

ECONOMIC COMMISSION FOR EUROPE

TEM and TER Master Plan Final Report

**Trans-European Motorway (TEM)
Trans-European Railway (TER)
Projects**



UNITED NATIONS

TEM AND TER MASTER PLAN FINAL REPORT

TRANS-EUROPEAN MOTORWAY (TEM) TRANS-EUROPEAN RAILWAY (TER) PROJECTS



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PREFACE

The United Nations Trans-European Motorway (TEM) and Trans-European Railway (TER) projects' Master Plan has been a unique undertaking. It was made possible thanks to the commitment, skills, and conviction of the UNECE TEM and TER Projects' Central Offices (PCOs), the external consultants and the designated experts of the countries concerned. Two expert groups, one for road and one for rail, worked for sixteen months, in consolidating and processing substantive information on transport plans and priority needs of the respective countries, as well as liaising with the respective Governments, UNECE, and TEM and TER PCOs.

The report presents the results of a first attempt of the TEM and TER Projects to elaborate a consistent and realistic short-, medium- and long-term investment strategy on the road, rail and combined transport Backbone Networks in 21 Central, Eastern and South east European countries, members of the Projects, and their immediate neighbours. As a result of this exercise, as many as 491 projects have been evaluated and prioritized, with an aggregate estimated cost of over 102 billion Euros. These results have been obtained by using a commonly agreed methodology and taking into account alternative scenarios of growth, bottlenecks and missing links as well as problems posed for the funding of transport infrastructure and border crossings.

Despite the application of rigorous screening criteria, a considerable proportion of the total implementation cost for the realization of the TEM and TER Projects' Master Plan is not yet secured. In addition, by examining border crossings issues in relation to a number of considerations such as infrastructure needs, procedures and staffing matters, it is clear that there is substantial need for further action. A range of proposals to address these issues is presented in this report.

The current work can substantially assist the development of transport infrastructure in the wider TEM and TER region. Moreover, it can also contribute to integration and harmonization of transport beyond Europe. However, the elaboration of an investment strategy, though important, is just a starting point. The implementation of this work is a long-term process that requires first and foremost all political will and commitment from the countries concerned. It will also require intensive follow-up work in close co-ordination between TEM and TER member countries, the TEM PCO, the TER PCO and the UNECE, as well as with the European Commission competent Directorates and other international organizations and bodies concerned.

I should like to thank all those who contributed to the elaboration of this work and encourage them to continue and further intensify their efforts for the progressive implementation of the TEM and TER Projects' Master Plan.



Marek Belka

Executive Secretary

United Nations Economic Commission for Europe

SUMMARY

The work summarized here – the Trans-European Motorway (TEM) and Trans-European Railway (TER) Projects' Master Plan – is intended to assist the thinking in TEM and TER member countries, in neighbouring countries, and within concerned international organizations about future road, rail and combined transport infrastructure developments and related investments. It also addresses important related questions such as alternative scenarios of growth, methodological aspects and assumptions, bottlenecks, missing links and other priority needs, as well as problems posed for funding of transport infrastructure and border crossings. More specifically, the work has addressed the goals of promoting the integration of European transport infrastructure, extending the TEN-T, supporting the implementation of the pan-European transport corridors, promoting of intermodal operations and supporting the objectives of the TEM and TER Projects.

In 2001, the TEM and TER Projects' Steering Committees, adopted a new short-term strategy for the Projects' further integration in the new transport context. The elaboration of the TEM and TER Master Plan, was among the first priorities of the strategy. Thereafter, the Terms of Reference for the elaboration of the Master Plan was prepared and approved. Work started in October 2003 and was completed in February 2005.

Two groups were created for the needs of the Master Plan, namely the *Master Plan Coordination Group*, constituted to supervise and coordinate the work, and the *Master Plan Expert Group*, in order to consolidate substantive information on transport plans and priority needs of the countries concerned, as well as to liaise with respective Governments and the UNECE and TEM and TER Projects' Central Offices (PCOs).

During the reporting period, the Master Plan Coordination Group, consisting of the TEM and TER Projects' Personnel and the Director of UNECE Transport Division and/or the Regional Adviser on Transport, UNECE, as well as the external consultants, has met four times. The TEM Master Plan Expert Group and the TER Master Plan Expert Group, consisting of different national coordinators and designated experts from the countries involved for each one of the Projects, met twice.

Special emphasis was placed throughout the project work on seeking to balance the internal priorities of States for the development of infrastructure within their own borders with the recognition that many of the most important national links are also critical to the establishment of effective international networks.

International networks have a major contribution to make to broader socio-economic goals aimed at the prosperity and stability of the wider region. However, despite the efforts of a number of organizations, this international dimension and the inter-play between national and international perspectives has not always been as fully recognized as it might be. For this reason, the current study has placed particular emphasis on co-ordination of thinking across different countries. Thus, identification of bottlenecks and missing links in relation to major international flows in the road, rail and combined transport networks has been given priority. Airports and inland waterway infrastructure projects were not the focus of this work.

However, it must also be acknowledged that the range of possible investments greatly exceeds the immediate and foreseeable capacity of national and international bodies to fund

them. What has been developed in the Master Plan is consciously *not* a simple wish list of desired investments, but is rather one that is tailored to a realistic assessment of likely available funds. Further, the work has not been undertaken in isolation from the range of previous studies and initiatives of international transport infrastructure needs that have been undertaken. It builds on and acknowledges the contributions of major projects such as TINA, TIRS, REBIS, TEN-STAC, EU High Level Group, etc.

The underlying methodology of the study has been top-down, reflecting in part the time and resources available, but also recognize that the availability of reliable data, especially over time, for a number of the areas included in the work was weak. Growth scenarios were therefore developed, starting with the socio-economic external environment such as demography, GDP growth and development in foreign trade. Two scenarios of growth were developed – one moderate, the other more optimistic – to recognize the uncertainty inevitably surrounding such projections. Transport demand forecasting up to 2020 performed by analyzing the current trends in transport industry and identifying inter relations between transport demand and the socio-economic environment.

Against the macroeconomic backgrounds sketched out through the scenarios, the work then sought to establish priorities for individual projects that had been identified through examination of known national and international plans. Specifically, evaluation and prioritization proceeded through four stages.

In the first stage, *Project Identification*, projects were screened according to generic criteria of relevance, readiness and viability. In essence, projects were only considered if they already showed within existing lists of proposals, were sufficiently far ahead in the planning process to be capable of being completed within the time frame of this study, and for which a degree of financial viability could be established with no evidence of major environmental constraints. Since candidate projects had to pass all three screening criteria, this stage representing a major step towards ensuring that only schemes under serious consideration were included.

In the second stage, *Forecasting*, the previously derived macroeconomic growth patterns were applied to flows on the proposed projects.

Thirdly, a simple multi-criteria model was applied to the *Evaluation* of each individual project. Evaluation focused around three clusters of criteria reflecting respectively socio-economic return on investment, functionality and coherence of the network, and strategic/political issues in relation to the network. Application of more sophisticated methods, such as full socio-economic cost-benefit analysis, is not feasible given the restrictions on data availability that are usually present. The importance of applying the multi-criteria approach lies in the fact that it allows a single known evaluation scheme to be applied with equal rigour to *all* projects under consideration and for the basis for the assessment to be transparent to all.

Fourthly and finally, *Prioritization* of projects was undertaken on the basis of technical priority as established through the multi-criteria model, compliance with any existing legally binding commitments (typically through international agreements) and the financial capacity of the country concerned to undertake the investment.

The projects were prioritized into the following four pre-defined priority categories, according to their scores:

- *Priority I*: projects, which may be funded and implemented rapidly, including on-going projects up to 2010.
- *Priority II*: projects requiring some additional investigations for final definition before likely financing, or planned for implementation up to 2015.

- *Priority III:* projects requiring further investigations for final definition and scheduling before possible financing, or planned for implementation up to 2020.
- *Priority IV:* projects to be implemented in the long run, including the projects where insufficient data existed.

For a few countries only, for which no projects were proposed, the study considered projects that were proposed in the framework of other similar works, such as REBIS, EU High Level Group and the UNECE-UNESCAP Project on developing Euro-Asian transport linkages.

As a result of this exercise, subsequently verified by the consultants and members of the TEM and TER Expert Groups to ensure that no anomalous proposals had been prioritized, sets of priority projects, as set out in sections 4 of this report were prepared. In total, 491 projects (319 TEM and 172 TER) were evaluated and prioritized, with an aggregate estimated cost of 102,114 billion Euros, of which, 49,556 billion Euros for TEM and 52,558 billion Euros for TER. According to the results reported here and despite the application of rigorous screening criteria, a considerable proportion of the total implementation cost for the realization of the TEM and TER Projects' Master Plan is not yet secured in the sense of potential funding sources having been confidently identified.

In addition to examining direct infrastructure needs, the work also pays attention to the question of border crossings, examining issues for both the TEM and TER Networks in relation to a number of considerations such as infrastructure needs, procedures and staffing matters. It is clear that, for both road and rail, there is a substantial need to modernize both facilities and procedures and that failure to do so poses a significant impediment to international movements. A number of proposals to address these problems are presented in this report.

Overall, the initial phase of the TEM and TER Projects' Master Plan elaboration has achieved its intended goals. It has succeeded in presenting a reliable and pragmatic investment strategy (for short, medium and long- term horizon) on road, rail and combined transport Backbone Networks in TEM and TER countries; in particular, it has provided, among other outputs:

- A methodological framework for the identification, evaluation, prioritization and financing of priority infrastructure projects;
- Identification of a TEM and TER Backbone Network of core projects;
- A TEM and TER Projects' Master Plan with alternative implementation scenarios;
- A corresponding inventory of specific projects for implementation;
- Budget estimates for implementation;
- Some possibilities in relation to staged construction;
- Estimates of likely available finance;
- An inventory of border crossing problems and some suggestions for ameliorative action;
- An inventory of TEM Network bottlenecks with a special respect to truck and coaches;
- An analysis of the possible impacts of the European Union Railway Infrastructure Package on TER Region.

The current work can substantially assist in allowing TEM and TER Projects to represent the backbone underpinning a future European transport integration process. Moreover, it can also make a substantial contribution to integration and harmonization of transport beyond Europe, notably as input to the EC High Level Group No. 2 and to the Euro-Asian Transport Links development process.

However, the work is not yet complete. To see it to fruition will require continued close cooperation between the TEM and TER member countries, between them and their immediate neighbors, the respective TEM and TER PCOs and the UNECE. This relates in particular to missing information on individual country plans, priorities and to missing data in general, as well as in monitoring the progress of implementation of the identified TEM and TER region Backbone Networks on the basis of commonly accepted technical and operational standards.

1. THE UNECE TEM AND TER PROJECTS' MASTER PLAN

1.1 Introduction

The United Nations Economic Commission for Europe (UNECE) is constantly supporting and encouraging specific actions, aiming at the promotion of relations between European countries and the economic development and co-operation in Europe. Among the most known actions in the field of transport, are the “Trans-European North-South Motorway (TEM), and Trans-European Railway (TER) Projects”.

The UNECE TEM and TER Projects are sub-regional cooperation frameworks established in 1977 and 1990 - respectively - by the Governments of the Central, Eastern and South Eastern European Countries under the aegis of UNECE for the development of coherent road, rail and combined transport infrastructure networks in the region and the facilitation of international traffic in Europe.

They have, so far, been instrumental in the development and upgrading of international road and rail links in the participating countries. They have also contributed to the interoperability of the European transport systems, elaborated studies, created continuously updated TEM and TER databases, published a large number of technical documents, guidelines, recommendations, and are working for the harmonization of management, maintenance and operational procedures of motorways and railways in the region and their integration in the Pan-European context.

The TEM and TER Projects' Master Plan, which is funded by the TEM and TER's own budgets and by the International Road Transport Union (IRU) as far as the road component is concerned, provides a useful contribution to the objectives of the individual TEM and TER Projects as well as to the work of the European Commission on the development of the Trans-European Transport Networks (TEN-T) in the new EU member and accession countries and to the future development of Transport Corridors outside the EU.

The countries participating in the UNECE-sponsored TEM and TER Projects' Master Plan aim at the identification of main bottlenecks, missing links and other priority infrastructure needs in their road, rail and combined transport networks, and the design of a realistic investment strategy to meet those needs.

Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Greece, Hungary, Italy, Lithuania, Poland, Moldova, Romania, Russian Federation, Serbia and Montenegro, Slovakia, Slovenia, The former Yugoslav Republic of Macedonia, Turkey and Ukraine have been invited to participate in the TEM and TER Projects' Master Plan work. The European Commission, the World Bank, the EBRD, the EIB and other international organizations and transport related bodies had also been invited to participate.

1.2 TEM and TER in the European Context

The ultimate goal of UNECE, with the support of the TEM and TER Projects' Master Plan, is to assist its member countries in the region to elaborate and develop a realistic investment plan for a road, rail and combined transport Backbone Network underpinning a future European transport integration process. The development of such an investment plan would contribute to the economic growth of the countries concerned and the well-being of their populations, as well as assisting the integration and harmonization of transport within Europe and beyond.

The TEM and TER Projects' long lasting, flexible, effective and self sustainable structures, in combination with the strong desire and commitment with the projects of their country members, provide an ideal framework for the development and monitoring the progress of such intercountry cooperation in the field of transport, which is essential for the achievement of these goals.

More specifically, the placement of TEM and TER Networks as backbones of Pan-European Road and Rail Corridors in CEE respectively, as well as of the TINA exercise, offered a valuable contribution to the formation of the new strategic transport plans of Europe and the priority plans for the extension of EU TEN to the new EU member and accession countries.

Apart from the TEM and TER Projects' Master Plan contribution in the development of Pan-European Transport Corridors and in the extension of the EU TEN, the TEM and TER international cooperation with other European institutions and bodies (ECMT, OECD, IRF, IRU, UIC, EIB, EBRD, World Bank, ASECAP, Europlatforms, etc.) involved in the transport field is expected to continue and intensify.

Furthermore, the TEM and TER Projects' Master Plan are collaborating or plan to extend its activities also to the regional initiatives and fora, active especially in South-Eastern Europe, such as: Southeast European Co-operative Initiative (SECI), TRACECA Programme, Black Sea Economic Co-operation (BSEC), Central European Initiative (CEI), MEDA – Euro Mediterranean Transport Forum.

Apart from the co-operation with the above-mentioned international organizations, institutions, initiatives and fora, the TEM and TER Projects are extremely interested in the development of Freight Villages as well as in the Framework of Research and Development (RTD&D) Priorities of the European Union.

Last but not least, an abundance of projects and studies related to the transport infrastructure of the TEM and TER region were elaborated particularly in the last 10 years, such as PLANTIS, TIRS, REBIS, TEN-STAC, etc.

