SERVRAIL

Final Report

APPENDIX B

FORECASTING THE SUPPLY, STRUCTURE AND DEMAND FOR RAIL RELATED SERVICES FOR THE YEARS 2010 AND 2015

Contents **Page**

1. INTRODUCTION

1.1 This workstream required the analysis of the demand and supply for the rail related services for the years 2010 and 2015. Our approach to this workstream was to take the information we have gathered through the initial data collection exercise and forecasting the projected levels of demand and supply.

1.2 Baseline of the demand forecasts was to be the expected market performance of three market segments: rail freight, long-distance passenger services and local/regional passenger services. These were to be taken from the most recent ProgTrans European Transport Report that forecasts demand in terms of tonne-kilometres for freight and passenger-kilometres for passengers. This report covers all present EU Member States as well as Norway, Switzerland, Bulgaria and Romania.

1.3 The study established a chain of dependency of demand rail related services through intermediate variables and parameters (e.g. train-kilometres on the basis of average train load factors) with an appropriate segmentation. The initial methodology of how to approach individual services is set out in the table below.

1.4 The study identified the trends and the relationship between intermediate variables for the periods 2005 to 2010 and 2010 to 2015 and showed the tendencies for each service or – in a small number of cases – clusters of services in contrast to the forecast of total market performance.

1.5 The demand forecasts will be carried out at national or territorial level and subsequently aggregated for the whole EU plus the relevant non-EU countries.

1.6 On the supply side, forecasts were difficult to obtain. The basic hypothesis that was adopted was that supply would be built up in response to demand trends. A more detailed discussion on the demand and supply side patterns in terms not only of numerical forecasts but also of the access conditions and industry consultation.

TABLE 1.1 FORECASTING METHODOLOGY

Rail-related services	Freight operations	Passenger operations	
		Long-distance	Local, regional
Supply of traction current / fuels	Tkm (ETR 2004); Train-km; Share of el. train-km, Share of diesel train-km	Pkm (ETR 2004); Train-km; Share of el. train-km, Share of diesel train-km	
Services in passenger stations, their buildings and other facilities (e.g. timetable information, through-ticketing, etc.)	Not relevant	Passengers, trains	
Services in freight terminals, including security	Tkm, trains using terminals	Not relevant	Not relevant
Services in marshalling and shunting yards	Prospects of single wagon load business	Not relevant	Not relevant
Train formation services	To be determined	Not relevant	Not relevant
Services in storage sidings	Availability and use of sidings	Not relevant	Not relevant
Maintenance, inspection and cleaning of rolling stock and repair services, distinguishing between heavy and light maintenance activities	Rolling stock	Rolling stock	Rolling stock
	Annual mileage	Annual mileage	Annual mileage
	Maintenance schedule	Maintenance schedule	Maintenance schedule
Back-up services (e.g. towing away of broken down locomotives)	To be determined		
Locomotive pushing services (e.g. required in regions with high track gradients)	No. of trains in sections	Not relevant	Not relevant
Services in border stations (e.g. access to power system change devices, etc.)	Number of trains at relevant border crossings	Not relevant	Not relevant
Train driver and other training services	Distinction between training needs for domestic services and cross border services (language, operations regulations, network knowledge)	Distinction between training needs for domestic services & cross border services	Not relevant
Provision of on board train protection systems	Network-related programmes to fit successively all trains with ATP or similar devices		
Telecom and communication services (i.e. analogue/digital train coms services)	Network-related programs to install new train communication systems for all relevant train types & to provide adequate services		
Telematics services for freight operations (e.g. tracking and tracing, etc.)	Network related programmes to install telematic infrastructure, on-board devices and to provide adequate services	Not relevant	Not relevant
Computer reservation services for passenger transport	Not relevant	Development of an EU-wide integrated reservation system for all long-distance passenger trains	Not relevant
Leasing of rolling stock and staff	Train-kms of non-incumbent RUs in specific market segments: locomotives, drivers, wagons all operations		

2. METHODOLOGY

2.1 All the rail related services are somehow related to demand for rail transport with its three main components:

- Freight transport
- Long-distance passenger transport
- Local/regional passenger transport

2.2 The table in the previous chapter shows which of these components the individual services relate to.

2.3 The basis for the development of the forecasts was to be the data on rail related services in each of the countries represented in each of the chosen clusters. The data return from questionnaires and interviews was for most countries incomplete and for a number of them poor. Consequently, we had to use more common statistical data. The basic quantitative framework for the forecasting exercise consisted of the following variables:

- Transport volume for passenger transport (passengers);
- Transport performance (passenger-kilometres; tonne-kilometres);
- Traffic performance (train-kilometres; vehicle-kilometres of the tractive units); and
- Average load / occupancy (tonnes per freight train; passengers per passenger train).

2.4 The forecasts of the demand for rail related services were to be based on the forecasts of transport performance of the study "Assessment of the contribution of the TEN and other transport policy measures to the midterm implementation of the White Paper on the European Transport Policy for 2010" (the ASSESS study), particularly the Annex VI Results from the SCENES model, prepared for the European Commission, DG TREN[1]. The annex VI includes the base year 2000 data and the forecasts for several scenarios. Following an initial review of the report the chosen baseline was the partial A scenario for the freight demand and the partial scenario for the passenger demand.

2.5 The partial implementation scenario includes all follow-up activities already implemented or planned to be implemented before 2010 by the EU or by Member States. This scenario is derived from the preliminary results of the policy review up to 2005 described in Annexes I to IV of the study. The key elements are:

- All measures/Directives that have been implemented or are due to be implemented by 2010 (and have been approved by European institutions) have been included;
- All measures waiting for approval by the European institutions are only included

[1] Transport & Mobility Leuven et al.: Assessment of the contribution of the TEN and other transport policy measures to the midterm implementation of the White Paper on the European Transport Policy for 2010, Final Report, prepared for the European Commission, DG TREN, Leuven, 28 October 2005.

in the partial implementation scenario 2010 (or 2020) when it can be expected that acceptation can be achieved before 2010 (or 2020). The expectation is based on the number of times that a proposal with regard to the particular measure has already been rejected; and

- All TEN-projects that, following the estimation published in 2004, are planned to be finalised before 2010 (or 2020), are included in the partial implementation scenario 2010 (or 2020).

2.6 Regarding these forecast some further facts need to be pointed out:

- With reference to rail passenger transport, adoptions of the ASSESS base year 2000 (and as a result also the forecast years) also include urban railway (tram and metro) and in some networks suburban railway. This study excludes urban and in some cases suburban rail as the analysis should focus on those networks and railway undertakings that are captured by Directive 2001/14/EC. The growth rates that have been used are those contained within the report;
- The ASSESS forecasts refer to 2010 and 2020 but the SERVRAIL study requires forecast for 2010 and 2015. The 2010 and 2020 figures were averages in order to derive forecasts for 2015;
- The ASSESS report provides forecasts for the European Union but does not cover Switzerland, Norway, Bulgaria and Romania. Therefore, the analysis supplemented the ASSESS forecasts with forecasts from the DG TREN publication European Energy and Transport, Trends to 2030 – update 2005[2] as well as the ProgTrans European Transport Report 2004[3];
- The base year for the ASSESS forecasts is the year 2000, therefore, it may occur that the development in recent years (2001 to 2004) does not follow the forecast trend. However, the study also shows data for the years after 2000 as far as available; and
- Statistical data are not complete particularly for the New Member States and the Candidate countries. However, the new EU Regulation on rail transport statistics[4] which deals with both rail freight and passenger transport and is in force since the beginning of 2003 will improve the database for the forecasts and more reliable forecasts may be possible in future.

2.7 Moreover, the base data was supplemented by data from the following sources (in addition to the data that we received directly from the stakeholders):

- Eurostat statistics;
- ECMT statistics;
- UIC statistics;
- DG TREN statistical pocketbook *Energy and Transport in Figures 2005*;
- DG TREN: Energy and Transport Trends to 2030, update 2005;

---

2 European Commission, DG TREN: European Energy and Transport, Trends to 2030 – update 2005, May 2006.

3 ProgTrans AG: European Transport Report 2004, Analyses and Forecasts, 27 European Countries, Basel, August 2004.

4 Regulation (EC) No. 91/2003 of the European Parliament and of the Council of 16 December 2002 on rail transport statistics.

- ProgTrans AG: European Transport Report 2004; and
- National statistics: country data and totals for the Member States.

2.8 The results of the analysis based on statistical information are described in the following chapter in relation to both passenger and freight transport separately.

3. MARKET DEVELOPMENT

Rail passenger transport

3.1 Table 3.1 shows the evolution rail passenger transport (measured in passenger-kms).

TABLE 3.1 RAIL PASSENGER TRANSPORT PERFORMANCE

Country	Passenger transport performance [billion pkm]							Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
	1990	1995	2000	2004	2005	2010	2015		
Belgium	6.5	6.8	7.8	8.7	9.2	8.6	8.8	1.0%	0.5%
Czech Republic	-	8.0	7.3	6.6	6.6	7.2	7.3	-0.1%	0.3%
Denmark	4.9	5.0	5.3	5.9	5.8	5.6	5.8	0.6%	0.5%
Germany	61.0	71.0	75.4	72.6	74.9	78.4	82.8	0.4%	1.1%
Estonia	1.5	0.4	0.3	0.2	0.2	0.2	0.3	-2.6%	4.6%
Greece	2.0	1.6	1.9	1.7	1.9	2.2	2.3	1.5%	1.4%
Spain	15.5	16.6	20.2	20.4	21.6	27.9	30.5	3.3%	1.8%
France	63.8	55.6	69.6	74.4	76.5	85.7	89.4	2.1%	0.8%
Ireland	1.2	1.3	1.4	1.6	1.8	1.7	1.8	2.0%	1.1%
Italy	44.7	43.9	47.1	49.3	46.1	45.8	45.1	-0.3%	-0.3%
Latvia	5.4	1.3	0.7	0.8	0.9	0.7	0.8	0.0%	2.7%
Lithuania	3.6	1.1	0.6	0.4	0.4	0.6	0.6	0.0%	0.0%
Luxembourg	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.0%	0.0%
Hungary	11.4	8.4	9.7	10.2	9.6	9.3	9.1	-0.4%	-0.4%
Netherlands	11.1	14.0	14.8	14.1	14.7	18.2	19.7	2.1%	1.6%
Austria	8.6	9.6	8.2	8.7	8.5	10.0	10.3	2.0%	0.5%
Poland	50.4	21.0	19.7	18.7	17.8	19.7	19.1	0.0%	-0.6%
Portugal	5.7	4.8	3.8	3.7	3.8	4.0	4.1	0.5%	0.2%
Slovenia	1.4	0.6	0.7	0.8	0.8	1.0	1.2	3.6%	2.8%
Slovak Republic	-	4.2	2.9	2.2	2.2	2.3	2.2	-2.1%	-0.8%
Finland	3.3	3.2	3.4	3.4	3.5	3.8	3.9	1.0%	0.7%
Sweden	6.6	6.8	8.2	8.7	8.9	9.8	10.0	1.8%	0.3%
United Kingdom	33.2	30.3	38.4	43.5	43.0	43.0	43.9	1.1%	0.4%
Norway	2.1	2.3	2.6	2.3	2.3	2.5	2.6	-0.4%	0.5%
Switzerland	12.7	13.4	14.7	16.1	16.3	17.7	19.3	1.9%	1.7%
Bulgaria	7.8	4.7	3.5	2.6	2.4	3.0	3.4	-1.5%	2.5%
Romania	30.6	18.9	11.6	8.6	8.0	8.3	9.6	-3.3%	3.0%
EU-23	-	316	348	356	359	386	399	1.1%	0.7%
27 Networks	-	355	380	386	388	418	434	1.0%	0.8%

Source: Transport&Mobility Leuven; Eurostat, EC, ECMT, UIC, ProgTrans AG, national statistics

Note: data for EU23 and EU27 Networks for 1990 is missing as a result of gaps in the data available for some networks

3.2 In the *ASSESS* study no distinction is made between regional and long-distance passenger transport, this is the case because in a number of cases statistical information is not available for each segment and also because the definitions vary from country to country. Therefore, the statistical analysis could only consider overall trends in the rail sector and the ability to draw conclusions from the data on the development of the regional and long-distance rail passenger transport is not possible.

3.3 The yearly variance, i.e. the average growth rate per year, is shown for the period 2000 - 2010 and 2010 - 2015. The rail passenger transport performance in the European Union shows a continuous growth which should reach 400 billion passenger-kilometres (pkm) in 2015. The new Member States should accumulate about 10% of that share. The growing demand in the EU is determined by the growth in the pre-2004 Member States but the average yearly growth will slow down in the period 2010 - 2015 to roughly 0.7%. In the new Member States, demand will decline slightly.

3.4 To estimate the passenger transport volume (number of passengers), we collected time series statistical data for all countries. We analysed the past development of the average distance per passenger between 1990 and 2004 however in most of the networks we could not find a clear trend. We therefore assumed that the average distance travelled would not change from 2000 to 2010 and 2015 respectively, i.e. based on the year 2000 the absolute growth rates of the transport performance (passenger-kilometres) were used to obtain 2010 and 2015 passenger transport volume estimates.

3.5 Table 3.2 shows the historical data and the estimates for the passenger volume as well as the average rate of change per year. Following our assumption set out above, transport volumes will develop in pace with transport performance.

TABLE 3.2 RAIL PASSENGER TRANSPORT VOLUME

Country	Passenger transport volume [million passengers]							Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
	1990	1995	2000	2004	2005	2010	2015		
Belgium	142	144	153	178	186	169	174	1.0%	0.5%
Czech Republic	-	227	185	180	178	182	185	-0.1%	0.3%
Denmark	157	157	166	169	-	175	180	0.6%	0.5%
Germany	1,043	1,367	1,712	2,090	2,131	1,781	1,880	0.4%	1.1%
Estonia	23	9	7	5	5	6	7	-2.6%	4.6%
Greece	12	11	15	9	10	17	18	1.5%	1.4%
Spain	274	366	439	484	505	606	663	3.3%	1.8%
France	843	741	850	944	975	1,047	1,091	2.1%	0.8%
Ireland	25	27	32	35	38	39	41	2.0%	1.1%
Italy	443	463	478	504	517	465	457	-0.3%	-0.3%
Latvia	145	42	18	24	26	18	21	0.0%	2.7%
Lithuania	43	15	9	7	7	9	9	0.0%	0.0%
Luxembourg	10	11	12	14	14	12	12	0.0%	0.0%
Hungary	211	156	156	161	152	150	147	-0.4%	-0.4%
Netherlands	256	305	305	310	321	377	408	2.1%	1.6%
Austria	168	194	183	188	191	223	228	2.0%	0.5%
Poland		383	361	266	250	361	350	0.0%	-0.6%
Portugal	226	188	160	153	151	168	169	0.5%	0.2%
Slovenia	21	13	15	14	16	21	25	3.6%	2.8%
Slovak Republic	-	89	67	50	50	54	52	-2.1%	-0.8%
Finland	46	44	55	60	63	60	63	1.0%	0.7%
Sweden	83	98	126	150	151	150	153	1.8%	0.3%
United Kingdom	767	738	963	1,088	1,100	1,078	1,101	1.1%	0.4%
Norway	34	40	50	51	52	48	49	-0.4%	0.5%
Switzerland	324	279	303	336	-	366	399	1.9%	1.7%
Bulgaria	120	59	50	38	34	43	49	-1.5%	2.5%
Romania	408	211	118	99	92	84	97	-3.3%	3.0%
EU-23	-	5,789	6,466	7,083	-	7,168	7,433	1.0%	0.7%
27 Networks	-	6,377	6,987	7,607	7,216	7,710	8,027	1.0%	0.8%

Source: Eurostat, EC, ECMT, UIC, national statistics and own estimates

Note: data for EU23 and EU27 Networks for 1990 and data for EU23 for 2005 is missing as a result of gaps in the data available for some networks

3.6 The development of the demand for rail related services is often linked to the traffic performance (measured in train-kilometres of passenger/freight trains). Therefore, we collected statistical data on train-kilometres for 1990 to 2005. We then calculated the average occupancy per train by dividing transport performance by traffic performance. The table below shows the average number of passengers per train, demonstrating the

volatility of the data, usually without showing a clear tendency or trend. Given this situation we did not "forecast" occupancy but estimated plausible values for 2010 and assumed that these values would not change significantly during the five following years. For Romania and Bulgaria, we did not have any information on the traffic performance and hence no occupancy rates.

