Developing **I**nfrastructure and **O**perating **M**odels for **I**ntermodal **S**hift

Workpackage A1
Trends in Domestic Combined Transport

Frankfurt am Main - Freiburg

November 2006

KombiConsult
beraten planen umsetzen

KP Transport Consultants
Hans-Paul Kienzler

ISBN 2-7461-1277-9

Warning

Contents

1 Objectives and methodology

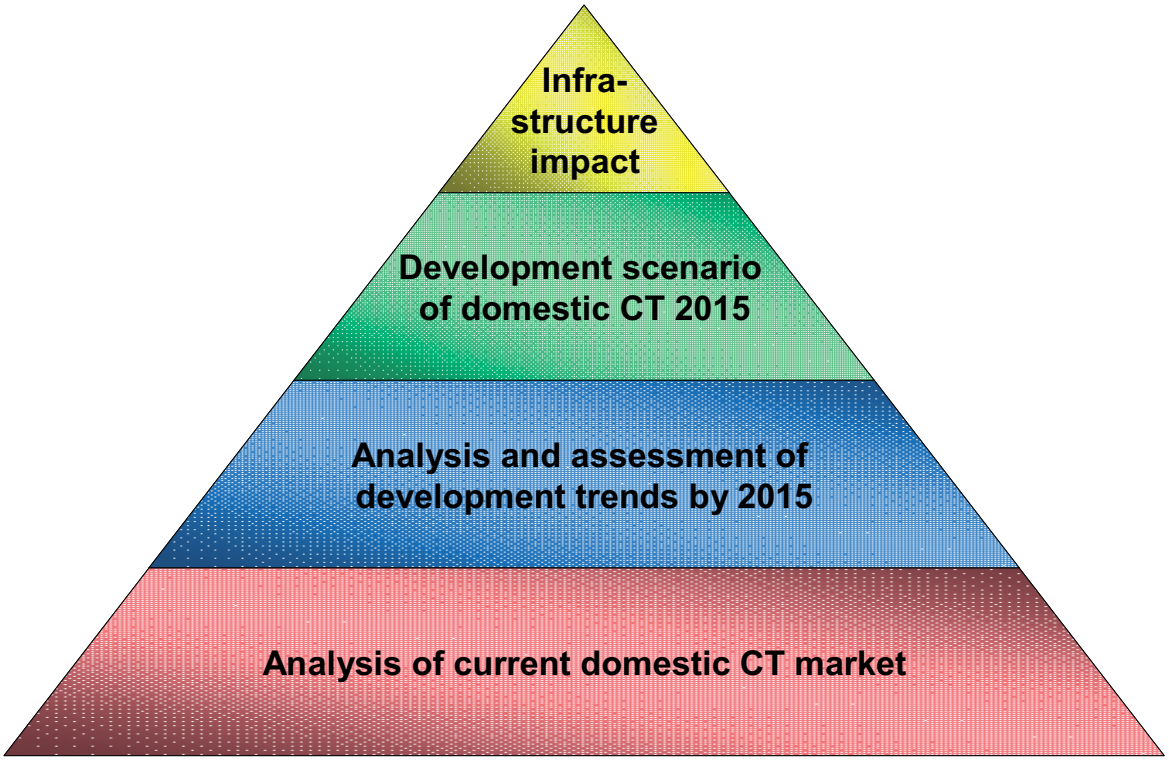
The UIC study on “Infrastructure Capacity Reserves for Combined Transport by 2015“, which was completed in May 2004, dealt with international combined transport (CT) but explicitly excluded an in-depth analysis of the future development of domestic combined transport services in European countries and their impact on the rail infrastructure network. For some countries this is likely to be of minor relevance since domestic combined transport is supposed to continue to be a “quantité négligeable” owing to the nature of the transport market or regional economic factors. In other European countries, domestic CT currently does play or in future may play a significant role and achieves a volume of shipments and trains, which is relevant for the infrastructure capacity utilization.

This study therefore has analyzed the current domestic combined transport trends, established a forecast for demand with a 2015 time horizon and assessed the impact on infrastructure capacity in selected European countries, which are on the corridors covered by the “Capacity Study” and in which major bottlenecks were identified: Austria, Belgium, France, Germany, Italy and Switzerland. Taking into account the research approach employed for the 2004 UIC study on international combined transport and in a recent KombiConsult project a common methodology had been agreed upon (cf. **Fig. 1-1***)*.

The analysis looked at official transport statistics and likely development trends for overall freight transport in the countries involved. By means of interviews with specialists, the most probable assumptions with respect to determining factors have been documented and translated into specific rates of development for the various market segments of domestic combined transport up to the year 2015. The forecast has then been validated in workshops with stakeholders from the selected countries.

The co-ordinated results concerning the development of the volumes of domestic combined transport were applied to calculate the impact on the utilisation of rail and terminal infrastructure. Finally, the results of this investigation and of the previous “Capacity Study” on international combined transport have been put together to produce an overall picture of the utilisation of rail capacity in the selected countries and on trans-European corridors.

Figure 1-1: Methodology of study



2 Trends in domestic combined transport in Austria

2.1 Overview of combined transport market in Austria 2005

In 2005, the volume of combined rail/road traffic in Austria totalled 23.62 million gross tonnes (cf. **Fig. 2-1**). Almost 17.5 million tonnes or 74 per cent of the total were carried on unaccompanied services corresponding to an estimated number of 1.66 million TEU. During the recent years this combined transport mode saw rather constant growth rates. From 1997 to 2005 it could almost double its volume (cf. **Fig. 2-2**).

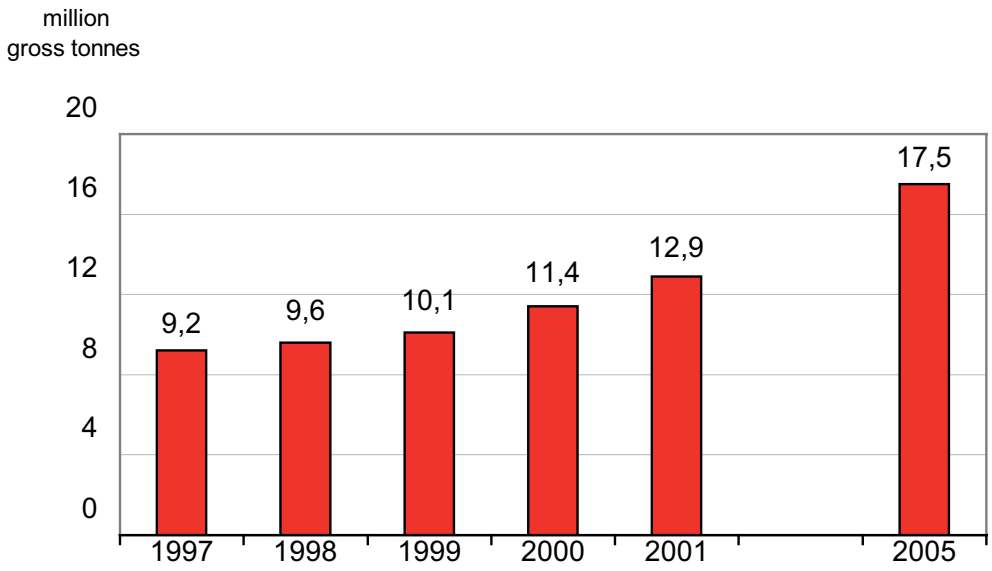
Figure 2-1: Combined rail/road transport volume in Austria: 2005

Combined transport market segment	2005		
	TEU	million gross tonnes	Percentage
Unaccompanied combined transport	1,661,600	17.47	74.0%
Domestic CT	348,900	3.12	13.2%
International CT	627,700	6.43	27.2%
CT transit through Austria	685,000	7.92	33.5%
Accompanied combined transport	458,200	6.15	26.0%
Total combined transport	2,119,800	23.62	100.0%

In spite of this overall trend the percentage of domestic intermodal traffic in Austria has remained comparatively small. In 2005, trains moved 3.12 million tonnes of goods within Austria corresponding to 13 per cent of the total volume. Cross-border unaccompanied traffic including transit through Austria, however, accounted for more than 14 million tonnes (60.7 per cent).

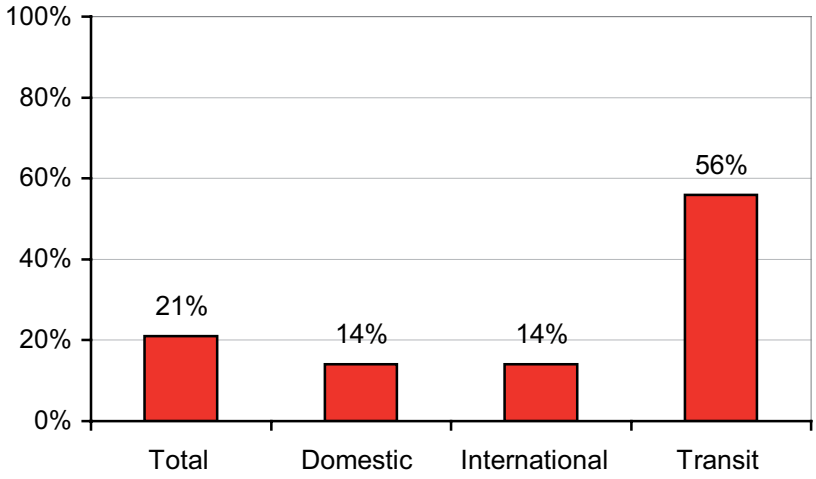
Compared to most of the other European countries, a remarkably high percentage of 33.5 per cent of all combined transport shipments were conveyed on unaccompanied transit services through Austria. This shows Austria's outstanding function as a turntable for trans-European freight flows the more as the majority of the accompanied traffic totalling 6.1 million tonnes also was a shift of road transit to rail.

Figure 2-2: Unaccompanied combined rail/road transport in Austria: 1997-2005



Against the European trend, in Austria, rail has maintained a high percentage of about 35 per cent of total freight traffic. 31 per cent of the total volume of rail freight services of 82 million gross tonnes accounted for combined transport, alone 21 per cent for unaccompanied services. Even more than 50 per cent of the Austrian rail transit has been performed by unaccompanied intermodal trains (cf. **Fig. 2-3**).

Figure 2-3: Share of unaccompanied combined transport of total rail freight per market segment: 2005



2.2 Analysis of current domestic combined transport in Austria

2.2.1 Legal framework of combined transport in Austria

The transport policy of Austria is strongly committed to environmental objectives. In order to protect people and the natural resources environmental-friendly modes of freight traffic such as rail and combined transport are promoted by a variety of legal and administrative actions. As concerns combined transport the most effective measures are the increased maximum gross weight of road vehicles employed for terminal haulage services, financial aids for the construction of intermodal terminals and the compensation of costs incurred by railway undertakings for services that are of public interest. Most of the aids and regulations, which are briefly described in **Fig. 2-4**, contribute to reducing the total cost of intermodal chains of transport and improving the competitiveness of the system compared to through-road operations.

Figure 2-4: Administrative incentives for combined transport in Austria

	Action	Legal basis	Impact on CT	Who can benefit	Period
Financial aid	Grants for combined transport facilities, systems and mobile equipment necessary for CT, feasability studies, external training costs	Programm zur Förderung des Kombinierten Güterverkehrs Straße-Schiene-Schiff	Reduction of total CT cost, improved cooperation of road, rail and ship, optimisation of traffic flow	All transportation, handling and logistic companies operating in Austria	2003 - 2008
	Grants for combined transport infrastructure	Förderung von Investitionen in den Bau, Ausbau und die Modernisierung von Einrichtungen für den Umschlag Straße/Schiene und Straße/Schiff im KV	Reduction of terminal handling and, consecquently, total CT transport cost	All European transportation companies operating in Austria	2006 - 2012
	Compensation of public services, BMVIT orders public services in CT	Vertrag über die Bestellung und Erbringung gemeinwirtschaftlicher Leistungen	Reduction of oeprational cost of unaccompanied and accompanied CT	Railway companies (2005: unaccompanied CT: 18 mill. €; accom-panied CT: 28 mill €)	ongoing
Fiscal aid	Exemption from road vehicle tax	Kraftfahrzeugsteuergesetz	Moderate reduction of total cost of unaccompanied	Owner of road vehicle employed on CT services	ongoing
Regulatory policy	Increased max gross weight of road vehicle for pick-up & delivery (41t semi trailer, 44t container/swap bodies)	Kraftfahrgesetz	Increased payload, potential for increased revenues	Every company using CT services	ongoing
	Exemption of road pick-up and delivery hauls from weekend, holiday and night driving ban	Kraftfahrgesetz	Pick-up and delivery of intermodal shipments during restricted periods	Every company using CT services	ongoing

2.2.2 Overview of domestic unaccompanied combined transport in Austria

The key actor in Austria's domestic combined transport is *Rail Cargo Austria (RCA), ÖBB's* rail freight subsidiary. It fulfils multiple tasks:

- provision of rail traction services,
- supply of a rail production system for combined transport services,
- combined transport operator,
- combined transport terminal operator.

About 95 per cent of the total domestic intermodal volume is carried on *RCA* trains. Apart from a Wels-Wien dedicated block train service *Rail Cargo Austria*, and this is a distinctive feature of Austria compared to other western European countries, moves all shipments in a joint rail production system both for intermodal and conventional rail services. It practically covers the entire Austrian network and allows to forward intermodal shipments to intermodal terminals as well as to private rail sidings.

This production scheme is an "open" system, which, in 2005, has mainly been used by the intermodal operators *Intercontainer Austria*, *Ökombi* and *Kombiverkehr* but is also available to other customers, forwarding agents in particular. In this respect *Rail Cargo Austria* acts as a combined transport operator in its own right.

With this production system *Rail Cargo Austria* serves both continental shipments and maritime containers in hinterland transport though domestic container hinterland transport, in the original meaning of the word, is impossible in Austria owing to the lack of a direct sea access. Consequently all maritime containers, which are moving on domestic intermodal services, were transhipped from international trains arriving in Austria or are bound for foreign sea ports. In 2005, about 43 per cent or 1.32 million gross tonnes of the total domestic combined traffic volume were containers shipped on those Gateway services. This figure includes the tonnage conveyed by another operator, *Wiener Lokalbahn* (*WLB*), in this market segment (cf. **Fig. 2-5**).

Continental shipments in domestic combined transport moved 1.8 million gross tonnes in the year 2005 thus maintaining a small lead over hinterland traffic. This result also takes account of the shipments conveyed by *Salzburger Lokalbahn* (*SLB*).

Figure 2-5: Domestic unaccompanied combined rail/road transport volume in Austria: 2005

Domestic combined transport (CT) market segment	2005			
	Gross tonnes	Percentage	TEU	Percentage
Continental CT	1,800,000	57.7%	194,470	55.7%
Container hinterland CT	1,320,000	42.3%	154,390	44.3%
Total domestic CT	**3,120,000**	**100.0%**	**348,860**	100.0%

2.2.3 Container hinterland combined transport

In 2005, more than 154,000 TEU of containers were carried in domestic container hinterland traffic in Austria. These transports are the pre- or end-haulages by rail preceding or following an international intermodal journey between a foreign port and a transhipment centre in Austria. Since many years the German container ports of Hamburg and Bremerhaven by far are the most important ports for Austria's containerized cargo flows. All economic centres basically are served at least by one daily service. As a result, the domestic container volume also primarily relies on international services with these ports. Considerably smaller impacts have container services with the ports of Rotterdam, Koper and Trieste.

Intercontainer Austria (*ICA*) clearly is the market leader for international container hinterland services (cf. **Fig. 2-6**). Most of the services are supplied in partnership with the German intermodal operator *Transfracht*.

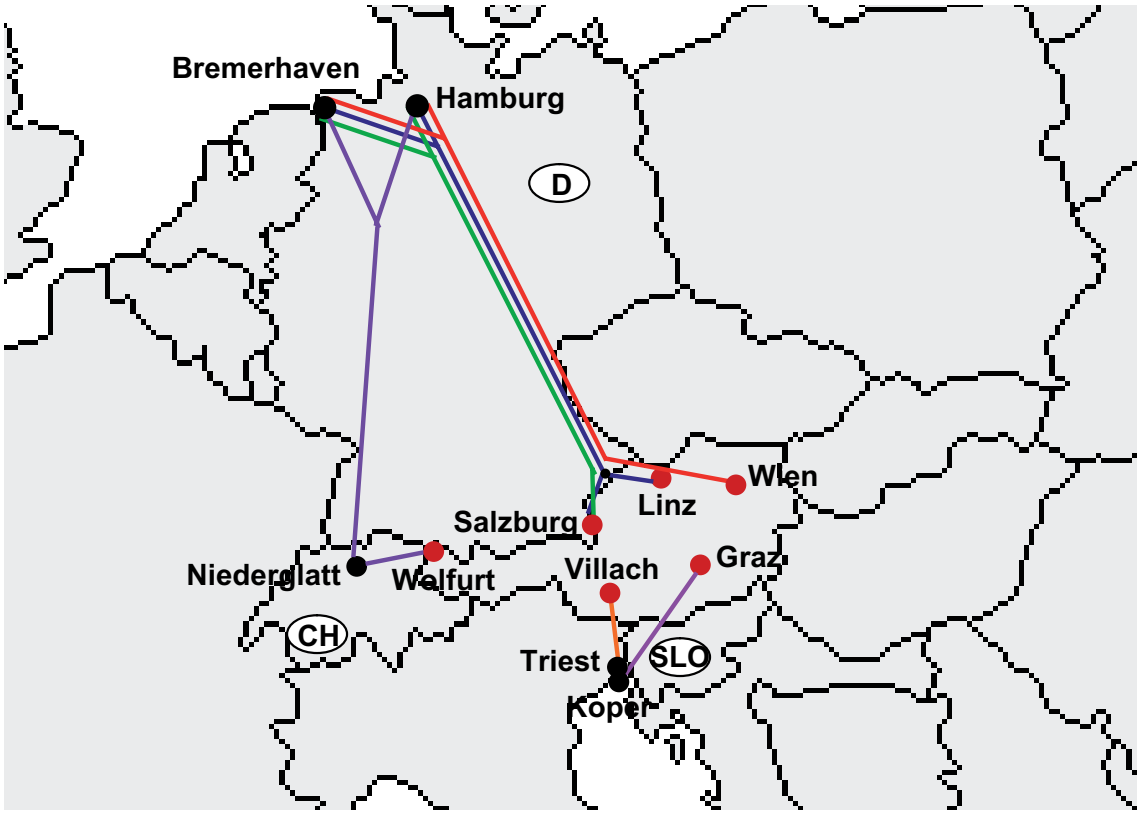
The major gateways to domestic services are Enns, Graz, Linz, Salzburg, Villach, Wels and Wien. By far the largest percentage maintains the terminal of Salzburg. Domestically, all maritime containers apart from those shipped on the block train service Enns-St. Michael, which is operated by *Wiener Lokalbahn*, are conveyed on *Rail Cargo Austria*'s multi-purpose domestic trains. For container transports this system generally is considered to have the following strengths:

- Competitive port-to-door transit times and costs.
- Bundling of container flows with other intermodal shipments and conventional wagonload traffic allows to offering a network of daily services covering the entire

country thus serving also areas with smaller economic activity.

- The system responds to a wide-spread request from the industry to receive or forward containers at their private rail sidings.

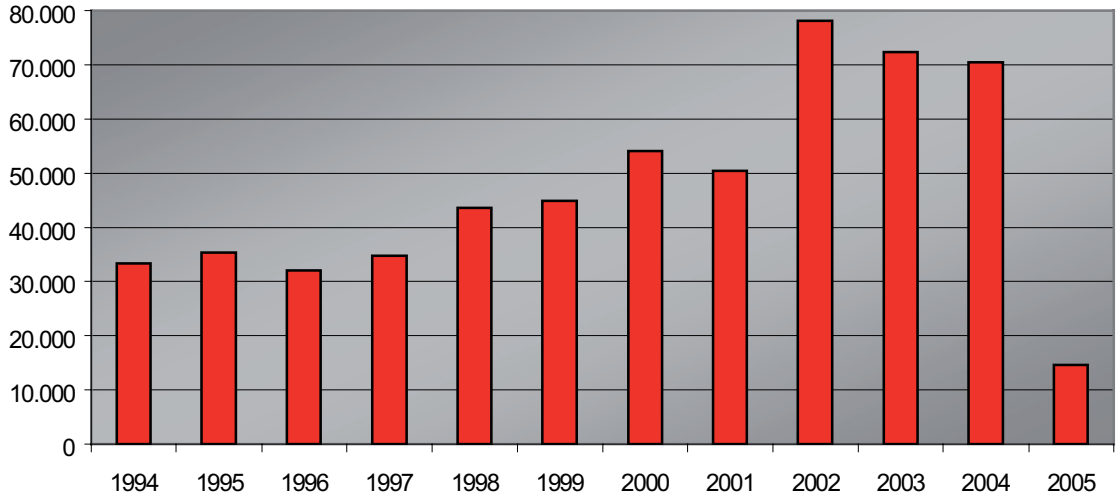
Figure 2-6: ICA international container block train services from/to Austria: 2005



2.2.4 Continental combined transport

During most of the last 20 years *Ökombi* was the main supplier of domestic continental services in Austria. In contrast to countries such as Germany or Italy where at the end of the 1990's the volumes in this market segment dropped sharply, in the same period *Ökombi* almost doubled the amount of shipments and achieved an all-time high of approximately 80,000 shipments in 2002 (cf. **Fig. 2-7**). In 2005, *Ökombi* lost about 75 per cent of its domestic volume. It resulted from *Kombiverkehr's* decision to suspend the long-term partnership in bilateral Austrian-German combined transport and exchange it for an alliance, in the first place, with *Rail Cargo Austria* and then with *Intercontainer Austria.* As things developed *ÖBB* took over *Ökombi's* capital and re-engineered the company to focus on accompanied services.

Figure 2-7: Ökombi's domestic unaccompanied combined transport volume (in shipments): 1994-2005



In spite of these events the total volume of domestic continental combined traffic in Austria didn't decline in 2005. Instead, it increased slightly to 194,500 TEU. Altogether 1.8 million tonnes of goods were moved in this market segment. Whereas, in container hinterland transport, the total domestic tonnage consisted of Gateway shipments it's only 25 per cent of the continental volume. Here a majority of shipments, which we describe as national shipments, really conveyed domestic cargo (cf. **Fig. 2-8**).

Figure 2-8: Domestic continental combined rail/road transport in Austria by segments: 2005

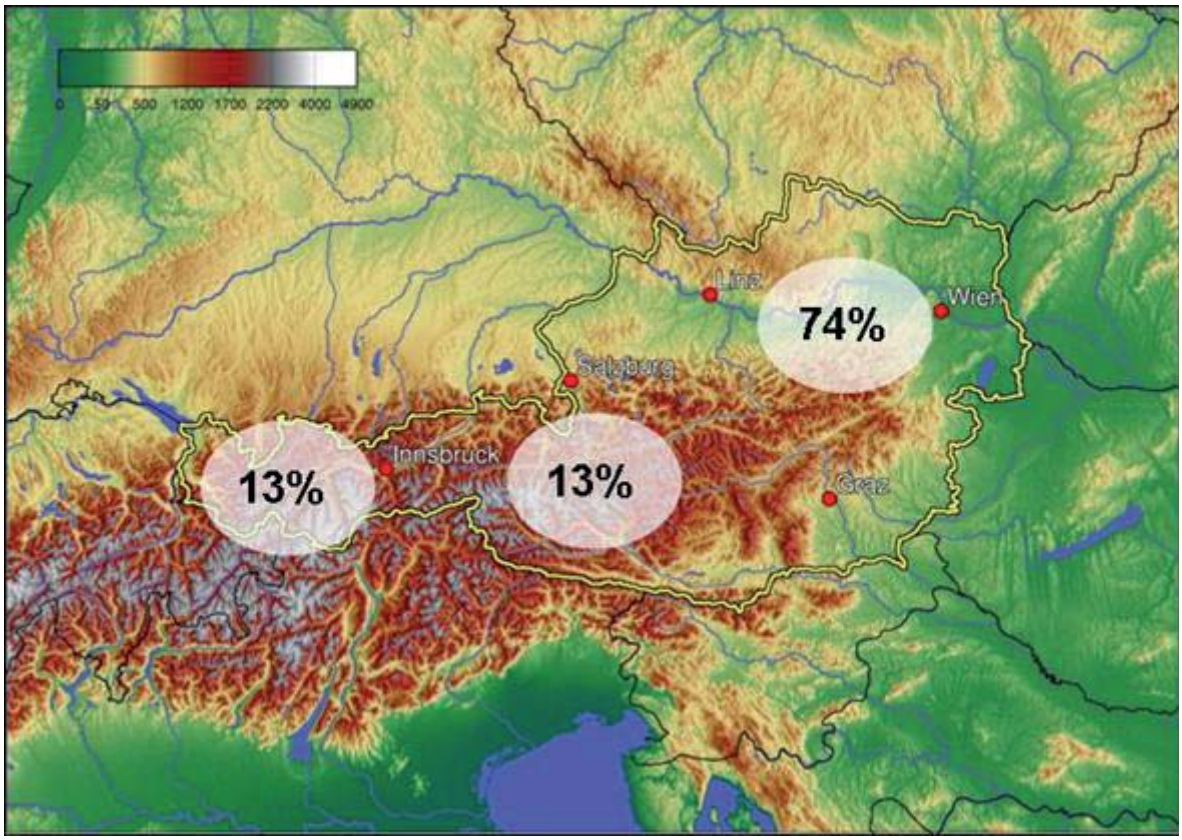
CT market segment	2005			
	Gross tonnes	Percentage	TEU	Percentage
National shipments	1,350,000	75.0%	153,830	79.1%
Gateway shipments	450,000	25.0%	40,640	20.9%
Total domestic continental CT	**1,800,000**	**100.0%**	**194,470**	**100.0%**

(1) National shipments

Compared to a through-operation by road an intermodal chain of transport generates considerably more efforts. In addition to the main rail haul two terminal rail/road handlings and pre- and end-haulages by road are required. It needs low average rail transport cost per shipment to compensate for the additional efforts and be road-competitive. Cost comparisons intermodal versus road clearly show that, on current terms of competition and market price levels, an intermodal chain of transport generally can match road cost at ***total*** transport distances of about more than 450 to 500 kilometres. For example, in Germany, the mean ***rail*** transport distance of *Kombiverkehr*'s domestic continental traffic was around 580 kilometres, in 2005.

Against this background, Austria's geo-economic conditions make it more difficult to implement viable continental services for national cargo. Though the maximum extension of Austria is about 650 kilometres and the largest transport distance approximately 750 kilometres the majority of freight is carried over rather small distances. This is since 74 per cent of the total population of 8.2 million live in east and northeast Austria (cf. **Fig. 2-9**) where are also most of the economic centres. They are concentrated in a rectangle edged by the cities of Wien, Linz, Salzburg and Graz, within distances of 100 to 350 kilometres. Longer transport distances only are between eastern Austria and Innsbruck, in Tirol, and Bludenz and Wolfurt, in Vorarlberg, which are also areas of major economic activities.

Figure 2-9: Distribution of population in Austria



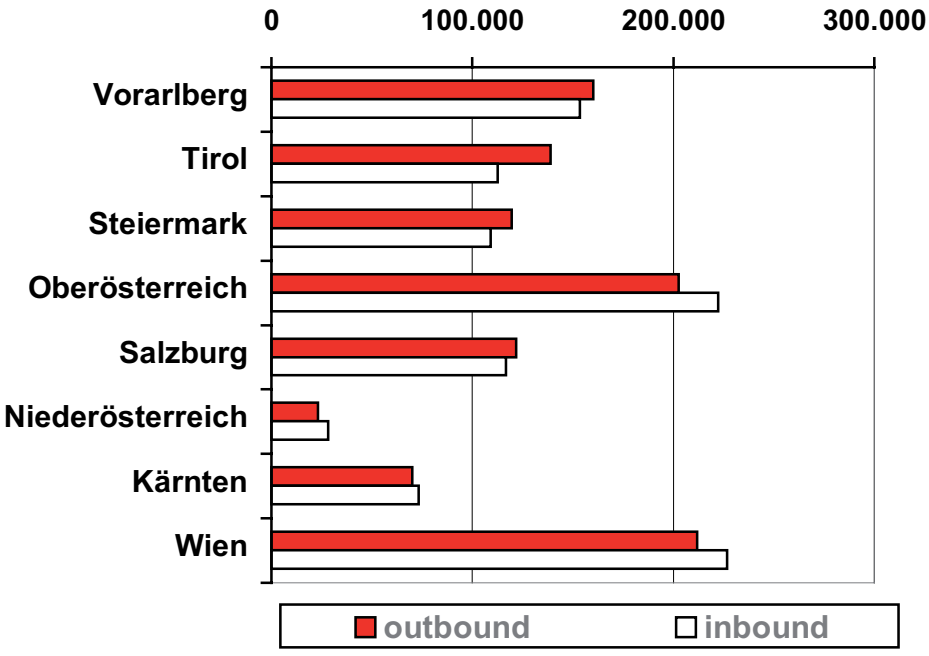
It needs particularly favourable conditions to establish competitive intermodal services in such an environment. Apparently they are given for the *Salzburger Lokalbahn* shuttle service Salzburg–Hüttau. Not only that it is the single block train service for national shipments in Austria it is also an extremely short-haul journey over less than 100 kilometres one way. However, it is a customized point-to-point intermodal service, which allows to optimizing the employment of locomotives, wagons and loading units in a way that it outdoes road transport.

All other national shipments are conveyed on trains of *RCA's* joint production system. As expected the largest demand, in 2005, came up for services over longer distances between the terminals Wien and Wels (Oberösterreich), on the one side, and Bludenz and Wolfurt (Vorarlberg), Hall (Tirol) and Salzburg, on the other side (cf. **Fig. 2-10**). Too, the Wels-Graz link was used heavily.

As it shows, this service supply is able to match the requirements of forwarders and shippers in terms of transit time and cost particularly for full-load shipments both of bulk and packed goods. Apart of the competitive rail freight rates the dense network of intermodal terminals in Austria is a major advantage as it reduces the expenses for terminal haulages by road. Too, the characteristic rail production facilitates to serve private rail sidings of intermodal customers, what keeps the extra handling cost compared to road at a minimum.

The time-tables of this production system, however, as a rule don't comply with the requirements of cargo such as groupage, food or parcel logistics, which are demanding both in terms of speed and reliability. With respect to the good road infrastructure and rather short distances of domestic transports it would be very difficult for rail to compete with road vehicles in these market segments.

Figure 2-10: Volumes of national shipments (in tonnes) per transport area in Austria: 2005



(2) Gateway shipments

The majority of the total 40,000 TEU of gateway shipments in continental combined transport was carried on *Kombiverkehr's* Wels-Wien block train service. In import, this service consolidates Wien shipments travelling primarily on international block trains from the German terminals of Duisburg, Neuss and Ludwigshafen to the gateway terminal Wels. Outbound shipments from Wien are transhipped at Wels from the Wien-Wels service to the international shuttle train in question. So this domestic continental service more or less is an extension of the cross-border trains.

Apart from this key market Gateway shipments are moved almost all over the Austrian network to various destinations, mostly via the terminal Wels. Their competitiveness is subject to the performance and economics of the underlying joint rail-production system. Considering the small volume it seems that, presently, it is less appropriate for international cargo flows on low-volume routes. Continental shipments are likely to reach their destinations faster and less expensive by a direct road haul than by Gateway-based rail journeys. This is also a major difference to container hinterland transport (cf. **chapter 2.2.3**).

2.2.5 Accompanied combined transport

In Austria, compared to other countries except for Switzerland, accompanied combined transport has maintained a major role for freight traffic. In 2005, this market segment accounted for 26 per cent of Austria's total intermodal volume (cf. **Fig. 2-1**). In that year accompanied traffic was recovering from a sharp decline of the volume in the previous year, which had been a consequence of two impacts:

- The eco-point system, which connected permits for road transit trips through Austria with the level of the air pollution caused by the road vehicles employed, was suspended. The measure had limited the number of truck journeys. If road operators wanted to perform more journeys beyond the allocated quota they had to use rolling highway services as a by-pass solution.
- After the enlargement of the European Union in May 2004 road operators established in the new EC Member States no longer had to use rolling highway services in order to bypass quota regulations of international road transport. As a consequence *Ökombi* and *Kombiverkehr* were forced to stop the Manching-Brennersee rolling highway service, which ranked top in terms of shipments at that time.

During the year 2005 the market conditions for accompanied transport in Austria started to improve as a result of, on the one hand, soaring fuel costs for goods vehicles, and, on the other hand, a restructuring of subsidies of the Austrian government to accompanied combined transport operators. The new scheme enabled *Ökombi* for example to launch a new Wörgl-Brennersee service that offers road-comparative prices in spite of the extraordinarily short distance.

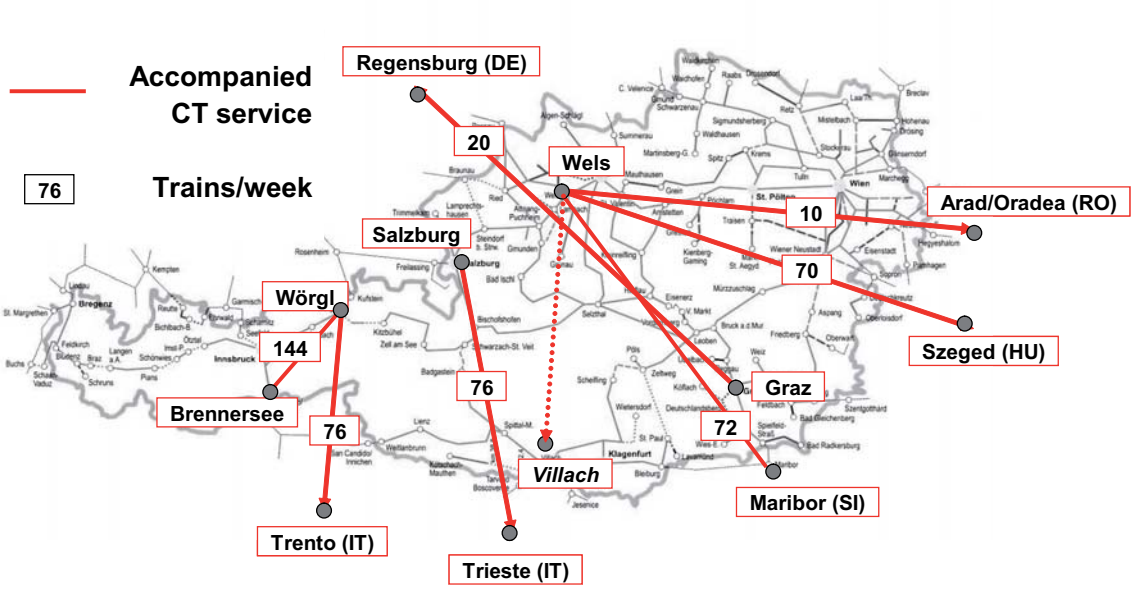
Wörgl-Brennersee was one of the two domestic rolling highway services operated in 2005. The other, the Wels-Villach service, however, had to be suspended meanwhile. 32,353 road vehicles were shipped on these services, in 2005, conveying more than1.1 million gross tonnes. In addition to that six international services of accompanied combined traffic were supplied. In total almost 200,000 road vehicle journeys were – partly - shifted from road to rail moving more than 6.1 million gross tonnes (cf. **Fig. 2-11 & 2-12**).

In the first half year of 2006 the constraints on international road freight traffic worsened. Fuel costs continued to rise. In addition a shortage of truck drivers and transport capacity arose that led to an increase of market price level. Against this background the intermodal operators were able to intensify the frequency of some rolling highway services to cope with the increased demand. Owing to that the Wörgl-Brennersee service has almost reached again the weekly frequency of departures of the previous Manching-Brennersee rolling highway. Altogether the volume of accompanied combined transport in Austria grew by 25 per cent in the first six months of 2006 compared to the same period in 2005.

Figure 2-11: Accompanied combined transport volume in Austria: 2005

Rolling highway service		Transport volume		N° of trains
		Shipments (trucks)	Gross tonnes	
Wörgl	- Brennersee	24.531	906.455	2.013
Wels	- Villach	7.822	240.382	768
Subtotal domestic services		***32.353***	***1.146.837***	***2.781***
Wörgl	- Trento	28.559	1.026.168	2.091
Salzburg	- Triest/(Ljubljana)	25.422	754.893	1.419
Regensburg	- Graz	519	13.665	74
Wels	- Maribor	49.811	1.448.201	3.202
Wels	- Szeged/(Budapest)	51.008	1.433.953	2.951
Wels	- Arad/Oradea	11.549	323.251	778
Subtotal intenational services		***166.868***	***5.000.130***	***10.515***
Total accompanied CT		**199.221**	**6.146.967**	**13.296**

Figure 2-12: Accompanied combined transport services by frequency of weekly departures: status June 2006



2.3 Analysis and evaluation of development trends of domestic unaccompanied combined transport in Austria by 2015

The evolution of domestic unaccompanied combined traffic in Austria by 2015 will be determined both by specific developments of each of the three market segments identified and by a couple of general factors, which will affect any segment though maybe at different extent. We didn't carry out an assessment of accompanied combined transport since, compared to unaccompanied services, the evolution of this mode is less determined by inherent performance parameters than by transport policy that can't properly be predicted for the next decade.

2.3.1 General impact factors

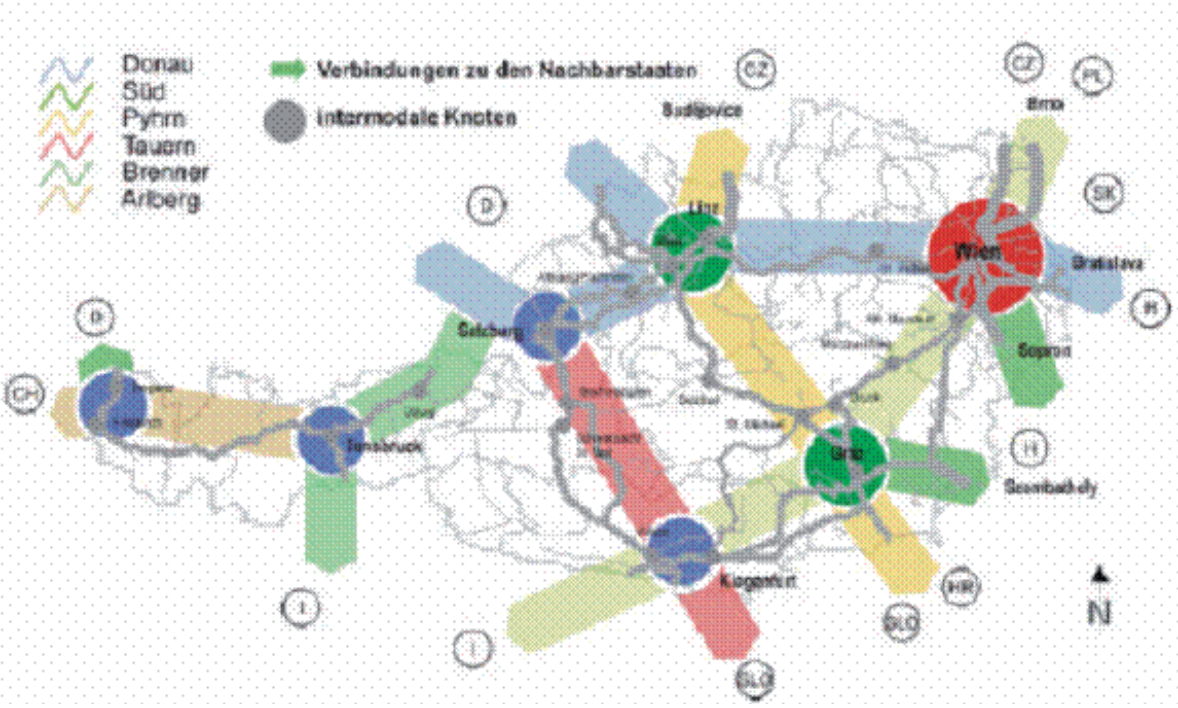
Our investigations into general impact factors of domestic combined transport in Austria brought about the following results:

(1) Austria's transport policy, which is significantly influenced by environmental objectives, is likely to be continued. The beneficial legal framework for combined transport will largely be maintained in particular as regards financial aids and regulatory measures. With respect to budget restrictions we, however, assume that incentives will be introduced to enhance the efficiency of aids, i.e. the traffic shift per Euro spent.

(2) The rail network in Austria already fulfils comparatively high standards considering the capabilities to care for heavy freight trains – length and weight of trains, axle load, loading gauge – and the state of maintenance. In spite of that the capacity of many sections and nodes tends to be saturated. In the framework of the *Transport Master Plan*, which covers all modes of transport, Austria's federal government therefore is scheduled to take numerous enlargement investments into the rail network and intermodal terminals (cf. also **chapter 2.6**). The *Transport Master Plan* published in 2002 aims at coping with the envisaged growth of transport demand and enhancing Austria's position in global competition. The total investment was set at 45 billion €, of which 20.6 billion € were allocated to rail, 8.5 billion € before and 12.1 billion € after 2010.

The focus of the *Transport Master Plan* is on strengthening the main transport corridors and intermodal nodes (cf. **Fig. 2-13**). Combined transport services could benefit from enlargement and upgrade investments in terms of increased train capacities, reduced transit times and more efficient rail production schemes.

Figure 2-13: Priority network of Austria's transport master plan



Amongst the priority actions related to rail infrastructure are the following investments:

- completion of *Westbahn* enlargement between Salzburg and Wien, e.g. expansion to four tracks between Linz and Wien;
- creation of by-pass Enns;
- extension of Wien as intermodal node;
- realization of new *Südbahn* (Semmering base tunnel);
- expansion to four tracks in the "Unterinntal" (in the course of the Northern Link to the Brenner Base Tunnel)
- completion of *Koralmbahn* enlargement between Klagenfurt (Villach) and Graz.

(3) According to our investigations *Rail Cargo Austria* basically is scheduled to maintain its existing rail production system. This would enable combined transport operators to continue offering domestic intermodal services nation-wide. From time to time, however, it is questioned whether *Rail Cargo Austria* is able to operate this system economically. Since those doubts are also raised by the company's top executives *Rail Cargo Austria* might be tempted to increase freight rates in spite of a stable legal framework of state aids.

In this respect it would be crucial if either the operators of domestic combined transport are able to improve their operations for example by establishing dedicated block trains or the terms of competition with road will allow to bearing increased freight rates.

(4) Another corrective to keep prices down is competition on rail freight services and rail traction. Even though there is an open access to rail freight services the level of competition in domestic combined traffic currently is small. Competition is considerably fiercer on international services. Some recent examples, however, give evidence that forwarders or shippers are prepared to change the service provider. As a rule this requires for sufficient volumes to operate dedicated services. Owing to an overwhelming majority of less-than-trainload routes it would be difficult for independent railway undertakings to compete with *Rail Cargo Austria's* supply of services. Hence we assume that the level of competition on domestic services will remain comparatively low.

(5) Finally, the evolution of the main competing mode of transport, road transport, has to be taken into account. According to our analysis of recent development trends we suppose that the market prices of road freight traffic are due to rise gradually during the next decade as a result of the increase of fuel and personnel cost. The impact will be even more distinctively in domestic than in international traffic where the level of competition is supposed to impede a sharp increase of freight rates. This assessment is based on the following considerations:

- The prices for diesel are predicted to grow in line with the increase of mineral oil costs.

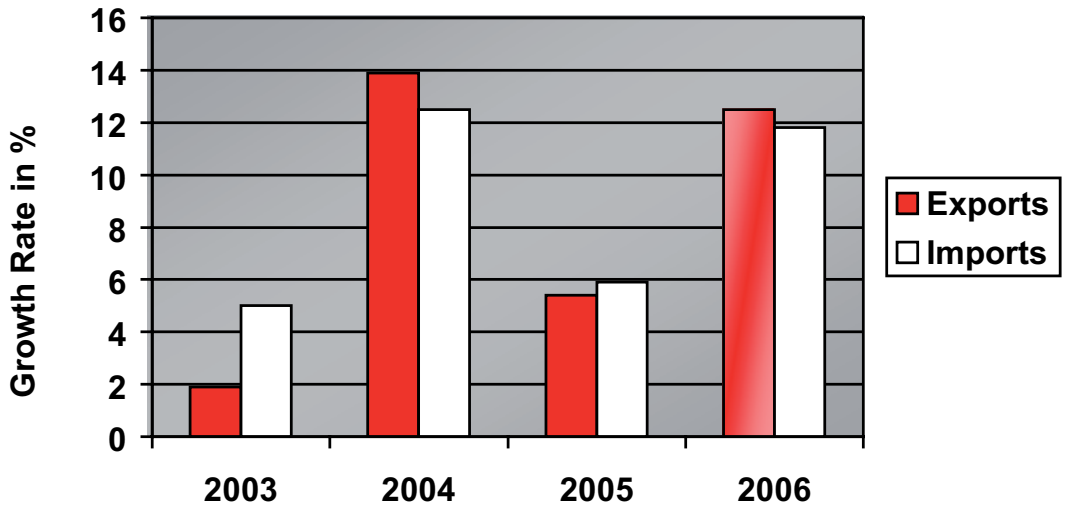
- According to forwarding and transport companies the current shortage of truck drivers will continue and bring about an increase of personnel cost in road freight transport. Together with the new EC regime on truck drivers' working and resting times and the obligatory application of the digital tachograph the effective working time per driver will decline and the personnel cost per shipment increase.
- The reduction of the effective drivers' working time will cause that, in Austria, a driver in one shift generally will not be able of performing a one-way journey of more than 600 kilometres or a round trip of about 250 to 300 km one way. This basically results in a reduction of the break-even distance intermodal versus road correspondingly.

2.3.2 Container hinterland combined transport

Domestic container hinterland combined transport in Austria, in the first place, is determined by the evolution of international container traffic between Austria and foreign sea ports. Secondly, it depends on the amount of containers not carried on direct international trains and the competitiveness of intermodal transport versus road.

According to various forecasts world trade is expected to grow by 5 to 10 per cent per year between 2000 and 2015. Austria's foreign trade rather reflected this range of growth in the last years (cf. **Fig. 2-14**). Based on the first eight months of 2006 in Austria a growth rate of about 12 per cent both for the import and export of goods for this year has been calculated. It is also expected that Austria's economy and foreign trade will continue to grow dynamically during the following years. In recent years, on average, the volume of container transports grew even more rapidly than Austria's total international freight traffic. Likewise in other countries it resulted from the soaring flow of import containers from Far East Asia, China in particular. Almost all trade analysts assume that the growth rates of world-wide container traffic will be maintained at a comparatively high level of 7 to 10 per cent per annum by 2015 and beyond. They reckon that even if container exports from China declined the "gap" would immediately be compensated by other countries. In this euphoric situation only a minority of experts ventured to be sceptical about enduring high container growth rates. Their doubts, however, were only related to the size of increase but not to the increase itself.

Figure 2-14: Austria's foreign trade of goods: 2003-2006



Source: Statistik Austria (2006), 2006: January to August

Against this background we assume that the sea ports of Hamburg and Bremerhaven will maintain their hub function for Austria's container exports and imports. In their 2015 forecasts on the sea-side container throughput the German ports reckon with this role. Indeed, there are no signs that the excellent relationship between these ports and the Austrian logistics industry could change considerably. Too, the bilateral intermodal services are such mature and competitive that they essentially contribute to choosing Hamburg and Bremerhaven for Austria's export and import containers. The German ports are supposed to increase their total international intermodal traffic of sea containers from 2005 to 2015 by 167 per cent (cf. **chapter 5**). The growth rates are expected to be more than proportionate on links with the new EC Member States in Central and Eastern Europe whereas intermodal hinterland traffic from/to Austria will rather increase more moderately by 120 to 130 per cent in the same period.

In container hinterland transport with Rotterdam and Antwerp the growth is supposed to be higher in a range of 180 to 200 per cent but starting from a considerably lower level. Until recently both the scope and the quality of intermodal services on this corridor except for a

few dedicated services, which had only a minor impact on domestic combined transport in Austria, were comparatively poor. Various intermodal operators either have already started or are examining to inaugurate international block train services with the western North-Sea ports. In a start-up phase Gateway concepts via German terminals such as Duisburg and Neuss are utilized as well. In addition, the growth of intermodal container transports in particular for Rotterdam should be fostered by the inauguration of the *Betuweline* that is dedicated to freight trains.

What is very difficult to assess is the development of intermodal container traffic between Austria and the Adriatic ports of Koper and Trieste. Theoretically, the lead time for container transports from and to the Far East via these ports is about five to ten days shorter than via the North-Sea ports. This should bring about a reduction of supply chain costs. In spite of this advantage the Adriatic ports to date were not successful in gaining a significant market share. This is owing to the following reasons:

- Lower frequency of calls of vessels at the ports of Koper and Trieste resulting in a wide range of transit times and reduced flexibility (basically no direct calls of mother vessels but feeder ships).
- Lead time advantage only for Far East liner services not for other destinations.
- North-Sea ports receive and distribute much more containers from and to other areas of the world, which can be carried together in hinterland services (economies of scale).
- Long-time commercial partnership between the North-Sea ports and the forwarders and shippers in Austria.

These service deficits will decline but not vanish within the next ten years. So the quay-side container throughput of the Adriatic ports is due to increase particularly in line with the growth of container transports from and to Asia. This will also stimulate the volumes of containers shipped on international intermodal services from and to Austria. We suppose that, starting from the low 2005 level, the volume on this corridor will about quadruple.

According to our analysis the total intermodal volume of international container hinterland transport from and to Austria will increase by about 145 per cent from 2005 to 2015. This calculation takes account of the existing market share of each of the three “container corridors” and the respective estimated growth rates derived above.

This growth of the total volume will raise the opportunity to operate more direct trains between the ports involved and terminals in Austria, which – owing to less-than-trainload potentials - currently are served via domestic Gateway connections. On the other hand it could be even more economic to run a high frequency of daily shuttle trains on the trunk routes to Salzburg, Wels and Wien and distribute the non-local containers via a nation-wide production system if Rail Cargo Austria maintained it. Such a system would also be supported by an increase of the market price level in road transport.

In 2005 about 60 per cent of all containers moved on international services were carried on by domestic trains. We reckon that this proportion will slightly decline to about 50 per cent by 2015. As a result we estimate the volume of domestic container hinterland transport in Austria will increase by about 72.5 per cent from 1.32 (2005) to 2.28 million tonnes (2015). This would result in a mean annual growth rate of 5.6 per cent.

2.3.3 Continental combined transport

In domestic continental traffic it is required to distinguish the national shipment from the Gateway shipment market since the latter one is primarily dependent on the evolution of the international continental traffic while the development of the volume of national shipments has autonomous reasons.

(1) National shipments

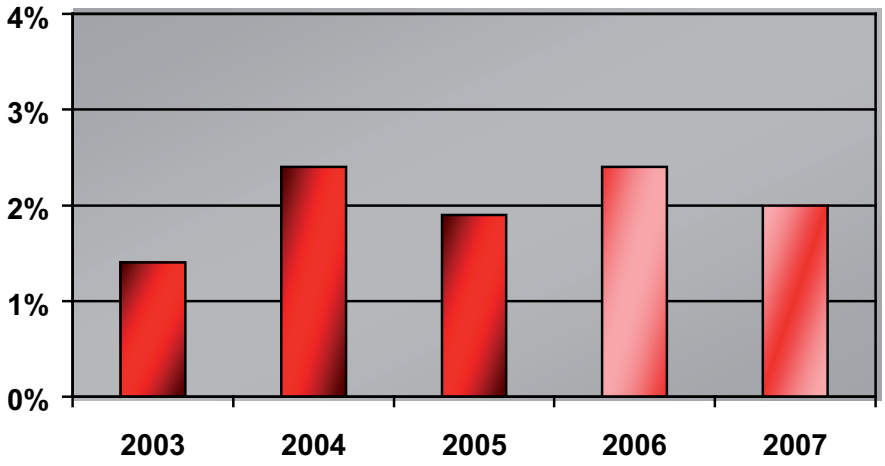
The demand for national shipments in domestic combined transport services, first of all, will be influenced by the evolution of the volume of total long-distance domestic freight traffic, which in turn is dependent on the development of the national economy. In this respect Austria's gross national product grew moderately in recent years particularly compared to the country's foreign trade. Annual growth rates amounted to about 2 per cent. According to analysts' estimations this path of growth will continue this year and in 2007 (cf. **Fig. 2-15**).

Long-term assessments of the economic development of Austria also forecast mean annual growth rates of 1.5 to 2.5 per cent. The development of long-distance freight traffic has increasingly de-coupled from the performance of the national economy, i.e. the volume of goods transport increased more than proportionate compared to the gross national product. This trend is likely to continue in the years to come resulting in a linear annual increase of 4.0 per cent of the relevant market for national intermodal shipments that is 40 per cent

from 2005 to 2015.

Many of the fastest growing freight market segments like groupage cargo, parcel or automotive logistics call for smart solutions, fast and highly reliable services, which a domestic rail production system like it is, generally, will not be able to match. We therefore consider that the national shipment segment of domestic combined transport will not grow at the same pace as the total market. It will, however, gain increased percentages in less time-sensitive goods markets so that this intermodal segment would achieve a linear growth rate of about 2 per cent out of the growth of the entire freight market totalling to 20 per cent over the period 2005-2015.

Figure 2-15: Real gross national product of Austria: 2003-2007



Source: Wirtschaftskammer Österreich; 2006 and 2007 forecasts

Moreover we estimate a further linear annual increase of 2 per cent of national shipments on those routes where road transport will have to face increased costs owing to the regulation on truck drivers working time. As mentioned above, these positive impacts are likely to be brought about on routes of about 600 kilometres one way or on round trips of 250 to 300 km each way. Legally, such distances won't anymore be performed by one driver in one shift. Thus this regulation should especially foster the long east-west routes within Austria.

Both effects taken together would lead to a 40 per cent increase of the volume of national shipments from 1.35 million tonnes, in 2005, to 1.89 million tonnes, in 2015. This results in a mean annual growth rate of 3.5 per cent.

(2) Gateway shipments

The future volume of domestic continental combined transport via gateway is depending on the development of the international continental combined transport. In particular it is strongly affected by the extension of the service networks with south-east Europe as well as with Germany and the Benelux countries. *Intercontainer Austria* partly in co-operation with *Kombiverkehr*, the main operators of international continental block trains from and to Austria, seek to starting a couple of new international services on these corridors in the next years due to bringing about a considerable increase of volume.

In this respect the terminal Wels that is already the most important gateway for continental shipments in Austria shall be further strengthened. Too, Wien terminals may be suitable turntables between services to south-eastern European destinations and inland locations in Austria.

We have estimated that the international continental combined traffic will more than double during the next decade. This should also stimulate Gateway shipments though to a much lesser degree. Based on the results of our investigations in Austria this domestic combined transport segment will increase by 50 per cent and reach 0.68 million tonnes in 2015. This results in a mean annual growth rate of 4.2 per cent.

(3) Total domestic continental combined transport

The total domestic continental combined transport in Austria including national and Gateway shipments will grow by an average of 3.6 per cent per annum during the period 2005 to 2015 to 2.57 million tonnes. Total growth will amount to 42.5 per cent.

2.4 Development scenario of combined transport in Austria: 2015

2.4.1 Development scenario of domestic combined transport: 2015

Based on the scenarios on continental and container hinterland traffic designed above the volume of domestic unaccompanied combined transport in Austria will rise by 55.4 per cent from 3.12 (2005) to 4.85 million tonnes (2015). The mean annual growth rate amounts to 4.6 per cent. Due to a higher growth in the analyzed period container hinterland traffic will increase its market share to 47 per cent (cf. **Fig. 2-16**).

Figure 2-16: Domestic unaccompanied combined rail/road transport in Austria by market segments: 2005/2015

Domestic CT market segment	2005 (Million gross tonnes)	2015 (Million gross tonnes)	Percentage change 2015/2005	Mean annual growth rate
Continental CT	**1.80**	**2.57**	**42.5%**	**3.6%**
National shipments	1.35	1.89	40.0%	3.5%
Gateway shipments	0.45	0.68	50.0%	4.2%
Container hinterland CT	**1.32**	**2.28**	**72.5%**	**5.6%**
Total domestic CT	**3.12**	**4.85**	**55.4%**	**4.6%**

2.4.2 Development scenario of total combined transport: 2015

Total unaccompanied combined transport in Austria is forecasted to improve by 111.5 per cent in the period 2005-2015. Advancing from 17.5 million tonnes it will reach approximately 37 million tonnes in 2015 corresponding to a mean annual growth rate of 7.8 per cent (cf. **Fig. 2-17**). While the scenario for domestic traffic has been elaborated in the present report, the forecast of international continental and transit traffic through Austria mainly reflects the results from our previous “Capacity Study”. As concerns international container hinterland traffic, however, we have taken account of the recent developments in sea-side container throughput and intermodal transport and adapted the earlier prognosis

correspondingly. As mentioned above (cf. **chapter 2.3**) we didn't investigate into the potential development of accompanied combined transport since it is primarily determined by political decisions.