1.3 Method of Work – The Report

The present report concludes the work done for the TEM and TER Projects' Master Plan and sets the basic reference framework for future project assessment and possibly extension.

The core results of the Master Plan, as they are analyzed in this report, were:

- (a) Socioeconomic framework of the TEM and TER region and alternative scenarios of growth
- (b) Methodology on evaluation and prioritization of infrastructure/investment needs
- (c) Realistic Master Plan based on investment priorities
- (d) Backbone Network and additional links
- (e) Funding considerations and financing arrangements
- (f) Border crossing issues.

2. THE SOCIO-ECONOMIC FRAMEWORK OF TEM AND TER REGION AND ALTERNATIVE SCENARIOS OF GROWTH

2.1 Introduction

For many years, the main emphasis in transport forecasting and modelling has been to enrich their behavioural content and improve data-collection methods as a means to enhancing their accuracy and predictability and to reduce application costs. A parallel line of research has sought to improve transport modelling by emphasizing the use of readily available data and the communication of simpler model features and results. This stream of research has had an important impact in practice as it offers not only reduced costs in forecasting but also simplified data collection and processing requirements.

For the TEM and TER Projects' Master Plan, consultants were asked to elaborate transport related scenarios of growth in a short time span, so the idea of not using any formal model - due to the above-mentioned limitations - means that empirical heuristic approaches were applied.

This present work was defined as a top-down approach starting from the socio-economic external environment. First, the different social, economic and foreign trade elements were considered and proposals for socio-economic external scenarios that could influence a specific country's transport development were outlined. The relevant and consistent factors needed for the scenarios development are demography, GDP and its components and foreign trade development. The economic environment has an impact on transport, and may be very important as regards transport policy decisions. After all, it is well documented that traffic growth is proportional to GDP growth (for freight traffic, most of the time, is almost identical).

Based on the available data, projections of population, economy and trade in TEM and TER region were made up to the year 2020. This was done using a combination of official forecasts, international studies forecasts as well as trend line extrapolation.

More analytically, the work was based on:

- Statistics from UNECE, EUROSTAT and the World Bank
- EU official statistics produced and published for the negotiations with the new EU Member countries.
- Projects/studies: TEN-STAC, SCENARIOS, CODE-TEN, TINA, TIRS and REBIS (for Balkans)
- National studies, reports and documents provided by the countries at a country level

Secondly, the analysis of the interrelation between transport and the socio-economic environment took place, to complete the picture of the scenarios with the description of the state of the transport situation now and in the future.

Needless to say that there was a risk involved in the elaboration of growth scenarios due to data availability, their quality and degree of detail. Hence, this is the reason why all the alternative scenarios were developed on a qualitative macro-scale.

2.2 Basic Assumptions

The future development of the world economy is of direct importance for the traffic forecasting on the TEM and TER system. At present, however, this development can only be predicted with a high degree of uncertainty. Therefore, it was sensible to work with different scenarios for

the future economic development but, in order to facilitate the use of the traffic forecasts later, only two scenarios of growth have been established (a moderate and an optimistic).

Due to the many countries participating in the TEM and TER Projects' Master Plan, the scenarios are global, though with major emphasis on the TEM and TER member countries.

For the scenarios, 2000 was chosen as the base year and data from years 1995-2000, 2001, 2002 and 2004 were employed to establish the trends to be used in forecasting. Trend forecasting of population, economy and trade started from this base line and has been prepared on a group-country¹ level (and then for each group on a country level) for 2020. The time horizon of most of the published studies normally extends to 2005, and sometimes to 2010, with the exception of TINA where it is until 2015, but there were hardly any projections or trends up to 2020, except for population. Where projections were available, they were used for the trend forecasting.

Concerning EU member countries before 1 May 2004, it was possible to take only one "trend" scenario, a moderate one. Nonetheless, an optimistic scenario for the EU member countries before 1 May 2004 is also provided. This latter scenario is not expected to be significantly different from the moderate one, for this group of countries.

Concerning the EU member countries after 1 May 2004 and the acceding and the non-acceding countries, it appeared better to initially consider some contrasting hypotheses, which would be characterized by a significant difference in GDP growth (high and low), and two options for the transition period, in order to form the "borders" of the scenario development area.

2.3 Alternative Scenarios of Growth

2.3.1 Population trends

EU member countries before 1 May 2004

Today, demography is very much influenced by external migration: the contribution of migration to demographic growth in EU member countries before 1 May 2004 is close to 75%, which means an average growth of 0.3 % per year in a context of a low demographic growth rate in Europe, which is below 0.5 % per year. Specifically, for the EU member countries before 1 May 2004 the average annual change for population varies from 0.12% to 0.45%.

EU member countries after 1 May 2004 and acceding countries

Like the EU member countries before 1 May 2004, diverging trends in population growth figures can also be found in the EU member countries after 1 May 2004 and acceding countries. For example, most countries' population is predicted to decline over the 20-year period, with Slovenia presenting the highest decrease of -0.96% to -0.77% per year, whilst in Lithuania the population is expected to increase about 0.95% to 1.14% per year.

Non-EU, non-acceding countries

For the non-EU, non-acceding countries, the population is also predicted to decline over the 20-year period, as in the latter mentioned group of countries, with Ukraine presenting the highest decrease of -0.74% to -0.59% per year, whilst in Bosnia and Herzegovina the population is expected to increase about 0.64% to 0.76% per year.

2.3.2 Economy trends

EU member countries before 1 May 2004

It is possible to define trend hypotheses of GDP for the EU member countries before 1 May 2004, since the existence of series and a relatively stable economic context over the past period

allows such trends to be determined. For these countries, concrete data exist up to 2002, from World Bank as well.

Trend forecasting projections, performed in this project, up to 2015 were compared with the TINA forecast model. Finally, projections for the period 2015–2020 were checked against SCENARIOS and TEN-STAC results. In general, EU member countries before 1 May 2004, will keep a level of between 2 and 3% of GDP growth rates, until 2020.

EU member countries after 1 May 2004 and acceding countries

Concerning EU member countries after 1 May 2004 and acceding countries, because of the transition process, it seems difficult to establish the same scheme of approach as in the EU member countries before 1 May 2004. The recent situation of the afore-mentioned with decreasing production and transport at the beginning of the nineties, followed by a recent increase, makes it difficult to define a clear trend.

There are now large uncertainties about their rate of growth for future years and a “trend” scenario does not really mean much: transition is a new situation, never experienced before. Furthermore, consistent statistical data are not easy to obtain. For the past few years, the general economic evolution shows a confirmed recovery of growth in all of the countries in Central and Eastern Europe, including the Baltic States. This recovery had long been uncertain and it is now achieved in different ways depending on the country. Therefore, the economic situation of EU member countries after 1 May 2004 and acceding countries may develop in various directions.

In order to cover a majority of possible cases, two main hypotheses were studied: a moderate and an optimistic growth of GDP. According to TINA, a reasonable range for annual GDP growth can be taken between 2.5% and 7%.

Therefore, the moderate scenario, of TEM and TER Projects’ Master Plan, assumes that average growth rates in the EU member countries after 1 May 2004 and acceding countries will reach levels up to 4 - 5% and maintain this level until 5 years after accession and will then slowly converge with EU levels, keeping a level of between 3 and 4% growth rates. The optimistic scenario, assumes that average growth rates will reach levels up to 6 - 7% and maintain this level until 5 years after accession and will then slowly converge with EU levels, keeping a level of between 3 and 4% growth rates.

Both scenarios are based on the assumption that, on the one hand, the accession process will follow the optimistic plan of the European Commission, and on the other hand, that the countries themselves will have a strict policy of structural reforming and direct foreign investments are increasing.

For this group of countries (EU member countries after 1 May 2004 and acceding countries), concrete data existed until 2002, from the World Bank. Trend forecasting projections up to 2015 were compared with the TINA forecast model. Finally, projections for the period 2015 – 2020 were compared with SCENARIOS and TEN-STAC results.

Non-EU, non-acceding countries

For non-EU, non-acceding countries, a moderate scenario to be used assumes that average growth rates will reach levels up to 2 -3% until 2020. An optimistic scenario assumes that average growth rates will reach levels up to 4 -5% until 2020. It can be argued that such scenarios are unrealistic for this group of countries, or that the differences between these countries will be

much more significant than between the EU member countries before 1 May 2004 and the EU member countries after 1 May 2004 and acceding countries.

In any case, it is not unrealistic to assume that the existence of cohesion policies, which will help in EU member countries after 1 May 2004 and acceding countries, can also contribute for the countries in a stage of pre-accession to catch up and integrate more rapidly, therefore speeding up their development. It seems logical that non-EU, non-acceding countries could benefit from European integration facilitating the opening of markets in all of Europe, the free traffic of freight and travellers and the suppression of all border effects. Another positive effect could come from the desire of world companies to return to Europe where risks seem more controlled after the “Asian Crisis”. In that way, an inflow of FDI (Foreign Direct Investments) towards the region of the non-EU, non-acceding countries will be observed as well.

In the CODE-TEN project, it was possible to follow and plot the pace of reform for some of these countries (CIS and Baltic countries). The indexes obtained were compatible with the growth rates forecasted for EU member countries after 1 May 2004 and acceding countries. This means that there would be a fairly good correlation between implementation of reforms and economic development between the two country-groups.

In any case, it is also useful to keep in mind that the present estimation of the level of GDP in non-EU, non-acceding countries remains difficult and the “unofficial” economy represents a relatively more important role than in the other country-groups. Corresponding activities are either not taken into account, or are poorly assessed. GDP figures for the countries emerging from war have thus to be considered with some care, even more so if we keep in mind the fluctuations of the local currencies' exchange rates.

For these countries, data existed until 2002, from the World Bank. The projections up to the year 2015 - for some of the countries- were compared with TIRS project results.

2.3.3 Foreign trade trends

In order to have a connection between economic growth and traffic growth for goods, details are needed concerning the trend of the national foreign trade.

Foreign trade is an important socio-economic variable for transport. International traffic flows are growing at a much faster rate than national traffic, in parallel with international trade, which is rising more quickly than national trade. On trunk networks international traffic is taking a growing share, which may often reach between one third and one half of the total traffic of many links within the next 20 years. The evolution of traffic in the hinterland of the large ports provides just one example of this phenomenon.

For international trade and the relative evolution of intra-European and extra-European relations, several analyses have been made (OECD 2020 for example), which are compatible with the GDP growth.

EU member countries before 1 May 2004

The general trend in the EU member countries before 1 May 2004 is well known but can be clarified: a falling share of primary goods and bulk products, a decreasing share of intermediate goods, but on the contrary a rapidly increasing share of the high value goods. In this latter case the average value of one tonne transported increases and the volume (measured in cubic metres) becomes a more relevant unit of transport than the tonnage. In parallel, a decrease can be observed in the shipment size and the development of associated logistic services.

Trend forecasting for these countries was made, on observed trade trends between 1998 and 2003 (Database of World Bank). Growth hypotheses of the import and export growth chosen

for these countries, are compatible with GDP growth with the underlying assumption that EU trade growth will increase at a similar rate as world trade.

The general trend for the EU member countries before 1 May 2004 is an increase of 12.5% to 100.3% for exports for the 20-year period of 2000-2020 and an increase of 57.66% to 81.04% for imports, for the same period.

EU member countries after 1 May 2004 and acceding countries

The economies of the EU member countries after 1 May 2004 and acceding countries are already very open economies although their GDP per capita is fairly low, showing again another characteristic of the transition situation. The same order of magnitude can be taken for the increase of the imports and exports as for EU member countries before 1 May 2004. However, more detailed geographic analysis will be necessary to investigate the potential growth of trade between neighbouring countries in the Baltic areas, the Central Europe area (Visegrad countries), the Black sea area and the Balkans.

The general trend for the EU member countries after 1 May 2004 and acceding countries is an increase of 11.8% to 123.7% for exports for the 20 year period of 2000-2020 and an increase of 11.4% to 175.43% for imports, for the same period.

Non-EU, non-acceding countries

The general trend in non-EU, non-acceding countries will follow the trend of EU member countries after 1 May 2004 and acceding countries, based on the same hypothesis as in the GDP growth. It can be argued that such scenarios are unrealistic for these countries, or that the differences between these countries will be much more significant than between the EU member countries after 1 May 2004 and acceding countries.

Nonetheless, the general trend for the non-EU, non-acceding countries shows an increase of 11.2% to 146.1% for exports for the 20 year period of 2000-2020 and an increase of 11.05% to 197.85% for imports, for the same period.

2.3.4 Transport trends

Transport demand forecasting was performed: (a) by analyzing the current trends in transport industry in order to identify existing interrelations between transport demand and the transport-relevant socio-economic parameters (population, GDP and foreign trade); and (b) by using the forecasts of such parameters (population, GDP or any other relevant economic data, such as foreign trade) from the base year 2000 to the forecast year 2020.

It has to be noted here that, for some countries, official forecasts do exist, and the apparently simplest option when dealing with forecasting of planning variables, such as transport growth, is to use official forecasts. Of course, official forecasts are seldom at a sufficient level of disaggregation to be directly usable in a modeling exercise; however, they do reduce the amount of work needed. To some extent, the problem with using official forecasts is that they sometimes reflect the expected effect of economic and regional policies whose success may actually depend on other uncontrollable factors like international trade and cooperation. Therefore, for this project, even if official forecasts of transport growth existed for some countries, they were treated with reticence and as a reference/comparison point.

EU member countries before 1 May 2004

For the EU member countries before 1 May 2004, an increase is expected in passenger and freight transport.

The two basic factors underlying the continuing growth of passenger transport in the EU member countries before 1 May 2004 are (a) growing incomes and (b) growing car ownership, both strongly correlated with GDP growth.

Freight transport growth, is closely linked to changes in the volume and structure of economic activity in EU member countries before 1 May 2004. The main underlying factors stimulating the growth are (a) globalization of the economy and liberalization of the internal market, (b) complex trading networks evolution, (c) specialization of production processes and preferences of customers and (d) the still low load factors.

Regarding modal share, road is by far the fastest growing mode for both passenger and freight transport.

In summary, the following trends are expected in the EU member countries before 1 May 2004, for the 20-year period of 2000-2020:

- Annual growth in passenger transport by car: 1.32% to 1.81%
- Annual growth in passenger transport by bus/coaches: 0.03% to 0.19%
- Annual growth in passenger transport by rail: 1.31% to 2.55%
- Modal share between road and rail for passenger transport will remain almost the same, with a very slight decrease for road
- Annual growth in freight transport by road (trucks): 3.2% to 3.38%
- Annual growth in freight transport by rail: 3.43% to 3.67%
- Modal share between road and rail for freight transport will remain almost the same, with a very slight decrease for road.

