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TRANSPORT CONSULTANTS

Etude sur les Réserves de Capacité d'Infrastructure pour le Transport Combiné à échéance 2015

Studie Über die Kapazitätsreserven Der Infrastruktur für den Kombinierten Verkehr mit Zeithorizont 2015

Study on Infrastructure Capacity Reserves for Combined Transport by 2015

Prepared for International Union of Railways
Combined Transport Group (UIC-GTC)

Résumé / Synthese / Synopsis

Freiburg / Frankfurt am Main / Paris
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GTC

GROUPE DU TRANSPORT COMBINE
COMBINED TRANSPORT GROUP
GRUPPE DES KOMBINIERTEN LADUNGSVERKEHRS

STUDY ON INFRASTRUCTURE CAPACITY RESERVES FOR COMBINED TRANSPORT BY 2015

SYNOPSIS

Introduction

In its White Paper, the European Commission speaks of a 38% increase in the intra-European freight transport market (all modes) over the next 10 years. It also predicts an increase in rail freight market share of some 8% to 15% by the 2020 time horizon.

To meet this challenge, a large number of European railway companies have adopted an aggressive strategy in which combined transport plays a key part. In contrast to the trends in rail freight, rail-road combined transport more than doubled between 1988 and 2002, rising from 14 to 44 million tonnes.

These figures demonstrate that to cope with the growth projected in the White Paper, and enable the railway companies to put forward tailored and competitive products on the market, it is vital to ensure sufficient availability of infrastructure capacity.

Scope of the study

The aim of the study, commissioned by the Combined Transport Group (GTC) of the International Union of Railways (UIC) and supported by the International Union of Rail-Road Companies (UIRR), is to help identify the measures which should be taken by transport stakeholders (political decision-makers, railway undertakings, operators, infrastructure managers) to ensure the rail network and terminals can accommodate the increased demand for combined transport.

Methodologically, the capacity analysis was applied to 18 trans-European freight corridors and 30 terminal areas to cover approximately 80% of the freight traffic on the European network.
With regard to the corridors the study performed the following tasks:

- Snapshot of the 2002 situation in terms of volumes and in terms of the intermodal traffic structure.
- Volume forecast and traffic structure by the 2015 time horizon.
- Investigation into the enhancement investments scheduled or already in progress for the rail network and combined transport terminals by 2015.
- Evaluation whether the 2015 infrastructure capacity (rail network, intermodal terminals) will be sufficient to absorb the increased demand for international combined transport.
- Recommendations on additional enhancement investments, which would be required if, in 2015, infrastructure capacity were insufficient.
- Recommendations on services and products, which should be implemented by intermodal actors to overcome infrastructure capacity limitations.

The study provides the first analysis of the combined transport sector since AT Kearney's report in 1989.

Analysis of current international combined transport traffic

The base year for the study is 2002. On the selected corridors (see pages 13 and 14), volumes totalled 4,741,653 TEU or 54.5 million tonnes, of which 44.1 mill tonnes (81%) were carried on unaccompanied CT services and 10.4 mill tonnes on accompanied CT services (cf. Table A).

Table A: International combined transport 2002

Market segment	TEU	Net tonnage
Unaccompanied CT	3,483,653	44.1 mill. t
Accompanied CT	1,258,000	10.4 mill. t
Total international CT	4,741,653	54.5 mill. t

The database on **international accompanied CT** includes the 2002 results of all 17 existing "rolling highway" services at that time. They conveyed 547,000 trucks. Of which one third were using services on the Brenner corridor, some 20% on the Tauern axis.