TABLE 3.3 AVERAGE NUMBER OF PASSENGERS PER TRAIN (OCCUPANCY)

Country	Average occupancy [passengers per train]						Yearly variance 2000-2010 [% p.a.]
	1990	1995	2000	2004	2010	2015	
Belgium	93	95	101	111	120	120	1.9%
Czech Republic	-	74	73	60	65	65	-1.1%
Denmark	106	98	96	88	90	90	-0.7%
Germany	-	-	102	103	105	105	0.3%
Estonia	-	85	65	60	70	70	0.7%
Greece	-	96	-	101	110	110	-
Spain	129	130	148	138	160	160	0.8%
France	200	181	186	185	185	185	-0.1%
Ireland	124	130	132	127	130	130	-0.2%
Italy	-	171	187	165	170	170	-0.9%
Latvia	360	105	77	108	70	70	-0.9%
Lithuania	-	110	79	80	70	70	-1.1%
Luxembourg	62	-	-	47	50	50	-
Hungary	-	114	142	124	130	130	-0.9%
Netherlands	105	128	120	122	130	130	0.8%
Austria	114	109	91	101	105	105	1.5%
Poland	215	121	118	133	140	140	1.9%
Portugal	206	164	101	146	130	130	2.9%
Slovenia	117	52	64	64	70	70	0.9%
Slovak Republic	-	107	80	71	60	60	-2.5%
Finland	137	127	123	107	90	90	-2.7%
Sweden	112	112	-	101	100	100	-
United Kingdom	88	-	-	96	100	100	-
Norway	83	85	104	71	70	70	-3.3%
Switzerland	94	102	104	107	105	105	0.1%
EU-23	145	115	110	106	107	107	-0.3%
27 Networks	138	113	109	105	105	105	-0.4%

Source: Eurostat, EC, ECMT, UIC, national statistics and own estimates. Note: no data available for Bulgaria and Romania; some data not available for other networks

3.7 For the interpretation of the occupancy indicator, we must be aware of the fact that changes in average train occupancy may be the result of changes in train types or

configurations and of improvements in train services offered (higher frequencies, more spacious trains).

3.8 In the EU, there is no clear trend with reference to increasing or decreasing occupancy rates. In some countries as Belgium, Germany, Estonia, Spain, the Netherlands, Austria, Poland and Switzerland we expect a (slight) increase in the average number of passengers per train from 2000 to 2010.However, for France, Italy, Latvia, Hungary and Norway we foresee a decline.

3.9 Finally, we estimated the traffic performance in 2010 and 2015 by means of the transport performance and the occupancy rates. The results as well as historical data are shown in the following table.

TABLE 3.4 RAIL PASSENGER TRAFFIC PERFORMANCE

Country	Passenger train movements [million train-km]						Yearly variance 2004-2010 [% p.a.]	Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
	1990	1995	2000	2004	2010	2015			
Belgium	71	71	77	78	71	73	-1.5%	-0.8%	0.5%
Czech Republic	-	108	99	111	111	113	0.0%	1.1%	0.3%
Denmark	46	51	55	67	62	64	-1.3%	1.2%	0.5%
Germany	415		741	702	747	788	1.0%	0.1%	1.1%
Estonia	-	5	4	3	3	4	-2.0%	-3.3%	4.6%
Greece	-	16	-	17	20	21	3.1%	-	1.4%
Spain	120	127	136	147	174	191	2.9%	2.5%	1.8%
France	318	308	373	401	463	483	2.4%	2.2%	0.8%
Ireland	10	10	11	12	13	14	0.9%	2.1%	1.1%
Italy	-	256	252	298	269	265	-1.7%	0.7%	-0.3%
Latvia	15	12	9	8	10	12	5.2%	0.9%	2.7%
Lithuania	-	10	8	6	9	9	7.6%	1.2%	0.0%
Luxembourg	3	-	-	6	6	6	0.8%	-	0.0%
Hungary	69	74	68	82	72	70	-2.2%	0.5%	-0.4%
Netherlands	106	-	-	115	140	152	3.3%	-	1.6%
Austria	75	89	90	86	95	98	1.7%	0.6%	0.5%
Poland	235	174	168	141	141	136	0.0%	-1.7%	-0.6%
Portugal	27	29	38	25	31	31	3.4%	-2.0%	0.2%
Slovenia	12	11	11	12	14	16	3.0%	2.7%	2.8%
Slovak Republic	-	39	36	31	39	37	3.7%	0.8%	-0.8%
Finland	24	25	28	31	42	43	4.9%	4.2%	0.7%
Sweden	59	61	-	85	98	100	2.4%	-	0.3%
United Kingdom	376	-	-	453	430	439	-0.9%	-	0.4%
Norway	25	27	25	33	36	37	1.8%	3.7%	0.5%
Switzerland	135	132	141	151	169	184	1.9%	1.8%	1.7%
EU-23	-	-	-	2,918	3,061	3,165	0.8%	-	0.7%
27 Networks	-	-	-	3,101	3,266	3,386	0.9%	-	0.7%

Source: Eurostat, national statistics and own calculations Note: no data available for Bulgaria and Romania; data for EU23 and EU27 Networks from 1990 to 2000 is missing as a result of gaps in the data available for some networks

3.10 As a whole, in all of the networks, the traffic performance will increase. However, we could not identify a clear trend throughout the countries in the EU. This results from the development of the transport performance and also the occupancy rate.

3.11 In Belgium for example, traffic performance (train-kilometres) will decrease in contrast to the transport performance (passenger-kilometres) as the occupancy rate increases. In Germany, the traffic performance will grow by 1% from 2004 to 2010

and then to 2015 by 1.1% on a yearly average. Even though the occupancy rate will increase, the transport performance will have a higher growth rate.

Rail freight transport

3.12 The study also analysed the general trends in the rail freight market based on the transport performance (measured in tonne-kilometres), the average load (measured in tonnes per freight train) and the traffic performance (measured in train-kilometres). The study did not analyse the development of transport volumes (measured in tonnes) as this indicator is not relevant for the rail related services addressed in this study. For the estimates of the traffic performance we used the same approach as for the traffic performance in the rail passenger market.

3.13 Table 3.5 shows the past development and the estimates of goods transport performance. Our base data, the *ASSESS* data for 2000 and the estimates for 2010 and 2020, were – where possible – supplemented by statistical data collected from international and national sources to analyse the trends from 1990 to 2005.

3.14 Overall, the demand for freight transport will increase by almost 1% per year on an average whereas the growth from 2010 - 2015 is expected to be higher than from 2000/2004 - 2010. An exception to this overall trend is Spain where the yearly change is expected to be negative from 2000/2004 - 2010 but positive between 2010 and 2015. In contrast the transport performance in Romania will increase up to 2010 but will then decrease.

TABLE 3.5 RAIL FREIGHT TRANSPORT PERFORMANCE

Country	Goods transport performance [billion tkm]						Yearly variance 2004-2010 [% p.a.]	Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
	1990	1995	2000	2004	2010	2015			
Belgium	8.4	7.3	7.7	7.7	7.7	7.9	0.0%	0.0%	0.5%
Czech Republic	-	22.6	17.5	15.1	14.7	15.2	-0.4%	-1.7%	0.6%
Denmark	1.7	2.0	2.0	2.1	2.2	2.3	0.4%	1.0%	0.9%
Germany	61.9	68.5	76.8	86.4	88.6	91.4	0.4%	1.4%	0.6%
Estonia	7.0	3.8	8.1	10.5	12.5	13.4	3.0%	4.4%	1.4%
Greece	0.6	0.3	0.4	0.6	0.6	0.6	0.2%	3.5%	0.0%
Spain	-	11.0	11.6	11.5	11.2	11.6	-0.4%	-0.4%	0.6%
France	50.7	47.9	55.4	45.1	42.0	44.2	-1.2%	-2.7%	1.0%
Ireland	0.6	0.6	0.5	0.4	0.3	0.3	-4.6%	-4.8%	0.0%
Italy	19.3	21.7	22.8	21.0	20.0	21.6	-0.8%	-1.3%	1.5%
Latvia	18.5	9.8	13.3	18.6	20.5	23.2	1.6%	4.4%	2.5%
Lithuania	19.3	7.2	8.9	11.6	13.2	15.2	2.1%	4.0%	2.8%
Luxembourg	0.6	0.5	0.6	0.6	0.6	0.6	0.2%	0.0%	0.0%
Hungary	16.8	8.4	8.8	8.3	8.8	8.9	1.0%	0.0%	0.2%
Netherlands	3.1	3.1	4.6	5.2	5.2	5.4	-0.1%	1.2%	0.8%
Austria	12.1	13.2	16.6	17.9	19.1	19.6	1.1%	1.4%	0.5%
Poland	81.8	68.2	54.0	47.8	46.3	47.9	-0.5%	-1.5%	0.7%
Portugal	1.5	2.0	2.2	2.7	2.7	2.9	0.2%	2.1%	1.1%
Slovenia	4.2	2.9	2.6	3.5	4.0	4.6	2.4%	4.4%	2.6%
Slovak Republic	-	13.8	11.2	9.7	10.1	7.7	0.7%	-1.0%	-5.4%
Finland	8.4	9.6	10.1	10.1	10.7	10.8	1.0%	0.6%	0.1%
Sweden	19.1	19.4	20.1	20.9	20.9	21.6	0.0%	0.4%	0.7%
United Kingdom	16.0	13.3	18.1	22.6	22.5	23.0	0.0%	2.2%	0.4%
Norway	2.6	2.7	2.4	2.2	2.2	2.2	0.0%	-1.0%	0.5%
Switzerland	8.1	7.8	9.7	9.7	11.5	13.0	2.9%	1.8%	2.5%
Bulgaria	14.1	8.6	5.5	5.2	5.4	5.9	0.6%	-0.3%	1.8%
Romania	48.8	24.2	16.3	17.0	18.8	18.2	1.7%	1.4%	-0.6%
EU-23	-	357.1	373.9	379.9	384.4	399.3	0.2%	0.3%	0.8%
27 Networks	-	400.5	407.8	414.0	422.3	438.7	0.3%	0.3%	0.8%

Source: Transport&Mobility Leuven; Eurostat, EC, ECMT, UIC, ProgTrans AG, national statistics Note: data for EU23 and EU27 Networks for 1990 is missing as a result of gaps in the data available for some networks

3.15 In a next step we collected statistical data on traffic performance in freight transport (train-kilometres of freight trains) and calculated the average load per freight train (measured in tonnes) for 1990 to 2005. Taking into account the development of the

load factor in the last 10 years we then estimated the average load for 2010 for each country separately and assumed that the average load will not change from 2010 to 2015 (see the following table).

3.16 In 2004, the load ratios range from only 150 tonnes (in Ireland) to 1800 tonnes (in Estonia). The high values in the Baltic States results from the dominating transit freight to and from Russia and Belarus. The different levels results from different influencing factors such as:

- market structure (shares of single wagon load trains, block trains);
- structure of goods; and
- size and geographical position of the country etc.

TABLE 3.6 AVERAGE LOAD PER TRAIN IN GOODS TRANSPORT

Country	Average load [tonnes per train]							Yearly variance 2004-2010 [% p.a.]	Yearly variance 2000-2010 [% p.a.]
	1990	1995	2000	2004	2005	2010	2015		
Belgium	391	423	418	446	-	450	450	0.2%	0.8%
Czech Republic	-	446	426	424	-	425	425	0.0%	0.0%
Denmark	262	279	345	454	-	450	450	-0.2%	3.1%
Germany	331	-	408	461	-	450	450	-0.4%	1.0%
Estonia	1,091	1,322	1,569	1,745	1,814	2,000	2,000	2.4%	2.7%
Greece	298	169	-	552	334	400	400	-4.6%	-
Spain	-	266	279	298	-	300	300	0.1%	0.8%
France	310	336	358	359	-	400	400	1.9%	1.2%
Ireland	135	136	125	147	-	150	150	0.3%	2.0%
Italy	-	315	392	319	-	350	350	1.6%	-1.1%
Latvia	-	1,407	1,499	1,713	1,753	1,800	1,800	0.8%	2.0%
Lithuania	-	1,125	1,225	1,371	1,390	1,400	1,400	0.4%	1.4%
Luxembourg	399	-	-	310	-	350	350	2.2%	-
Hungary	468	433	518	479	-	500	500	0.7%	-0.4%
Netherlands	265	-	-	581	-	600	600	0.6%	-
Austria	305	311	335	345	-	350	350	0.2%	0.4%
Poland	651	632	614	571	-	550	550	-0.6%	-1.0%
Portugal	233	262	196	275	-	275	275	0.0%	4.0%
Slovenia	393	379	345	433	412	450	450	0.7%	3.1%
Slovak Republic	-	553	545	614	-	650	650	1.0%	1.9%
Finland	498	600	586	583	577	600	600	0.5%	0.2%
Sweden	480	496	572	508	-	500	500	-0.3%	-1.3%
United Kingdom	269	-	-	573	-	500	500	-2.1%	-
Norway	228	289	272	295	279	300	300	0.3%	1.0%
Switzerland	269	268	308	267	-	300	300	2.1%	-0.3%
EU-23	-	521	566	590	-	604	604	0.4%	0.7%
27 Networks	-	498	540	565	-	580	580	0.4%	0.7%

Source: Eurostat, EC, ECMT, UIC, national statistics and own estimates Note: data for Bulgaria and Romania is not available; data for EU23 and EU27 Networks for 1990 and 2005 is missing as a result of gaps in the data available for some networks

3.17 In most networks, the efficiency in the rail freight market (expressed as average load per train) will be higher in 2010 compared to 2000. We expect only for the Czech Republic, Italy, Hungary, Poland, Sweden and Switzerland a slight decrease of average load per train.

3.18 Based on the load factor estimates and the transport performance it is possible to calculate the future level of the traffic performance in the rail freight market. Table 3.7 shows the past development and the 2010 and 2015 estimates. We have no data for Romania and Bulgaria. With the exception of the Slovak Republic the traffic performance will increase from 2010 to 2015 in all countries.