EU member countries after 1 May 2004 and acceding countries

For the EU member countries after 1 May 2004 and acceding countries, an increase is expected in passenger and freight transport, though the magnitude of the increase is not completely known. There are important data gaps on passenger transport that hamper a complete assessment of passenger and freight transport demand. Nonetheless, some comments can be made for changes in modal share.

A negative trend is to be expected in public transport of the EU member countries after 1 May 2004 and acceding countries that can be explained by the higher competitiveness of private cars, which are also seen as a symbol of the higher standard of living experienced in the EU. Additionally, decreasing accessibility, a consequence of both urban sprawl and degrading public transportation systems, can also be mentioned as an explaining factor behind decreasing passenger transport demand for rail and buses.

As it concerns freight transport, the share of road transport is expected to increase but rails' share is expected to remain almost the same - if not decrease - due to (a) an increase in rail transport prices, (b) liberalization and deregulation in road transport, which is close to completion; in the case of railways, this process is much slower; road transport is therefore more efficient than rail transport and (c) capacity expansion of most infrastructure is directed to roads.

In summarizing, the following trends are expected in the EU member countries after 1 May 2004 and acceding countries, for the 20-year period of 2000-2020:

- Annual growth in passenger transport by car: 2.07% to 3.10%
- Annual growth in passenger transport by bus/coaches: -0.01% to -0.28%
- Annual growth in passenger transport by rail: 0.75% to 1.18%
- Modal share between road and rail for passenger transport will remain almost the same, with a slight increase for road
- Annual growth in freight transport by road (trucks): 2.49% to 2.77%

- Annual growth in freight transport by rail: 2.57% to 2.59%
- Modal shares between road and rail for freight transport will drastically change; the modal share of freight transport by road is expected to increase by almost 43% (from 58% to 83%), while the corresponding share for rail transport would fall by 60% (from 42% to 17%), until 2020.

Non-EU, non-acceding countries

For the non-EU, non-acceding countries, limited or no data existed to support forecasting. Based on the limited data from 3 countries, Bosnia and Herzegovina, Serbia and Montenegro and The former Yugoslav Republic of Macedonia, accumulated traffic projections were made to the horizon year 2020.

In summarizing, the following trends are expected in the non-EU, non-acceding countries for the 20-year period of 2000-2020.

- Accumulated road traffic growth: *varies from* 187.2% to 255.6%
- Accumulated rail traffic growth: *varies from* 61.2% to 81.6%

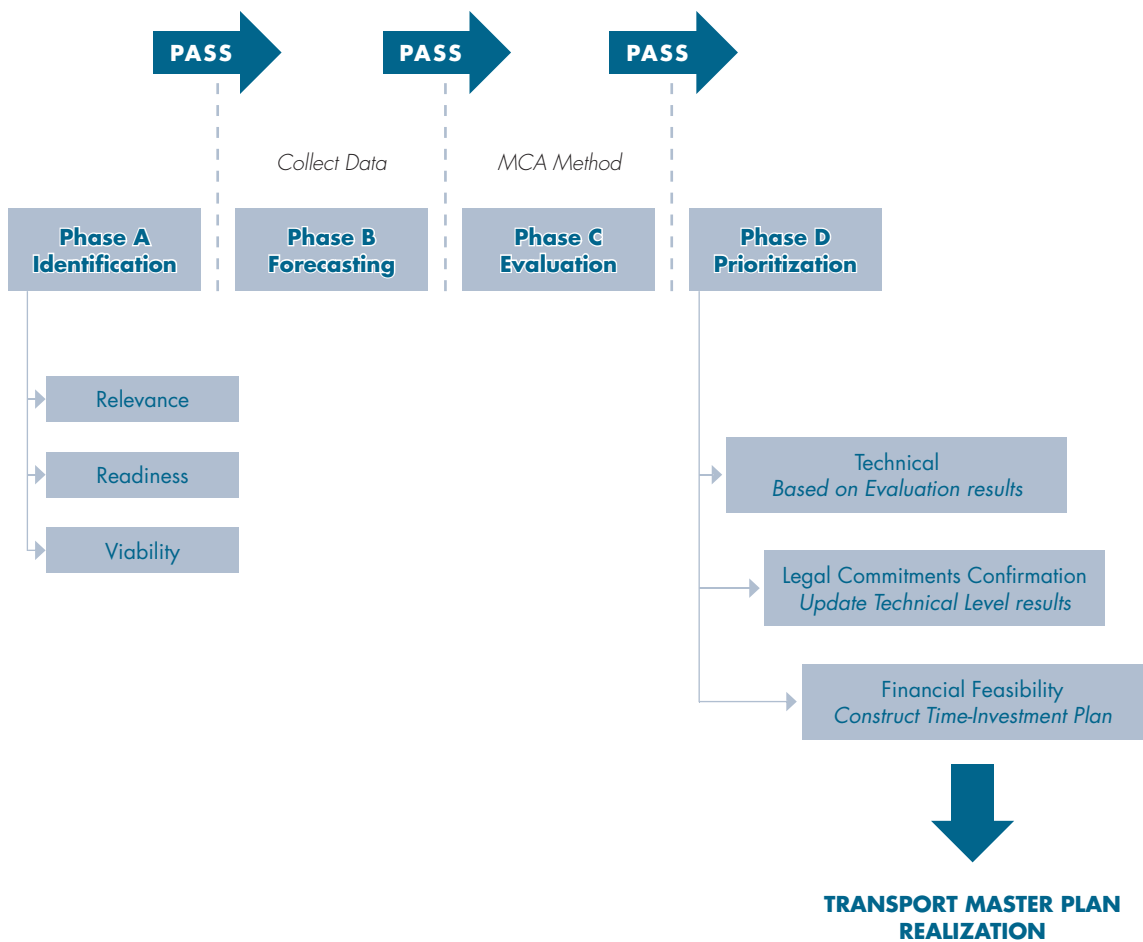
The forecasted economic growth and traffic growth served as input for the Methodology for Evaluation/Prioritization of projects of TEM and TER Projects' Master Plan.

3. METHODOLOGY ON EVALUATION AND PRIORITIZATION OF INFRASTRUCTURE/INVESTMENT NEEDS

The ultimate goal of the methodology is to identify the project’s prioritization/categorization, in order to support the elaboration of a medium- and long-term investment strategy in the region concerned and encourage the realization of projects that have good chances of implementation and fall within the TEM and TER Projects’ Master Plan objectives.

The methodology can be divided in four phases: (a) *Identification* -according to generic criteria- of the projects that are worth further analysis and evaluation; (b) *Forecasting* the future conditions of the identified network; (c) *Evaluation* of the selected projects, with respect to specific evaluation criteria; (d) *Prioritization* of the projects - based on the evaluation results - in order to classify them into four priority categories.

The latter mentioned phase is further divided in three prioritization levels, as shown in Figure.



3.1 PHASE A – Projects Identification

This phase is designed in three screening levels, the first dealing with the projects' "relevance", the second with their "readiness" and the third with their "viability". All three levels are simple and easy to apply in this first stage of the project, in order to choose from the National Plans, the projects (*local, national and international*) that are worth further evaluation.

Thorough evaluation will be performed in order to mainly identify investment priorities and later establish a timetable for their realization and assess cost and financing arrangements within the time horizon of 2020.

Thorough evaluation will be applied **only** for the projects passing all the screening levels. The ones with insufficient information for the identification phase or the ones that will not pass all the screening levels will be automatically classified in the last priority category, which lists all projects to be implemented at a later stage.

3.1.1 1st Level: Relevance of Project

- The project is consistent with UNECE AGR, AGC, AGTC, TEM and TER technical standards and recommendations, respectively.
- The project advances one or more goals of the TEM and TER Projects' Master Plan
- The project is on a main trans-European axis pertinent to the internal market of the enlarged Europe, the Pan-European Transport Corridors, TINA, REBIS, TEN-T, etc.
- The project is contributing to the connection of TEM and TER Networks to other regions (e.g. the 4 Euro-Asian corridors identified at the Second International Euro-Asian Conference on Transport, St. Petersburg, September 2000).
- The project is capable of reducing bottlenecks and eliminating missing links
- The project is consistent with the objectives of country's National Plans, or neighbour countries plans, or other sub-area plans, or the visions of country leadership.

3.1.2 2nd Level: Readiness of Project

- The project has been defined and development responsibility has been established and acknowledged (e.g. in terms of (a) existing budget for the project in country's public investment budget, (b) project's assignment to a specific agency, which will be responsible for its planning and/or execution, (c) existence of studies).
- Additional considerations could be:
 - Whether a management plan exists that can lead to a successful implementation of the project (in other words, the responsible agency has approved the time plan for the project implementation)

3.1.3 3rd Level: Viability of Project

- For the purpose of TEM and TER Projects' Master Plan projects with a minimum budget amounting to 10 million Euros per project were considered.
- The existence of evidence, out of the project's feasibility study, showing potential economic viability (e.g. acceptable IRR and other measures for socioeconomic benefits), and firm commitments from the concerned countries to carry out the required impact assessments with a view to completing the project within an agreed timeframe (*This criterion assumes that a feasibility study is already implemented and accepted*).
 - Whether there are no major environmental constraints (major according to international treaties for protected areas) that would prevent the start of implementation
 - Whether the expected/ forecasted demand associated with the project, can justify the need for the project.

3.2 PHASE B – Forecasting

Forecasting for the TEM and TER Projects' Master Plan was performed on a macro level, using the alternative scenarios of growth - as presented earlier in this report - as well as readily available data as collected from the TEM and TER countries, using specific data templates.

3.3 PHASE C – Evaluation of Projects

The still very preliminary level of definition of most projects, the lack of precise information on the present situation, the imperfect knowledge of transport demand perspectives, the large array in types of projects, as well as the specific objectives of TEM, were in favour of utilizing a Multi-Criteria Analysis, instead of any other method, to compare and evaluate the identified projects.

Such a method allowed available information to be taken into account on projects, even at their very preliminary level of definition, as well as background data. At the same time, some specific elements of particular interest for the decision makers were introduced.

3.3.1 Criteria definition

The criteria for the evaluation were defined according to three basic concerns:

- the socio-economic return on investment;
- the functionality and the coherency of the network;
- the strategic/ political concerns of the network.

Under these three fundamental orientations of the evaluation process, the following criteria have been introduced.

CLUSTER A - Socio-economic return on investment (C_A):

- Degree of urgency (C_{A1}),
- Cost effectiveness (C_{A2}),
- Relative investment cost (C_{A3}),
- Level of transport demand (C_{A4}),
- Financing feasibility (C_{A5}).

CLUSTER B - Functionality and coherency of the network (C_B):

- Relative importance of international demand of traffic/ passengers (C_{B1}),
- Relative importance of international demand of traffic/ goods (C_{B2}),
- Alleviation of bottlenecks (C_{B3}),
- Interconnection of existing networks (international level) (C_{B4}),
- Interoperability of networks (C_{B5}).

CLUSTER C - Strategic/ Political concerns regarding the network (C_C):

- Border effects (C_{C1}),
- Political commitment (C_{C2}),
- Regional and international cooperation (C_{C3}),
- Historical/ heritage issues (C_{C4}),
- Economic impact (C_{C5}).

Following set criteria scores for each project, the evaluation and projects prioritization were proposed.

3.3.2 Criteria quantification

Criteria were quantified for each of the projects considered either by direct classification according to available data or measurable characteristics, or by “quality attributes”, provided

by expert judgment from the involved national authorities. To make the various criteria scores compatible it was necessary to transform them into one common measurement unit.

For the quantitative criteria, their quantification was not based on a specific utility function –like in all conventional MCA methods –, but on direct scoring at an artificial scale, which will be performed by connecting threshold values of the artificial scale with threshold values of the physical scale. Physical's scale threshold values were based mainly on project nature (i.e. road, rail, port/ maritime). The use of artificial scale was deemed necessary due to the different measurement units of the criteria under consideration.

The artificial scale chosen is: A = 5, B = 4, C = 3, D = 2, E = 1, with 5 the highest value.

3.3.3 Criteria weighting

At this stage, for establishing the criteria weights “Saaty's Analytical Hierarchy Process” (AHP) was used, because it is simple, transparent and widely accepted procedure. In addition, the existence of “Eigen vector method” in AHP provides fast and reliable weights: fast in expressing the short time necessary for its application; and reliable in minimizing the subjectivity of weights' values. It should be noted here that the resulted criteria weights should add up to unit.

3.3.4 Total score per project

The total score of each project in each country was calculated based on the multi-attribute utility theory (MAUT). This was done by multiplying the value score on each criterion by the weight of that criterion, and then adding all those weighted scores together.

Total score per project is obtained by integrating the total score of each project for all countries involved in the project. This was done using Spatial Weights (SW), reflecting the impact of the project to each country if more than one is present. The underlying assumption was that the impacts were proportional to the length of the specific project in the country under consideration.

3.4 PHASE D – Prioritization

The prioritization phase was performed in three levels:

- Technical (direct application of the evaluation methodology, which provides the scores for projects).
- Compliance with prior commitments that set priorities (e.g. TEN-T network for EU member states): then perform corrective actions if needed for the priorities.
- Financial capability of the country (comparison with 1,5% of GDP per year), to secure the good implementation of the prioritized projects: this level forced some projects to shift over time.

3.4.1 Technical prioritization

The ultimate goal of the technical prioritization level was to identify project's categorization -into four pre-defined priority categories- according to their scores, in order to further support the elaboration of a short, medium and long-term investment strategy in each country concerned and encourage the realization of projects that have good chances of implementation and fall within the TEM and TER Projects' Master Plan objectives. The four pre-defined priority categories are:

- *Priority I*: projects, which may be funded and implemented rapidly, including on-going projects up to 2010.
- *Priority II*: projects requiring some additional investigations for final definition before likely financing, or planned for implementation up to 2015.

- *Priority III*: projects requiring further investigations for final definition and scheduling before possible financing, or planned for implementation up to 2020.
- *Priority IV*: projects to be implemented in the long run, including the projects where insufficient data existed.

And if the projects scores lie between:

- 4-5 then it belongs to priority category I.
- 3 -4 then it belongs to priority category II.
- 2 -3 then it belongs to priority category III.
- 1-2 then it belongs to priority category IV.

3.4.2 Compliance with prior commitments

The results of technical prioritization level were cross-checked with priorities assigned in similar procedures (EU Van Miert High Level Group, TINA etc.) that are already accepted and finalized.

The projects, the TEM and TER Projects' Master Plan technical prioritization of which was in compliance with other prior binding commitments, were left as they were. Those not in compliance were modified according to prior commitment.

It has to be noted here that very few cases existed, where changes were made.