Figure 2-17: Combined rail/road transport volume in Austria by market segments: 2005-2015

Combined transport (CT) market segment	2005 (million gross tonnes)	2015 (million gross tonnes)	Percentage change 2015/2005
Unaccompanied combined transport	**17.47**	**36.95**	**111.5%**
Domestic CT	**3.12**	**4.85**	**55.4%**
Continental	1.80	2.57	42.8%
Container hinterland	1.32	2.28	72.5%
International CT	**6.43**	**14.79**	**130.0%**
CT transit through Austria	**7.92**	**17.32**	**118.6%**
Accompanied combined transport	**6.15**	*)	**n.a.**
Total combined transport	**23.62**	**n.a.**	**n.a.**

**) Development is primarily subject to political decisions; no forecast carried out.*

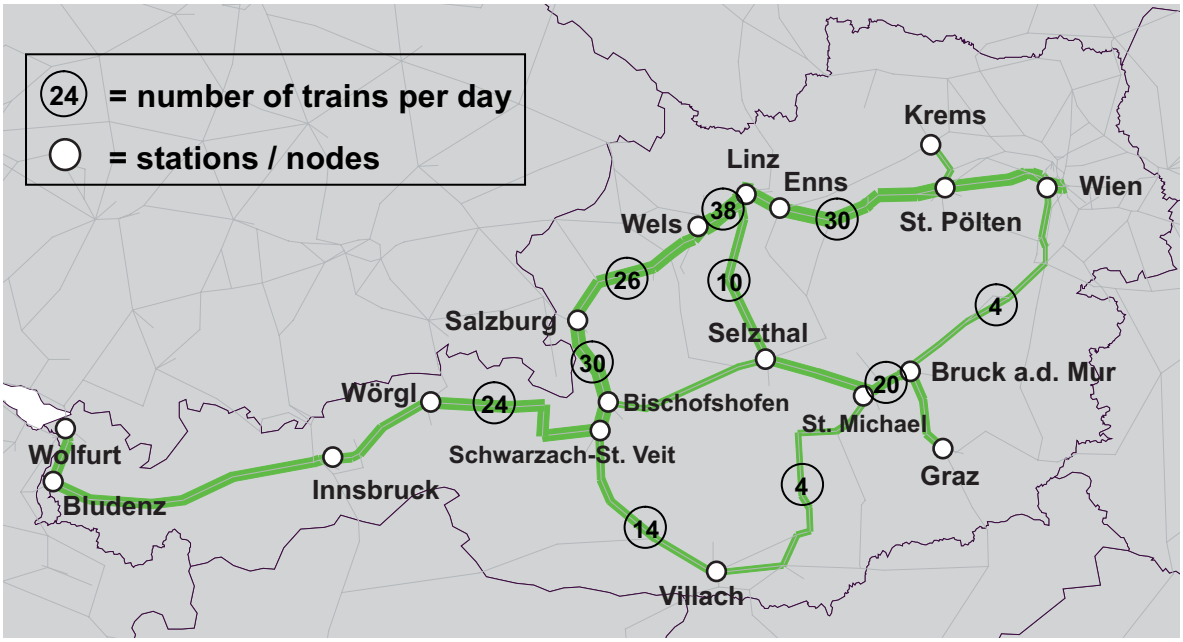
2.5 Impact of combined transport development on rail network capacity: 2015

2.5.1 Capacity load of Austria's rail network by domestic combined transport

Since we assumed that a joint rail production system both for combined and wagonload freight services will be maintained **Fig. 2-18** shows the expected capacity load of Austria's rail infrastructure primarily caused by trains of this operational scheme.

Intermodal shipments, however, make up such a high percentage on some of the underlying links that they could almost be considered as dedicated services. Domestic combined transport is due to be particularly concentrated on the main east-west corridor Voralberg (Wolfurt/Bludenz) – Innsbruck – Salzburg – Wels – Wien and on two north-south axes to Villach.

Figure 2-18: Capacity load of Austria's rail network caused by domestic combined rail/road transport: 2015



2.5.2 Total capacity load of Austria's rail network

In order to produce a picture of the expected overall utilization of Austria' rail network capacity by 2015 the results of the present investigation and of our previous study on international combined transport, published in 2004, as well as forecasts on all other categories of rail traffic including other freight and passenger services were consolidated. In a first scenario the capacity employment of the rail network was calculated taking account of the envisaged infrastructure enlargement investments reported (cf. **Fig. 2-19**). The second scenario assumes that these measures would not have been taken (cf. **Fig. 2-20**).

The envisaged infrastructure enlargement measures in Austria are part of the "Transport Master Plan". One of the most important improvements is the completion of the expansion of the *Westbahn* Salzburg-Wien line to four tracks. Except for smaller bottlenecks in two nodes in the area of Niederösterreich and Wien the network capacity would be sufficient on this axis. The continuation of this line from Salzburg to western Austria, however, will become critical. Particularly owing to the high volume of regional passenger trains the capacity of many sections will be saturated or close to saturation. This also applies to the line section St. Michael–Graz. The bottleneck would however be eliminated if the *Koralmbahn* Graz-Villach could be completed by the year 2016.

If the planned infrastructure enlargements could not be realized or terminated on time the entire east-west corridor Innsbruck-Salzburg-Wels-Wien, which is the backbone both for domestic and many international combined transport services, would become the Achilles heel of Austria's rail network (cf. **Fig. 2-20***)*. Not only capacity shortages would arise on the section Innsbruck-Wörgl, according to forecasts, demand would exceed the nominal capacity of train paths. Apart from impediments for key domestic lines these bottlenecks would considerably affect two of the main trans-European growth corridors in combined transport, the Brenner corridor between Italy and Germany, and the axis from the Netherlands to south-east Europe.

This shows that Austria's rail infrastructure is key to a successful evolution of combined transport services on strategically important trans-European corridors.

Figure 2-19: Total capacity load of Austria's rail network by 2015 including enlargement investments scheduled

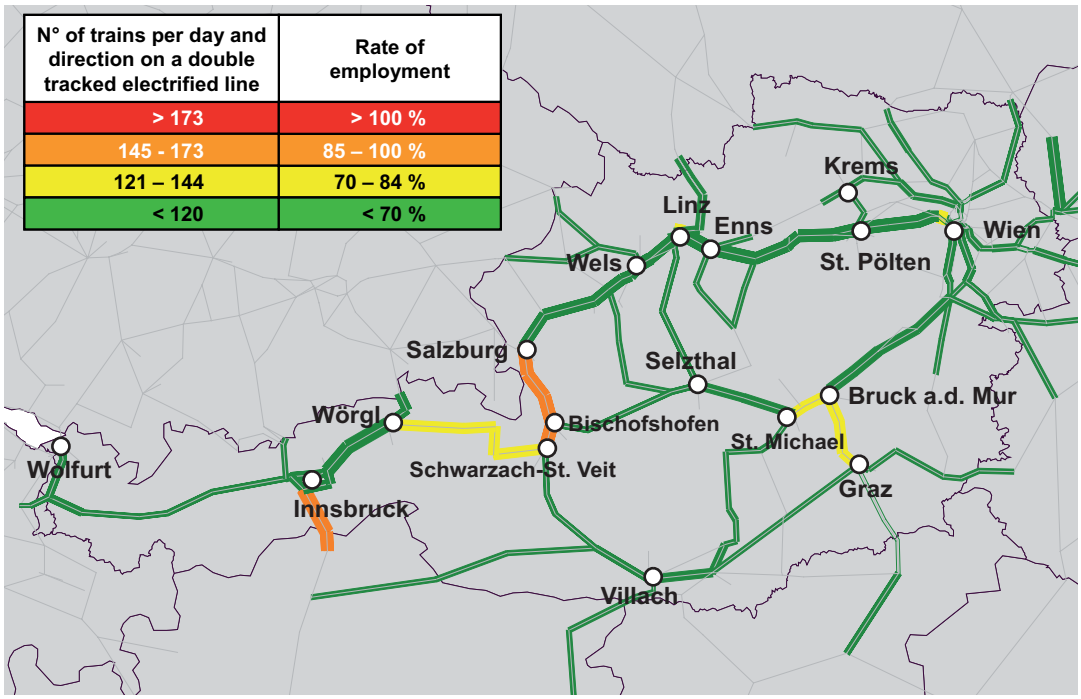
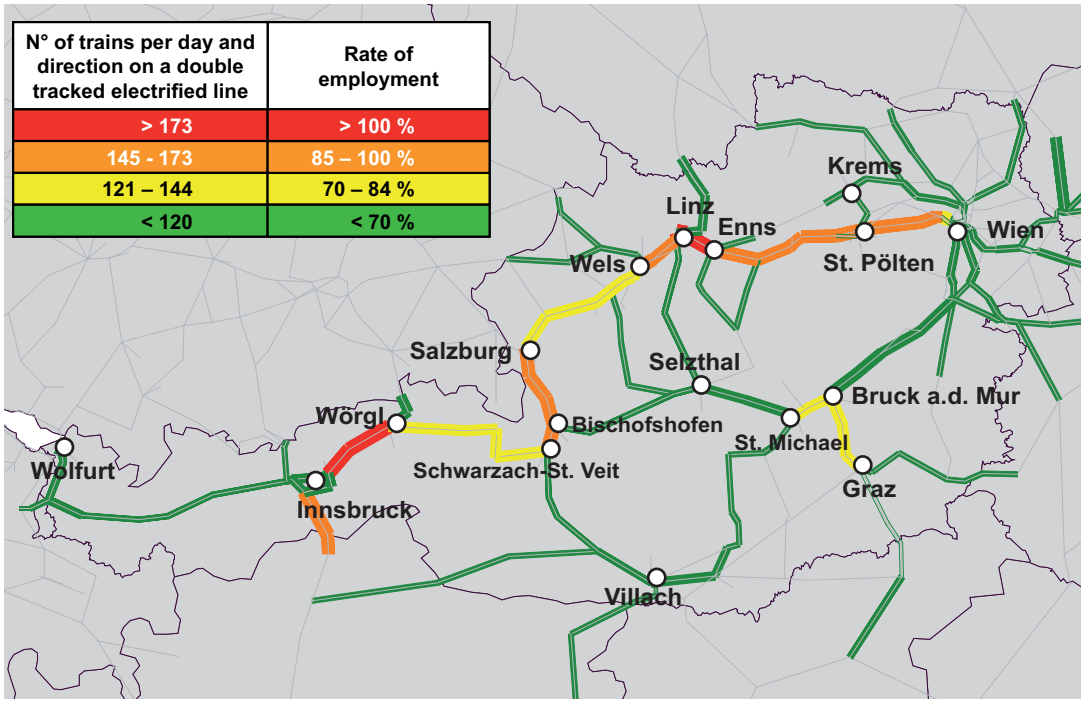


Figure 2-20: Total capacity load of Austria's rail network by 2015 disregarding enlargement investments scheduled



2.6 Impact of combined transport development on terminal capacity: 2015

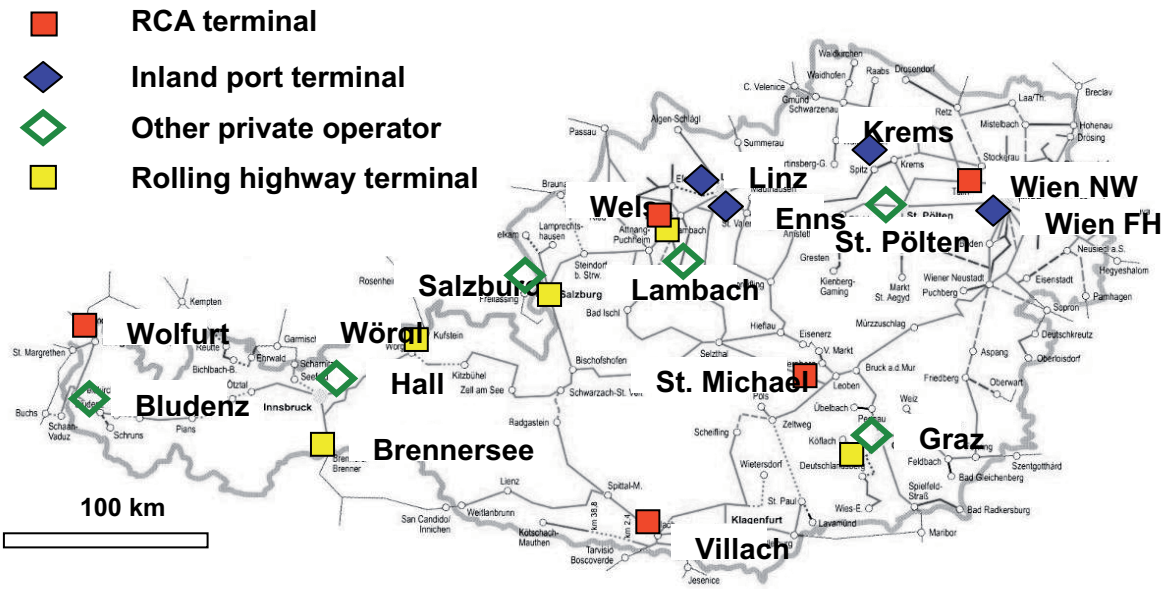
The impact of the estimated development of total unaccompanied combined rail/road transport including both domestic and international services on the capacity need for terminals in Austria by 2015 was elaborated as follows:

- Analysis of current terminal handling capacity,
- Calculation of the required handling capacity at terminals in Austria by the year 2015,
- Analysis of enlargement investment schedules in the period 2005-2015,
- Calculation of the additional capacity enlargement need.

2.6.1 Handling capacity of combined rail/road terminals in Austria: 2005

In 2005, unaccompanied combined transport services were supplied at 15 terminals in Austria: five of them were owned and operated by *Rail Cargo Austria*, the others by private companies; four terminals are located in inland ports. Accompanied combined transport services were operated from five terminals in Austria (cf. **Fig. 2-21**).

Figure 2-21: Combined rail/road transport terminals in Austria: 2005



We allocated the 15 transhipment sites of unaccompanied combined traffic to transport areas corresponding to the respective federal country, in which the terminals are located. The total rail-side handling volume of these terminals amounted to 861,000 loading units, in 2005 (cf. **Fig. 2-22**). The significance of the terminal sites in the federal country of Oberösterreich for combined transport in Austria is apparent: they represented almost 40 per cent of the total both in terminal capacity and rail/road transhipments. Next to them ranked the terminals in Wien and in the Steiermark.

Though the overall nominal employment rate of the terminals amounted “only” to some 60 per cent, the capacity of some of the combined transport terminals was close to saturation or even completely used. This applied to major facilities such as Wien-Freudenau or Wels.

Figure 2-22: Combined rail/road transport terminals in Austria: rail/road handling volume and capacity 2005

Transport area (federal state)	Terminal	2005	
		Handling volume (loading units p.a.)	Handling capacity (loading units p.a.)
Kärnten	Villach CCT	59.200	70.000
Niederösterreich	Krems CCT St. Pölten CCT	24.600	110.000
Oberösterreich	Linz CCT Wels CCT Enns CCT Lambach CCT	326.800	617.000
Salzburg	Salzburg CCT	90.000	125.000
Steiermark	Graz CCT St. Michael CCT	125.000	190.000
Tirol	Hall CCT	21.200	35.000
Vorarlberg	Bludenz CCT Wolfurt CCT	54.600	81.000
Wien	Wien Freudenau Hf CCT Wien Nordwest CCT	159.600	176.000
Total		**861.000**	**1.404.000**

2.6.2 Required handling capacity of combined rail/road terminals in Austria: 2015

According to our scenarios the volume of unaccompanied combined transport will rise to 37 million tonnes by the year 2015, of which 19.5 millions will affect terminals in Austria. We consider that transit traffic will entirely "bypass" the transhipment facilities in Austria. Based on our detailed 2015 transport programmes of combined transport services and the results of the previous "Capacity Study" we have calculated that intermodal terminals in Austria will require - at minimum - for an annual handling capacity of about 1.79 million loading units. This is almost 108 per cent more than the actual volume of transhipments in the year 2005 (cf. **Fig. 2-23**).

Figure 2-23: Unaccompanied combined rail/road transport in Austria: handling volume 2005; required handling capacity 2015 per transport area

Transport area (federal state)	2005	2015	Percentage change 2015/2005
	Handling volume (loading units p.a.)	Required Capacity (loading units p.a.)	
Kärnten	59.200	121.000	104,4%
Niederösterreich	24.600	58.000	135,8%
Oberösterreich	326.800	679.000	107,8%
Salzburg	90.000	190.000	111,1%
Steiermark	125.000	242.000	93,6%
Tirol	21.200	36.000	69,8%
Vorarlberg	54.600	119.000	117,9%
Wien	159.600	344.000	115,5%
Total	**861.000**	**1.789.000**	**107,8%**

Compared to 2005 the overall capacity of intermodal terminals in Austria would have to be enlarged by at least 27 per cent until 2015 to be able to serve the expected amount of intermodal loading units. The distribution of the capacity need per transport area shows that even if the largest growth rate may be accounted for Niederösterreich's terminals, the highest absolute increase of handling volume will be achieved in the transport areas of Oberösterreich, Wien and Steiermark. They will continue to represent the backbone of domestic and international combined traffic in Austria.

2.6.3 Additional capacity enlargement need of combined rail/road terminals in Austria by 2015

In the next step we have investigated into enlargement schedules of owners of existing terminals and potential others. We were informed about investment schedules amounting to an annual handling capacity of 510,000 loading units (cf. **Fig. 2-24**). Most of the measures concern the enlargement of existent transhipment facilities: the construction of an additional handling area, the building of new or the extension of existent handling tracks, the enhancement of the process organization, the procurement of additional or the replacement of older handling equipment. Moreover we have taken into account two new terminals. One is planned to be built in Kapfenberg near St. Michael. In Wien-Inzersdorf, a new facility is scheduled to replace the existent Wien-Nordwest terminal by the year 2010. This project is already a component of the "Transport Master Plan".

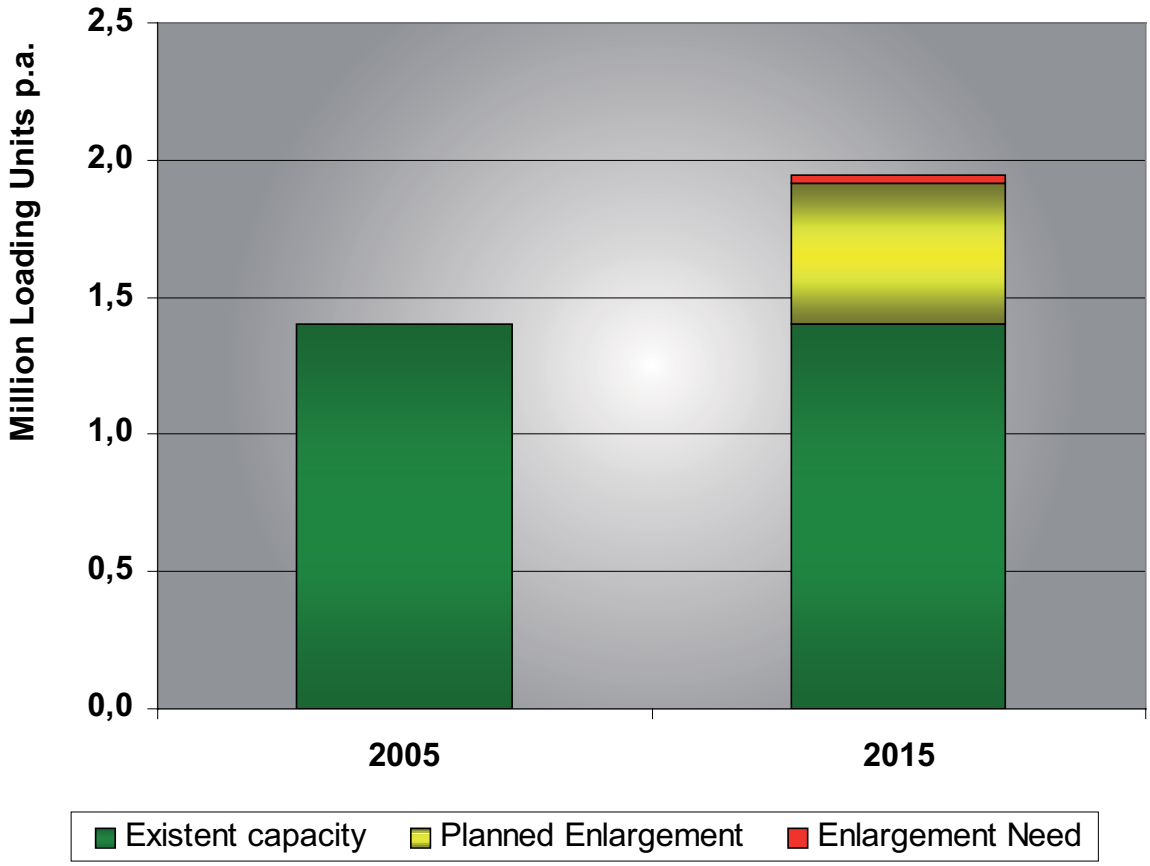
Assuming that these enlargement investments will be carried out the total annual handling capacity of Austria's terminals would rise to 1.91 million loading units by 2015. Compared to a required capacity of 1.79 million loading units, in the first place, it seems as if, in Austria, it has already been cared for supplying a sufficient terminal infrastructure. In spite of this overall result additional enlargement investments of a rather small scale of 65,000 annual loading units will be required in a few terminals in Austrian transport areas ***(*cf. Fig. 2-24 & 2-25**). However, it needs to be considered that even if in any transport area the total handling capacity is sufficient individual terminals, which develop faster than others, may suffer from a capacity gap since there is no 100 per cent substitution of capacity between various terminal sites. But what is even more important is that a handling volume of 1.79 million loading units would mean that the consolidated rate of employment of all terminals would amount to 93 per cent. With regard to peak times it is generally assumed that if the employment rate exceeds 85 per cent of the nominal capacity, the terminal is considered

to be saturated and needs to be enlarged to avoid performance deficits. In this respect enlargement investments, which exceed those calculated above, are more than likely.

Figure 2-24: Unaccompanied combined rail/road transport in Austria: required terminal handling capacity by 2015 compared to 2005 handling volume per transport area

Transport area (federal state)	Terminal handling capacity (loading units p.a.)				
	2005	2015			
	Existing	Enlargement planned	Total planned	Required	Enlargement need
Kärnten	70,000	70,000	140,000	121,000	
Niederösterreich	110,000	50,000	160,000	58,000	
Oberösterreich	617,000	50,000	667,000	679,000	12,000
Salzburg	125,000	75,000	200,000	190,000	
Steiermark	190,000	37,000	227,000	242,000	15,000
Tirol	35,000	15,000	50,000	36,000	
Vorarlberg	81,000	-	81,000	119,000	38,000
Wien	176,000	213,000	389,000	344,000	
Total	**1,404,000**	**510,000**	**1,914,000**	**1,789,000**	**65,000**

Figure 2-25: Unaccompanied combined rail/road transport in Austria: required terminal handling capacity by 2015



3 Trends in domestic combined transport in Belgium

3.1 Overview of combined transport market in Belgium 2005

In 2005 domestic combined transport in Belgium can be characterised by the following:

- In principal two operators are active in this market in Belgium, Inter Ferry Boats (IFB) and TRW. The latter is involved in continental transports, whilst IFB is mainly active in hinterland transports of maritime containers.
- Domestic combined transport in Belgium is in principal generated by the big seaports Antwerp and Zeebrugge. Gent, the third seaport in Belgium, is an industrial port practically without any container traffic to/from the hinterland.
- It goes without saying that, due to the relatively short distance in Belgium, the continental combined transport plays only a secondary role. Nevertheless, TRW offers gateway services via the hub Ronet (Namur) from/to Antwerp and Zeebrugge. The national leg of this offer is statistically counted as domestic transport.

In **fig. 3-1** the overall structure of domestic combined transport 2005 in Belgium is presented:

Figure 3-1: Structure of domestic combined transport 2005 in Belgium (Gateway services included)

	Million tonnes	
Overall total of “domestic” combined transport	**9.2**	
Internal traffic in the port of Antwerp	**2.8**	
Total (exclusive of port traffic)	**6.4**	
Maritime traffic		**4.9**
single wagon load		1.1
block trains		3.8
Continental traffic		**1.5**

	Million tonnes	
single wagon load		0.9
block trains		0.5

Source: different sources, own estimations

As can be seen from **fig. 3-1**, 4.3 million tonnes were transported in block trains, but also the single wagon load plays an important role since 2 million tonnes were transported in this scheme.

In **fig. 3-2** the operator's declarations for domestic combined transport are presented. The preponderance of the maritime (=IFB) transports becomes obvious.

Figure 3-2: Total market 2005 in Belgium for domestic combined transport in 1,000 tonnes

	1,000 tonnes
TRW	0,028
IFB	4,700

Source: UIRR statistics, IFB

From this figure it becomes obvious that the "real" domestic continental traffic (without gateway shipments) amounts to only 28,000 tonnes, which is a "quantity negligible".

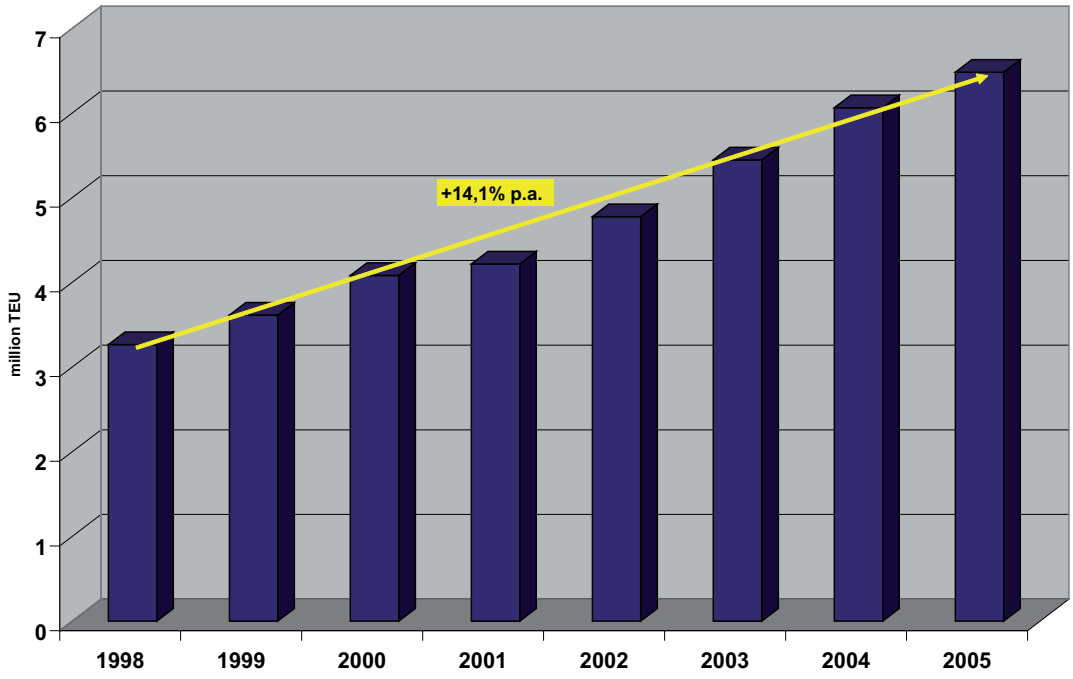
3.2 Analysis of current domestic combined transport in Belgium

3.2.1 Domestic combined hinterland transport

3.2.1.1 Evolution of container ports and sea-side container handling volumes

In **fig. 3-3** the evolution of the sea side container traffic in the port of Antwerp (including sea-sea transhipment = feeder traffic) is presented. In the observed period 1998 – 2005 the container volumes in TEU doubled, which means that this traffic grows with an average annual linear growth rate of 14.1 per cent from 3.3 million TEU to 6.5 million TEU as indicated in **fig. 3-3**.

Figure 3-3: Total container volumes handled in the port of Antwerp; including sea-sea transit

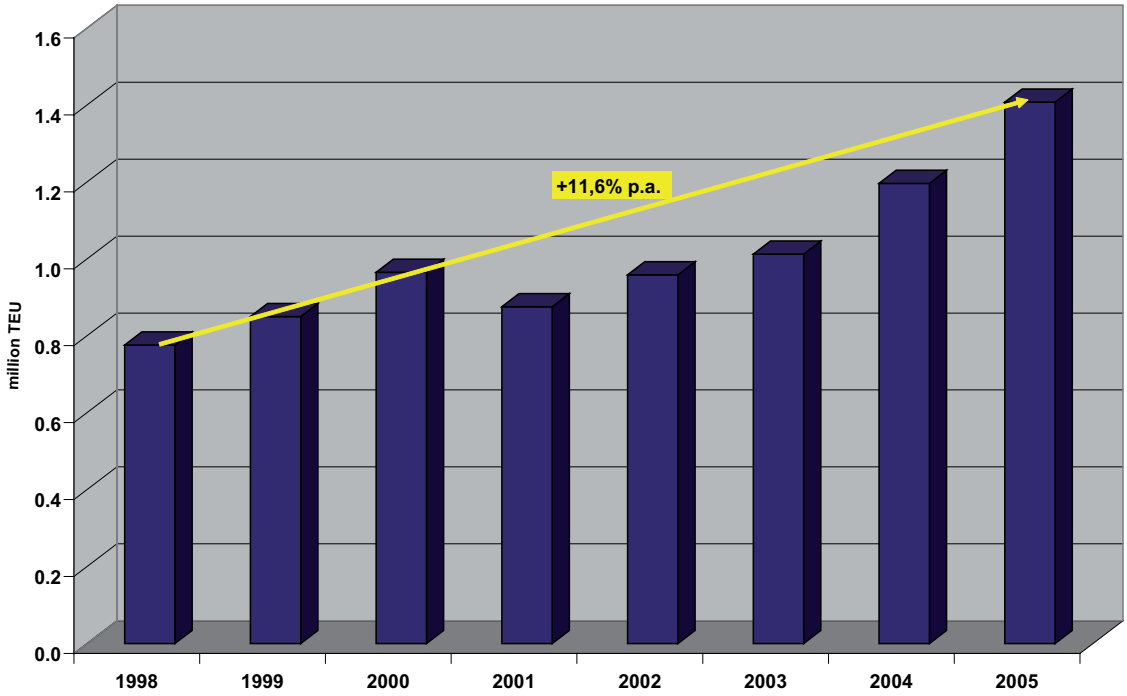


Source: Port of Antwerp

Between 2000 and 2005 the traffic grew by 59% which is, together with Algeciras, the third largest growth rate of the big European ports behind Hamburg (+89%) and Valencia (+84%).

The second container port in Belgium, Zeebrugge, handled 1.4 million TEU in 2005. Compared to 1998, when 0.776 million TEU were handled, this means also nearly a doubling of the volumes in the observed period. This results in an average annual linear growth rate of 11.6%. In **fig. 3-4** one can observe a sharp drop of the volumes between 2000 and 2001, due to problems of a stevedore. Only in 2005 Zeebrugge was back on the original growth path.

Figure 3-4: Total container volumes handled in the port of Zeebrugge, including sea-sea transit



Source: Port of Zeebrugge

In **fig. 3-5** the evolution of the sea-side container volumes (in tonnes) of both ports is summarised:

Figure 3-5: Evolution of sea side container volumes of the port of Antwerp and the port of Zeebrugge (million tonnes)

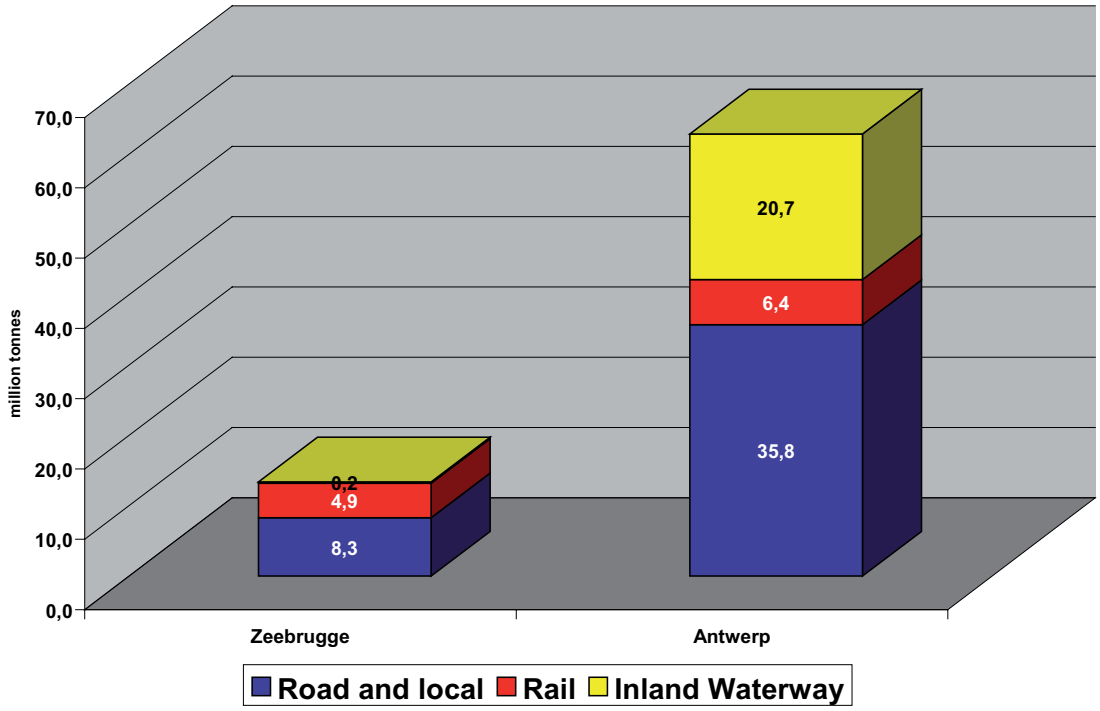
	2000	2005	percentage change
Antwerp	44.5	74.6	+67.5%
Zeebrugge	11.6	15.6	+34.4%
Total	**56.1**	**90.2**	**+60.7%**

Source: Port of Antwerp and Port of Zeebrugge

3.2.1.2 Hinterland transports of maritime containers per mode

For the purpose of DIOMIS, the total throughput of the ports to and from the hinterland is of particular importance. In the following the respective figures are presented and analysed. In **fig. 3-6** the absolute volumes of hinterland container traffic 2005 per mode is presented. As concerns Antwerp 62.9 million tonnes out of 74.6 (= 84%) is transported between the port and the hinterland. For Zeebrugge the ratio is 13.4/15.6 = 86%. It must be emphasized that the figures refer to the total hinterland traffic, domestic as well as international.

Figure 3-6: Container hinterland traffic per mode 2005 in million tonnes



Source: Port of Zeebrugge and Port of Antwerp

Fig. 3-7 shows the modal split of the total hinterland traffic. As concerns railway traffic, it has to be pointed out that the rail market share of the port of Zeebrugge is considerably higher than in Antwerp (Zeebrugge 36.6%, Antwerp 10.2%). The market share for road is about the same in both ports, whilst the inland navigation plays a significant role in Antwerp.

Figure 3-7: Modal split of container hinterland traffic 2005

	Road and local	Rail	Inland navigation
Antwerp	56.9%	10.2%	33.0%
Zeebrugge	61.9%	36.6%	1.4%

Source: Port of Antwerp and Port of Zeebrugge

As concerns intermodal domestic services of hinterland transports of the ports, **fig. 3-8** gives an overview of the daily departures. It becomes evident that all regular services are oriented to and from Antwerp. The shuttles between Antwerp and Athus, Chatelet, Kortrijk and Mouscron constituent the NARCON (National Rail Container Network) product of IFB. NARCON links all services between the hinterland terminals via the Main hub in Antwerp with all terminals in the port of Antwerp.

Between the ports of Zeebrugge and Antwerp, IFB offers a high frequency shuttle service with eight departures per day and direction, the so-called “Railbarge” system.

Figure 3-8: Daily departures of intermodal railway services 2005 for hinterland transport of maritime containers

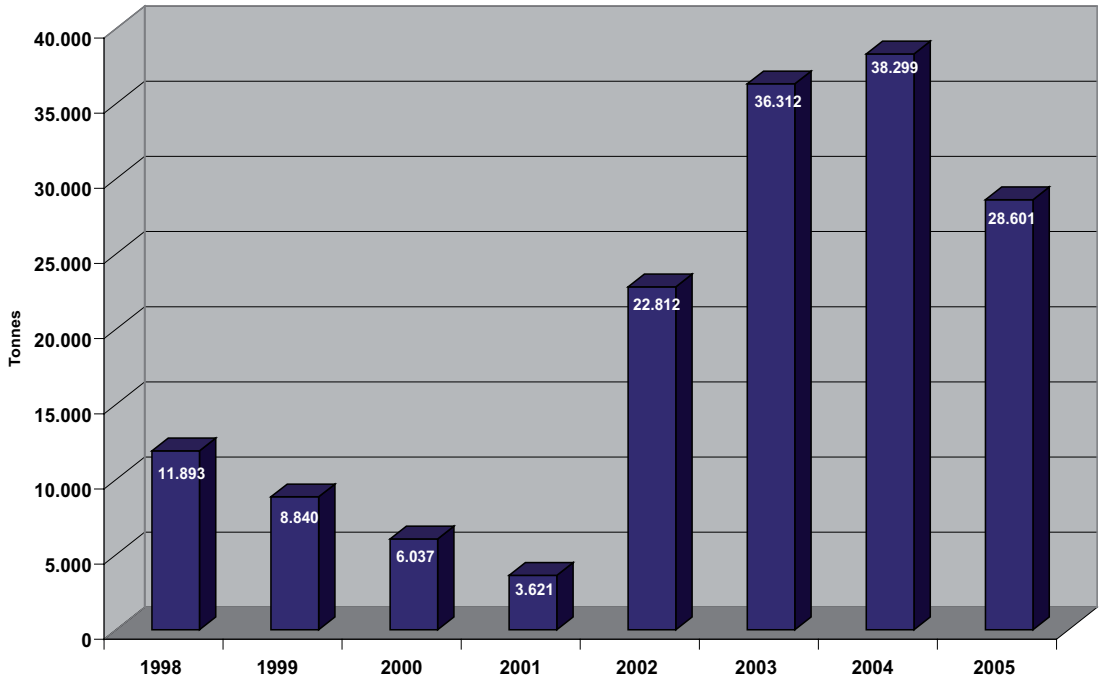
	Antwerpen	Athus	Chatelet	Kortrijk	Mouscron	Zeebrugge
Antwerpen		1.5	1.5	1.0	1.0	8.0
Athus	1.5					
Chatelet	1.5					
Kortrijk	1.0					
Mouscron	1.0					
Zeebrugge	8.0					

3.2.2 Domestic combined continental transport

As pointed out above and as can be seen from **fig. 3-9** below, the domestic transport in Belgium, disregarding gateway shipments, is very small. In addition, these traffics are very volatile with high fluctuations. Since 2002 these traffics seem to stabilise with an order of magnitude between 20,000 and 40,000 tonnes per year, which means less than 20 TEU per day.

On the other hand, gateway services of continental transports between the ports of Antwerp and Zeebrugge and the TRW hub Ronet play an important role (**fig. 3-10**): Each day 7 services connect the ports with the hub, disregarding spot trains. Given the volume of 1.4 million tonnes of "domestic" traffic with continental loads *(**cf. fig. 3.1**),* this means a use of capacity of approx. 80 TEU per train, thus a use of capacity of 100%.

Figure 3-9: Evolution of the domestic continental transport in Belgium 1998 – 2005 of TRW



Source: UIRR

Figure 3-10: Number of daily departures of domestic combined continental transport services 2005

	Antwerpen	Ronet (Namur)	Zeebrugge
Antwerpen		1.5	1
Ronet (Namur)	1.5		1
Zeebrugge	1	1	

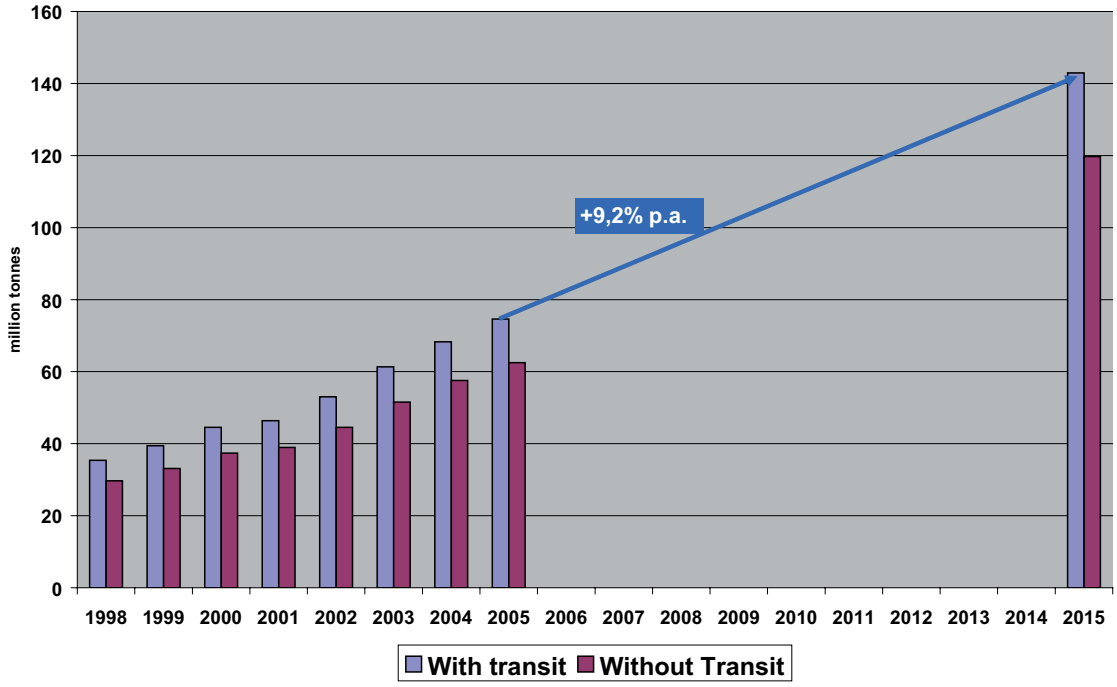
Source: operators

3.3 Analysis and evaluation of development trends of domestic combined transport in Belgium by 2015

3.3.1 Domestic combined hinterland transport

When extrapolating the observed average annual growth rate of 9.2% per year until 2015, the total container handling volume of the port of Antwerp will reach 142 million tonnes, which is twice the volume 2005. Extrapolating the relative stability of the sea-sea transit of about 16% between 1998 and 2005, this would lead to a total hinterland oriented volume of approx. 120 million tonnes in the year 2015 (**fig. 3-11 and 3-12**).

Figure 3-11: Observed and estimated future development of the container volumes in Antwerp



Source: Port of Antwerp

Figure 3-12: Development of sea-side and hinterland container handling volume in the port of Antwerp

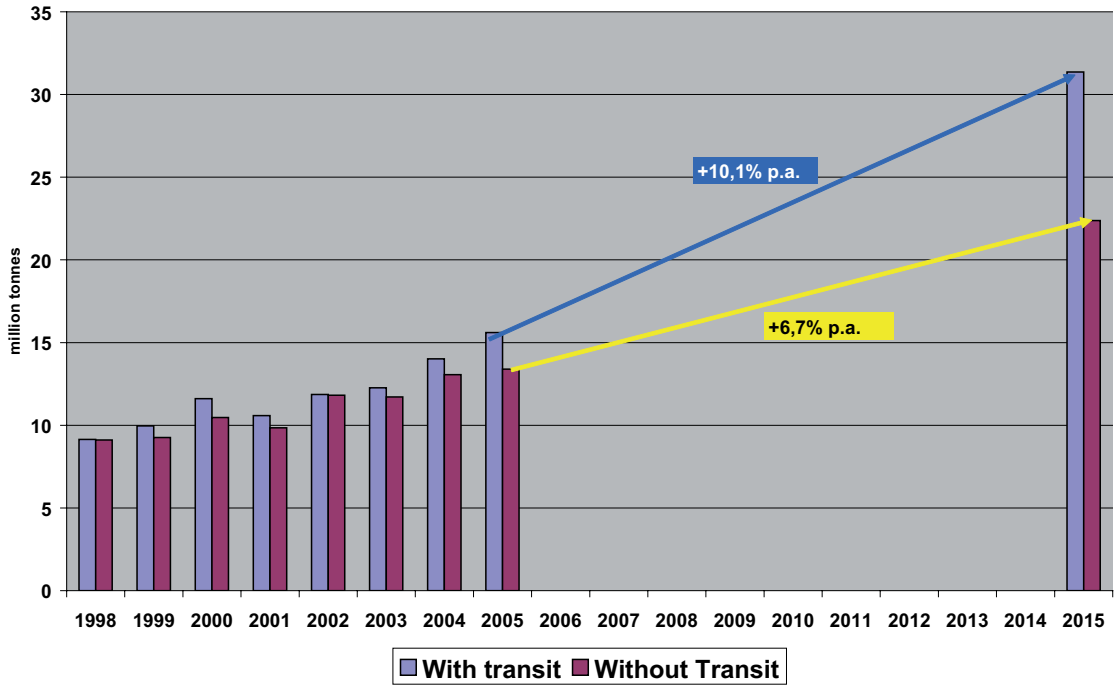
	Million Tonnes		Percentage change
	2005	2015	
Sea-side container volumes	74.6	142.9	+91.6%
Hinterland container volumes	62.9	119.7	+91.6%

Source: Port of Antwerp

For the second Belgian port, Zeebrugge, we made the same assumptions as for Antwerp: Thus, when extrapolating the observed growth rates 1998 – 2005 for the total handling volumes, the port of Zeebrugge will attain a total seaside handling volume of 31.4 million tonnes in 2015, which is again about twice the amount of the 2005 figures.

As concerns the hinterland oriented container traffic of Zeebrugge, we assume a growing market share of feeder transports and consequently these transports will grow slightly slower than the total sea-side container volumes. This would lead to an average annual growth rate of 6.7% between 2005 and 2015. Given this hypothesis, the hinterland oriented transports of Zeebrugge will amount to 22.4 million tonnes in 2015 (**fig. 3-13 and 3-14**).

Figure 3-13: Observed and expected container volumes of the port of Zeebrugge and the respective annual growth rates



Source: Port of Zeebrugge, own estimations

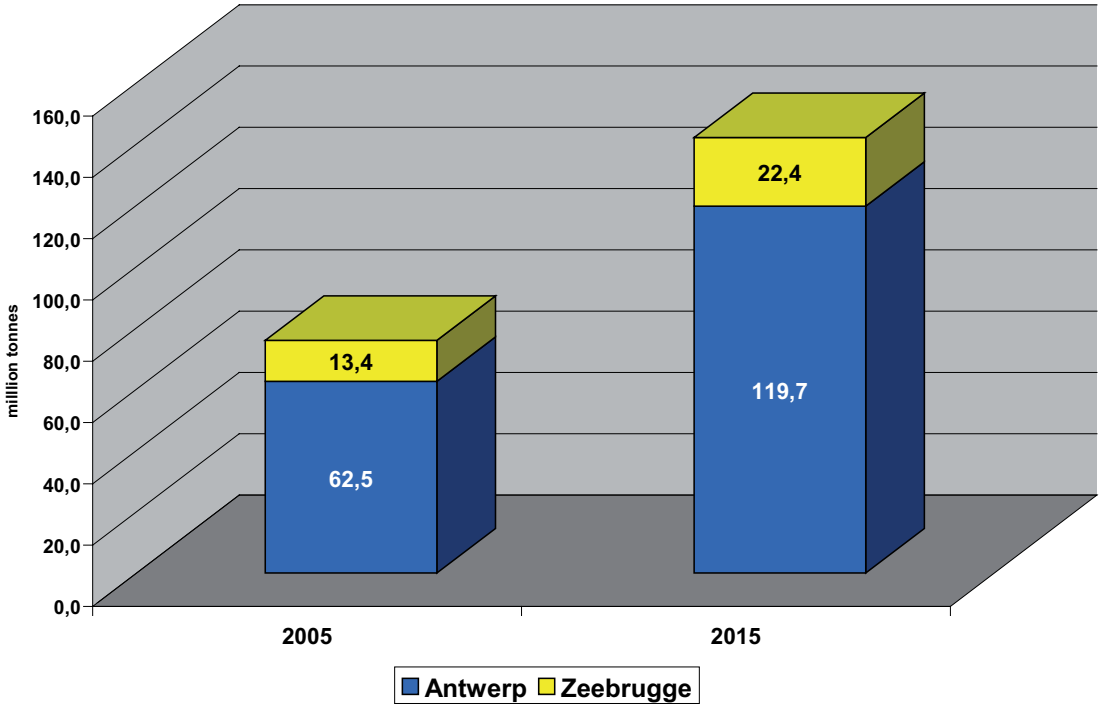
Figure 3-14: Development of sea-side and hinterland container handling volume in the port of Zeebrugge

	Million tonnes		Percentage change
	2005	2015	
Sea-side container volumes	15.6	31.4	+101%
Hinterland container volumes	13.4	22.4	+67%

Source: Port of Zeebrugge, own estimations

Fig. 3-15 below summarises the estimated development 2005 – 2015 of the total hinterland maritime container volumes in both ports, Zeebrugge and Antwerp. According to these estimations in 2015 both ports will generate 142.1 million tonnes of container hinterland traffic, which is nearly twice (+87%) the volumes of 2005.

Figure 3-15: Total maritime container volumes of Belgian ports to/from its hinterland



Source: Port of Antwerp, Port of Zeebrugge, own estimations

When estimating the share of hinterland transports by rail, we would remind the structure of the domestic rail container traffic in Belgium in the year 2005 (**cf. fig. 3-1**), where the maritime container traffic by rail amounts to approx. 4.9 million tonnes.

The port of Antwerp elaborated a forecast of the modal split in its hinterland connection, which foresees a growth of rail transports between 2005 and 2015 by +84% (conservative scenario) and +167% (progressive scenario). Consequently, an intermediate scenario would amount to +126%. Since Zeebrugge is exclusively connected to Antwerp (**cf. fig. 3-8**), both ports are included in these figures. The following **fig. 3-16** summarizes the results of these reflections:

Figure 3-16: Development of domestic hinterland transports by rail 2005 – 2015

	Million tonnes (gross weight)		**Percentage change**
	2005	**2015**	
Antwerp/Zeebrugge	4.9	11.1	+126%

Source: own estimations

After this estimation, in 2015 the total maritime container transport by rail will amount to 11.1 million tonnes.

3.3.2 Domestic combined continental transport

As concerns the domestic continental combined transport, **fig. 3.1** indicates a volume of 1.5 million tonnes,

- which are generated in the ports of Antwerp and Zeebrugge (**fig. 3.10**)
- and to almost 100% gateway shipments to/from international origins/destinations.

Consequently, we applied for the gateway shipments the same growth rate as we did in the capacity study. As presented in **fig. 3-17** the domestic continental transports by rail will grow by 3.5% p.a.[1], which means that in 2015 2.1 million tonnes will be transported in this market.

1 Exponential growth of tonne-kilometres. Since we assume the origin-destination structure as constant, it is possible to assign the tonne-kilometre growth rate to the volumes.

Figure 3-17: Development of domestic continental transports by rail 2005 – 2015

	Million tonnes (gross weight)		Percentage change
	2005	**2015**	
Continental transports	1.5	2.1	+ 41%

(source: UIC capacity study, own estimations)

3.4 Development scenario of combined transport in Belgium: 2015

Fig. 3-18 summarises the estimations of the development of Belgian domestic combined transport. According to these estimations the total market will grow from 6.4 million tonnes to 13.2 million tonnes in 2015, which means an additional traffic of 6.8 million tonnes. As pointed out several times before, the continental traffic includes the gateway shipments via the TRW hub in Ronet.

Figure 3-18: Development of the combined transport in Belgium 2005 – 2015

Domestic combined transport Market	**Volumes 2005 (million tonnes)**	**Volumes 2015 (million tonnes)**	**Percentage change**
Maritime market	4.9	11.1	+126%
Continental market	1.5	2.1	+41%
Total	**6.4**	**13.2**	**+106%**

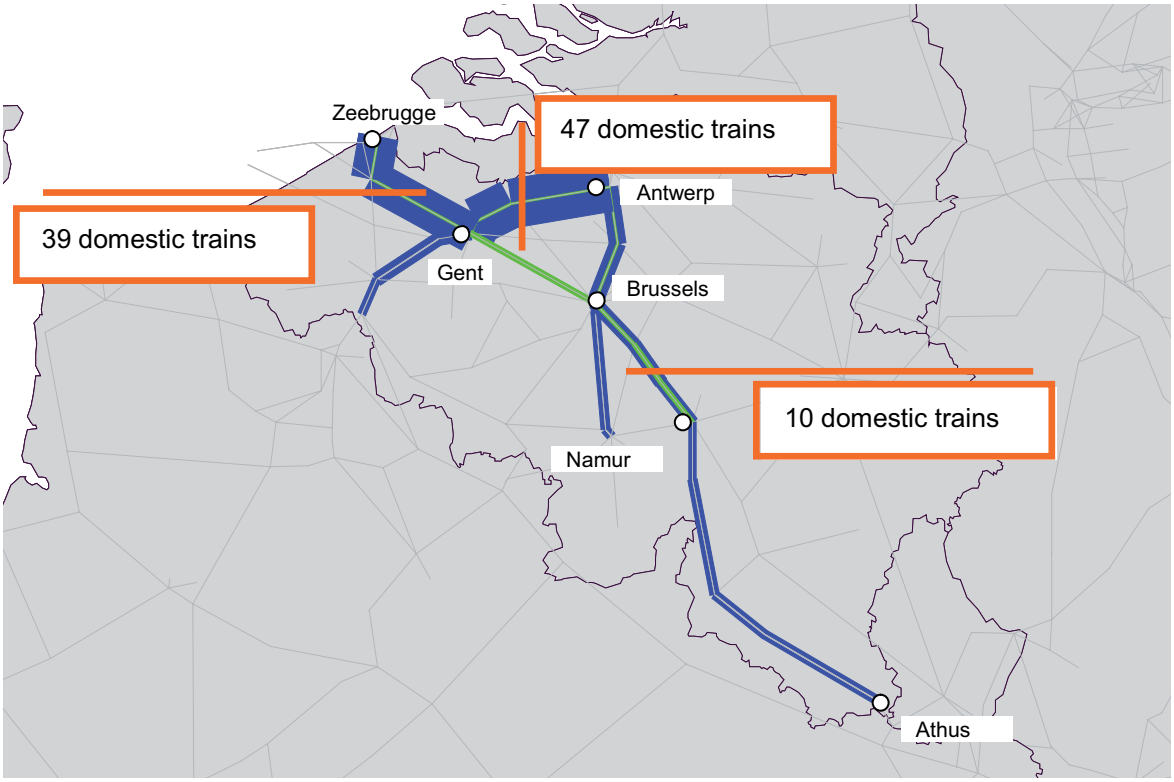
Transferring these figures into the number of trains, which run each day on the Belgian network, would lead to 65.8 daily trains on domestic O/D pairs. In the Capacity Study the forecast for direct (without gateway) international trains amounts to 94.4 daily trains. Thus, in total 160.2 trains will run on the Belgian network in 2015 (**Fig. 3-19**).

Figure 3-19: Domestic and international combined trains 2015 on the Belgian network

Market	Trains per day 2015	Percentage
Domestic combined transport	65.8	41%
International combined transport	94.4	59%
Total	**160.2**	**100.0%**

3.5 Impact of combined transport development on rail network capacity: 2015

Figure 3-20: Assignment of the domestic combined transport on the Belgian network 2015 (maritime traffic (blue), continental traffic (green))



As can be seen from the map above, domestic trains affect in particular the axes to/from and between the two ports Antwerp and Zeebrugge. A maximum of 47 domestic trains are assigned on the line between Antwerp and Gent and 39 domestic trains between Gent and Zeebrugge.

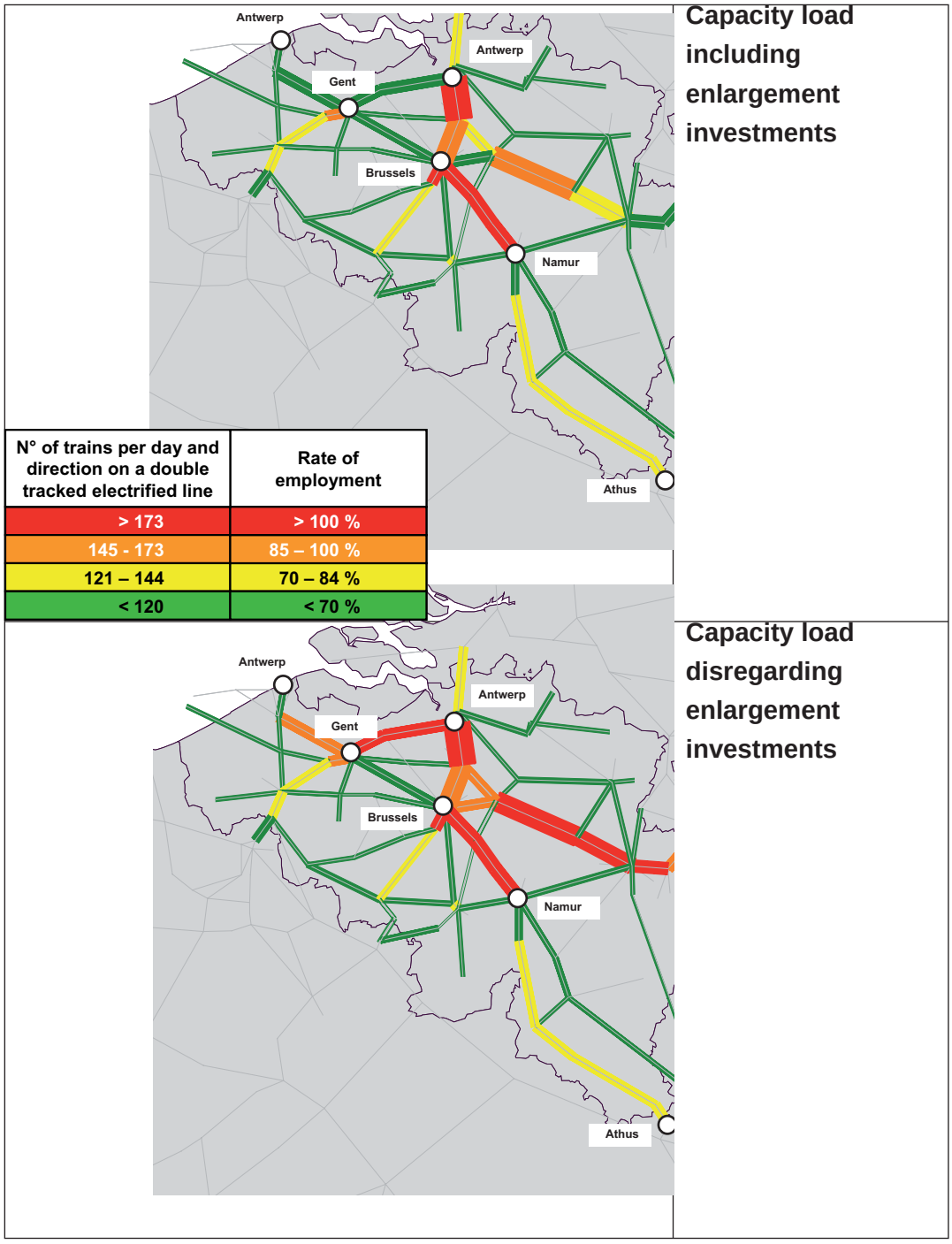
As concerns planned investments, **fig. 3-21** gives an overview. We would emphasize that the Iron Rhine is not included, since the political discussions are not finished and in Germany respective investments are not planned yet.