TABLE 3.7 RAIL FREIGHT TRAFFIC PERFORMANCE

Country	Goods train movements [million train-km]						Yearly variance 2004-2010 [% p.a.]	Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
	1990	1995	2000	2004	2010	2015			
Belgium	21.4	17.3	18.4	17.3	17.1	17.6	-0.1%	-0.7%	0.5%
Czech Republic	-	50.7	41.1	35.6	34.6	35.6	-0.5%	-1.7%	0.6%
Denmark	6.7	7.1	5.8	4.7	4.9	5.1	0.6%	-1.7%	0.9%
Germany	186.8	-	188.2	187.4	196.9	203.1	0.8%	0.5%	0.6%
Estonia	6.4	2.9	5.2	6.0	6.3	6.7	0.7%	1.9%	1.4%
Greece	2.0	1.7	-	1.1	1.5	1.5	5.8%	-	0.0%
Spain	48.6	41.1	41.6	38.5	37.3	38.5	-0.5%	-1.1%	0.6%
France	163.6	142.8	154.7	125.5	105.0	110.4	-2.9%	-3.8%	1.0%
Ireland	4.4	4.4	3.9	2.7	2.0	2.0	-4.9%	-6.5%	0.0%
Italy	-	68.9	58.2	66.0	57.1	61.6	-2.4%	-0.2%	1.5%
Latvia	-	6.9	8.9	10.9	11.4	12.9	0.8%	2.5%	2.5%
Lithuania	-	6.4	7.3	8.5	9.4	10.8	1.8%	2.6%	2.8%
Luxembourg	1.5	-	-	1.9	1.7	1.7	-1.8%	-	0.0%
Hungary	35.9	19.4	17.0	17.4	17.6	17.8	0.2%	0.4%	0.2%
Netherlands	11.6	-	-	9.0	8.7	9.0	-0.6%	-	0.8%
Austria	39.8	42.4	49.5	51.9	54.6	55.9	0.8%	1.0%	0.5%
Poland	125.7	107.9	87.9	83.7	84.2	87.0	0.1%	-0.4%	0.7%
Portugal	6.3	7.7	11.2	9.7	9.8	10.4	0.2%	-1.3%	1.1%
Slovenia	10.7	7.6	7.5	8.0	8.9	10.1	1.8%	1.7%	2.6%
Slovak Republic	-	24.9	20.5	15.8	15.5	11.8	-0.2%	-2.7%	-5.4%
Finland	16.8	16.0	17.2	17.3	17.8	17.9	0.5%	0.3%	0.1%
Sweden	39.8	39.1	35.2	41.1	41.8	43.2	0.3%	1.7%	0.7%
United Kingdom	59.5	-	-	39.4	45.0	46.0	2.2%	-	0.4%
Norway	11.4	9.4	8.8	7.4	7.3	7.4	-0.3%	-1.9%	0.5%
Switzerland	30.0	29.3	31.4	36.4	38.5	43.5	0.9%	2.0%	2.5%
EU-23	-	-	-	799.3	789.1	816.5	-0.2%	-	0.7%
27 Networks	-	-	-	843.1	834.9	867.4	-0.2%	-	0.8%

Source: Eurostat, EC, ECMT, UIC, national statistics and own estimates

Note: data for Bulgaria and Romania is not available; data for EU23 and EU27 Networks from 1990 to 2000 is missing as a result of gaps in the data available for some networks

4. DEMAND FOR RAIL RELATED SERVICES

Energy consumption

4.1 Energy consumption is measured in:

- Kilowatt hours (kwh) for electric traction;
- Tonnes of diesel fuel for diesel traction; and
- Tonnes of oil equivalent (toe) for electric and diesel traction combined.

4.2 Basically, the development of the future energy consumption is determined by:

- development of the traffic performance (vehicle-kilometres, vkm) of tractive units (locomotives, railcars);
- the development of the share of electric tractive units and of the share of diesel tractive units respectively; and
- the energy efficiency, i.e. the specific energy consumption per vehicle-kilometre.

4.3 General trends:

- Growing demand for rail transport services in all categories (freight, long-distance passengers, local/regional passengers);
- Similarly growing rail traffic (train-km) except regional rail where service levels are likely not to be expanded (increase of patronage leading to better occupancy of trains, higher capacity trains); and
- Progressing electrification of networks and abandoning of lines with little usage (usually not electrified); increasing share of electric traction; and
- No clear trends regarding energy efficiency (specific energy consumption per train-km or vehicle-km); decrease in certain countries, increase in others.

4.4 The European Commission has published forecasts of energy consumption as part of long-term energy forecasts by country (Table 4.1)[5]. These forecasts assume a significant increase in fuel efficiency and hence a long-term decline in total energy consumption for rail transport (overall decline of total energy consumption[6] of railways from 2005 to 2010 by 6% and from 2010 to 2015 by a further 13%). From statistical data (not available for all countries and years), we conclude that consumption of electrical energy is overall rather stable while diesel consumption declines significantly. However, total energy consumption is unlikely to decrease as much as assumed in Commission forecasts.

5 European Commission: European Energy and Transport Trends to 2030, update 2005.

6 Total energy consumption of railways is measured in toe (tonne of oil equivalent).

TABLE 4.1 TOTAL ENERGY CONSUMPTION OF RAILWAYS

Country	Energy consumption of railways [1000 toe per year]						Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
	1990	1995	2000	2005	2010	2015		
Belgium	177	202	183	170	164	152	-1.1%	-1.5%
Czech Republic	272	200	295	278	246	216	-1.8%	-2.6%
Denmark	113	118	103	101	98	90	-0.5%	-1.7%
Germany	2,116	2,126	1,946	1,866	1,743	1,550	-1.1%	-2.3%
Estonia	65	44	51	65	76	83	4.1%	1.8%
Greece	75	57	60	57	39	31	-4.2%	-4.5%
Spain	528	626	847	879	837	608	-0.1%	-6.2%
France	1,150	1,220	1,373	1,420	1,319	1,232	-0.4%	-1.4%
Ireland	48	50	42	41	34	29	-2.1%	-3.1%
Italy	738	819	834	795	715	629	-1.5%	-2.5%
Latvia	188	90	75	88	99	93	2.8%	-1.2%
Lithuania	132	86	75	90	99	98	2.8%	-0.2%
Luxembourg	13	9	15	15	13	12	-1.4%	-1.6%
Hungary	270	190	174	157	133	108	-2.7%	-4.1%
Netherlands	147	162	176	188	175	152	-0.1%	-2.8%
Austria	357	292	328	354	359	327	0.9%	-1.8%
Poland	1,095	667	539	502	441	375	-2.0%	-3.2%
Portugal	82	80	88	89	86	78	-0.2%	-1.9%
Slovenia	29	29	23	27	31	32	3.0%	0.6%
Slovak Republic	100	119	83	78	68	58	-2.0%	-3.1%
Finland	99	105	94	91	86	77	-0.9%	-2.2%
Sweden	252	273	299	309	288	251	-0.4%	-2.7%
United Kingdom	1,076	1,246	1,192	1,199	1,142	943	-0.4%	-3.8%
Norway	104	176	150	160	151	131	0.1%	-2.8%
Switzerland	230	220	240	249	248	227	0.3%	-1.8%
Bulgaria	216	144	77	63	58	52	-2.8%	-2.2%
Romania	282	471	449	361	247	230	-5.8%	-1.4%
EU-23	9,122	8,810	8,895	8,859	8,291	7,224	-0.7%	-2.7%
27 Networks	9,954	9,821	9,811	9,692	8,995	7,864	-0.8%	-2.5%

Source: Eurostat, EC

4.5 Apart from the traffic performance measured in train-kilometres there is statistical data on the traffic performance measured in vehicle-kilometres of tractive units (locomotives and railcars). Whilst train-kilometre is the unit of measurement representing the movement of a train over one kilometre; the tractive vehicle-kilometre is the unit of measurement representing any movement of an active tractive

vehicle over a distance of one kilometre. Shunting movements are excluded.

4.6 For the analysis of the future development of energy consumption, vehicle-kilometres are more appropriate than train-kilometres. Analysing the ratio of vehicle-kilometres and train-kilometres, it can be seen that the ratio did not change substantially. We calculated the ratio for 2010 and 2015 by averaging the ratios of the years 1990 - 2004 for each country separately. Based on the train-kilometre forecasts and the estimates of the level of the ratio for 2010 and 2015, we calculated the vehicle-kilometres for 2010 and 2015[7]. The following table shows the results.

[7] We calculated the train-kilometres of all trains by adding the train-kilometres of passenger and freight trains.

TABLE 4.2 MOVEMENTS OF TRACTIVE UNITS (LOCOMOTIVES AND RAILCARS)

Country	Tractive units movements [million tractive vkm]						Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
	1990	1995	2000	2004	2010	2015		
Belgium	151	130	153	-	140	144	-0.9%	0.5%
Czech Republic	-	219	190	179	195	199	0.3%	0.4%
Denmark	82	-	90	-	100	103	1.2%	0.6%
Germany	821	-	1,376	-	1,334	1,402	-0.3%	1.0%
Estonia	-	14	14	-	15	17	0.8%	2.4%
Greece	18	24	23	-	28	29	1.7%	1.3%
Spain	221	193	195	204	242	261	2.2%	1.6%
France	650	601	696	-	759	792	0.9%	0.9%
Ireland	15	14	-	-	16	16	-	1.0%
Italy	-	390	401	-	409	410	0.2%	0.0%
Latvia	-	36	28	26	38	43	3.1%	2.6%
Lithuania	-	29	19	20	26	28	3.3%	1.5%
Luxembourg	6	-	-	-	10	10	-	0.0%
Hungary		111	107	-	106	105	-0.1%	-0.3%
Netherlands	166	-	-	-	210	227	-	1.5%
Austria	-	158	-	-	181	185	-	0.5%
Poland	-	420	376	309	335	332	-1.2%	-0.1%
Portugal	-	54	-	-	58	59	-	0.4%
Slovenia	-	22	21	22	27	31	2.7%	2.7%
Slovak Republic	-	97	-	-	75	67	-	-2.0%
Finland	60	63	66	67	87	89	2.8%	0.5%
Sweden	126	114	-	-	165	169	-	0.4%
United Kingdom	779	-	-	-	858	876	-	0.4%
Norway	40	42	42	-	51	52	2.0%	0.5%
Switzerland	147	143	-	-	185	203	-	1.9%
EU-23	3,096	2,692	3,754	828	5,414	5,596	4.4%	0.7%
27 Networks	3,283	2,877	3,796	828	5,650	5,851	4.9%	0.7%

Source: Eurostat and own estimates. Note: data for Bulgaria and Romania not available: some data not available for other networks

Demand for traction current

4.7 To identify possible trends in the demand for traction current we collected the statistical data on traffic performance of electric tractive units (measured in vehicle-kilometres) and calculated the share of electric tractive vehicle-kilometres in total traffic performance. In a second step, we analysed the development of the shares for each country separately and estimated the shares for 2010 and 2015. Table 4.3 shows

the traffic performance of electric tractive units and Table 4.4 shows the share of electric tractive vehicle-kilometres in total traffic performance.

TABLE 4.3 DEVELOPMENT OF TRAFFIC PERFORMANCE OF ELECTRIC TRACTIVE UNITS (LOCOMOTIVES AND RAILCARS)

Country	Movements of electric tractive units [million vkm]						Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
	1990	1995	2000	2004	2010	2015		
Belgium	122	112	134	-	126	129	-0.6%	0.5%
Czech Republic	-	103	93	95	107	109	1.4%	0.4%
Denmark	39	-	37	-	46	48	2.2%	0.6%
Germany	612	-	1,015	-	1,027	1,079	0.1%	1.0%
Estonia	-	3	2	-	3	4	3.8%	2.4%
Greece	-	-	0	-	1	1	2.7%	1.3%
Spain	147	154	155	169	205	222	2.8%	1.6%
France	424	450	549	-	607	634	1.0%	0.9%
Ireland	2	2	-	-	2	2	-	1.0%
Italy	-	305	319	-	356	356	1.1%	0.0%
Latvia	-	16	11	10	14	16	2.6%	2.6%
Lithuania	-	4	1	2	3	3	10.5%	1.5%
Luxembourg	3	-	-	-	6	6	-	0.0%
Hungary	-	58	60	-	64	63	0.5%	-0.3%
Netherlands	144	-	-	-	185	200	-	1.5%
Austria	-	-	-	-	152	156	-	0.5%
Poland	-	329	305	245	268	266	-1.3%	-0.1%
Portugal	-	26	-	-	33	34	-	0.4%
Slovenia	-	13	13	15	20	23	4.5%	2.7%
Slovak Republic	-	55	-	-	45	40	-	-2.0%
Finland	31	34	40	45	65	67	5.0%	0.5%
Sweden	111	102	-	-	154	157	-	0.4%
United Kingdom	340	-	-	-	377	385	-	0.4%
Norway	30	31	32	-	40	41	2.2%	0.5%
Switzerland	143	-	-	-	181	199	-	1.9%
EU-23	-	-	-	-	3,868	4,001	-	0.7%
27 Networks	-	-	-	-	4,089	4,241	-	0.7%

Source: Eurostat and own estimates. Note: data for Bulgaria and Romania not available; data for EU23 and EU27 Networks from 1990 to 2004 is missing as a result of gaps in the data available for some networks

4.8 Since 1990 the share increased in almost all countries and we also expect that the share of electric tractive vehicle-kilometres will slightly increase in future as well.

TABLE 4.4 SHARE IN TOTAL RAILWAY TRAFFIC PERFORMANCE OF TRACTIVE UNITS

Country	Share of vkm of electric tractive units in total vkm [%]								
	1990	1995	2000	2001	2002	2003	2004	2010	2015
Belgium	81	86	87	88	88	88	-	90	90
Czech Republic	-	47	49	51	52	53	53	55	55
Denmark	48	-	42	46	-	-	-	46	46
Germany	74	-	74	75	75	-	-	77	77
Estonia	-	20	17	20	22	23	-	23	23
Greece	-	-	2	2	2	1	-	2	2
Spain	67	80	80	81	82	-	83	85	85
France	65	75	79	78	78	77	-	80	80
Ireland	13	-	-	-	-	-	-	12	12
Italy	-	78	80	-	83	-	-	87	87
Latvia	-	44	40	39	38	37	38	38	38
Lithuania	-	12	5	6	9	10	10	10	10
Luxembourg	54	-	-	-	-	-	-	65	65
Hungary		52	57	58	58	59	-	60	60
Netherlands	87	-	-	-	-	-	-	88	88
Austria	-	-	-	-	-	-	-	84	84
Poland	-	78	81	82	82	81	80	80	80
Portugal	-	49	-	-	-	-	-	57	57
Slovenia	-	60	63	65	67	67	68	75	75
Slovak Republic	-	56	-	-	-	-	-	60	60
Finland	51	54	61	64	66	68	67	75	75
Sweden	88	89	-	-	-	-	-	93	93
United Kingdom	44	-	-	-	-	-	-	44	44
Norway	75	74	76	76	-	-	-	78	78
Switzerland	97	-	-	-	-	-	-	98	98
EU-23	61	59	54	54	57	51	57	60	60
27 Networks	65	60	56	55	57	51	57	62	62

Source: Eurostat and own estimates Note: data not available for some networks Note: data for Bulgaria and Romania not available; some data not available for other networks

4.9 In a next step we collected available data on electricity consumption of railways whereas more than the electricity consumption than only for traction may be included (Table 4.5). However, based on the electric tractive vehicle-kilometres and the electricity consumption it is possible to calculate the specific electricity consumption (Table 4.6). We could not identify clear trends in the energy efficiency (specific electricity consumptions) but for Belgium, the Czech Republic, France and Finland we estimated the specific electricity consumption and calculated the future energy

consumption.