3.4.3 Financial capability of countries

In short in this level the below-mentioned steps were followed:

- Estimation of budget for the implementation of the proposed TEM and TER Projects' Master Plan
- Investment budget on annual basis compared with 1.5% percentage of GDP (per country) to identify financial feasibility
- Construction of complete time-tables of investments
- Finalization of priorities
- Identification of possibilities of stage construction per projects
- Estimation of financial resources available.

4. REALIZATION OF TEM AND TER PROJECTS' MASTER PLAN

The step-by-step implementation of the Methodology, led to the realization of the TEM and TER Projects' Master Plan.

First, the results of the technical prioritization level of the Methodology, hence the direct application of the Methodology, were used, confirmed at the prior binding commitments prioritization level and fed the financial capability prioritization level, which examined the financial capability of the countries to implement all the projects to finally present the short-term, mid-term and long-term investment plan.

The presentation of the results is done in two ways for a better "view" of the Master Plan. First they are presented on a country level and then aggregated figures are presented for all the prioritized projects.

4.1 TEM and TER Projects' Master Plan Results per Country

Austria

Austria proposed 7 projects (1 TEM and 6 TER projects) of the total implementation cost of 11,073.8 million Euros, of which, 173.8 million Euros for TEM and 10,900 million Euros for TER.

All Austrian projects belong to Priority Category I.

According to the implementation/investment timetable, 14% of the Austrian TEM and TER Network will be completed before 2010. The rest, 86%, will be completed before 2013.

Funding is secured for all projects.

Notes: The rail projects were not "submitted" in the proper format in the framework of the TEM and TER Projects' Master Plan, but in a general description in the Austrian Transport Master Plan of 2001 ("Generalverkehrsplan from 2001"). Therefore, the implementation of the methodology for the evaluation of these projects was not possible. However, based on the time and investment plan in the country's transport master plan, it was made possible to define the priority category of each project and estimate its budget.

Belarus

For Belarus, 4 projects were considered (3 TEM and 1 TER projects) of total implementation cost 23.1 million Euros, of which, 22.44 million Euros for TEM and 0.57 million Euros for TER.

All Belarusian projects belong to Priority Category I.

According to the implementation/investment timetable, 100% of the Belarusian TEM and TER Network will be completed before 2010.

Funding is secured for all projects.

Notes: The projects were not "submitted" in the framework of the TEM and TER Projects' Master Plan, to support elaboration of prioritization Methodology, but sufficient information existed in a document of UNECE of October 2004, entitled "Euro-Asian Linkages Information for Investment Activities".

Bosnia and Herzegovina

Bosnia and Herzegovina proposed 15 projects (8 TEM and 7 TER projects) of a total implementation cost of 4,519.6 million Euros, of which, 4,165.5 million Euros for TEM and 354.1 million Euros for TER.

Out of the 15 projects, 2 belong to Priority Category I and their implementation cost is 146.25 million Euros and the remaining 13 belong to Priority Category II and their implementation cost is 4,373.35 million Euros.

According to the implementation/investment timetable, 14% of the Bosnia and Herzegovina TEM and TER Network will be completed before 2010; 40% of the Bosnia and Herzegovina TEM and TER Network will be completed between 2010–2015; 6% of the Bosnia and Herzegovina TEM and TER Network will be completed between 2015–2020; 40% of the Bosnia and Herzegovina TEM and TER Network will be completed after 2020.

Funding is secured only for the 25% of the projects' total cost. For the unfunded projects, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Bulgaria

Bulgaria proposed 18 projects (10 TEM and 8 TER projects) of a total implementation cost of 6,012.76 million Euros, of which, 1,043.76 million Euros for TEM and 4,969 million Euros for TER.

Out of the 18 projects, 7 belong to Priority Category I and their implementation cost is 923.3 million Euros and the rest 11 belong to Priority Category II and their implementation cost is 5,089.47 million Euros.

According to the implementation/investment timetable 33% of the Bulgarian TEM and TER Network will be completed before 2010; 27% of the Bulgarian TEM and TER Network will be completed between 2010–2015; 22% of the Bulgarian TEM and TER Network will be completed between 2015–2020; 18% of the Bulgarian TEM and TER Network will be completed after 2020.

Funding is secured only for the 38% of the projects' total cost. For the unfunded projects, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Croatia

For Croatia, 43 projects were considered (27 TEM and 16 TER projects) of a total implementation cost 3,711.40 million Euros, of which, 3,115.8 million Euros for TEM and 595.6 million Euros for TER.

Out of the 43 projects, 24 belong to Priority Category I and their implementation cost is 1,396.6 million Euros and the remaining 19 belong to Priority Category II and their implementation cost is 1,780.80 million Euros.

According to the implementation/investment timetable, 56% of the Croatian TEM and TER Network will be completed before 2010; 30% of the Croatian TEM and TER Network will be completed between 2010–2015; 12% of the Croatian TEM and TER Network will be completed between 2015–2020; 2% of the Croatian TEM and TER Network will be completed after 2020.

Funding is secured for the 70% of the projects' total cost. For the remaining 30%, it is unknown - based on the readily available data - if funding is secured or not. In the latter case, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Notes: The TER projects were not "submitted" in the framework of the TEM and TER Projects' Master Plan, to support elaboration of Prioritisation Methodology, but sufficient information existed in the REBIS study for the 16 rail projects.

Czech Republic

The Czech Republic proposed 13 projects (5 TEM and 8 TER projects) of a total implementation cost of 6,315.92 million Euros, of which, 3,273 million Euros for TEM and 3,042.92 million Euros for TER.

Out of the 13 projects, 10 belong to Priority Category I and their implementation cost is 4,344.3 million Euros and the remaining 3 belong to Priority Category II and their implementation cost is 1,971.62 million Euros.

According to the implementation/investment timetable, 69% of the Czech TEM and TER Network will be completed before 2010; 8% of the Czech TEM and TER Network will be completed between 2010–2015; 23% of the Czech TEM and TER Network will be completed between 2015–2020.

Funding is secured for all projects.

Georgia

For Georgia, 6 projects were considered (4 TEM and 2 TER projects) of a total implementation cost 1,914.98 million Euros, of which, 88.6 million Euros for TEM and 1,826.37 million Euros for TER.

Out of the 6 projects, 5 belong to Priority Category I and their implementation cost is 1,399.01 million Euros and 1 belongs to Priority Category II and its implementation cost is 515,97 million Euros.

According to the implementation/investment timetable, 66% of the Georgian TEM and TER Network will be completed before 2010; 33% of the Georgian TEM and TER Network will be completed after 2020.

Funding is secured for all of the projects apart from one road (TEM) project. In the latter case, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Notes: The TEM projects were not "submitted" in the framework of the TEM and TER Projects' Master Plan, to support elaboration of Prioritization Methodology, but sufficient information existed in a document of UNECE of October 2004, entitled "Euro-Asian Linkages Information for Investment Activities" for the 4 road (TEM) projects.

The Ministry of Economic Development of Georgia, by its letter No. 26/747/9-6 of 7 April 2006, proposed some corrections to the data concerning the two railway projects of Georgia. As this request could not be met due to its late submission, this letter is annexed to the present report (Annex IX).

Greece

Greece proposed 17 projects (5 TEM and 12 TER projects) of a total implementation cost of 6,420.43 million Euros, of which, 794 million Euros for TEM and 5,626.43 million Euros for TER.

Out of the 17 projects, 7 belong to Priority Category I and their implementation cost is 1,900.63 million Euros, 9 belong to Priority Category II and their implementation cost is 4,284.8 million Euros and 1 belongs to Priority Category III and its implementation cost is 235 million Euros.

According to the implementation/investment timetable, 29% of the Greek TEM and TER Network will be completed before 2010; 29% of the Greek TEM and TER Network will be completed between 2010–2015; 35% of the Greek TEM and TER Network will be completed between 2015–2020; and 7% of the Greek TEM and TER Network will be completed after 2020.

Funding is secured for 29% of the projects' total cost. For the rest, 71% identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Hungary

Hungary proposed 43 projects (20 TEM and 23 TER projects). TEM projects total implementation cost is unknown – based on the readily available data -. TER projects' total implementation cost is 4,453.89 million Euros.

Out of the 20 TEM projects, 11 belong to Priority Category I and 9 belong to Priority Category II, but for both categories the implementation cost is unknown as mentioned above.

Out of the 23 TER projects, 16 belong to Priority Category I and their implementation cost is 2,666.60 million Euros, 1 belongs to the intermediate Priority Category I-II and its implementation cost is 80.37 million Euros, 5 belong to Priority Category II and their implementation cost is 767.91 million Euros and 1 belongs to the intermediate Priority Category II-III and its implementation cost is 939 million Euros. The intermediate categories exist only because these projects were broken down to sub-projects.

For conformity reasons with the pre-selected Priority Categories, these “intermediate Priority Category” projects were treated as if they belong in the higher of the two Priorities, i.e. if intermediate Priority Category I-II, then the project belongs to Priority Category I.

According to the implementation/investment timetable 44%, of the Hungarian TEM and TER Network will be completed before 2010; 26% of the Hungarian TEM and TER Network will be completed between 2010–2015; 5% of the Hungarian TEM and TER Network will be completed between 2015–2020; 2% of the Hungarian TEM and TER Network will be completed after 2020; for the remaining 23% of the Hungarian TEM and TER Network, it is unknown - based on the readily available data - when it will be completed.

Funding is secured for 44% of the projects total cost. For the 9% of the projects' total cost funding is not secured and for the remaining 47% it is unknown - based on the readily available data - if funding is secured or not. In the case of unfunded projects, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Notes: TEM projects as “submitted” in the framework of the TEM and TER Projects' Master Plan presented insufficient data to support elaboration of Prioritization Methodology. Their ranking in Priority Categories was provided directly by Hungary, regardless of the scores they received after the Evaluation Methodology. For TER projects some additional information, apart from that received from the country in the framework of the project, was collected from ISPA information sheets.

Italy

No data existed and none received from this country, to support elaboration of Prioritization Methodology. However, as Italy is among the TEM and TER countries in which the TEM and TER Networks are almost complete (99% of its TEM and TER Networks are already in place), the lack of project proposals was not considered to affect the efficiency of this work.

Lithuania

Lithuania proposed 32 projects (10 TEM and 22 TER projects). For 7 TEM projects there was absolutely no data. For the remaining 25 projects, the total implementation cost is 1,900.1 million Euros, of which, 97 million Euros for TEM and 1,803.1 million Euros for TER.

Out of the 32 projects, 19 belong to Priority Category I and their implementation cost is 1,437.5 million Euro, 6 belong to Priority Category II and their implementation cost is 462.6 million Euros and the 7 projects that presented no data categorized directly in Priority Category IV and their implementation cost is unknown.

According to the implementation/investment timetable, 47% of the Lithuanian TEM and TER Network will be completed before 2010; 28% of the Lithuanian TEM and TER Network will be completed between 2010–2015; 3% of the Lithuanian TEM and TER Network will be completed between 2015–2020; 22% of the Lithuanian TEM and TER Network will be completed after 2020.

Funding is secured for the 72% of the projects' total cost. For the remaining 28% it is unknown if funding is secured or not since there were no available data. In case the 28% is unfunded, then identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Notes: 7 out of 10 TEM projects were “submitted”, in the framework of the TEM and TER Projects' Master Plan, in an inappropriate format and presented insufficient data to support elaboration of Prioritization Methodology. These projects were treated as Priority IV and without details in financing.

Poland

For Poland, 97 projects were considered (91 TEM and 6 TER projects). For 65 (all TEM) projects there was absolutely no data. For the remaining 32 projects, the total implementation cost is 2,674.5 million Euros, of which, 2,080 million Euros for TEM and 594.5 million Euros for TER.

Out of the 97 projects, 32 belong to Priority Category I and their implementation cost is 2,674.5 million Euros and the 65 projects that presented no data were categorized directly in Priority Category IV and their implementation cost is unknown.

According to the implementation/investment timetable 33% of the Polish TEM and TER Network will be completed before 2010. For the remaining 66% of the Polish TEM and TER Network, it is unknown when it will be completed, it can only be estimated that it will start in the long-term.

With the exception of one rail project where funding is secured, funding seems to be a problem for all projects that are in Priorities I and II. This is due to the fact that for these projects the prioritization was done directly by the country without supporting data such as the funding sources and allocation per project. The few details of funding were found in ISPA

information sheets. However, in the Schedule of Motorways and Expressways of the Polish General Directorate of National Roads and Motorways, it seems that funding is secured for projects in Priority I and II, but the allocation of funds in each project is unknown. For the projects in Priority IV, where no data existed either, it is unknown if funding sources are secured or not. In the case of unfunded projects, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Notes: Most of the TEM projects as “submitted” in the framework of the TEM and TER Projects' Master Plan presented no data to support elaboration of Prioritization Methodology, so they were categorized directly in Priority Category IV. As for the rest, which are mostly in Priority I and some in Priority II, they presented the same quality of data as the ones in Priority IV but they were considered important and their priorities were given directly by the country. As for the information regarding the latter's timeplan and investment costs, these were taken from “Polish General Directorate of National Roads and Motorways: Schedule of Motorways and Expressways”. As it concerns TER, no data was received from this country in the framework of the TEM and TER Projects' Master Plan, to support elaboration of Prioritization Methodology, but sufficient information existed in ISPA information sheets for 6 rail projects.

Republic of Moldova

The Republic of Moldova proposed 3 projects (1 TEM and 2 TER projects) of a total implementation cost of 500.5 million Euros, of which, 18.2 million Euros for TEM and 482.3 million Euros for TER.

All Republic of Moldova's projects belong to Priority Category I.

According to the implementation/investment timetable, 66% of the Moldavian TEM and TER Network will be completed before 2010. The remaining 33% will be completed after 2020.

Funding is secured for all projects.

Romania

Romania proposed 45 projects (41 TEM and 4 TER projects) of a total implementation cost of 20,601.19 million Euros, of which, 17,529.09 million Euros for TEM and 3,072.1 million Euros for TER.

Out of the 45 projects, 17 belong to Priority Category I and their implementation cost is 7,122.39 million Euros and 28 belong to Priority Category II and their implementation cost is 13,478.8 million.

According to the implementation/investment timetable, 18% of the Romanian TEM and TER Network will be completed before 2010; 16% of the Romanian TEM and TER Network will be completed between 2010–2015; 18% of the Romanian TEM and TER Network will be completed between 2015–2020; 48% of the Romanian TEM and TER Network will be completed after 2020.

Funding is secured for 56% of the projects' total cost. For the remaining 44%, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Notes: In Romania the categorization of Priority Category II was not followed strictly as it concerns investment procedures, since the trial and error process in investment plan forced some projects in Priority Category II to be “moved” in the time horizon in Priority Category III or IV as it concerns their investment. These projects were the most expensive, and that was the

reason for their movement. Therefore in Romania, unlike other countries, the time horizon of project construction might be different from investment horizon. Maybe the investment plan could be “narrowed” if Romania reconsiders the priorities given to some projects.