Counted in TEU the volume of **international unaccompanied CT** amounted to approximately 3.5 mill TEU. The investigation into the structure of this market segment resulted in the following findings:

- In 2002, some 40 companies were supplying international unaccompanied CT services on the corridors involved. 49% of the total was allocated to intermodal operators belonging to the UIRR family, 19% to Intercontainer-Interfrigo (ICF), and 32% to various "other" operators. In contrast, some 15 years ago at the time of the AT Kearney report, the European "intermodal world" was almost completely shared by UIRR companies and ICF. Thus the analysis gives evidence that competition is at work in this industry.
- The current volume of unaccompanied CT is pretty concentrated not only on individual corridors but also on services. 100 intermodal services (both ways), which represent 10% of all recorded services, make up more than 80% of the total TEU.
- In 2002, 60% of the total European unaccompanied CT was generated by continental services, and 40% by the hinterland transport of maritime containers. Given that, it is striking that in services between CEEC countries and the EU-15 member states maritime containers made up about 80% of the total volume, while continental shipments reached 20%.

Forecast for international combined transport by 2015

According to our forecast, international combined transport (CT) on the 18 trans-European corridors will increase from 54.5 mill tonnes in 2002 to 116.0 mill tonnes in 2015. (cf. Table B).

Table B: International combined transport 2002/2015

Market segment	TEU (mill)		Net tonnage (mill tonnes)		
	2002	2015	2002	2015	2015/2002
Unaccompanied	3.48	8.7	44.1	103.6	+ 135 %
Accompanied	1.26	1.5	10.4	12.4	+ 19 %
Total	**4.74**	**10.2**	**54.5**	**116.0**	**+ 113 %**

A forecast for international **accompanied CT** must be considered with great care as developments in that market segment depend on the political framework. Until recently, the political context was pretty favourable in the Alpine states of Switzerland and Austria in particular.

Our 2015 forecast assumes that such a framework is due to change and that both subsidies for rolling highway services and quota restrictions on road transport will be significantly reduced or eliminated. On the other hand more qualitative controls of road vehicles and a comprehensive road toll scheme will be enforced. According to our expertise this will lead to a considerable cut down of the number of accompanied CT services, which provide for the following features:

- Focus on high-frequency services, calculated as one departure every three hours, 7 days both ways.
- Services, which bring value to road operators, e.g. compliance with driving hours.

However, international accompanied CT has a chance to survive. It could even grow to a volume of 652,000 trucks carrying 12.4 mill tonnes, which is +19% compared to 2002.

International **unaccompanied CT** is expected to be the more dynamic market segment, with an increase by 2015 to almost 9 mill TEU with a net load of 103.6 mill tonnes. This corresponds to an average annual growth rate of 6.8%. The forecast was based on the following figures and assumptions:

- The starting point was the PROGNOS forecast per country. We then assumed the annual growth rate of international CT 2015/2002 per country. Through discussions with market experts we concluded that CT was likely to witness a stronger growth than road due to major enhancements in rail and intermodal transport such as improved quality, efficiency, and interoperability, and, on the other hand, increased controls of road vehicles and charging of road infrastructure usage.
- In a second step specific aspects of the freight corridors were evaluated in terms of their likelihood to promote or impede CT development (transport policy, topography etc.). We also took into account recent research on the transport-related effects of the EU enlargement and carried out interviews with railways and intermodal operators on the “East-West” issue. These resulted in the following conclusions:
  - A significant CT increase is facilitated on „mature“ CT markets in Western Europe owing to existing market penetration and the robustness of services against economic weakening.
  - A less than proportionate CT growth is to be expected on East-West corridors. A decline is even foreseen in the years following the EU enlargement (cheap trucks

etc.). Unaccompanied CT on these corridors is due to rise only in a medium-term perspective from a current low level.

Compared to 2002 international unaccompanied CT will have more than doubled by 2015. An increase of +135% over 13 years is not as extraordinary as it might appear at first glance especially if one looks at this forecast is the light of the results of the 1988-2002 period. On the basis of the 1988 figures recorded by AT Kearney (1989), having in mind that the geographic scope is not completely congruent with ours, in that 14-year period international CT actually grew by about 215% (see table C).