Figure 3-21: Planned investments in the Belgian network

N°	Railway line section	Remarks
1	Liefkenshoektunnel	New infrastructure in the port of Antwerp
2	Second exit by rail for the right bank of the port of Antwerp	New infrastructure in the port of Antwerp
3	Brussels - Leuven	Additional tracks (2 -> 4)
4	New connection from the port of Zeebrugge to ports of Antwerp and Gent	New infrastructure
5	Leuven - Mechelen - Gent	Capacity extensions
6	Landen - Hasselt	Additional track (1 ->2)
7	Namur - Erquelinnes	Capacity extensions
8	Fleurus - Auvelais	Additional tracks
9	Leuven - Aachen	New tracks/capacity extensions

sources: Infrabel, European Comission (TEN)

Figure 3-22: Total capacity load of rail network in Belgium by 2015



In **fig. 3-22** the capacity load on the Belgian rail network 2015 is presented after assigning intermodal and conventional freight trains as well as passenger trains. As can be seen from the comparison of the maps in **fig. 3-22**, even after the realisation of the planned investments in Belgium (map above),

- the central corridor between Antwerp, Brussels and Namur will be congested,
- as well as the Liège – Leuven corridor, which will be close to saturation,
- as well as some other links, in particular to the French and Dutch border.

The latter could in principal be alleviated by deviating trains to non-congested parallel lines.

When regarding the map below (without investments) it becomes more than evident that the essential part of the Belgian railway network will be congested.

3.6 Impact of combined transport development on terminal capacity: 2015

In **fig. 3-23** all the Belgian terminals currently under operation and their operators are presented. Out of 23 terminals (Ronet is a shunting yard), 9 terminals are located in the greater port area of Antwerp, which highlights the particular importance of combined transport by rail in Antwerp.

Figure 3-23: Belgian terminals and their operators (different sources)

	Terminal region	Terminal name	Operator
1	Antwerpen	Antwerpen Circeldijk	IFB
2	Antwerpen	Antwerpen D.S. Angola TRW Zomerweg	TRW
3	Antwerpen	Antwerpen Inter Ferry Boat Zomerweg	IFB
4	Antwerpen	Main Hub A1	TRW
5	Antwerpen	Main Hub A2	IFB
6	Antwerpen	Antwerpen Quai 468	Hupac /IFB
7	Antwerpen	Antwerpen Schijnpoort	IFB/TRW
8	Antwerpen	Waaslandhaven K1227	TRW
9	Antwerpen	Antwerpen Zomerweg	TRW
10	Athus	Athus TCA	IFB
11	Bruxelles	Bruxelles Port - BCT	IFB, TRW
12	Charleroi	Charleroi Dry Port	IFB/TRW
13	Genk	Genk-Euroterminal	TRW
14	Genk	Haven Genk	TRW
15	Liège	Gare de Bressoux	Terminal Euro Combi Est SA (IFB)
16	Liège	Port de Renory	Terminal Euro Combi Est SA (IFB / TRW)
17	Mechelen (Muizen)	Ambrogio	Ambrogio
18	Mechelen (Muizen)	Muizen Dry Port	IFB/TRW
19	Mouscron	Dry Port Mouscron/Lille international	IFB/TRW
20	Oostende	Ferryways	TRW
21	Oostende	Oostende	TRW
22	Zeebrugge	Zeebrugge	TRW
23	Zeebrugge	Zeebrugge Flanders en OCZ Terminals	IFB

In the following **fig. 3-24**, all available information about handling volumes 2005 and 2015, as well as the capacities are presented.

From this, one can draw the following:

- In 2005 most of the terminals still have free capacity,
- Whereas practically all terminals **Zeebrugge**, **Mouscron, Mechelen** and **Genk** will be saturated
- As concerns Antwerp, the multitude of terminals in the port makes it difficult to estimate exactly the capacity available. This is even truer, since we do not dispose of all necessary information. But given the important increase of demand, one can estimate that in 2015 terminal capacity in Antwerp is lacking.

To summarize: In 2015 the biggest terminals in Belgium will be saturated to a high degree.

Figure 3-24: Key figures of Belgian terminals

Terminal region	Handling capacity 2005 (ld. units)	Total handling volume 2005	Use of capacity 2005	Handling capacity 2015 (ld. units)	Trans-shipments 2015	Use of capacity 2015
Zeebrugge	365,000	274,000	75.0%	365,000	650,000	178.1%
Oostende		20,540			52,000	
Mouscron	18,000	13,136	73%	18,000	22,000	122.2%
Charleroi		31,636			80,000	
Antwerpen	610,000			940,000		
Mechelen (Muizen)	110,000	95,547	87%	110,000	224,000	204%
Liège	25,000	4,492	18%	25,000	13,000	52%
Athus		57,358			100,000	
Genk	45,000	38,487	85.5%	80,000	100,000	125%

Different sources

4 Trends in domestic transport in France

4.1 Overview of combined transport market in France 2005

In 2005 the French domestic combined transport market was shared by three operators:

- CNC („Compagnie Nouvelle de Conteneurs")/Naviland cargo,
- Novatrans and
- Rail Link.

Rail Link, a subsidiary of CMA CGM, the third leading container shipping company in the world, and Véolia (ex Connex), offers currently hinterland services from/to Marseille.

Novatrans, one of the first UIRR companies, offers terminal-to-terminal transports for their clientele of the forwarder market.

Up to 2005 CNC offered generally door-to-door services for maritime and continental shipments on more than 100 relations in France and neighbouring countries mostly for shippers. Most of the domestic services were routed via the central hub (Villeneuve St. Georges) in the Paris region, the so-called PNIF (**P**oint **N**odal **I**le de **F**rance), which connected in 2004 approx. 30 Terminals in France. A maximum of yearly 180.000 wagons were shunted in the PNIF. On the one hand, the hub system allows for a bundling of intermodal consignments and could thus also serve smaller terminal areas in France. On the other hand, this system led sometimes to not market-conform transport times, which is not astonishing regarding for example a service Pau – Toulouse via the PNIF in Paris.

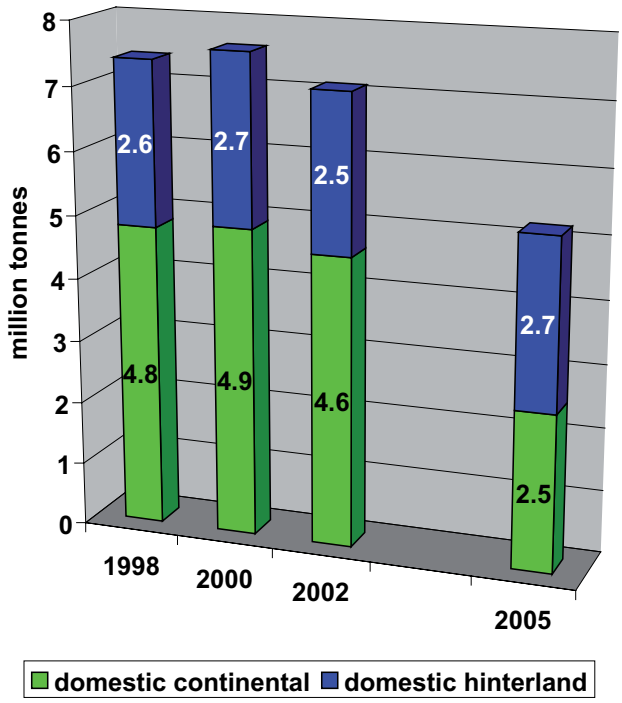
The year 2004 saw the first massive reduction of the CNC services with the closedown of a first set of terminals (e.g. Nancy, Nantes, Sotteville, Mulhouse, Fos-sur-Mer). As of the 12th june 2005 a complete restructuring of CNC started with the abandon of the PNIF, the concentration on trunk axes and the transport of maritime containers. Nevertheless this could not avoid that CNC disappeared in October 2005 from the market and came back as "Naviland cargo" by concentrating its activity exclusively on the transport of maritime containers of high volume origin-destination pairs.

But not only CNC/Naviland cargo saw a break down of its intermodal transports in France. Novatrans also saw a drop of nearly 10% of the transported consignments compared to the peak year 2000. Services from/to the Paris region alone dropped by approx. 20%.

As the main reason, the operators stated that SNCF raised traction prices by 7% on average each year during the period 2004 – 2006, which lead –along with a very poor operational quality- to this enormous drop of volumes.

The following **fig. 4-1** presents the evolution of the total domestic market (continental and maritime traffic) for the period 1998 – 2002. It is based on UIRR statistics, where it is mentioned that the Naviland figures of 2005 have to be taken with care, since they are estimates and most likely overestimated. Nevertheless, we think that UIRR statistics can give a good overview of the general evolution of domestic combined transport.

Figure 4-1: Total market in France for domestic combined transport



Source: UIRR statistics

Whilst in the period 1998 to 2002 the total domestic market reached more than 7 million tonnes, in 2005 only approx. 5.2 million tonnes were transported within France[1].

The domestic hinterland flows revealed as comparatively stable, whereas the domestic continental flows broke down by almost 50% between 2000 and 2005. This was due to the complete abandonment of a big part of the terminals served so far (e.g. the new terminal in Dijon Gevrey was closed after only two and a half years of operation) and the stop of CNC's activity in this market.

Even if the base year for this report is 2005, one can conclude from the first figures 2006 that domestic combined transport in France has reached the bottom in 2005, since then a slight recovery can be observed. Preliminary figures for 2006 from Novatrans, confirm this conclusion: Their traffic grew by 10% compared to the same period in 2005.

Against this background it becomes evident that for some markets in France it was relatively difficult to determine the "Trends in domestic combined transport" since estimates of future trends could not be based on the evolution in the past with the aid of time series. Even the operators hesitated to give estimates of their future traffic and the global development of combined transport in France. During a certain period in late 2005 and early 2006 even a complete abandonment of all domestic continental services was discussed. Thus, the "trends" have more or less been based on expert's estimations and assumptions.

1 One has to keep in mind that statistically, flows to/from terminals near the Spanish border (Perpignan, Bayonne) are counted as "domestic", even though in reality these flows are cross-border flows to/from Spain

4.2 Analysis of current domestic combined transport in France

4.2.1 Domestic combined hinterland transport

4.2.1.1 Evolution of container ports and sea-side container handling volume

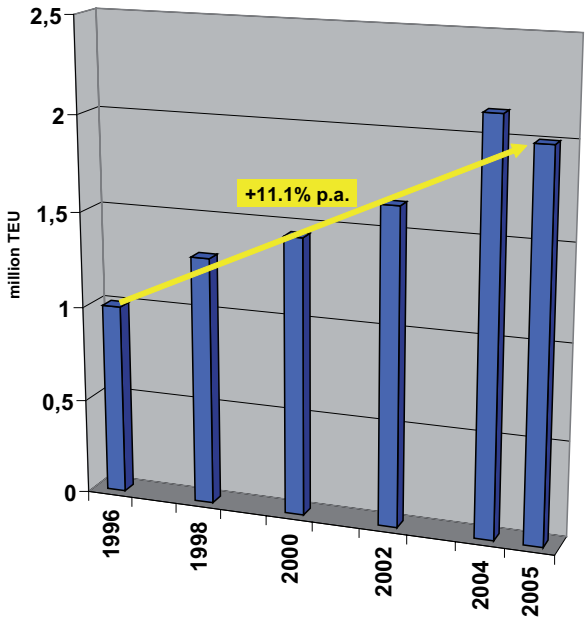
In France maritime container traffic is almost completely concentrated on two ports:

- Le Havre handled in 2005 approx 60% of the container volumes which is 2.0 million TEU.
- The second French port, Marseille/Fos, handled 26% of the French maritime container volumes, which amounts to 0,908 million TEU.

The other French ports are of minor importance. The total volume of these ports was in 2005 around 0.5 million TEU, which is 14 % of the total maritime container volume in 2005. Dunkerque plays with 0.2 million TEU in 2005 the most important role in this group.

The following **fig. 4-2** gives an overview of the development of the container volumes handled in the most important container port, **Le Havre**, from 1998 to 2005.

Figure 4-2: Total container volumes handled in the port of Le Havre; including sea-sea transit



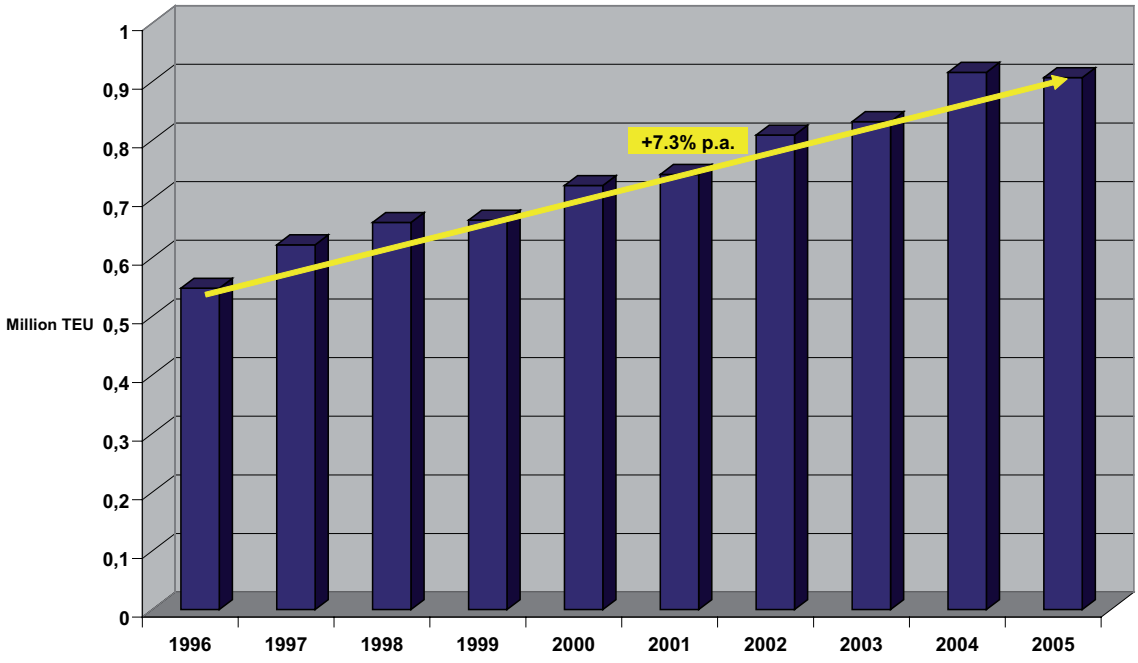
Source: Port Autonome du Havre

In the peak year of 2004 2,132 million TEU (loaded and empty) were handled in Le Havre, which represents 21.5 million tonnes. Thus the average load factor per TEU (empty and loaded) is 10.1 tonnes. Only loaded containers amount to 1,810 TEU (=85%). The reduction of the volumes between 2004 and 2005 was caused by capacity bottlenecks and strikes in this port.

According to **fig. 4-2**, the average annual (linear) growth rate between 1996 and 2005 amounts to 11.1% p.a. In these figures the sea-sea transit is included, which amounts to approx. more than one third of the total volumes handled (2003: 34.5%, 2004: 39.4% of the tonnage).

The second French port, which consists of the two port areas **Marseille and Fos,** indicates the following volumes of total container traffic for the years 1996 – 2005:

Figure 4-3: Total container volumes handled in the port of Marseille/Fos



Source: Port Autonome de Marseille

In Marseille/Fos the seaside transit is relatively low: in 2004 it was just 26.000 TEU of 0,916 million TEU (= approx 3%), consequently 97% of the container volumes are bound to the hinterland and the greater port area (Marseille, Etang de Berre etc.).

As indicated in **fig. 4-3**, the average annual linear growth rate between 1996 and 2005 amounts to 7.3%. As can be seen from this figure, the ports of Marseille also denote a slight reduction of volumes between 2004 and 2005, but not as significant as in Le Havre.

4.2.1.2 Hinterland transports of maritime containers per mode

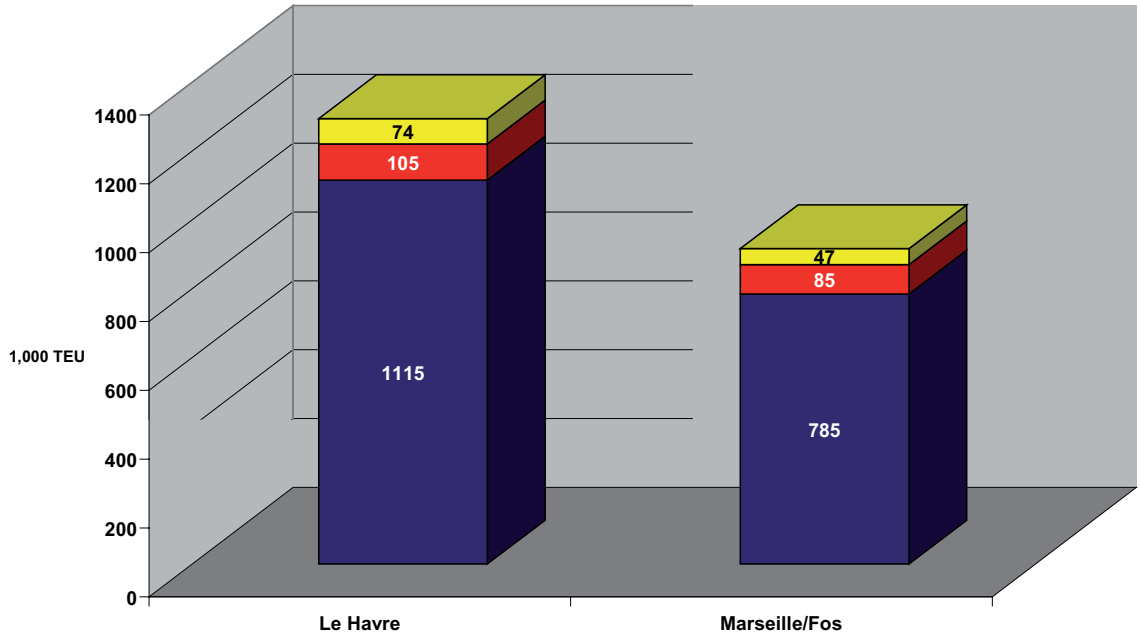
In both main ports in France all modes, road, rail and inland navigation, are present and offer hinterland services. These ports are also the only ones offering regular rail services. Thus, they are of particular interest for this study.

Contrarily to the seaside volumes, there is a lack of observed data for hinterland transports. In particular, time series of hinterland transports per mode are not available. On the other hand, given the complete restructuring of the intermodal rail transport in France during the period 2005/06, time series of this traffic would not be very helpful anyway. Consequently, the following analysis had to be based on the analysis of selective data.

Fig. 4-4 gives an overview of the absolute volumes of the hinterland transports per mode in 2004, which is the most recent base year, where comparable statistics are available[2]:

2 In addition, in the case of Le Havre it was necessary to transfer figures given in tonnes into TEU by using the average load factor of 10.1 tonnes per TEU.

Figure 4-4: Container hinterland traffic per mode 2004 in 1,000 TEU



Source:Port Autonome du Havre and Port Autonome de Marseille

When regarding these figures, one has to keep in mind that the road comprises beside hinterland transports all container hauls within the (greater) port area. The following **fig. 4-5** presents a comparison between the modal splits of the hinterland transports of the ports of Le Havre and Marseille/Fos.

Figure 4-5: Modal split of container hinterland traffic 2004

	Road and local	Rail	Inland navigation
Le Havre	86,2%	8,1%	5,7%
Marseille/Fos	85,6%	9,3%	5,1%

Source:Port Autonome du Havre and Port Autonome de Marseille

As **fig. 4-5** indicates, the modal split for both ports is relatively comparable. In Marseille/Fos the rail share is slightly higher; this may be due to the regular rail shuttle services between this port and its “dry port” in Lyon.

In absolute figures (cf. **fig. 4-4**) as well as what concerns the relative market share, the inland navigation in Le Havre is comparably higher than in Marseille. This reflects the growing number of inland navigation container services between the port of Le Havre and the Paris region.

The following matrix (**fig. 4-6**) gives an overview of the actual intermodal regular hinterland services by rail. In the matrix is shown the number of departures per week. All of these services are in day A – day B quality[3]. One has to keep in mind that the matrix reflects the situation in early 2006 and that a transport programme will be constantly adapted to the client's requirements. Thus, the programme may have changed since early 2006. In addition, non-regular trains ("spot trains") are not included in **fig. 4-6**.

Figure 4-6: Intermodal railway services 2006 for hinterland transport of maritime containers; departures per week

Naviland cargo						
	Bordeaux	Fos / Marseille	Le Havre	Lyon	Strasbourg	Toulouse
Bordeaux		3	5			
Fos/Marseille	3			5		3
Le Havre	5			5	2	
Lyon		5	5			
Strasbourg			2			
Toulouse		3				

Rail Link				
	Fos/Marseille	Le Havre	Valenton	Strasbourg
Fos/Marseille		2	1	1
Le Havre	2			
Valenton	1			
Strasbourg	1			

3 Sometimes, however, in "poor" day A – day B quality (afternoon – afternoon).

At the time being, Naviland cargo offers 6 regular hinterland services, whereas Rail Link is active on 3 links.

As concerns the volumes of hinterland combined transports 2005 by rail, two data sources have to be analysed:

- The UIRR statistics 2005, which indicate 2.7 million tonnes (**cf. fig. 4-1**).
- The port statistics 2004, which indicate for Le Havre 1.061 058 (net tonnage) = 105.000 TEU and for Marseille 85.000 TEU, thus 190.000 TEU in total (**cf. fig. 4-4**).

The ports indicate the average net load factors per TEU, which are 10.1 tonnes in Le Havre and 9.7 tonnes in Marseille. Given the average tare per TEU with 1.5 tonnes this would lead to a total volume of 2.170.000 gross tonnes in 2004. Since for 2005 comparable figures are not available, **we would estimate this volume as stable**, knowing that in both ports the total container handling volumes slightly dropped between 2004 and 2005. On the other hand, we should add some traffic from spot trains of other ports, of course not included in the Le Havre and Marseille figures.

Based on the information presented so far and the actualisation of the 2004 figures, we estimate the **number of daily trains on hinterland services in 2005 to approx. 13**.

4.2.2 Domestic combined continental transport

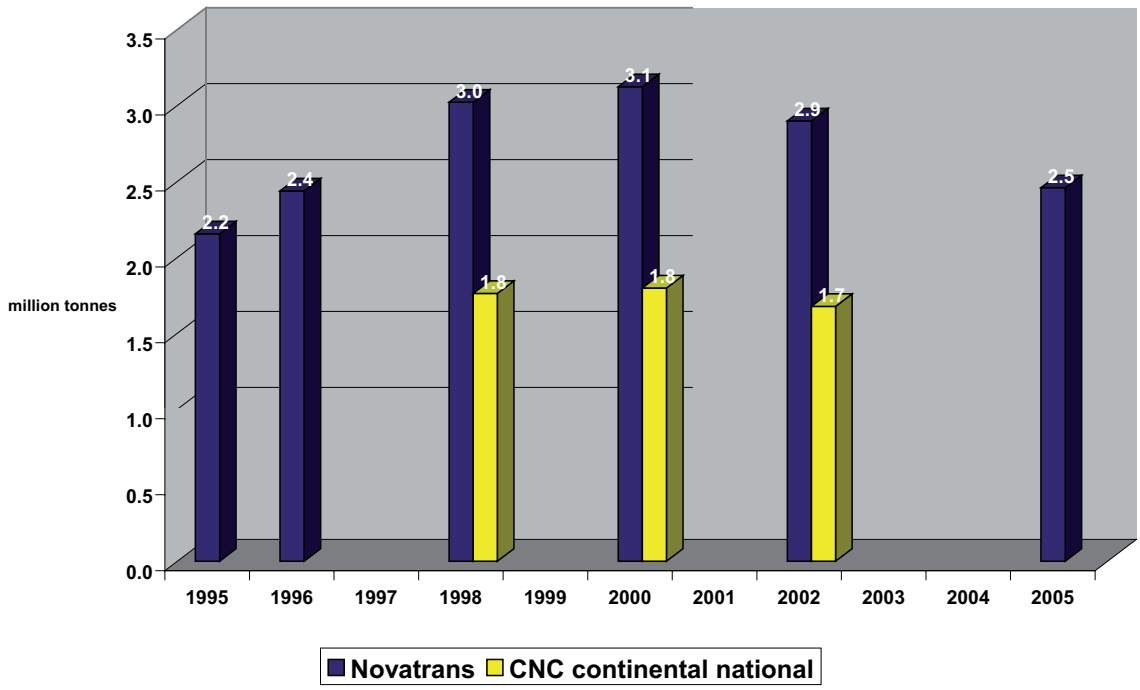
Until the consolidation of CNC in mid 2005, the continental market in France was characterised by the “classic” split of the intermodal market into the “forwarder market” and the “shipper market”, served by two companies:

- Novatrans for the forwarder market and
- CNC for the shipper market

Novatrans offered terminal – terminal transports of the forwarder’s equipment, since CNC offered mainly “door-to-door” services with own equipment.

Fig. 4-7 below presents the evolution of the absolute volumes in tonnes of the two operators of the domestic continental combined transport in France in the period 1995 to 2005. The continental domestic transport of CNC had to be derived from the total CNC figures published in the UIRR statistics with the aid of the UIRR data base.

Figure 4-7: Evolution of the domestic continental transport in France 1995 – 2005 by operator

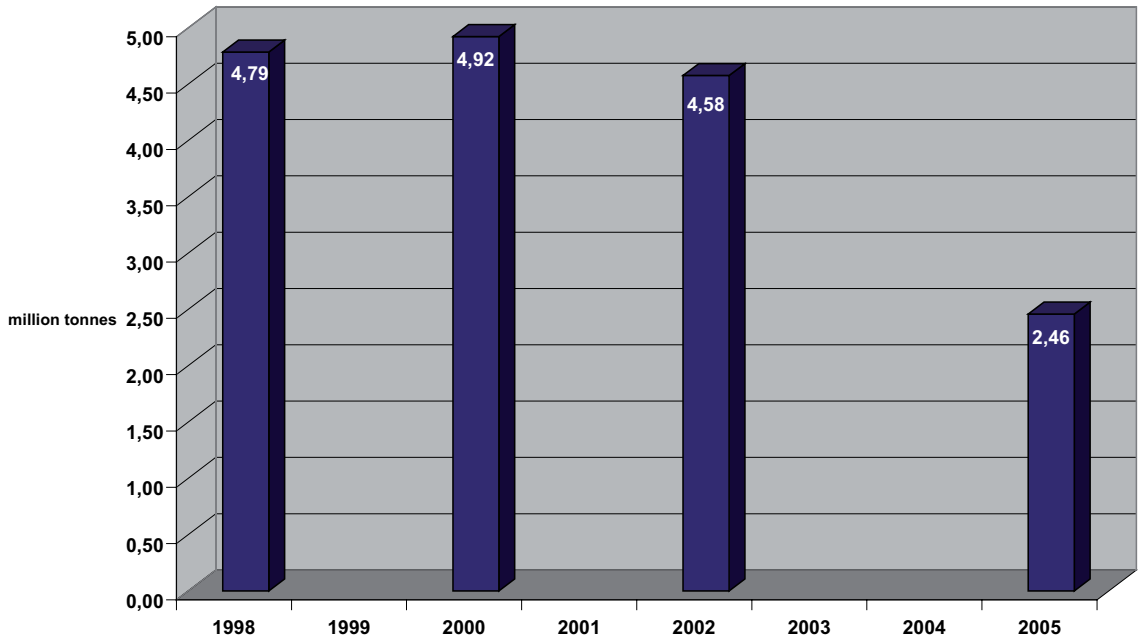


Source:UIRR data base

When regarding only the Novatrans figures, it becomes evident that after a constant growth of the volumes during the first half of the observed decade, the second half between 2000 and 2005 can be characterised by a constant drop of the volumes. This becomes even more evident when superposing the volumes of the two operators in this market.

Given the fact that CNC completely gave up the national continental market in 2005, **fig. 4-8** gives an impression of the decline of domestic continental combined transport in France.

Figure 4-8: Evolution of the domestic continental combined transport in France 1995 – 2005



Source: UIRR data base

Compared to the peak year 2000 the domestic continental intermodal transport in France has lost 50% of its volumes until 2005. This development was accompanied by a concentration of the services on a few strong relations, which are shown in **fig. 4-9:**

Figure 4-9: Weekly departures of Novatrans' domestic combined transport services beginning of 2006

		Av	Bo	Do	Ly	Ma	Mo	Pa	To	Pe
Avignon	**Av**			5				15		
Bordeaux	**Bo**			5				5		
Dourges	**Do**	5	5		5	5			6	7
Lyon	**Ly**			5						
Marseille	**Ma**			5				5		
Montpellier	**Mo**							5		
Paris	**Pa**	15	5			5	5		10	
Toulouse	**To**			6				10		
Perpignan	**Pe**			7						

Source: Novatrans

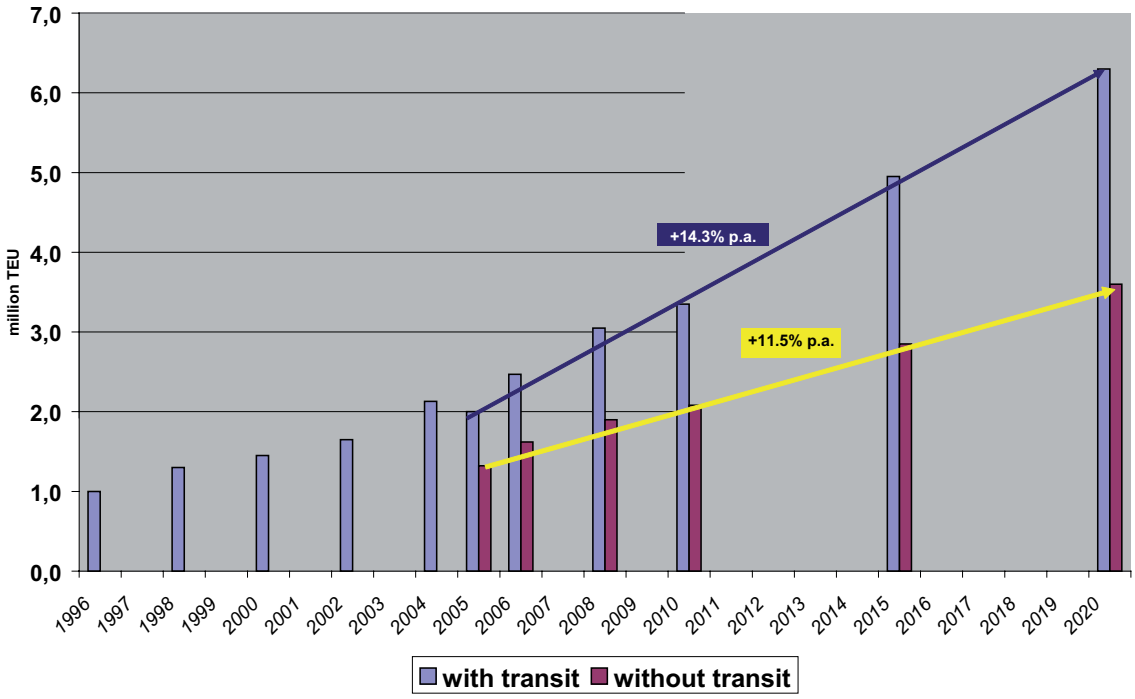
As can be seen from **fig. 4-9**, Novatrans offers services on 11 relations. Again, one has to keep in mind that the matrix, which reflects the situation in early 2006, will be constantly adapted to the client's requirements and that spot trains are not included in **fig. 4-9**. In addition, in some services the terminals are served by means of wagon groups (e.g. Avignon/Lyon – Paris/Dourges). Taking this into consideration, we calculated **an average of 26 trains per day for domestic continental combined transport in France.**

4.3 Analysis and evaluation of development trends of domestic combined transport in France by 2015

4.3.1 Domestic combined hinterland transport

As concerns the port of **Le Havre**, since April 2006 the first part of "Port 2000" is under operation. When "Port 2000" will be under complete operation, it will provide an additional capacity of 4 million TEU. In the following **fig. 4-10** is given a comparison of the observed and estimated future development of the container volumes. The figures are based on the newest forecasts of the port authority of Le Havre, handed over in late 2006 after the "Port 2000" had been under operation for a few months.

Figure 4-10: Observed and estimated future development of the container volumes in Le Havre



Source: Port Autonome du Havre

The port of Le Havre expects until 2020 a total container handling volume of 6.3 million TEU, sea-sea transit included. This represents an average annual linear growth rate of 14.3% between 2005 and 2020, which is approximately comparable to the expected 13.9 % annual growth of the German ports *(***cf. chapter 5***)*. On the other hand, this is considerably higher than the observed rates in the past *(***cf. fig. 4-2***)*.

Approximately one third of the total container volumes in Le Havre consist of seaside transit (feeder traffic). Regarding only the volumes transported to the hinterland, Le Havre expects an average yearly linear growth rate of 11.5% between 2005 and 2020, respectively of 8.7% between 2006 and 2020. **Fig. 4-11** summarises the forecasts of Le Havre.

Figure 4-11: Development of sea-side and hinterland container handling volume in the port of Le Havre

	Million TEU		Percentage change
	2005	2015	
Sea-side container volumes	**2.0**	**5.0**	**+ 147.50%**
Hinterland container volumes	**1.3**	**2.9**	**+ 123.08%**

Source: Forecast of the Port Autonome du Havre

The second French port, **Marseille/Fos**[4], does not indicate estimates of its future container volumes. At the moment, PAM (Port Autonome de Marseille) is investing in "FOS2XL", a new container terminal which will be under full operation in 2011. With "FOS2XL" the handling capacity of both ports, Marseille and Fos, will reach 2 million TEU.

Since no forecast of the utilisation of capacity in Marseille/Fos is available, we estimated two scenarios for the development until 2015:

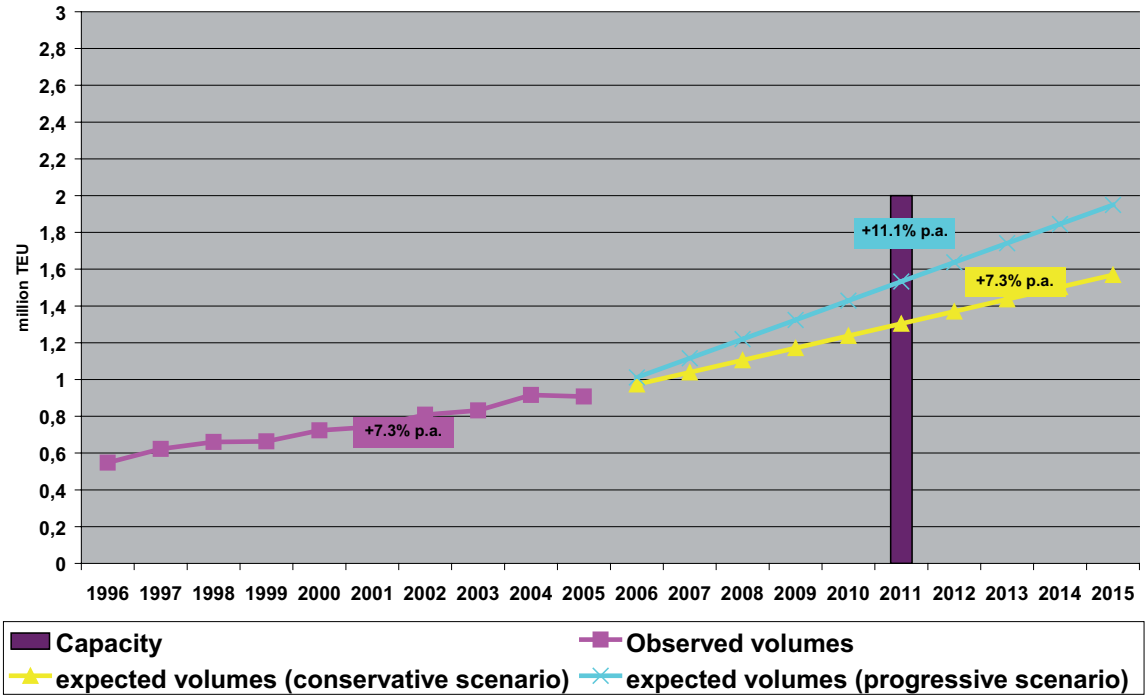
- A „conservative scenario", which extrapolates the observed linear growth rates of 7.3% p.a.
- A "progressive scenario" on the base of the observed growth of Le Havre which amounts to 11.1%.

As concerns the relatively small share of seaside transit in Marseille (in 2004 it was just 26.000 TEU of 0.916 million TEU = approx 3%), we assume that this share will be stable in the future, too. Thus, 97% of the container volumes embarked or disembarked in Marseille/ Fos have their origin or destination in the hinterland and the greater port area.

In total the "conservative scenario" would lead 2015 to a volume of 1.6 million TEU, the progressive scenario to a bit less than 2.0 million TEU. Given the assumption that the port of Marseille will profit from the growing Far East trade, we would assume the progressive scenario as achievable.

4 =Port of Marseille and Fos, Terminals Marseille Graveleau and Fos Maurepianne

Figure 4-12: Observed and expected container volumes of the ports of Marseille and the respective annual growth rates



Source: PAM Port Autonome de Marseille, own estimations

Thus the expected development of the port of Marseille/Fos can be summarised as shown in **fig. 4-13**, where the container volumes will a bit more than double between 2005 and 2015 (by +115%)[5].

Figure 4-13: Development of sea-side and hinterland container handling volume in the port of Marseille

	Million TEU		Percentage change
	2005	2015	
Sea-side container volumes	0.91	1.95	+ 115.00%
Hinterland container volumes	0.88	1.89	+ 115.00%

Source: Port Autonome de Marseille, own estimations

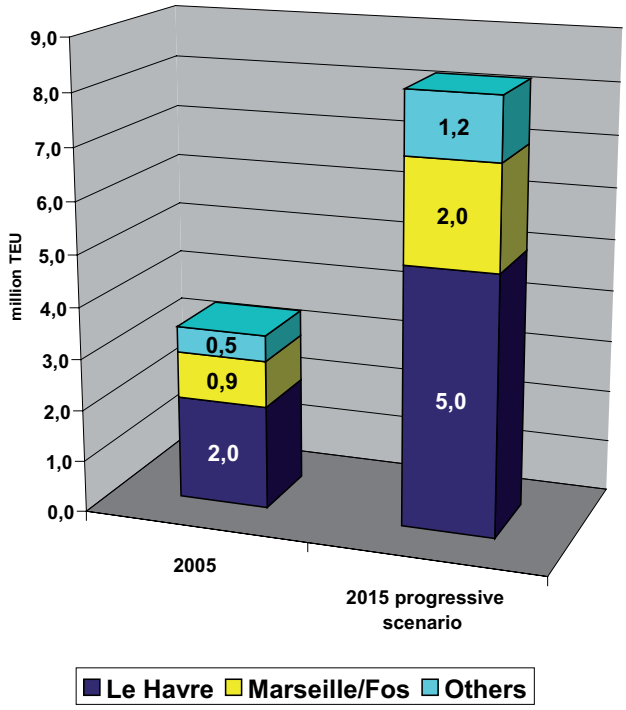
5 It goes without saying that the identical growth factors for sea-side and hinterland are due to the assumption of a constant sea-sea transit.

It must again be pointed out, that the hinterland volumes include local transports to the greater port area, especially for the industry in Marseille and in the area of the Etang de Berre.

As concerns the **other French ports**, we assume a constant market share (approx. 4%).

To summarize, these forecasts would lead to the following picture of the total container volumes between the French ports and their hinterland *(**cf. fig. 4-14**)*:

Figure 4-14: Total maritime container volumes of French ports to/from their hinterland



Source: Port Autonome du Havre, Port Autonome de Marseille, own estimations

Fig. 4-15 presents the total maritime container volumes in TEU as well as in tonnes (net weight).

Figure 4-15: Total maritime container volumes of French ports to/from its hinterland

	Million TEU		Percentage		Million tonnes (net weight)		Percentage	
	2005	**2015**	**2005**	**2015**	**2005**	**2015**	**2005**	**2015**
Le Havre	2.0	5.0	58.8%	61.0%	20,200	50,500	59.5%	61.7%
Marseille (progressive)	0.9	2.0	26.5%	24.4%	8,775	19,499	25.9%	23.8%
Other ports	0.5	1.2	14.7%	14.6%	4,962	11,910	14.6%	14.5%
Total	**3.4**	**8.2**	**100.0%**	**100.0%**	**33,937**	**81,909**	**100.0%**	**100.0%**

Source: Port Autonome du Havre, Port Autonome de Marseille, own estimations

As concerns the mode choice for hinterland transports the following push and pull factors for the rail transport can be seen:

- In mid-term the rail services will mainly remain concentrated on the 2 main ports: Le Havre and Marseille/Fos.
- The Hinterland of the French ports will remain mainly within France

However, for the future we can assume a growing share of rail transports. This will be due to the following aspects:

- Both main ports (Le Havre and Marseille/Fos) invest in new facilities (Port 2000 and Fos2XL), which allow for a better linkage between sea and rail. In addition, the ports search to improve their railway connections with their hinterland and within the port area (e.g. as of April 2006, the Port Autonome du Havre took over the railway network from RFF with the objective to improve the quality of rail services by executing the shunting themselves).
- Both main ports seek to extend their container handling areas by establishing “dry ports” in the hinterland (Lyon and Toulouse for Marseille, Rouen for Le Havre) and to connect them with regular shuttle services.

- The assumption of a constant market share of the other ports would lead to a volume of 1.2 million TEU. In the case of Dunkerque, this would mean that the port will reach the “critical mass” of 0.4 – 0.5 million tonnes, which allows for a regular rail service. It seems reasonable that Dunkerque will aim at a regular connection with Dourges with the objective to feed from there into the national (and international) network.
- The maritime market is easier to handle than the continental market, due to a concentration of volumes on a few relations and the concentration of a few “high volume” clients (Shipping companies). Consequently, we expect that it will be firstly the maritime market, where new railway undertakings could sustainably establish their offers in competition to the SNCF.
- Furthermore, we think that a general quality improvement of the railway system is a basic prerequisite for any development of the rail freight market in France.
- As concerns the competition to road transports, one can expect a slight growth of road costs (increase of tolls and labour costs (35 working hours)).
- Due to geographical reasons: We assume a comparably lower competition of low cost road carriers from Eastern Europe, which will help to keep road prices on a relatively stable (high) level.
- Even if we do not think that French ports will gain considerable market shares from their competitors in the Le Havre – Hamburg range and the Mediterranean Sea, the ports seek to extend their hinterland to regions outside France, in particular in the South of Germany and the Benelux states. This will positively affect the domestic transports by strengthen French regions near the borders (e.g. Strasbourg).

However, some critical factors will alleviate the expected growth of the rail in the hinterland market.

As concerns the localisation of the hinterland, the container volumes will remain concentrated on axes between the ports and a few important economic regions, due to the stability of the socio-economic structure of France. This concerns in particular:

- the Paris region, where rail services Le Havre-Paris will meet a strong competition of barge services on the river Seine and an even stronger competition of road transport, due to the relatively short distance,

- then the Lyon area where rail services from/to Marseille will meet a certain competition of barge services on the river Rhône, and
- finally some medium sized economic centres (Toulouse, Strasbourg and Bordeaux).

To summarize, these developments will not lead to important structural changes in the French domestic hinterland combined transports.

These assumptions have been transferred into the estimated development of the hinterland transports by rail in **fig. 4-16**:

Figure 4-16: Development of domestic hinterland transports by rail 2005 – 2015

	Million tonnes (gross weight)		**Percentage change**	**1,000 TEU**		**Percentage change**
	2005	**2015**		**2005**	**2015**	
Le Havre	1.218	2.636	+116.4%	105	261	+148.6%
Marseille	0.952	1.775	+86.5%	85	176	+106.8%
Other ports		0.248			25	
Total	**2.170**	**4.659**	**+114.7%**	**190**	**461**	**+142.8%**

4.3.2 Domestic combined continental transport

In the following the push and pull factors and the critical factors are discussed with the objective to develop scenarios for the most likely growth of the domestic combined continental transport.

As mentioned several times before, the domestic continental combined transport in France saw in 2005/2006 a complete restructuring with an enormous drop of volumes. Nevertheless, as stated in **chapter 4.1**, in 2006 a slight recovery of the combined transport in France can be observed. The reasons for this might be comparable to the situation in Germany in the late 90s and the beginning of the next decade (cf. **chapter 5** of this report). As “push and pull” factors we identified the following aspects:

- A consolidation on “strong” origin-destination pairs and, consequently, on bigger terminals helps to cut down the costs for intermodal transport and thus to offer road-competitive prices.

- In addition, we assume a general improvement of the quality of the railway system in France, since this seems to be a basic prerequisite that rail freight traffic in general will survive in France.
- Furthermore, we expect a slight increase of road costs, due to the French regulation of working times (35 hours) and increased fuel prices and tolls.

In total, these factors will lead to a growing confidence of shippers and of the transport industry in intermodal traffic.

A further positive impact on the domestic continental combined transport in France may have the inauguration of the “autoroute ferroviaire” between Bettembourg (Luxemburg) and Perpignan foreseen in 2007. Even though this service is geared to international traffic, it can give an incentive to domestic traffic between the Lorraine region and the south of France under the following conditions:

- The service must be open for unaccompanied traffic. This seems to be of utmost importance, since the Aiton – Orbassano test has proved that unaccompanied traffic will be more interesting for the clients.
- The service must be open for standard equipment, i.e. 4m trailers. It is well known in the intermodal community that in France the loading gauge is limited and 4m standard road trailers are normally excluded from combined traffic in France. For Bettembourg – Perpignan, SNCF Infra and RFF stated that it will be possible as of 2007 with special equipment (Modalohr system and “wagon corbeille” (basket wagons)) to load 4m standard trailer. In addition, these techniques have the advantage that standard trailers can be loaded.
- Finally, it will be a basic prerequisite that a sufficient service quality will be offered. This seems hard to achieve, since this axis is touching the most congested rail corridors in France (i.e. Metz – Dijon, the Lyon area and Nimes-Montpellier).

If the conditions are fulfilled, we assume a push for the domestic continental transport in France, since this offer serves an axis with a favourable distance of nearly 1000 km as well as regions with high economic activity (Lorraine area, Mediterranean coast between Marseille and the Spanish border). Furthermore, an intermediate stop in the Lyon area and

an integration of the service from/to Italy could create additional volumes[6].

As concerns an eventual positive impact by the market entrance of new railway operators that will strengthen the competition, we think that for continental combined transport this will have only a mid-term effect, since the classic railway undertaking will as long as possible keep the entrance barriers high. This seems to be confirmed, when regarding the difficulties "new" railway operators have to face, until they get all necessary certifications.

Contrarily to the push and pull factors, the following critical factors hamper the development of the domestic continental combined transport in France:

Regarding the socio-geographical structure of France, the French economic centres are located in distances to each other, which is in most cases below a critical distance for combined transport (**c.f. fig. 4-17**):

Figure 4-17: Route distances between economic centres in France (kilometres)

	Stras-bourg	Lyon	Marseille	Clermont-Ferrand	Bordeaux	Toulouse	Le Havre
Paris	488	463	774	421	583	676	196
Strasbourg		494	815	704	968	1028	670
Lyon			315	205	591	538	662
Marseille				475	645	404	971
Clermont-Ferrand					371	376	611
Bordeaux						244	865
Toulouse							865

Source: mappy

As pointed out before, the lauding gauge of the French rail network is not sufficient for transporting 4m semi trailers. P400 loading gauge can, as stated SNCF Infra and RFF, only be offered on distinct axis (e.g. Bettembourg – Perpignan) in combination with specific intermodal equipment (Modalohr and/or wagon corbeille).

6 It seems appropriate to remind that one daily departure could create an additional traffic of 150.000 tonnes per year.

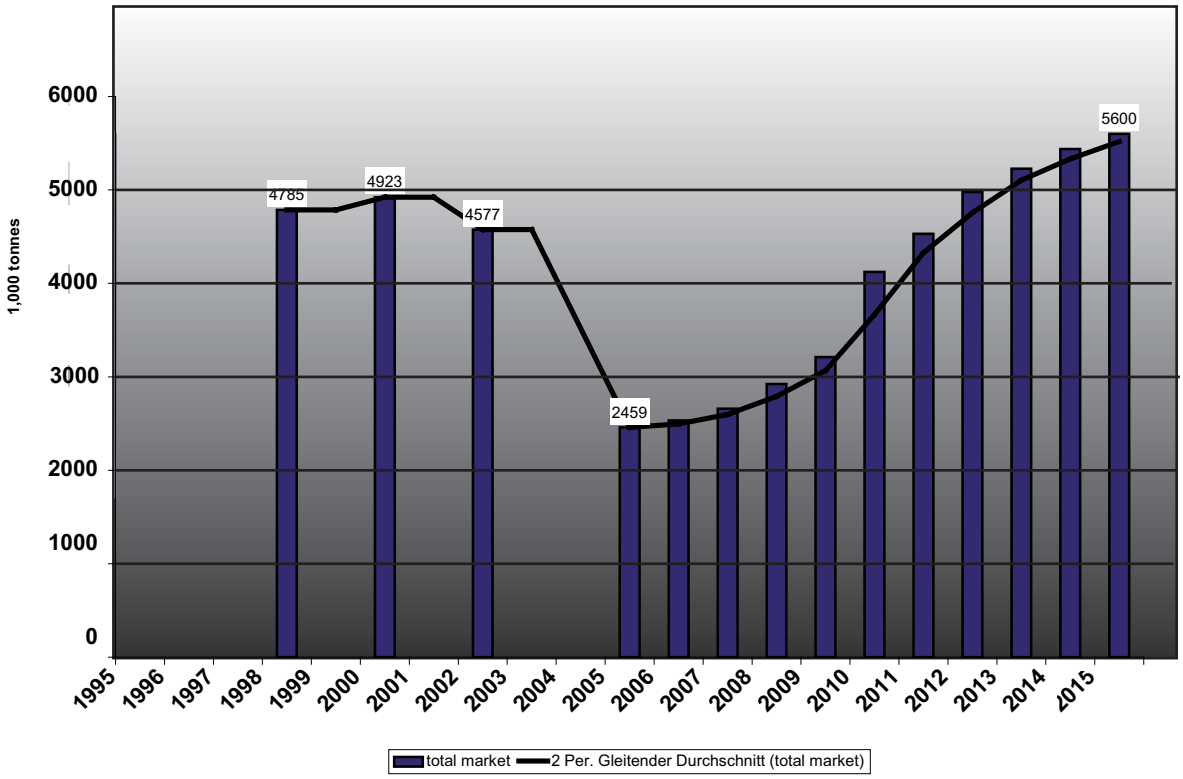
Another obstacle for the development of combined transport in France is the ongoing increase of traction prices, which rose by 7% each year between 2004 and 2006. Due to the difficult economic situation of SNCF, we assume an ongoing increase the next years, too, although with reduced growth factors.

As a conclusion, we expect the following growth path for the French domestic continental transports (**cf. fig. 4-18**) within the next decades:

- A first phase between 2005 and 2009 of approx 3% - 10% growth per year ("start up phase"), where continental combined transport slowly re-enters the minds of shippers and the transport industry. This phase is also driven by a growth of international shipments on domestic services (e.g. services to/from Perpignan and Bayonne). But still the obstacles are not surmounted (e.g. service quality).
- A second phase with high yearly average growth rates (up to more than 20%), where new services come successfully under operation (e.g. Bettembourg – Perpignan). In addition, international gateway shipments will raise the use of national trains (Bettembourg → Lyon area (→ Italy)) and a general increase of market conform service quality can be expected.

From 2012/13 on, the yearly growth factors will decrease, which is due to market saturation on O/D pairs with distances favourable for combined transport (> 500km). In addition to that, we do not expect that in France continental combined transport services will sustainably enter markets on shorter distances (e.g. Paris – Lyon).

Figure 4-18: Development of domestic combined transport 1998 – 2015



In total figures this would lead to the following development of domestic combined transport in the continental market:

Figure 4-19: Development of domestic continental combined transport by rail 2000 - 2005 – 2015

	Volumes (million tonnes)	percentage change between… and 2015
2000	4,923	+ 14 %
2005	2,459	+128 %
2015	5,600	

In 2015 the total volume amounts to 5.6 million tonnes, which is more than twice as much (+128%) as the current volumes, but only 14% more compared to the historic peak in the year 2000.

4.4 Development scenario of combined transport in France: 2015

The conclusion of the analysis and evaluation of development trends of domestic combined transport in France described in **chapter 4.3** is presented in **fig. 4-20**.

Figure 4-20: Development of combined transport in France 2005 – 2015

Domestic combined transport Market	Volumes 2005 (million tonnes)	Volumes 2015 (million tonnes)	Percentage change
Maritime market	2,170	4,659	+114.7%
Continental market	2,459	5,600	+127.7%
Total	**4,629**	**10,259**	**+121.6%**

Fig. 4-21 presents the conversion of tonnes of national combined transport into number of trains 2015. In this figure also the number of trains in international combined transport is presented which comes out of the "Capacity Study".

Figure 4-21: Domestic and international combined trains 2015 on the French network

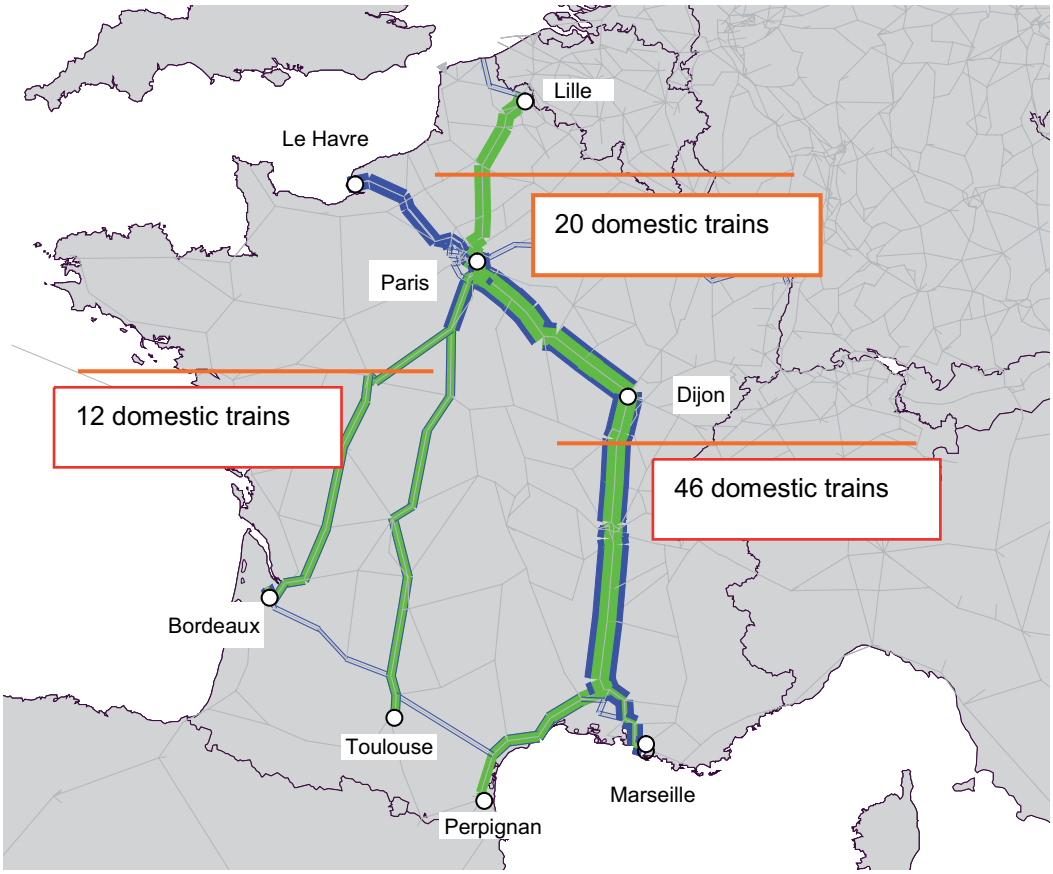
Market	Trains per day 2015	Percentage
Domestic combined transport	84.4	65.8%
International combined transport	43.8	34.2%
Total	**128.2**	**100.0%**

When regarding the results of **fig. 4-21**, one has to keep in mind that trains from/to the terminals at the Spanish border (Perpignan, Mougerre) are statistically calculated as domestic trains, whereas most of the consignments on these trains were in fact international.

4.5 Impact of combined transport development on rail network capacity: 2015

In **fig. 4-22** is presented the assignment of the domestic combined transport on the French network.