Russian Federation

For the Russian Federation, 31 projects were considered (12 TEM and 19 TER projects) at a total implementation cost of more than 11,340 million Euros, of which, 4,389.68 million Euros for TEM and 6,950.32 million Euros for TER.

All Russian projects belong to Priority Category I.

According to the implementation/investment timetable, 100% of the Russian TEM and TER Network will be completed before 2010.

For all the projects, it is unknown if funding sources are secured or not - according to the readily available data. In the latter case, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects’ Master Plans.

Notes: The projects of this country were not “submitted” in the framework of the TEM and TER Projects’ Master Plan, to support elaboration of Prioritization Methodology, but sufficient information existed in the country’s National Report in the framework of the UNECE-UNESCAP Project on developing Euro-Asian Transport Linkages.

According to the Russian Federation National Report, road and rail projects are mainly parts of two Euro-Asian corridors: the TRANSSIB and “North-South” corridors. Volumes of investments into the development of the TRANSSIB corridor up to the year 2010 will be more than 7.5 billion US dollars, and into the “North-South” corridors – 6.4 billion US dollars. Respectively, these amounts (in Euros) are 6.14 billion Euros and 5.2 billion Euros. The investment costs of road and rail projects belonging in each Euro-Asian corridor - in total - are presumably less than the investment volumes in the corridors, since both TRANSSIB and “North-South” corridors include other kinds of transport projects apart from road and rail, i.e. ports.

It has to be noted here that no sufficient data existed in the national report to support the calculation of investment cost per year for each project and, therefore, the country’s expenses per year for TEM and TER construction, but the starting and ending year of construction for most of the projects was known. Furthermore, no funding information was available. Therefore, for the Russian Federation it was difficult to prepare a cost/investment plan on a yearly basis in order to check the rule of ‘total investment cost per year < 1.5% GDP’, but since the total cost of the projects (being less than the investment volume of the two Euro-Asian Corridors) under consideration if broken down in years is significantly lower than the country’s GDP, it can be assumed that there will be no problem for the Russian Federation to implement the projects between the selected/indicated years.

Finally, for the same reason, the estimation of TEM and TER individual implementation budgets are estimated under the hypothesis that each project’s cost (TEM or TER) are almost equal.

Serbia and Montenegro

For Serbia and Montenegro, 41 projects were considered (28 TEM and 13 TER projects) of a total implementation cost of 1,398.9 million Euros, of which, 933.8 million Euros for TEM and 465.1 million Euros for TER.

Out of the 41 projects, 37 belong to Priority Category I and their implementation cost is 1,024.8 million Euros and 4 belong to Priority Category II and their implementation cost is 374.1 million Euros.

According to the implementation/investment timetable, 90.2 % of the Serbian and Montenegrin TEM and TER Network will be completed before 2010; 9.8 % of the Serbian and Montenegrin TEM and TER Network will be completed between 2010–2015.

Funding is secured for 12.1% of the projects' total cost. For the remaining 87.9%, it is unknown if funding is secured or not since there was no available data. In case the 87.9% is unfunded, then identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Notes: The projects of this country were not “submitted” in the framework of the TEM and TER Projects' Master Plan, to support elaboration of the Prioritization Methodology, but sufficient information existed in the REBIS study.

Slovakia

Slovakia proposed 24 projects (19 TEM and 5 TER projects) of a total implementation cost 6,199.88 million Euros, of which, 4,379.35 million Euros for TEM and 1,820.53 million Euros for TER.

Out of the 24 projects, 11 belong to Priority Category I and their implementation cost is 3,685.49 million Euros and 13 belong to Priority Category II and their implementation cost is 2,514.39 million Euros.

According to the implementation/investment timetable, 4% of the Slovakian TEM and TER Network will be completed before 2010; 8% of the Slovakian TEM and TER Network will be completed between 2010–2015; 42% of the Slovakian TEM and TER Network will be completed between 2015–2020; 46% of the Slovakian TEM and TER Network will be completed after 2020.

Funding is secured for all projects.

Slovenia

Slovenia proposed 14 projects (7 TEM and 7 TER projects) of a total implementation cost of 3,686.68 million Euros, of which, 2,372.08 million Euros for TEM and 1,314.60 million Euros for TER.

Out of the 14 projects, 13 belong to Priority Category I and their implementation cost is 3,476.68 million Euros and 1 belongs to Priority Category II and its implementation cost is 210 million Euros.

According to the implementation/investment timetable, 36% of the Slovenian TEM and TER Network will be completed before 2010; 43% of the Slovenian TEM and TER Network will be completed between 2010–2015; 7% of the Slovenian TEM and TER Network will be completed between 2015–2020; 14% of the Slovenian TEM and TER Network will be completed after 2020.

Funding is secured for 50% of the projects' total cost. For the remaining 50%, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

The former Yugoslav Republic of Macedonia

The former Yugoslav Republic of Macedonia proposed 8 projects (3 TEM and 5 TER projects) of a total implementation cost of 1,425.27 million Euros, of which, 913.7 million Euros for

TEM and 511.57 million Euros for 2 out of 5 TER, since for 3 TER projects the implementation cost is unknown.

Out of the 8 projects, 2 belong to Priority Category I and their implementation cost is 63.7 million Euros, 3 with an implementation cost of 1,361.57 million Euros, it is unknown in which Priority Category they belong due to lack of data and for the last 3 it is unknown how much they cost and in which Priority Category they belong due to lack of data.

For conformity reasons with the pre-selected Priority Categories, these “unknown Priority Category” projects were treated as if they belong in Priority Category IV, since this Priority Category contains projects with no sufficient data to support proper evaluation/prioritization.

Thus, out of the 8 projects, 2 belong to Priority Category I and their implementation cost is 63.7 million Euros, 6 belong to Priority Category IV, of which 3 have a total implementation cost of 1,361.57 million Euros, and for the remaining 3, is unknown how much they cost due to lack of data.

According to the implementation/investment timetable, 25% of the FYROM TEM and TER Network will be completed before 2010; for the remaining 75% it is unknown for the same reason mentioned above.

Funding is secured for 25% of projects’ total cost. For the remaining 75%, it is unknown - based on the readily available data - if funding is secured or not. In the latter case, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects’ Master Plans.

Notes: The projects were not “submitted” in proper format in the framework of the TEM and TER Projects’ Master Plan, to support elaboration of Prioritization Methodology, but sufficient information existed in a brief description of the country’s priorities and therefore 8 projects were identified.

Turkey

Turkey proposed 24 projects (20 TEM and 4 TER projects) of a total implementation cost of 6,658.27 million Euros, of which, 3,123.47 million Euros for TEM and 3,534.8 million Euros for TER.

Out of the 24 projects, 18 belong to Priority Category I and their implementation cost is 2,998.58 million Euros and 6 belong to Priority Category II and their implementation cost is 3,659.68 million Euros.

According to the implementation/investment timetable 50% of the Turkish TEM and TER Network will be completed before 2010; 29% of the Turkish TEM and TER Network will be completed between 2010–2015; 21% of the Turkish TEM and TER Network will be completed between 2015–2020.

Funding is secured for 54% of the projects’ total cost. For the remaining 46%, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects’ Master Plans.

Ukraine

For Ukraine, 6 projects were considered (4 TEM and 2 TER projects) of a total implementation cost of 1,283 million Euros, of which, 1,043 million Euros for TEM and 240 million Euros for TER.

Out of the 6 projects, 3 belong to Priority Category I and their implementation cost is 483.61 million Euros and 3 belong to Priority Category II and their implementation cost is 799.2 million Euros.

According to the implementation/investment timetable, 50% of the Ukrainian TEM and TER Network will be completed before 2010; 50% of the Ukrainian TEM and TER Network will be completed between 2010–2015.

Funding is secured for all projects.

Notes: The TER projects were not “submitted” in the framework of the TEM and TER Projects’ Master Plan, to support elaboration of Prioritization Methodology, but sufficient information existed in a document of UNECE of October 2004, entitled “Euro-Asian Linkages Information for Investment Activities”.

4.2 TEM and TER Projects’ Master Plan Results per Country Group

It is interesting to view the results from the country-group perspective, following the country groups presented in Chapter 2, EU member countries before 1 May 2004, EU member countries after 1 May 2004 and acceding countries, Non-EU, non-acceding countries.

EU member countries before 1 May 2004

The EU member countries before 1 May 2004 (Austria, Italy and Greece) proposed 24 projects (6 TEM and 18 TER projects) of a total implementation cost of 17,494.23 million Euros, of which, 967.8 million Euros for TEM and 16,526.43 million Euros for TER

Out of the 24 projects, 14 belong to Priority Category I and their implementation cost is 12,974.43 million Euros, 9 belong to Priority Category II and their implementation cost is 4,284.8 million Euros and 1 belongs to Priority Category III and its implementation cost is 235 million Euros.

According to the implementation/investment timetable of this country group: 25% of the TEM and TER Network will be completed before 2010; 46% of the TEM and TER Network will be completed between 2010–2015; 25% of the TEM and TER Network will be completed between 2015–2020; 4% of the TEM and TER Network will be completed after 2020.

Funding is secured for 50% of the projects’ total cost. For the remaining 50%, identification of the possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects’ Master Plans.

EU member countries after 1 May 2004 and acceding countries

The EU member countries after 1 May 2004 and the acceding countries (Bulgaria, Croatia, Czech Republic, Hungary, Lithuania, Poland, Romania, Slovakia, Slovenia and Turkey) proposed 353 projects (250 TEM and 103 TER projects). For the 261 projects, out of these 353, the total implementation cost is 61,197.53 million Euros, of which, 37,013.54 million Euros for TEM and 24,183.99 million Euros for TER. For the remaining 92 (all TEM), the implementation cost is unknown.

Out of the 353 projects, 168 belong to Priority Category I and their implementation cost is 30,130.63 million Euros, 11 belong to Priority Category I and their implementation cost is unknown, 91 belong to Priority Category II and their implementation cost is 31,066.9 million Euros, 9 belong to Priority Category II and their implementation cost is unknown and 72 belong to Priority Category IV and their implementation cost is unknown.

According to the implementation/investment timetable of this country group: 35% of the TEM and TER Network will be completed before 2010; 16% of the TEM and TER Network

will be completed between 2010 – 2015; 11% of the TEM and TER Network will be completed between 2015 – 2020; 14% of the TEM and TER Network will be completed after 2020.

Funding is secured for 47% of the projects' total cost. Funding is not secured for 15% of the projects' total cost and for the remaining 38%, it is unknown if funding is secured or not. In the latter two cases, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

Non-EU, non-acceding countries

The non-EU, non-acceding countries (Belarus, Bosnia and Herzegovina, FYROM, Georgia, Republic of Moldova, Russian Federation, Serbia and Montenegro and Ukraine) proposed 114 projects (63 TEM and 51 TER projects). For the 111 projects, out of these 114, the total implementation cost is 22,405.13 million Euros, of which, 11,575.14 million Euros for TEM and 10,829.99 million Euros for TER. For the rest 3 (all TER), the implementation cost is unknown

Out of the 114 projects, 87 belong to Priority Category I and their implementation cost is 14,980.91 million Euros, 21 belong to Priority Category II and their implementation cost is 6,062.62 million Euros, 3 belong to Priority Category IV and their implementation cost is 1,361.6 million Euros and 3 belong to Priority Category IV and their implementation cost is unknown.

According to the implementation/investment timetable of this country group: 74% of the TEM and TER Network will be completed before 2010; 11% of the TEM and TER Network will be completed between 2010–2015; 4% of the TEM and TER Network will be completed between 2015–2020; 6% of the TEM and TER Network will be completed after 2020 and 5% of the TEM and TER Network is unknown when it will be completed.

Funding is secured for 25% of the projects' total cost. Funding is not secured for 11% of the projects total cost and for the remaining 64% it is unknown if funding is secured or not. In the latter two cases, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined in the framework of the TEM and TER Projects' Master Plans.

4.3 TEM and TER Projects' Master Plan Total Results

In total, 491 projects were proposed from the TEM and TER countries and included in the TEM and TER Projects' Master Plan (319 TEM projects and 172 TER projects). The implementation of TEM and TER Network as a whole will need 102,114 billion Euros, of which, 49,556 billion Euros for TEM and 52,558 billion Euros for TER.

Out of these 491 TEM and TER Projects:

- 269 projects categorized in Priority Category I and their implementation cost is 58,085 billion Euros, (141 TEM projects of a total value of 25,255 billion Euros and 128 TER projects of a total value of 32.83 billion Euros).
- 11 (all TEM) projects categorized in Priority Category I but their implementation cost is unknown.
- 123 projects categorized in Priority Category II and their implementation cost is 41,41 billion Euros, (84 TEM projects of a total value of 23.22 billion Euros and 39 TER projects of a total value of 18,19 billion Euros).

- 9 (all TEM) projects categorized in Priority Category II, but their implementation cost is unknown.
- 1 (TEM) project categorized in Priority Category III and its implementation cost is 0.235 billion Euros.
- 3 projects categorized in Priority Category IV and their implementation cost is 1.36 billion Euros, (1 TEM project of a total value of 0.085 billion Euros and 2 TER projects of a total value of 0.511 billion Euros).
- 75 (72 TEM and 3 TER) projects categorized in Priority Category IV but their implementation cost is unknown.

According to the implementation/investment timetable:

- 44% of the TEM and TER Network will be completed before 2010;
- 16% of the TEM and TER Network will be completed between 2010–2015;
- 10% of the TEM and TER Network will be completed between 2015–2020;
- 11% of the TEM and TER Network will be completed after 2020 and
- 19% of the TEM and TER Network, completion date is unknown.

Separately for TEM Network:

- 36% of the TEM Network will be completed before 2010;
- 13% of the TEM Network will be completed between 2010–2015;
- 10% of the TEM Network will be completed between 2015–2020;
- 13% of the TEM Network will be completed after 2020 and
- 27% of the TEM Network, completion date is unknown.

Separately for TER Network:

- 58% of the TER Network will be completed before 2010;
- 22% of the TER Network will be completed between 2010–2015;
- 9% of the TER Network will be completed between 2015–2020;
- 7% of the TER Network will be completed after 2020 and
- 3% of the TER Network, completion date is unknown.

46 billion Euros of funding is secured covering 45% of the TEM and TER Projects' total implementation cost or about 60% of the projects. Funding is not secured for 16% of the TEM and TER Projects' total implementation cost. For the remaining 39%, it is unknown if funding is secured or not since there was no available data. In any case, for the unfunded projects, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined later in this report.