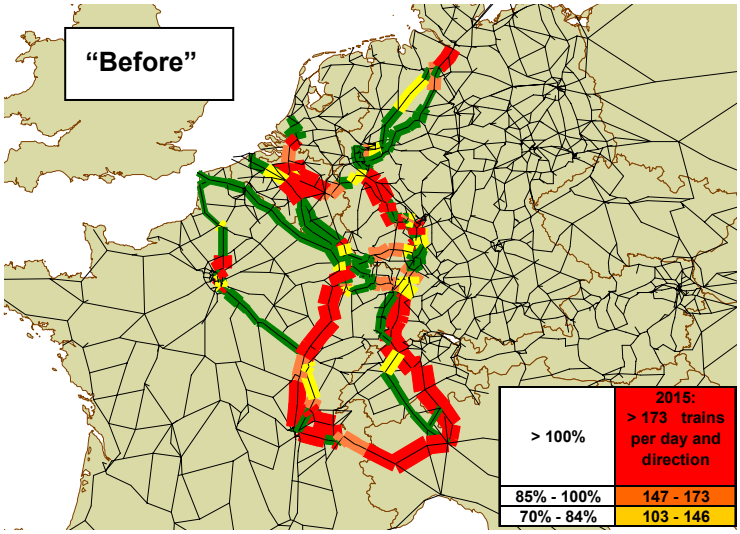
Table C: International unaccompanied combined transport 1988/2002/2015 – a comparison of AT Kearney (1989) with Kessel+Partner/ MVA/KombiConsult (2004) records and prognoses

	1988 (mill t)	2002 (mill t)	2002/1988 (%)	2015 (mill t)	2015/2002 (%)
AT Kearney report	**14.0**	**38.7**	**+ 176 %**	**64.0**	**+ 65 %**
Kessel+Partner/MVA/ KombiConsult report	**-**	**44.1**	**+ 215 %**	**103.6**	**+ 135 %**

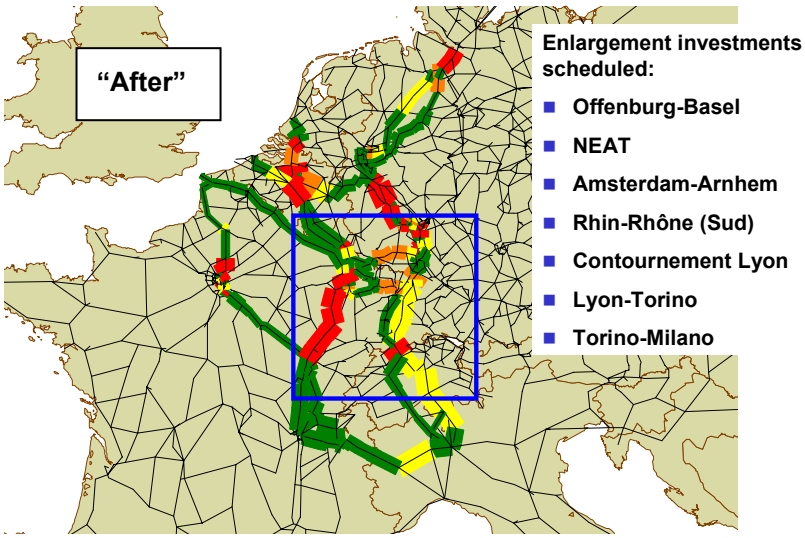
Evaluation of rail network capacity by 2015

The evaluation of the rail network capacity by 2015 was carried out in consecutive steps:

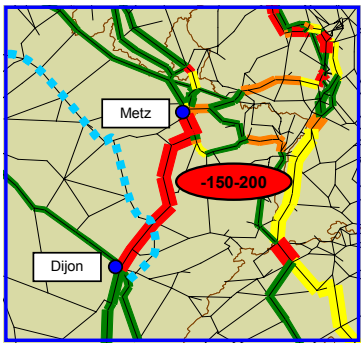
- Assignment of the number of international combined trains in 2015 together with passenger services and other freight trains (national intermodal, national and international conventional freight trains) by 2015 on the European railway network.
- Evaluation of total network capacity requirement per corridor in 2015 and identification of capacity bottlenecks **before** considering investments (cf. example below for consolidated corridors 2,3,15,16,17 UK ⇔ Benelux ⇔ France/Germany/Switzerland ⇔ Italy)



- Evaluation of total network capacity requirement per corridor in 2015 and identification of capacity bottlenecks **after** considering scheduled investments.