Figure 4-22: Assignment of the domestic combined transport on the French network 2015 (maritime traffic (blue), continental traffic (green))



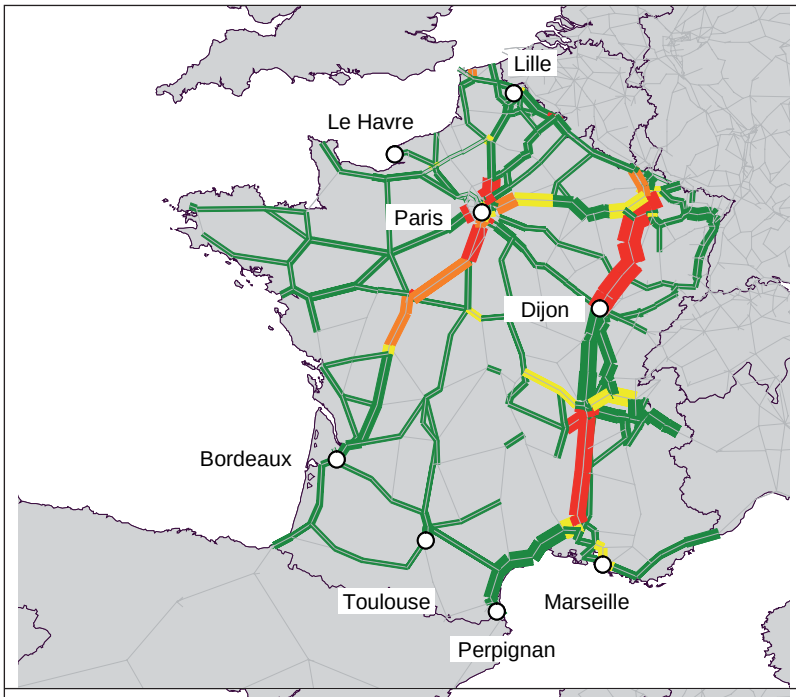
As can be seen from the map above, the domestic trains affect in particular the PLM (Paris-Lyon-Méditerrannée) axis, with a maximum of 46 trains in the Dijon area, which is currently a particular bottleneck in the French network. All domestic flows affect the Paris area, another neuralgic point in the network. In **fig. 4-23** all planned investments in the French network are presented. The investments were fixed in the CIADT (Comité interministériel d'aménagement et de développement du territoire) or CPER (Contrat de plan Etat-Région).

Figure 4-23: Planned investments in the French network

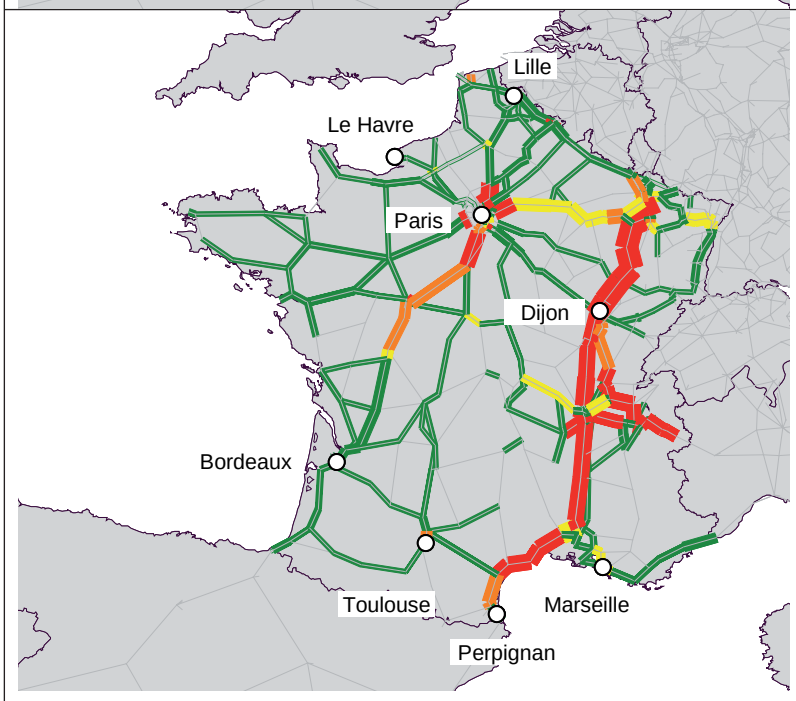
Project	Type of project
High speed link Paris - Strasbourg	Capacity extension on the existing line
Strasbourg – Basel	Capacity extension
POLT (Paris-Orléans-Limoges-Toulouse)	Capacity extension
Lyon bypass	New infrastructure
Mixed high speed link Rhine - Rhone	New infrastructure
New railway link Lyon - Turin	New infrastructure
Nîmes – Montpellier bypass	New infrastructure
Mixed high speed link Montpellier - Perpignan	New infrastructure
Mixed high speed link Perpignan - Figueras	New infrastructure
Dijon bypass	New infrastructure
Mixed high speed link Dax – Spanish border	New infrastructure

The following **fig. 4-24** presents the superposition of the results of this workpackage (domestic combined trains (**cf. fig. 4-22**)) and the results of the previous “Capacity study” (international combined trains, conventional freight trains as well as passenger trains) including respectively disregarding enlargement investments.

Figure 4-24: Total capacity load of the rail network in France by 2015



Capacity load including enlargement investments



Capacity load disregarding enlargement investments

It can be clearly seen from the two maps above that even when all enlargement investments were under operation by 2015, some capacity bottlenecks will remain. In particular

- the axis Lorraine – Dijon, which is and will remain a strategic axis of major importance for the traffic between Benelux/Germany and Southern France/Spain, which is even more of importance, since this axis is foreseen for the only P400 corridor (Bettembourg-Perpignan),
- the Paris region,
- the right bank of the river Rhone, although the line on the left bank of the river Rhone offers theoretically some free capacity, which could alleviate the situation, there are some investments needed to clear loading gauge and to connect the left bank line in the Avignon area with the right bank line,
- Orléans – Tours, another axis of particular importance, especially for Benelux – Spain.

The map in **fig. 4-24** below perfectly shows that when the planned investments will not come under operation until 2015, the two north-south axes are practically completely congested. These bottlenecks will negatively impact in particular the connection between the Iberian Peninsula on the one side and Benelux, Germany and Northern Europe on the other side.

4.6 Impact of combined transport development on terminal capacity: 2015

The difficult situation of combined transport in France in 2004/2005 complicated the estimate of this market's future development trend. This is true for services as well as for terminals. In addition, not all operators asked for, delivered the required information. Thus, we had to deal with incomplete information and rough estimations in this chapter. Nevertheless, we think it was worth proceeding in that way in order to give at least an idea about the terminals' situation in France.

Out of more than 40 terminals in early 2004, currently only 22 are still under operation (= 51%) *(**cf. fig. 4-25**)*.

Figure 4-25: Operator and state of the operation of French terminals

	Terminal region	Terminal name	Operator
1	Avignon	Avignon-Courtine	Novatrans
2	Bayonne	Mouguerre	Novatrans
3	Vesoul	Vesoul	special services of Naviland
4	Bordeaux	Bordeaux	Naviland cargo
5	Bordeaux	Bordeaux Combiné	Novatrans
6	Clermont-Ferrand	Clermont-Ferrand / Gerzat	closed
7	Cognac	Cognac	closed
8	Dax	Dax	closed
9	Hendaye	Hendaye	closed
10	Le Havre	Gare le Havre local	Novatrans
11	Le Havre	Le Havre terminaux portuaires	Naviland cargo
12	Lille	Lille	closed
13	Lille	Lille Gare Saint Sauveur	closed
14	Lille	Lomme	closed
15	Lille	Dourges	Novatrans
16	Lyon	St. Priest	Novatrans
17	Lyon	Venissieux	Naviland cargo
18	Marseille	Marseille - Canet	Novatrans
19	Marseille	Marseille - Fos	Naviland cargo
20	Metz	Metz-Sablon	closed
21	Montpellier	Montpellier (CNC)	closed
22	Montpellier	Montpellier (Novatrans)	closed
23	Nancy	Nancy (CNC)	closed
24	Paris	Bonneuil (CNC)	closed
25	Paris	La Chapelle	closed
26	Paris	Noisy-le-Sec	Novatrans
27	Paris	Pompadour	closed
28	Paris	Rungis	Novatrans
29	Paris	Valenton (CNC)	closed
30	Paris	Valenton	Novatrans
31	Paris	Valenton	T3M
32	Pau	Agen	closed
33	Perpignan	Perpignan (CNC)	closed
34	Perpignan	Perpignan St. Charles	Novatrans
35	Port Bou	Port Bou	Novatrans
36	Rennes	Rennes (CNC)	closed
37	Rouen	Sotteville (CNC)	closed
38	Strasbourg	Strasbourg (CNC)	closed
39	Strasbourg	Strasbourg (Novatrans)	closed
40	Strasbourg	Strasbourg Port du Rhin Nord	Naviland cargo

	Terminal region	Terminal name	Operator
41	Sète	Sète Zone Portuaire	Novatrans
42	Toulouse	Toulouse Fenouillet	Novatrans
43	Toulouse	Toulouse	Naviland cargo

Source: different sources

The following **fig. 4-26** gives an overview of the terminals currently under operation and (if available) their capacities as well as the actual and future use of these capacities.

In the case of no information from the operators being available, the total handling volumes 2005 and 2015 were calculated by using the information of this study **(chapter 4.1 - 4.5)** and the "Capacity Study".

Figure 4-26: Use of capacity of French terminals

Terminal region	Handling capacity 2005 (load units)	Total handling volume 2005 (load units)	Use of capacity 2005	Handling capacity 2015	Trans-shipments 2015 (load units)	Use of capacity 2015
Avignon	112,000	76,800	68.6%	112,000	172,800	154.3%
Bayonne	58,000	36,000	62.1%	58,000	72,000	124.1%
Bordeaux	180,000	100,000	55,5%	180,000	144,000	80,0%
Le Havre	59,000	60,000	101.7%		158,000	
Lille/Dourges	200,000	96,000	48.0%	200,000	218,800	109.4%
Lyon	267,000	64.000	24.0%	267,000	138,000	51.6%
Marseille	138,000	58,000	42.2%	250,000	137,000	54.8%
Paris	298,000	213,000	71.5%	328,000	422,000	128.6%
Perpignan	50,000	36,000	72.0%	50,000	64,800	129.6%
Strasbourg		7,500			18,750	
Sète	59,000	6,400	10.8%			
Toulouse	207,000	53,000	25.6%	207,000	67,500	32.8%

Source: different sources, own estimations

Even if the handling volumes given above in most cases are rough estimates, in particular for the 2015 horizon, one can conclude the following:

In the base year 2005 there is still free capacity in most of the terminals. As concerns the Paris region, in 2005 a certain capacity lack of **Valenton** was reported. In 2006 “Valenton II” came under operation, which raises the capacity by 90,000 load units. With the inauguration of “Port 2000” in **Le Havre** the capacities will be adapted to the demand.

Contrarily to 2005, in 2015 further terminal regions are running out of capacity:

- Avignon (154% use of capacity),
- Mouguerre (124%),
- Dourges (109%),
- Paris (129%),
- Perpignan (130%).

As concerns **Perpignan** and **Mougerre** the use of capacity in the Terminal depends on the availability of railway links with UIC standard gauge to Spain (Perpignan – Figueras (- Barcelona) and the “Y-Basque”). If these links are under operation until 2015, this would allow for combined trains to enter the Spanish network until their final destination. In this case we would expect that the use of capacity in these two terminals will considerably drop. The capacity bottleneck in **the Paris region** could in theory be alleviated by deviating services to terminals with free capacity.

The terminal in **Avignon** needs a capacity extension. Since the terminal area itself does not allow further extensions, other locations, like Cavaillon or Miramas could be evaluated. Finally, **Dourges** reaches its capacity limits in 2015.

5 Trends in domestic combined transport in Germany

5.1 Overview of combined transport market in Germany 2005

In Germany, 51.7 million gross tonnes have been conveyed on combined rail/road transport services in the year 2005, of which unaccompanied traffic contributed nearly 98 per cent (cf. **Fig. 5-1**). Cross-border unaccompanied combined transport including bilateral and transit flows, amounted to more than 31 million tonnes thus achieved 61 per cent of total intermodal traffic in Germany. In 2005, domestic services within Germany moved 19.1 million tonnes of cargo resulting in a market share of 37 per cent.

Figure 5-1: Combined rail/road transport volume in Germany: 2005

Combined transport (CT) market segment	2005	
	Million gross tonnes	Percentage
Unaccompanied combined transport	**50.55**	**97.8%**
Domestic CT	**19.11**	**37.0%**
Continental	7.00	
Container hinterland	12.11	
International CT	**23.94**	**46.3%**
Continental	15.40	
Container hinterland	8.54	
from/to German sea ports	*7.24*	
from/to foreign sea ports	*1.30*	
CT transit through Germany	**7.50**	**14.5%**
Accompanied combined transport	**1.16**	**2.2%**
Total combined transport	**51.71**	**100.0%**

Source: Statistisches Bundesamt [Federal Office for Statistics], KombiConsult & HaCon analysis

The volume of accompanied traffic, which had amounted to approximately 6.0 million tonnes two years ago, significantly declined to 1.2 million tonnes owing to the suspension of the two high-frequency services München-Brennersee and Dresden-Lovosice, in 2004. Following the liberalization of international road traffic with the new EU Member States and the elimination of the Austrian eco-point regime demand for these services dropped so sharply that, in spite of state subsidies, they couldn't be maintained.

5.2 Analysis of current domestic combined transport in Germany

5.2.1 Legal framework of combined transport in Germany

Since the 1970's the German federal government has encouraged both the supply of and the demand for combined transport services by a variety of legal and administrative measures. The existing actions are summarized in **Figure 5-2**.

Figure 5-2: Administrative incentives for combined transport in Germany

Action	Legal basis	Impact on CT	Who can benefit?	Periodization
State grants for building new CT terminals or enlarge existing sites	Gesetz über den Ausbau der Schienenwege des Bundes (BSWAG)	Reduction of terminal handling and, consequently, total CT transport cost	DB Netz	ongoing
State grants for building new CT terminals or enlarge existing sites	Richtlinie zur Förderung von Umschlaganlagen des Kombinierten Verkehrs	Reduction of terminal handling and, consequently, total CT transport cost	Private companies	unitil 2009 (extension is likely)
State grants for starting up domestic services or purchasing special equipment	Richtlinie zur Förderung neuer Verkehre im Kombinierten Verkehr auf Schiene und Wasserstraße	Facilitation of new domestic services and market access of special technologies	Private companies	until 2008
Exemption from road vehicle tax	Kraftfahrzeugsteuer-Gesetz (KraftStG)	Moderate reduction of total cost of unaccompanied CT operations (c. 10€ per shipment)	Owner of vehicle exclusively deployed for unaccompanied CT	ongoing
Reimbursement of road vehicle tax	Kraftfahrzeugsteuer-Gesetz (KraftStG)	Reduction of total cost of unaccompanied semitrailer and accompanied CT	Owner of road vehicle employed on CT services	ongoing
Increased maximum gross weight of road vehicle (44 v 40 tonnes)	Straßenverkehrs-Zulassungsordnung (StVZO)	Increased payload, potential for increased revenues	Every company using CT services	ongoing
Exemption of road pre- and on-carriage from weekend and holiday driving ban	Straßenverkehrsordnung (StVO)	Pick-up and delivery of intermodal shipments during restricted periods	Every company using CT services	ongoing

Source: KombiConsult analysis

From today's point of view, the most effective incentives as concerns the impact on promoting combined transport have been the state grants for constructing or enlarging intermodal terminals and the increased gross weight of 44 tonnes for road vehicles employed for pick-up and delivery services of combined transport operations. In earlier years the alleviation of road vehicle tax had also been effective until, in the 90s, the tax rate was reduced significantly. Except for one, all regulations are promoting domestic and international transport indiscriminately. Only the so-called "national PACT programme", which is allocating state aid for start-up services, is specifically targeting at domestic intermodal services. Since this action has only been introduced in the year 2005 its effectiveness cannot be assessed yet.

5.2.2 Overview of domestic combined transport in Germany

About 64 per cent of the total volume of domestic combined transport in Germany, in 2005, was shipped on container hinterland services between German sea ports and inland destinations. Approximately 1.25 million TEU of containers carried more than 12 million gross tonnes (cf. **Fig. 5-3**). In continental intermodal services that is the carriage of intermodal shipments within Germany between "dry" inland terminals, the operators involved achieved 7.0 million gross tonnes or 682,000 TEU, in 2005.

Figure 5-3: Domestic combined rail/road transport volume in Germany: 2005

Domestic combined transport (CT) market segment	2005			
	Million gross tonnes	Percentage	TEU	Percentage
Continental CT	7.00	36.6%	0.682	35.4%
Container hinterland CT	12.11	63.4%	1.246	64.6%
Total domestic CT	**19.11**	**100.0%**	**1.928**	100.0%

Source: Statistisches Bundesamt [Federal Office for Statistics], KombiConsult & HaCon analysis

5.2.3 Container hinterland combined transport

Evolution of container ports and sea-side container handling volume

The volume of sea-side container throughput of German sea ports and the scope and performance of domestic container hinterland services in Germany have mutually reinforced during most periods of the past since 1966 when the first *Sea-Land* container vessel called at the port of Bremen.

The growth of overseas container traffic in Germany, which has always been concentrating on the ports of Bremen/Bremerhaven and Hamburg, particularly soared during the last 15 years. Total sea-side container throughput grew by 273 per cent from 1990 to 2005 to 11.8 million TEU (cf. **Fig. 5-4**). The slightly higher growth rate of the tonnage, however, is misleading since, in 1990, the ports applied the net load concept (cf. **Fig. 5-5**). In 2005, all containers together carried 120 million gross tonnes of cargo.

Figure 5-4: Container throughput of German sea ports: 1990-2005

Port	Million TEU								Percentage change		
	1990	1995	2000	2001	2002	2003	2004	2005	2005 v 2000	2005 v 1995	2005 v 1990
Hamburg	1.97	2.89	4.28	4.69	5.37	6.14	7.00	8.09	89%	180%	311%
Bremerhaven	1.20	1.52	2.75	2.97	3.03	3.19	3.47	3.74	36%	146%	212%
Total	**3.17**	**4.41**	**7.03**	**7.66**	**8.40**	**9.33**	**10.47**	**11.83**	68%	168%	273%

Figure 5-5: Container handling volume of German sea ports: 1990-2005

Port	Million gross tonnes *)								Percentage change		
	1990	1995	2000	2001	2002	2003	2004	2005	2005 v 2000	2005 v 1995	2005 v 1990
Hamburg	19.59	29.36	45.29	49.79	57.19	64.28	74.03	83.05	83%	183%	324%
Bremerhaven	11.43	15.12	27.72	29.48	30.29	31.89	35.09	37.34	35%	147%	227%
Total	**31.02**	**44.48**	**73.01**	**79.27**	**87.48**	**96.17**	**109.12**	**120.39**	65%	171%	288%

*) 1990-1995: net tonnes

Source: Port of Hamburg, Port of Bremen/Bremerhaven, KombiConsult analysis

While the ports of Bremen/Bremerhaven already trebled their container handling volume the port of Hamburg achieved an even more spectacular growth. From 1990 to 2005 Hamburg quadrupled the amount of containers to 8.1 million TEU. Compared to all other major European container ports disregarding Taranto that had only opened end of the 90's, Hamburg also succeeded to capture the largest increase of throughput in the period 2000 to 2005 (cf. **Fig. 5-6**). Why could German container ports Hamburg in particular grew so strongly?

Figure 5-6: Container throughput of European sea ports: 1995-2005

Port	Million TEU				Percentage change	
	1990	1995	2000	2005	2005 v 2000	2005 v 1995
Rotterdam	3.67	4.79	6.27	9.29	48%	94%
Hamburg	1.97	2.89	4.28	8.09	89%	180%
Antwerpen	1.55	2.33	4.08	6.49	59%	179%
Bremerhaven	1.2	1.52	2.75	3.74	36%	146%
Algeciras	0.55	1.16	2.01	3.18	58%	174%
G. Tauro	-	0.02	2.65	3.16	19%	15700%
Felixstowe	-	-	1.84	2.7	47%	n.a.
Valencia	0.39	0.67	1.31	2.41	84%	260%
Barcelona	0.45	0.69	1.39	2.07	49%	200%
Le Havre	0.86	0.97	1.47	2.06	40%	112%
Genova	0.31	0.62	1.5	1.63	9%	163%
Piräus	0.43	0.6	1.16	1.4	21%	133%
La Spezia	0.45	0.97	0.91	1.02	12%	5%
Marseille	0.48	0.5	0.72	0.95	32%	90%
Taranto	-	-	0.15	0.72	380%	n.a.

Source: KombiConsult analysis

Key success factors of German container ports

The almost continuous increase of the German ports' sea-side container handling volume was due to favourable geo-economic conditions, the support from administrations and their specific market positioning:

- The ports are close to the German export industry and to importers' warehouses. Hamburg in particular is not only itself an industrial and commercial centre but has also a large hinterland of 4 million inhabitants and a variety of industries. About one third of all import shipments are bound for this area.
- During the cold war the German ports were standing with their back to the wall owing to their most eastern location among the North Sea ports so that their future appeared to be somewhat bleak. With the fall of the "Iron Curtain", however, the situation turned upside down. They have been benefiting from the proximity to the new markets in the Central and Eastern European countries whose population had a lot to catch up. Especially Hamburg became the major hub port for this area. This advantage is reflected in the accelerated growth of container throughput since 1990 (cf. **Fig. 5-6**).
- The ports, in co-operation with the transport administrations at federal and regional level, were always capable of enlarging infrastructure and handling facilities to match the expected growth of volume. The Bremen ports almost completely transferred the container handling to Bremerhaven that provides for deep-water quays and extensive enlargement opportunities. The river Elbe fairway has been deepened several times to enable big vessels travelling from and to Hamburg. Also the road and rail hinterland infrastructure has been continued to be enlarged and upgraded.
- The German ports are well-known for a high service quality and don't suffer from labour disputes.
- At an early stage of container traffic German forwarders consolidated their volumes in special agencies such as *TCU*. They preferred to routing the containers via Bremerhaven and Hamburg if, in return, they gained special rates in transport and handling.
- Finally, the German ports were set to carry as many containers as possible by rail and, in co-operation with German railways *DB*, were successful to establish a network of competitive services over the years (see below).

In 2005, 1.9 million TEU were moved by hinterland combined transport from/to Hamburg and Bremerhaven of which 1.25 million TEU were on domestic services. Intermodal traffic achieved a market share of 16 per cent of the total sea-side container throughput of German sea ports (cf. **Fig. 5-7**). This figure, however, needs to be qualified in so far as, firstly, a large percentage of the sea-side volume accounts for sea feeder traffic, and, secondly, what particularly applies to Hamburg, nearly 50 per cent of the total hinterland volume is over rather short distances of up to 150 km and therefore, generally, no rail market.

Figure 5-7: Container throughput and hinterland combined transport of German sea ports: 2005

Port	Sea-side throughput (million TEU)	Combined transport volume (million TEU)	Percentage
Hamburg	**8,09**	**1,40**	**17,3%**
Bremerhaven	**3,74**	**0,50**	**13,4%**
Total	**11,83**	**1,90**	**16,1%**

Source: Port of Hamburg, Port of Bremen/Bremerhaven, KombiConsult analysis

Evolution of Transfracht's container hinterland combined transport

Whereas the sea-side container throughput of German sea ports improved nearly continually domestic container hinterland transport had its ups and downs in the last 15 years. After the reunification of Germany, in 1990, the combined transport operator *Transfracht,* a *Deutsche Bahn* subsidiary that, at that time, was a quasi monopolistic supplier of these services achieved stable growth rates. In the second half of the 90's, however, the break-even distance of intermodal hinterland services to through-road increased to some 450 kilometres following the liberalization of road hinterland and of cabotage transport. The competitiveness of intermodal rail services on medium distances declined.

End of the 90's, domestic container hinterland transport - like the entire domestic intermodal system in Germany (cf. also **chapter 5.2.4**) – even entered a state of crisis. At that time *DB Cargo*, the freight division of *Deutsche Bahn*, almost completely bore the economic risk of capacity employment of intermodal services. This commercial relationship was closely

linked to the operational conditions of intermodal hinterland services as they were primarily performed within the single-wagon traffic system provided by *DB Cargo.* Thus *Transfracht* could offer thousands of connections to every rail siding across Germany, which *DB Cargo* served even if it was only once per year. *DB Cargo* allegedly incurred a considerable financial loss from domestic combined transport every year. It, however, refused to continue bearing it and insisted on a reorganization of the system and calling on an increased commercial responsibility from combined transport operators.

The outcome of this crisis, in the short term, was a decrease of the volume of containers carried by *Transfracht*. In the long term, however, domestic hinterland traffic was strengthened and taken back on a path of growth. *DB Cargo*, first of all, raised the prices for the single-wagon transport of containers to compensate for the increased efforts, but worsened transit times. As expected most of the volume on services affected broke away. Secondly, the commercial and operational relations between *DB Cargo* and *Transfracht* were completely restructured. They established a domestic network of hinterland services operated under the brand name *Albatros* – later *AlbatrosExpress.* The system comprises two main components. Firstly, *Transfracht* is purchasing the network on a block train basis thus taking over the capacity employment risk from *DB Cargo*. Secondly, a new port-to-door production concept has been introduced:

- Inland terminals are only served by through intermodal rail services if they are likely to generating sufficient shipments to the terminals in this area. The final loading and unloading points are served by trucks.
- The marshalling yard of Maschen located south of Hamburg serves as hub for all shipments between inland terminals and Bremerhaven and Hamburg. Here dedicated domestic trains to inland destinations are formed out of the “commuting trains” from the ports. The Maschen hub also breaks up incoming trains from inland terminals and distributes wagons to the ports.
- Inland terminals are served by direct or liner trains ensuring competitive transit times.

With the *AlbatrosExpress* concept *Transfracht* attained the turn-around of its domestic intermodal hinterland services. By and by, the operator has been extending the number and frequency of its services and is now covering every economic centre in Germany. In 2005, *Transfracht* regularly served up to 18 inland terminals (cf. **Fig. 5-8**). Due to this

efficient network the total cost of port-to-door container logistics currently are noticeably less on combined rail/road journeys than by road for most areas more than 350 to 400 km away from German container ports. Owing to the reclaimed competitiveness *Transfracht* is now shipping more containers than ever.

Figure 5-8: Transfracht's AlbatrosExpress network of domestic services

Source: Transfracht website

The impact of new combined transport operators

Since 2000 several new intermodal operators were established in Germany that, until 2005, had been positioning themselves exclusively on the market of domestic container hinterland services. Their market entry clearly is connected with the emergence of two services that influenced the economics of rail freight services:

- Independent railway undertakings that previously only operated on short hauls offered long-distance traction services;
- The locomotive manufacturer *Siemens* established the locomotive leasing company *Siemens Dispolok*. Thus small-scale railway operators were able to provide themselves with appropriate long-distance engines even for short-term leases.

The majority of new operators has chosen one of the independent railway undertakings (cf. **Fig. 5-9**). It was *boxxpress* that pioneered this market by cooperating with *TX Logistik* as traction service provider. Its network comprises of links between the ports of Hamburg and Bremerhaven and high-volume inland areas in South Germany, which partly are served twice a day (cf. **Fig. 5-10**).

Figure 5-9: Combined transport operators of domestic hinterland services in Germany: scope of services, rail traction provider: 2005

CT operator	Domestic container hinterland service	Brand name	Rail traction provider
ACOS	Bremen - Erfurt/Schweinfurt/Nürnberg/ Stuttgart/Wörth	NECOSS	EVB
ACOS	Hamburg - Bremerhaven - Bremen	NTT	EVB
Bahn Tank Transport	Hamburg - Mühldorf		Railion
boxxpress	Hamburg/Bremerhaven - Nürnberg/München/ Stuttgart/Mainz/Ludwigshafen		TX Logistik
Kali-Transport Gesellschaft	Hamburg - Wismar/Beiseförth	Baltic Train	Railion
Spedition Zippel	Hamburg - Berlin	Z-Train	D&D
Spedition Petersen	Hamburg/Bremerhaven - Frankfurt/Oder		Railion
Transfracht	Hamburg/Bremerhaven ↔ 18 inland terminals	AlbatrosExpress	Railion

Figure 5-10: boxxpress network of domestic services

Source: boxxpress website

In the beginning the new operators were trying to catch “easy volume” from existent intermodal services. As soon as they had stabilized their business they, however, were set to release additional container shipments. They were capable of giving strong incentives to the hinterland combined transport market in Germany and contributed to strengthening it considerably:

- The newcomers deployed additional services on links that were already served by *Transfracht*. This increased the total capacity and the frequency on the link and raised the flexibility for customers.
- Supported by independent rail traction services they triggered off competition both for quality and cost. As a result intermodal port-to-door freight rates generally remained moderately and were becoming more and more competitive on medium-range distances.
- New operators were also innovating container hinterland transport as regards the disclosure of untapped market potentials and rail production. *ACOS* for example implemented a service network called *NECOSS* between Bremerhaven and inland locations such as Erfurt or Schweinfurt that have never or not more been served. The several, often small-scale locations are efficiently served by employing a smart liner train system (cf. **Fig. 5-11**). The company, too, developed the triangular service *NTT*, which, calling at Bremen, Hamburg and Bremerhaven, is primarily used for the re-positioning of empty containers. This system of rather short-haul trains has gained a tremendous market acceptance; *ACOS* carried about 130,000 TEU last year.

5.2.4 Conclusions

Domestic container hinterland combined transport in Germany has achieved a strong market position. The competitiveness is based on the following conditions:

- High and continuous growth rates of sea-side container volume of German ports also owing to a “consolidation effect” ensuring a cross-fertilization of domestic and international container flows,
- Interest of ports of reinforcing intermodal services,
- Successful marketing of ports’ capabilities with shippers and forwarders,

- Comprehensive supply of competitive intermodal hinterland services as regards market penetration, freight rates and frequency,
- Increasing competition in hinterland services on operator and rail traction level,
- Innovation potential.

Due to these strengths which, for the time being, is only spoilt by a chronic lack of punctuality across all railway undertakings, combined transport has gained a rather high share of modal split. It is estimated that, in 2005, about 60 per cent of all hinterland containers carried over more than 150 km from/to the ports - that is the distance Hamburg-Hannover – have been moved by intermodal rail services. Below that distance road is clearly more economic except for the *NTT* short-haul service (see above). This service, however, is operating under the specific conditions of the inter-port balancing of container flows, comparable to the Rotterdam-Antwerp services of the Belgian operator *Interferry Boats*.

Figure 5-11: ACOS domestic *NECOSS* and *NTT* services

Source: ACOS website

5.2.5 Continental combined transport

In 2005, regular long-distance continental services within Germany were provided primarily by seven combined transport operators (cf. **Fig. 5-12**). Local feeder services such as the Marl-Duisburg shuttle operated by *duisport rail* haven't further been considered in the present investigation even if they contribute to support the entire intermodal system.

Figure 5-12: Combined transport operators of domestic continental services in Germany: scope of services, rail traction provider: 2005

CT operator	Domestic container hinterland service	Brand name	Rail traction provider
DHL	Hamburg/Hannover - Nürnberg/München; Unna/Bönen - Berlin; Unna - Hamburg	Parcel Intercity (PIC)	Railion
Hellmann	Osnabrück - Hannover - Nürnberg/Regensburg/ Landshut; Hamburg/Bremen - Hannover - Frankfurt/Karlsruhe	Rail Solutions	Railion
Hupac	Duisburg - Singen; Duisburg - Schwarzheide		Railion, Rail4Chem
Kombiverkehr	Network of 30 domestic links served 5 to 6 times per week both ways	Kombi-Netz 2000^{+}	Railion
Railog	Bönen/Unna - Nürnberg/München		Railion
Transfesa	Köln - Berlin		Railion
Westfälische Landes-Eisenbahn	Warstein - München		Westfälische Landes-Eisenbahn

Source: KombiConsult survey

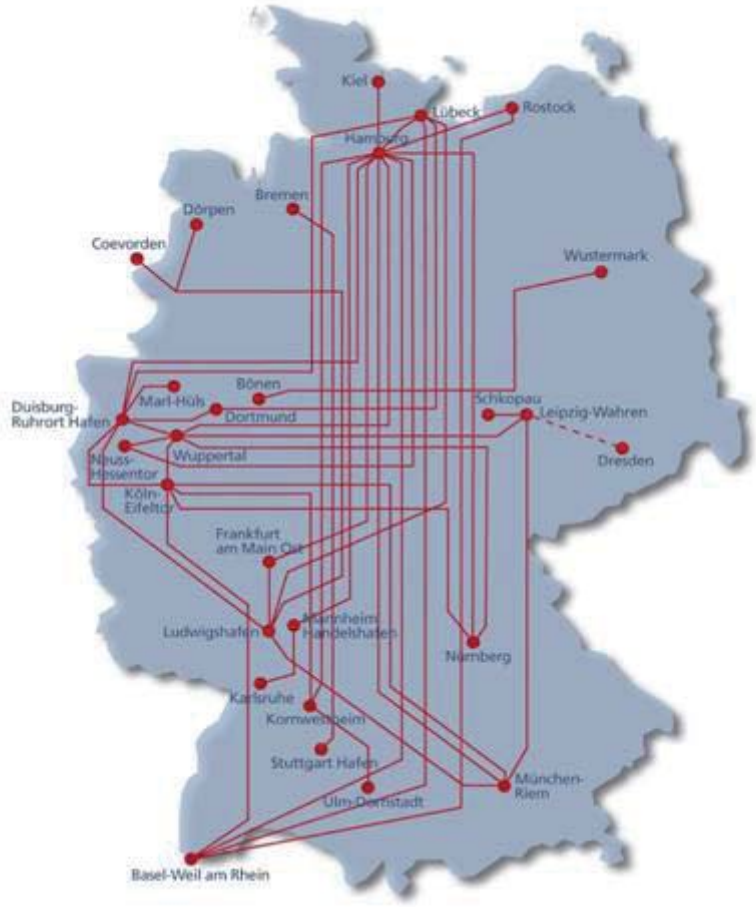
The evolution of Kombiverkehr's traffic

Kombiverkehr has always been the market leader in domestic continental combined transport in Germany. In 2005, the company held a share of more than 80 per cent of the total volume of this market segment. *Kombiverkehr* is one of the "classic" combined transport operators that are used to neither perform rail/road services for their own cargo nor deploy proprietary intermodal loading units. Instead, *Kombiverkehr* is committed to organizing an "open system" of terminal-to-terminal services for account of forwarders, logistic service providers and transport companies that are deploying proprietary equipment and perform

pre- and post-haulage on their own. To this purpose *Kombiverkehr* is (wholesale) procuring of train capacities and (retail) selling them to clients.

Like *Transfracht* - and for almost the same reasons (cf. page 100) - *Kombiverkehr* had to go through a process of re-engineering its domestic business in the period 1998 to 2000. Following the path already adopted for international combined transport the operator decided to focus on a viable network of block train services. Under the brand name *Kombi-Netz 2000*⁺ this system was launched in February 2000 (cf. also **Fig. 5-13**).

Figure 5-13: Kombiverkehr's domestic system Kombi-Netz 2000⁺ (2006)



Source: Kombiverkehr KG

Presently the *Kombi-Netz 2000*$^{+}$ consists of the following main characteristics

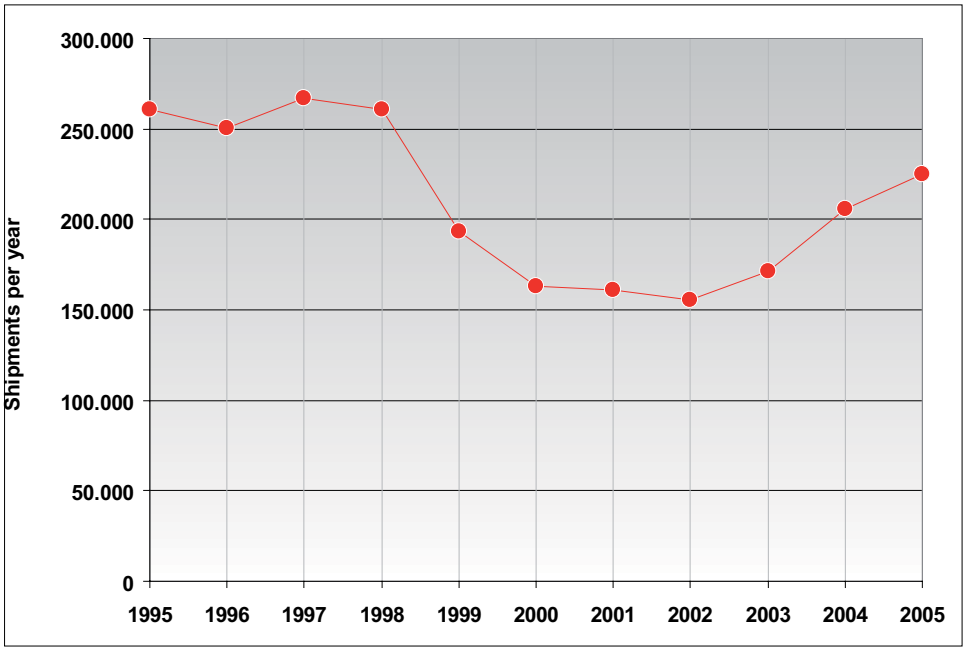
- *Kombiverkehr* is purchasing the entire system from *Stinnes Intermodal*; rail traction is performed by *Railion Deutschland*.
- The network primarily links the major economic centres in Germany. Too, it includes services between inland terminals and the Baltic Sea ferry ports of Kiel, Lübeck and Rostock.
- Preferentially, the domestic lines are served by direct trains. Liner or Y-shape services, however, are employed in the start-up phase of new services or if the market potential for a point-to-point service is not sufficient.
- *Kombiverkehr* and *Stinnes Intermodal* agreed on a performance regime, which should make sure a competitive rate of reliability and also foresees an incident management.
- In addition to this core supply the partners agreed on a kind of “incubator scheme”. Links that are assumed to possess potential for a satisfactory development but would need an extended start-up phase to foster traffic are offered at “protective” conditions as regards transit time and freight rates. If the objectives are achieved the services are “upgraded” and included into the *Kombi-Netz 2000*$^{+}$. If they were underperforming the special conditions would be suspended.

At the same time when *Kombiverkehr* implemented the new block train network, it also cut down the supply of services, which owing to an insufficient market potential would have had to be served by wagon-group or single-wagon operation schemes. Their service standard generally was far from being competitive particularly owing to the worsening of time-tables, an extraordinary price increase and – on the other side – an incessant decline of road freight rates. As a result, *Kombiverkehr*’s total domestic volume of shipments dropped by nearly 50 per cent within three years (cf. **Fig. 5-14**).

The new block train network, however, quickly gained acceptance in the market place. In autumn 2002, the operator achieved the turnaround of the domestic business. It was the first quarter, after its restructuring, that the transport volume exceeded the result of the previous year. Since then *Kombiverkehr* repeatedly reported two-digit growth rates and was reaching a total plus of 45 per cent in the period from 2002 to 2005 (cf. **Fig. 5-14**). The following factors were key to the recovery of domestic continental services:

- Road-comparative transit times geared to full-load and part-load traffic.
- Competitive and stable freight rates.
- Enhancement of reliability and consistency: *Kombi-Netz 2000*$^{+}$ services, until mid-2005, were operated at a mean rate of punctuality of about 90 per cent what is extraordinary high compared to international standards.
- *Gateway* services: An increasingly successful integration of domestic services into *Kombiverkehr's* European network fostered the growth of the domestic volume. Shipments sourced in areas, which don't provide for sufficient volume to serve them by international through trains, are travelling on domestic trains from/to central terminals. Here they are transhipped on direct, fast international services. Meanwhile about one third of the total domestic volume is *Gateway* shipments.

Figure 5-14: Kombiverkehr's domestic continental combined transport: 1995-2005



Source: UIRR statistics

The impact of new combined transport operators

In recent years a couple of new intermodal operators entered the domestic continental market place in Germany. It was particularly forwarding or logistic service providers such as DHL, Hellmann, Railog, Transfesa or ABX that, however, later gave up its services in conjunction with a business re-engineering.

What is distinct about the intermodal services they have inaugurated is that, in the first place, they are customized to either the requirements of merchandise, which is arising from within their own logistic systems, or the needs of specific clients or industries. To the first category of business belong groupage cargo, parcel and express services, automotive components or department store supplies to the second category. With those shipments the logistic companies ensure at least a basic capacity employment rate of their underlying combined transport services. In order to enhance the capacity load factor they, however, are caring for promoting empty space to third parties. So far these companies crossed the line that is dividing dedicated intermodal services from "open operator systems".

The new combined transport operators have noticeably contributed to enhancing and innovating domestic continental services:

- The services are geared to specific markets or industries of logistically demanding goods particularly as concerns the speed and reliability of service.
- DHL and Hellmann succeeded in enforcing fast combined transport services even if complex rail operation schemes are required like it is the case for Hellmann's Rail Solutions.
- Their services – though few in numbers - give proof that intermodal trains can be operated at a road-comparative performance of up to 99 per cent punctuality. Excellent train paths and a priority regime during rail operation are the prerequisites for enforcing such high-quality intermodal services.
- Combined transport services can function like a pipeline of merchandise if shippers can be convinced of the economic and logistic advantages of the bundling of individual shipments to an intermodal-based supply chain for them. This also shows the dedicated *WLE* Warstein-München service for the *Warsteiner* brewery.

5.2.6 Conclusions

In spite of the remarkable recovery of domestic continental combined traffic its pattern has considerably changed compared to the 1990's. That can be put down to both inherent factors and external influences. The chief characteristics are as follows:

(1) A continuous decline of the market price level in road transport increasingly tightened the competition and caused that, within ten years, the mean transport distance of e.g. *Kombiverkehr's* domestic shipments increased from 510 to 585 km. Freight rates only stabilized at the end of 2005 owing to increased fuel prices and first impacts from the introduction of the motorway toll (*Maut*) on 1 January 2005.

(2) Price and service competition also contributed to the fact that the proportion of heavier and less time-sensitive cargo, e.g. chemicals, metal products, paper, recycling material or beverages, has considerably increased in domestic combined transport. Since the demand of these industries and their related logistic service providers keep on rising, the service network even is required to be further enlarged.

(3) Continental intermodal services, in reverse, are moving significantly less time-critical shipments such as groupage, foodstuffs and automotive, as both the transit time and the level of punctuality often can't match the tightened requirements of industry and wholesale and retail trade. Hellmann and DHL intermodal services, however, prove that such demanding products can be carried on dedicated intermodal services provided that prime train paths and top priority rules for the rail journey are allocated to them.

(4) These developments also brought about a shift of the composition of intermodal loading units employed. The share of tank and bulk containers increased to the detriment of swap bodies and semi-trailers.

(5) Kombiverkehr in particular has achieved to integrate domestic intermodal services into its European network. This *Gateway* concept ensures a cross-fertilization of both systems. It has strengthened the domestic network by ensuring improved capacity load factors by carrying international shipments, which in turn are feeding cross-border block train services. The integrated concept also enables to supplying competitive international services for less-than-trainload transport areas and/or gradually generating a sufficient volume of shipments from these areas with the objective of setting up a new cross-border point-to point train, which then would replace the *Gateway* transport on domestic services.

We estimate that, meanwhile, Gateway shipments come to some 20 per cent of the total domestic continental volume (cf. **Fig. 5-15**). The total percentage of international tonnage of Germany's domestic continental network even may amount to about 40 per cent since the shipments, which are conveyed on domestic services with the Baltic Sea ferry ports of Kiel, Lübeck and Rostock, are also moving international cargo. Thus about 60 per cent or 4.1 million tonnes are likely to be "real" national shipments.

Figure 5-15: Domestic continental combined rail/road transport in Germany by segments: 2005

CT market segment	Million gross tonnes	Percentage
National shipments	4.13	59%
Gateway shipments	1.38	20%
Shipments from/to ferry ports	1.50	21%
Total domestic continental CT	7.00	100%

Source: Kombiverkehr, DHL, Hellmann, KombiConsult calculations

5.3 Analysis and evaluation of development trends of domestic combined transport in Germany by 2015

5.3.1 Container hinterland combined transport

The evolution of domestic container hinterland transport in Germany will be determined by the development of two bundles of determinants, which are also affecting each other: the strengths of German sea ports and the competitiveness of domestic container hinterland intermodal services compared to other modes. In addition, we assume that the legal framework will be maintained largely, in particular the aid for terminal construction.

Development of sea-side container handling volume

Authorities and operators of the major German container ports of Bremen/Bremerhaven and Hamburg see themselves well positioned amongst European competitors. They are confident of capturing a big slice out of the expected growth of global container flows and, thus, have only recently raised their estimations concerning the sea-side container throughput by 2015. The port of Hamburg is now expecting an increase of more than 120 per cent to 18 million TEU, in a “minimum scenario”, while the Bremen ports believe in doubling their container traffic to 7.5 million TEU within the next decade (cf. **Fig. 5-16**).

The total sea-side container throughput is even estimated to increase by approximately 140 per cent from 11.8 (2005) to 28.3 million TEU (2015) since, at about the year 2010, a new deep-water container port shall be put into operation at Wilhelmshaven and catch additional volume quickly. This would result in a rather ambitious average growth rate of about 9 per cent per annum.

Apart from the enormous impact, which is attributed to the establishment of the port of Wilhelmshaven, the positive expectations are based on the following considerations:

- The global sea container traffic is forecasted to expanding by 90 to 200 per cent, depending on the time of the prognosis and the forecasting institute, in the period 2000 to 2015.
- Foreign overseas trade of Germany both in export and import is supposed to continue expanding by growth rates between six and ten per cent. In the past container traffic used to grow by about one percentage-point more than foreign trade. It is expected that this relationship will remain giving strong incentives to container flows.
- Hamburg in particular could benefit from the recent boom of container traffic with China and other Far East countries. In the past five years, the port achieved significantly higher growth rates than all other major European ports. Even if the current growth rates slowed down the volumes would be due to rise more than proportionate.
- A soaring trade with India, Vietnam and other “tiger countries” as well as with the economies of the Middle East is also estimated to contribute to the growth of container volume even if it starts at a comparatively smaller level.
- The German ports are set to maintaining and reinforcing their excellent hub function especially for Northern, Eastern and South-Eastern European countries. More container flows shall be attracted by improving the transhipment capacities and the hinterland connections. The new Wilhelmshaven container port is even specifically designed as hub port: about 70 per cent of all containers are expected to be transhipped between mother and feeder vessels.

Figure 5-16: Container throughput of German sea ports: 2005/2015

Port	Million TEU		Percentage change
	2005	2015	
Hamburg	8.1	18.0	122%
Bremen/Bremerhaven	3.7	7.5	101%
Wilhelmshaven	-	2.8	n.a.
Total	11.8	28.3	139%

Source: Ports of Hamburg and Bremen/Bremerhaven, Eurogate, KombiConsult analysis

In order to ensure the expected growth of sea-side container handling volume Bremerhaven and Hamburg have initiated or scheduled a bundle of measures to enlarge port infrastructure and sea-side handling facilities, e.g. Bremerhaven: CT IV; Hamburg: Altenwerder, as well as implementing enhancements for the waterborne traffic such as the deepening of the river Elbe for 10,000 TEU vessels.

For the time being we foresee just two developments, which might be contrary to the above positive trends. On the one hand side, the ports of Antwerp and Rotterdam are likely to increase their presently rather small market share in the dynamic southern German centres off the river Rhine, i.e. München, Nürnberg, Stuttgart, provided that the intermodal-based supply chains become more competitive. The inauguration of the new *Betuwe* rail line scheduled for 2007 and improvements of the rail infrastructure on the German side are important prerequisites for such an evolution.

On the other side, Mediterranean ports such as Trieste, Koper or Genova, which are used to be feedered via hub ports like Gioia Tauro, Taranto or Malta, are also keen on capturing container shipments from and to the south of Germany. They claim that the door-to-door transit time of containers shipped between the Far East and Germany are five to ten days shorter than the routing via the North Sea ports. In spite of that the Mediterranean container ports haven't yet been successful to catch more than a few thousand containers per year

in this market place owing to the following main reasons:

- smaller frequency of sea-side services than North sea ports, amongst others, owing to a much less total volume in the area and a lower degree of bundling opportunities of various origins and destinations e.g. only Asian shipments;
- lack of competitive hinterland services;
- preferences of shippers and forwarders.

During the next decade these drawbacks are due to decrease particularly if the economies of south-east Europe will grow. Other factors of influence like preferences are likely to be more persistent. All in all we assume that the Mediterranean ports will be capable of catching not more than a small share of the envisaged growth of container shipments from and to southern Germany. This, however, would not affect the North Sea ports noticeably.

Development of domestic container hinterland combined transport

The sea-side container volume of German sea ports is forecasted to grow by a mean annual rate of nine per cent in the period 2005 to 2015. Against this background the evolution of domestic hinterland combined transport in Germany by 2015 will chiefly be influenced by the following external and internal factors.

(1) Development of hinterland infrastructure. The ports of Bremen/Bremerhaven and Hamburg are set to strengthening the hinterland connections, which have become a more and more important criteria for shipping lines to call at a port. The port operators themselves that in the past five years have already built up several rail/road terminal facilities have scheduled investments to enlarge the annual handling capacity by about another one million units in the years to come.

Since a sufficient transport capacity of the hinterland infrastructure is vital for the inbound and outbound container flows the German ports call the transport administrations for a timely extension of the rail network such as the so-called “Y-route” in the triangle Bremen-Hannover-Hamburg or a new Elbe rail bridge in Hamburg. Too, the operators of the new container port of Wilhelmshaven have started negotiations with DB Netz and the authorities to upgrade and enlarge the existent railway lines in order to accommodate the expected volume of hinterland intermodal services. Even though all these measures

have a high priority for the German transport administrations some delays may occur owing to citizens' objections, environmental conflicts or budget restrictions. Hence we assume that sufficient terminal handling capacity in the ports will be supplied quite on time but more rail network capacity only after 2010 so that train path conflicts are due to increase until then.

(2) Share of domestic volume of total hinterland container traffic. According to the present planning the port of Wilhelmshaven, apart from sea-side transhipments between mother and feeder vessels, shall primarily be geared to German export and import containers. The percentage of cross-border hinterland container flows is considered to be very low.

As concerns the ports of Bremerhaven and Hamburg the international hinterland volume is expected to grow considerably faster than the domestic and more than the average rate. It will be fostered by a strengthening of the ports' hub function both for existing stronghold markets such as Austria and particularly for Central and Eastern European countries like Poland or the Czech and Slovak republics, whose economies and foreign trade is forecasted to grow strongly and rapidly in the years to come. Compared to that the growth rates of domestic hinterland traffic though still rather high will slow down, since economic experts foresee that German foreign trade will not continue to increasing at the current rates. As a result we assume that domestic hinterland traffic will rise by a mean annual rate of 6 to 7 per cent.

(3) Development of competing modes. In container hinterland traffic of German ports road transport is the only relevant competitor to rail. Owing to unfavourable natural and infrastructure conditions only a few barge services on rives and canals have been implemented. It is also unlikely that this framework will considerably improve during the next decade.

Currently, the domestic rail/road transport of maritime containers is highly competitive with road in terms of cost. While intermodal freight rates have been maintained

rather stable the market prices in road transport went up 2005/2006 for the following reasons:

- saturation of transport capacities following the recovery of the German economy and most of the entire euro zone;
- decline of inexpensive eastern European trucking operators following improved labour opportunities in their respective countries;
- decrease of supply of German and other western European truck drivers owing to an diminishing attractiveness of this occupation;
- soaring diesel price;
- minor impact of the introduction of the motorway toll (“Maut”) in Germany.

The question is whether these phenomena reflect secular developments or are only cyclical effects and if and how they influence the future terms of competition road v intermodal. Our investigations have led to the following conclusions:

- Capacity bottlenecks have often arisen in situations characterized by a sudden and unforeseeable increase of freight transport demand like it was in spring 2006. Following most of the transport experts interviewed we assume that a new balance will be reached on a short-term basis, and the increased market prices will induce an additional supply of truck capacity bringing down the price level again.
- As regards fuel costs all experts forecast a further massive increase; they only don’t agree on the size of growth. Even if railway undertakings will not be able to escape such a development they wouldn’t be hit as violently as road transport companies. In rail freight transport, first of all, much less fossil energy sources are used than in road traffic, and, secondly, the share of energy cost of total transport cost is considerably smaller – about 10 versus 30 per cent. Thus the comparative cost relationship is likely to change to the detriment of road transport.
- A further increase of the “Maut” is limited by EC regulation on infrastructure charging. If it will not be liberalized the impact on road freight cost, generally, would be moderate and affect competitiveness only on very long distances.

- According to forwarding and transport companies' statements the shortage of truck drivers presumably will remain and even worsen and bring about a noticeable increase of personnel cost in road freight transport. On the one hand, the influences mentioned above will continue to prevail. What, however, has a much more severe effect is the recently implemented new EC regulation on drivers working and resting times and the obligatory application of the digital speedometer ("blackbox"). It is due to reducing the effective working time per driver and require from road operators to employ more drivers for the same scope of services. Forwarders estimate that personnel cost in road transport may rise by 10 to 25 per cent depending on the level of compliance with current rules. Considering that drivers' cost make up about 30 per cent of total road transport cost the market price level is due to rise by 3 to 8 per cent.

- The reduction of the effective drivers' working time will cause that a driver in one shift generally will not be capable of performing a container round trip on a route of about 300 to 350 km one way between a sea port and an inland destination, this is the distance Hamburg-Berlin, including loading/unloading. Even if road operators will elaborate smart operational solutions such as new relay systems of interchanging trucks or drivers, the working time regime is likely to lead to a significant increase of transport cost and result in reducing the break-even distance intermodal v road correspondingly.

The above considerations show that two of the major cost drivers of road freight transport, fuel and personnel cost, are due to rise noticeably in the next years. As experience tells road operators and logistics service suppliers will be able to optimize the material flow and transport capacity employment. Regardless of these measures, however, we expect that, in contrast to the past 20 years that saw a continuous decline of market prices, the level of road freight rates will increase by a mean annual rate of 1.5 to 2.0 per cent by 2015.

(4) Development of intermodal services. Our analysis has produced evidence that the competitive framework is due to changing favourably for combined transport services in container hinterland transport, in Germany. Will intermodal operators and railway undertakings, however, be capable of seizing the opportunity?

In recent years the operators have already shown signs of how they could enhance the service level to maritime customers and, thus, capture a larger part of the growing market potential for rail. These actions should be continued and strengthened in order to increase the share of intermodal transport of the modal split in container hinterland traffic of German ports by 2015. They are particularly required to improving and optimizing operational logistic solutions as follows:

- The overall growth of volume will increasingly allow to operating direct trains or shuttle services between port-related and inland terminals. This would reduce production cost and contribute to raising the quality of service as operational interfaces, i.e. the consolidation and separation of wagon groups, would be eliminated.

- Combined transport operators have met the recent boom of container transports by increasing the frequency of departures on high-volume routes. We expect that until 2015 most of the German domestic intermodal links will be served at least six days a week, some even seven days, in order to be able to “clear” ports and dry terminals.

- While economic centres in Germany will generally be served by direct trains a new concept would be required for regional centres since their daily regular volume is below a full trainload. Up to date marshalling yards or small stations providing for sufficiently long - overtaking - tracks have been used to bundle volumes and build high-volume trains. According to the results of various studies the so-called “mega-hub production system” would be a more efficient solution to bring about an en-route consolidation of volumes from or for several locations. The mega-hub concept is based on the Gateway system, which enables the rail/rail transfer of loading units between various trains in intermodal terminals. Compared to common terminals, which primarily serve rail/road shipments, the mega-hub terminal would be specialized on – though not completely dedicated to - rail/rail transhipments requiring for faster cranes and increased interim storage areas. For years a first mega-hub terminal has been envisaged to be built in Lehrte east of Hannover. Though the site was always considered to serve chiefly continental shipments it would be located almost ideally in the hinterland of the three German container ports.

The mega-hub terminal could be used as their “cross-docking station” for serving less-than-trainload areas, but also to raise the frequency of services on direct train links. Though delayed for many years signs have shown as if it could be realized until 2009/2010.

- Finally, we assume that the recent trend of new intermodal and rail traction operators emerging on the container hinterland market place will continue in the next years. The forecasted growth of total volume certainly will leave market niches and, moreover, stimulate and enable newcomers to offer services. Even though we’re expecting rather an oligopoly of intermodal service suppliers, in the first place, the competition will intensify and contribute to enlarging the entire network of services and controlling the development of price. Competition may also foster an enhancement of the reliability and punctuality of rail traction service.

Conclusions

According to our evaluation of development trends intermodal services in container hinterland traffic with German sea ports haven’t had such prospects as in the next ten years. Whereas road transport will have to face comparatively vigorous increases of cost, operators of domestic hinterland intermodal services will have the opportunity to expand the network of services and run their trains more efficiently by optimizing rail production. Moreover, the ports of Hamburg and Bremerhaven that were always anxious to see as many containers as possible carried by intermodal services are seeking to support a further change of modal split towards rail.

Based on that we expect that rail’s share of total container throughput, in Hamburg, will rise to 20 per cent by 2015 (2005: 17.3%), and, in Bremerhaven, to 16 per cent (2005: 13.4%). The new container port of Wilhelmshaven, from the beginning, shall be served by rail so that its share of modal split is supposed to jump to 16.1 per cent within five or six years. The total volume of hinterland combined transport in Germany is forecasted to grow by more than 175 per cent from 1.90 (2005) to 5.25 million TEU (2015).

Even if domestic hinterland combined transport services will not reach such an increase the growth rates are extraordinary (cf. **Fig. 5-17**). The total number of containers conveyed

on domestic services in Germany by 2015 will improve by 149 per cent to 3.1 million TEU. Assuming that cargo shipped by maritime containers will be becoming less heavily the total gross weight will “only” grow by 140 per cent to 29 million tonnes (cf. **Fig. 5-18**), corresponding to a mean annual rate of 9.2 per cent from 2005 to 2015.

Figure 5-17: Domestic container hinterland combined transport volume (in TEU) in Germany: 2005/2015

Port	Total hinterland CT (million TEU)		Percentage change 2015/2005	Domestic hinterland CT (million TEU)		Percentage change 2015/2005
	2005	2015		2005	2015	
Hamburg	1.40	3.60	157.1%	0.87	1.98	127.6%
Bremen/Bremerhaven	0.50	1.20	140.0%	0.37	0.74	101.1%
Wilhelmshaven	-	0.45	n.a.	-	0.38	n.a.
Total	1.90	5.25	176.3%	1.24	3.10	149.0%

Figure 5-18: Domestic container hinterland combined transport volume (in tonnes) in Germany: 2005/2015

Port	Total hinterland CT (million TEU)		Percentage change 2015/2005	Domestic hinterland CT (million TEU)		Percentage change 2015/2005
	2005	2015		2005	2015	
Hamburg	1.40	3.60	157.1%	0.87	1.98	127.6%
Bremen/Bremerhaven	0.50	1.20	140.0%	0.37	0.74	101.1%
Wilhelmshaven	-	0.45	n.a.	-	0.38	n.a.
Total	1.90	5.25	176.3%	1.24	3.10	149.0%

Source: KombiConsult analysis

According to our analysis, the port of Bremerhaven may just double its size of domestic hinterland intermodal traffic to 7 million tonnes. In Hamburg, the tonnage will even grow by 116 per cent during the period 2005-2015. In spite of that Hamburg’s share will fall to 64 per cent since Wilhelmshaven is due to capture about 12 per cent from the scratch.