TABLE 4.5 TOTAL ELECTRICITY CONSUMPTION OF RAILWAYS

Country	Electricity consumption of railways [GWh per year]								
	1990	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2010**	**2015**
Belgium	1,245	1,455	-	-	-	1,348	-	1,259	1,292
Czech Republic	-	1,373	1,204	1,223	1,150	1,198	1,163	1,178	1,201
Denmark	210	244	-	-	-	285	-	-	-
Germany	13,676	16,202	-	-	-	10,679	-	-	-
Estonia	-	-	-	-	-	-	-	-	--
Greece	128	151	-	-	-	4	-	-	-
Spain	3,666	3,946	-	-	-	2,132	-	-	-
France	8,892	9,707	-	-	-	7,819	-	12,754	13,313
Ireland	12	23	-	-	-	-	-	-	-
Italy	6,285	7,275	-	-	-	4,488	4,607	-	-
Latvia	-	-	-	-	-	38	-	-	-
Lithuania	-	-	-	-	-	7	-	-	-
Luxembourg	58	81	-	-	-	-	-	-	-
Hungary	-	-	-	-	-	801	-	-	-
Netherlands	1,269	1,478	-	-	1,219	-	-	-	-
Austria	2,665	3,131	-	-	-	1,899	-	-	-
Poland	-	-	-	-	-	3,104	2,800	-	-
Portugal	314	303	-	-	-	255	-	-	-
Slovenia	-	-	-	-	-	170	-	-	-
Slovak Republic	-	-	-	-	-	624	-	-	-
Finland	340	419	486	516	537	563	-	791	811
Sweden	1,669	1,736	-	-	-	623	-	-	-
United Kingdom	5,284	7,403	-	-	-	-	-	-	-
Norway	-	-	-	-	-	400	488	-	-
Switzerland	2,320	2,149	2,252	2,308	2,307	2,319	2,394	-	-
Bulgaria	-	-	-	-	-	424	-	-	-
Romania	-	-	-	-	-	553	-	-	-
EU-23	45,715	54,927	1,690	1,739	2,906	36,037	8,570	15,981	16,616
27 Networks	48,035	57,075	3,942	4,047	5,213	39,733	11,452	15,981	16,616

Source: Questionnaires, Eurostat, national statistics, annual reports of railways Note: data not available for some networks

TABLE 4.6 SPECIFIC ELECTRICITY CONSUMPTION

Country	Specific electricity consumption [GWh per vkm of electric tractive units]								
	1990	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2010**	**2015**
Belgium	10	13	-	-	-	10	-	10	10
Czech Republic	-	13	13	13	13	13	12	11	11
Denmark	5	-	-	-	-	-	-	-	-
Germany	22	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-
Spain	25	26	-	-	-	-	-	-	-
France	21	22	-	-	-	-	-	21	21
Ireland	6	-	-	-	-	-	-	-	-
Italy	-	24	-	-	-	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	-
Lithuania	-	-	-	-	-	-	-	-	-
Luxembourg	17	-	-	-	-	-	-	-	-
Hungary	-	-	-	-	-	12	-	-	-
Netherlands	9	-	-	-	-	-	-	-	-
Austria	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	11	-	-
Portugal	-	12	-	-	-	-	-	-	-
Slovenia	-	-	-	-	-	-	-	-	-
Slovak Republic	-	-	-	-	-	-	-	-	-
Finland	11	12	12	12	12	13	-	12	12
Sweden	15	17	-	-	-	-	-	-	-
United Kingdom	16	-	-	-	-	-	-	-	-
Norway	-	-	-	-	-	-	-	-	-
Switzerland	16	-	-	-	-	-	-	-	-
EU-23	157	138	25	26	25	47	24	54	54
27 Networks	173	138	25	26	25	47	24	54	54

Source: Questionnaires, Eurostat, national statistics, annual reports of railways and own estimates

Note: data not available for some networks

4.10 As stated above, we could not find a clear trend to better energy efficiency in based on the database. Moreover, the increasing share of tractive vehicle-kilometres of electric tractive units will result in an increase in demand for electricity. However, in some countries diesel tractive units are often used by new entrants. The market entry by new entrants could affect the evolution of the tractive vehicle-kilometres. Nevertheless, we assume that the trend of the share of electric tractive vehicle-kilometres will continue.

Demand for traction fuels

4.11 Analogue to the previous chapter on demand for electricity we collected the statistical information on diesel fuels for traction but there are also gaps in the data we were able to collect. Table 4.7 shows the vehicle-kilometres of diesel tractive units estimated by the share of diesel tractive vehicle-kilometres which results from the estimate on the share of electric tractive vehicle-kilometres (see above).

TABLE 4.7 DEVELOPMENT OF TRAFFIC PERFORMANCE OF DIESEL TRACTIVE UNITS

Country	Movements of diesel tractive units [million vkm]						Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
	1990	1995	2000	2004	2010	2015		
Belgium	28	18	19	-	14	14	-3.1%	0.5%
Czech Republic	-	116	97	84	88	89	-1.0%	0.4%
Denmark	43	-	52	-	54	56	0.4%	0.6%
Germany	210	-	360	-	307	322	-1.6%	1.0%
Estonia	-	11	12	-	12	13	0.0%	2.4%
Greece	18	24	23	-	27	29	1.6%	1.3%
Spain	74	39	39	35	36	39	-0.8%	1.6%
France	192	151	147	-	152	158	0.3%	0.9%
Ireland	13	12	-	-	14	14	-	1.0%
Italy	-	85	82	-	53	53	-4.2%	0.0%
Latvia	-	20	17	16	23	27	3.4%	2.6%
Lithuania	-	25	18	18	24	26	2.8%	1.5%
Luxembourg	3	-	-	-	3	3	-	0.0%
Hungary	-	53	46	-	42	42	-0.8%	-0.3%
Netherlands	22	-	-	-	25	27	-	1.5%
Austria	--	-	-	-	29	30	-	0.5%
Poland	-	91	71	63	67	66	-0.5%	-0.1%
Portugal	-	28	-	-	25	25	-	0.4%
Slovenia	-	9	8	7	7	8	-1.2%	2.7%
Slovak Republic	-	42	-	-	30	27	-	-2.0%
Finland	29	29	26	22	22	22	-1.8%	0.5%
Sweden	15	12	-	-	12	12	-	0.4%
United Kingdom	438	-	-	-	480	491	-	0.4%
Norway	10	11	10	-	11	12	1.2%	0.5%
Switzerland	4	-	-	-	-	-	-	-
EU-23	-	-	-	-	1,546	1,595	-	0.6%
27 Networks	-	-	-	-	1,557	1,607	-	0.6%

Source: Eurostat and own estimates Note: data for Bulgaria and Romania not available; data for EU23 and EU27 Networks from 1990 to 2004 is missing as a result of gaps in the data available for some networks

4.12 We then collected data on diesel fuel consumption (normally measured in tonnes (see the table below) and calculated the specific diesel fuel consumption (see Table 4.9).

TABLE 4.8 TOTAL DIESEL FUEL CONSUMPTION OF RAILWAYS

Country	Diesel consumption of railways [1,000 tonnes per year]							
	1990	1995	2000	2001	2002	2003	2004	2005
Belgium	-	-	-	-	-	39	-	-
Czech Republic	-	-	-	-	-	82	-	-
Denmark	-	-	-	-	-	76	-	-
Germany	-	-	-	-	-	476	-	-
Spain	-	-	-	-	-	98	-	-
France	-	-	-	-	-	225	-	-
Italy	-	-	-	-	-	-	111	-
Latvia	-	90	87	92	-	107	97	100
Lithuania	-	-	-	-	-	68	-	-
Hungary	-	-	-	-	-	64	-	-
Netherlands	-	-	-	-	-	10	-	-
Poland	-	-	-	-	-	134	-	-
Portugal	-	-	-	-	-	36	-	-
Slovenia	-	-	12	12	11	12	12	-
Slovak Republic	-	-	-	-	-	39	-	-
Finland	61	58	48	44	43	42	-	-
Sweden	32	24	25	23	22	22	22	-
United Kingdom	-	590	430	410	330	300	160	-
Norway	-	-	-	-	-	8	14	-
Bulgaria	-	-	-	-	-	28	-	-
Romania	-	-	-	-	-	167	-	-

Source: Questionnaires, Eurostat, national statistics, annual reports of railways Note: data not available for some networks

TABLE 4.9 SPECIFIC DIESEL CONSUMPTION

Country	Specific diesel consumption [1,000 tonnes per vkm of diesel tractive units]						
	1990	1995	2000	2001	2002	2003	2004
Belgium	-	-	-	-	-	2.1	-
France	-	-	-	-	-	1.4	-
Latvia	-	4.5	5.1	5.7	-	6.3	6.0
Poland	-	-	-	-	-	2.2	-
Slovenia	-	-	1.6	1.6	1.5	1.7	1.7
Finland	2.1	2.0	1.8	1.9	1.9	2.0	-
Sweden	2.2	1.9	-	-	-	-	-

Source: Eurostat Data not available for some networks. Note: data not available for some networks

4.13 The demand of traction fuel depends on the progressive electrification of lines but also on the supply of it and with it the access to the facilities. The legislation particularly in the field of energy is also an issue in this context. In Germany for example it is not possible, for environmental reasons, to fuel the tractive unit outside a certified facility.

All railway undertakings have to fuel their tractive units in a DB facility (or in the facility of another infrastructure manager/operator) otherwise they must use their own facilities which are very expensive to build and to operate. Such conditions also affect the development of the diesel fuel consumption.

Services in passenger stations

4.14 Data on railway (passenger) stations are available for only 10 countries; only four countries show the evolution over a decade. These figures suggest a stable level of stations in certain countries and slightly diminishing numbers in others, e.g. Germany.

TABLE 4.10 TOTAL NUMBER OF PASSENGER STATIONS, SELECTED COUNTRIES

Country	Passenger stations [number]								
	1990	1995	2000	2001	2002	2003	2004	2005	2006
Belgium	-	-	-	-	-	-	-	-	272
Denmark	-	-	319	319	323	300	298	305	-
Germany	-	-	5,794	5,760	5,710	5,665	5,697	5,707	-
Estonia	80	75	74	71	69	71	64	68	-
France	-	-	-	-	-	-	-	-	3,142
Italy	-	-	-	-	-	-	2,316	-	-
Luxembourg	-	-	-	-	-	-	-	-	67
Hungary	-	-	-	-	-	-	1,789	-	-
Netherlands	-	-	380	384	385	387	388	390	-
Slovenia	129	122	117	121	118	117	117	-	-
United Kingdom	-	2,497	2,508	2,508	2,508	2,507	2,508	-	-
Switzerland	1,881	1,873	1,850	1,868	1,887	1,888	1,878	-	-

Source: Questionnaires, national statistics, annual reports of railways. Note: data not available for some networks

4.15 The classification of stations is not harmonised. We deal for example with 3 stations types in Belgium, 4 station types in Italy according to size, 6 station types in Germany according to function and 13 categories in France differentiating by type of line and traffic level.

TABLE 4.11 CATEGORIZATION OF PASSENGER STATIONS IN BELGIUM

Category	2006
Main stations	37
Midsize stations	235
Stops without a station	222

Source: Questionnaires

TABLE 4.12 PASSENGER STATIONS IN BELGIUM

Station Name	Average number of daily trains	Average number of daily passengers	Average number of passengers per train
Bruxelles-Midi	741	34,900	47
Antwerpen-Berchem	646	13,343	21
Antwerpen-Caal	623	18,929	30
Gent-St Pierters	573	31,729	55
Charleroi	432	9,300	22
Liège-Guillemins	390	11,336	29
Namur	365	13,200	36
Brugge	334	12,857	38
Mons	270	7,100	26

Source: Questionnaires

TABLE 4.13 NUMBER OF DB STATIONS BY STATION TYPE, 2006

Category	2005	2006
1 Long distance transport node	21	21
2 Long distance system station	71	62
3 Local transport node, possibly with long-distance station	257	234
4 Highly frequented local transport station/ Local transport node	665	584
5 Local transport system station	1,360	1,315
6 Local transport station	3,286	3,204

Source: DB AG

TABLE 4.14 PASSENGER STATIONS IN ITALY BY CATEGORY

Category	2004
Major stations	13
Midsize stations	103
Other stations	2,200
of which located in urban areas	*300*
of which located in tourist areas in the south	*100*
of which small stations	*1,800*

Source: Questionnaires

TABLE 4.15 PASSENGER STATIONS (CATEGORY 1) IN ITALY

Station Name	Type of station	Daily trains	Daily passengers	Passengers per year
Roma Termini	Category 1	-	-	-
Milano Centrale	Category 1	-	320,000	120,000,000
Torino Porta Nuova	Category 1	-	-	70,000,000
Venezia Santa Lucia	Category 1	-	-	30,000,000
Venezia Mestre	Category 1	-	-	31,000,000
Verona Porta Nuova	Category 1	-	-	25,000,000
Genova Piazza Principe	Category 1	-	-	-
Genova Brignole	Category 1	-	-	-
Bologna Centrale	Category 1	-	159,000	58,000,000
Firenze Santa Maria Novella	Category 1	-	160,000	59,000,000
Napoli Centrale	Category 1	-	-	50,000,000
Bari Centrale	Category 1	-	-	-
Palermo Centrale	Category 1	-	-	-

Source: http://www.grandistazioni.it Note: data not available for some stations

TABLE 4.16 PASSENGER STATIONS IN FRANCE BY CATEGORY

Category			2006
Category A	Peri-urban lines	High-traffic	120
Category B		Medium-traffic	310
Category C	Main intercity lines	High-traffic	870
Category C*		High-traffic, maximum speed 220km/h	51
Category D		Medium-traffic	733
Category D*		Medium-traffic, maximum speed 220km/h	11
Category N1	High-speed lines	High-traffic	4
Category N2		Medium-traffic	3
Category N2*		Medium-traffic HSL Méditerranée	0
Category N3		Low-traffic	1
Category N3*		Low-traffic HSL Méditerranée	2
Category N4		East European high-speed line	3
Category E	Other lines		1,034

Source: Questionnaires

4.16 We have observed in the past the downgrading of stations with regard to ticket sales, luggage depository and luggage transport service as a result of staff reduction to improve productivity. Smaller railway stations are more affected than larger ones by

this scaling down of services. This process is most likely completed in EU-15 countries but continuing in EU-8 countries.

4.17 As we do not have detailed information we use the transport volume (the number of passengers) as an indicator for the development of the demand for services in passenger stations (see Table 4.17). Our forecast is based on the assumption that the development of the demand of services in passenger stations is similar to the development of number of railway passengers or of transport performance (pkm) assuming that average travel distance does not change significantly. Stations in the higher classes will expand services accordingly. At the same time, commercial services (shopping etc) at these stations will expand.

TABLE 4.17 CHANGE IN DEMAND FOR SERVICES IN PASSENGER STATIONS

Country	Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
Belgium	1.0%	0.5%
Czech Republic	-0.1%	0.3%
Denmark	0.6%	0.5%
Germany	0.4%	1.1%
Estonia	-2.6%	4.6%
Greece	1.5%	1.4%
Spain	3.3%	1.8%
France	2.1%	0.8%
Ireland	2.0%	1.1%
Italy	-0.3%	-0.3%
Latvia	0.0%	2.7%
Lithuania	0.0%	0.0%
Luxembourg	0.0%	0.0%
Hungary	-0.4%	-0.4%
Netherlands	2.1%	1.6%
Austria	2.0%	0.5%
Poland	0.0%	-0.6%
Portugal	0.5%	0.2%
Slovenia	3.6%	2.8%
Slovak Republic	-2.1%	-0.8%
Finland	1.0%	0.7%
Sweden	1.8%	0.3%
United Kingdom	1.1%	0.4%
Norway	-0.4%	0.5%
Switzerland	1.9%	1.7%
Bulgaria	-1.5%	2.5%
Romania	-3.3%	3.0%
EU-23	1.0%	0.7%
27 Networks	1.0%	0.8%

Source: Eurostat, EC, ECMT, UIC, national statistics and own estimates

4.18 As there are only few parties that are new entrants into the passenger market, there is little experience regarding access to information systems at stations, timetabling etc. But the future development of the demand for services in passenger stations will also depend on the liberalisation process in the rail passenger market.

Services in freight terminals (including security)

4.19 Underlying trends in this area are:

- growth in total goods transport performance (all modes combined) higher than GDP growth;
- share of rail transport has decreased in the past but is now stabilising in EU-15 countries; and
- strong growth in the combined transport market (double digit).

4.20 These trends translate into the following tendencies:

- increase of demand of services in freight terminals;
- capacity is not adequate in some terminals; and
- terminals of small importance have on the other hand some free capacity.

4.21 Information on terminals (inventories and/or transhipment capacity / demand is only available for selected terminals in several countries.

4.22 The demand in Belgian terminals will increase for all terminals whereas the increase varies between 25% and more than 200%.

TABLE 4.18 DEMAND IN BELGIUM TERMINALS

Name	Owner	Historic maximum [TEU]	Transhipments 2004 [TEU]	Transhipments in future [TEU]	Demand going forward
Mainhub	IFB	291,854	263,888	329,043	25%
Antwerpen Circkeldyck	IFB	298,168	218,512	288,000	32%
Antwerpen Schijnpoort	IFB	105,413	61,667	96,000	56%
Antwerpen Zomerweg	IFB	149,029	97,189	192,000	98%
Dry Port Muizen	IFB	79,472	51,838	64,000	23%
Renory	IFB/ECE	25,947	20,750	48,000	131%
Brussels Terminal Intermodal	CFNR/Haven van Brussel	-	-	-	-
LAR	Delcatrans	-	-	-	-
Dry Port Mouscron/Lille	DPML	34,712	34,712	48,000	38%
Genk Euro Terminal	ETGE nv	59,627	43,451	96,000	121%
PSA Zeebrugge	PSA Zeebrugge	-	-	-	-
Liège Logistivs Intermodal	LLI sa	26,843	19,880	64,000	222%
Charleroi Dry Port	CDP sa	29,395	20,787	64,000	208%
Athus	sa Terminal Athus	113,666	107,653	160,000	49%

Source: Questionnaires

4.23 With respect to Italy, detailed information was only provided for the terminals listed in the following table. Particularly for the terminal Busto Arsizio - Gallarate there is an increase of almost a third expected.