Separately for TEM: 15.3 billion Euros of funding is secured covering 31% of the TEM Projects total implementation cost. Funding is not secured for 21% of the TEM Projects total cost. For the remaining 48%, it is unknown if funding is secured or not since there was no available data. In any case, for the unfunded projects, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined later in this report.

Separately for TER: 30.5 billion Euros of funding is secured covering 58% of the TER Projects' total implementation cost. Funding is not secured for 10% of the TER Projects' total cost. For the remaining 32%, it is unknown if funding is secured or not since there was no available data. In any case, for the unfunded projects, identification of possible sources of funding, eligibility criteria for receiving funding and the required procedures are outlined later in this report.

Notes: Most of these projects were submitted by countries with sufficient information in order to be evaluated and some found in relevant studies such as TIRS, REBIS, Euro-Asian Transport

Linkages, ISPA information sheets, EU Van Miert High Level Group, etc. This large number of road and rail projects was evaluated and the prioritization of the projects was undertaken.

4.4 Identification of TEM and TER Bottlenecks

4.4.1 Identification of TEM Bottlenecks

The methodological approach to identifying the capacity bottlenecks with a special respect to the effects of the truck and bus transport was based on the Methodological Basis for the Definition of Common Criteria Regarding Bottlenecks, Missing Links and Quality of Service of Infrastructure Networks, elaborated by the UNECE Inland Transport Committee Working Party on Transport Trends and Economics. For the purpose of identification of the individual bottlenecks, the level of service concept of the US Highway Capacity Manual (HCM), in the framework of which the level of service C was chosen as still acceptable, and the relation between the capacity of the infrastructure and quality of transport service represented important indicators.

Moreover, in accordance with the findings of the above-mentioned UNECE Inland Transport Committee document, a quantifiable and practical bottleneck criterion to be found in all European countries was that of road capacity, which permitted to compare internationally the bottlenecks in various countries.

For individual road categories, the following maximum capacities in terms of number of vehicles as the average daily traffic were recommended:

4-lane motorway	60,000 PCU/24 hrs
road of 2 lanes	12,000 PCU/24 hrs

These capacity limits were used to identify the bottlenecks in the TEM Master Plan. When stating the capacity, it was also necessary to evaluate differently the vehicle types according to their influence on the traffic flow. The most important role here was played by the trucks and buses, the influence of which was the highest. To take it into account properly, their weights (passenger car equivalents) had to be chosen, depending on the type of terrain, through which the road (motorway) passed.

For two-lane highways, these HCM-based values of trucks' and buses' passenger car equivalents were used:

Vehicle type	Type of terrain		
	flat	hilly	mountainous
trucks and buses	2.1	4.5	9.0

Similarly, in order to identify the capacity bottlenecks on four lane TEM motorway (to be removed by adding two or more lanes), the following HCM passenger car equivalents were taken as a basis:

Vehicle type	Type of terrain		
	flat	hilly	mountainous
trucks and buses	1.5	3.0	6.0

On this basis it was possible to identify the expected bottlenecks in the respective five-year periods until 2020 using these equations:

(a) for two-lane highways

$$x + 1.1y \geq 12000 \text{ PCU in flat terrain}$$

$$x + 3.5y \geq 12000 \text{ PCU in hilly terrain}$$

$$x + 8.0y \geq 12000 \text{ PCU in mountainous terrain}$$

(b) for four-lane motorways (motorways having 6 lanes and more were not taken into account when identifying bottlenecks, their capacity being considered sufficient)

$$x + 0.5y \geq 60000 \text{ PCU in flat terrain}$$

$$x + 2.0y \geq 60000 \text{ PCU in hilly terrain}$$

$$x + 5.0y \geq 60000 \text{ PCU in mountainous terrain}$$

where:

PCU – were passenger car units (equivalents)

x – number of all vehicles

y – number of trucks and coaches.

The potential bottlenecks thus identified were positioned on the interurban (rural) TEM network sections only (i.e. urban areas were excluded). The TEM sections with bottlenecks expected to appear until 2020 were listed in the Master Plan final report and shown also on the respective maps reflecting the bottlenecks' status in 2005, 2010, 2015 and 2020.

4.4.2 Identification of TER Bottlenecks

In terms of bottlenecks in the railway sector, there are many elements which may constitute a bottleneck. These include:

- Single or double track;
- Electrified or non electrified line;
- Narrow gauge or normal European standard gauge or broad gauge;
- Tunnels;
- Bridges;
- Level crossings or overpasses requiring in most cases a speed reduction;
- Platform length in stations;
- Gradient or radius of curve;
- Actual or designated speed or maximum speed allowed by the track;
- Signalling system in use;
- Processing time required for passenger or freight traffic at border crossings;
- Modernized or old infrastructure existing in border crossings;
- Traction system in border stations;
- Maximum capacity per line section;
- Frequency of services offered;
- Maximum axle load;
- Main overhaul done or in course or not done, etc.

The TER member countries have always regarded the collection, processing and presentation of such data as a very important task for TER. The TER PCO, in cooperation with the national data experts of its member countries, is collecting and processing a great number of relevant data along the TER Network as part of its permanent work. This information is shared among the TER members. However, this work is not yet complete. This refers in particular to the non-TER member countries involved in the Master Plan, for which such data do not exist in the TER PCO, as well as to some TER member countries whose data is far from being complete or need further updating.

Bearing in mind the above, as well as the complexity of the work which, if considered on an individual basis, would generate a great volume of information impossible to be processed within the existing time frame and resources available for the completion of this work, it was considered more appropriate that the current study not go into such details.

On the contrary, the TER PCO identified a number of missing links along the TER network, which were considered much more relevant for the purpose of this study. These missing links are presented below:

Braniewo (Pol) – Kaliningrad (Rus) – Nesterov (Rus) – Kybartai (Ltu)
 Lvov (Ukr) – Przemysl (Pol)
 Lvov (Ukr) – Uzhgorod (Ukr)
 Lvov (Ukr) – Chop (Ukr)
 Lukow(Pol) – Lublin(Pol) – Dorohusk(Pol) – Chelm (Pol)
 Lyubolm'il (Ukr) – Kowel (Ukr) – Vladimir (Ukr) – Volunskiy (Ukr) – Lvov (Ukr)
 Halmeu (Rou) – Vinigradov (Ukr) – Munkacevo (Ukr)
 Brest (Blr) – Kowel (Ukr)
 Kovel (Ukr) – Sarmy (Ukr) – Kiev (Ukr)
 Kiev (Kiev) – Nizhin (Ukr) – Chernihiv (Ukr) – Repki (Ukr) – Dobryanka (Ukr) – Homyel (Blr) – Osipoviki (Blr) – Minsk (Blr) – Kena B.S. (Ltu)
 Zhmerinka (Ukr) – Odessa (Ukr)
 Odessa (Ukr) – Kukurhan (Mda) – Tiraspol (Mda) – Tighina (Mda)
 Kiev (Ukr) – Donetsk (Ukr) – Luhansk (Ukr) – Likhaya (Rus)
 Pascani (Rou) – Suceava (Rou) – Vicsani (Rou) – Vadu Siretu (Ukr) – Chernovtvy (Ukr) – Byala (Ukr) – Berezowika-Ostrow (Ukr)
 Donetsk (Ukr) – Rostov Na Donu (Rus)
 Belgrade (Scg) – Ripanj (Scg) – Valjevo (Scg) – Zvornik (Scg)
 Valjevo (Scg) – Titovo-Uzice (Scg) – Bijelo Polje (Scg) – Podgorica (Scg) – Bar (Scg)
 Caplijina (Bih) – Hum (Hrv)
 Gostivar (FYROM) – Kicevo (FYROM)
 Struga (FYROM) – Durres (Alb)
 Gdansk – Warsaw – Lublin – Yogodin – Lvov – Halmeu – Cluj – Brasov – Bucuresti – Constanta
 Pascani – Vicsani – Vadu Siret – Cernauti – Kiev

5. TEM AND TER PROJECTS' MASTER PLAN BACKBONE NETWORK AND ADDITIONAL LINKS

The definition of the TEM and TER Master Plan Backbone Networks, as outlined in this project, was based on a certain number of assumptions:

- the technical standards of the future infrastructure should ensure consistency between the capacity of network components and their expected traffic. To achieve this, it was accepted that these standards should be in line with the recommendations of the UNECE Working Party on Transport Trends and Economics (WP.5) on the definition of transport infrastructure capacities (TRANS/WP.5/R.60);
- the time horizon for achievement of the network should be 2020, although differentiation should be indicated among the three time horizons of 2010, 2015 and 2020;
- the cost of the network should be consistent with realistic forecasts of financial resources, so that average costs should not exceed 1.5% of each country's annual GDP over the period up to 2020;
- to the extent deemed appropriate, the network in the EU Member Countries (old and new) as well as in the accession countries, should be in line with the criteria laid down in the EU guidelines for the development of the TENs (Council decision 1692/96/EC);

The first draft Backbone Network was the starting point of the TEM and TER Projects' Master Plan for a differential network design. This network was defined by TEM and TER PCOs and their consultants, separately for TEM and TER, so as to include:

- Major parts of the TEM and TER Networks for their member countries;
- TEN corridors (EU Van Miert High Level Group projects), Pan-European Corridors; MEDA TEN-T corridors and Euro-Asian Routes for the non-member countries of TEM and TER;
- the intermodal terminals/freight villages and ports;
- the TIRS and REBIS projects wherever relevant, and of course;
- the projects proposed by the involved countries as their priority needs.

Further to the first draft Backbone Network, during the TEM and TER Projects' Master Plan process, additional network components were proposed to be included in the final TEM and TER Projects' Master Plan Backbone networks. Special consideration was given to the interconnection and continuity of the additional links with parts of the Backbone Networks. More specifically, the additional network components should:

- together with the Backbone Network, be able to form a network which will be in line or extending the EU TEN-T;
- give priority, where possible, to the better use of existing infrastructure;
- be able to comply with the set time-period for the development of the network (2020);
- be in line with the given financial framework.

Finally, the missing links were identified, broadly following the recommendations of UNECE Working Party on Transport Trends and Economics (WP.5) for the identification of missing links and bottlenecks.

5.1 TEM Master Plan Backbone Network: Backbone Links, Additional and Missing Links and TEM Extensions

To identify the TEM Master Plan Backbone Network and its additional links, TEM PCO suggested as the most logical and generally acceptable approach, to be based on the Pan-European Transport Corridors approved in 1994, and 1997 at Crete and Helsinki respectively, on the Trans-European Road Network of the European Union and on the Euro-Asian transport links.

So, the basic criterion for selection of the TEM Master Plan Backbone links was their international importance, i.e. their affiliation to the Pan-European Transport Corridors, Trans-European Network of the EU and to the Euro-Asian transport links.

Following the above-mentioned approach, these links were identified as parts of the TEM Master Plan Backbone Network (per country):

AUSTRIA

Nickelsdorf (H/A) – Wien
 Berg (SK/A) – Fischamend
 Wien – Graz – Arnoldstein (A/I)

BOSNIA AND HERZEGOVINA

Bos. Samac (HR/BIH) – Sarajevo – Visici (BIH/HR)

BULGARIA

Kalotina (SIM/BG) – Sofia – Kapitan Andreevo (BG/TR)
 Ruse (RO/BG) – Bjala – Haskovo

CROATIA

Bregana (SLO/HR) – Zagreb – Lipovac (HR/SIM)
 Gorican (H/HR) – Zagreb – Karlovac – Rijeka
 Knezevo (H/HR) – Osijek – Slav. Samac (HR/BIH)
 Metkovic (BIH/HR) – Ploce

CZECH REPUBLIC

Cinovec (D/CZ) – Praha – Brno – Lanzhot (CZ/SK)
 Rozvadov (D/CZ) – Praha
 Brno – Ostrava – C. Tesin (CZ/PL)

GEORGIA

Leselidze (RUS/GA) – Senaki – Tbilisi – Tsiteli Khidi (GA/AZ)
 Sarpi (TR/GA) – Poti – Senaki
 Larsi (RUS/GA) – Tbilisi – Sadakhlo (GA/AR)

HUNGARY

Hegyeshalom (A/H) – Budapest – Szeged – Rösztke (H/SIM)
 Rajka (SK/H) – Levél
 Szeged – Nagylak (H/RO)
 Letenye (HR/H) – Budapest – Záhony (H/UA)
 Budapest – Udvar (H/HR)

ITALY

Genova – Padova – Palmanova – Trieste (I/SLO)
 Coccau (A/I) – Palmanova
 Padova – Bologna – Bari – Brindisi

LITHUANIA

Klajpeda – Kaunas – Vilnius – Medininkai (LT/BY)
 Kaunas – Sangruda (LT/PL)
 Salociai (LV/LT) – Sitkunai

POLAND

Swiecko (D/PL) – Poznan – Warszaw – Terespol (PL/BY)
 Gdansk – Lodz – Piotrkow Tr. – Katowice – Zwardon (PL/SK)
 Katowice – Cieszyn (PL/CZ)
 Olszyna (D/PL) – Wroclaw – Katowice – Krakow – Medyka (PL/UA)
 Jedrzychowice (D/PL) – Krzywa
 Budzisko (LT/PL) – Warszawa – Piotrkow Tr.

ROMANIA

Nadlac (H/RO) – Timisoara – Sebes – Bucuresti – Constanta
 Timisoara – Craiova
 Albita (RO/MO) – Marasesti – Bucuresti – Giurgiu (RO/BG)

SLOVAKIA

Kuty (CZ/SK) – Bratislava – Rusovce (SK/H)
 Petralka (A/SK) – Bratislava – Zilina – Kosice – V. Nemecke (SK/UA)
 Skalite (PL/SK) – Zilina

TURKEY

Kapikule (BG/TR) – Istanbul – Gerede – Ankara – Askale – Gurbulak (TR/IRN)
 Gerede – Samsun – Trabzon – Sarp (TR/GA)
 Trabzon – Askale
 Izmir – Afyon – Ankara
 Ankara – Adana – Toprakkale – Gaziantep – Habur (TR/IRQ)
 Toprakkale – Iskenderun – Yayladagi (TR/SYR)
 Tarsus – Mersin.