Most of the existing top ranking lines in domestic container hinterland intermodal traffic will be maintained by 2015 such as the services between the ports of Hamburg and Bremerhaven and München, Stuttgart, Nürnberg and Mannheim. However, we assume that transport areas such as Leipzig, Berlin, Ulm and Regensburg may also gain significantly in the years to come. In addition, the routes between the ports and Hannover would become a “pipeline” for container trains if the mega-hub in Hannover/Lehrte will be realized.

5.3.2 Continental combined transport

For the purpose of our investigation into the future development of Germany’s domestic continental combined transport we have separately analyzed the three market segments identified above: national shipments, Gateway shipments and shipments from/to the Baltic Sea ferry ports in Germany.

(1) National shipments

The scope of demand for domestic combined transport services, in the first place, is supposed to be influenced by the evolution of the volume of total long-distance domestic freight traffic, which in turn is dependent on the development of the national economy and the transport intensity of the commodities shipped. After Germany’s re-unification boom had ebbed away, in the past ten years, the German economy was rather weak over almost the entire period. Gross national product hardly increased more than 1 to 1.5 per cent per annum. According to research studies the growth rates of long-distance freight traffic are slightly higher. Valid statistical data regrettably are not compiled anymore, which would allow to describe how the relevant market for combined transport, that is transports over more than 450 kilometres, has developed.

An analysis of Kombiverkehr’s statistics, however, proves that the evolution of domestic combined transport doesn’t correlate with the development of gross national product and total freight traffic. There is also no clear relationship to the evolution of road freight traffic. Apparently, the growth or decline of national shipments was primarily dependent on inherent influences such as the inauguration or suspension of services, the quality of service or the price policy. Given that, we consider that also the development of domestic combined transport in Germany by 2015 will rather be determined by the strengths and weaknesses

of the system itself and the interaction with the main competitor, road transport, than by the evolution of the domestic economy.

As a consequence, first of all, we have analyzed the development of the terms of competition with road. This part is largely congruent to our investigation of domestic container hinterland services. Against the background of these results, secondly, we have evaluated inherent development trends and the action potential of intermodal operators with regard to distinct segments of this “truly” domestic continental market.

Development of terms of competition with road

As described above (cf. **chapter 4.1.2**) the enforcement of the new EC regime on truck drivers working time and the enforcement of the digital speedometer will result in an extraordinary increase of personnel cost for road operators that they will not be able of completely compensating by operational optimizations or other measures. In spite of that the competition in continental road transport will remain vigorously amongst other factors owing to a high rate of foreign drivers and trucks. Like in container hinterland traffic road price level is due to going up in Germany and basically enhancing the terms of competition in favour of combined transport. However, we’re expecting significant effects only in the medium term. How this development could impact on domestic continental traffic we show further below.

The motorway toll (*maut*) that was introduced on January 1st, 2005, in Germany, has also improved the terms of competition for continental combined transport. Intermodal operators also observed that, owing to the *maut*, one or the other shipment on long distances is now carried on intermodal trains but it has not set off a significant shift of freight from road to rail. This observation was confirmed by a recent market analysis carried out by the *Bundesamt für Güterverkehr* (Federal Office for Goods Transport). Apparently the level of the *maut* - 12.5 cent per truck-kilometre - is not sufficient to produce such an effect. As explained above (cf. **chapter 4.1.2**) it is not likely that the toll can be increased more than moderately. Hence it will not impact considerably on the decision of logistics service providers which mode of transport they will be using. Though, we assume that in a medium and long-term perspective a slight shift of road freight volume will occur.

Development of market of national intermodal shipments

(1) The domestic intermodal network presently covers almost all routes between Germany's economic centres over distances of more than 500 kilometres, which provide for a sufficient "critical mass" to operationally serve them by efficient direct, shuttle or liner trains. The service level of a larger proportion of these services in terms of time-table, performance and price is geared to less time-critical but price-sensitive cargo. The expected increase of road freight rates may change the cost parity in favour of combined transport for another part of this market though, according to our analysis, the remaining market potential, which could be captured by enlarging the supply of intermodal services, is restricted. Therefore we assume that, by 2015, this market segment will contribute to the growth of national shipments by approximately one per cent linear growth p.a. totalling to an increase of 0.41 million tonnes over the entire period.

(2) The opportunities for domestic continental combined transport as concerns this type of cargo are much larger on medium-distance routes over 350 to 450 kilometres such as Hamburg-Ruhr area, Hannover-Rhein/Ruhr area, Köln-Stuttgart, Rhein/Ruhr-Mannheim, Rhein/Ruhr-Nürnberg or Frankfurt-München. These markets are almost completely in the hands of effectively organized road operators that, for the time being, are often able to make a daily round trip and thus ensure low transport costs and a high service level to industry and trade. Intermodal operators presently can't compete with road. They would be able to offer overnight services on these routes but lacking of a comparable over-the-day service since it was impossible to obtain a competitive train path in competition to passenger traffic. On these conditions combined transport is not competitive with road both in terms of cost and service quality.

The new regime on truck drivers' working and resting times is due to inducing a reduction of the break-even distance between continental intermodal and road traffic, disregarding qualitative parameters, and creates the opportunity for combined transport to access this market segment. The most important prerequisites are the supply of competitive train paths both by night and day in order to ensure a round trip schedule for a dedicated wagon set, and a road-comparative reliability and rate of punctuality of at least 95 per cent.

We consider that a sufficient rail infrastructure capacity on the relevant routes, which are major connections within Germany, will be available after the year 2010 at the earliest. By that time, rail traction service providers, too, should have become aware of the fact that a high service quality is of paramount importance to survive in a competitive environment. This would enable to catch a proportion of the volume of demanding goods logistics such as foodstuffs and other elated wholesale and retail commodities. For our 2015 forecast we estimate that two of such innovative domestic services, i.e. four pairs of daily trains totalling eight trains per day, could be implemented contributing about 0.64 million tonnes to the segment of national shipments.

(3) The current supply of continental domestic intermodal transport only marginally serves high-quality logistics such as the carriage of parcels, groupage cargo or foodstuffs. This requires both rather fast and extraordinarily reliable intermodal services of some 99 per cent rate of punctuality within small tolerances.

For the time being, the rail system in Germany apparently is prone to manifold irregularities internally and externally, which impede an intensified supply of high-performance services. In spite of that some logistics service providers eventually in co-operation with intermodal operators are set to reinforce intermodal-based logistic solutions by consolidating volumes of various complimentary goods markets such as those mentioned above. On the other side, this market is fairly fragmented: there are just a few domestic long-distance routes that provide for a sufficient “critical mass” to serve them by efficient direct or simple liner trains, which is also a prerequisite to obtain fast transit time and ensure the performance required. Thus we expect that, as of 2009/2010, two more intermodal services will be enforced especially geared to national shipments, generating a volume of about 0.36 million tonnes by 2015.

(4) It is evident that, in Germany, industry and warehousing activities, which, in earlier years, preferentially were concentrated in agglomerations, are increasingly becoming fragmented. Domestic continental goods traffic attains the highest growth rates on routes between the “traditional” centres of population and economic activities and those decentralized distribution centres or new production plants. This development tends to

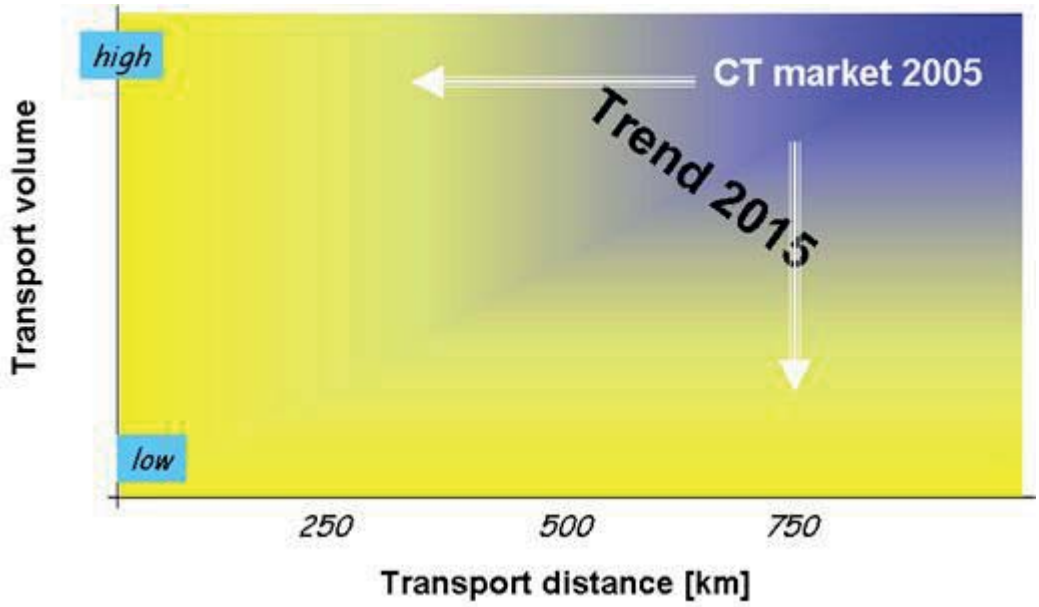
reduce “natural” bundling effects of transport volume, raises the distance and the cost of pre- and post-haulage in combined transport and increasingly impedes the operation of efficient domestic direct trains. *Gateway* services, i.e. the joint carriage of national and international shipments on domestic trains, were one innovative response to meet this challenge.

It is crucial for the domestic combined transport system in Germany to enforcing appropriate rail production schemes and advanced bundling and transhipment technologies to consolidate less-than-trainload flows of shipments to efficient block train services. One suitable solution is the mega-hub rail production system including the establishment of fast operating mega-hub rail/rail transhipment centres described above (cf. **chapter 4.1.2**). We assume that, by the end of this decade, a first mega-hub terminal will be built in Lehrte east of Hannover. For the purpose of this 2015 report we have conceived a complete transport programme of domestic services, which is related to existing concepts of the envisaged mega-hub terminal operator. Based on that, we carried out a rather conservative estimation of the volume of national intermodal shipments, which could be conveyed by the mega-hub production system. It amounts to about 1.2 million tonnes by 2015.

Summary

According to our investigations the largest growth potential for “truly” national shipments in Germany are in freight markets characterized by medium transport distances around 400 to 500 kilometres and less-than-trainload volumes (cf. **Fig. 5-19**). Operators that focus on these categories of goods transport are likely to not only catching a greater market share but also improving their market penetration significantly. The four market segments of national shipments examined are estimated to account for 2.64 million tonnes in the period 2005 to 2015. Thus the total volume will increase by more than 60 per cent to 6.77 million tonnes, in 2015, corresponding to an annual growth rate of 5.1 per cent (cf. **Fig. 5-20 and 5-21**).

Figure 5-19: Growth potential of domestic continental combined transport: 2015



Source: KombiConsult

Figure 5-20: National shipments in domestic continental combined transport: 2005/2015

National shipments	Million gross tonnes
Volume 2005	**4.13**
Additional volume by 2015	**2.64**
existent core markets	0.41
medium-distance shipments	0.64
high-performance services	0.36
mega-hub services	1.23
Total volume 2015	**6.77**

Source: KombiConsult analysis

(2) Gateway shipments

It was extremely difficult to forecast the development of *Gateway* transports, which, in 2005, held a share of 20 per cent of domestic continental traffic, by 2015. A considerable proportion of the *Gateway* volume is used to be composed of shipments on routes that later have been replaced by direct international services, and of “excess” shipments, which couldn’t be forwarded on regular international block train services on the routes concerned. Due to the very nature of these shipments the total *Gateway* tonnage though increasing altogether, has been zigzagging in recent years.

Also for this reason this market segment will not grow as rapidly as the – direct - international continental intermodal traffic that is forecasted to increase by 7.8 per cent per annum. On the other hand, it is likely to come off better than the volume of “real” national shipments during the next decade. Against this background we assume a mean annual growth rate of 6.0 per cent, which is about the average increase in recent years. Hence, in 2015, the volume would total 2.45 million tonnes (cf. **Fig. 5-21**).

(3) Shipments from/to Baltic Sea ferry ports

For the purpose of this report, in the first place, we were not required to carry out a detailed investigation of this component of domestic continental combined transport in Germany since we had analyzed the underlying corridor of freight transports between Germany, Northern Europe and the Baltic States via the ferry ports in our previous “Capacity Study”. We forecasted an increase of 130 per cent of the total volume of combined transport from 2002 to 2015. This corresponds to a mean annual growth rate of 7.2 per cent.

A review of recent years, however, demonstrates that, in 2005, almost 50 per cent more shipments were carried on this corridor than in the year 2002. Hence growth was about twice as high as predicted. However, it would be premature to extrapolate this evolution until 2015 since this extraordinary increase primarily was a result of the extension of services and capacities on this corridor following after a period of rather moderate growth, before 2002.

Intermodal experts questioned don't expect that this pace can be maintained. Nevertheless they agreed that, particularly with respect to the new truck drivers' working time regime, combined transport will become even more attractive on distances of 600 kilometres and more. So intermodal services between southern German centres such as Ludwigs-hafen, Mannheim, Karlsruhe, Stuttgart or München are supposed to be fostered. Against this background we have raised the prognosis for the mean annual growth rate from 7.2 to 8.5 per cent for the period 2005-2015 resulting in an increase of 126 per cent of this domestic market segment to 3.4 million tonnes (cf. **Fig. 5-21**).

Summary

According to our analysis domestic continental combined transport will grow by 80.3 per cent from 7.0 (2005) to 12.6 million tonnes (2015). The consolidated annual growth rate amounts to 6.1 per cent (cf. **Fig. 5-21**). The market share of national shipments losing about five percentage-points, however, will fall to 53.6 per cent.

Figure 5-21: Domestic continental combined rail/road transport in German by segments: 2005/2015

Domestic CT market segment	2005 (Million gross tonnes)	2015 (Million gross tonnes)	Percentage change 2015/2005	Mean annual growth rate
National shipments	**4.13**	**6.77**	**64.1%**	**5.1%**
Gateway shipments	**1.38**	**2.46**	**79.1%**	**6.0%**
Shipments from/to ferry ports	**1.50**	**3.39**	**126.0%**	**8.5%**
Total	**7.00**	**12.62**	**80.3%**	**6.1%**

Source: KombiConsult analysis

5.4 Development scenario of combined transport in Germany: 2015

5.4.1 Development scenario of domestic combined transport: 2015

According to our scenarios on continental and hinterland traffic the volume of domestic combined transport in Germany will rise by 118 per cent from 19.1 (2005) to 41.7 million tonnes (2015). This means an average annual growth rate of 8.1 per cent. Container hinterland traffic will increase its market share by six per cent-points to approximately 70 per cent (cf. **Fig. 5-22**). In terms of TEU, Germany's domestic combined transport volume will even improve by more than 125 per cent to a total of 4.35 million TEU (cf. **Fig. 5-23**).

Figure 5-22: Domestic combined rail/road transport volume in Germany by market segments (in tonnes): 2005/2015

Domestic combined transport (CT) market segment	Million gross tonnes		Percentage change 2015/2005	Percentage	
	2005	2015		2005	2015
Continental CT	7.00	12.62	80.3%	36.6%	30.3%
Container hinterland CT	12.11	29.09	140.2%	63.4%	69.7%
Total domestic CT	**19.11**	**41.71**	**118.3%**	**100.0%**	**100.0%**

Figure 5-23: Domestic combined rail/road transport volume in Germany by market segments (in TEU): 2005/2015

Domestic combined transport (CT) market segment	Million TEU		Percentage change 2015/2005
	2005	2015	
Continental CT	0.682	1.250	83.3%
Container hinterland CT	1.246	3.102	149.0%
Total domestic CT	**1.928**	**4.352**	125.7%

Source: KombiConsult analysis

5.4.2 Development scenario of total combined transport: 2015

Total unaccompanied combined transport in Germany is estimated to rise by 125.6 per cent from 50 (2005) to 114 million tonnes (2015), which corresponds to a mean annual growth rate of 8.5 per cent (cf. **Fig. 5-24**). While the scenario for domestic traffic has been elaborated in the present report, the forecast of international continental and transit traffic through Germany mainly reflects the results from our previous "Capacity Study". As concerns international container hinterland traffic, however, we have taken account of the recent boom both in sea-side container throughput and intermodal volume and adapted the earlier prognosis correspondingly. The evolution of accompanied combined transport has not been evaluated since, compared to unaccompanied traffic, it is less determined by inherent performance parameters than by transport policy that can't properly be predicted.

Figure 5-24: Combined rail/road transport volume in Germany by market segments: 2005-2015

Combined transport (CT) market segment	2005	2015	Percentage change 2015/2005
	(million gross tonnes)		
Unaccompanied combined transport	**50.55**	**114.05**	**125.6%**
Domestic CT	**19.11**	**41.71**	**118.3%**
Continental	7.00	12.62	80.3%
Container hinterland	12.11	29.09	140.2%
International CT	**23.94**	**56.14**	**134.5%**
Continental	15.40	32.63	111.9%
Container hinterland	8.54	23.51	175.3%
from/to German sea ports	*7.24*	*19.35*	*167.3%*
from/to foreign sea ports	*1.30*	*4.16*	*220.0%*
CT transit through Germany	**7.50**	**16.19**	**115.9%**
Accompanied combined transport	**1.16**	-	**n.a.**
Total combined transport	**51.71**	**n.a.**	**n.a.**

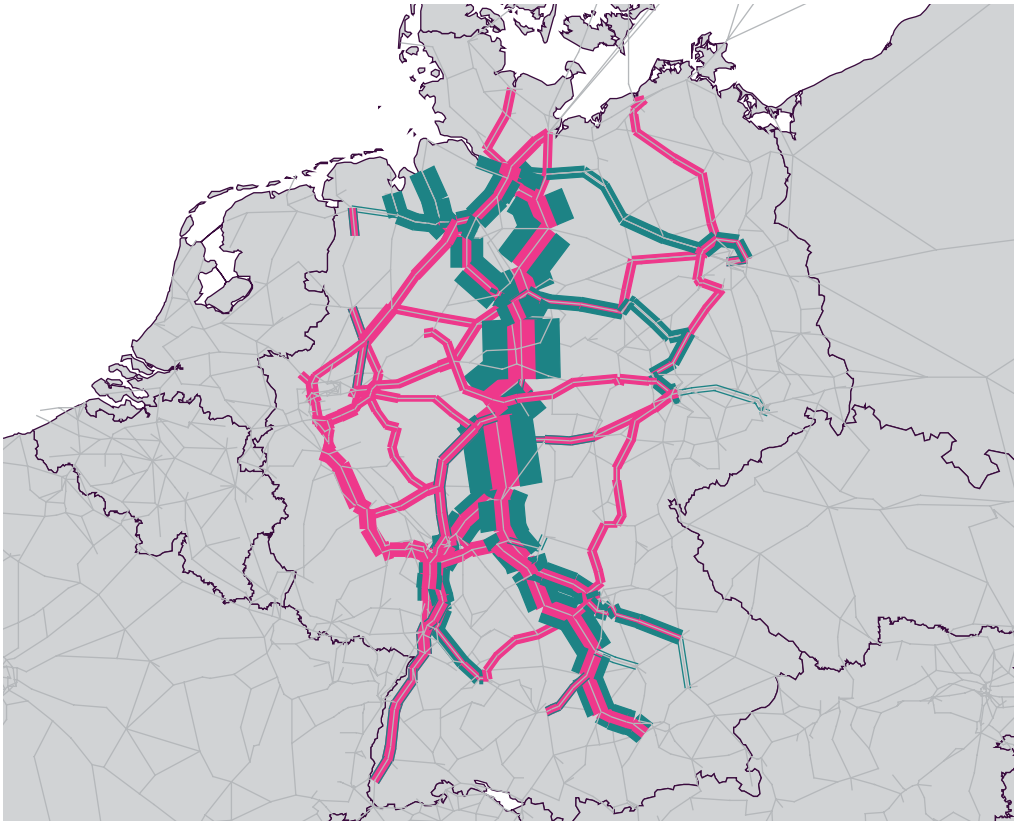
Source: KombiConsult analysis

5.5 Impact of combined transport development on rail network capacity: 2015

5.5.1 Capacity load of Germany's rail network by domestic combined transport

The forecast of the evolution of domestic combined transport volume described in the previous chapters is based on detailed transport programmes of intermodal services of both market segments for the time horizon 2015. A detailed routing has been assigned to each combined transport service, which then has been allocated to the physical rail network in Germany. Taking account of the frequency of departures per service the average daily or annual capacity load of the network caused by domestic intermodal services could be calculated (cf. **Fig. 5-25**).

Figure 5-25: Capacity load of Germany's rail network caused by domestic continental (red) and container hinterland (green) combined rail/ road transport: 2015



Source: KombiConsult and K+P Transport Consultants analysis

The map clearly shows that the existing pattern of domestic combined transport will not significantly be changed by 2015. The north-south axis Hamburg/Bremen-Hannover-Fulda-Würzburg-Nürnberg-München and the branch Fulda-Frankfurt-Mannheim will have to take up the majority of intermodal trains. Quite naturally, container hinterland traffic will be concentrated on these routes since all services represent connections with the North Sea ports. Continental intermodal services, in contrast to that, are much better distributed over Germany and will be employing almost any part of the German rail network.

5.5.2 Total capacity load of Germany's rail network

In the next step we have calculated the total capacity load of the rail infrastructure in Germany by 2015 caused by all categories of traffic including combined transport, other freight as well as passenger services. As regards the network capacity requirement of combined transport it is represented as a consolidated result of the present investigation and of the previous "Capacity Study" on international CT.

In a first scenario the capacity employment of the rail network was calculated taking account of envisaged infrastructure enlargement investments reported. For this purpose we included the capacity-increasing measures listed in the "*Bundesverkehrswegeplan 2003*" and in the recent "*Infrastrukturrahmenplanung 2010*" (cf. **Fig. 5-26**). In a second scenario we assumed that these enlargement investments would not have been realized. The following **Figures 5-27 to 5-29** contain the results of the first scenario always in the top exhibit and of the second scenario in the bottom exhibit. **Fig. 5-27** shows the results for the entire rail network in Germany while **Fig. 5-28** and **5-29** present magnified maps of the northern resp. southern part of the network.

If the envisaged enlargement measures will not be taken many key sections of Germany's rail network would be close to saturation (market in orange) or over-employed (marked in red), i.e. that the demand for train paths would exceed the average calculated train capacity of the section in question. What, however, is extremely alarming is that even if the planned enlargement investments measures were implemented almost the same segments of Germany's rail network would be employed beyond their capacity limits. This particularly applies to the node Hamburg, almost the complete north-south line Hamburg-Frankfurt-Mannheim, the line sections Hannover-Magdeburg, Köln-Mainz and Würzburg-Nürnberg.

According to these findings we clearly have to face the fact that network segments that are crucial for accommodating both domestic and international combined trains will be saturated if no additional enlargement measures will be enforced. Train path conflicts, which currently impede or prevent to operate one or the other new service, are due to increasing considerably.

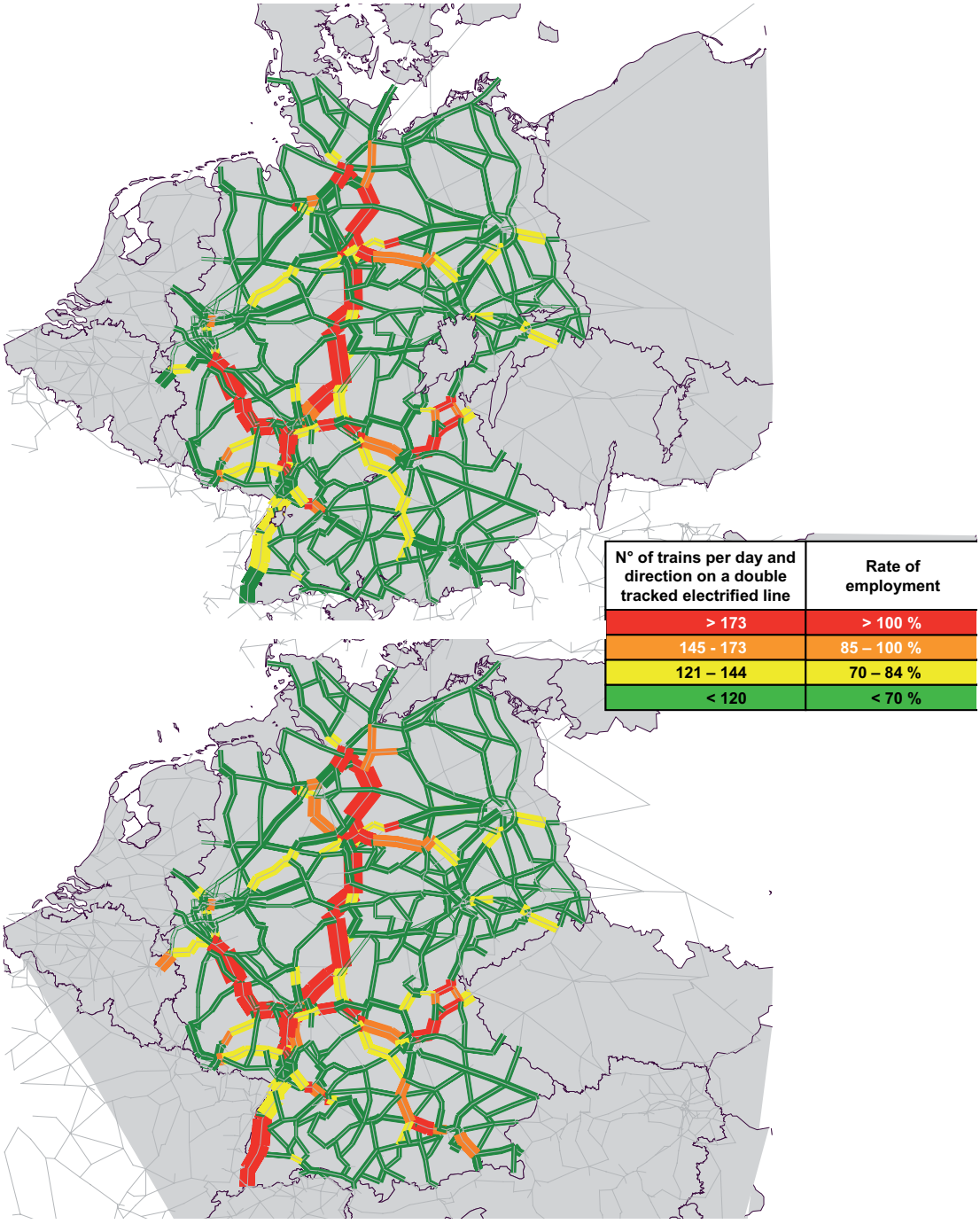
While intermodal operators are called on optimizing their operations and the employment of their trains in order to alleviate the strains the responsible transport administrations and the infrastructure manager are requested to taking actions in eliminating the bottlenecks on time and thus ensuring the potential growth of combined transport.

Figure 5-26: Infrastructure enlargement investments envisaged by 2015

Project
VDE 1 Lübeck/ Hagenow Land – Stralsund
VDE 2 Hamburg – Büchen – Berlin
ABS Berlin – Dresden (1st stage of expansion)
ABS Hannover – Lehrte
ABS Löhne – Braunschweig – Wolfsburg (1st stage of expansion)
ABS Dortmund – Paderborn – Kassel
VDE 8.1 Nürnberg – Erfurt
VDE 8.2 Erfurt – Halle/ Leipzig
VDE 9 Leipzig – Dresden
ABS Paderborn – Chemnitz (1st stage of expansion)
ABS Karlsruhe – Stuttgart – Nürnberg – Leipzig/ Dresden
ABS Berlin – Frankfurt/Oder
ABS Köln – Aachen
ABS Ludwigshafen – Saarbrücken, Kehl – Appenweier
ABS Mainz – Mannheim
ABS Fulda – Frankfurt/M
ABS/ NBS Stuttgart – Ulm – Augsburg
ABS Augsburg – München (1st stage of expansion)
ABS München – Mühldorf – Freilassing (1st stage of expansion)
ABS/ NBS Karlsruhe – Basel (1st + 2nd stage of expansion)
ABS Stelle – Lüneburg
ABS/ NBS Hanau – Nantenbach
Hamburg – Lübeck
ABS Oldenburg – Wilhelmshaven/ Langwedel – Uelzen
NBS/ ABS Hamburg/ Bremen – Hannover
ABS (Amsterdam -) Grenze D/NL – Emmerich – Oberhausen (1st stage of expansion)
ABS Hoyerswerda – Horka – Grenze D/PL
NBS Rhein/ Main – Rhein/ Neckar
ABS Düsseldorf – Duisburg
ABS Freilassing – Grenze D/A (Salzburg)
ABS/ NBS München - Nürnberg

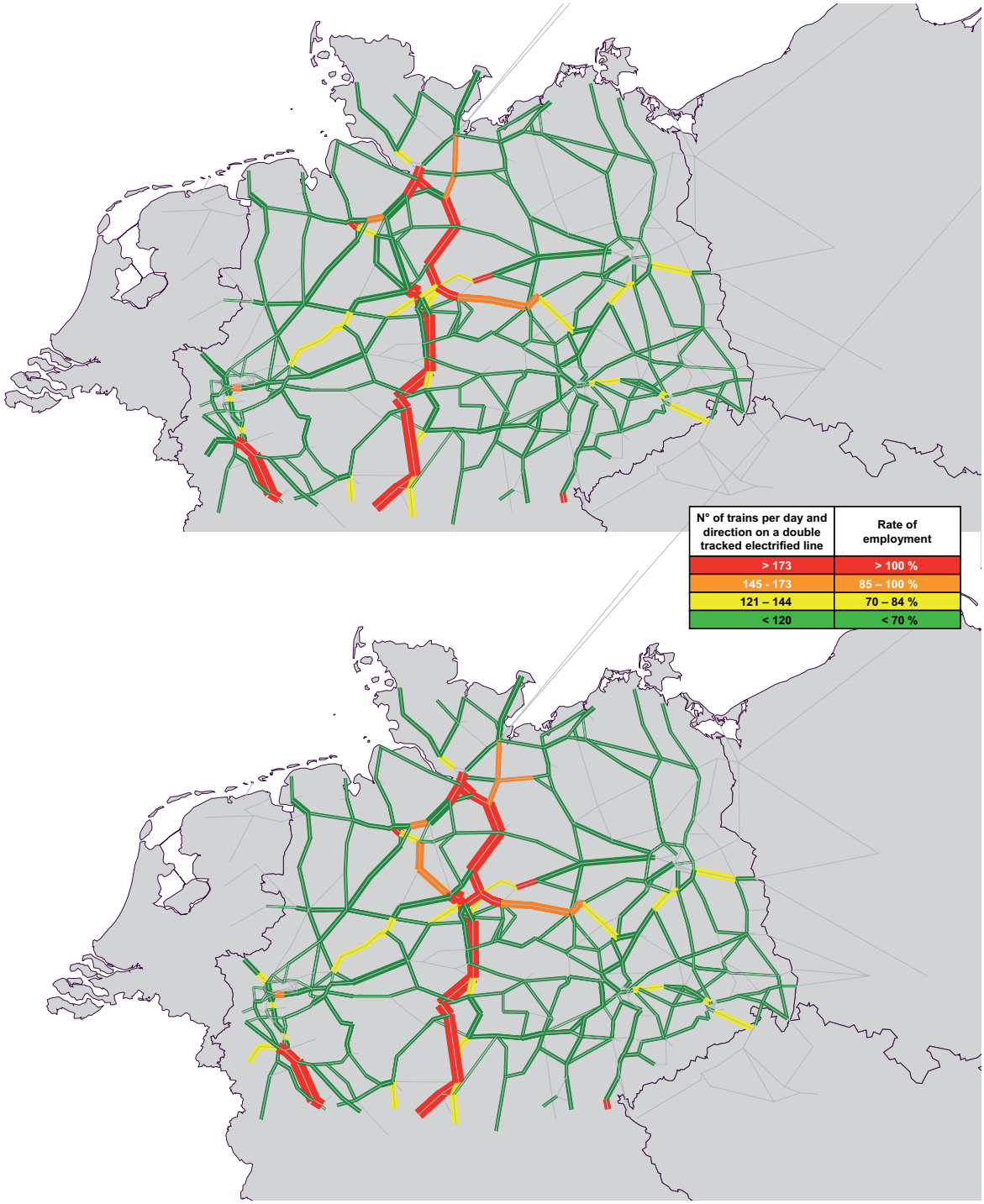
Source: BMVBS [Ministry for Transport]: Investitionsrahmenplan (Fünfjahresplan für den Ausbau der Schienenwege des Bundes 2006 bis 2010 (IRP 2006 – 2010), October 2006; Bericht zum Ausbau der Schienenwege 2005 (BAS 2005)

Figure 5-27: Total capacity load of Germany's rail network by 2015: including (top) respectively disregarding (below) enlargement investments



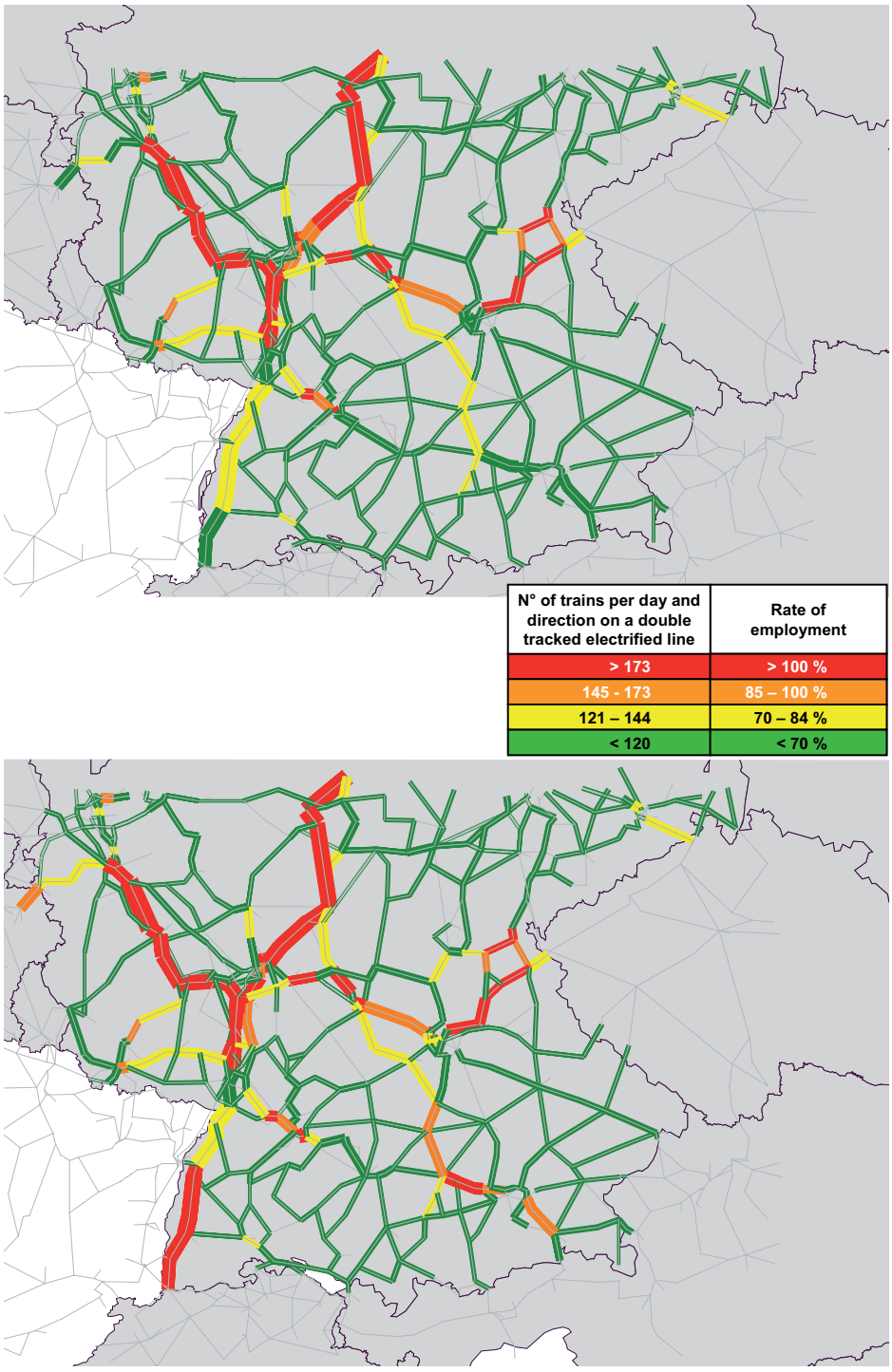
Source: KombiConsult and K+P Transport Consultants analysis

Figure 5-28: Total capacity load of rail network by 2015: including (top) resp. disregarding (below) enlargement investments: north Germany



Source: KombiConsult and K+P Transport Consultants analysis

Figure 5-29: Total capacity load of rail network by 2015: including (top) resp. disregarding (below) enlargement investments: south Germany



Source: KombiConsult and K+P Transport Consultants analysis

5.6 Impact of combined transport development on terminal capacity: 2015

Methodologically, we elaborated the impact of the estimated evolution of total unaccompanied combined rail/road transport including both domestic and international services on the capacity need for terminal handling facilities in Germany as follows:

- Recording of current terminal handling capacity
- Calculation of the required handling capacity at terminals in Germany by the year 2015
- Analysis of enlargement investment schedules in the period 2005-2015
- Calculation of the additional capacity enlargement need

5.6.1 Handling capacity of combined rail/road terminals in Germany: 2005

64 intermodal terminal sites in Germany reported that they were regularly served by unaccompanied combined transport trains in the year 2005. The consolidated annual handling capacity of these sites amounted to about 5.7 million loading units (cf. **Fig. 5-32**). This record, however, couldn't take into account small-scale transhipment facilities, which are chiefly served by single wagons. Since these sites are often multi-purpose facilities their "real" handling capacity would have hardly been able to be calculated or evaluated.

We have allocated each terminal to a transport area, which represents the catchment area for individual freight flows (cf. **Fig. 5-32**). Of the total number of recorded transhipment centres 58 were located in inland Germany ("dry" terminals) or at the Baltic Sea ferry ports of Kiel, Lübeck and Rostock. They accounted for an annual handling capacity of 4.42 million loading units. At the big Germany container ports of Bremerhaven and Hamburg operated six dedicated intermodal rail/road terminals that provided for a capacity of 1.28 million loading units.

5.6.2 Required handling capacity of combined rail/road terminals in Germany by 2015

According to our investigation approximately 98 million tonnes of the total 114 millions that we have forecasted as the volume of unaccompanied combined transport by 2015, will affect intermodal terminals in Germany. We assume that the entire transit traffic wouldn't involve any facility in Germany.

It would require a total annual terminal handling capacity of about 10.4 million loading units, in Germany, to cope with this amount of intermodal cargo, of which almost more than 30 per cent will be needed at seaport-related terminals and almost 70 per cent at inland and ferry port locations (cf. **Fig. 5-30**). In order to "translate" the transport volume from tonnes into loading units we applied common assumptions especially on the expected average gross weight per unit, the number of handlings at German terminals considering both Gateway services and the mega-hub production system. The assumptions have been distinctly derived for each combined transport market segment.

Figure 5-30: Unaccompanied combined rail/road transport in Germany: required terminal handling capacity by 2015

Unaccompanied CT market segment	2015			
	Volume (gross tonnes)	Terminal handling capacity need (in loading units p.a.)		
		inland	port-related	total
Domestic CT	**41,710,000**	**3,895,294**	**1,939,412**	**5,834,706**
Continental transport	12,620,000	2,030,000		2,030,000
Hinterland transport	29,090,000	1,865,294	1,939,412	3,804,706
International CT	**56,140,000**	**3,243,717**	**1,290,000**	**4,533,717**
Continental transport	32,630,000	2,995,850		2,995,850
Hinterland transport	23,510,000	247,867	1,290,000	1,537,867
from/to German ports	*19,350,000*		*1,290,000*	
from/to foreign ports	*4,160,000*	*247,867*		
Total	**97,850,000**	**7,139,011**	**3,229,412**	**10,368,423**

Source: KombiConsult analysis

Figure 5-31 shows that the existing overall capacity of rail/road terminals in Germany will not be sufficient to handle the expected growth of volume. The total annual transhipment capacity is required to be enlarged by about 4.7 million loading units or 82 per cent. A more than proportionate extension of terminal infrastructure of 152 per cent will be needed for seaport-related terminals to absorb the expected boom of container hinterland transport. The enlargement need for inland and ferry port terminals, in contrast to that, is rather moderate. There the handling capacity must "only" be built up by 2.7 million loading units or 62 per cent.

Figure 5-31: Unaccompanied combined rail/road transport in Germany: terminal capacity enlargement need by 2015

Transport areas	Terminal handling capacity (in loading units p.a.)		
	Existing: 2005	Required: 2015	Enlargement need: 2015
Inland & ferry port terminals	4,419,000	7,139,011	2,720,011
Seaport-related terminals	1,280,000	3,229,412	1,949,412
Total	5,699,000	10,368,423	4,669,423

Source: KombiConsult analysis

5.6.3 Additional capacity enlargement need of combined rail/road terminals in Germany by 2015

Based on the detailed transport programmes of combined transport services and the results of the previous "Capacity Study" we have calculated the required terminal handling capacity per transport area in Germany by the year 2015 (cf. **Fig. 5-32**). We, however, would like to emphasize that the catchment area especially of transport areas, which are located next to another, can't be separated completely. In what transport area intermodal services will be supplied, at the end of the day, is subject to many influences such as the quality of service, the conditions for pre- and post-haulage and the customer base.

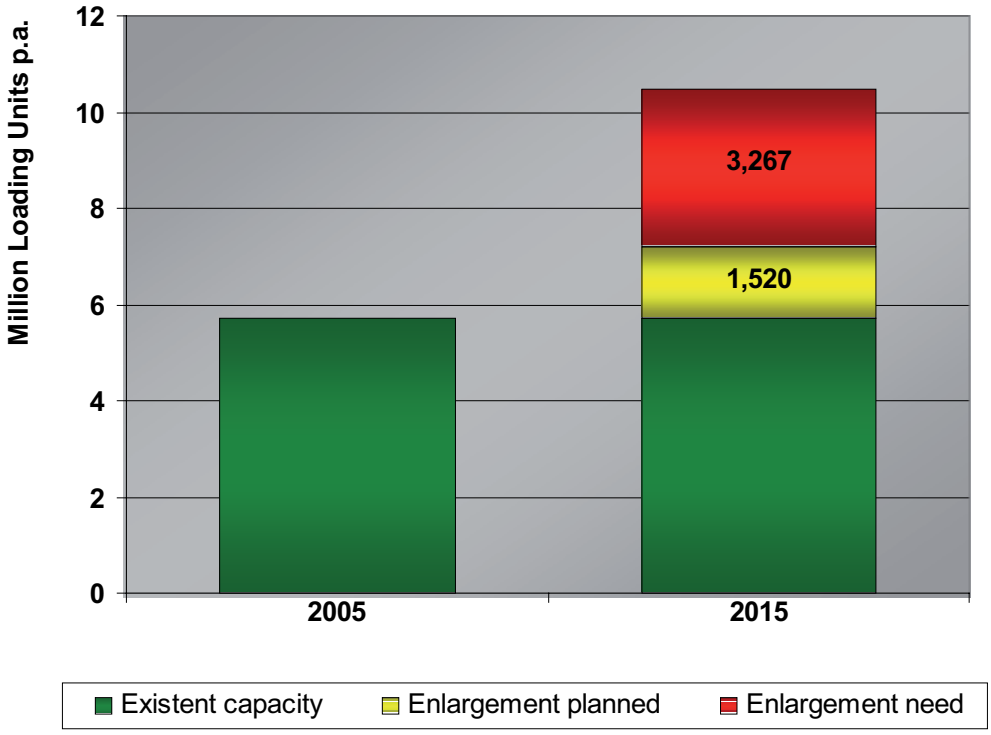
Figure 5-32: Unaccompanied combined rail/road transport in Germany: terminal handling capacity per transport area 2005/2015

Transport Area (n° of terminals)			Terminal handling capacity (in loading units p.a.)				
			2005	2015			
			Existing	Enlargement planned	Total planned	Required	Enlargement need
Inland and ferry port terminals	Augsburg	1	22,000	0	22,000	113,000	91,000
	Basel	1	155,000	35,000	190,000	219,000	29,000
	Berlin	2	85,000	55,000	140,000	156,000	16,000
	Bielefeld	1	100,000	0	100,000	77,000	
	Bremen	1	120,000	0	120,000	166,000	46,000
	Burghausen	1	0	0	0	59,000	59,000
	Dörpen	1	95,000	0	95,000	102,000	7,000
	Dortmund/Unna	2	80,000	0	80,000	146,000	66,000
	Dresden	2	56,000	0	56,000	98,000	42,000
	Duisburg	3	320,000	90,000	410,000	548,000	138,000
	Erfurt	1	15,000	15,000	30,000	49,000	19,000
	Frankfurt/Main	2	200,000	20,000	220,000	159,000	
	Frankfurt/Oder	1	25,000	0	25,000	25,000	0
	Göttingen	1	30,000	0	30,000	30,000	0
	Hamburg	1	195,000	55,000	250,000	381,000	131,000
	Hannover	3	62,000	0	62,000	331,000	269,000
	Herne/Marl	2	82,000	0	82,000	98,000	16,000
	Ingolstadt	1	30,000	10,000	40,000	69,000	29,000
	Karlsruhe	2	110,000	40,000	150,000	128,000	
	Kassel	2	53,000	20,000	73,000	73,000	0
	Kiel	2	28,000	0	28,000	41,000	13,000
	Köln	3	545,000	30,000	575,000	672,000	97,000
	Leipzig	1	120,000	120,000	240,000	268,000	28,000
	Lübeck	2	142,000	0	142,000	208,000	66,000
	Mannheim/Ludwigshafen	4	450,000	0	450,000	662,000	212,000
	München	1	220,000	100,000	320,000	590,000	270,000
	Neuss	1	140,000	0	140,000	200,000	60,000
	Nürnberg	3	288,000	50,000	338,000	407,000	69,000
	Osnabrück	1	10,000	0	10,000	79,000	69,000
	Regensburg/Landshut	2	125,000	0	125,000	170,000	45,000
	Rostock	1	85,000	0	85,000	129,000	44,000
	Saarbrücken	1	10,000	0	10,000	0	
	Schweinfurt	1	25,000	0	25,000	49,000	24,000
	Singen	1	156,000	0	156,000	175,000	19,000
	Stuttgart	2	140,000	140,000	280,000	294,000	14,000
	Ulm	1	100,000	50,000	150,000	168,000	18,000
	Subtotal (1)	**58**	**4,419,000**	**830,000**	**5,249,000**	**7,139,000**	**2,006,000**
Sea-ports	Bremerhaven	1	330,000	290,000	620,000	731,000	111,000
	Hamburg (See)	4	950,000	400,000	1,350,000	2,219,000	869,000
	Wilhelmshaven	1	0	0	0	281,000	281,000
	Subtotal (2)	**6**	**1,280,000**	**690,000**	**1,970,000**	**3,231,000**	**1,261,000**
Grand total		**64**	**5,699,000**	**1,520,000**	**7,219,000**	**10,370,000**	**3,267,000**

In the next step we have investigated into the enlargement schedules of owners and operators of existing terminals. We were informed about investment plans amounting to an annual handling capacity of 1.5 million loading units (cf. **Fig. 5-32**). Basically, we have only included projects, which are either already in the course of being implemented or scheduled but lacking of e.g. approvals or a financing concept. We entirely left out terminal concepts, which appeared to be very far from realization.

In spite of the surprisingly extensive schedules for terminal enlargement measures it remains a capacity gap of nearly 3.3 million loading units (cf. **Fig. 5-32 & 5.33**). Additional enlargement investments are required to accommodate the forecasted volume of combined transport in Germany in 2015. Thereof an annual handling capacity of 2 million loading units is needed for inland and ferry port terminals and a capacity of 1.3 million loading units for seaport-related locations.

Figure 5-33: Unaccompanied combined rail/road transport in Germany: required terminal handling capacity by 2015



Source: KombiConsult analysisCum vullaor percinim veliquatue cor sustio dolorpe rcipit do eu faci eliquis nisi.

6 Trends in domestic combined transport in Italy

6.1 Overview of combined transport market in Italy 2005

In 2005, the total volume of combined rail/road transport in Italy amounted to 41.9 million gross tonnes, of which 37.1 millions were conveyed on unaccompanied services. About two thirds of this tonnage was moved on international services whereas domestic intermodal trains carried 12.8 million tonnes corresponding to a share of 30 per cent of total intermodal traffic in Italy (cf. **Fig. 6-1**).

Figure 6-1: Combined rail/road transport volume in Italy: 2005

Combined transport market segment	2005		
	Million TEU	Gross weight	
		Million tonnes	Percentage
Unaccompanied combined transport	**4.100**	**37.1**	**88.6%**
Domestic CT	1.400	12.8	30.6%
International CT	2.700	24.3	58.0%
Accompanied combined transport	**0.380**	**4.8**	**11.4%**
Total combined transport	**4.480**	**41.9**	**100.0%**

Source: Trenitalia, Cemat, Kombiverkehr, Ökombi, UIRR, KombiConsult analysis

In unaccompanied traffic intermodal operators carried out the transportation of 4.1 million TEU of units. Almost 160,000 road vehicles corresponding to 0.38 million TEU were shipped on the following five international accompanied transport services from and to Italy, in 2005: Aiton-Orbassano; Freiburg-Novara; Singen-Milano; Wörgl-Trento; Salzburg-Trieste. With a gross weight of 4.8 millions tonnes this combined transport mode represented 11.4 per cent of total combined transport in Italy.

An analysis of Italy's goods traffic statistics reveals the key role that combined transport has acquired for the evolution of rail freight transportation in Italy. In 2005, combined transport achieved a share of 49.6 per cent of total rail freight volume of 84.5 million gross tonnes and thus ranked top among all business areas (cf. **Fig. 6-2**). This result is likely to be unique across Europe. On cross-border traffic intermodal services even held a lead over conventional wagonload by almost 60 to 40 per cent while combined transport's share of the domestic rail freight market amounted to 37 per cent.

Figure 6-2: The Italian rail freight market: 2005

Railfreight market segment	Domestic		International		Total	
	Mill tonnes	Percentage	Mill tonnes	Percentage	Mill tonnes	Percentage
Conventional wagonload	21.8	63.0%	20.8	41.7%	42.6	50.4%
Combined transport	12.8	37.0%	29.1	58.3%	41.9	49.6%
Total railfreight	**34.6**	**100.0%**	**49.9**	**100.0%**	**84.5**	**100.0%**

Source: Ministero Infrastrutture; KombiConsult analysis

6.2 Analysis of current domestic combined transport in Italy

6.2.1 Legal framework of combined transport in Italy

In past years various Italian regions, i.e. the administrations below the national level, have set up numerous programmes to promote combined transport. Aids were dedicated to build intermodal terminals, purchase intermodal equipment, enforce information technology, train staff or support the start-up of new services. All programmes were temporary mostly limited to a three year period and primarily designed to foster combined transport on a regional level.

The first national programme that has been perceived by intermodal operators and railway undertakings as an effective action to promote combined transport in Italy was established by Law number166, article 38, in 2002. The entire implementation process that included the notification of the aid scheme with the European Commission, the budgeting, the set-up of regulations and the tendering for projects took more than three years. The programme, which also aims at supporting the rail transport of hazardous cargoes, was finally enforced

with the Presidential Decree DPR 340 issued on 22 December 2004. As concerns combined transport it comprises three sets of aids (cf. **Fig. 6-3**):

- A: Incentives for companies that commit themselves in providing full trainloads at national level: recipients of funds have to sign a three-year contract with a railway undertaking and a commitment with the Ministry for Infrastructure; grants are based on the amount of train-kilometres performed on Italian territory thus including also the domestic distance of international services.
- B: Contributions to investments in the rail freight sector: rolling stock, railway equipment, terminal equipment, intermodal loading units.
- C: Contributions for railway undertakings that sign framework agreements with the Ministry for Transport for developing projects in the field of combined transport aiming at ensuring a modal shift from road to rail; the tender issued in February 2006 described the eligible initiatives that are more or less in line with the actions funded by the Commission's Marco Polo programme.

Figure 6-3: Administrative incentives for combined transport in Italy

Aid	Max funding	Specific conditions	Budget 2004-2006
A	2 € per train-km	Minimum 90 percent compliance with annual objective in terms of traffic performance (train-km)	175 mill €
	2.5 € per train-km for balanced traffic		
	≤ 3.5 € per train-km for distances ≤ 400km		
	Premium of 1.5 € per train-km for additional trains		
B	Rolling stock + locos: 7.5 -15 % of total cost	Assets not be sold for 7-10 years; only SME eligible	87.5 mill €
	Terminal equipment: 30 % of total cost	Assets not be sold for 5-7 years	
	Intermodal loading units: 30 % of total cost	Assets not be sold for 7 years	
C	Depending on type of action, amount of eligible cost and size of deficit	Business plan	87.5 mill €

Source: Ministero Infrastrutture, Gruppo CLAS, KombiConsult analysis

The programme aimed at initiatives in the period from 2004 to 2006. As the amount of contributions was not fixed until 2005 some projects were co-funded retroactively.

All relevant intermodal actors in Italy as well as the Ministry for Transport consider the programme successful as concerns the categories of aids and the modal shift achieved. Thus, they firmly ask for a refinancing of the incentive scheme for the period 2007-2009. In spite of that they are requesting for modifying some complex aspects of the regulation to ensure a full exploitation of the contributions to investments and combined transport services.

6.2.2 Overview of domestic combined transport in Italy

Domestic combined transport in Italy only consists of unaccompanied services. In 2005, 65 per cent of the total tonnage of 12.8 million gross tonnes of domestic volume was shipped in 960,000 TEU of containers on container hinterland services between Italian sea ports and inland destinations. The volume of domestic continental combined transport accounted for 4.5 million tonnes or about 440,000 TEU (cf. **Fig. 6-4**).

Figure 6-4: Domestic combined rail/road transport volume in Italy: 2005

Domestic combined transport (CT) market segment	2005			
	Million gross tonnes	Percentage	TEU	Percentage
Continental CT	4.50	35.1%	440,000	31.4%
Container hinterland CT	8.33	64.9%	960,000	68.6%
Total domestic CT	**12.83**	**100.0%**	**1,400,000**	100.0%

Source: Trenitalia, Alpeadria, Cemat, Italcontainer, Sogemar, KombiConsult analysis

6.2.3 Container hinterland combined transport

Even though Italy has about 50 ports along its extraordinary long sea coast, until recently, domestic container hinterland combined transport was almost completely concentrated on the four north Italian ports of Genova, La Spezia, and Livorno, at the Tyrrhenian Sea, and Trieste at the Adriatic Sea coast. Even in 2005, they accounted for about 80 per cent of the total intermodal volume of 0.95 million TEU. Not until, in the 1990's, the two new container ports of Gioia Tauro and Taranto in southern Italy were built the geographical range of intermodal hinterland services has extended in the past five years. All other ports currently are of minor importance for combined transport even if they have a considerable sea-side container throughput such as the ports of Napoli, Salerno or Ravenna (cf. **Fig. 6-5**).

Figure 6-5: Major container ports in Italy

Source: Italcontainer

The concentration of the intermodal volume on the side of the sea ports has its complement on the side of inland destinations. Some 85 per cent of all export and import containers moved on domestic intermodal services affect four transport areas: Milano/Novara, Padova, Modena and Bologna.

The evolution of this market pattern and the state of competitiveness of intermodal container hinterland services has been examined in the following sections. First of all we have analyzed the recent development of Italian container ports.

Evolution of container ports and sea-side container handling volume

In 2005, the three largest container ports in north Italy - Genova, La Spezia and Livorno - had a sea-side container throughput of 3.31 million TEU. This was 13 per cent more than in the year 2000 (2.93 million TEU). In spite of this increase the ports fell back on a European level since, in the same period, all major North Sea ports and also most of the competitors in the Mediterranean Sea achieved growth rates of 50 percent or more. In addition these Italian ports also didn't come off particularly well from the recent boom of Far East container imports compared to the leading ports in Europe (cf. **Fig. 6-6**).

This development, first of all, can be attributed to the enduring weakness of the Italian economy in recent years. In the second half of the 1990's, the major Italian ports benefited from a comparatively strong domestic economy and thus increased their container handling volume on a European average. The port of Genova even achieved the highest increase of Europe's top 15 ports in the period from 1995 to 2000. Italy's economy failed to release such incentives for foreign trade in the last five years. The real gross domestic product almost stagnated (cf. **Fig. 6-67**).