TABLE 4.19 DEMAND IN SELECTED TERMINALS IN ITALY

Name	Operator	Access [yes/no]	Historic maximum [ITU]	Transhipments 2004 [TEU]	Security staff [number]	Emergency staff [number]	Demand going forward
Busto Arsizio - Gallarate	Hupac	All	280,366	230,897	1	25	30%
Desio (Milan)	Hupac	All	15,227	14,656	1	1	5%
Milano Greco Pirelli	Hupac	All	9,553	9,553	1	1	0%

Source: Questionnaires

4.24 In Hungary, figures are available for the recent BILK terminal and a terminal owned and operated by the railway undertaking GySEV Rt.

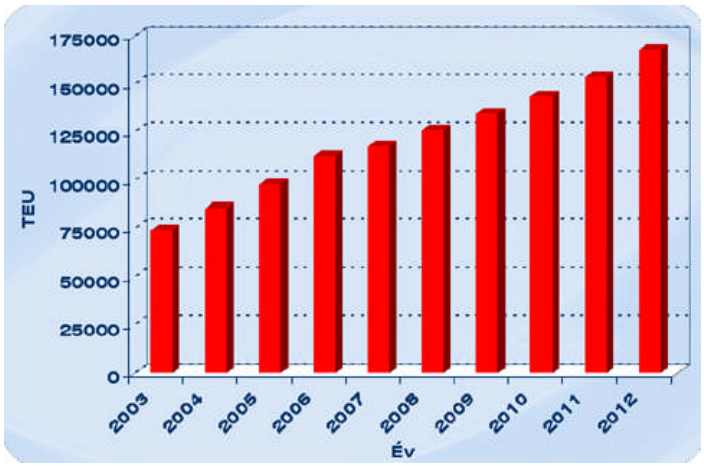
TABLE 4.20 DEMAND IN SELECTED TERMINALS IN HUNGARY

Name	Operator	Access [yes/no]	Transhipment capacity per year	Transhipments 2004	Emergency staff [number]	Demand going forward [TEU]
BILK Kombiterminal Co. Plc.	Intercontainer SA., Hungaria Intermodal Ltd., Metrans Danubia Ltd., Alpe-Adra SA., ETS Ltd.	Yes	150,000 TEU + 20,000 lorries	88,000 TEU + 1,500 lorries	6	
GySEV Rt. Raaberlag Logiszitkai Szolgaltatop Központ	GySEV Rt.	No	57,000 TEU	52,500 TEU		Exptd: 54,000 TEU

Source: Questionnaires, BILK Kombiterminal

4.25 Moreover, BILK provides estimations on the future development of the demand. Transhipments are expected to increase going forward, as shown in the figure below.

FIGURE 4.1 DEVELOPMENT OF TRANSHIPMENTS IN BILK KOMBITERMINAL



Source: BILK

4.26 The list of terminals in Poland is shown below. The available figures for three terminals indicate that there is a growing demand for transhipment in terminals. However, we do not have information on the expected future level.

TABLE 4.21 DEMAND IN TERMINALS IN POLAND

Name	Owner	Operator	Open access [yes/no]	Transhipments [TEU]		
				2002	2003	2004
Gdansk		PKP Cargo	Yes	20,269	22,537	42,838
Baltycki Terminal Kontenerowy	International Container Terminal Services Inc. (ICTSI)		Yes	252,247	308,526	377,236
Gliwice		PKP Cargo				
Krakow Krzeslawice		Spedcont	Yes			
Lodz		Spedcont				
Malaszewicze		PKP Cargo				
Poznan Garbary		Spedcont	Yes			
Pruszkow		Polzug	Yes			
Sosnowiec Poludniowy		Spedcont	Yes			
Szczecin		PKP Cargo	Yes	19,367	22,024	27,680
Swinoujscie						
Warszawa		Spedcont	Yes			
Kolsped Terminal Kontenerowy		No operator				
Wroclaw Glowny		Polzug	Yes			
Kobylnica Terminal Intermodalny		No operator				
Gadki		Polzug	Yes			
Slawkow		Polzug	Yes			
Medyka		Polzug	Yes			

Source: Questionnaires, UIRR

4.27 Terminals in Great Britain are privately operated and privately-owned or leased. On some main rail corridors, existing intermodal terminals are approaching full capacity utilisation and additional terminal capacity is being developed, either by constructing new terminals or by extending and reequipping existing facilities. Most new terminals are being developed as privately-funded commercial projects; some public funding may be available at certain locations. Since November 2005, third parties have rights of access to all rail-linked intermodal terminals.

4.28 For Great Britain we have also analysed the 'Existing Freight Connections' database provided on Network Rail's website and also used proprietary data bases of freight traffic flows in GB and other public domain sources to establish the number of rail-

served intermodal terminals in Great Britain.

4.29 There are currently 48 intermodal terminals in Great Britain. These are broadly categorised as follows:

- 18 terminals within ports (of which 9 are at major GB deep-sea container ports) and 30 terminals at inland locations; and
- 21 Terminals operated by Rail Freight Operating Companies (including terminals operated in partnership with third Parties or independent terminal operators) and 27 Terminals operated by third Parties or Independent Terminal Operators.

4.30 It has also been estimated that the total capacity of a network of 25 major GB terminals (included in the above table) functioning as distribution hubs for deep sea and other maritime container traffic, is 1.6 million transhipments per annum. However, additional terminal capacity is currently being added to this network. The capacity utilisation of this network is currently estimated to be around 70%. On the busiest routes from major ports, this figure may be higher.

4.31 As we did not get detailed information for all analysed countries, we refer to the *Study on infrastructure capacity reserves for combined transport by 2015* which was prepared for the International Union of Railways (UIC). Table 4.22 shows the transhipment volumes in 2002 and 2015; the measurement unit used is a loading unit.

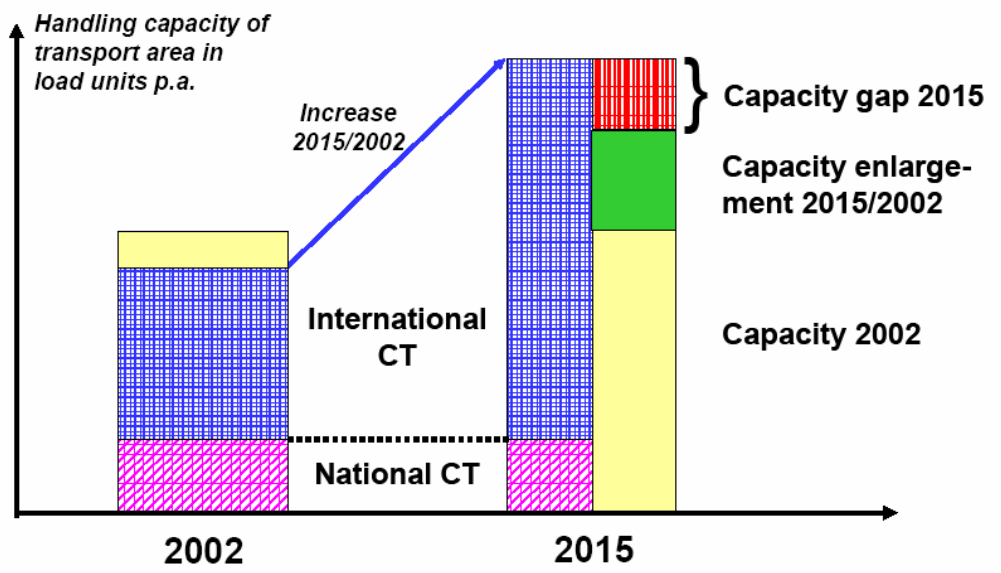
TABLE 4.22 TRANSHIPMENT VOLUME IN 2002 AND 2015

Country	Transport area	Transhipments [1,000 loading units]				Change 2002-2015	
		2002		2015			
		International	Total	International	Total	International	Total
BE	Antwerpen	195	357	257	614	32%	72%
	Genk	55	58	92	150	68%	159%
	Zeebrugge	120	120	186	306	55%	155%
CZ	Praha	139	149	139	288	0%	94%
DK	Taulov	50	75	55	130	9%	73%
DE	Bremen / Bremerhaven	205	542	285	813	39%	50%
	Duisburg	54	108	58	166	8%	54%
	Hamburg	271	853	369	1,222	36%	43%
	Koeln	193	266	251	517	30%	95%
	Lübeck	43	43	59	101	38%	138%
	München	56	200	83	283	49%	42%
	Neuss	65	75	71	146	9%	94%
	Nürnberg	55	119	76	195	38%	64%
	Mannheim / Ludwigshafen	131	261	182	443	39%	70%
ES	Barcelona	76	163	144	307	89%	88%
	Madrid	20	100	40	140	100%	40%
	Valencia	92	135	153	288	66%	113%
FR	le Havre	13	109	18	127	32%	17%
	Paris	64	175	93	270	44%	54%
IT	Bologna	44	94	62	155	40%	66%
	Milano	407	488	642	1,130	58%	132%
	Novara	182	183	295	478	62%	162%
	Verona	223	224	327	551	47%	146%
HU	Budapest	140	140	123	263	-12%	88%
NL	Rotterdam	391	516	477	993	22%	92%
AT	Graz	41	50	87	137	112%	174%
	Villach	45	51	70	121	57%	136%
	Wels	69	103	79	181	14%	76%
	Wien	110	152	131	282	19%	85%
PL	Gliwice	30	30	27	57	-10%	90%
	Poznan	27	27	26	53	-2%	96%
	Warszawa	40	40	39	79	-3%	98%
SI	Ljubljana	47	58	28	87	-40%	49%
CH	Basel	88	155	82	238	-6%	53%
	Total for all Europe	3,851	6,350	5,314	11,540	38%	82%

Source: IWW, Kombiconsult, Kessel&Partner: Study on Infrastructure Capacity Reserves for combined transport, prepared for the International Union of Railways (UIC), Final report, Freiburg/Frankfurt am Main/Paris, May 2004

4.32 The capacity available in 2002 and 2015 (considering planned capacity enlargement between 2002 and 2015) was analysed in this study. Figure 4.2 shows the overall development in from 2002 to 2015 and Table 4.23 shows the expected future "need" for each terminal area.

FIGURE 4.2 CAPACITY GAP 2015



Source: IWW, Kombiconsult, Kessel&Partner: Study on Infrastructure Capacity Reserves for combined transport, prepared for the International Union of Railways (UIC), Final report, Freiburg/Frankfurt am Main/Paris, May 2004

4.33 In most of the networks analysed in the UIC study, there will be a shortfall in terminal capacity.

TABLE 4.23 DETERMINATION OF EXPECTED "NEED" BY TERMINAL AREA BY 2015 [1,000 LOADING UNITS]

Country	Transport area	Capacity 2015	Total volume 2015	Rate of employment	Probable capacity gap 2015
BE	Antwerpen	940	614	65%	-
	Genk	122	150	123%	52
	Zeebrugge	365	306	84%	14
CZ	Praha	200	288	144%	128
DK	Taulov	120	130	108%	34
DE	Bremen / Bremerhaven	1,060	813	77%	-
	Duisburg	318	166	52%	-
	Hamburg	1,200	1,222	102%	262
	Koeln	300	517	172%	277
	Lübeck	140	101	72%	-
	München	320	283	88%	27
	Neuss	140	146	104%	34
	Nürnberg	320	195	61%	-
	Mannheim / Ludwigshafen	346	443	128%	166
ES	Barcelona	348	307	88%	29
	Madrid	192	140	73%	-
	Valencia	236	288	122%	99
FR	le Havre	39	127	326%	-
	Paris	658	270	41%	-
IT	Bologna	235	155	66%	-
	Milano	1,058	1,130	107%	284
	Novara	805	478	59%	-
	Verona	780	551	71%	-
HU	Budapest	300	263	88%	23
NL	Rotterdam	1,400	993	71%	-
AT	Graz	130	137	105%	33
	Villach	110	121	110%	33
	Wels	132	181	137%	75
	Wien	300	282	94%	42
PL	Gliwice	32	57	178%	31
	Poznan	65	53	82%	1
	Warszawa	60	79	132%	31
SI	Ljubljana	150	87	58%	-
CH	Basel	390	238	61%	-
	Total	13,272	11,184	84%	1,676

Source: IWW, Kombiconsult, Kessel&Partner: Study on Infrastructure Capacity Reserves for combined transport, prepared for the International Union of Railways (UIC), Final report, Freiburg/Frankfurt am Main/Paris, May 2004

Services in marshalling and shunting yards, train formation services and services in storage sidings

4.34 The demand for services in marshalling and shunting yards is related to the single wagon (load) market development (as part of the total rail freight market). We expect the following general trends with regard to demand for such services:

- restructuring of wagon load transport, e.g. by DB (MORA C, Project 200x) and SBB (Project Fokus);
- this will result in a decline of total number of marshalling yards and therefore the concentration on hubs;
- decline of importance of single wagon load transport whilst continuous demand for transportation of heavy, high-volume products (e.g. coal) in wagon load transport in block trains as well as growing demand for transport in combined transport (particular for continental and maritime unaccompanied combined transport); and
- decline of private sidings.

4.35 The stakeholders were asked for the prospects of demand for services in marshalling and shunting yards which we defined as wagons handled per year. Data on the use of individual marshalling and shunting yards would be the best information to analyse the single wagon traffic and to discuss potential developments. We only received information for such facilities located in Hungary (see Table 4.24). In Hungary, a slight increase of demand for services in marshalling yards (measured in wagons handled per year) was expected for 2005. However, between 1995 and 2005, demand declined by more than a half in total or rather 8% on an average per year. However, it is hardly possible to forecast the change rates for 2005-2010 and 2005-2015 respectively, as we do not have data in form of time series.