- Evaluation of **remaining bottlenecks** and detailed recommendations of actions (cf. example below for the Metz-Dijon area in France)



Actions:

1. Enlarge Metz-Dijon
2. Magistrale Eco Fret

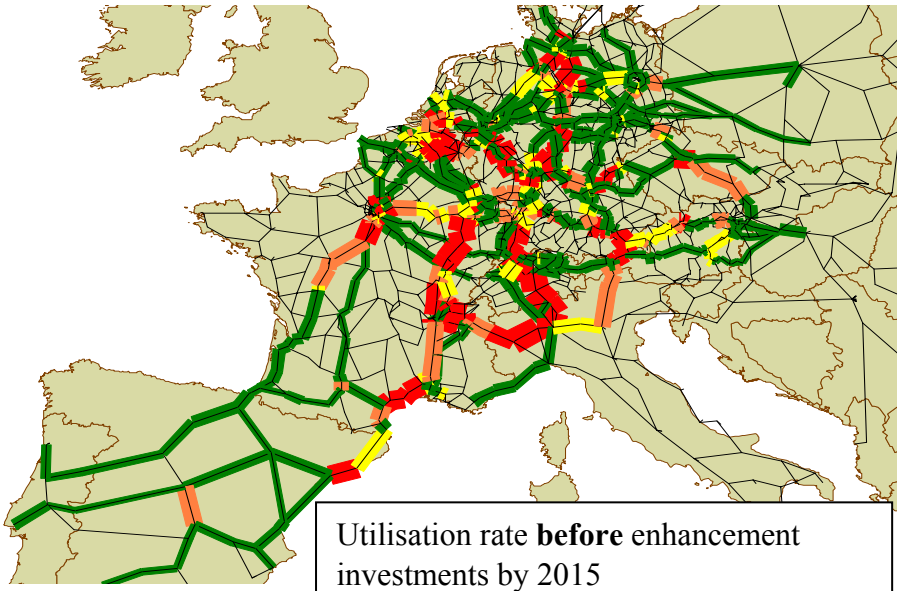
The report presents these evaluation steps for each corridor in detail, thus a full inventory of all foreseeable capacity bottlenecks by 2015 is available with the study. Particularly, it provides for each of the 18 trans-European corridors

- rail network capacities (train operating capacity),
- national/international network enlargement schedules,
- utilisation rate (for each section) broken down by type of rail product particularly including the forecast on international CT trains
- quantitative results of capacity bottlenecks (lack of train paths) before/after enlargement investments scheduled.

The report also contains:

- recommendations for further rail infrastructure enhancements to ensure traffic shift towards rail,
- recommendations for alternative routings on less utilised lines if applicable.

To serve the purpose of this summary, the following figures give an overview of the utilisation rate of the European rail network as a whole, **before** and **after** investments.