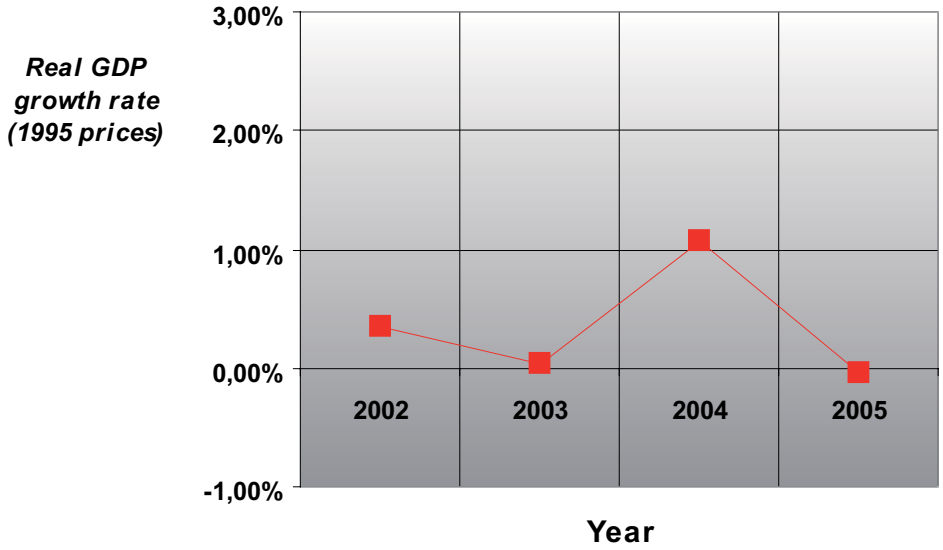
What massively affected the evolution of the container throughput in the three northern Italian ports were the increasing capacity bottlenecks in the ports themselves. Located in a demanding topography every port is suffering from a lack of space both for the quay-side handling of vessels and the interim storage of containers. From time to time congestions of the infrastructure have caused increased processing times and prevented that import containers were released on time for on-carriage. The ports lost volumes since shipping lines or importers that are sensitive to those deficits changed to other ports when they had the opportunity or didn't foresee an immediate improvement of the situation.

Figure 6-6: Container throughput of European and Italian sea ports: 1995-2005

Port	Million TEU				Percentage change	
	1990	1995	2000	2005	2000/1995	2005/2000
Rotterdam	3,67	4,79	6,27	9,29	31%	48%
Hamburg	1,97	2,89	4,28	8,09	48%	89%
Antwerpen	1,55	2,33	4,08	6,49	75%	59%
Bremerhaven	1,20	1,52	2,75	3,74	81%	36%
Algeciras	0,55	1,16	2,01	3,18	73%	58%
Gioia Tauro	-	0,02	2,65	3,16	13150%	19%
Felixstowe	-	-	1,84	2,70	n.a.	47%
Valencia	0,39	0,67	1,31	2,41	96%	84%
Barcelona	0,45	0,69	1,39	2,07	101%	49%
Le Havre	0,86	0,97	1,47	2,06	52%	40%
Genova	0,31	0,62	1,5	1,63	142%	9%
Piräus	0,43	0,60	1,16	1,40	93%	21%
La Spezia	0,45	0,97	0,91	1,02	-6%	12%
Marseille	0,48	0,50	0,72	0,95	44%	32%
Taranto	-	-	0,15	0,72	n.a.	380%
Livorno	0,42	0,42	0,52	0,66	24%	27%
Salerno	0,07	0,17	0,28	0,42	65%	50%
Napoli	0,13	0,23	0,40	0,37	74%	-8%
Trieste	0,14	0,15	0,21	0,20	40%	-5%

Source: KombiConsult research

Figure 6-7: Growth of Italy's gross domestic product (GDP): 2002- 2005



Source: ISTAT – Conti economici nazionali, anni 2001-2005

In the context of this investigation the container ports of Gioia Tauro, operational since 1995, and Taranto, opened end of the 1990's, have a special position. They are primarily designed as hubs to ensure the transhipment of containers between trans-continental mother vessels and feeder vessels operating in the Mediterranean Sea. The containers handled at these hub ports overwhelmingly are not arriving from or meant for Italy leave alone local or regional destinations. In 2005, just 135,000 TEU or 4 per cent of Gioia Tauro's total container throughput were carried by road and rail in hinterland traffic. Consequently their sea-side container throughput, in contrast to all other ports, in the first place can't be considered as market potential for intermodal transport. Albeit a couple of domestic hinterland services have already been implemented by various intermodal operators (cf next paragraph).

Evolution of container hinterland combined transport

Domestic container hinterland combined transport in Italy, compared to this business in most of the other European countries, is characterized by two distinctive features:

- Rather short transport distances
- Comparatively high level of operators' competition

In 2005, about 80 per cent of all intermodal container movements were performed on services between the four north Italian container ports and the economic centres of Milano, Modena, Bologna and Padova. This means distances mainly in the range of 200 to 400 kilometres. With Genova-Milano one of the shortest intermodal links is even the one with the largest stream of containers. Disregarding the specific situation in Belgium (cf **chapter 3**), otherwise domestic hinterland services are supposed to be cost-competitive with road above a distance of 350 or more kilometres. In Germany, the break-even distance intermodal v road was likely to be even higher in 2005.

Long-distance hinterland services have only enforced in recent years between the hub ports of Gioia Tauro and Taranto, in south Italy, and the northern Italian centres of Milano or Bologna. Those services, however, have to compete with combined sea/(rail)/road logistic chains that are based on short-sea feeder vessels, which can achieve considerably lower transport cost per unit than rail on the trunk haul owing to their higher loading capacity.

What supply chain finally is more efficient is dependent on the relative cost for the “last mile” from and to the customers. In this respect intermodal rail services provide the advantage to serve Italy’s economic centres directly.

Our survey identified eight intermodal companies that operated domestic block train systems in 2005 (cf **Fig. 6-68**). Compared to most of the other European countries, in which one operator dominates the business, in Italy, the market leader, *Italcontainer*, “only” holds a share of about 45 per cent of the total volume by TEU.

Figure 6-8: Combined transport operators of domestic container hinterland services in Italy: 2005

CT operator	Main characterictics
Alpe Adria	Specialized on services Trieste - Padova/Milano Shareholders: port, region Friulia, Trenitalia
Bucci	One service: Gioia Tauro - Napoli
GTS Trasporti	Two services from/to Bari with Salerno and Gioia Tauro
Italcontainer	Market leader: nation-wide network of services; in 2005, served all major ports except for Gioia Tauro Shareholder: Trenitalia
Logtainer	Focus on services with ports of La Spezia and Livorno Shareholders: shipping lines
Messina	Specialized on services from/to port of Genova Intermodal arm of shipping line; operates sea port terminal in Genova
Sogemar	Nation-wide network of services; in 2005, served all major ports except for Taranto Shareholder: Contship Italia (Eurogate group)
Spinelli	Focus on services with ports of Genova and Livorno Intermodal arm of road trucking company

Source: KombiConsult analysis based on operator and web-site information

Therefore *Sogemar*, the second largest operator, and also most of the other intermodal companies convey a considerable amount of containers in the range of 100,000 to 200,000 TEU annually.

This exceptional market situation, too, might have contributed to the comparatively strong growth of domestic container hinterland intermodal volume in the period 2000 to 2005 despite the under proportionate increase of throughput of Italy's main ports. So the two largest operators, *Italcontainer* and *Sogemar*, improved their volumes by up to 50 per cent in that period. For 2006, many intermodal operators expect again a double-digit growth rate compared to the previous year. According to our findings the existing success of domestic hinterland combined transport in Italy, apart from the high level of competition, is based on the following prerequisites and strengths:

- Containers overwhelmingly are shipped on cost-efficient direct trains between ports and inland terminals, sometimes by even more productive shuttle services.
- The implementation of efficient rail production schemes in effect have been facilitated by the extraordinary concentration of the majority of container flows on a few trunk routes as shown above. Too, it increasingly enables intermodal operators to serve the same link several times per day, which should also lead to a further reduction of operational cost thanks to an improved rate of employment of locomotives and wagons.
- According to our market analysis intermodal operators almost entirely are buying the rail journeys on a block train basis and thus take over the economic risk of employing train capacities from *Trenitalia*, currently the only long-distance rail traction service provider for container hinterland services in Italy. This commercial relationship essentially contributes to ensuring road-competitive port-to-door freight rates.
- As **Fig. 6-8** shows quite some operators in the market place have container shipping lines, port terminal operators or logistical service providers as a background. This situation may facilitate to set up dedicated block train services and control the container movements in a way to optimize both the capacity load factor of trains and the round trip schedules of the pick-up and delivery road vehicles.
- That intermodal operators primarily provide port-to-door services contributes to ensure this objective but also matches the needs of carriers. Besides the operators are in a better position to compensate for disruptions occurring in the chain of transport.
- Intermodal hinterland services considerably help to relieve the port facilities and neighbouring roads. If they were not provided at that scope the port-related infrastructure would be even more congested than it is now. The rather fragmented road haulage

industry in Italy, in reverse, would presently not be able to cope with this vast number of inbound and outbound container movements.

Our investigations, however, have also provided evidence that Italy's hinterland combined transport operators could have done even better if they were not faced with some severe deficiencies. With regard to the future development of this market these weaknesses are particularly serious since most of them seem to be persevering and structural:

- The main problem is an enduring lack of reliability and punctuality of rail traction services, which enormously impede the competitiveness of intermodal traffic. What is even worse is that the performance hasn't improved for years.
- Despite the congested port-related road infrastructure intermodal hinterland services generally can't match the transit times of through road haulage. While the speed of the main rail hauls – according to time-tables – is considered as sufficient many hours are "lost" for the manoeuvrings of trains from and to intermodal terminals. If containers must not be delivered rapidly this weakness would not be crucial. Especially export containers, however, have to arrive at sea ports on time to catch the vessel. Besides, in import there are more and more "perishable" commodities such as fashion ware or non-food consumer goods where speed to the market is so crucial that wholesalers and retailers are keen to bring them into the shops as fast as possible. Who's the first on the market place generally can gain a larger market share and more revenues than others. Speed also reduces the supply chain and particularly the capital cost.
- Owing to a saturated rail infrastructure and the high priority of passenger over freight trains in Italy, intermodal operators are not able to procure for sufficient train paths to meet the increased demand.
- The expansion of hinterland services also is impeded by a chronic shortage of locomotives and loco drivers for freight trains. Operators emphasized that competition for domestic rail traction services could help to improve the situation.
- The current lack of wagons, in contrast, is likely to be only a short-term impediment to hinterland services. The big European wagon renting companies have ordered a large amount of additional container cars that are due to be put into operation by and by.

- The competitiveness particularly of intermodal services with the ports of Gioia Tauro and Taranto are suffering from weaknesses of the rail infrastructure. Fierce restrictions of the maximum length and weight of trains down to 400 m and 1,000 gross tonnes respectively currently reduce the container transport capacity and induce an increase of the transport cost per unit.

Conclusions

Domestic container hinterland combined transport in Italy, basically, has achieved a strong position. In recent years it grew stronger than the quay-side handling volume of the main Italian container ports. The competitiveness of intermodal services can chiefly be attributed to the implementation of efficient rail operation schemes, which enable to convey the massive and concentrated flows of containers between the ports and the major economic areas, and the effective business models as concerns port-to-door services, the procurement of block train services and the involvement of shipping lines and other logistic service providers in intermodal hinterland services. Too, the ports are requiring for a further reinforcement of rail transport since it would substantially contribute to relieving the congested port facilities.

These advantages, for the time being, can more than outweigh the deficits of domestic hinterland combined transport, a lack of service quality (punctuality, transit time) and various restrictions of the infrastructure capacity (train path availability, priority rules, weight and length of trains). The market position, however, is jeopardized if the current boom especially of Far East import containers, which make ports, shipping lines as well as trading and industrial companies rather dependent on rail, slows down. In the medium- and long-term they would be able to either establish other efficient hinterland services in Italy e.g. by road, or re-organize the routing of containers, which could lead to a further loss of sea-side container throughput for Italian sea ports. So far Italy’s intermodal stakeholders are challenged to enhance the quality and efficiency of their services on a sustained basis.

6.2.4 Continental combined transport

In 2005, Italy's domestic continental combined transport totalled 4.5 million gross tonnes. The volume was shipped by three intermodal operators: *Cemat*, *GTS Trasporti* and *LSi* (cf. **Fig. 6-9**).

Cemat clearly is the market leader; therefore its business approach will be more closely analyzed further below. *GTS* is operating a domestic intermodal service with Piacenza from its home town Bari (Puglia). At the terminal Piacenza the company provides international Gateway connections with Belgium, France and the United Kingdom. *GTS* is the single operator in Italy that is serving both the maritime container and continental markets. *LSI* (*Logistica e Servizi Intermodali*) is a subsidiary of the Sicilian GMC International Trade group that operates in the sector of supply chain management. Presently, the company operates only out of Sicily and has services with the north of Italy.

Figure 6-9: Combined transport operators of domestic continental services in Italy: 2006

CT operator	Main characterictics
Cemat	Market leading operator: nation-wide network of services; international Gateway solutions via transalpine routes Shareholders: Trenitalia, Hupac, forwarders
GTS Trasporti	Bari-Piacenza domestic service; transalpine Gateway connections from Piacenza Background: logistical service provider
LSI	Two services from/to Catania with Genova/Milano and Padova/Bologna areas Background: logistical service provider
Interporto Campano/ Rail Traction Company (RTC)	One service since May 2006: Milano - Nola (Napoli) First independent rail traction service in domestic CT

Sources: KombiConsult survey, web-sites

With *Interporto Campano*, Nola, a new operator has entered this market in the year 2006. This freight village operator has set up a Nola (Napoli) - Milano block train service in co-operation with *Rail Traction Company* (*RTC). RTC* is one of the first independent railway undertakings in Italy. Until recently it had only provided rail traction services for intermodal and conventional trains on the Brenner corridor in co-operation with its German partner *Lokomotion*. The implementation of the Milano-Napoli service means an extension of its previous scope of business. It is also the first long-distance intermodal freight train operated by an independent railway undertaking in Italy.

The evolution of Cemat's traffic

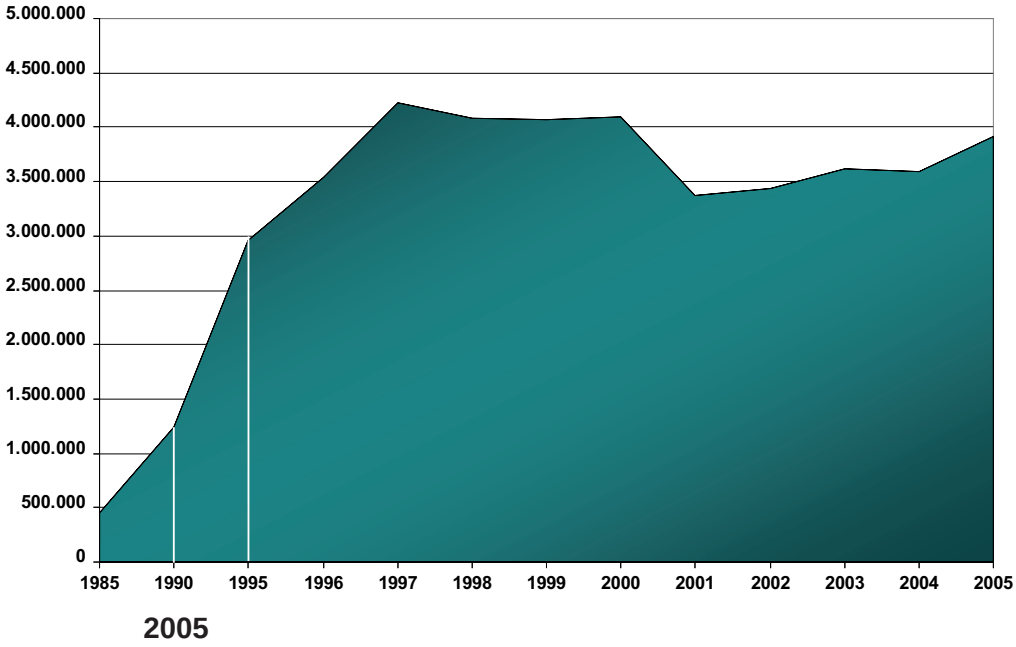
Cemat (*Combined European Management and Transportation*) has always been the market leader in continental intermodal services in Italy both on the domestic and international level. In 2005, the company carried about 3.9 million tonnes of goods domestically corresponding to a market share of 87 per cent.

Cemat like most of the companies associated in the UIRR is one of the "classical" combined transport operators. *Cemat* provides terminal-to-terminal intermodal services not for own account but for forwarders and transport companies that, too, employ their own equipment and organize the pre- and on-carriage to/from the terminals. On the other hand, *Cemat* owns quite a large fleet of intermodal wagons and is Italy's leading operator of combined transport terminals.

An analysis of *Cemat's* domestic continental traffic during the last 20 years shows that the volume of goods grew strongly within one decade and scored the peak value of 4.2 million tonnes, in 1997. After a sharp decline in 2001 the traffic has slowly been recovering since (cf. **Fig. 6-10**).

Figure 6-10: Cemat's domestic combined transport volume (in tonnes): 1985-2005

Gross tonnes



Source: Cemat, UIRR

This development resulted from the following impacts:

- As from the late 1980s *Cemat* in cooperation with the Italian state railway *FS* expanded the network of domestic intermodal connections, which – though served primarily by single-wagon traffic – were comparable with road.
- The competitiveness of continental intermodal services declined in the mid-90's when, on the one hand side, the liberalized road haulage industry improved its performance in terms of cost, transit time and reliability and, on the other side, the punctuality of rail traction dropped. As a consequence, *Cemat* lost quality-sensitive shipments such as groupage cargo or consumer goods that had been won previously.
- At the same time the volume of semi-trailers decreased as more and more customers employed 4 meter high equipment, which – owing to the restricted loading gauge - can't be carried on Italy's rail network South of Verona (cf. **Fig. 6-11**).

- What hit the domestic traffic fiercely, was an extraordinary increase of rail traction purchasing prices in the year 2000 that *Cemat* had to pass on to sales rates largely. The amount of shipments dropped by more than 15 per cent in the following year.
- *Cemat* responded to this challenge by re-aligning the domestic business entirely. Like *Kombiverkehr* in Germany, *Cemat* started to procure from *Trenitalia* block train services that increasingly replaced the system of booking wagon capacities. In order to produce more efficiently and enhance the transit times the partners also converted rail operation from single-wagon traffic to dedicated intermodal services operated as direct, shuttle or liner trains. These measures effected that shipments have slightly increased since 2002.

Figure 6-11: Cemat's domestic combined transport volume by type of intermodal loading unit (in shipments): 1995-2005

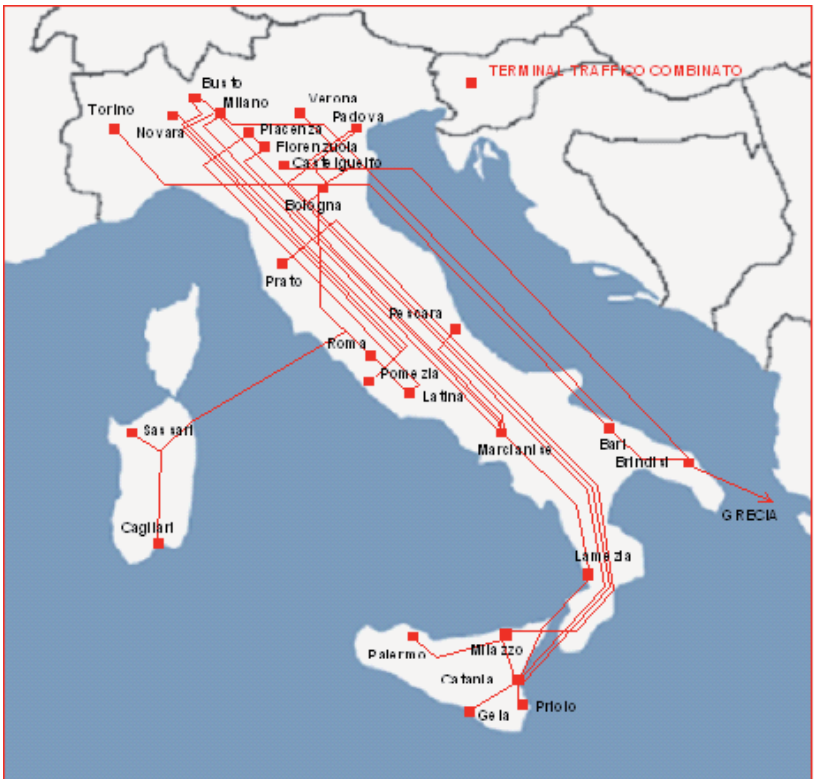
Tpe of loading unit	Shipments										
	2005	**2004**	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**	**1997**	**1996**	**1995**
Semitrailers	1.540	2.012	2.477	2.580	2.813	3.805	5.932	6.445	9.528	9.805	10.507
Swap bodies/ containers	185.585	174.816	189.030	158.926	159.528	190.522	193.747	198.975	212.049	183.993	156.493
Total	**187.125**	**176.828**	**191.507**	**161.506**	**162.341**	**194.327**	**199.679**	**205.420**	**221.577**	**193.798**	**167.000**

Source: UIRR

The establishment of the new commercial and operational relationship with *Trenitalia* has stabilized Italy's domestic continental combined transport. Presently, *Cemat* operates an extensive network of block trains services, which connect the economic centres of the northwest and northeast of Italy with those in central and south Italy (cf. **Fig. 6-12**).

In 2005, *Cemat* run a total of more than 10,000 trains, of which accounted for services between north Italy (Torino, Novara, Milano, Bologna, Padova) and Sicily: 35%, Puglia (Bari, Brindisi): 25%; Lazio (Roma): 20%, Campania (Napoli): 11 %; Sardegna: 9%. In 2006, *Cemat* has continued to extend its domestic network and launched a couple of new services: Piacenza-Roma, Piacenza-Catania, Milano-Palermo, Prato-Catania.

Figure 6-12: Cemat's network of domestic continental services

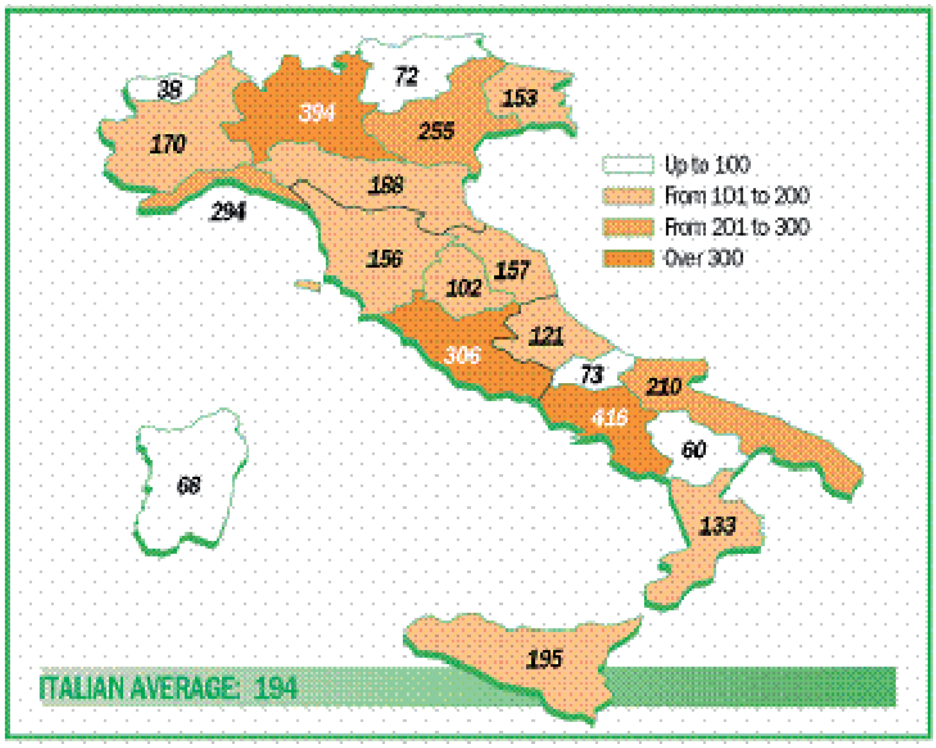


Source: Cemat website

Apart from the block train system the recent growth and current stability of *Cemat's* continental intermodal services in Italy is mainly based on the following ***strengths*** and success factors:

- The domestic north-south transport distances between most of the Italian economic centres are large and thus favourable for supplying intermodal services. One of the shortest services connects the metropolitan areas of Milano and Roma that lie already 600 kilometres apart. As a consequence the mean distance of *Cemat's* domestic services with about 800 kilometres is comparatively high (Germany: 580km).
- Tremendous volumes of goods are daily carried on all those long-distance routes providing a sufficient market potential for establishing intermodal point-to-point services. The volumes especially on links between Italy's centres of industrial production and population even allow to operating multiple trains per day. This is also a result of the distribution of Italy's population (cf. **Fig. 6-13**).

Figure 6-13: Italy: density of population by regions



Source: ISTAT: Italy in figures 2005

- The costs of domestic continental services are very road-competitive due to the implementation of efficient rail production schemes and favourable rail traction rates.
- In Marcianise near Napoli *Cemat* has established an inland hub for collecting and distributing intermodal shipments on a large scale between north and south Italy. Almost all trains bound for Calabria and Sicily are put together in Marcianise. They consist of intermodal shipments, which arrive on trains from northern Italian terminals that also carry local shipments delivered by road in the Napoli area. This hub system enables *Cemat* to realize synergy effects on the link between north Italy and Napoli and cope with infrastructure constraints in an optimum way as the rail network north of Napoli provides more favourable parameters as concerns the maximum length and weight of trains than in southern Italy.
- In recent years *Cemat*, in co-operation with its partners *Hupac*, *Kombiverkehr* and *Novatrans*, has enlarged and improved the *Gateway* concept that ensures the cross-

fertilization between international and domestic services. Hereby intermodal shipments, which arrive on international trains at north Italian end terminals but are bound for central and south Italy, are transhipped on *Cemat's* domestic services – and vice versa. Efficient transalpine *Gateway* services currently are supplied as follows:

  - ❒ Via Brenner: From Bologna/Verona to Germany and Scandinavia
  - ❒ Via Modane: From Torino to France and Belgium
  - ❒ Via Gotthard/Lötschberg: From Milano/Busto/Novara to Germany, Belgium, the Netherlands and Scandinavia

- The domestic continental services can rely on a comprehensive network of intermodal terminal sites across Italy. What also fosters combined transport is that an increasing number of terminals are located in freight villages (Interporto). In Italy, companies operating in freight villages offer a wide range of forwarding, transport warehousing, contract logistics, wholesale and other services. So demand for intermodal services arises also out of these activities.

Even though domestic continental intermodal services in Italy improved their positioning in recent years unfavourable market conditions and internal weaknesses have prevented a stronger market penetration and may also jeopardize the future evolution, as follows:

- Italy's industry is characterized by a prevalence of medium-sized manufacturers. The level of outsourcing of warehousing and other contract logistics services is comparatively low, which renders it difficult to develop strategic logistic concepts and achieve bundling effects that enable to use combined transport services. In contrast to that the producers tend to contract road operators rather on a short-term basis.
- This disequilibrium of power is complemented on the side of logistic service providers. There are very few large or medium-sized forwarders. Instead, the atomistic structure of the Italian road transport industry characterized by about 70,000 owner-operators ("padroncini") impedes the organization of efficient CT chains:
  - ❒ They make their earnings from road transportation and not from sending shipments per rail.

- ❒ These small road operators usually can't contract sufficient volumes to establish regular intermodal transports.
- ❒ Their degree of co-operation with other hauliers in most cases is too small to organize both ends of an unaccompanied combined transport journey.

- Combined transport is faced with an enduring and fierce price competition in road haulage, which is stimulated by these market patterns and recently was reinforced by an increased volume of cabotage transports.
- The economic centres of north-west and north-east Italy are located only 200 to 500 kilometres apart from each other. The distances are considered too short to be able to compete with road transport. This is the reason why, for the time being, no operator supplies east-west continental intermodal services.
- *Cemat* like the operators of container hinterland services has been suffering from a poor quality of rail traction services since many years. This deficiency makes it impossible to access time-sensitive and quality-oriented goods markets.
- Continental intermodal services most often are road-comparative in terms of cost. Particularly on medium transport distances they, however, don't provide for competitive transit times because of the time spent for moving trains between long-distance journey and terminal. While intermodal trains cover for example the route Milano-Roma (about 600 km) rapidly within 8.5 to 9 hours the total transit time terminal-to-terminal only amounts to 13.5 hours.

Conclusions

In Italy, domestic continental combined transport knows a clear market leader. *Cemat* holds a market share of over 85 per cent with a network of about 40 daily block train services. *Cemat* like the other Italian operators link the major centres of north and south Italy. They are competitive with road in terms of cost thanks to the long distances, efficient rail production systems and favourable traction rates.

All intermodal operators, however, are faced with a very difficult market structure. Both the manufacturing and the forwarding and transport industry in Italy are characterized by medium-sized companies or even particularistic patterns. They cause a lack of horizontal

co-operation and pre-consolidated regular volumes, which are prerequisites for efficiently employing intermodal services. In addition the operators suffer from enduring performance deficits in rail traction.

With the inland hub of Marcianise *Cemat* has established a very effective operational scheme to optimize the capacity loading factor of its block trains and cope with the limitations of Italy's rail network particularly in the south. Too, the intermodal logistics company has reinforced international *Gateway* solutions, which enables to cross-feeding domestic and international intermodal services. *GTS* and the new entrant *RTC* also are keen to enforce this concept. As a result, the *Gateway* volume meanwhile accounts for 20 per cent of the total 4.5 million gross tonnes of domestic continental transport.

6.3 Analysis and evaluation of development trends of domestic combined transport in Italy by 2015

6.3.1 Container hinterland combined transport

The future evolution of domestic container hinterland traffic in Italy, to begin with, is dependent on the competitiveness of its services compared to road transport and the growth of the market and thus the ability of Italy's main container ports to catch a larger volume of maritime containers. More and more, however, the performance of hinterland services themselves, in conjunction with the ports' handling capacities, determine the development of the sea-side container throughput.

Since, according to our investigation, those interdependencies vary from port to port we are going to present our results on the expected development of sea-side container volume and hinterland intermodal traffic per cluster of ports. Initially, however, we have assessed general, less port-related developments with regard to their expected impact on the evolution of hinterland combined transport.

General impact factors

(1) *Trenitalia*, currently the single rail traction provider for hinterland combined transport services, has announced to raise block train sales prices considerably with an aim to reduce financial deficits incurred in this business area. Such a step, on the one hand side, is understandable since *Trenitalia's* rates are supposed to be low compared to European average. On the other side, intermodal operators are worried that the competitiveness of intermodal services particularly of those on rather short distances like Genova-Milano will be jeopardized and volumes shifted back to road. This concern is justified against the following background: The operators have to cope with restricted train parameters owing to rail infrastructure limitations. In north Italy, domestic intermodal trains are used to have around 450 to 500 metres maximum length and 1,100 to 1,300 tonnes gross weight and in south Italy even less whereas domestic trains in Germany or France achieve a maximum length of 600 to 700 metres and up to 1,650 tonnes. As a result, if traction prices in Italy were raised to European level the cost per TEU shipped would be significantly higher.

We estimate that even if *Trenitalia* raises block train freight rates and intermodal operators pass the increase on to customers, in the short-term they will hardly lose volumes since road can't offer an appropriate alternative and thus ports and shipping lines practically dependent on the supply of rail services. Exporters and importers could also bear an increase of transport cost to a certain extent.

If, however, the intermodal operators were not able to design solutions within about 12 to 18 months that compensate for a proportion of the expected price increase their volumes might decline or at least stagnate. For shipping lines eventually in co-operation with port terminal operators could set up dedicated road haulage services and even consider to routing more containers than now from/to Italy via North Sea ports. With respect to the large volumes involved it might become more economically to serve major north Italian centres by long and heavy long-distance trains from Rotterdam and Antwerp via Germany and Switzerland. Too, they have a third option that is to choose an independent railway undertaking or establish one of its own (see below).

(2) Some of the experts interviewed in course of this investigation predicted that competition for domestic rail traction services will arise in Italy. In particular they expect the emergence of carriers dedicated to “simple” or standardized rail traction services. This could also be another option of shipping lines and port terminal operators to respond to the expected increase of intermodal freight rates. Considering the massive concentration of domestic container flows in north Italy those railway undertakings might be capable of achieving competitive costs per unit by enforcing efficient intermodal shuttle services between ports and inland terminals.

As most terminals, however, don’t provide for a direct rail access with electric locomotives independent rail operators would additionally need effective solutions for the section between the main rail haul and the terminal yard. If they did not prefer to rely on *Trenitalia’s* shunting services they would be forced to design other operational schemes such as the deployment of own shunting locos and staff. But as we analyzed previously (cf. **chapter 6.2.3**) such solutions are called for at any rate to improve the efficiency of the entire intermodal-based supply chain.

Competition on rail traction services, apart from cost effects, should additionally foster an enhancement of the reliability and punctuality of intermodal trains in arrival, which is a key prerequisite to capture more demanding maritime container market segments.

(3) Our scenario assumes that Italy’s national programme on supporting combined transport due to expiring end of 2006 will be modified and even more than before aligned to the existing Marco Polo Programme. Owing to budget restrictions and to optimize the efficiency of funds the total annual amount of grants presumably will be reduced as well as the size of support. Only new intermodal block train services would then be funded in the start-up phase to co-finance losses incurred.

(4) There are almost as many different forecasts on the development of world-wide sea container traffic as studies carried out. Each of them, however, predicts that container volumes will continue to grow. Expected annual growth rates in the period to 2015 are ranging from about five to more than ten per cent. A survey of development schedules of European port operators and port authorities reveals that, generally speaking, every

organization is convinced to participate in that global growth and particularly expects to benefit from the soaring container flows with China and other Asian countries. Basically this also applies to Italian container ports. Against this background one or the other port is campaigning for shipping lines to use their facilities and for – foreign - investors to at least co-finance enlargement investments envisaged. How these initiatives might translate into a growth of container throughput will be presented below per cluster of ports.

Combined transport with ports of Genova, La Spezia and Livorno

The main container ports in north Italy, Genova, La Spezia and Livorno, suffer from saturated capacities as concerns quay-side handling facilities, interim storage space and hinterland infrastructure. Owing to the topography and the neighbourhood of residential areas enlargement measures will be difficult and investments rather high. Various expansion projects are under consideration. A recent feasibility study for the Voltri terminal in Genova for example concluded that if 4.5 kilometres of new quays were built and the fairways deepened to 14 to 20 metres the handling capacity could increase to 12 million TEU by around 2012.

According to our survey, a significant increase of quay-side capacity is not likely to be realized in Genova, La Spezia and Livorno until 2010. If enlargement investments are to be effective for container handling volume before 2015 decisions would be required within the next two to three years. We, however, assume that measures, which aim at optimizing the process organization, and the installation of additional storage areas can alleviate congestions and enable the port terminal operators to raise container throughput moderately.

In this situation intermodal rail transport could play a crucial role in significantly extending the capacities of the Tyrrhenian ports at least on the landside. It would require for a kind of intermodal “conveyor belt systems” that is an accelerated operational system enabling to clear congested port facilities rapidly, which would comprise the following components:

- reduction of processing time between quay and rail thus relieving interim storage space based amongst others on accelerated data exchange between all actors of the maritime container transport chain;;

- establishment of “backyard” dry ports or rail hubs, which could serve as a turntable for the distributing of import containers and the collection of export containers;
- implementation of intermodal shuttle services between ports and inland terminals or, when established, “backyard” hubs;
- increased frequency of departures per day operating like a conveyor belt for container flows.

It should be emphasized that fast customs clearance processes at ports and/or the transfer of customs procedures into hinterland terminals, which is already applied in a few cases, are a prerequisite for a large-scale application of such intermodal schemes.

If intermodal operators and railway undertakings in co-operation with shipping lines, port terminal operators and authorities are able to create more room to move containers in the three Tyrrhenian Sea ports, in spite of capacity bottlenecks, they are supposed to clearly maintain the leading role for Italy’s maritime container traffic and container hinterland combined transport by 2015. This is particularly owing to their competitive edges: they are close to the main markets; Italian and foreign companies have strategically invested into port terminals; they provide for a long-time experience and market intelligence; they offer a variety of vessel services and can achieve economies of scale both as concerns sea-side feeder and hinterland intermodal services.

Based on these considerations we estimate that the ports of Genova, La Spezia and Livorno will achieve a mean annual growth of sea-side container throughput of about 4-6 per cent from 2005 to 2015. These growth rates would be higher than in recent years but lower than the average of the leading European container ports. As concerns container hinterland combined transport with the three ports we expect a somewhat stronger growth. The mean annual growth rates in the period from 2005 to 2015 are estimated to amount to 6.4 to 7.2 per cent depending on port (cf. **Fig. 6-14**).

Combined transport with Adriatic Sea ports

Owing to the strengths and successful market penetration of Italy's three main container ports it is unlikely that Adriatic ports such as Trieste, Monfalcone, Venezia or Ravenna could assume their role. Moreover their capacities presently are not sufficient to absorb such large volumes. It is also not clear if enlargements were feasible and could be financed or whether major container shipping lines could be won for calling at the ports regularly. But even if all measures could be enforced – what is highly speculative – it would take many years before investments would become effective.

Therefore we don't expect a major shift of sea-side container volumes from the Tyrrhenian to the Adriatic ports by 2015. We estimate, however, that a larger proportion of containers bound for or sourced in the north-east of Italy or in the region Emilia-Romagna (Udine, Padova, Verona, Bologna) in future will be routed via Adriatic ports to by-pass congestions at the Tyrrhenian ports. In that case liner feeder vessels are likely to carry volumes for other northern Italian centres such as Milano as well. So far the market potential for intermodal services not only on short distances to Padova or Bologna but also from/to the Milano area is expected to increase. Against this background, from 2005 to 2015, container hinterland combined transport is forecasted to increase by an average annual rate of 6.8 per cent at the port of Trieste and 10 to 20 per cent at other ports such as Ravenna (cf. **Fig. 6-14**).

Combined transport with hub ports of Gioia Tauro and Taranto

As mentioned above, the main purpose of Gioia Tauro and Taranto is to tranship containers between mother vessels and feeder ships, which are serving the Mediterranean and Black Sea. The container handling facilities only went into operation in the last decade. In each of the ports major shipping lines are heavily involved. Since these investments most likely haven't been amortized yet and if the shipping lines will not completely re-schedule their service strategies they are supposed to maintain the hubs and expand the services and volumes correspondingly. The extent of the growth primarily depends on whether sufficient sea-side handling capacity both in the hub ports and in their counterpart ports for example in north Italy will be provided.

The combined rail/road transport of maritime containers between the two ports and inland destinations in Italy primarily stands in competition with combined feeder vessel/road or even feeder/rail/road services. Owing to their bigger transport capacities – 500-2,000 TEU compared to 40-60 TEU by train – feeder ships reach significantly lower costs per TEU than rail services on the main haul. Only if the costs for pre- or end-haulage and terminal handling are so small that they compensate this handicap rail could compete with feeder vessels economically. Also if rail/road transport were so much faster than feeder-based services resulting in reduced capital and total supply chain costs containers might be moved by rail. Most import containers in fact are required to be carried to their inland destinations as quickly as possible when customs have cleared them.

These are the two main market opportunities for container hinterland combined transport with Gioia Tauro and Taranto. Currently though they are hampered by rail infrastructure restrictions as concerns limitations of train parameters and capacity bottlenecks. Italy's infrastructure manager *RFI*, however, is about to execute major improvement measures along the Adriatic corridor due to bringing about more capacities both in terms of length and weight of trains and train paths. When finished by about 2008/2009 it implies considerably improved conditions particularly for intermodal hinterland services from/to the port of Taranto. *RFI* also has planned to upgrade the rail infrastructure to Gioia Tauro. In spite of that certain limitations such as the gross weight for freight trains (max 1,000 tonnes) and the loading gauge (C 32) are likely to remain until 2015. The latter means that 9'6" high-cube containers can only be carried on special low-bed wagons.

Weighing these distinct opportunities and weaknesses we expect, in the period 2005-2015, a mean annual growth of domestic hinterland intermodal services with Gioia Tauro of 10 per cent and Taranto of about 20 per cent (cf. **Fig. 6-14**).

Combined transport with ports of Napoli and Salerno

The ports of Napoli and Salerno, for the time being, are primarily relevant for the regional economy in central and southern Italy. This has also restricted the supply of competitive hinterland intermodal services. According to our analysis this situation is not due to change significantly in the years to come. Both ports will not be able to gain a major proportion of containers sourced in or bound for northern Italy, which will remain Italy's primary area in

exports and imports, particularly owing to the following restrictions:

- The quay-side handling capacity of the port of Salerno, though highly productive as concerns the ratio container throughput per square metre, by 2015, can only marginally be enlarged owing to the topographical situation. Too, the rail access is poor and hinterland roads often congested.
- The port of Napoli could increase its quay-side handling capacity. Container throughput, however, could only grow if the current bottlenecks particularly as concerns the processing time in the port, the customs clearance and the road and rail hinterland infrastructure could be eliminated. With regard to direct intermodal services, for the time being, we see no signs that the single track line that connects the port with the main railway line will be upgraded soon. If not, most containers will have to be carried by truck from and to the port, eventually also for intermodal services which might be supplied at the terminals of Nola or Marcianise.

Against this background we consider that new direct intermodal services with the ports of Napoli and Salerno, in addition to the few already existing, will not be launched. We'd rather expect that like now maritime containers would be moved by road to inland intermodal terminals mentioned above and complete domestic trains that also convey continental shipments. If, however, rail access to the ports were improved it could create the opportunity to operate feeder trains between the ports and the dry inland terminals, where containers could be transhipped to various domestic services.

Conclusions

Based on the evaluation of development trends we elaborated a detailed transport programme of domestic container hinterland intermodal services in Italy for 2015, which resulted in the forecast of the growth of this traffic for each of the currently six major Italian container ports. The prognosis for all other ports has been consolidated in one figure. According to this analysis Italy's domestic hinterland combined transport altogether would increase by 115 per cent from 8.0 (2005) to 17.2 million tonnes (2015). This corresponds to a mean annual growth rate of approx. 8 per cent over the entire period (cf. **Fig. 6-14**).

Figure 6-14: Domestic container hinterland combined transport volume in Italy by container port: 2005/2015

Port	CT volume 2005		CT volume 2015	Percentage change 2015/2005	Mean growth rate p.a.
	(TEU)	(Mill tonnes *))	(Mill tonnes)		
Genova	350,000	3.15	6.32	100.7%	7.2%
La Spezia	262,000	2.60	4.83	85.6%	6.4%
Livorno	130,000	1.14	2.24	96.7%	7.0%
Taranto	30,000	0.27	1.63	496.4%	19.6%
Gioia Tauro	74,000	0.52	1.38	164.6%	10.2%
Trieste	75,000	0.44	0.86	93.7%	6.8%
Other ports	39,000	0.20	0.60	200.0%	14.9%
Total	**960,000**	**8.33**	**17.85**	**114.5%**	**7.9%**

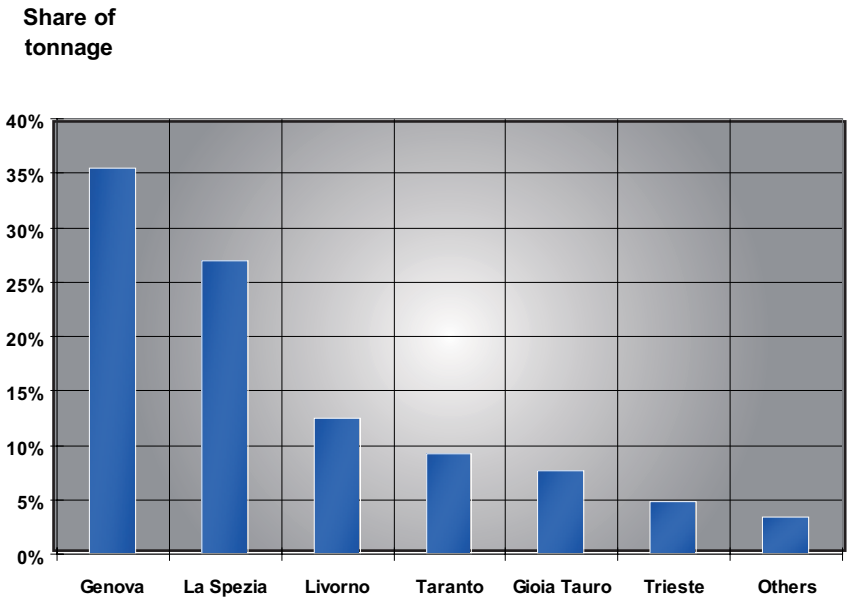
**) estimation based on CT operators and ports statistics*

Source: KombiConsult analysis

The increase of combined transport volume in terms of TEU is supposed to be slightly higher since we expect a further small decrease of the payload per container shipped. Owing to that the volume of containers will rise by 121 per cent from 0.95 million TEU (2005) to approximately 2.1 million TEU in the year 2015.

As explained above we expect that the ports of Genova, La Spezia and Livorno will clearly maintain the lead in this intermodal business area even though their growth rates are likely to be below the average of 8 per cent. For this reason their consolidated market share of domestic hinterland combined transport will decline to 75 per cent by the year 2015, down 7 percentage points from 2005. Notwithstanding, about 35 percent of all domestic intermodal containers will be handled at Genova, and 27 per cent at La Spezia (cf. **Fig. 6-15**).

Figure 6-15: Domestic container hinterland combined transport volume in Italy by percentage of container ports: 2015

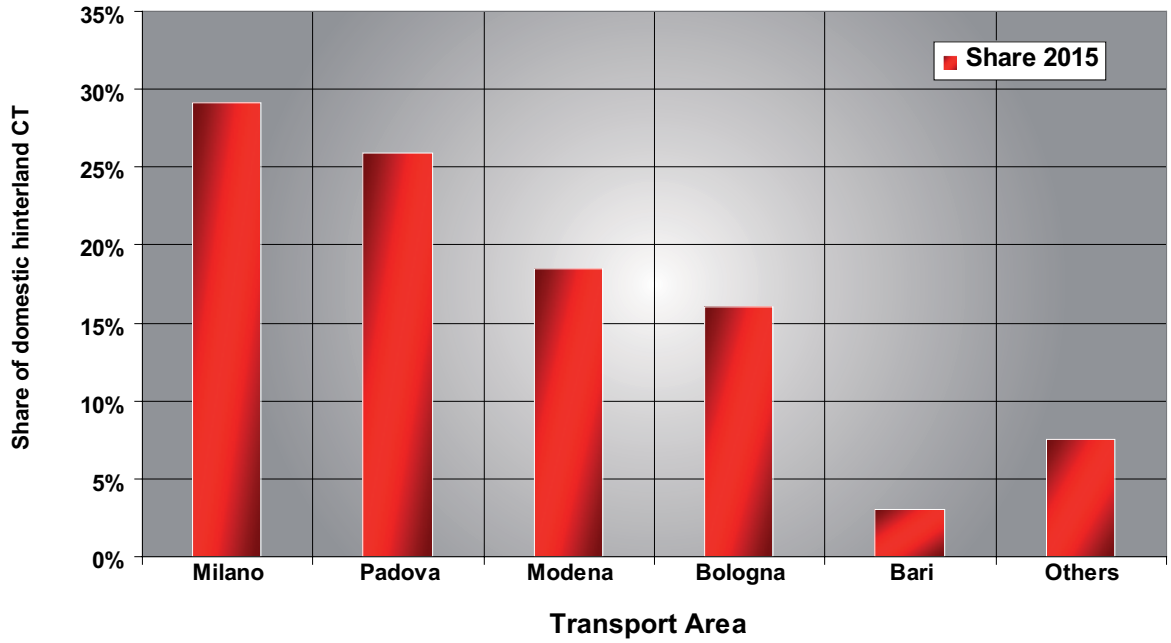


Source: KombiConsult analysis

Intermodal hinterland transport with the port of Taranto will achieve a soaring plus of almost 500 per cent and thus is likely to overtake Gioia Tauro as concerns the volume of intermodal containers handled. We particularly attribute this evolution to the superior hinterland rail infrastructure conditions of Taranto and the shorter distances to the main markets in north Italy. We also expect that by 2015 a proportion of about 10 to 15 per cent of all containers shipped on domestic intermodal services from and to the two hub ports will be carried on by cross-border gateway services to other countries such as Germany, Austria or Hungary, and vice versa.

In 2015, the geographical pattern of domestic container hinterland combined traffic will not vary significantly from the current situation. Milano/Novara, Padova/Verona, Modena and Bologna are due to remain the top ranking inner-Italian transport areas for inbound and outbound container flows (cf. **Fig. 6-16**).

Figure 6-16: Domestic container hinterland combined transport volume in Italy by percentage of inland transport areas: 2015



Source: KombiConsult analysis

According to our findings the container handling volume will absolutely increase in each of these areas, however, the consolidated relative market share of the areas of Milano, Padova and Modena is expected to decline by about 9 percentage points during the next ten years. The decrease will be considerably stronger for Milano and Modena than for the north-east of Italy.

The Bologna area, in contrast to that, might gain about 5 percentage points of market share as it could benefit not only from an increased loco volume of export and import containers but even more from being employed both as a backyard port for purely domestic container flows and a gateway between domestic and international intermodal services for example with Taranto and Gioia Tauro. We also foresee a more than proportionate increase of domestic container volume for Bari and, in particular, for other areas such as the regions of Lazio and Toscana.

6.3.2 Domestic continental combined transport

The demand for domestic continental intermodal services in Italy, in the first place, is supposed to be influenced by the development of the volume of total long-distance domestic freight traffic, which in turn depends on the economic situation of the country. For this purpose we have examined the relationship between the evolution of the domestic transport volume of *Cemat*, the biggest operator in this business area, and Italy's gross national product. As it turned out, the demand for *Cemat's* services clearly was much more determined by weaknesses or improvements of its own including the national incentive programme for combined transport, than by the economic framework.

Against this background we assume that the future development of domestic continental combined transport in Italy will also primarily depend on the opportunities of this industry and the threats it will encounter.

Opportunities for continental combined transport

(1) Italian transport experts interviewed confirmed the results of our market analysis that an enormous freight volume hasn't been captured by intermodal operators yet especially on domestic trunk routes such as Milano-Roma, Milano-Sicilia, Bologna-Napoli or Padova-Sicilia. Even though they are already served by at least 5 pairs of weekly block trains the level of exploitation of the market potential is comparatively small since, in contrast to road operators, domestic intermodal services were not able to match the requirements of quality-sensitive goods transport markets such as consumer goods, automotive components or perishables.

While freight rates are considered rather road-competitive customers call for intermodal services that are considerably improved as concerns the following features:

- faster transit time;
- earlier time slots of arrival in terminals;
- road-comparative rate of punctuality of about 90 to 95 per cent (even 99 per cent in case of parcel and express services).

(2) What could bring about an enhanced quality of domestic intermodal services? Some experts are confident that the emergence of new rail traction service providers that would be committed to produce a high performance could exert pressure on incumbent railway undertakings. As a result the overall quality level would increase. There is already a good example for this kind of leverage effect from the Brenner corridor. Since in 2001, the Italian *Rail Traction Company* (*RTC*) and the German *Lokomotion* as independent railway undertakings inaugurated traction services the rate of punctuality of Brenner intermodal traffic has tremendously improved. With respect to that it is expected that the recent entry of *RTC* to domestic continental combined transport will also release such effects.

RTC and, eventually, other new entrants, however, are faced with rail infrastructure constraints that are due to hamper an immediate enhancement: shortages of train path capacity on trunk routes; priority of passenger services over freight. We estimate that only around the year 2009/2010 when *RFI* is to have completed a couple of important enlargement investments and construction of new high-speed passenger rail lines, rail freight services should obtain an increased capacity and a higher priority on existing lines. As from that time intermodal operators should have better opportunities to develop and operate high-quality domestic services, which should enable them to catch also time- and quality-critical markets such as the transport of temperature-controlled goods or processed foods from the regions of Sicilia or Campania.

(3) The loading gauge of the entire Italian rail network south of the line Milano-Verona is limited to P/C 45/375 or less. This has restrained the market opportunities for intermodal operators since more and more freight forwarders and transport companies wish to employ high-cube or mega transport equipment – with an external height of 2.9 to 3.15 metres - to accommodate for voluminous commodities as well. To respond to these market needs *Cemat* recently has acquired specialized low-bed *Megafret* container wagons. They have been deployed on *Cemat's* intermodal services between north Italy and Sicily.

We expect that, by 2015, a lot more wagons of this or a similar type will be procured both for domestic continental and hinterland transport. They will be particularly required in connection with the implementation of high-quality intermodal services on other inner-Italian routes since a large proportion of quality-sensitive shipments consist of rather light-weight goods e.g. automotive, electronics, clothes, foods, groupage cargo, parcel services, furniture. Even if the loading gauge of some rail sections will be upgraded to P/C 45 to accommodate for high-cube maritime containers – as it is envisaged by *RFI* – it will still remain too small for the bulk of continental equipment.

(4) The emergence of competition for long-distance rail traction services is considered to lead not only to a better performance of combined transport but also to more efficient operations thus keeping prices competitive with road. The margin between intermodal and road may even widen since road haulage operators are faced with the new EC regulation on drivers working and resting times and the obligatory application of the digital speedometer ("blackbox"). These measures induce a reduction of the effective working time per driver – reinforced by the provision that waiting times are recognized as working times - and require from road operators to either employ more drivers or carry less cargo. Forwarders estimate that personnel cost may rise by 15 to 30 percent depending on the level of compliance with current rules.

The reduction of the effective drivers' working time will also cause that a driver in one shift generally will not be capable of performing a one-way journey including waiting time of more than about 600 to 650 km or a round trip on a route of about 300 to 350 km one way. Even if road operators elaborated smart operational solutions such as new relay systems of interchanging trucks, drivers or equipment, the working time regime is likely to lead to a significant increase of road transport cost and result in reducing the break-even distance intermodal v road correspondingly. With regard to the very long north-south distances in Italy this could lead to a noticeable increase of demand for combined rail/road but also motorways of the sea services. We therefore assume that, latest as from the second half of the following decade, the domestic trunk routes mentioned above will be served by multiple daily trains.

(5) We reckoned that, in 2005, *Gateway* shipments made up about 20 per cent of Italy's total domestic continental combined traffic. The overwhelming percentage of units was conveyed on corridors via Switzerland and Modane (Italy/France).

Regular *Gateway* transports were also performed on the Brenner corridor via Austria especially with the areas of Bari and Napoli. The market penetration, however, appears to be restricted owing to the complex operational scheme and the poor rail connection: Intermodal shipments, which for example in Bari are loaded on a *Cemat* domestic train, must be transhipped at the terminal Bologna Interporto onto a shuttle service to Verona Q.E. where they will be transferred to one of the international block train services supplied by *Cemat* and *Kombiverkehr* e.g. to Germany. The railway line Bologna-Verona and the rail access both to the terminals in Verona and Bologna still are a major impediment to this intermodal service. Over the largest part a single track line it is loaded with regional passenger trains that prevent road-competitive transit times for the intermodal shuttle. Too, a lot of time is wasted on this short-distance journey of some 110 kilometres for leaving the Bologna terminal and entering the Verona facility.

Italy's infrastructure manager *RFI* train, however, is about to enlarge the Bologna-Verona link to an electrified double-track line scheduled to be completed in 2008. In addition the loading gauge is going to be cleared and upgraded to P/C 400, which would allow to carrying up to standard 4m high semi-trailers. As from 2008 intermodal operators could supply considerably improved *Gateway* connections on the Brenner corridor in terms of transit time and operational efficiency, either by operating domestic services through to Verona or starting international block train services already in Bologna, and vice versa.

(6) Currently, continental intermodal services only are supplied on north-south routes in Italy. East-west connections between economic centres in the north-east and north-west of Italy are not regarded to be competitive with road. We, however, believe that, in the period from 2005 to 2015, the terms of competition will change in favour of combined transport as concerns the following factors:

- the road infrastructure is highly saturated;
- the new regulation on truck drivers' working time will make it more difficult for road operators to organize efficient round trip schedules;

- the completion of the new high-speed passenger line Milano-Venezia by 2010 will provide more capacity for freight trains on the existing line;

According to our market analysis such an innovative continental intermodal service could be implemented on links such as Novara/Milano-Cervignano or Torino-Padova. If freight trains will have priority on the existing east-west line such an intermodal service would be feasible that ensures a daily round trip of the entire train configuration (wagons, loco). As a result two departures per day both ways could be offered at different time-slots. Hereby, this service would not only match the requirements of the logistics service providers for more flexibility in rail transport but, at the same time, it could be geared to two markets: domestic logistics and international shipments. While at the end terminal of this domestic service national shipments would be unloaded and delivered by truck international units would be transhipped on an international train leaving, in the West, to France, Belgium or the UK, and, in the East, to Hungary, Slovakia or Turkey. The combination of two market segments would help to optimize the capacity load factor and ensure competitive costs.

(7) As mentioned above (cf. **chapter 6.2.1**) we estimate that Italy's national incentive programme for combined transport will be continued in a modified way and particularly give subsidies for the start-up of services. Such a scheme would support the establishment of innovative and rather risky continental services such as the east-west links mentioned previously.

Threats to continental combined transport

(1) Likewise in container hinterland traffic *Trenitalia* has threatened intermodal operators to increase sales prices considerably with an aim to reduce or eliminate financial losses incurred. While such a step would not be likely to immediately jeopardize the competitiveness of hinterland intermodal services for the reasons described above it could severely hit continental combined transport in the short-term. If intermodal transport costs exceeded road freight rates, within weeks or months, many customers would be in a position to shift shipments back to road. In this respect the impact of the 2000 price increase on the evolution of *Cemat's* domestic traffic volume can give an

idea of the presumable effects. Cemat lost more than 15 per cent of its national volume in the year after.

According to our assessment the imminent price increase for rail traction services is due to imperil a noticeable proportion of domestic continental combined transport. We do not consider that competitors for rail traction services could immediately emerge and deploy sufficient transport capacities. Only in a medium-term perspective of about three years competition might impact on the cost of combined transport and effectuate a turnaround for domestic continental services, which additionally will be fostered by the increase of market price level in road haulage. These developments are reflected in our assessment of the path of growth of domestic continental intermodal services in Italy. The average growth rate over the entire period of ten years likely is smaller than it could be if operators from the price side were able to tap the full market potential (cf. **Fig. 6-17**).

(2) Capacity bottlenecks and technical-operational restrictions of Italy's rail infrastructure are an almost "common" and often covered reason why the volume of continental combined transport doesn't grow faster. The restrictions, which relate to train parameters (max length, weight and axle load), the loading gauge and train path availability, reduce the productivity of rail operations and impede the access to certain goods markets as shown above.