TABLE 4.24 MARSHALLING YARDS IN HUNGARY (2004)

Name	Owner	Operator	Historical maximum 1995 [wagons handled per year]	Current demand [wagons handled per year]	Future expectation 2005 [wagons handled per year]	Absolute change 1995-2005
Sopron-Rendezö	GySEV Rt.	GySEV Rt.		60,000	65,000	
Budapest Ferencváros (K, Ny)	Republic of Hungary	MÁV ZRt.	596,487	340,283	315,764	-47%
Rákosrendezo	Republic of Hungary	MÁV ZRt.	103,669	-	0	-100%
Rákos	Republic of Hungary	MÁV ZRt.	40,333	-	0	-100%
Komárom	Republic of Hungary	MÁV ZRt.	181,527	-	0	-100%
Felsögalla	Republic of Hungary	MÁV ZRt.	5,919	-	0	-100%
Székesfehérvár	Republic of Hungary	MÁV ZRt.	86,560	-	0	-100%
Miskolc	Republic of Hungary	MÁV ZRt.	196,667	163,695	175,292	-11%
Hatvan	Republic of Hungary	MÁV ZRt.	83,679	-	0	-100%
Szolnok	Republic of Hungary	MÁV ZRt.	150,083	-	0	-100%
Debrecen	Republic of Hungary	MÁV ZRt.	23,730	-	0	-100%
Nyiregyháza	Republic of Hungary	MÁV ZRt.	37,972	-	0	-100%
Fényeslitke (É, D)	Republic of Hungary	MÁV ZRt.	326,530	141,268	215,865	-34%
Békéscsaba	Republic of Hungary	MÁV ZRt.	119,188	83,835	86,973	-27%
Kiskunfélegyháza	Republic of Hungary	MÁV ZRt.	17,875	-	0	-100%
Dombóvár	Republic of Hungary	MÁV ZRt.	185,626	42,876	0	-100%
Celldömölk	Republic of Hungary	MÁV ZRt.	142,302	94,905	122,629	-14%
Normal wagons total			2,298,147	866,868	981,523	-60%
Záhony	Republic of Hungary	MÁV ZRt.	40,735	-	0	-100%
Eperjeske	Republic of Hungary	MÁV ZRt.	114,113	94,683	175,585	54%
Broad-gauge wagons total			154,848	94,683	175,585	13%
Total			2,452,995	961,551	1,157,108	-55%

Source: Questionnaires

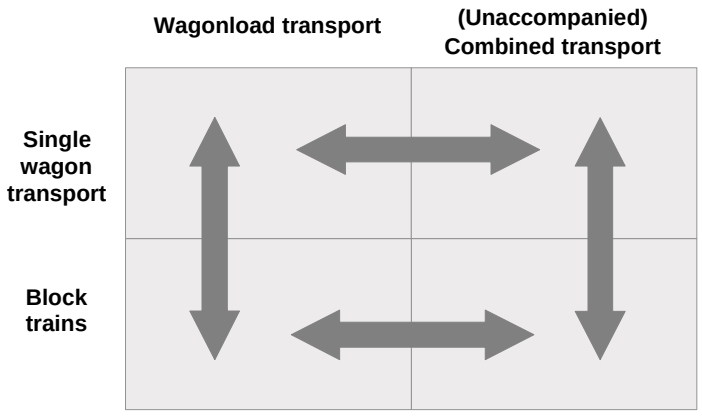
4.36 As we only received information for marshalling yards in Hungary we gathered statistical information by desk research from the railway undertakings and infrastructure managers (annual reports, statistical vademecums etc.). The data available turned out to be minimal which made the analysis of the single wagon traffic and therefore for the demand in marshalling and shunting yards complicated:

- data is not available for the single wagon traffic only

- there are problems in the separation of wagon load transport by type of production (full train loads/block trains, single wagon traffic);
- furthermore sometimes groups of wagons are operated as full train loads;
- there are problems in separation of wagon load and combined transport in case of mixed block trains (wagon load and containers in intermodal transport);
- there are problems in the separation of single wagon traffic in wagon load transport and in unaccompanied combined transport: for example in Switzerland the delivery out of the terminals (of the containers) in unaccompanied combined transport is sometimes operated by rail (pick-up freight trains) instead of on the road; production in combined transport could be also in single wagon traffic and not only in block trains (e.g. shuttle-trains); and
- in combined transport the role of the parties involved is not always clear, for example railway undertakings offer not only the traction for combined transport (for the operators in combined transport) but also offer "own" products or products in cooperation with other companies in combined transport (e.g. SBB Cargo with Cargo Domino in intermodal loading units for customers without branch line; Rail Cargo Austria with its subsidiary company Speditions Holding AG which is the owner of Intercontainer Austria).

4.37 The liberalisation of the rail freight market resulted in the market entry of new railway undertakings and the establishment of subsidiary companies of RUs already operating in other Member States. This resulted in competition between the RUs and consequently in the restructuring of the rail freight market which is still ongoing (for example Railion is restructuring the single wagon traffic, Project 200x). When analysing the demand for services in marshalling and shunting yards, only the (production) market segment single wagon traffic is of interest but as mentioned above to assess the transport performance in this segment is complicated. The following figure tries to make this overlap clear.

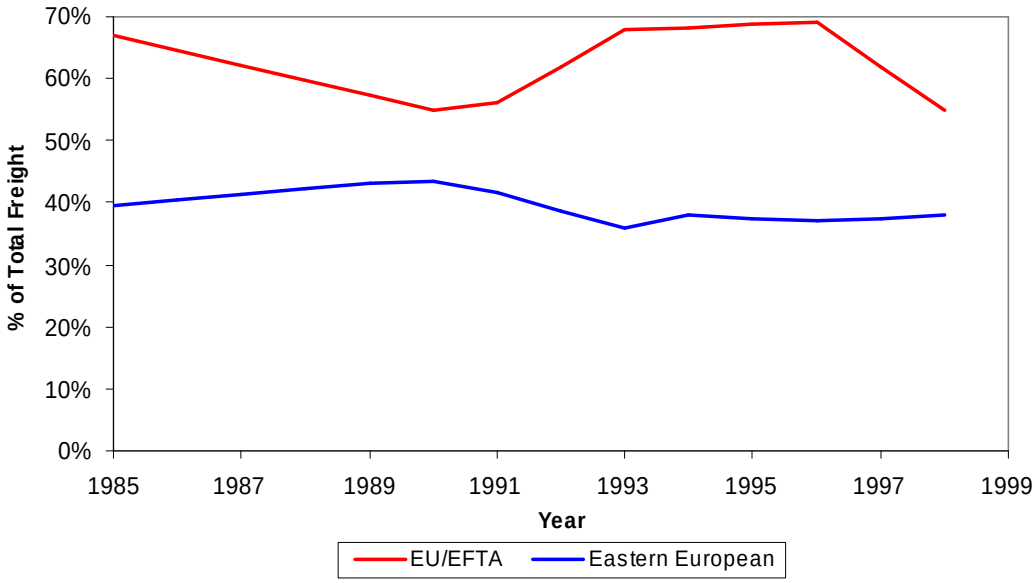
FIGURE 4.3 THE OVERLAP OF TRANSPORTATION TYPES



4.38 The *Study of Single Wagonload Rail Traffic*, prepared for the European Commission, DG TREN in 2001, analysed the development of the single wagon load transport

market[8]. Figure 4.4 on the development of the wagon load market share (as a proportion of total rail freight movements) for the EU and EFTA states (blue line) as well as for key CEEC states (red line) shows a higher share for the (selected) CEEC than for EU/EFTA countries. The EU/EFTA share reached its minimum level in 1993 and since then slightly increased. The share of the selected CEEC states shows a decrease up to 1990, then an increase up 1996 but then again a substantial decrease[9].

FIGURE 4.4 WAGON LOAD MARKET SHARE IN TOTAL RAIL FREIGHT



Source: Symonds et al.

4.39 The figure above ends in 1998 and we therefore tried to collect current data at least on the wagon load and combined transport by the railway undertakings. As already stated above the data gathering turned out to be difficult. Regulation (EC) 91/2003 lays down the railway statistics to be gathered by the member states. As specified in the Annex A of this Regulation the reporting of transport performance by the type of consignment ("may be broken down as follows: full train loads, full wagon loads and other") is optional. The reported data by country is – as expected – incomplete. However, the result of the data analysis is as follows:

- The share in full train load in Germany reached about 60% in 2004;
- In Ireland, the share in full train load is almost 80% in 2005; the same situation as in Italy in 2004;

[8] Symonds Group Ltd et al.: A Study of Single Wagonload Rail Traffic, prepared for the European Commission, DG TREN, Final Report, July 2001.

[9] The authors of this study noted 'that there are some data quality problems with this Figure as the number of railways completing the relevant UIC returns varies year by year. This appears to be the reason for the increase in the percentage for CEEC states between 1991 and 1993.'

- Poland: increase in the share of full train load from 62% in 2004 to 65% in 2005;
- In Slovakia, the share of full trains load decreased by 2 percentage points from 2004 to 2005 (62%);
- Slovenia: increase in full train load share from 42% in 2004 to 49% in 2005; and
- Sweden: the share of full train loads increased from 42% in 2000 up to 52% in 2005.

4.40 As a conclusion, we expect an overall decline of the demand for services in marshalling yards due to the fact that the marshalling and shunting processes are complex and very expensive. New entrants concentrate on block trains as they are more profitable and due to the requirements for access to marshalling and shunting yards. The competition in the rail freight market resulted and will continue to result in restructuring of the rail freight market, particularly in the single wagon traffic. We also expect an increase in intermodal rail-road transport due to the promotion of the harmonisation and standardisation of intermodal loading units but also due to increasing intercontinental transport in containers. However, the data reported to Eurostat is not adequate (and for example the type of consignment is not defined) to fully analyse and forecast the transport performance in single wagon traffic and hence the demand for services in marshalling and shunting yards.

Train formation services

4.41 Due to the fact that the passenger market has not developed fully in a large number of networks and that new entrants only exist in a small number of markets, there is very little information about the demand for train formation services. This is further supplemented by the fact that in the market with the highest number of passenger operators, Great Britain, the rolling stock that is used is in the majority of cases fixed multiple units and as a result there is very little demand for such services.

4.42 We are aware of the fact that this analysis hardly meets the expectation of the European Commission. However, we must be clear that there is no obligation for any operator of such services to provide data that they may consider commercially sensitive. A different approach (for example benchmarking) would be necessary to obtain meaningful results.

TABLE 4.25 AVERAGE CHANGE RATE P.A. IN DEMAND FOR TRAIN FORMATION SERVICES

Country	Yearly variance 2004-2010 [% p.a.]	Yearly variance 2000-2010 [% p.a.]	Yearly variance 2010-2015 [% p.a.]
Belgium	-1.7%	-0.8%	0.5%
Czech Republic	0.0%	1.0%	0.3%
Denmark	-1.4%	1.1%	0.5%
Germany	0.9%	0.1%	1.0%
Estonia	-2.2%	-3.6%	4.1%
Greece	2.8%	-	1.2%
Spain	2.6%	2.2%	1.6%
France	2.2%	2.0%	0.7%
Ireland	0.8%	1.9%	1.0%
Italy	-1.9%	0.6%	-0.3%
Latvia	4.7%	0.8%	2.4%
Lithuania	6.8%	1.1%	0.0%
Luxembourg	0.7%	-	0.0%
Hungary	-2.4%	0.4%	-0.4%
Netherlands	3.0%	0.0%	1.4%
Austria	1.5%	0.5%	0.5%
Poland	0.0%	-1.9%	-0.7%
Portugal	3.0%	-2.2%	0.2%
Slovenia	2.7%	2.4%	2.6%
Slovak Republic	3.3%	0.7%	-0.9%
Finland	4.4%	3.8%	0.6%
Sweden	2.1%	-	0.3%
United Kingdom	-0.9%	-	0.4%
Norway	1.6%	3.3%	0.5%
Switzerland	1.7%	1.6%	1.6%
EU-23	0.7%	-	0.6%
27 Networks	0.8%	-	0.7%

Source: Eurostat, national statistics and own calculations Note: data for Bulgaria and Romania not available; yearly variance 2000-2010 for EU23 and EU27 Networks is missing as a result of gaps in the data available for some networks

4.43 As more passenger markets are liberalised, the demand for train formation services will rise in general in line with the change in train-km in passenger transport. The change rates in traffic performance in rail passenger transport have been adjusted downwards to take account of the fact that some of the operators will use multiple units and such will not need as much of this service (see Table 4.25).

4.44 There is no detailed information on storage sidings available so a forecast of the demand for such services is not possible. Only for Finland we received the information that the capacity could be a problem if there is an expansion in the number of operators, both in terms of physical and operational barriers. In general, it would be possible that (long-term) contracts between the owners/operators of the storage sidings with railway undertakings may be a problem when all storage sidings are contracted (although not necessarily used) and a new entrant does not have the opportunity to get access to the storage sidings.

Maintenance, technical inspection services and cleaning of rolling stock and repair services

4.45 The number of rolling stock in use and the traffic performance (measured in train-km) of the rolling stock are indicators for the future development of the demand of maintenance, technical inspection services and cleaning of rolling stock and repair services. The statistics for rolling stock also include vehicles not in use. In recent years, railway rolling stocks have been scrapped or sold outside Europe, so a decrease in the numbers does not necessarily imply a decrease in the demand of the related services.

4.46 Statistics of locomotives which are mainly used for freight transport show a declining tendency in most of the countries as set out in the table below.

TABLE 4.26 DEVELOPMENT OF THE LOCOMOTIVE STOCK

Country / Year	Locomotives (number)							
	1990	1995	2000	2001	2002	2003	2004	2005
Belgium	1,040	977	969	965	914	762	770	-
Czech Republic	-	2,968	2,829	2,639	2,476	2,478	2,456	-
Denmark	376	315	215	187	182	184	177	-
Germany	-	8,985	7,054	6,127	5,949	-	-	-
Estonia	-	143	119	119	173	178	121	-
Greece	233	234	157	156	155	153	157	-
Spain	1,287	1,081	899	884	860	834	821	-
France	5,654	5,295	4,983	4,987	4,983	4,836	4,670	4,372
Ireland	126	114	107	107	104	97	-	94
Italy	-	3,268	3,270	-	3,444	-	-	-
Latvia	484	349	248	232	229	229	217	-
Lithuania	-	329	278	265	254	254	251	249
Luxembourg	80	76	94	92	88	102	93	96
Hungary	1,617	1,352	1,107	1,100	1,061	1,059	1,029	-
Netherlands	522	526	305	-	267	279	225	-
Austria	1,232	1,333	1,280	1,287	1,316	1,370	-	-
Poland	4,076	6,094	4,027	4,040	4,179	4,275	4,396	-
Portugal	320	275	229	221	198	189	171	-
Slovenia	236	214	186	184	180	163	162	150
Slovak Republic	-	1,322	1,209	1,167	1,131	1,116	1,072	-
Finland	682	663	622	630	629	630	631	-
Sweden	-	740	691	674	663	664	678	-
United Kingdom	2,242	-	997	1,005	1,014	1,017	-	-
Norway	326	235	172	172	-	-	-	-
Switzerland	1,435	1,454	-	-	-	-	-	-
Bulgaria	-	876	-	673	602	597	585	580
Romania	-	4,370	3,448	3,318	3,260	3,188	-	-
EU-23	20,207	36,653	31,875	27,068	30,449	20,869	18,097	-
27 Networks	21,968	43,588	35,495	31,231	34,311	24,654	18,682	-

Source: Questionnaires, Eurostat, EC, UIC, national statistics Note: data not available for some networks; data for EU23 and EU27 Networks for 2005 are missing as a result of gaps in the data available for some networks

4.47 In most countries, the number of railcars almost exclusively used in passenger transport increased in recent years (see the table below).

TABLE 4.27 DEVELOPMENT OF THE RAILCAR STOCK

Country / Year	Railcars (number)							
	1990	1995	2000	2001	2002	2003	2004	2005
Belgium	687	597	701	741	764	760	759	-
Czech Republic	-	960	973	970	968	977	985	-
Denmark	546	-	414	485	531	-	-	-
Germany	2,170	2,774	6,946	-	-	-	-	-
Estonia	-	80	77	75	63	63	57	-
Greece	168	196	90	90	88	89	112	-
Spain	785	762	794	806	804	806	826	-
France	1,768	1,921	2,175	2,253	2,358	2,404	2,479	2,576
Ireland	40	57	117	117	-	-	-	-
Italy	-	1,443	1,445	-	1,595	-	-	-
Latvia	265	246	181	167	159	159	159	-
Lithuania	-	70	63	63	61	60	62	62
Luxembourg	19	34	37	40	39	39	42	48
Hungary	282	287	339	342	343	363	370	-
Netherlands	722	-	1,845	1,866	1,883	1,922	1,969	1,957
Austria	321	520	496	482	464	442	-	-
Poland	1,407	1,372	1,266	1,246	1,207	1,204	1,207	-
Portugal	228	318	351	332	306	296	294	-
Slovenia	122	113	114	120	130	114	114	117
Slovak Republic	-	373	361	344	320	315	329	249
Finland	100	100	112	112	119	119	129	147
Sweden	-	-	363	451	519	529	514	-
United Kingdom	4,316	-	-	8,279	8,279	3,282	3,309	3,089
Norway	160	145	172	172	-	-	-	-
Switzerland	252	245	-	-	-	-	-	--
Bulgaria	-	-	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-
EU-23	13,946	12,223	19,260	19,381	21,000	13,943	13,716	-
27 Networks	14,358	12,613	19,432	19,553	21,000	13,943	13,716	-

Source: Questionnaires, Eurostat, EC, UIC, national statistics Note: data for Bulgaria and Romania not available; some data not available for other networks; data for EU23 and EU27 Networks for 2005 are missing as a result of gaps in the data available for some networks

4.48 As shown in Chapter 3 we expect passenger and freight transport to increase in terms of traffic performance but with lower growth rates than transport performance (measured in tkm and pkm) due to an increase in efficiency of rail transport, i.e. an increase in the occupancy (average number of passengers per train) and the average

load (tonnes per freight train). Furthermore, stakeholders have pointed out that rolling stock now needs less maintenance than in the past. As new entrants use predominantly leased (new) rolling stock, the average age of the overall used rolling stock will drop further. Therefore, we expect no increase in demand of maintenance and repair services. It is assumed that a surplus supply in depots may exist in the next years. This will speed up the market opening process for such facilities. In Switzerland for example, an excess supply already exists. On the other hand, demand for inspection services is likely to increase with the increase of traffic performance.