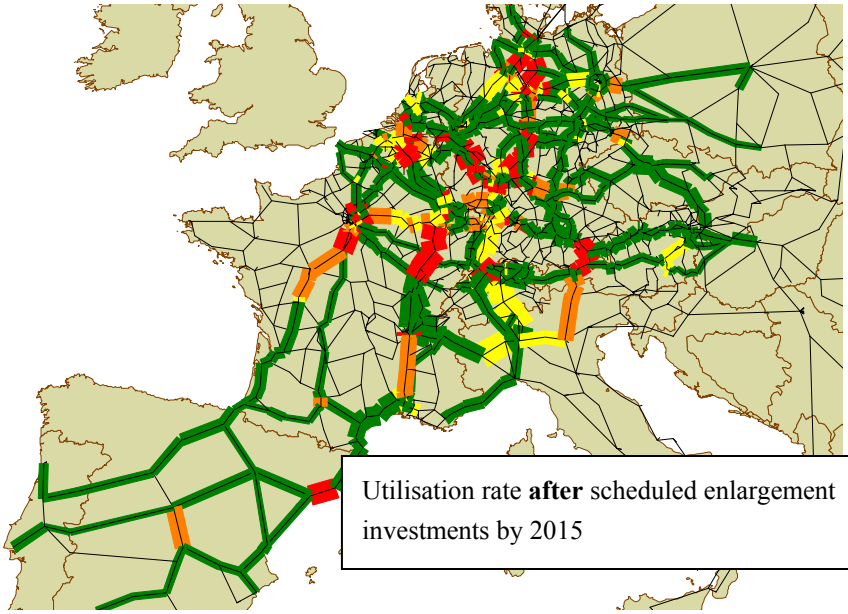


Utilisation rate **before** enhancement investments by 2015

The study clearly shows that even if all planned infrastructure investments are realised by 2015, considerable bottlenecks (lack of capacity for operating daily trains) would remain (cf. figure below). This would be exacerbated if capacity enhancements programmes regarding train and line capacity parameters, sometimes regarded as ambitious, were not achieved. In that case network bottlenecks would increase further. This summary points out the major bottlenecks (see table E).

Table E: Main international rail axes with bottlenecks by 2015

Country	**Main axes with bottlenecks**
Germany	Hamburg – Rhein/Main
	Köln – Rhein/Main
	Saarbrücken – Stuttgart
France	Metz – Dijon
	Lyon – Avignon
	Paris – Orléans – Tours
Belgium	Freight corridors from/to Anvers
Switzerland	Greater Basel area
Spain	Barcelona-Tarragona



Utilisation rate **after** scheduled enlargement investments by 2015

- In combination with the figures, the table E clearly shows that these bottlenecks are located on the major European freight corridors and that, consequently, the elimination of these obstacles is of great strategic significance for European transport. Consequently, the planned infrastructure investments must focus on eliminating these bottlenecks, which are crucial for entire CT network („Achilles' heels").
- The study shows the necessity to implement enhancement programmes on time. If these are not achieved, the growth of CT and rail will be impeded.
- Since the study provides quantitative results regarding bottlenecks (lack of train paths) before/after planned investments, it enables to calculate the losses in terms of volume (and revenue) which are likely to be incurred if network capacity is restricted.
- To conclude, it has become apparent that considerable efforts will be required until 2015 to cope with the increase in transport volumes.

Evaluation of intermodal terminal capacity 2002-2015

The capacity assessment of intermodal terminals has been performed in six sequential steps:

- Identification of representative European intermodal terminals.
- Analysis of total handling volume (2002).
- Analysis of the 2002 handling capacity and utilisation rate.
- Survey of scheduled capacity extension programmes and terminal investments.
- Deduction of 2015 capacity needs (target) from the forecast.
- Determination of additional terminal infrastructure investment needed to comply with forecasted volumes.

This study analysed 34 transport areas on the 18 trans-European corridors, representative of the network of terminals for unaccompanied combined transport services. They include the 25 largest transport areas and 9 end-of-corridor areas, which are relevant for intermodal services beyond the limits of the 18 corridors selected. These areas cover 70 individual terminal sites representing some 85% of the total 2015 volume of international unaccompanied combined transport (see table F).

The result of the 2002-2015 survey is a unique inventory composing of

- 2002 handling volume broken down by international and domestic services.
- 2002 transhipment capacity, handling features (handling equipment & tracks etc.), and rate of employment.
- forecast of 2015 transhipment capacity need.
- 2015/2002 enlargement schedules.
- „Capacity gap“: additional capacity needs by 2015.