Remaining outside thus defined Backbone Network, these are the additional TEM network links:

BOSNIA AND HERZEGOVINA

Neum West (HR/BIH) – Neum East (BIH/HR)
 Izacic (HR/BIH) – Bihac – Sarajevo – Bolanic (BIH/SIM)

BULGARIA

Sofia – Bjala
 Svilengrad – Novo Selo (BG/GR)

CROATIA

Rijeka – Split – Dubrovnik – Debeli Brijeg (HR/SIM)
 Karlovac – Grabovac – Knin – Split
 Grabovac – Vaganac (HR/BIH)

CZECH REPUBLIC

Praha – Turnov – Harrachov (CZ/PL)
 Praha – Hradec Kr. – Beloves (CZ/PL)
 Holubice – St. Hrozenkov (CZ/SK)

GEORGIA

Ureki – Samtredia
 Khashuri – Naohrebi (GA/TR)
 Marneuli – Guguti (GA/AR)

HUNGARY

Budapest – Parassapuszta (H/SK)
 Mosonmagyaróvár – Nagykanizsa
 Tornyosnémeti (SK/H) – Miskolc – Debrecen – Biharkeresztes (H/RO)

LITHUANIA

Panevezys – Vilnius

POLAND

Szczecin – Z.Gora – Legnica – Jakuszyce (PL/CZ)
 Kudowa Zdr. (CZ/PL) – Wrocław – Piotrkow Tr.
 Rzeszów – Barwinek (PL/SK)

ROMANIA

Craiova – Bucuresti
 Timisoara – Moravita (RO/SIM)
 Bors (H/RO) – Oradea – Cluj Napoca – Sebes
 Halmeu (RO/UA) – Satu Mare – Cluj Napoca
 Siret (UA/RO) – Suceava – Sabaoani – Marasesti
 Sculeni (RO/MO) – Iasi – Sabaoani
 Cluj Napoca – Brasov – Bucuresti

SLOVAKIA

Drietoma (CZ/SK) – Chocholna
 Ruzomberok – B.Bystrica – Zvolen – Sahy (SK/H)
 Kosice – Milhost (SK/H)
 Presov – Vys. Komarnik (SK/PL)
 Trnava – Zvolen

TURKEY

Horasan – Kars – Turkozu (TR/GA)
 Afyon – Konya – Ulukisla
 Izmir – Aydin – Antalya
 Izmir – Cesme
 Izmir – Balikesir – Bursa – Gebze

BULGARIA

Southern part of the Sofia ring
 Sofia – Greek border (Kulata)
 Orizovo – Burgas – Varna
 Varna – Sumen – Bjala

CROATIA

Zagreb – Slovenian border (Macelj)
 Bosiljevo – Otocac – Maslenica
 Rijeka – Matulji – Slovenian border (Rupa)
 Matulji – Kanfanar – Pula
 Kanfanar – Slovenian border (Plovanija)

CZECH REPUBLIC

Praha – Austrian border (D. Dvoriste)
 Brno – Austrian border (Mikulov)

GEORGIA

Akhaitzikhe – Zdanov (Armenian border).

HUNGARY

Szeged – Yugoslav border (Roszke)
 Letenye – Slovenian border (Tornyiszentmiklos)

POLAND

Warszawa – Lublin – Ukrainian border (Hrebenne)
 Szczecin – German border (Kolbaskowo)

ROMANIA

Northern part of the Bucuresti ring

TURKEY

Dogubayazit – Diyarbakir – Sanliurfa
 Suluova – Amasya – Refahiye

BELARUS

Brest (PL/BY) – Minsk – Krasnoje (BY/RUS)
 Kamenny Loh (LT/BY) – Minsk - Gomel
 Jezjarysca (RUS/BY) – Orsa – Gomel – Novaja Guta (BY/UA)

BULGARIA

Sofia – Kjustendil – Gjusevo (BG/FY)

THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

Tabanovce (SIM/FY) – Kumanovo – Titov Veles – Gevgelia (FY/ GR)
 Titov Veles – Bitola – border (FY/GR)
 Kriva Palanka (BG/FY) – Kumanovo – Skopje – Debar (FY/AL)

GREECE

Igoumenitsa – Kipi (GR/TR)
 Alexandroupoli – Ormenio (GR/BG)
 Thessaloniki – Promachonas (GR/BG)
 Kozani – Niki (GR/FY)
 Siatista – Ieropigi (GR/AL)
 Patra – Athens – Thessaloniki – Evzoni (GR/FY)
 Rio – Kakavia (GR/AL)
 Corinthos – Tripoli – Sparti

Corinthos – Tripoli – Kalamata

North Creta Road Axis

REPUBLIC OF MOLDOVA

Leuseni (RO/MO) – Chisinau – Dubasari – border (MO/UA)

Chisinau – Tiraspol – border (MO/UA)

POLAND

Warszawa – Lublin – Dorohusk (PL/UA)

RUSSIAN FEDERATION

St. Peterburg – Pskov – Nevel – border (RUS/BY)

Krasnoje (BY/RUS) – Smolensk – Moskva – Nižnij Novgorod

St. Peterburg – Moskva – Borisoglebsk – Volgograd

Jaroslavl – Moskva – Brjansk – Kalinovka (RUS/UA)

Krupec (UA/RUS) – Kursk – Voronez – Borisoglebsk – Saratov – Dergachi (RUS/KAZ)

Border (UA/RUS) – Kamensk Sachtinskij – Volgograd – Astrakhan

Novosachtinsk (UA/RUS) – Rostov na Donu – Pavlovskaja – Novorossijsk – Adler (RUS/GA)

Pavlovskaja – Armavir – Vladikavkaz – Makhackala

Mayaral (KAZ/RUS) – Astrakhan – Makhackala – Orudzhaba (RUS/AZ)

SERBIA AND MONTENEGRO

Kelebia (H/SIM) – Novi Sad – Beograd – Nis – Strezovce (SIM/FY)

Batrovci (HR/SIM) – Beograd

Nis – Dimitrovgrad (SIM/BG)

SLOVENIA

Fernetici (I/SLO) – Ljubljana – Obrezje (SLO/HR)

UKRAINE

Starovojtovo (PL/UA) – Kovel – Korosten – Kiev – Charkiv – Debalceve – Antracit – border (UA/RUS)

Seginie (PL/UA) – Lvov – Zitomir – Kiev

Kipti – Hluchov (UA/RUS) – Cervone (UA/RUS)

Border (RUS/UA) – Ripki – Kipti – Kiev – Uman – Ljubasivka – Odessa

Krasni Okni (MO/UA) – Ljubasivka

Limanske (MO/UA) – Odessa

Cop (H/UA) – Uzhorod (SK/UA) – Mukaceve – Stryj – Lvov

Djakove (RO/UA) – Mukaceve

Stryj – Tarnopol – Vinnicja – Uman – Dnipropetrovsk – Doneck – Debalceve – Krasnodon (UA/RUS)

Tarnopol – Cernivci – Porubne (UA/RO)

5.2 TER Network: Backbone Links and Missing Links

TER Master Plan Backbone Network includes the following links, as identified per country:

AUSTRIA

Salzburg – Bischofshofen – Schwarzach – Spittal-M. – Villach – Rosenbach

Passau (D) – Neumarkt – Wels – Linz – St. Valentin – St. Polten – Wien

Linz – Salzburg – Innsbruck – Bregenz

Wien – Parndorf – Hegyeshalom (HU)/Bratislava Petralka (SK)

Wien – Bruck an der Mur – Villach – Tarvisio (IT)

Wien – Hohenau – Breclav (CZ)

Summerau – Linz – Selzthal – St. Michael – Leoben – Bruck an der Mur – Graz – Spielfeld
Innsbruck – Brenner (IT)

BOSNIA AND HERZEGOVINA

Bosanski – Samac – Doboj – Zenica – Sarajevo – Konjic – Mostar – Capljina

BULGARIA (TER Member country)

Vidin – Mezdra – Sofia – Pernik – Radomir – Dupniza – Kulata

Russe – G. Oriahovitza – Dubpvo – Stara Zagora – Dimitrovgrad – Svilengrad

Dragoman – Sofia – Mesdra – Pleven – G. Oriahovitza – Kaspichan – Sindel – Varna

Sofia – Plondiv – Dimitrovgrad

Stara Zagora – Karnobat – Burgas

CROATIA

Tovarnik – Zagreb – Gornje Dubrave – Rijeka

Gornje Dubrave – Gorpi – Stara Straza – Split

Beli Manastir – Osijek – BCP with BIH

Zagreb – Ljubljana (SL)

CZECH REPUBLIC

(Germany) – Decín – Ústí nad Labem – Lovosice – Kralupy – Praha – Kolín – Pardubice
– Česká Trebová – Brno – Breclav – (Austria/Slovakia)

(Poland) – Petrovice u Karviné – Ostrava – Prerov – Breclav – (Austria/Slovakia)

(Germany) – Cheb – Plzen – Beroun – Praha – Kolín – Pardubice – Olomouc – Prerov – Ostrava
– Mosty u Jablunkova – (Slovakia)

(Poland) – Lichkov – Usti nad Orlicí – Pardubice – Kolín – Praha Benesov – Tábor – Vaselí nad
Luznicí – České Budejovice – Horní Dvoriste – (Austria)

Prerov – Brno (Priority project No. 23 – Decision 884/2004/EC Gdansk – Warsaw – Brno
– Vienna)

Hranice na Morave – Horní Lidec (Slovakia)

GEORGIA

Gantiadi – Achadara – Gali – Abasha – Batumni

Abasha – Poti

Abasha – Agara – Gori – Kaspi – Tbilisi – Sadakhlo

Tbilisi – Gardabani

GREECE

Svilengrad – Alexandroupoli – Thessaloniki

Promachonas – Thessaloniki – Athina

Thessaloniki – Skopje (Ma)

HUNGARY

Sopron – Győr – Budapest

Budapest – Hatvan – Miskolc – Nyíregyháza – Záhony (BCP with UKR)

Felsőzsolca – Hidasnémeti

Zalalövő – Zalaegerszeg – Ukk – Boba – Székesfehérvár – Budapest

Budapest – Cegléd – Szolnok – Püspökladány – Biharkeresztes (BCP with RO)

Szajol – Békéscsaba – Lökösháza (BCP with RO)

Szob – Budapest

Budapest – Pusztaszabolcs – Dombovár – Pécs – Magyarboly
 Budapest – Kelebia

ITALY

Trieste – Venice – Bologna – Ankona – Rome
 Verona – Bologna – Venice

LITHUANIA

Kena – Kaisiadorys – Klaipeda
 Kaisiadorys – Kybartai BCP
 Radviliskis – Pagegiai BCP
 Mockava BCP – Kazlu Ruda – Palemonas – Gaiziunai – Siauliai – Joniskis BCP

POLAND

Gdynia – Gdansk – Tczew – Malbork – Warsaw
 Trakiszki – Suwalki – Sokolka – Bialystok – Warsaw
 Warsaw – Korytow – Idzikowice – Zawiercie – Katowice – Chalupky
 Warsaw – Lukow – BCP with BLR
 Warsaw – BCP with UKR
 Rzepin – Poznan – Konin – Warsaw
 Poznan - Miedzylesie
 Wroclow – Wegliniec – Gliwice – Krakow
 Glivice – Bohumin (CZ)

ROMANIA

Oradea – Poieni – Cluj – Apahida – Alba Iulia – Copsa M. – Brasov – Ploiesti
 Suceava – Pascani – Adjud – Marasesti – Buzau – Ploiesti
 Ploiesti – Bucuresti – Giurgiu
 Bucuresti – Fetesti – Constanta
 Bucuresti – Videle – Craiova – D.T. Severin – Timisoara – Arad – BCP with HU

RUSSIAN FEDERATION

Moscow – N. Novgorod
 Moscow – St. Petersburg
 Moscow – Krasnoye
 Moscow – Suzemka

SLOVAKIA

BCP with CZE – Malacky – Dev. N. Ves- B. Petrzalka – Rusove
 Zilina – Puchov – N.M.Vahom – Leopoldov – Bratislava/Galanta
 Bratislava – Galanta – N. Zamky – Sturovo
 Cadca – Zilina – Vrutky – Ruzomberok – Kralova Lehota – Poprad – S.N.Ves – Margecany
 – Kysak – Kosice – Cierna nad Tisou
 Plavec – Presov – Kysak – Kosice – Cana
 Cadca – Skalite

SLOVENIA

Koper – Divaca – Pivka – Ljubljana – Zidani Most – Pragersko – Ormoz – Murska Sobota
 – Puconci – Hodos
 Divaca – Sezana
 Pivka – I. Bistrica

Ljubljana – Jesenice
 Pragersko – Maribor – Sentilj
 Ormoz – Sredisce
 Ljubljana – Zagreb (CR)

TURKEY

Kapikoy (BCP with Iran) – Van – Tatvan – Yolcati – Malatya – Cetinkaya
 Cetinkaya – Divrigi – Erzurum – Kars – Dogukapi (BCP with Armenia)
 Kars – Aktas (BCP with Georgia)
 Cetinkaya – Sivas – Kalin – Ankara – Istanbul – Halkali – Mandra – Pehlivonkoy – Kapikule
 (BCP with Bulgaria)
 Sivas – Amasya – Samsun
 Malatya – Narli – Toprakkale – Iskenderun
 Toprakkale – Adana – Mersin

BELARUS

Krasnoe – Minsk – Brest
 BCP with LI (Sumskas) – Homyel – BCP with UKR

THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

BCP with SGC – Tabanovce – Kumarovo – Skopje – Titov Veles
 Titov Veles – Kremence
 Titov Veles – Gevgelija
 Skopje – Thessaloniki (GR)

REPUBLIC OF MOLDOVA

BPC with RO – Ungheni – Chisinau – Tighina – Bender

SERBIA AND MONTENEGRO

BCP with HUN (Kelebia) – Subotica – Stara Pazova – Belgrad – Veliko – Orasje – Nis – Pirot
 – BCP with BGR (Dragoman)
 Stara Pazova – Ruma – Sid – BCP with CR
 Nis – Leskovac – Presevo – BCP with FYROM

UKRAINE

BCP with BLR – Chernihiv – Kiev – Vinnytsya – Khmel’nyts’kyy – Ternopil’ – L’viv – BCP
 with POL
 BCP with RUS (Suzemka) – Kiev

Concerning the backbone network, TER missing links are:

Katowice – Krakow – Przemysl – Mostiska – Lvov
 Jasi – Pascani
 Craiova – Calafat
 Muzsina – Krakow – Katowice
 Innsbruck – Brenner – Verona (Brenner base tunnel project)
 St. Petersburg – Pskov – Latvia

Concerning the whole TER network, missing links are considered the following:

Braniewo (Pol) – Kaliningrad (Rus) – Nesterov (Rus) – Kybartai (Ltu)

