Network leads to a formidable gain of transport demand for the railways in Europe. With the advancement of High-Speed Traffic, the railways are able to claim a higher-than-average share in the overall growth of transport demand. Indeed, the development of transport policies and user costs plays an important role in this growth. If public policy in Europe can generate better conditions for the railways, the transport demand of railways can more than double by the year 2020. However, the considerable gains of transport demand effected by the extension of the High-Speed Network are rather uninfluenced by the transport political context.