Table F: Top 25 transport areas with respect to international unaccompanied CT by the year 2015

N°	Transport area	Export [1,000 t]		Import [1,000 t]		Growth rate	
		2002	2015	2002	2015	2015/2002	p.a.
1	Milano	4.402	11.477	4.908	12.566	158%	7,6%
2	Rotterdam	3.176	6.960	3.450	7.717	122%	6,3%
3	Köln	3.338	7.811	2.184	4.870	130%	6,6%
4	Verona	2.123	5.225	2.642	6.522	147%	7,2%
5	Antwerpen	2.574	6.355	2.283	4.934	132%	6,7%
6	Hamburg	2.384	6.335	2.241	4.585	136%	6,8%
7	Novara	1.677	4.382	2.238	5.862	162%	7,7%
8	Praha	1.141	2.277	1.288	2.580	100%	5,5%
9	Mannheim/Ludwigshafe	1.279	3.070	646	1.521	138%	6,9%
10	Zeebrügge	953	2.441	730	1.849	155%	7,5%
11	Paris	830	2.004	759	1.866	144%	7,1%
12	Basel	982	1.923	978	1.863	93%	5,2%
13	Barcelona	517	1.460	662	2.047	197%	8,7%
14	Valencia	558	1.328	587	1.714	166%	7,8%
15	Genk	663	1.769	449	1.217	169%	7,9%
16	Nürnberg	602	1.436	551	1.297	137%	6,9%
17	Neuss	710	1.500	529	1.084	109%	5,8%
18	Bremen/Bremerhaven	623	1.643	463	874	132%	6,7%
19	Roma	301	781	586	1.519	159%	7,6%
20	München	479	1.200	395	989	151%	7,3%
21	Duisburg	605	1.275	440	894	108%	5,8%
22	Wien	311	678	623	1.370	119%	6,2%
23	Wels	379	795	495	1.073	114%	6,0%
24	Budapest	408	749	553	1.051	87%	4,9%
25	Ljubljana	466	736	518	840	60%	3,7%
Subtotal 1.-25. (~72%)		31.480	75.609	31.196	72.706	137%	6,9%
Other transport areas		12.391	28.017	12.549	28.794	126%	6,5%
Total volume		43.870	103.626	43.744	101.499	134%	6,8%

The total transhipment **volumes** in these 34 transport areas is forecast to increase by 80% from 6.3 mill intermodal load units (2002) to 11.4 million units (2015). Investigations into enlargement programmes proved that a large scope of investments is scheduled or already in progress, both extending existing sites or building new terminal sites. According to that, the nominal total transhipment **capacity** is due to rise from 9.6 million units (2002) by 39% to 13.3 mill load units. Despite these ambitious enlargement programmes, capacity gaps are likely to arise in 20 out of 34 transport areas by 2015 (table G).

As a consequence, on top of the investments scheduled another 13% of transhipment capacity enabling to handle 1.7 mill units p.a. is required to meet the increasing demand for unaccompanied CT services, and to maintain a high quality of service towards intermodal customers.

Table G: Terminal capacity bottlenecks (gaps) by transport area by 2015

Country	Transport area	Capacity 2015	Total volume 2015	Rate of employment	Probable capacity gap 2015
AT	Graz	130.000	137.000	105%	33.000
	Villach	110.000	121.000	110%	33.000
	Wels	132.000	181.000	137%	75.400
	Wien	300.000	282.000	94%	42.000
BE	Antwerpen	940.000	614.000	65%	
	Genk	122.000	150.000	123%	52.400
	Zeebrugge	365.000	306.000	84%	14.000
CH	Basel	390.000	238.000	61%	
CZ	Praha	200.000	288.000	144%	128.000
DE	Bremen/Bremerhaven	1.060.000	813.000	77%	
	Duisburg	318.000	166.000	52%	
	Hamburg	1.200.000	1.222.000	102%	262.000
	Koeln	300.000	517.000	172%	277.000
	Luebeck	140.000	101.000	72%	
	Muenchen	320.000	283.000	88%	27.000
	Neuss	140.000	146.000	104%	34.000
	Nürnberg	320.000	195.000	61%	
	Mannheim/Ludwigshafen	346.000	443.000	128%	166.200
DK	Taulov	120.000	130.000	108%	34.000
ES	Barcelona	348.000	307.000	88%	28.600
	Madrid	192.000	140.000	73%	
	Valencia	236.000	288.000	122%	99.200
FR	Le Havre	39.000	127.000	(a)	(a)
	Paris	658.000	270.000	41%	
HU	Budapest	300.000	263.000	88%	23.000
IT	Bologna	235.000	155.000	66%	
	Milano	1.057.925	1.130.000	107%	283.660
	Novara	805.000	478.000	59%	
	Verona	780.000	551.000	71%	
NL	Rotterdam	1.400.000	993.000	71%	
PL	Gliwice	32.000	57.000	178%	31.400
	Poznan	65.000	53.000	82%	1.000
	Warszawa	60.000	79.000	132%	31.000
SI	Ljubljana	150.000	87.000	58%	
Total terminals		13.271.925	11.184.000	84%	1.675.860