The Italian government and *RFI*, however, have a launched an extensive programme for upgrading the rail network in the next years. When finished they would bring about a considerable increase of train path capacity for freight traffic and, on some sections, improvements of train parameters. In spite of that the rail infrastructure in central and south Italy, however, will not match European "standards" of 600 to 700 m length and 1,500 to 1,600 tonnes gross weight leave alone UIC loading gauge B+ or C. So Italy's operators of domestic continental intermodal services are faced with economic drawbacks as concerns the capacity of trains and thus the cost per shipment.

(3) Saturated capacities of intermodal terminals in key transport areas such as Milano, Verona and Catania, for the time being, slow down the expansion of intermodal services. Whereas in some Italian areas ample terminal handling capacity is supplied the situation particularly in the Milano area is critical. Most of the existing terminal sites, except for those built recently such as Busto, are not only congested but especially those used for domestic continental services have unfavourable layouts and configurations. Even though there are various facilities the area urgently requires for at least one or two additional large-scale sites, which would provide for sufficient storage space, good road access and a direct, fast rail access in order to enable improved transit times and eliminate frictional losses.

(4) The set-up of additional domestic continental intermodal services currently is impeded by shortages of rail ferry capacities between mainland Italy and the islands of Sardinia and Sicily. Intermodal operators claim that owing to a lack of dedicated freight ferry capacity intermodal shipments often were delayed or – in the case of hazardous cargo – couldn't even be accepted.

The shortages of ferry capacity with Sicily partly were caused by the previous government's announcement to build a bridge over the Messina sound. Ferry operators were reserved to invest in new vessels under these circumstances. Since the new government has suspended these plans we expect that investors will go forward and additional capacity be supplied in due time. If the investment gap can also be closed for services with Sardinia couldn't be assessed yet.

Conclusions

Based on the evaluation of the above mentioned trends and impact factors we have derived a comprehensive scenario on a transport programme of domestic continental intermodal services in Italy by the year 2015. For this purpose we distinguish three market segments: existent domestic markets; new domestic markets for continental combined transport; international gateway shipments carried on domestic services.

(1) Existent markets: We have analyzed that the largest untapped market potential could be caught on routes that are already served. According to our scenario about eight additional services corresponding to 16 daily trains would be implemented by the year 2015 presumably on the following trunk routes: Milano/Torino-Roma; Milano/Novara-Napoli; Milano-Sicilia; Milano/Torino/Novara-Bari; Padova/Bologna-Bari; Padova/ Bologna-Napoli; Padova/ Bologna- Sicilia; Padova/Bologna- Roma.

Assuming an average annual volume of 170,000 tonnes per block train service the total volume in this domestic continental market segment would rise by 75.6 per cent from 3.6 million (2005) to about 6.3 million gross tonnes in the year 2015 (cf. **Fig. 6-17**).

(2) New domestic markets: We reckon that, by 2015, up to four new routes will be developed for domestic continental services amounting to almost 700,000 tonnes per year (cf. **Fig. 6-17**). At least one new service is to be implemented on an east-west link in north Italy with two daily departures both ways (4 daily trains). Other new potential services presumably are on north-south routes such as Verona-Napoli, Novara-Napoli or Toscana-Sicilia.

(3) Gateway shipments: According to our analysis the volume of gateway transports will double in the next ten years to about 1.8 million tonnes (cf. **Fig. 6-17**). Most likely this volume will be gained on major corridors between north Italy and economic centres in central and south Italy fro example Roma; Napoli or Bari, which are already used for international shipments. To ensure this envisaged growth the deployment of another about five block train services will be required leading to a multiple daily frequency of services on the major inner-Italian routes.

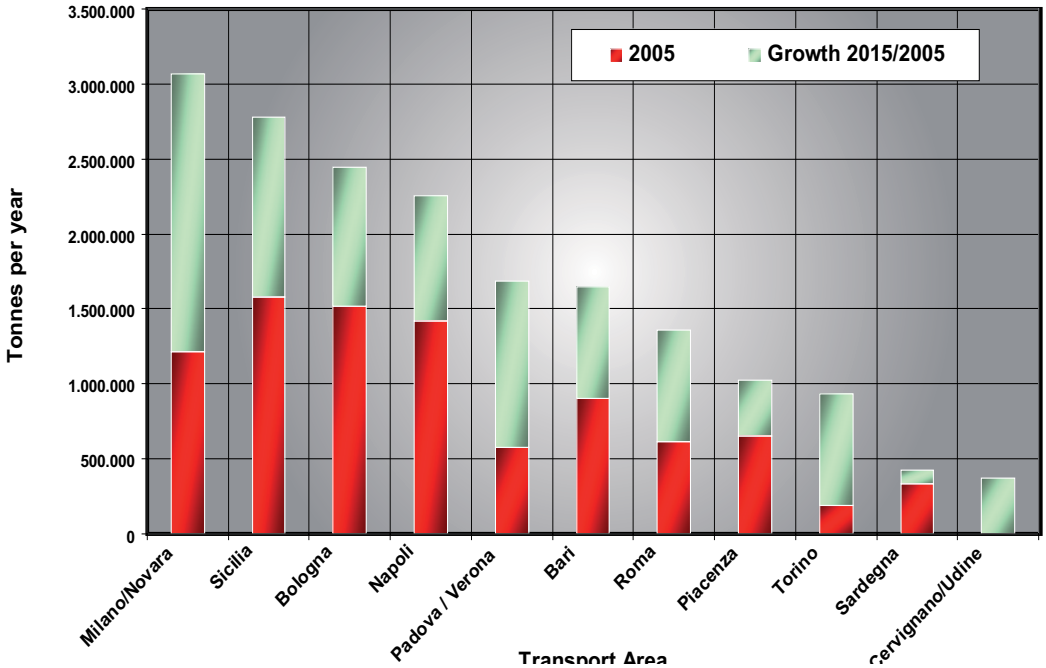
Figure 6-17: Domestic continental combined transport volume in Italy by market segments: 2005/2015

Domestic continental CT market segment	2005 (Million gross tonnes)	2015 (Million gross tonnes)	Percentage change 2015/2005	Mean annual growth rate
Existent domestic markets	3.60	6.32	75.6%	5.8%
New domestic markets	0.00	0.68	n.a.	n.a.
Gateway shipments	0.90	1.80	100.0%	7.2%
Total	**4.50**	**8.80**	**95.6%**	**6.9%**

Source: KombiConsult analysis

The envisaged 2015 transport programme for domestic continental combined transport will affect Italy's transport areas to a different extent. Unsurprisingly we expect the comparatively strongest increases for the "mega" transport areas Milano/Novara and Padova/Verona. The potential distribution of the domestic volume per area is presented in **Fig. 6-18**.

Figure 6-18: Domestic continental combined transport volume in Italy by percentage of transport areas: 2015



Source: KombiConsult analysis

6.4 Development scenario of combined transport in Italy: 2015

6.4.1 Development scenario of domestic combined transport: 2015

According to our scenario on continental and container hinterland traffic the consolidated volume of domestic combined transport in Italy will increase by approximately 108 percent to 26.7 million gross tonnes in 2015, up from 12.8 million tonnes in the year 2005. This corresponds to a mean annual growth rate of 7.6 per cent. Container hinterland transport will slightly increase its share of Italy's domestic combined transport to 67 per cent (cf. **Fig. 6-19**). We expect that combined transport measured in TEU will grow even by about 120 per cent from 1.4 (2005) to 3.1 million TEU in 2015 (cf. **Fig. 6-20**).

Figure 6-19: Domestic combined rail/road transport volume in Italy by market segments (in tonnes): 2005/2015

Domestic combined transport (CT) market segment	Million gross tonnes		Percentage change 2015/2005	Percentage	
	2005	2015		2005	2015
Continental CT	4.50	8.80	95.6%	35.1%	33.0%
Container hinterland CT	8.33	17.85	114.5%	64.9%	67.0%
Total domestic CT	**12.83**	**26.65**	**107.7%**	**100.0%**	**100.0%**

Source: KombiConsult analysis

Figure 6-20: Domestic combined rail/road transport volume in Italy by market segments (in TEU): 2005/2015

Domestic combined transport (CT) market segment	Million TEU		Percentage change 2015/2005	Percentage	
	2005	2015		2005	2015
Continental CT	0.440	0.917	108.3%	31.4%	29.6%
Container hinterland CT	0.960	2.177	126.8%	68.6%	70.4%
Total domestic CT	**1.400**	**3.093**	**121.0%**	**100.0%**	**100.0%**

Source: KombiConsult analysis

6.4.2 Development scenario of total combined transport: 2015

Total unaccompanied combined transport in Italy is estimated to rise by 115 per cent from 37 to almost 80 million tonnes in the period 2005 to 2015. This means an ambitious average annual growth rate of 8 per cent (cf **Fig 6-21**). While the scenario for domestic traffic has been elaborated in the present report, the forecast of international traffic primarily reflects the results from our previous “Capacity Study”. We didn’t produce an assessment of accompanied combined transport since, compared to unaccompanied services, the evolution of this mode is less determined by inherent performance parameters than by transport policy particularly of the Alpine states.

Figure 6-21: Combined rail/road transport volume in Italy by market segments: 2005/2015

Combined transport (CT) market segment	2005	2015	Percentage change 2015/2005
	(million gross tonnes)		
Unaccompanied combined transport	**37.13**	**79.87**	**115.1%**
Domestic CT	**12.83**	**26.65**	**107.7%**
Continental	4.50	8.80	95.6%
Container hinterland	8.33	17.85	114.5%
International CT	**24.30**	**53.22**	**119.0%**
Accompanied combined transport	**4.80**	**n.a.**	**n.a.**
Total combined transport	**41.93**	**n.a.**	**n.a.**

Source: KombiConsult analysis

6.5 Impact of combined transport development on rail network capacity: 2015

6.5.1 Capacity load of Italy's rail network by domestic combined transport

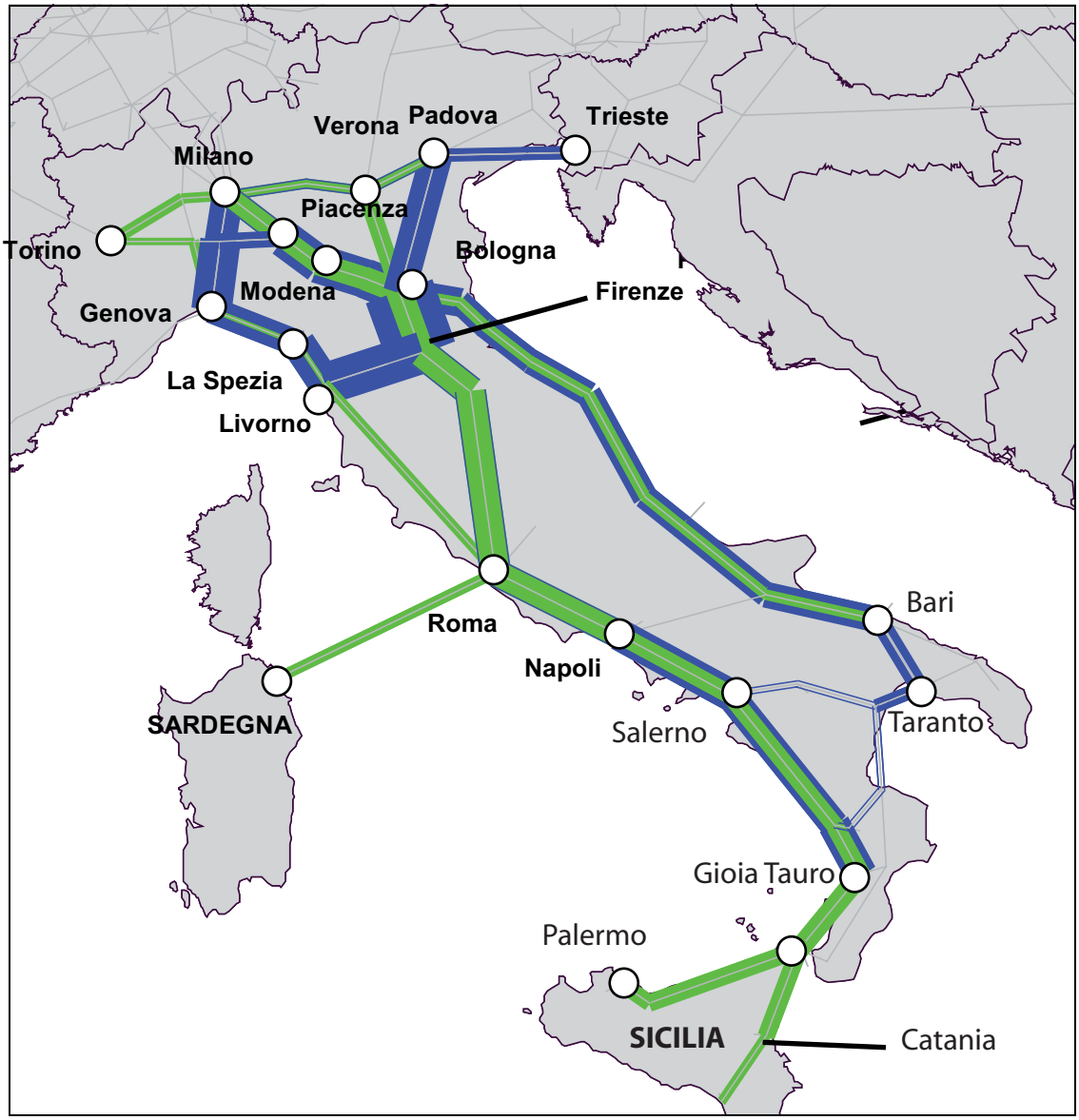
The forecast of the evolution of domestic combined transport volume described in the previous chapters is based on detailed transport programmes of intermodal services of both market segments for the horizon 2015. A detailed routing has been assigned to each combined transport service, which then has been allocated to the physical rail network in Italy. Taking account of the frequency of departures per service the average daily or annual capacity load of the network caused by domestic intermodal services has been calculated.

Fig 6-22 clearly shows what sections of Italy's rail network are particularly required for domestic intermodal services. By the year 2015 container hinterland services (marked blue) will continue to primarily employ the infrastructure in north Italy between the three main ports and the four main inland areas.

Continental services (marked green) in contrast will be strong on the long north-south routes, but more evenly distributed than currently. The sections mostly loaded with domestic combined transport are:

- Piacenza – Bologna,
- Bologna – Firenze,
- Livorno – Firenze,
- Firenze – Roma.

Figure 6-22: Capacity load by domestic combined transport



Source: KombiConsult analysis, K+P Transport Consultants

6.5.2 Total capacity load of Italy's rail network

In the next step we have calculated the total capacity load of the rail infrastructure in Italy by 2015 caused by all categories of traffic including combined transport, other freight as well as passenger services. As regards the network capacity requirement of combined transport it is represented as a consolidated result of the present investigation and of the previous "Capacity Study" on international CT.

In a first scenario the capacity employment of the rail network was calculated taking account of envisaged infrastructure enlargement investments reported. For this purpose we included the capacity-increasing measures envisaged by the Italian infrastructure manager *RFI* or already in progress (cf. **Fig. 6-23**). In a second scenario we assumed that these enlargement investments would not have been realized.

For the forecast horizon 2015 a general growth of the average network capacity of 20% has been assumed. This is due to technical and organisational improvements (e.g. shorter block distances, improved operating/signalling systems). These productivity gains will lead to an average maximum capacity limit of 173 trains per day and direction by 2015.

The **Figure 6-24** contains the result for the first scenario. Even if all envisaged infrastructure alleviation measures were finished by 2015 several rail sections would remain congested or be close to saturation. Amongst them are the following important inner-Italian links:

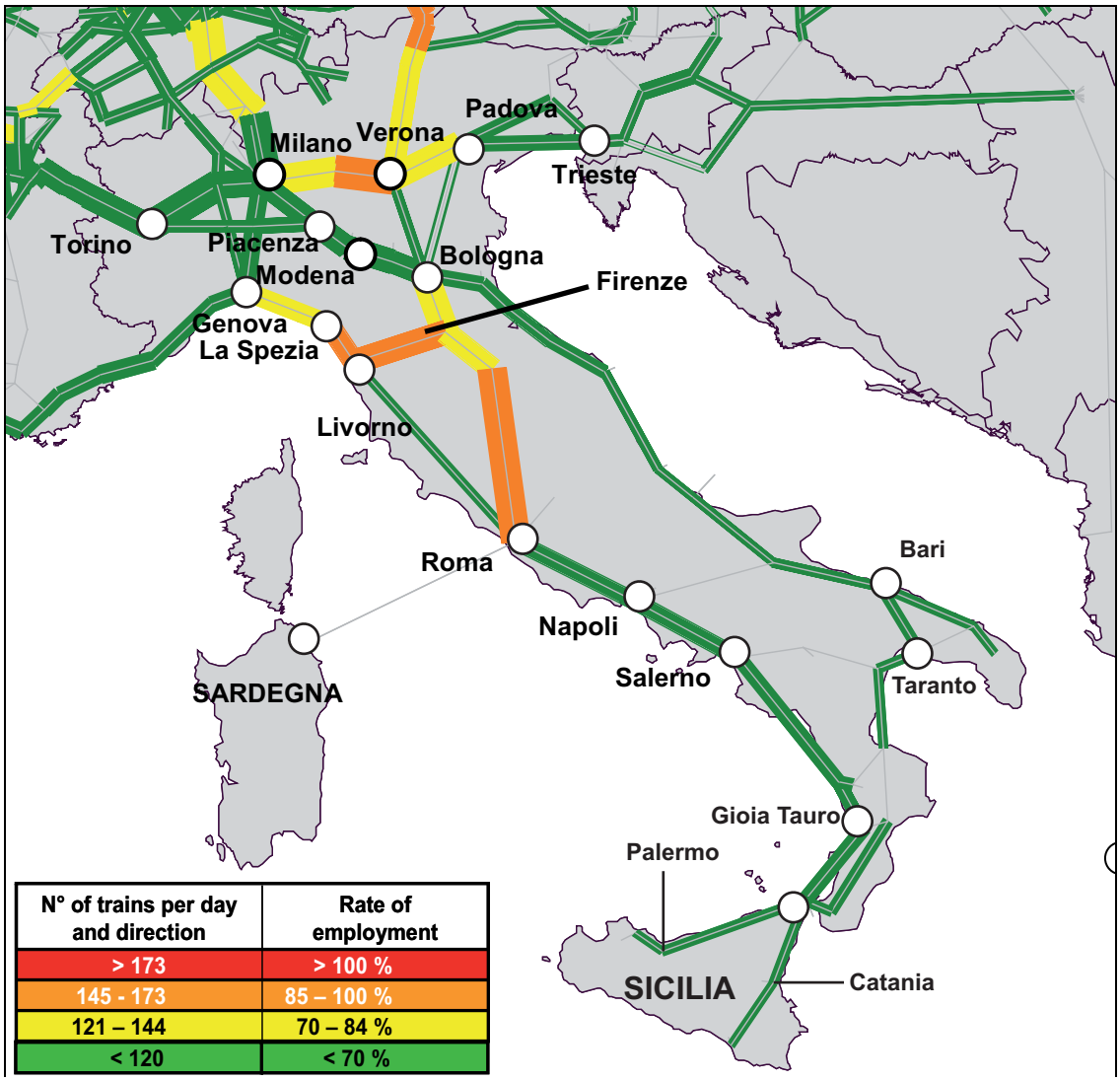
- Milano – Verona – Padova,
- Brennero – Verona,
- Bologna – Firenze – Roma,
- Livorno – Firenze,
- Firenze – Roma,
- Genova – La Spezia.

Figure 6-23: Rail infrastructure enlargement investments scheduled by 2015

N°	Railway line section	Remarks
	Northern Italy:	
1	Modane - Torino	Upgrading of infrastructure on axis Lyon - Torino
2	Torino - Novara - Milano	Quadrupling of lines; new high capacity line by 2010
3	Iselle (Domodossola) - Milano	Upgrading of connecting infrastructure to Swiss NEAT
4	Chiasso - Milano	Upgrading of connecting infrastructure to Swiss NEAT
5	Genova - Tortona	Quadrupling of line between Voghera and Genova by 2010
6	Milano - Verona - Padova	New parallel high speed-line by 2012 / 2013 facilitates additional capacity for freight transport on old line
7	Milano - Piacenza - Modena - Bologna - Firenze	New parallel high speed-line by 2008 facilitates additional capacity for freight transport on old line
8	Verona - Bologna	Doubling of all single track sections on the line by 2008
9	Border crossing nodes of Chiasso, Luino, Domodossola, Modane	Several technical alleviation measures in border crossing stations
10	Domodossola - Novara - Alessandria - Genova	Improvement of technical parameters on several sections; increase train lenght to 650m, axle load to 22.5 tonnes
11	Modane - Torino	Upgrading of line to gauge P/C 45
	Adriatic Corridor:	
12	Taranto - Bari	Completion of the doubling of the Bari - Taranto line by 2009
13	Brindisi - Bari	Finalization of doubling and electrification of last sections between Bari and Lecce by 2006
14	Bologna - Bari	Technical improvement of the whole Bologna - Bari route; new Control Center in Bari, completion of coded block system; upgrading of electric traction facilities by 2008
15	Pescara - Bari	Doubling of last single track sections by 2009
16	Bologna - Padova	Construction of new bridge over the Po river by 2006
17	Padova - Venezia	Quadrupling of tracks between Padova and Mestre; upgrading of signalling system by 2006
18	Venezia - Villa Opicina	Bi-directional block system between Monfalcone and Villa Opicina; upgrading of electricity system by 2007
	Tyrrhenian Corridor:	
19	Roma - Napoli	New parallel high speed-line by 2008 facilitates additional capacity for freight transport on old line
20	Gioia Tauro - Battipaglia	Elimination of technical impediments for freight transport by 2010
21	Gioia Tauro - Taranto	Upgrading of several track section for establishing an alternative route for northbound freight transport by 2006
22	Genova - Las Spezia	Quadrupling of 10 km tracks south of Genova
23	La Spezia - Pisa - Roma	Upgrade of track gauge: La Spezia and Grosseto to PC 80; upgrade of axle load Livorno - Civitavecchia to 22.5 t
24	Node of Roma	Increase capacity around Roma by construction of a new by-passing line to separate freight and local traffic
	Sicilia:	
25	Inner-Sicilian railway network	Various technical alleviation measures envisaged by RFI

Source: KombiConsult and K+P Transport Consultants analysis

Figure 6-24: Total capacity load of Italy's rail network by 2015: including enlargement investments



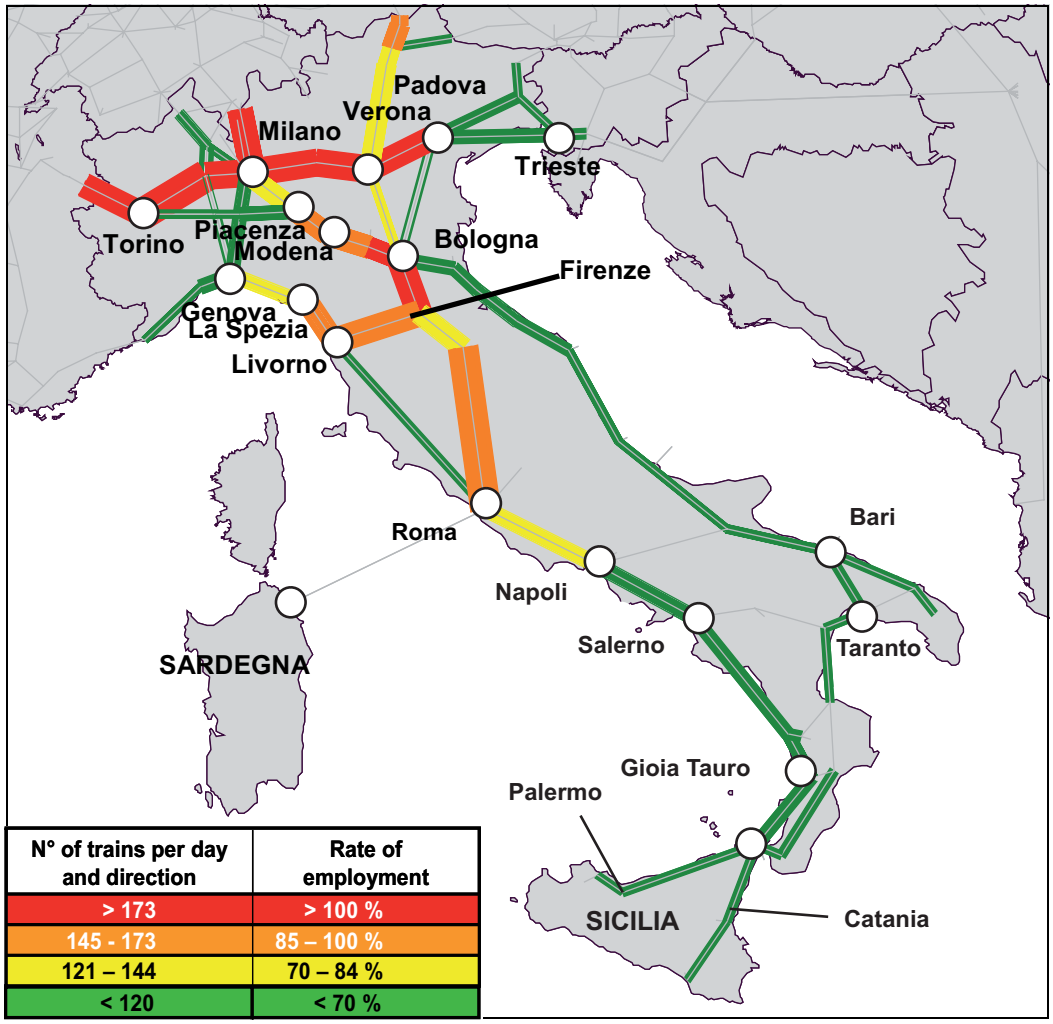
Source: KombiConsult and K+P Transport Consultants analysis

If infrastructure enlargement measures will not or only partly be taken some key sections of Italy's rail network would be saturated (cf. **Fig. 6-25**). Demand for train paths would considerably exceed infrastructure capacity on several important railway lines, in addition to those mentioned in the scenario with alleviation projects, in particular:

- Torino – Milano – Verona – Padova,
- Node Bologna
- Roma - Napoli.

Almost the entire east-west corridor between Modane and Padova would be congested if the planned new high-speed passenger line couldn't be finished on time. In that case practically no additional capacity could be provided for combined transport what would also impede the implementation of new east-west domestic continental services. Also very critical would be the saturation of rail infrastructure in the area of Bologna since it is an important node for both continental and hinterland combined transport.

Figure 6-25: Total capacity load of Italy's rail network by 2015: excluding enlargement investments



Source: KombiConsult and K+P Transport Consultants analysis

6.6 Impact of combined transport development on terminal capacity: 2015

6.6.1 Intermodal terminals in inland transport areas

Methodologically, we elaborated the impact of the estimated evolution of total unaccompanied combined rail/road transport including both domestic and international services on the capacity need for terminal handling facilities in Italy as follows:

- Recording of current terminal handling capacity
- Calculation of the required handling capacity at terminals in Italy by the year 2015
- Analysis of enlargement investment schedules in the period 2005-2015
- Calculation of the additional capacity enlargement need

(1) We were able to gather data on 43 intermodal inland “dry” terminals that were regularly served by unaccompanied combined transport trains in the year 2005. The consolidated annual handling capacity of these facilities amounted to 3.165 million loading units. We clustered all terminals and allocated them to transport areas, which are suitable to represent the catchment area for individual freight flows (cf. **Fig. 6-26**).

(2) According to our investigation the volume of unaccompanied combined transport in Italy affecting intermodal rail/road terminals will more than double to approximately 80 million tonnes by 2015. To achieve the traffic shift envisaged it will require a total annual terminal handling capacity of about 5.4 million loading units at Italian inland terminals. This corresponds to a plus of 70 per cent compared to 2005. **Figure 6-28** shows the geographical distribution of the capacity requirements over the main Italian transport areas.

The capacity need only for domestic intermodal services both continental and hinterland traffic is due to rise to about 2.65 million loading units by the year 2015. Thus **Figure 6-29** just represents the impact of domestic volume on Italy’s transport areas.

(3) In the next step we have investigated into the enlargement schedules of owners and operators of existing terminals. They reported investment plans amounting to an annual handling capacity of 1.23 million loading units. Basically, we have only included projects, which are either already in the course of being implemented or scheduled. We didn't take account of terminal concepts, which appeared to be very far from realization.

If the enlargement were realized as planned the transhipment capacity of existent terminals would grow to 4.4 million loading units during the next ten years.

(4) Despite the rather comprehensive schedules for terminal enlargement it would remain a capacity gap of almost one million loading units. Additional enlargement investments of this size are required to accommodate the forecasted total volume of combined transport in Italy by 2015. The largest additional capacity need is expected to arise in the areas of Milano/Novara, Padova, Bologna and Bari (cf. **Fig. 6-26 and 6-27**).

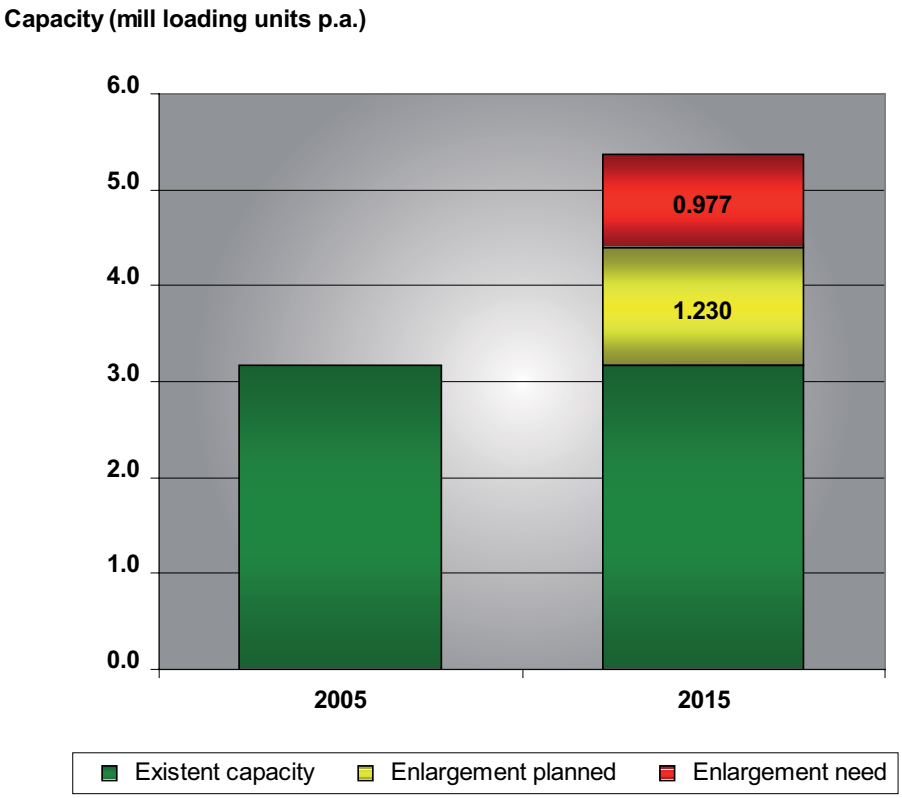
Figure 6-26: Unaccompanied combined rail/road transport in Italy: terminal handling capacity per transport area: 2005/2015

Transport Area (n° of terminals)		Terminal handling capacity (in loading units p.a.)				
		2005	2015			
		Existing	Enlargement planned	Total planned	Required	Enlargement need
Torino	1	45,000	55,000	100,000	122,000	22,000
Milano / Novara	12	1,316,000	597,000	1,913,000	2,157,000	244,000
Verona	5	381,000	524,000	905,000	905,000	0
Padova	1	141,000	0	141,000	406,000	265,000
Piacenza	3	93,000	0	93,000	93,000	0
Modena	4	255,000	0	255,000	255,000	0
Bologna	1	220,000	15,000	235,000	501,000	266,000
Roma	2	130,000	28,000	158,000	158,000	0
Napoli	3	212,000	0	212,000	212,000	0
Bari	2	98,000	11,000	109,000	246,000	137,000
Sicilia	4	174,000	0	174,000	217,000	43,000
Others*	5	100,000	0	100,000	100,000	0
Total	**43**	**3,165,000**	**1,230,000**	**4,395,000**	**5,372,000**	**977,000**

** Others include Cagliari, Sassari, Lamezia, Cervignano, Prato*

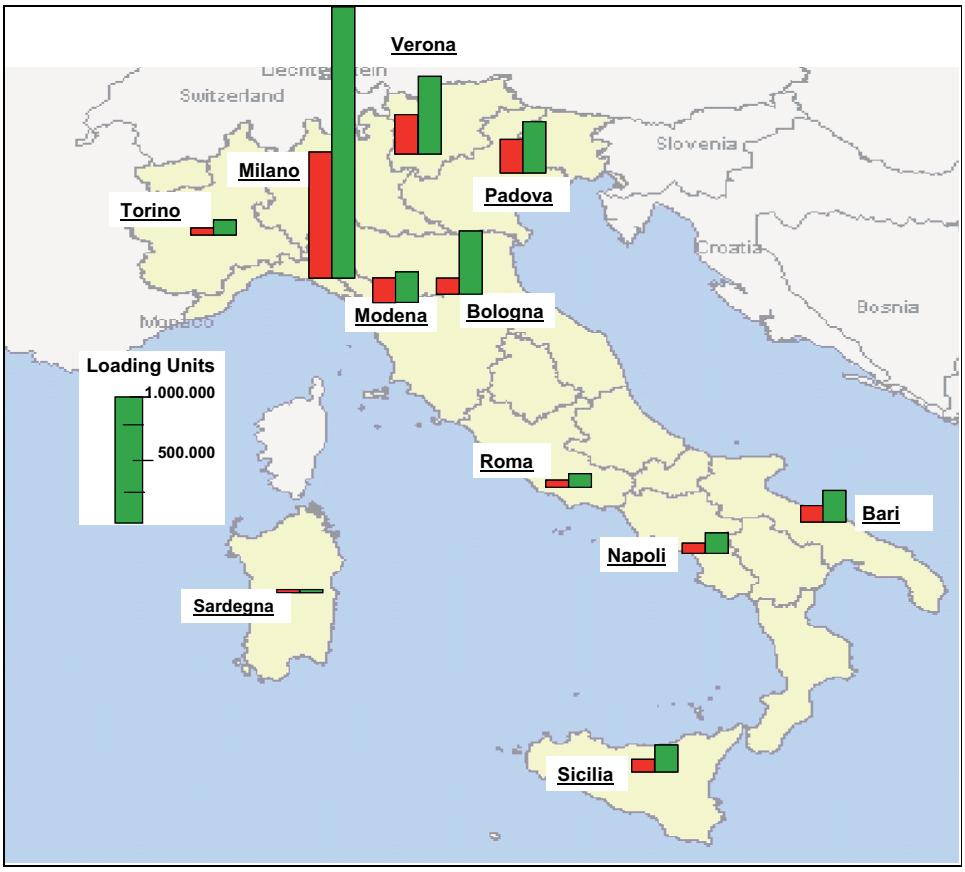
Source: KombiConsult analysis

Figure 6-27: Total terminal enlargement need by 2015



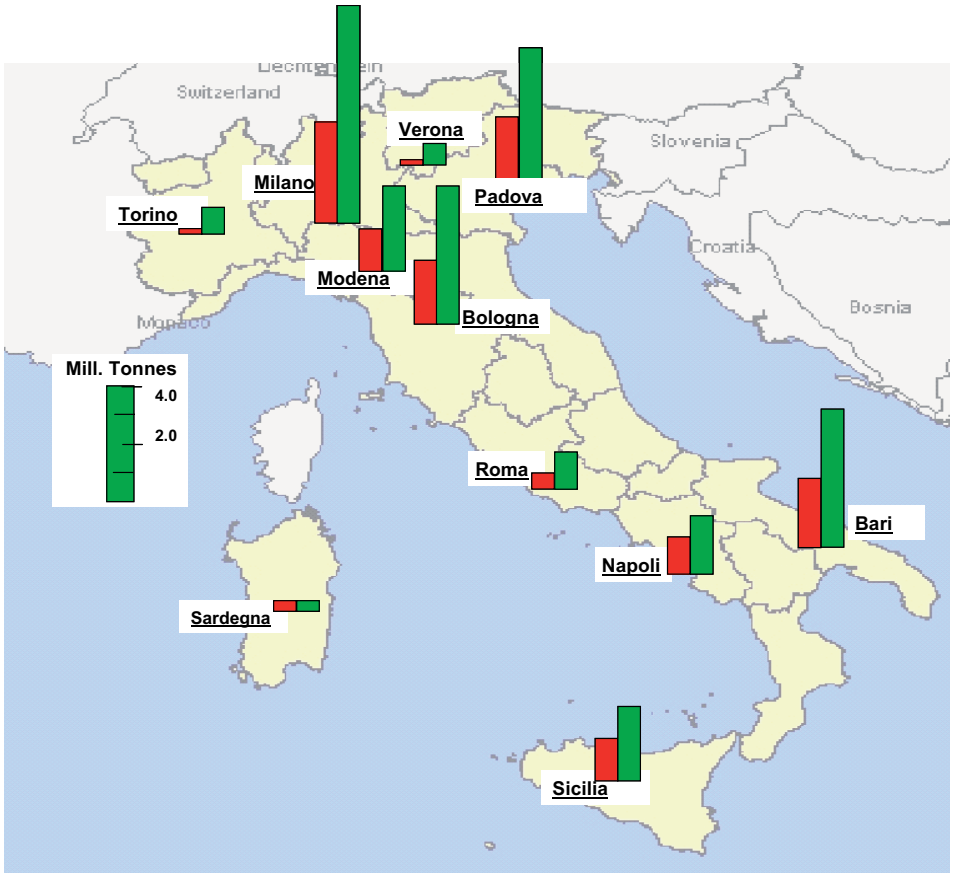
Source: KombiConsult analysis

Figure 6-28: Unaccompanied combined rail/road transport in Italy: impact of total domestic and international volume (in loading units) on intermodal terminals in inland transport areas: 2015 (green) versus 2005 (red)



Source: KombiConsult analysis

Figure 6-29: Unaccompanied combined rail/road transport in Italy: impact of total domestic volume (in tonnes) on intermodal terminals in inland transport areas:
2015 (green) versus 2005 (red)



Source: KombiConsult analysis

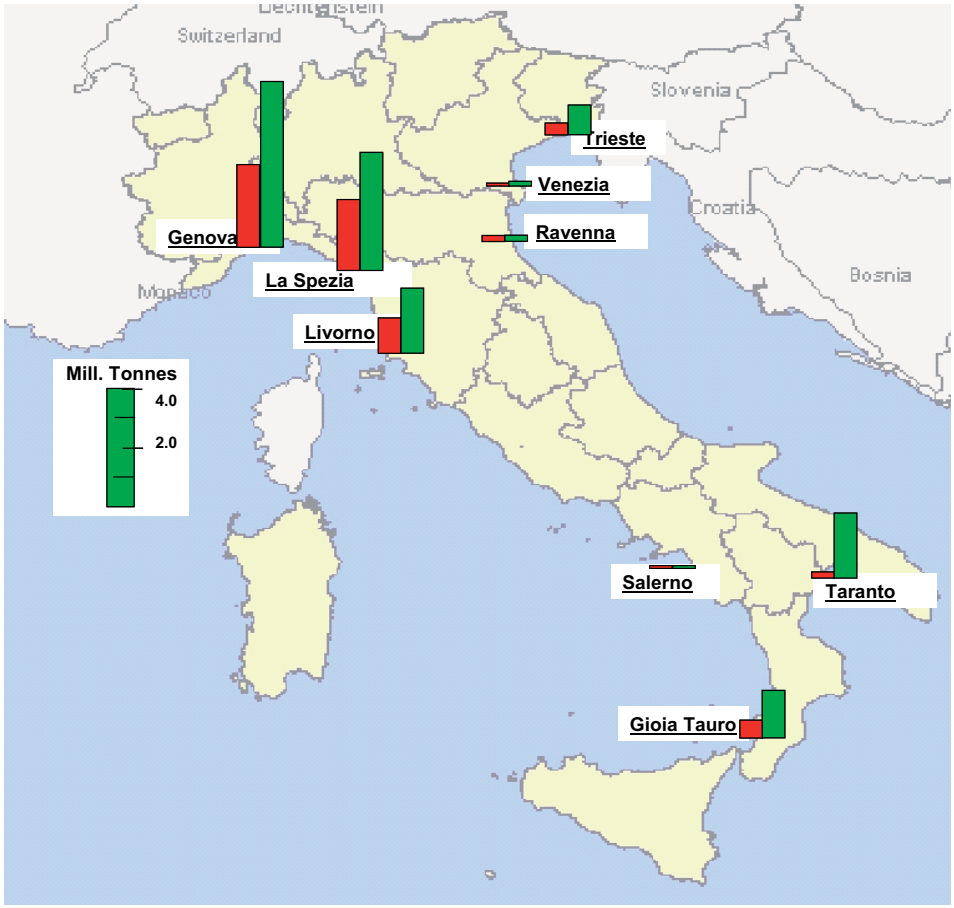
6.6.2 Seaport-related intermodal terminals

In the year 2005, rail-side intermodal terminals at Italy's seaports transhipped more than 950,000 TEU of containers that moved about 8.3 million tonnes of goods in domestic container hinterland traffic. According to our development scenario the transport volume will increase to 17.85 million tonnes or 2.2 million TEU by 2015.

In order to ensure this growth of traffic the capacity of the seaport-related intermodal terminals will have to be adapted correspondingly. It is common knowledge that the handling capacities of most of the existing facilities at Italian seaports are congested or at least close

to saturation. Since, however, we didn't obtain detailed data on the existing capacity we were not able to calculate the exact capacity enlargement or additional enlargement need of the sea-port related intermodal terminals. As a consequence, ***Figure 6-30*** can only show the expected change of transhipment volume on domestic container hinterland traffic per seaport from 2005 to 2015.

Figure 6-30: Unaccompanied combined rail/road transport in Italy: volume of domestic hinterland volume at seaport-related terminals: 2015 (green) versus 2005 (red)



Source: KombiConsult analysis

7 Trends in domestic combined transport in Switzerland

7.1 Overview of combined transport market in Switzerland 2005

In 2005, the following operators respectively railway undertakings offered domestic combined transport in Switzerland:

- SBB Cargo AG,
- Hupac,
- Rail Logistics AG,
- Basel Multi Terminal AG,
- Conteba Container-Terminal Basel AG.

The following products were offered:

- Pre- and on-carriage of containers of international combined transport trains (in particular ICF and Hupac) into the national single wagon load network of SBB Cargo AG (Product name: “Import/Export“ or “SwissSplit“),
- Repositioning of empty load units between sidings, terminals and depots (product name: „individual offers“),
- Cross alpine shuttle trains (Aarau – Stabio as well as Basel – Chiasso) for continental traffics,
- Purely domestic services for continental traffics which are shipped as single wagon loads (Cargo Domino) with specific horizontal transhipment techniques (“Horizontal-umschlag”)),
- Purely domestic services for continental traffics by shuttle trains (Rail Logistics AG),
- Pre- and on-carriage for containers to and from the ports of the river Rhine in Basel by shuttle trains as well as single wagon loads (Basel Multi Terminal AG and Conteba Container-Terminal Basel AG),
- Rolling Highway Basel – Lugano (Hupac).

This first overview shows that a big part of domestic combined traffic in Switzerland is not carried by combined block trains but in single wagon loads of the SBB Cargo AG.

The so-called “ACTS” product, which plays a certain role regarding its volume, is not considered as combined transport in the following.

The “Cargo Domino“ product is exclusively used by domestic continental traffic, whereas the other products are geared to loaded and empty maritime containers. “Cargo domino” deserves mostly small “terminals” (=sidings), the other products are routed via bigger terminals.

Compared to other European countries, a specific feature of combined traffic in Switzerland, consists of the situation that the Federal government itself acts as purchaser and financer of the combined transport, with the objective to subsidise cross-alpine traffic. At the end of the previous year the BAV tenders traffics for the following year. The volumes of consignments are fixed based on the estimations of the BAV and the operators. BAV is monitoring the services and subsidises every transported consignment with a fixed amount. For example, in 2005, agreements on the subvention of 38,640 shuttle trains and a further 185,000 consignments in single wagon loads have been made. Of which 3,500 trains and all of the 185,000 consignments concern purely domestic offers.

7.2 Analysis of current domestic combined transport in Switzerland

7.2.1 Domestic combined hinterland transport

The maritime traffic plays an important role in the domestic transports, as concerns in particular

- domestic pre- and on-carriages to/from international hinterland services by single wagon loads,
- pre- and on carriages by single wagon loads and shuttle trains to and from the inland navigation in Rhine ports in Basel and
- the repositioning of empty maritime containers by single wagon loads.

As already presented in **chapter 7.1**, the offers “Swiss Split”, “Import/Export” and “Individual offers” of SBB Cargo serve nearly solely the transport of maritime containers. For this market in 2005, agreements of 127,000 consignments between the Bundesamt für Verkehr (BAV) and SBB Cargo AG have been settled.

This means that in 2005 5,080 trains[8] , or about 20 daily trains were operated with these services. As pointed out several times before, it has to be kept in mind that the consignments are mostly shipped in single wagon load services.

For the shuttle trains between the Rhine ports in Basel and destinations in Switzerland, in the same period, agreements over about 1,500 trains have been made between the BAV and different operators. This corresponds to approx. 4 trains per day on the services Basel – Rekingen, Basel - Chavornay as well as Basel – Niederglatt.

7.2.2 Domestic combined continental transport

In the domestic combined continental transport of Switzerland two services are offered: On the one hand, Cargo Domino by SBB Cargo’s single wagon loads services and on the other hand three shuttle services offered by Hupac.

Cargo Domino is geared to the transport of swap bodies which are transhipped by horizontal loading systems between adapted road vehicles and rail cars. As a particular advantage

8 under the assumption of 25 consignments per train

can be seen that the investment costs in terminals are very low (sidings accessible for road vehicles), which makes the handling of relatively low volumes economically feasible. On the other hand the rolling stock (rail cars and road vehicles) need some specific devices.

Already, with 4-6 daily consignments such a “terminal” could be installed at the shipper’s location. Shippers with lower volumes can deliver and collect their load units at one of the 16 terminals with free access. These are located in Schaffhausen, Basel, Dietikon, Gossau, Oensingen, Rotkreuz, Bern, Landquart, Thun, Renens, Brig, Genève, Sion, Cadenazzo, Lugano and Chiasso. Most of the Cargo Domino shipments are transported in the „Cargo Express“ network which allows for a cut-off time in the late evening and a time of availability the early morning.

For the year 2005, agreements have been settled between the SBB Cargo AG and the BAV over approx. 27,000 consignments. In reality 23,500 consignments have been subsidised, which means the volume of approx. 940 yearly trains respectively of 4 trains per day.

In the domestic continental traffic of Switzerland in 2005, two cross alpine services for the unaccompagnied traffic were offered by Hupac.

- Basel – Chiasso with 5 departures per week and direction,
- Aarau – Stabio with 10 departures per week and direction.

These services, too, are subsidised by the BAV.

A third domestic cross alpine service is the accompanied rolling highway between Basel and Lugano-Vedeggio operated by Hupac. One daily departure (Monday – Friday) per direction is scheduled.

7.3 Analysis and evaluation of development trends of domestic combined transport in Switzerland by 2015

7.3.1 Domestic combined hinterland transport

The development of domestic combined hinterland transport in Switzerland is largely dependent on two factors:

- Development of Swiss imports and exports via the seaports
- The continuation of subventions for domestic combined transports

For the estimations of import and export traffics the survey “Perspectives of Swiss Freight Traffic until 2030”, published in 2004 on behalf of the Federal Office for Spatial Development served as base.

In the base scenario (medium scenario) the following annual growth rates for import and export by rail are assumed:

Figure 7-1: Growth rates for Import and Export in Switzerland 2005 – 2015

	2005 - 2010	2010 – 2015
Import	6.6 % p. a.	3.6 % p. a.
Export	4.3 % p. a.	3.1 % p. a.

The proportion of import to export by rail in Switzerland currently is about 2 to 1. Together with the growth rates above, this would lead to an increase of nearly 60% of import and export traffics by rail for the period 2005 to 2015.

In contrast to this stands a scheduled decrease of public subsidies for rail traffics, which do not cross the Alps. Given the fact that the biggest part of maritime imports and exports takes place between northern Switzerland and the ARA ports respectively the German North Sea ports, these traffics have to face a stronger decrease of subsidies, since the focus of the subventions will be more laid on cross-alpine traffic.

In 2006 the subsidies for each consignment transported by single wagon load trains, account for 42.50 €. Load units shipped in block trains are subsidised with 23.50 € and additionally 280 € per train. It goes without saying that these financial aids constitute a considerable incentive to execute the pre- and on carriage within Switzerland by rail.

From 2008 on, the subsidies for unaccompanied combined traffic shall be reduced by 5% per year. Thereby, the rates for border crossing unaccompanied combined traffics, which do not cross the Alps, are supposed to decrease even more. This means for the period 2008-2015, a reduction of the subsidy amount per consignment by at least 30%, but probably noticeably more.

Even before this decrease of subsidies, SBB Cargo assumes that the growth of import and export volumes will completely be transported by rail, thus rail's market share in domestic pre- and on-carriage will be stable.

Because of these contradictory developments – on the one hand an increase of volumes by 60% and on the other hand a decrease of subsidies by at least 30% (for single wagon load) – it is assumed that the growth of import and export traffics by rail will effect for a great part domestic traffic within Switzerland. Instead of by 60%, it is imputed that the products „Swiss Split", „Import/Export", „Individual offers" will grow by only 50%.

Thus, the products „Swiss Split", „Import/Export" and „Individual Offers" will grow from 20 to 30 trains per workingday by 2015, distributed over the whole network of the single wagon load services.

For shuttle trains, an increase from 4 to 6 trains per working day, distributed on the existing links, is assumed.

7.3.2 Domestic combined continental transport

For the projection to the year 2015, as concerns the two offers in domestic combined continental transport in Switzerland – Cargo Domino respectively shuttle trains – very different conditions have to be taken into account.

Cargo Domino consists for the biggest part of non alpine crossing traffics, thus subsidies are more reduced than for alpine crossing traffics.

For domestic traffics, the survey "Perspectives of Swiss freight traffic until 2030" assumes annual growth rates of 0,5% from 2005 to 2010 and 1,3% from 2010 to 2015. This leads to an overall growth of volumes by 2015 of approx. 9%.

At the same time, the decrease of subsidies occurs. Interviews revealed that SBB expects a development for **Cargo Domino** between stagnation and a decline by up to 30%. In order not to underestimate the effects of domestic combined traffics, a stagnation of the volumes of Cargo Domino up to 2015 is assumed.

The conditions for domestic **shuttle trains using horizontal transhipment techniques** are very similar, since they run on relatively short distances (e.g. Bulle – Luterbach, 100 km). Thus, stagnation is assumed, too.

For the **shuttle services** Basel – Chiasso, Aarau – Stabio, Weil – Chiasso as well as the Rolling Highway the conditions are as follows:

- The traffics are Alpine crossing, which means that the reduction of subsidies will be lower than for example for Cargo Domino.
- As the terminals Basel, Chiasso, Aarau, Stabio and Lugano are located near Germany or Italy, most traffic consists of international gateway shipments. These Alpine crossing traffics consist of exclusively continental load units, which tend to rise less than maritime traffic, but at the same time their subvention decreases less than for the hinterland traffics. Consequently, an increase of consignments by 30% by 2015 is assumed.

In addition, further push and pull factors impact the domestic combined transport:

- Development of the tolls (LSVA): A further increase of the LSVA is currently politically discussed. In line with the survey of the Federal Office for Spatial Development, another increase of the LSVE is assumed.
- In context with this survey, it is assumed, too that the Swiss lorry ban during the night and at Sundays will be maintained. This primarily influences transit traffics, i.e. parts of the volume of the shuttle services Basel – Chiasso and Aarau – Stabio.

7.4 Development scenario of combined transport in Switzerland: 2015

The conclusion of the analysis and evaluation of development trends of domestic combined transport in Switzerland described in **chapter 7.3** is presented in **fig. 7-2***:*

Figure 7-2: Development of combined transport in Switzerland 2005 – 2015 (Gateway services included)

Market	Volumes 2005 (consignments)	Volumes 2015 (consignments)	Percentage change
Domestic combined transport			
Maritime market	144.000	216.000	+ 50,0%
Continental market	79.000	92.000	+16,5%
Total	**223.000**	**308.000**	**+38,1%**

Source: Bundesamt für Verkehr (BAV), own estimations

Fig. 7-3 presents the conversion of consignments of national combined transport 2015 into trains. In this figure, the number of trains in international combined transport from the "Capacity Study" is presented, too.

Figure 7-3: Domestic and international combined trains 2015 on the Swiss network (Gateway services included)

Market	Trains per day 2015	Percentage
Domestic combined transport	55	30,4%
International combined transport	126	69,6%
Total	**181**	**100,0%**

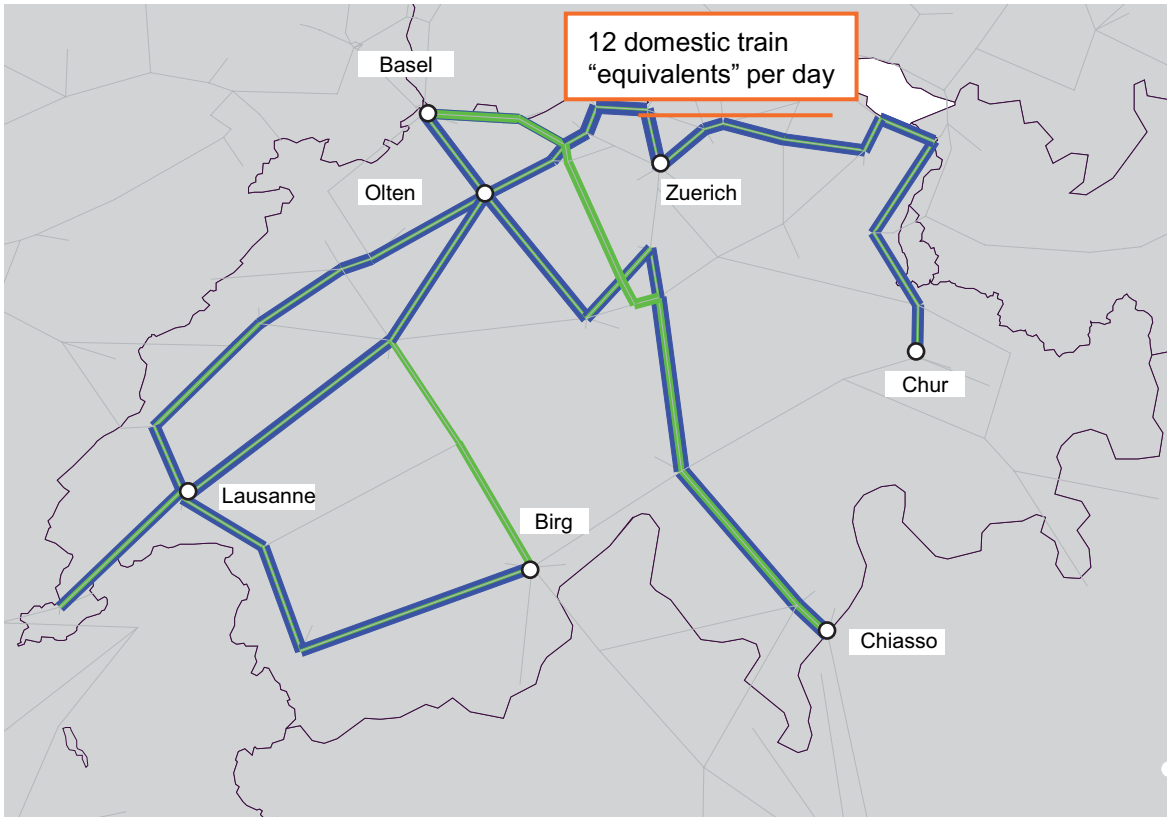
Source: Bundesamt für Verkehr (BAV), own estimations, Study on Infrastructure Capacity Reserves for Combined Transport by 2015 (UIC)

At first sight, the part of domestic trains seems very high (30.4%). But it has to be kept in mind that the international trains are concentrated on the two main axes (Gotthard respectively Simplon), whilst the 50 trains of domestic traffic are distributed on the whole Swiss network, especially on the east-west-axes.

7.5 Impact of combined transport development on rail network capacity: 2015

In **fig. 7-4** is presented the assignment of the domestic combined transport on the Swiss network.

Figure 7-4: Assignment of the domestic combined transport on the Swiss network 2015 (maritime traffic (blue), continental traffic (green))



Since, as described several times before, the biggest part of the load units in domestic combined transports are shipped within the single wagon load system, we had to form “train equivalents”, which are assigned on the network. Thus, as can be seen from **fig. 7-4**, on the link between Base and Brugg the volumes for 12 domestic “train equivalents” occur. The single wagon load network consists mainly of the following axes:

- Basel – Olten – Luzern – Zug – Chiasso
- Genf – Lausanne – Biel – Olten

- Sion – Lausanne – Bern – Olten
- Olten – Brugg – Zügich – St. Gallen – Sargans

According to the socio-economic structure of Switzerland, one can summarise that in reality, the single wagon traffics will concentrate more on the east-west-axes than on the north-south-axis.

It can be clearly identified, that the volume of maritime consignments has a much stronger impact on the infrastructure loading than the one of continental consignments.

Fig. 7-5 presents the planned investments in the Swiss network.