4.49 The recently published results of the *European Rolling Stock Maintenance Survey* focused on issues such as the average age of the rolling stock[10]. They also assume that the older the rolling stock, the more frequently maintenance must be carried out. The results of the survey regarding the average age of the rolling stock fleet are as follows:

- traditional railway undertakings (e.g. SNCF, SBB, NS and SJ) have rolling stock with an average age of between 15 and 20 years; and
- undertakings who have recently won a franchise have invested in new rolling stock; therefore their average age is considerably lower than incumbent undertakings.

4.50 As regards the demand for cleaning services, the following table shows the development of the stock of railcar trailers and coaches as cleaning services are of importance mainly for passenger transport.

[10] European Rolling Stock Maintenance Survey, in: European Railway Review, Issue 4, 2006.

TABLE 4.28 DEVELOPMENT OF STOCK OF RAILCAR TRAILERS AND COACHES

Country / Year	Railcar trailers and coaches (number)							
	1990	1995	2000	2001	2002	2003	2004	2005
Belgium	3,271	3,136	3,501	3,479	3,413	3,358	3,292	3,251
Czech Republic	-	5,996	5,284	5,259	5,149	5,121	5,019	-
Denmark	1,533	-	1,603	1,742	1,937	-	-	-
Germany	14,128	17,950	21,097	20,864	21,723	20,992	-	-
Estonia	-	504	241	308	203	251	243	-
Greece	810	869	503	504	503	457	514	
Spain	3,907	4,273	3,701	3,654	3,742	-	3,843	-
France	15,798	15,799	15,694	15,653	15,685	15,553	15,627	15,879
Ireland	333	331	421	421	419	405	-	-
Italy	14,025	13,451	11,935	-	11,007	-	-	-
Latvia	1,137	1,066	701	622	598	580	537	-
Lithuania	-	696	563	537	509	480	471	467
Luxembourg	116	112	112	112	112	112	-	-
Hungary	4,454	3,754	3,191	3,226	3,087	3,093	3,060	-
Netherlands	2,622	2,611	2,742	-	2,832	2,758	2,802	-
Austria	3,689	3,740	3,468	3,332	3,320	3,175	-	-
Poland	8,683	11,377	9,761	9,544	8,985	8,877	8,603	7,725
Portugal	1,033	1,380	1,417	1,313	1,249	1,221	1,168	-
Slovenia	728	513	461	470	482	432	403	423
Slovak Republic	-	2,638	2,273	1,915	2,229	1,984	1,797	1,759
Finland	965	953	1,002	1,011	1,030	1,060	1,029	1,084
Sweden	1,698	1,633	1,174	1,847	1,885	1,884	-	-
United Kingdom	12,564	-	2,217	10,425	16,981	16,982	-	10,872
Norway	905	897	918	942	930	-	-	-
Switzerland	4,124	3,879	3,333	3,925	4,020	4,076	-	-
Bulgaria	-	2,190	-	1,874	1,655	1,705	1,749	1,217
Romania	-	6,666	6,429	6,474	6,019	5,560	-	-
EU-23	91,494	92,782	93,062	86,238	107,080	88,775	48,408	41,460
27 Networks	96,523	106,414	103,742	99,453	119,704	100,116	50,157	42,677

Source: Questionnaires, Eurostat, EC, UIC, national statistics Note: data not available for some networks; data from 2003 onwards is lower as a result of gaps in the data available for some networks

4.51 In most of the countries, the passenger vehicle stock decreased in the last years and we expect that the trend will continue in the next years. On the other hand, the traffic performance (measured in train-km) in passenger transport shows a slight increase. Therefore, we expect a slight increase in demand for cleaning services.

4.52 Overall, we expect that demand for maintenance, repair, inspection and cleaning services could be met by present facilities if these were open to all RUs, that is an open market developed for such services.

Back-up services

4.53 In most of the countries, the obligations of the railway undertakings to assure back-up services are regulated in the track access conditions. In contrast, in Great Britain for example there is an open market for breakdown services. Any owner of a locomotive can provide its locomotives to recover a train; in practice there are about 3 companies that actually do this on a regular basis.

4.54 However, breakdowns of locomotives en route are the exception rather than the rule; hence we do not expect that a market will develop for such services. Statistical information on actual back-up service requirements is not available.

4.55 The reliability of locomotives was assessed in the interviews. As not all RUs answered the questions, we only have a limited insight in this matter. The reliability of locomotives used by new entrants is generally considered to be higher but we are missing concrete evidence. We have also reasons to believe that the rolling stock fleets are being modernised but there are no statistics on the age of the present fleets.

4.56 However, assuming that the average age of locomotives is dropping and given the trend to locomotives which need less maintenance, we also expect that the demand for back-up services will not increase even if the traffic performance of these vehicles will slightly increase in the next 10 years. But if the incumbents start to sell off their second hand rolling stock rather than scrap the vehicles, it is possible that the amount of old rolling stock on certain networks where second-hand rolling stock is used may increase and as a result, there would be more breakdowns.

Locomotive pushing services

4.57 Locomotive pushing services are mainly needed in mountainous areas such as the Alps or the Pyrenees. Basically, it is the responsibility of the RUs in most of the countries to arrange for such services. It is hardly possible to get any information on this and to outline the structure of demand for such services.

4.58 In Poland for example, locomotive pushing services are of minor importance whilst in Switzerland pushing services are requested more often due to the nature of the terrain. As the train-kilometres in freight transport in Switzerland will slightly increase by 4% between 2000 and 2010 and by 3% between 2010 - 2015 p.a. on average, we also expect a slight increase in demand for locomotive pushing services on the same level. However, as part of the NEAT project (Neue Eisenbahn-Alpentransversale) the Lötschberg-Simplon-Axis (Lötschberg-Basistunnel) is planned to be opened in 2007 and the Gotthard-Axis (Gotthard-Basistunnel) is planned to be opened by the end of 2015. This will result in a lower demand for railway pushing services.

Services in border stations

4.59 The services that are required in border stations could be locomotive change, track gauge change, border control, customs clearance, sanitary and veterinary controls,

document checks and/or technical checks. However, services such as customs clearance are not necessary at borders between EU Member States and locomotive change is not necessary when a multi-system locomotive is used. The supply of services in border stations and the open access to the necessary facilities is of importance as cross-border rail traffic is increasing.

4.60 For France and Italy we have some information on the average number of train paths per category per day for certain border stations as well as their train path capacity. As regards train paths, all border stations have free capacity available.

TABLE 4.29 SELECTED BORDER STATIONS IN FRANCE

Name	Long-distance passenger trains	Regional passenger trains	Freight trains	Other	Capacity
Modane -> Bardonecchia	0	4	41		57
Bardonecchia ->Modane	0	4	38		54
Thionville ->Bettembourg	16	7	36		115
Remilly ->Forbach	13	5	15		110
Forbach ->Remilly	15	5	15		110
Apach ->Thionville	3	0	16		57
Apach <-Thionville	4	0	15		57
Strasbourg ->Kehl	9	6	4		60
Strasbourg <- Kehl	10	6	4		54
Mulhouse ->BALE	70	37	184		127
Mulhouse <- BALE	22	30	28		127
Total	162	104	396		928

Source: Questionnaires

TABLE 4.30 BORDER STATIONS IN ITALY

Name	Long-distance passenger trains	Regional passenger trains	Freight trains	Other	Capacity
Domodossola	25	58	30	23	360
Domo II	0	0	95	26	360
Luino	0	37	85	25	360
Chiasso	37	39	74	0	360
Chiasso Smistamento	0	0	75	0	360
Brennero	16	27	145	29	360
Tarvisio	12	15	94	45	360
Modane	10	0	85	40	240
Ventimiglia	20	72	18	42	240
Villa Opicina	6	0	27	45	312
Total	126	248	728	275	3,312

Source: Questionnaires

4.61 As regards the level of demand for services in the border stations, we have no information. Hence, it is not possible to forecast the level of demand for such services. However, statistical information from Eurostat for a number of countries indicates that between 2003 and 2005, international rail transport increased in almost all countries. Due to further integration of the European Railway Area, international transport will increase faster than domestic and international transport combined. Therefore, border-crossing traffic will increase albeit less than transport demand given the trend to higher average load. On the other hand, with progressing interoperability, for example the use of multi-system locomotives, certain services for border-crossing will lose importance. To date the majority of new operators, especially on the alpine routes, have acquired dual voltage rolling stock and as a result do not need to stop at border crossings to change locomotives, this is a practice that is likely to increase and have an effect on the demand for such border services.

4.62 In the interviews carried out for this study, problems at border stations were expressed particularly for Poland. This is also analysed and described more deeply in the study on rail border agreements prepared for the European Commission, DG TREN[11]. Therefore, we arrive at the conclusion that the demand for cross-border rail traffic (and so for services in border stations) is probably higher than the supply or rather the access conditions to services and/or facilities.

Train driver and other training services

4.63 The increase in traffic (measured in train-kilometres) will also result in an increase of demand for additional train drivers and therefore also in an increase in demand for

[11] Colin Buchanan and Partners: A Study on the compliance of rail border traffic agreements with EU rail and competition legislation, prepared for the European Commission, DG TREN, Final report, June 2005.

training services in the coming years. Moreover, the further integration of the European Railway Area, i.e. the increase in cross-border operations will result in an additional increase in the demand for specific railway staff, e.g. train drivers with license for more than one railway network. Railway undertakings located in Italy, Hungary, Norway and Great Britain all indicated that additional train drivers are needed in future years.

4.64 As regards Great Britain, the Association of Train Operating Companies (ATOC)[12] collects and monitors manpower statistics about train drivers in Great Britain, on behalf of its members (passenger train operating companies (TOCs) and freight train operating companies (FOCs)). Based on the figures below and the assumption that all 'productive' train drivers will also be employed in 2007 plus the additional train drivers recruited, the increase in the demand for drivers will be for passenger transport about 6% and for rail freight transport about 18%.

TABLE 4.31 ESTIMATED GB TRAIN DRIVER POPULATION 2006 FROM ATOC

Driver category	No. of drivers (Rounded)
'Productive'[13] Train Drivers employed by TOCs	11,250
'Productive' Train Drivers employed by FOCs	2,900
Total: Productive' Train Drivers employed by FOCs and TOC'S	14,150

Source: ATOC

TABLE 4.32 ESTIMATED RECRUITMENT REQUIREMENTS 2006-7 FROM ATOC[14]

Year	Recruitment requirement
Projected Annual Recruitment Requirement 2006 (TOCs+FOCs)	720
Projected Annual Recruitment Requirement 2006 (TOCs+FOCs)	520
Average Annual Recruitment Requirement 2006 (TOCs+FOCs)	620

Source: ATOC

4.65 In Belgium there exist several training centres which have free capacity. Overall, 350 train drivers were trained in the last 10 years in Belgium.

---

12 The Association of Train Operating Companies is an incorporated association owned by its members who are generally the operators of franchised passenger services in Great Britain. Open access passenger train operators may be invited to join ATOC and EWS, as a rail freight operating company also operating non-franchised passenger services, is a member –however, Eurostar UK Ltd is not a member. ATOC was set up by the train operators formed during the privatisation of British Rail under the Railways Act 1993. As well as being the official voice of franchised passenger train operating companies, ATOC also provides its members with a range of services that enable them to comply with conditions laid on them in their contractual franchise agreements and operating licences.

13 Trained and available for duty.

14 Rounded to the nearest 20.

TABLE 4.33 TRAINING FACILITIES IN BELGIUM

Name	Capacity (NL/FR)	Number of train drivers in basic training
Antwerpen	150/-	8
Ardenne – Arlon	-/50	-
Ardenne – Namur	-/60	16
Bruxelles	80	8
Charleroi	-/60	13
Kortijk	20/-	11
Hasselt/Leuven	80/-	21
Liège Guillemins	-/80	13
Merelbeke	120/-	10
Mons	-/40	-
Ostende	20/-	-

Source: Questionnaires

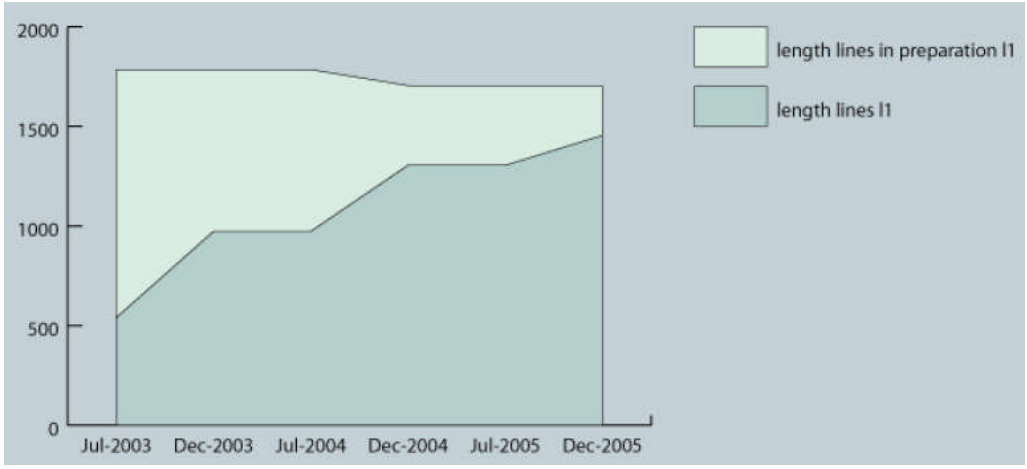
4.66 The supply of train driver and other train services varies between the countries. In some countries, there exists an open access to training facilities and several training services are offered, e.g. in Switzerland (login), Germany, Spain, Hungary (owned by MAV), Norway and Great Britain. On the other hand access to training facilities is restricted, or training is dominated by the incumbent railway. However, there is a demand for training services now and in future years. On the other hand, capacity constraints in training facilities could also lead to a shortage of trainer drivers in countries where access to the facilities is guaranteed.

Provision of on-board train protection systems, telecom and communications services

4.67 As regards the provision of on-board train protection systems there are two aspects which have to be taken into consideration: on the one hand the equipment of railway lines and therewith associated the equipment of rolling stock for train control and signalling systems. At the moment there exist several train signalling and control systems in Europe. The European rail traffic management system (ERTMS) has been developed to overcome this obstacle to cross-border rail traffic.

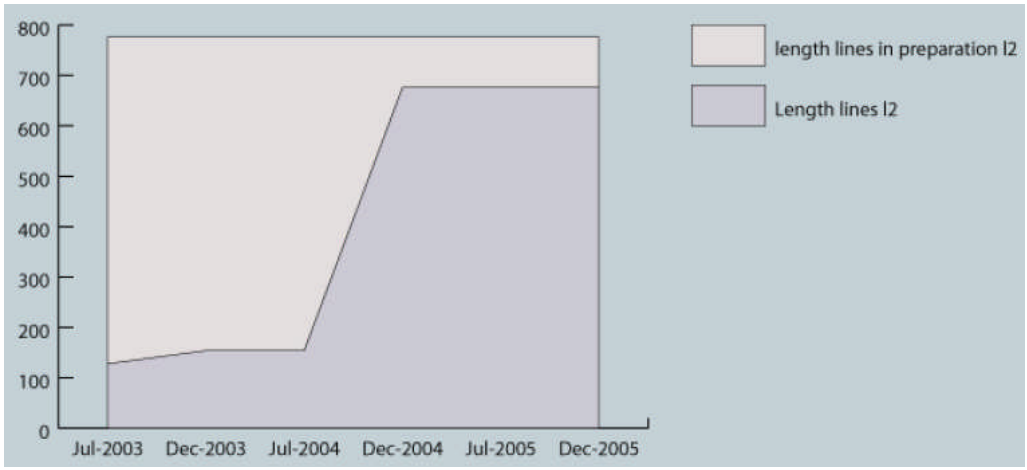
4.68 The basic components of ERTMS are the European Train Control System (ETCS) and GSM-R. The following figures show the deployment of ERTMS/ETCS as regards the railway lines. The figures show the length of railway lines equipped with ERTMS/ETCS level 1 and level 2. At present Eurostat does not provide statistics on the train signalling and control systems of the railway infrastructure in each country.