Conclusions and recommendations

This study into international combined rail-road transport on 18 trans-European corridors shows that combined transport market segment is likely to expand over the 2002-2015 period from 54.5 to 116 mill tonnes.

The likelihood that the 2015 forecast for accompanied CT services (19% increase to 12.4 mill tonnes), will come true, depends, to a large extent, on the implementation of administrative and transport policy measures described in the report.

In contrast to that, international unaccompanied CT is less dependent on a favourable political framework than on imminent improvements of the intermodal and rail industry, particularly as regards service quality, efficiency, and cross-border coordination. This market segment has a long-standing experience in responding to market requirements appropriately. So the forecast for unaccompanied CT (135% increase from, in 2002, 44 to

104 mill tonnes by 2015) appears to be rather conservative, particularly compared to the 215% growth witnessed over the 1988-2002 period.

In order for rail to be able to absorb the forecasted growth for international CT, increased capacity is required both in terms of the rail network and intermodal terminals.

Rail network

With respect to the rail network the study came to the following general conclusions and recommendations:

- The study proves how crucial it is to implement the infrastructure enlargement investments planned between now and 2015.
- Further rail infrastructure enlargement actions, which are described in detail in the report, should urgently be implemented to ensure modal shift towards rail.
- Should these measures not be achieved, the growth for CT and rail freight in general would be impeded.
- Infrastructure investments should particularly focus on eliminating bottlenecks.
- The results of the capacity analysis enable to calculate the losses in terms of volume (and revenues) which are likely to be incurred if the network capacity is restricted.

In addition to these most significant "messages" resulting from the study, we recommend further actions primarily towards **infrastructure managers** such as

- Construction of dedicated freight lines (e.g. B-Cargo: Athus-Meuse).
- Priority networks for rail freight services including adaptation investments (e.g. DB Netz „Netz 21").
- Avoid dismantling of overtaking tracks or flyovers, which are currently under-utilised. It allows operational flexibility.
- Investigate the cost and benefits of enlarging the loading gauge on a few main routes to P/C 400 particularly in France and Central/South Italy.

If, despite of all, railway undertakings and intermodal operators were forced to cope with rail infrastructure bottlenecks the study recommends various "soft tools". The "tool box", which was elaborated, contains various intelligent actions applicable by **railway undertakings and/or infrastructure managers** such as

- Homogenization of train path scheduling (B-Cargo/CFL/SNCF: Anvers-Basel)
- Bi-directional traffic (ÖBB)
- Interoperable production system (Railion/SNCF: KMML project)
- Increased train length (LIIIFT project)
- High and sustainable reliability of service

In this respect the authors of the report are convinced that, with the railways involved, there is less a lack of „best practices" as concerns coping with limited infrastructure capacity than a lack of dissemination and mutual learning.

Apart from infrastructure managers and railway undertakings, the **intermodal operators**, too, have a variety of measures at their disposal to improve the utilisation of rail infrastructure:

- Substitution of the original/final road leg by rail (Verona to Bologna etc.) or shifting of volumes from international key terminals to other locations and extending the rail service network.
- Enforcement of capacity management system (CMS) to improve train load factor.
- Substitution of less efficient rail products for international CT services e.g. accompanied by unaccompanied CT services.
- Efficient production systems to bundle volumes, like GATEWAY, Y-shuttle or other hub services.
- Examining the application of mixed trains to raise the bundling effect.
- Advanced wagon technologies to raise payload factor.
- Finally, raise customer satisfaction to catch shippers' base volumes currently carried by trucks to achieve more regular volumes.