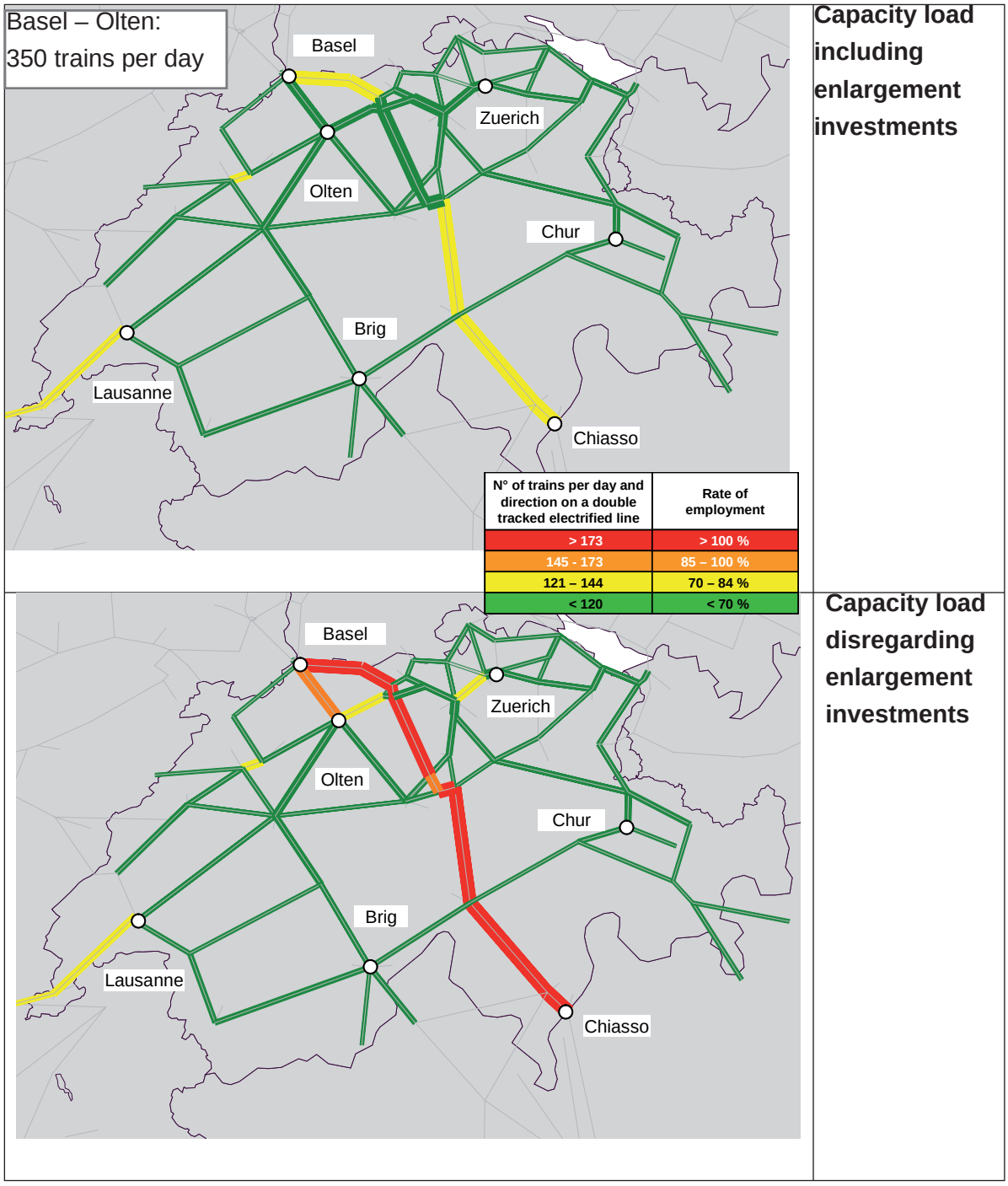
Figure 7-5: Planned investments in the Swiss network

N°	Railway line section	Remarks
	Measures between 2000 and 2005 (Bahn 2000) - already considered in the network "Capacity load disregarding enlargement investments"	
1	Mattstetten - Rothrist	New infrastructure
2	Zürich - Thalwil	New infrastructure
3	Muttenz - Liestal	New infrastructure
4	Coppet - Genève	New track (2 -> 3)
	Measures since 2005	
5	Olten - Zürich	Capacity extension
6	Zürich - Winterthur	Capacity extension
7	Basel - Olten - Luzern	Capacity extension/ New infrastructure
8	Luzern - Bern - Brig - Domodossola	Capacity extension/ New infrastructure
9	Luzern - Andermatt - Chiasso	Capacity extension/ New infrastructure

sources: SBB, European Comission (TEN)

The following **fig. 7-6** presents the superposition of the results of this work package (domestic combined trains (**cf. fig. 7-3**)) and the results of the previous “Capacity study”, where international combined trains, conventional freight trains as well as passenger trains are assigned.

Figure 7-6: Total capacity load of the rail network in Switzerland by 2015



It is obvious that the considered extension measures lead to a clear relief of capacities in the Swiss network.

As can be seen from the map above, the remaining bottlenecks on the Gotthard could be alleviated by deviating trains to the Lötschberg. Nevertheless, some capacity bottlenecks remain:

- A slight overloading still exists in the section Renens – Geneva - border (CH/F) with 130 trains per day and direction.
- Another slight overloading shows the short section Biel – Lengnau, even when considering four track sections in the Biel area.
- Also on the section Basel – Brugg there will be an overload.

7.6 Impact of combined transport development on terminal capacity: 2015

Fig. 7-7 shows the terminals in Switzerland currently under operation.

Figure 7-7: Operator and state of the operation of Suisse terminals (different sources)

	Terminal region	Terminal name	Operator
1	Aarau	Aarau CT	Hupac
2	Arbon	Arbon	ASTA AG
3	Basel	Basel Kleinhüningen Hafen / Swissterminal AG	Swissterminal AG
4	Basel	Basel Kleinhüningen Hafen / Rhenus Alpina	Basel Multi Terminal AG, Hupac
5	Basel	Basel SBB CT (Basel Wolf)	SBB Cargo, Hupac
6	Bern	Bern CT	SBB Cargo
7	Birrfeld	Birrfeld CT	Bertschi AG
8	Birsfelden	Birsfelden Hafen (Auhafen)	Swissterminal AG
9	Buchs	Buchs SG CT	SBB Cargo
10	Cadenazzo	Cadenazzo	Stisa SA
11	Chavornay	Chavornay	PESA
12	Chiasso	Chiasso CT	Hupac
13	Basel	Container Center Hafen Weil/ Rhein	Rheinhafen-Gesellschaft Weil am Rhein mbH
14	Dietikon	Dietikon	SBB Cargo
15	Embrach	Embrach Embraport CT	Zürcher Freilager AG, Güterverkehrszentrum Embraport
16	Domat/Ems	Ems Werk CT	Ems-Chemie AG

	Terminal region	Terminal name	Operator
17	Fehraltorf	Fehraltorf	Schütz AG
18	Frenkendorf	Frenkendorf-Füllinsdof	Swissterminal AG
19	Genève	Genève CT	CTG-AMT
20	Landquart	Landquart	SBB Cargo
21	Langenthal	Langenthal	SBB Cargo
22	Lugano	Lugano-Vedeggio CT	SBB
23	Luzern	Luzern CT	SBB Cargo; will be closed
24	Martigny	Martigny-Bourg CT	Port-franc de Martigny
25	Rekingen	Hochrhein Terminal	Hochrhein Terminal AG
26	Stabio	Mendrisio	Magazzini Generali con Punto Franco SA
27	Niederglatt	Niederglatt CT	Swissterminal AG
28	Renens VD	Renens VD CT	SBB Cargo
29	Rothrist	Rothrist	Giezendanner Transport AG
30	Schaffhausen	Schaffhausen	SBB Cargo
31	Sion	Sion	SBB Cargo
32	Solothurn	Solothurn	SBB Cargo
33	Basel	Ubf Basel Weil am Rhein	DUSS
34	Visp	Visp	Bertschi AG Dürrenäsch
35	Wil SG	Will SG	SBB Cargo
36	Wiler	Wilder Cargodrome	Wiler Terminal + Logistik AG
37	Zürich	Zürich HB CT	TERZAG, Terminal AG

It should be clearly pointed out that most of the terminals presented in the table above are very small „terminals“ where only small volumes are transshipped, e.g. 2-3 wagons per day. Sidings, where exclusively horizontal transshipment techniques take place are not listed in the table above.

In the terminals mentioned below at least 30,000 transshipments per year take place.

- Basel Kleinhüningen
- Basel SBB CT
- Aarau
- Rothrist
- Birrfeld
- Rekingen
- Niederglatt
- Zürich
- Bern/Wiler
- Genève
- Lugano-Vedeggio
- Chiasso

In addition to these terminals, one has to mention terminals located in the border area to Switzerland as Basel/Weil (DE/CH), Singen (DE) and Wolfurt (AT). These belong to the “bigger” terminals with more than 30.000 load units per year.

The following investments in new terminals are planned for the next years:

- The terminal **Basel Eurohub** will be operated by SBB Cargo and will replace the terminal Basel SBB CT (Basel-Wolf). The planned layout of the terminal foresees 9 tracks, whereof 3 tracks under 2 gantry cranes. The maximum track length will amount to 700 m.
- Also in Zurich a new terminal is planned. Since currently serious discussions about environmental impacts were held, the start of operation is not foreseeable.

As the terminal operators made only few declarations concerning volumes of transshipments and terminal capacities, the creation of a complete overview on handling capacities, handling volume and use of capacity is not possible. For single terminals the necessary data were allocated. But as they cannot be aggregated to terminal regions, a direct correlation between the data and the terminals would be possible. Thus, the publication of the data is not yet possible for reasons of secrecy.

According to general declarations of terminal operators, the following can be noted on capacity bottlenecks in Swiss terminals:

- The terminals in the regions Basel and Zurich (including Niederglatt) have reached their capacity limits.
- Because of congestion of the terminal region Zurich, a deviation of traffics to Rekingen occurs.
- The construction of the new terminal Eurohub in Basel will relieve the capacity situation in this terminal region.
- The designated construction of the terminal Zurich would enable the urgently needed extension of capacities in this region.

8 Conclusions

The present study has analyzed the current state of domestic unaccompanied combined rail/road traffic in six countries – Austria, Belgium, France, Germany, Italy and Switzerland – and evaluated the evolution of these markets by the year 2015. The expectations on the total 2015 volume of unaccompanied combined transport in the countries involved has been derived by taking into account the prognoses of international combined transport for 2015 elaborated by the 2004 “Capacity Study” and most recent developments.

The expected volume has been translated into intermodal services and trains, which were allocated to the respective rail network in Europe. Based on this calculation the impact of combined transport on rail infrastructure was analyzed and potential network bottlenecks and enlargement investment needs revealed, which might arise in the period to 2015. Finally the study evaluated the capacity requirements and investment enlargement needs for intermodal terminals. The outcome of these investigations and the conclusions that can be drawn from them are summarized in this chapter.

8.1 Evolution of domestic combined transport: 2005/2015

The current volume of domestic combined transport varies considerably in the six countries involved in the survey. In 2005, it ranged from 3.1 million tonnes, in Austria, to 19.1 million tonnes, in Germany (cf. **Fig. 8-1**). About 63 per cent of the consolidated domestic intermodal volume has been generated by the carriage of maritime containers on hinterland services, 37 per cent in continental intermodal traffic (cf. **Fig. 8-2**). Here, basically, two categories of domestic intermodal markets can be distinguished. In four countries - Belgium, Germany, Italy and Switzerland - container hinterland traffic clearly dominated in 2005 and held a market share of about 65 to 75 per cent. Only in Austria and France continental intermodal services slightly prevailed over hinterland traffic. However, it needs to be emphasized that, as a matter of fact, domestic container hinterland traffic in countries without a direct sea access, i.e. Austria and Switzerland, completely consisted of the domestic on-carriage of containers previously conveyed on international rail services, and vice versa.

Figure 8-1: Domestic combined transport volume by country and CT market segment: 2005/2015

Country	Continental (mill gross tonnes)		Container hinterland (mill gross tonnes)		Total domestic CT (mill gross tonnes)		% change 2015/2006
	2005	2015	2005	2015	2005	2015	
Austria	1.80	2.57	1.32	2.28	3.12	4.85	55.4%
Belgium	1.50	2.10	4.90	11.10	6.40	13.20	106.3%
France	2.46	5.60	2.17	4.66	4.63	10.26	121.6%
Germany	7.00	12.62	12.11	29.09	19.11	41.71	118.3%
Italy	4.50	8.80	8.33	17.85	12.83	26.65	107.7%
Switzerland	1.59	1.84	2.88	4.32	4.47	6.16	37.8%
All countries	**18.85**	**33.53**	**31.71**	**69.30**	**50.56**	**102.83**	**103.4%**

Source: KombiConsult and K+P Transport Consultants analysis

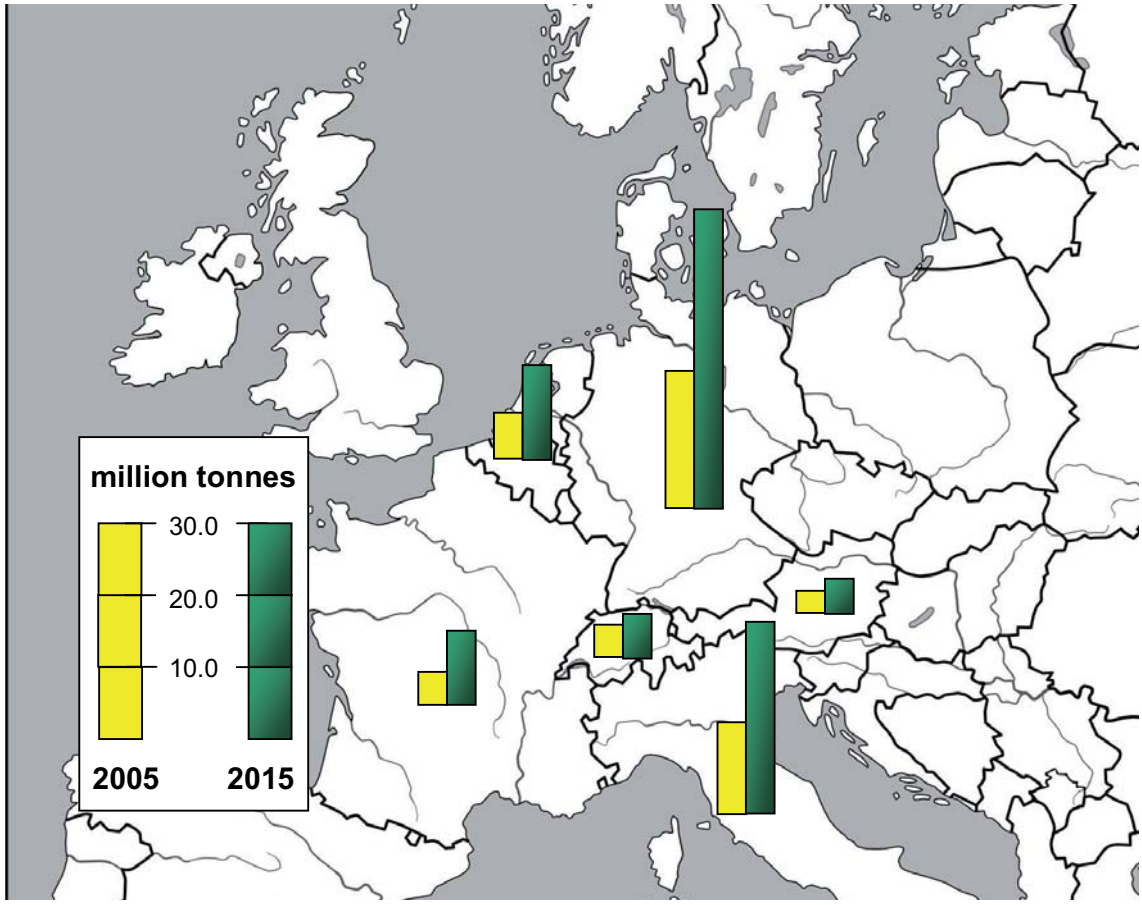
Figure 8-2: Percentage shares of continental and container hinterland combined transport of total volume (in gross tonnes): 2005/2015

Country	Continental CT		Container hinterland CT	
	2005	2015	2005	2015
Austria	57.7%	53.0%	42.3%	47.0%
Belgium	23.4%	15.9%	76.6%	84.1%
France	53.1%	54.6%	46.9%	45.4%
Germany	36.6%	30.3%	63.4%	69.7%
Italy	35.1%	33.0%	64.9%	67.0%
Switzerland	35.6%	29.9%	64.4%	70.1%
All countries	**37.3%**	**32.6%**	**62.7%**	**67.4%**

Source: KombiConsult and K+P Transport Consultants analysis

Among the sample of countries surveyed Germany and Italy had by far the largest domestic intermodal markets in 2005 with 19.1 and 12.8 million tonnes of goods carried. According to our in-depth analysis this position will be reinforced within the next ten years, the volumes raised to approximately 42 and 27 million tonnes respectively (cf. **Fig. 8-1 & 8-3**). The total domestic unaccompanied combined transport in the six countries involved is likely to more than double by 2015 from 50 to 103 million gross tonnes. Depending on the country the increase varies from about 38 to 122 per cent (cf. **Fig. 8-1**).

Figure 8-3: Total domestic combined transport volume by country: 2005/2015



Source: KombiConsult and K+P Transport Consultants analysis

Generally it is expected that, owing to the more than proportionate evolution of the world-wide container traffic resulting in a soaring volume of containers in the leading European seaports, container hinterland traffic will evolve considerably more dynamic than the continental domestic market. Against this background the annual growth rate of hinterland traffic in the period from 2005 to 2015 is estimated to average 8.2 per cent whereas the domestic continental combined transport, in the same period, will improve by an average annual rate of 6.0 per cent (cf. **Fig. 8-4**). Therefore hinterland transport is due to gain an additional 4.7 percentage points of the share of the domestic intermodal market in the six countries involved in the survey (cf. **Fig. 8-2**). Only in France continental services are expected to grow faster than container hinterland traffic.

Figure 8-4: Mean annual growth rates of domestic combined transport by country and market segment: 2015/2005

Country	Continental CT	Container hinterland CT	Total domestic CT
Austria	3.6%	5.6%	4.6%
Belgium	3.4%	8.5%	7.5%
France	8.6%	7.9%	8.3%
Germany	6.1%	9.2%	8.1%
Italy	6.9%	7.9%	7.6%
Switzerland	1.5%	4.1%	3.3%
All countries	**6.0%**	**8.2%**	**7.4%**

Source: KombiConsult analysis

8.2 Main impact factors on evolution of domestic combined transport

The assessment of development trends for domestic unaccompanied combined transport by 2015 revealed some general key impact factors on the evolution of this market across the six countries involved in the survey. We have categorized these influences as follows:

- internal factors: they are defined as characteristics of the supply and competitiveness of combined transport that can largely be determined by the intermodal industry itself that is intermodal operators and railway undertakings;
- external factors: they are defined as impacts on combined transport that cannot be directly influenced by the intermodal industry.

The most effective factors of influence recognized during the investigations are presented in **Fig. 8-5** together with an indication of the direction and the strength of the impact on the distinct markets of domestic combined traffic as follows:

+++	=	extraordinary positive effect
++	=	very positive effect
+++	=	slight positive effect
-	=	slight negative effect
--	=	very negative effect
---	=	extraordinary negative effect

Figure 8-5: Influencing factors on evolution of domestic combined transport

	Influencing factor	Impact on domestic combined transport	
		Continental	Container hinterland
Internal	Shuttle and high-frequency rail production	++	+++
	Enforcement of hub rail production systems to serve less-than-trainload routes	+++	+
	Reinforcement of gateway concept to achieve synergies between domestic and international combined transports services	++	+
	Road-competitive performance of intermodal services	+++	++
	Moderate price level and consistent pricing policy	+++	++
	Improved capacity management of services	+++	+
	Design of innovative intermodal services and technologies to capture new goods markets (parcel services, groupage or temperature-controlled cargo)	+	
	Increased level of competition in rail traction services	++	++
	Supply of appropriate and sufficient rolling stock	++	++
	Establishment of "backyard ports"		++
	Set-up and/or enlargement of intermodal terminals	++	++
External	Growth of world trade and level of containerization	+	+++
	Reinforcement of European division of labour	-	-
	Growth of domestic economy (private consumption, investment)	+	++
	Increase of long-distance domestic freight traffic	+	
	Competition between ports influencing sea-side container throughput of national sea ports		+ / -
	Enlargement investments in sea port facilities, good performance of operations		+++
	Congested sea-side port facilities and port-related rail infrastructure		--
	Congested hinterland rail connections		--
	Saturated rail infrastructure network	---	---
	Restrictions of rail infrastructure such as maximum weight, length or loading gauge	---	-
	Extension of hinterland catchment area of container ports		+
	Increase of fuel cost in road transport	+	+
	Regulation on truck drivers' resting and driving hours and enforcement of "black box" speedometer	+++	++
	Price competition with road and barge	+	+
	Beneficial legal framework		
	grants for start-up of services	+	+
	grants for terminal investment projects	+++	+
	increased vehicle gross weight	++	++
	tax discounts etc.	+	+

Source: KombiConsult analysis

8.3 Importance of 6 countries for domestic combined transport in Europe

According to our recent survey on the state of the European intermodal industry, which -carried out in the framework of the DIOMIS project - has been edited as “Report on Combined Transport in Europe 2005”, domestic unaccompanied combined transport in Europe amounted to approximately 72 million tonnes in the year 2005. Hence the six examined countries made up about 70 per cent of this volume. They even covered 90 per cent of the overall domestic continental tonnage in Europe, in 2005, while their share of the container hinterland market was some 62 per cent (cf. **Fig. 8-6**).

The present study has evaluated the future trends of domestic combined transport in these countries resulting in an expectation of a total volume of 102.83 million tonnes in the year 2015. If we assumed that the share of the six countries of domestic combined transport in Europe would remain at 70 per cent the total market would rise to about 145 million tonnes by 2015.

Figure 8-6: Share of six countries of total domestic combined transport volume in Europe by CT market segment: 2005

Country	Million gross tonnes: 2005		
	Continental CT	Container hinterland CT	Total domestic CT
Austria	1.80	1.32	3.12
Belgium	1.50	4.90	6.40
France	2.46	2.17	4.63
Germany	7.00	12.11	19.11
Italy	4.50	8.33	12.83
Switzerland	1.59	2.88	4.47
All countries	**18.85**	**31.71**	**50.56**
Total Europe	20.84	50.90	71.74
Share of 6 countries	**90.5%**	**62.3%**	**70.5%**

Source: KombiConsult and K+P Transport Consultants analysis

8.4 Importance of domestic market for combined transport: 2005/2015

In addition to the in-depth investigation into domestic intermodal traffic the present study has also evaluated the evolution of international combined transport in the countries involved. For this purpose, first of all, statistical data on the 2005 volumes have been collected and edited in a transparent way. Secondly, the corridor-related prognoses of international combined transport for the time-horizon 2015 elaborated by the 2004 “Capacity Study” have been allocated to the countries in the survey. These results, finally, were evaluated against the background of recent developments and additional information on improvements of or impediments to international combined transport services, and adjusted if necessary.

Based on these findings the volumes of unaccompanied combined transport by the year 2015 could comprehensively be derived for each country and intermodal market segment (cf. **Fig. 8-7 & Fig. 8-8**).

Figure 8-7: Total unaccompanied combined transport volume by country and market segment: 2005/2015

Country	Domestic CT (mill tonnes)		International CT (mill tonnes)		Transit CT (mill tonnes)		Total CT (mill tonnes)		% change 2015/2005
	2005	2015	2005	2015	2005	2015	2005	2015	
Austria	3.12	4.85	6.43	14.79	7.92	17.32	17.47	36.96	111.6%
Belgium	6.40	13.20	10.07	22.97	0	1.52	16.47	37.69	128.8%
France [1)]	4.63	10.26	2.76	10.32	5.62	20.42	13.01	41.00	215.1%
Germany	19.11	41.71	23.94	56.14	7.5	16.19	50.55	114.04	125.6%
Italy	12.83	26.65	24.3	53.22	0	0	37.13	79.87	115.1%
Switzerland [2)]	4.47	6.16	3.65	6.02	15.63	34.39	23.75	46.57	96.1%
All countries	*50.56*	*102.83*	*71.15*	*163.46*	*36.67*	*89.84*	*158.38*	*356.13*	*124.9%*

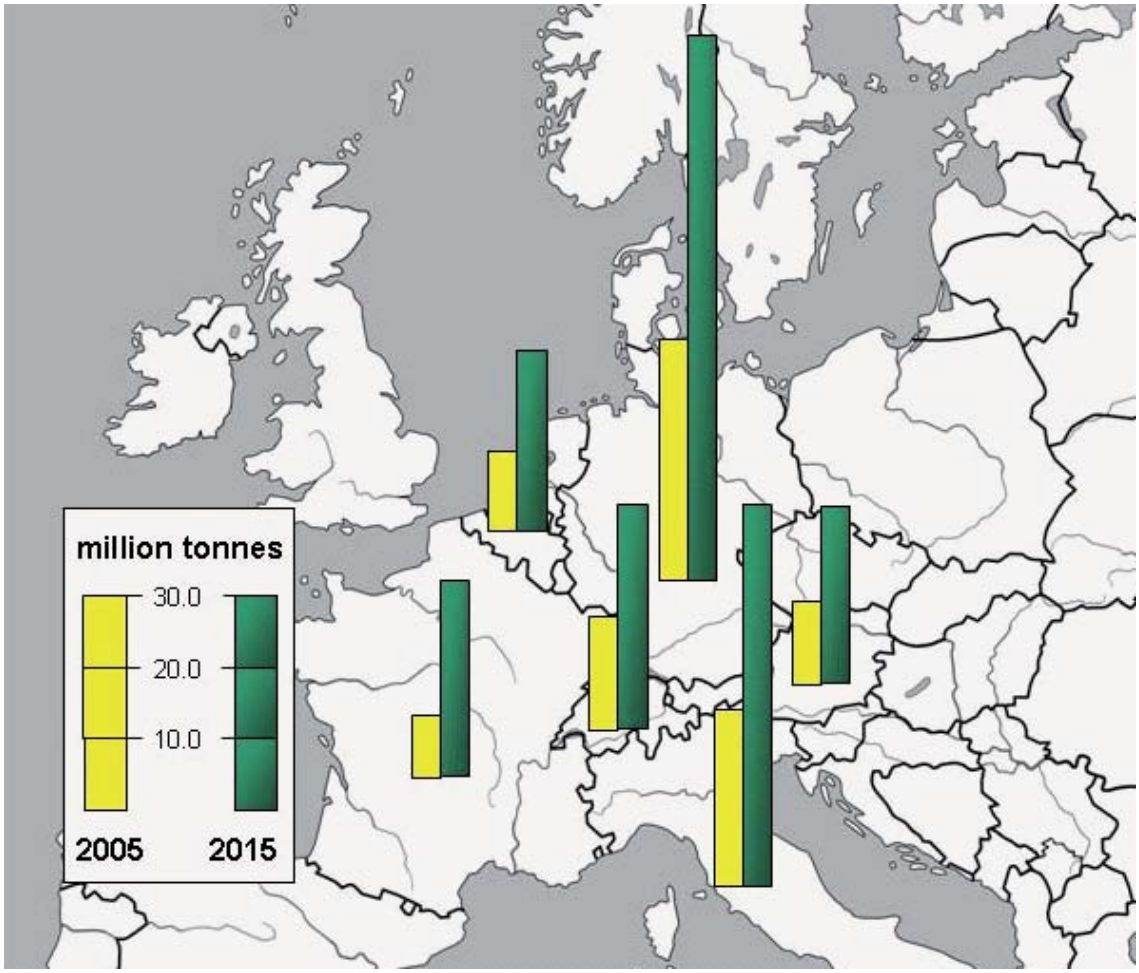
1) 2005 international and transit CT figures only include transport via the Alps and the Pyrenees.

2) 2005 figures calculated on base of agreements between BAV and CT operators.

Source: KombiConsult and K+P Transport Consultants analysis

The growth rates of bilateral international combined transport in Austria, Belgium, Germany and Italy are largely in the same range of 120 to 135 per cent for the period 2005-2015 whereas a significantly higher (+ 270 per cent) or lower (+ 65 per cent) increase of the intermodal tonnage has been calculated for France and Switzerland. In total the volume of international combined transport of the six countries is estimated to rise by almost 130 per cent from 71 to 163 million tonnes in 2015. This result, however, needs to be qualified since it includes double counts so far as bilateral shipments between the examined countries are concerned. This qualification also applies to the transit traffic.

Figure 8-8: Total unaccompanied combined transport volume by country: 2005/2015



Source: KombiConsult and K+P Transport Consultants analysis

This would result in a total volume of unaccompanied combined transport of 357 million tonnes by 2015 up 126 per cent from 158 million tonnes in 2005. The strongest growth with more than a trebling of the tonnage is expected for France. Despite of that, by 2015 Germany and Italy would clearly remain the most important intermodal markets in our sample of countries with a scope of 114 and 80 million tonnes respectively.

Fig. 8-9 presents the percentage shares of the domestic traffic of the total intermodal transport volume per country. It proves that, despite the ongoing globalization of trade this market segment has a large importance for combined transport. Curiously, the proportion of the intermodal tonnage carried on domestic services was almost equal at around 35 per cent in four countries in the year 2005. This rather high percentage could have been expected for France, Germany and Italy with their rather large territories and long distances. Yet it comes as a surprise that, in Belgium, domestic intermodal transport scored the highest share with approximately 40 per cent. This result is due to the large amount of inland container flows from and to Antwerp, the third largest container port in Europe. In contrast to that domestic combined transport is less significant in Austria and Switzerland since the countries don't provide for a direct seaport access and freight transport distances generally are rather short to supply competitive continental intermodal services.

Figure 8-9: Percentage of domestic combined transport of total volume (related to gross tonnage) by country: 2005/2015

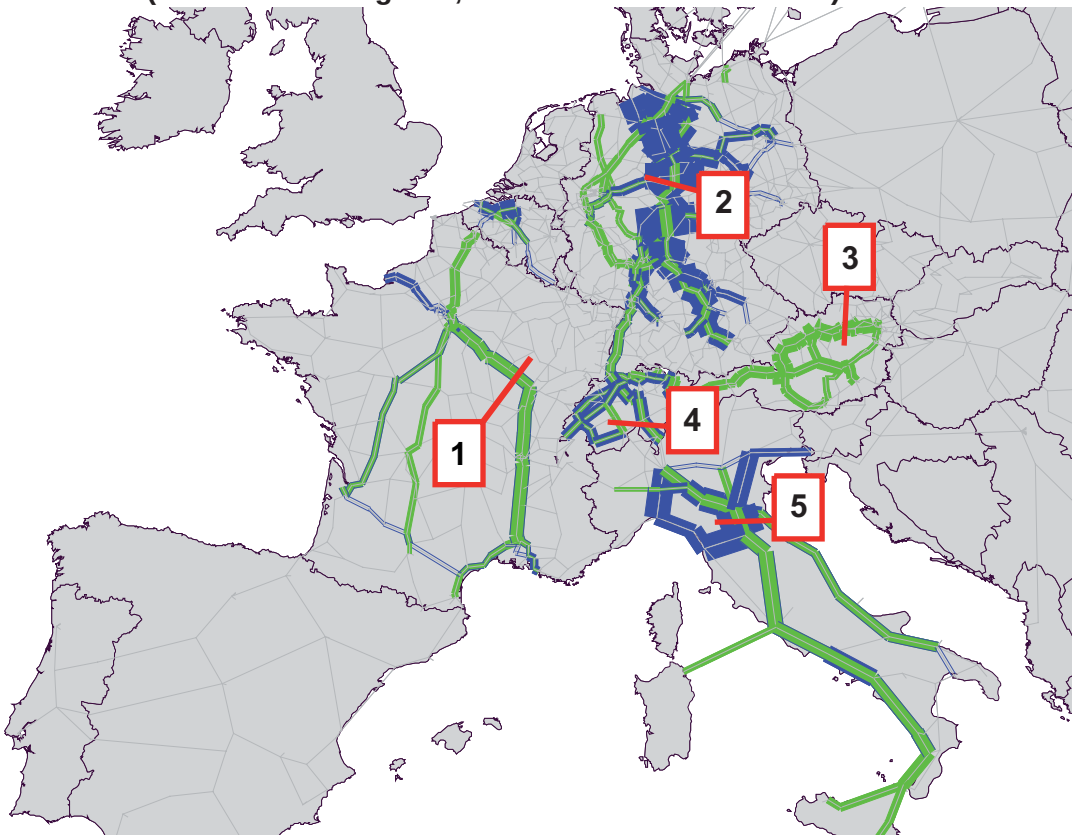
Country	Percentage of total unaccompanied CT		2015/2005 change of ratio
	2005	2015	
Austria	17.9%	13.1%	-26.5%
Belgium	38.9%	35.0%	-9.9%
France	35.6%	25.0%	-29.7%
Germany	37.8%	36.6%	-3.3%
Italy	34.6%	33.4%	-3.4%
Switzerland	18.8%	13.2%	-29.7%
All countries	*31.9%*	*28.9%*	*-9.6%*

Source: KombiConsult and K+P Transport Consultants analysis

8.5 Impact of combined transport development on rail network capacity

The following two maps visualise the capacity load of rail network caused by domestic combined transport in the six countries selected for the survey and for each of the two intermodal market segments: **Fig. 8-10** represents the situation in the year 2005 and **Fig. 8-11** the expected capacity load by 2015.

Figure 8-10: Capacity load of rail network caused by domestic combined transport in selected countries by market segment (continental CT: green, container hinterland: blue): mean number of daily trains 2005

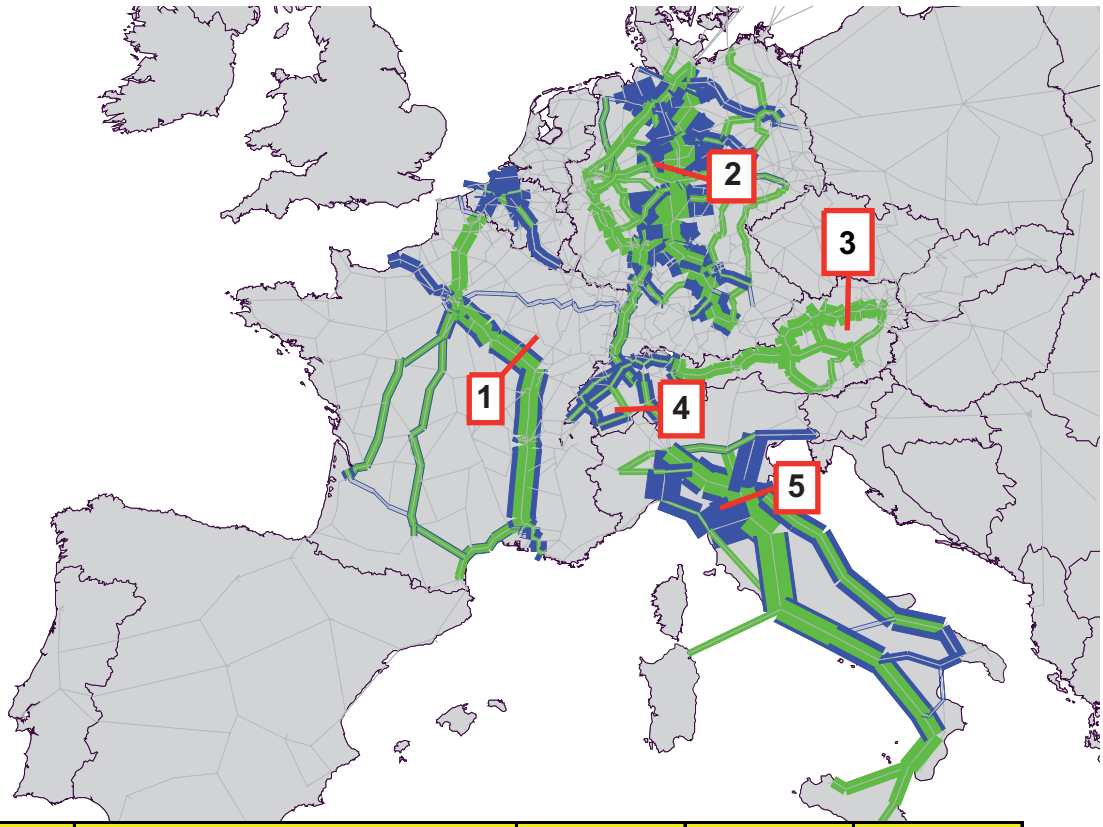


Source: KombiConsult and K+P Transport Consultants analysis

The dominance of domestic container hinterland traffic, in Germany, on the main north-south rail corridor, in Belgium on the routes between Antwerpen and Zeebrugge and

southern Belgium, and in northern Italy between the three Tyrrhenian ports and the four main inland destinations is obvious both in the year 2005 and 2015. Continental combined transport is also highly concentrated on north-south corridors in Italy and France whereas this type of traffic shows a more wide-spread distribution over the rail network in Germany. **Fig. 8-11**, too, includes a couple of cross sections of the rail network to illustrate how the capacity load caused by combined transport is expected to develop.

Figure 8-11: Capacity load of rail network caused by domestic combined transport in selected countries by market segment (continental CT: green, container hinterland: blue): mean number of daily trains 2015



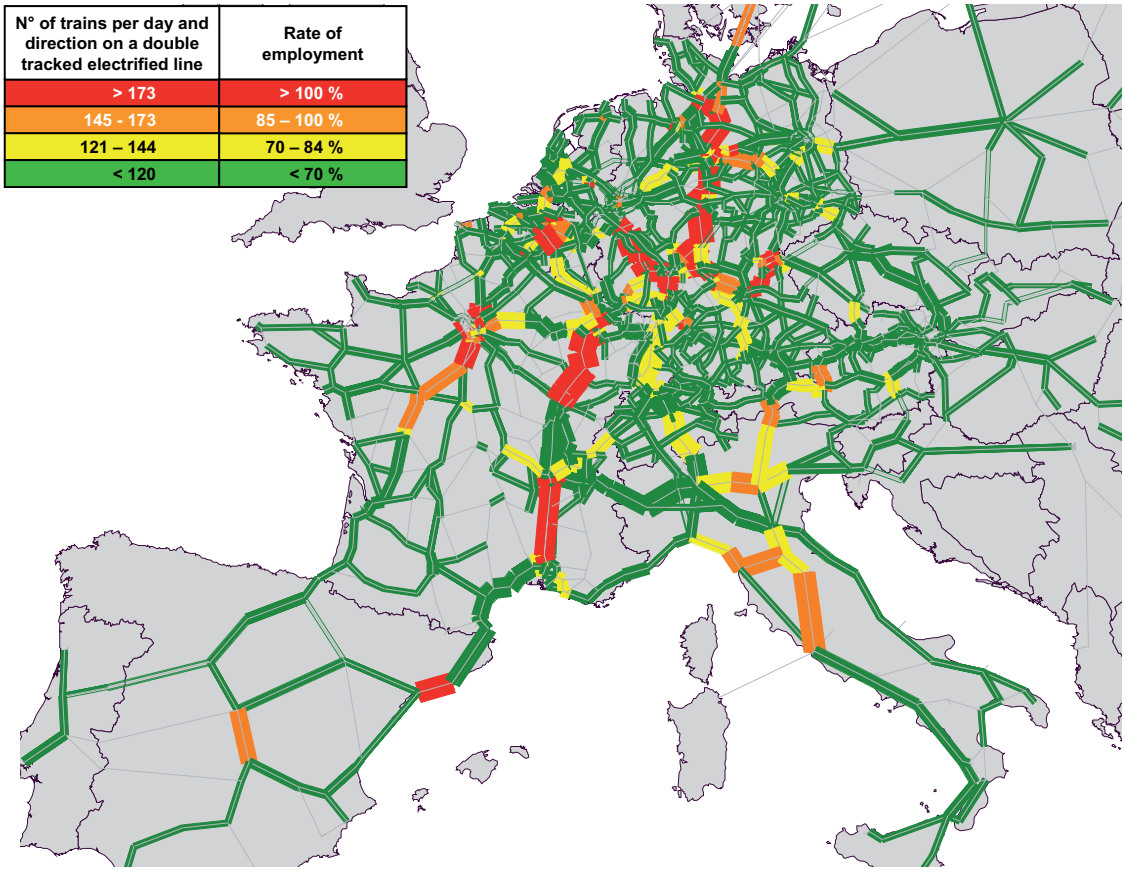
Cross section		Domestic trains 2005	Domestic trains 2015	Percentage change
1	Paris - Dijon	22	44	+ 100,0 %
2	Hannover - Göttingen	108	158	+ 46,3 %
3	Sankt Pölten - Wien	16	24	+ 50,0 %
4	Arth-Goldau/Spiez - Andermatt/Brig	21	24	+ 14,3 %
5	Bologna - Firenze	69	119	+ 72,5 %

Source: KombiConsult and K+P Transport Consultants analysis

What can be taken from both maps is that domestic traffic is concentrated on a few European key corridors. This increases the risk of capacity bottlenecks on these links and will influence also the development of international and transit transport on these routes.

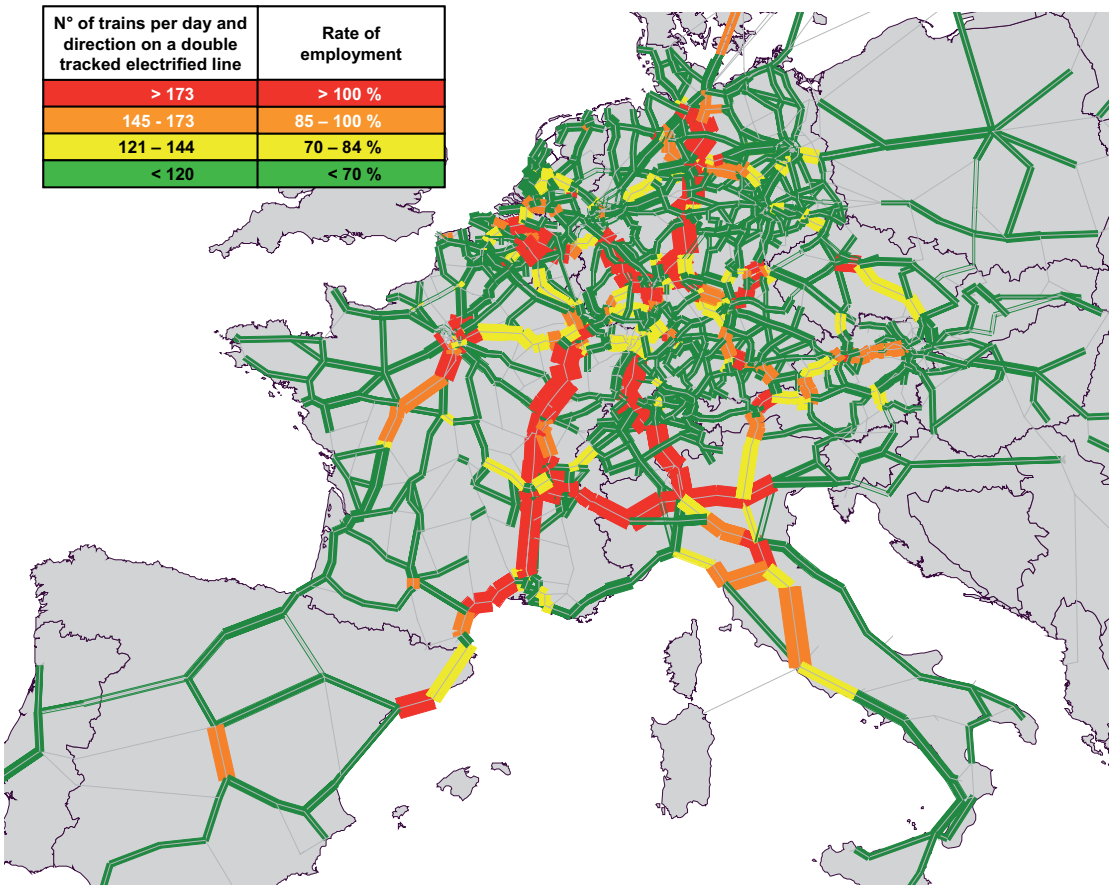
In a next step the forecasted volumes of domestic and international combined transport including the results of the 2004 “Capacity Study”, conventional rail freight and passenger traffic for the horizon 2015 were assigned to the rail network. **Fig. 8-12** presents the capacity load under the assumption that all planned enlargements investments will be completed and under operation by 2015 whilst **Fig. 8-13** contains the results of this capacity analysis disregarding enlargement investments.

Figure 8-12: Capacity load of European rail network including envisaged enlargement investments: mean number of daily trains 2015



Source: KombiConsult and K+P Transport Consultants analysis

Figure 8-13: Capacity load of European rail network: disregarding envisaged enlargement investments: mean number of daily trains 2015



Source: KombiConsult and K+P Transport Consultants analysis

Fig. 8-14 lists those rail sections that, in 2015, would be loaded by 145 and more daily trains per direction corresponding to a mean capacity employment of at least 85 per cent (sections marked red or orange). This has to be seen under the optimistic assumption that every planned investment will be under operation and an overall growth of productivity of 20% will be reached by 2015. It is assumed that this increase of productivity will be attained amongst others by more sophisticated production schemes and improvements of signalling and operational systems (e.g. reduction of block distances). More details can be found in the DIOMIS Report on “Improving the use of the available train length”.

Some bottlenecks, however, may be alleviated to a certain extent by diverting traffic via parallel routes. Nevertheless it must be said that, due to technical limits such as loading gauges, capacity restrictions at junctions that may occur diversions to alternative routes could only bear a certain amount of additional traffic.

Thus it becomes evident that even if all planned enlargement investments were implemented by 2015 numerous and severe capacity bottlenecks would remain. Since most of them concern key sections of the European rail network they would truly become “Achilles’ heels” for combined transport and rail traffic in general. This would have serious consequences, since all flows crossing these sections will be affected by the capacity problems. Consequently, a bottleneck for example in the area of Basel could then affect various Pan-European flows between Northern Europe and Italy, the Benelux and Italy etc.

Figure 8-14: Remaining capacity bottlenecks after all planned enlargement investments will be under operation by 2015

Country	Section	Capacity load
AT	Bischofshofen – Schwarzach St.Veit	85 – 100 %
AT/IT	Innsbruck - Fortezza	85 – 100 %
BE	Antwerpen –Mechelen - Landen	85 - > 100%
BE	Bruxelles – Halle	> 100%
BE	Gent - Deinze	85 – 100 %
DE	Hamburg – Hildesheim – Kassel – Fulda – Darmstadt	85 - > 100%
DE	Köln – Bingen - Mainz –Karlsruhe	> 100%
DE	Hamburg – Bremen	85 - > 100%
DE	Essen - Mühlheim	85 – 100 %
DE	Neuwied - Koblenz	> 100 %
DE	Ludwigshafen– Schifferstadt (Neustadt/Weinstraße)	> 100 %
DE	Rohrbach – Saarbrücken	85 – 100 %
DE	Hamburg - Buchholz	> 100 %
DE	Gemuenden (Fulda) - Würzburg	> 100 %
DE	Öbisfelde – Wolfsburg	> 100 %
DE	Hannover - Braunschweig – Magdeburg - Biederitz	85 - > 100%
DE	Aschaffenburg – Würzburg – Nürnberg – Marktredwitz (Bayreuth)	85 - > 100%
DE	Mühlacker (Pforzheim) -Vaihingen	> 100 %
ES	Barcelona - Tarragona	> 100%
ES	Madrid – Alcazar de San Juan	85 – 100 %
FR	Aulnoye-Aymeries - Berlaimont	> 100 %
FR	Creil – Stains (Paris)	> 100 %
FR	Meaux-Vaires Torcy	85 – 100 %
FR	Lyon – Avignon (right bank of the river Rhone)	> 100 %
FR	Longuyon - Conflans	85 – 100 %
FR	Conflans – Frouard (Nancy)	85 - > 100%
FR	Frouard (Nancy) -Dijon	> 100 %
IT	Verona - Brescia	85 – 100 %
NL/BE	Rotterdam – Antwerpen - Bruxelles - Namur	85 - > 100%

Source: KombiConsult and K+P Transport Consultants analysis

8.6 Impact of combined transport development on terminal capacity

The impact of the estimated evolution of total unaccompanied combined rail/road transport including both domestic and international traffic on the terminal handling capacity in the countries involved in the survey has been derived in four methodological steps:

- Analysis of current intermodal terminal handling capacity (2005)
- Calculation of the required terminal handling capacity by the year 2015 based on the detailed transport programmes for individual combined transport market segments
- Analysis of enlargement investment schedules in the period 2005-2015
- Calculation of the additional capacity enlargement need

The overall aggregated results of these investigations for Austria, Belgium, France, Germany, Italy and Switzerland, disregarding the regional distribution of terminals and capacity requirements, are presented in **Fig. 8-15**.

Figure 8-15: Total unaccompanied combined rail/road transport in 6 countries: terminal handling capacity 2005/2015

Countries (n° of terminals			Terminal handling capacity (in loading units p.a.)				
			2005	2015			
			Existing	Enlargement planned	Total planned	Required	Enlargement need
Austria		16	1,404,000	510,000	1,914,000	1,789,000	65,000
Belgium	*)	13	1,290,000	403,000	1,693,000	1,089,000	428,000
France	*)	20	1,658,000	112,000	1,770,000	1,616,650	301,230
Germany		58	4,419,000	830,000	5,249,000	7,139,000	2,006,000
Italy		43	3,165,000	1,230,000	4,395,000	5,372,000	977,000
Switzerland	*)	8	284,000	265,000	549,000	n.a.	n.a.
Total		**158**	**12,220,000**	**3,350,000**	**15,570,000**	***17,005,650***	***3,777,230***

*) Subtotals aggregated from available terminal data included in country section.

Source: KombiConsult analysis, K+P Transport Consultants

Since the country reports on Belgium, France and Switzerland did not provide a comprehensive list of detailed information for all terminals the subtotals are not comparable to the other countries. Nevertheless a total of the available data has been calculated. The largest terminal handling capacity by 2015 is required in Germany and Italy. In spite of the extensive planned enlargements in these countries an additional annual handling capacity need for more than 2 million loading units in Germany and almost 1 million loading units in Italian terminals is required in order to ensure the anticipated growth of total combined transport. The enlargement schedules in Austria widely do correspond to the required volumes although an additional annual handling capacity need for about 65,000 loading units has been calculated.

Fig. 8-16 lists those 30 transport areas in the six countries selected, which will rank top in 2015 as regards the expected intermodal transhipment volume concerning all segments of unaccompanied combined rail/road transport. According to the country analysis the ten largest transport areas will be the “mega area” Milano/Novara, Verona, Oberösterreich (Wels/Linz/Enns), Köln, Mannheim/Ludwigshafen, München, Duisburg, Bologna, Paris and Nürnberg.

Although, in these top 30 transport areas, enlargement investments are already scheduled totalling an annual handling capacity of 2.1 million loading units, our analysis has given evidence that a further capacity enlargement need of about 2.7 million loading units is required to make sure that the expected transport volume could be served appropriately.

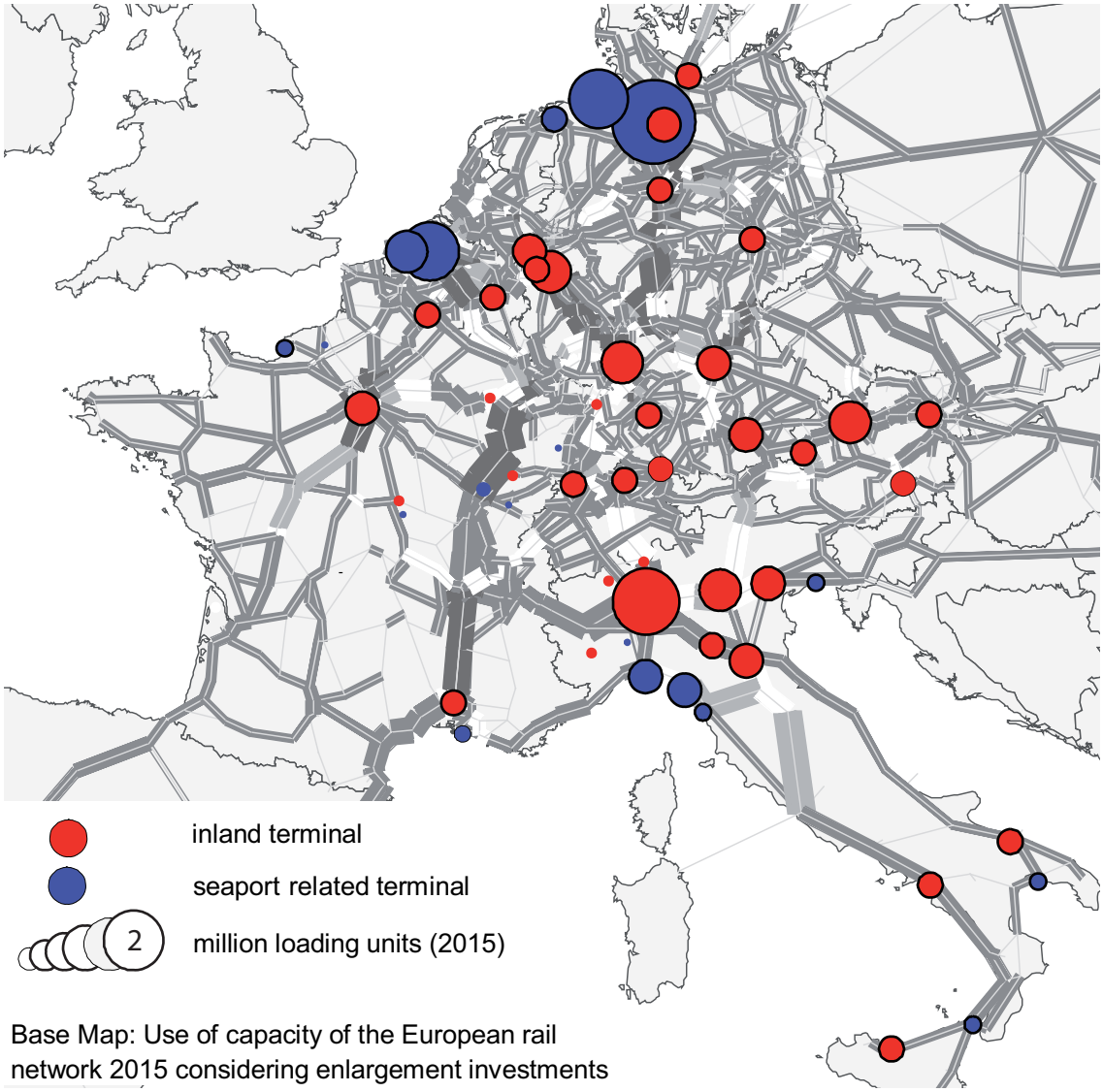
Fig. 8-17 illustrates the required terminal handling capacity by the year 2015 both of the top 30 “dry“ inland transport areas and of rail-side intermodal handling facilities related to the most important container ports in the countries involved in the present survey.

Figure 8-16: Total unaccompanied combined rail/road transport in 6 countries: terminal handling capacity of top 30 transport areas 2005/2015

Transport Area (n° of terminals			Terminal handling capacity (in loading units p.a.)				
			2005	2015			
			Existing	Enlargement planned	Total planned	Required	Enlargement need
Milano/Novara	IT	12	1,316,000	597,000	1,913,000	2,157,000	244,000
Verona	IT	5	441,000	464,000	905,000	905,000	
Oberösterreich	AT	4	617,000	50,000	667,000	679,000	12,000
Köln	DE	3	545,000	30,000	575,000	672,000	97,000
Mannh./Ludwigshafen	DE	4	450,000		450,000	662,000	212,000
München	DE	1	220,000	100,000	320,000	590,000	270,000
Duisburg	DE	3	320,000	90,000	410,000	548,000	138,000
Bologna	IT	1	220,000	15,000	235,000	501,000	266,000
Paris	FR	4	328,000		328,000	422,000	94,000
Nürnberg	DE	3	288,000	50,000	338,000	407,000	69,000
Padova	IT	1	141,000		141,000	406,000	265,000
Hamburg (continent.)	DE	1	195,000	55,000	250,000	381,000	131,000
Wien	AT	2	176,000	213,000	389,000	344,000	
Hannover	DE	3	62,000		62,000	331,000	269,000
Stuttgart	DE	2	140,000	140,000	280,000	294,000	14,000
Leipzig	DE	1	120,000	120,000	240,000	268,000	28,000
Modena	IT	4	255,000		255,000	255,000	
Bari	IT	2	98,000	11,000	109,000	246,000	137,000
Steiermark	AT	3	190,000	37,000	227,000	242,000	15,000
Muizen	BE	2	110,000		110,000	224,000	114,000
Basel	DE	1	155,000	35,000	190,000	219,000	29,000
Lille	FR	1	200,000		200,000	218,800	18,800
Sicilia	IT	4	174,000		174,000	217,000	43,000
Napoli	IT	3	212,000		212,000	212,000	
Lübeck	DE	2	142,000		142,000	208,000	66,000
Neuss	DE	1	140,000		140,000	200,000	60,000
Salzburg	AT	1	125,000	75,000	200,000	190,000	
Singen	DE	1	156,000		156,000	175,000	19,000
Avignon	FR	1	112,000		112,000	172,800	60,800
Ulm	DE	1	100,000	50,000	150,000	168,000	18,000
Subtotal		**77**	**7,748,000**	**2,132,000**	**9,880,000**	**12,514,600**	**2,689,600**

Source: KombiConsult analysis

Figure 8-17: Required intermodal terminal handling capacity in 6 countries: top-30 inland transport areas and major seaports 2015



Source: KombiConsult analysis

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Editorial note

On behalf of the Union Internationale des Chemins de fer (UIC) the present study has jointly been carried out by the consultancies KombiConsult GmbH, Frankfurt am Main, and K+P Transport Consultants, Freiburg im Breisgau. The authors of the individual country reports are as follows:

KombiConsult GmbH: Rainer Mertel, Klaus-Uwe Sondermann, Kai Petri

for Austria, Germany, and Italy.

K+P Transport Consultants: Hans-Paul Kienzler, Steffen Bitter

for Belgium, France, and Switzerland.

ETF

EDITIONS TECHNIQUES FERROVIAIRES

RAILWAY TECHNICAL PUBLICATIONS - EISENBAHNTECHNISCHE PUBLIKATIONEN

16, rue Jean Rey - F 75015 PARIS

http://www.uic.asso.fr/etf/

Printed by

Xerox Global Services France

16, rue Jean Rey 75015 Paris - France

Mars 2007

Dépôt légal Mars 2007

ISBN 2-7461-1277-9 (English version)