FIGURE 4.5 RAILWAY LINES EQUIPPED WITH ERTMS/ETCS LEVEL 1



Source: UNIFE

FIGURE 4.6 RAILWAY LINES EQUIPPED WITH ERTMS/ETCS LEVEL 2



Source: UNIFE

4.69 The first figure provides an overview of the lines for which commercial use of ETCS is planned before the end of 2008.

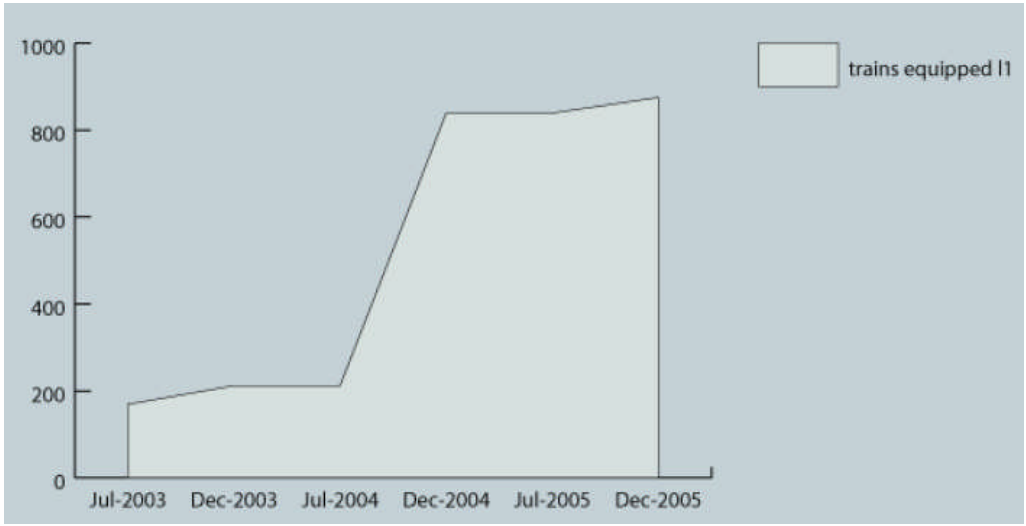
FIGURE 4.7 LINES FOR WHICH COMMERCIAL USE OF ETCS IS PLANNED BEFORE THE END OF 2008 IN EU-25 (STATUS MAY 2005)

Source: European Commission

4.70 The demand for the provision of on-board train protection systems will develop according to the number of rolling stock to be equipped, the use of multi-system locomotives and the extension of the network with ERTMS/ETCS. In most of the countries the stock of locomotives decreased in recent years. But no statistics on the

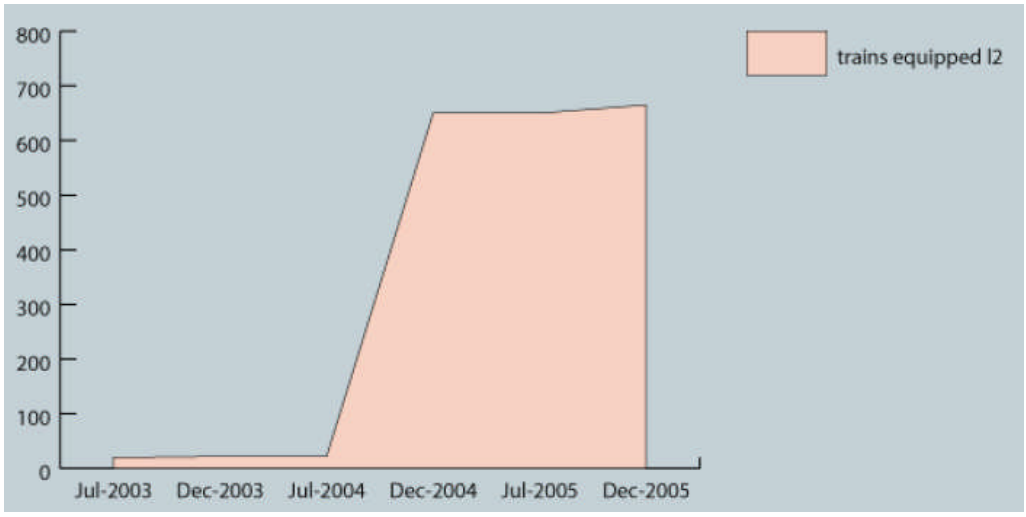
homologation of new rolling stock is available. As multi-system locomotives are very capital intensive we expect no major impact of the use of such locomotives on the demand for on-board train protection systems. Thirdly and most importantly is the deployment of ERTMS/ETCS. The following figures shows the number of trains in the EU equipped with ERTMS/ETCS level 1 and 2 respectively.

FIGURE 4.8 TRAINS EQUIPPED WITH ERTMS/ETCS LEVEL 1



Source: UNIFE

FIGURE 4.9 TRAINS EQUIPPED WITH ERTMS/ETCS LEVEL 2



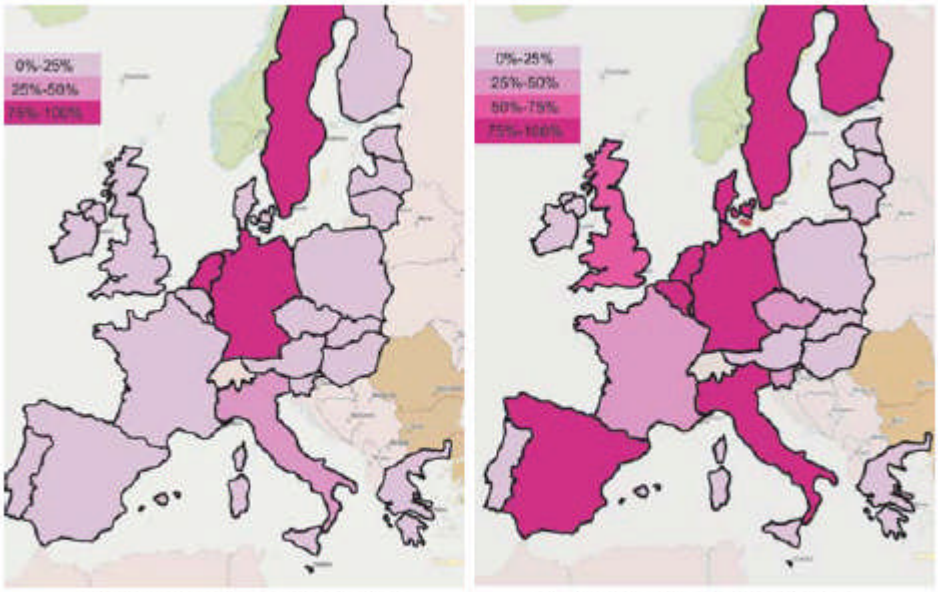
Source: UNIFE

4.71 In conclusion, it is expected that the demand for the provision of on-boards train protection systems will increase due to the use of new rolling stock (particularly of new entrants), the equipment of rolling stock with more than one system for cross-border operations and essentially the equipment of tractive units for the use on lines equipped for the ERTMS/ETCS.

4.72 The demand for telecom and communications services will also increase as the

demand for railway freight and passenger services will increase. In particular, the use of GSM-R (Global System for Mobile Communications - Railway) in connection to ETCS will increase the demand for mobile communication. Figure 4.4 shows the extension of GSM-R in Europe. We expect that by end of 2010 in Europe, more than 25% of the main lines are equipped with GSM-R and by 2015 more than 50%.

FIGURE 4.10 EXTENSION OF GSM-R IN EUROPE



EU-25: Percentage of main lines equipped with GSM-R by mid-2005

EU-25: Percentage of main lines equipped with GSM-R by the end of 2008

Source: EC

Telematics services for freight operations

4.73 For the purpose of this study telematic services are defined as services related to the tracking and tracing of rolling stock and/or freight consignments transported in that rolling stock. Commission Regulation 62/2006 lays down the Technical Specification for Interoperability relating to Telematic Applications for freight subsystem (TSI TAF).[15] As specified in the TSI: "a TSI on telematics should not demand the use of specific technologies or technical solutions except where this is strictly necessary for the interoperability of the trans-European conventional rail system". The Strategic European Deployment Plan (SEDP) Project has been formed to create and document the deployment plan for the implementation of the requirements of the TAF TSI including the underlying systems and the supporting messaging infrastructure.

4.74 Technologies such as the Global Navigation Satellite System (GNSS) are developing further. The tracking and tracing of rolling stock and of freight consignments

[15] Commission Regulation (EC) No 62/2006 of 23 December 2005 concerning the technical specification for interoperability relating to the telematic applications for freight subsystem of the trans-European conventional rail system.

transported will be possible with the satellite radio navigation system.[16] Europe's contribution to GNSS GALILEO should be operational by 2008.

4.75 Currently a number of railway undertakings request telematic applications but the supply is not yet satisfactory. It is expected that the demand for telematics services for freight operations will further increase disproportionate to the transport performance. All interviewees confirmed that there will be a growing demand for telematics services. In particular the demand for international integrated systems will increase as almost half of the total transport (measured in tonnes-kilometres) is cross-border transport in the European Union.

4.76 As the current supply is not satisfactory and the demand for such services will further increase, we assume that there will be in future a shortage in the supply of telematics services for freight operations.

Computer reservation services for passenger transport

4.77 In most of the countries, each railway operator in passenger transport provides independently computer reservation services or such services are provided by the incumbent railway undertaking. The railway undertakings did not provide detailed information as regards the demand for computer reservation services. New entrants operate generally without an own computer reservation system.

4.78 The increase in the number of passengers may indicate the development of the demand for computer reservation services in passenger transport. In the European Union, the passenger volume will increase by about 10% from 2000 to 2010 and by about 15% to 2015 respectively. Computer reservation services are mainly of interest in long-distance passenger transport. However, the passenger volume includes both, long-distance railway passenger transport and regional rail transport.

Leasing of rolling stock and staff

Leasing of rolling stock

4.79 There already exists a market for the leasing of locomotives and of wagons for freight transport in most countries. Leasing of passenger rolling stock is not yet common in most of the countries as the liberalisation of the passenger rail market is not yet required. Such services are offered by operators, manufacturers and independent leasing companies. The following table shows a part of the companies active on the market of leasing and rental of rolling stock.

[16] Rail applications include not only tracking of vehicles (and fleet management) or consignments transported but also for train control (ERTMS), passenger information, energy optimisation, track survey etc.

TABLE 4.34 LEASING OF ROLLING STOCK BY COMPANY

Company	Locomotives	of which diesel	of which electric	passenger rolling stock	Of which electric
Angel Trains	499	419	80	2174	1477
HSBC Rail	108	24	84	3659	2504
Poterbrook	186	92	94	3739	881
CB Rail	32	24	8	103	17[2]
Mitsui Rail Capital Europe B.V.	33	-	33	-	-
Dispolok GmbH[1]	120[3]	-	-	-	-
Rent-a-rail Eisenbahn-Service AG	20	-	-	-	-
MGV Service BmbH & Co. KG	2	-	2	-	-

Source: Consortium analysis 2006. Note: data not available for some companies; (1) Siemens Displock GmbH was sold to Mitsui Railway Capital Europe B.V. in September 2006; (2) Ordered; (3) Mostly electric locomotives

4.80 With reference to locomotives, particularly new entrants request leasing and rental services (as second hand rolling stock of the traditional railway undertakings is not available). However, we expect that the demand for such services will increase according to the increase in traffic performance in rail freight (measured in train-kilometres).

4.81 The question arises whether private operators have a higher propensity to lease rolling stock rather than purchasing it and whether or not large operators would have different preferences than smaller ones. Operating leasing to overcome capacity shortages or to provide capacity for operational build-up are one part, but the smaller one. Finance leasing for the purpose of depreciation and taxation management is the broader field of financial instruments. Financial market analysts suggest that there is a threshold beyond which operators tend to avoid leasing and that this threshold is according to US experience of rail operators with a Single A rating. The market is thus rather complex and it will not be possible to provide forecasts in the present process of liberalisation.

Leasing of staff in the freight sector

4.82 In several countries, the establishment of companies offering railway services such as leasing staff, e.g. MEV Eisenbahn-Verkehrsgesellschaft mbH, shows that a market for staff leasing exists. On the other hand, in some networks this is not allowed.

4.83 The demand for such services will increase as the liberalisation process further proceeds. As reflected in the interviews, new entrants mainly demand staff leasing services. As the provision of staff leasing is a necessary requirement for a new entrant to compete with the incumbent railways, we expect that the share of new entrants in train-kms will increase if the demand for leasing of staff is appropriately met.

5. SUMMARY

5.1 Table 5.1 shows the summary of the previous chapters as regards the demand and possible problems as regards the supply or demand of the services.

TABLE 5.1 SUMMARY

Service category	Demand	Threats
Electricity consumption	Increase of vehicle-kilometres of electric tractive units; increase of the share of electric vkm in total vkm; slight decrease in specific electricity consumption Increase of demand	
Diesel consumption	Slight increase of vehicle-kilometres of diesel-units; decrease of the share of diesel vkm in total vkm; no clear trend as regards the specific diesel consumption	
Services in passenger stations	Increase of demand due to an increase of the overall passenger volume between 2000-2015 by about 1% p.a. on average for EU-15 + EU-8	Restricted access of new entrants to services and facilities
Services in freight terminals	Increase of demand	Capacity constraints in some terminals/areas; access to terminals and/or access to the feeder line in terminals
Services in marshalling and shunting yards	Decrease of demand	Access to facilities often possible in theory, but not in practice
Train formation services	Increase of demand less than traffic performance in passenger transport between 2004-2015 by about 0.7% p.a. on average for EU-15 + EU-8	
Services in storage sidings	No detailed information available	Capacity constraints when storage sidings are contracted
Maintenance, technical inspection services and cleaning of rolling stock and repair services	No increase in demand of maintenance and repair services but increase in the demand for inspection services; increase in demand for cleaning services (for passenger rolling stock only)	
Back-up services	No increase in demand	

Service category	Demand	Threats
Locomotive pushing services	Increase in demand as traffic performance in the specific mountainous areas	
Services in border stations	increase in demand albeit less than transport demand	Problems as regards access to services and facilities e.g. in Poland
Train driver and other training services	Increase in demand as traffic performance (in passenger transport between 2004-2015 by about 0.7% p.a. and in goods transport by about 0.5% on average for EU-15 + EU-8)	Access to training facilities e.g. in Italy or Poland; shortage of drivers
Provision of on-board train protection systems, telecom and communications services	Increase in demand	Shortage in supply of the necessary equipment
Telematics services for freight operations	Increase in demand	Current supply not satisfactory
Computer reservation services for passenger transport	Increase in demand as passenger volume between 2000-2015 by about 1% p.a. on average for EU-15 + EU-8	National based systems (not international system); access to CRS by new entrants
Leasing of rolling stock	Increase in demand as traffic performance in rail freight transport, i.e. by about 0.5% on average for EU-15 + EU-8	
Leasing of staff	Increase in demand as traffic performance (in passenger transport between 2004-2015 by about 0.7% p.a. and in goods transport by about 0.5% on average for EU-15 + EU-8)	