Intermodal terminals

According to the findings of the study, there will be a transshipment capacity gap for 1.7 mill load units by 2015. In relationship to the enlargements planned, an overall extra capacity of 13% would be required to meet the CT demand and ensure a high quality of services. However, this capacity gap at intermodal terminals by 2015 appears to be less severe than on the rail network, provided that the enlargement schedules are realized on time. We therefore recommend the following actions towards **terminal investors**:

- It is crucial that enlargement investments are taking place on time to avoid temporary capacity shortages: calculate sufficient time for planning, approval procedures and financing, construction and opening of the enlarged terminals and their access infrastructure.
- Being the interface between road and rail, the terminal is the most crucial part of the CT supply chain. Sufficient handling capacity is thus a prerequisite for ensuring high performance: allow capacity reserves to prevent the terminal from becoming the bottleneck.

A range of "soft tools" is also available to **terminal operators** to overcome some infrastructure constraints:

- The most crucial factor is having qualified terminal management and staff. The "human factor" is probably the most important driver for an efficient use of infrastructure.
- Actions to optimize capacity utilisation on intermodal terminals, e.g. by enhancements of process organization and operations (clear definition of roles and interfaces) supported by an IT terminal management system
- Creation of "public" terminals operated by "neutral" companies permitting non-discriminatory access to operators, since this will create a bundling effect.

Apart from capacity-related aspects two other issues were identified and would benefit from further analysis:

- A lack of international coordination in terminal investments may jeopardize the growth of international CT.
- The domestic combined transport in various European countries plays an important role, which could even grow by 2015. Investigations into domestic CT were excluded from the forecast as they fell outside the scope of the study. Since, domestic flows do require infrastructure, investigating this segment more in depth would be worthwhile.

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The study was carried out by a team of consultants from Kessel+Partner, KombiConsult, and MVA, headed by Kessel+Partner. For the execution a working group, which met regularly, has been established composing of representatives of the commissioners and the consultants, as follows:

- Ms. Sandra Géhénot, UIC-GTC
- Mr. Eric Peetermans, UIC-GTC (B-Cargo)
- Mr. Javier Casanas, UIC-GTC (Trenitalia Cargo)
- Mr. Martin Burkhardt, UIRR
- Mr. Hans-Paul Kienzler, Kessel+Partner
- Mr. Rainer Mertel, KombiConsult
- Mr. Klaus-Uwe Sondermann, KombiConsult

Table 1.1: Trans-European reference corridors of this project

Corridor		Via…
1	Benelux, Germany, Switzerland, Italy	
2	Benelux, France, Switzerland, Italy	Bettembourg/Athus, Metz, Basel
3	Benelux, France, Italy	Bettembourg/Athus, Metz, Modane
4	Benelux, France, Italy	Paris, Modane
5	Scandinavia, Germany, Austria Italy	
6	Germany, Poland	
7	Benelux, Germany, Czech Republic, Slovakian Republic	
8	Benelux, France, Spain	Paris, Bordeaux, Hendaye
9	Benelux, France, Spain	Paris, Dijon, Lyon, Cerbère
10	Germany, France, Spain, Portugal	Cerbère and Hendaye
11	France, Germany, Austria, Hungary	Le Havre/Forbach or Paris/ Basel
12	France, Hungary	Switzerland
13	United Kingdom, France, Spain	Cerbère or Hendaye
14	United Kingdom, France, Germany, Austria, Hungary	Calais, Metz or Forbach
15	United Kingdom, France, Italy	Paris or Metz or Modane
16	United Kingdom, France, Switzerland, Italy	Metz, Strasbourg or Basel
17	United Kingdom, France, Belgium, Germany, Switzerland, Italy	
18	Italy, France, Spain	Modane or Ventimiglia/ Cerbère or Hendaye

Figure 1.1: Trans-European reference corridors of this project (red links)