Lvov (Ukr) – Przemysl (Pol)
 Lvov (Ukr) – Uzhgorod (Ukr)
 Lvov (Ukr) – Chop (Ukr)
 Lukow(Pol) – Lublin(Pol) – Dorohusk(Pol) – Chelm (Pol)
 Lyubolm'il (Ukr) – Kowel (Ukr) – Vladimir (Ukr) – Volunskiy (Ukr) – Lvov (Ukr)
 Halmeu (Rou) – Diakovo (Ukr) – Vinigradov (Ukr) – Munkacevo (Ukr)
 Brest (Blr) – Kowel (Ukr)
 Kowel (Ukr) – Sarmy (Ukr) – Kiev (Ukr)
 Kiev (Kiev) – Nizhin (Ukr) – Chernihiv (Ukr) – Repki (Ukr) – Dobryanka (Ukr) – Homyel
 (Blr) – Osipoviki (Blr) – Minsk (Blr) – Kena B.S. (Ltu)
 Zhmerinka (Ukr) – Odessa (Ukr)
 Odessa (Ukr) – Kukurhan (Mda) – Tiraspol (Mda) – Tighina (Mda)
 Kiev (Ukr) – Donetsk (Ukr) – Luhansk (Ukr) – Likhaya (Rus)
 Vicsani (Rou) – Vadu Siret (Ukr) – Chernovtvy (Ukr) – Byala (Ukr) – Berezowika-Ostrow
 (Ukr)
 Donetsk (Ukr) – Rostov Na Donu (Rus)
 Belgrade (Scg) – Ripanj (Scg) – Valjevo (Scg) – Zvornik (Scg)
 Valjevo (Scg) – Titovo-Uzice (Scg) – Bijelo Polje (Scg) – Podgorica (Scg) – Bar (Scg)
 Caplijina (Bih) – Hum (Hrv)
 Gostivar (FYROM) – Kicevo (FYROM)
 Struga (FYROM) – Durres (Alb)
 Gdansk – Warsaw – Lublin – Yogodin – Lvov – Halmeu (Rou) – Dej (Rou) – Cluj (Rou)
 – Brasov – Bucuresti – Constanta
 Vicsani (Rou) – Vadu Siret (Ukr) – Cernauti – Kiev
 Ankara – Yozgat – Yildizeli

6. FUNDING CONSIDERATIONS, FINANCING ARRANGEMENTS, TECHNICAL AND INSTITUTIONAL ASPECTS FOR TEM AND TER PROJECTS' MASTER PLAN IMPLEMENTATION

According to the results of TEM and TER Methodology implementation, as outlined in the previous chapter, a considerable amount of the total implementation cost for the realization of the TEM and TER Projects' Master Plan is not "secured". Due to this, and in order to advance further and support the process of the implementation of TEM and TER Projects' Master Plan, the identification of possible sources of funding for country projects - that have not yet secured funding-, the eligibility criteria for the respective countries to receive funds as well as the required procedures, have been outlined and analyzed.

The main identified sources of funding are European Investment Bank (EIB), European Bank for Reconstruction and Development (EBRD), World Bank, European Union, including Cohesion Fund, Structural Funds, TEN-T funds, ISPA and INTERREG frameworks.

For the majority of these sources the following main elements were analyzed:

- (a) Initial approach to the funding/financing institution
- (b) Information provided by the institution
- (c) Legal framework
- (d) Projects' eligibility criteria to receive loan/funding
- (e) Projects' appraisal procedures
- (f) Projects' examination procedures
- (g) Projects' monitoring procedures
- (h) Decision making procedures
- (i) Contracts signature procedure
- (j) Loans/Funds activity breakdown by region in EU.

Finally, the possibility of private participation, via Public-Private Partnership (PPP), in the implementation of TEM and TER infrastructure projects was also investigated, starting from the Green Paper on Public-Private Partnerships and Community law on public contracts and concessions.

Although the principal concern addressed has been that of funding and ways in which approaches such as staged construction may offer opportunities both to ameliorate budgetary difficulties and to give some further element of robustness to future uncertainties within the plans proposed, it is important not to overlook other ways in which the realization of those plans may be supported.

An important feature of the thinking embedded in the proposals developed for the elaboration of the TEM and TER Projects' Master Plan has been the careful and simultaneous consideration of both national and international perspectives. By seeking to bear in mind both perspectives, the aim has been to move towards plans that acknowledge shared international needs and goals while, at the same time, recognizing the reality that national needs were themselves also important and that much, though not necessarily all, of the funding for implementation would probably have to be secured from national sources, or at least would need the inclusion of the relevant projects in lists of identified national priorities.

Furthermore, in supporting the type of collaboration and degree of mutual interdependence that is implicit in this approach, consideration needs to be given to related issues that directly influence the likely ease with which such collaboration may be secured. In particular, there are a range of concerns where failure properly to secure co-ordination could significantly interfere with the approach that the current work seeks to encourage.

Another particular concern for both road and rail is where there are proposals for shared cross-border infrastructure.

The demands put on transport infrastructure planning from the perspective of environmental planning have grown out of all recognition since the original thinking that underpinned the development of the TEM and TER organizations. It is important that these changes are understood and embedded in not only the proposals that are brought forward, but also in the detail of individual proposals.

Another area of activity that the increasingly international nature of funding and building of major networks such as the TEM and TER elaboration proposals highlights is the need to ensure that state laws with respect to tendering and construction are appropriately harmonized with emerging European good practice.

One issue that needs careful attention in both the motorway and rail sectors is the extent of convergence in thinking, regarding technical standards to be secured. Ensuring the interoperability among the identified road, rail and combined transport priority projects, as well as between them and the other parts of the respective networks is a major element for the successful implementation of the TEM and TER Projects' Master Plan. The development of the TEM and TER Master Plans should follow commonly accepted standards and practices recommended for use by all the countries involved.

The UNECE International Agreements AGR, AGC, AGTC, as well as the TEM and TER Standards and recommended practices provide the technical and institutional framework for it. Assisting the implementation of these standards by all concerned countries, as well as monitoring of the progress in bringing the TEM and TER Backbone networks up to the required standards could be among the permanent tasks of the TEM and TER Projects in future.

In concluding, more than just transport planning action is needed to support the successful implementation of the nature and scale of planning implicit in the proposals that this report is seeking to instigate. There are also important enabling actions required that take time to set in place, that sometimes require changes in ways of thinking and attitudes, and that themselves need to be planned with the same degree of rigour and care that underpin the network planning itself.

7. BORDER CROSSING ISSUES FOR TEM AND TER NETWORK

Special attention was paid to recognition and addressing of the border crossing problems that could possibly appear in such a project. Quality assessment of the border crossing procedures, the institutional differences, etc., was performed in order to prioritize the causes of border crossing problems. Assistance from the International Road Transport Union (IRU), International Union for Railways (UIC), International Union of Combined Road Rail Transport (UIRR), UNECE and other related organizations, was provided.

In this connection, it is necessary to acknowledge the valuable inputs, to this part of the TEM and TER Projects' Master Plan and especially to addressing road border crossing issues, provided by the European Conference on Ministers of Transport (ECMT) documents on this topic.

As a first step, the inventory of border crossing points was made, listing data on countries involved, names of border points on both sides of the border and their present and future, whenever defined, status. These border crossing points were also presented in GIS maps along with multimodal transfer points in the TEM and TER region.

Then, the identification of border crossing problems, the separation of problems' origins and in each origin the main inadequacies as well as recommendations for the alleviation of problems, were provided.

It has to be noted that the border crossing issues, were examined separately for TEM and TER Networks.

7.1 TEM Border Crossing Issues

Border issues constitute major barriers to trade, tourism and transport. Long waiting times at borders cause huge disruption to logistic activities and massively increase costs. Whilst transport operators' employees waste time at borders, it is shippers and, ultimately, consumers, who pay the bill for these barriers, which reduce the efficiency of the global economy and delay much-needed economic development in less-favoured regions of the world.

7.1.1 Inventory of border crossing problems (Road)

The main obstacles at border crossings of TEM network have their origins in: (a) infrastructure, (b) procedures and (c) staff. The main inadequacies per origin are presented below.

Infrastructure

- Unsuitability and insufficient capacity of border posts
- Obsolete and poor quality facilities
- Inadequate equipment
- Absence of separate lanes for transit traffic and empty vehicles
- Under-sized access roads to border posts and insufficient parking space at borders.

Procedures

- Insufficient of often over-complex control procedures
- Insufficient computerization of control procedures
- Systematic control of all vehicles instead of controls based on risk management techniques
- Complex and often contentious procedures for weighing commercial vehicles

- Absence of non-stop veterinary and phytosanitary controls
- Introduction of additional controls of doubtful necessity, such as radioactivity controls at some borders (Serbia and Montenegro)
- Lack of coordination between the customs administrations of the various countries, and in particular insufficient exchange of information
- Insufficient cooperation between the authorities responsible for controls
- Non-compliance with TIR procedures
- Failure to provide information to the professionals, private sector, etc.
- Changes without notice of the procedures used
- Compulsory convoys of vehicles with customs or police escorts
- Imposition of compulsory pay services using "commercial" structures established at border crossing points
- Proliferation of taxes, duties and fees.

Staff

- Shortage of control personnel
- Low productivity
- Non-continuous working hours
- Lack of skills and training
- Lack of continuity in the management of controls due to a high level of staff rotation at all levels
- Inappropriate behaviour of some officials responsible for controls.

7.1.2 Recommendations for improvement

To solve the main problem of delays and all the consequences on transport and economy, the recommendation is to tackle border procedures, through simplification and harmonization. Authorities should anticipate future growth in trade flows by investing – in advance - in improved infrastructure, procedures and training, to prevent borders from remaining or becoming places where scarce resources are wasted. Facilitation of trade, tourism and road transport is an area where it is vital for Governments to work together to reduce barriers to economic and social development.

UNECE has developed a number of international Agreements and Conventions on border crossing facilitation, which provide a common legal and technical platform for both EU and non-EU countries for achieving a harmonized and efficient performance of border crossing controls. Therefore, accession to and implementation of these Agreements and Conventions should be in the focus of all Governments of the countries concerned.

Per category of problems, the recommended solutions are presented below.

Infrastructure

- Improving facilities at borders
- Providing a sufficient number of queues and windows
- Improving access to border crossings by widening roads and creating additional lanes.

Procedures

- Introducing common customs posts and controls carried out jointly
- Transferring of control procedures to sites inside the country (especially for transit) or at the place of destination
- Introducing new, simplified control procedures
- Complying strictly with the provisions of the TIR Convention
- Simplification and harmonization of procedures for weighing vehicles
- Improving coordination between the customs authorities of neighboring countries

- Creating cooperation between national administrations
- Simplifying and, if possible, reducing of taxes, fees and duties charged at border crossings
- Facilitating the issuance of visas to professional drivers
- Improving communication with the private sector
- Harmonizing and, if possible, reducing of the bans.

Staff

- Increasing the number of personnel
- Failing 24/24 opening, alignment of border post opening times
- Training of control personnel
- Motivating of control officials
- Fighting against corruption.

Transport services are the lifeline between economic and social players. At the present time, this is particularly true of road transport, since it carries the majority of traded goods moved on land routes (70% by volume, 90% by value). In addition, road transport by bus and coach is highly important in the passenger transport market.

All the problems, mentioned previously, result in excessive waiting times at borders and in turn in serious hampering of international movements of goods and people. It is not unusual that due to all these problems cars, trucks, buses and coaches have to wait for hours at borders before they can proceed.

7.2 TER Border Crossing Issues

Border crossing regulations and standards for facilitating border crossing in international rail transport have been developed by UNECE, ECMT, EU, the Schengen Agreement, UIC, etc.

7.2.1 Inventory of border crossing problems (Rail)

In the course of the last four years, the TER Project has developed a permanent monitoring system to follow the developments and progress achieved in facilitation of rail border control in Central and Eastern Europe. This process is based on country inputs and is promoted in close cooperation with UIC and the European Commission – Justice and Internal Affairs.

Experts from TER member countries, as well as Central European Initiative (CEI) member countries in the last two years attended specialized regular TER meetings to discuss railway border crossing problems and measures taken, as well as future facilitation measures and actions needed to bring border control in line with Schengen regulations or EU Directives.

From the examination of the situation in most of the railway border crossings in Central and Eastern Europe, the following problems were identified:

- Lack of adequate technology for the handling of arrival and departure of trains at the border (delayed disposition of locomotives – late arrival of staff – insufficient coordination and management etc.);
- Lack or insufficient legal basis for establishing rules and relations between railway administrations and all other interested institutions in the harmonization of border procedures;
- Slow implementation of measures in line with the need for more adequate information on flows, transmission of data inside and outside a country;
- Inaccuracy in completing the documents, thus causing major delays;
- Inadequate cooperation due to lack of initiative at all levels.

7.2.2 Recommendations for improvement

From the examination of the situation in most of the railway border crossings in Central and Eastern Europe, the following recommendations were drawn:

- There is a need for the establishment of Railway Working Groups on a bilateral and/or multilateral basis;
- The communication among those involved in the border crossing operations should be further improved;
- All parties involved in border crossing operations should adopt and implement the best practices developed in the field;
- Border control procedures should be organized during the running train;
- The performance of non-railway procedures (such as customs formalities) should be transferred to origin and destination stations;
- For combined transport transportation, all customs and border control operations, including veterinary or phytosanitary should be carried out at the points of loading and unloading;
- Technical facilities on border crossing points should be improved;
- Performance indicators to monitor future progress on border crossing should be introduced.

In the future, special attention should be given to the impact, which the enlarged EU or Schengen area regulations will have on border crossing control at the external border stations of the EU in order to prevent bottlenecks and ensure the necessary fluidity of the traffic of passenger and freight. These regulations are listed below:

- Towards an integrated European railway area – Communication from the Commission to the Council and the European Parliament (COM(2002)18 final);
- Towards integrated management of the external borders of the member states of the EU – Communication from the Commission to the Council and the European Parliament (COM(2002)233 final);
- Proposal for a Council Regulation on the establishment of a regime of local border traffic at the external land borders of the Member States; and
- Proposal for a Council Regulation on the establishment of a regime of local border traffic at the temporary external land borders between the Member States (COM(2002)502 final).

8. CONCLUSIONS / RECOMMENDATIONS

The TEM and TER Projects' Master Plan elaboration has so far achieved its intended goal, which is to present a consistent and realistic short-, medium-, and long-term investment strategy on the road, rail and combined transport Backbone Networks in the wider TEM and TER region.

With the elaboration of their Master Plan, TEM and TER Projects offered a substantial contribution to the extension of TEN-T; the practical implementation of Pan-European Transport Corridors; the promotion of intermodal operation and transport modes complementarity; and assisted towards the provision of maximum effectiveness of transport infrastructure.

The implementation of such an investment plan, if ensured, would contribute to the economic growth of the countries concerned and to the well-being of their populations, as well as assisting the integration and harmonization of transport within Europe and beyond.

For this to happen close monitoring of its implementation and regular adaptations of the network outline would be required. This, in particular would require intensive follow-up work, in close co-ordination between TEM and TER member countries, the TEM PCO, the TER PCO and the UNECE, as well as with the European Commission competent Directorates and other international organizations and bodies concerned.

It is evident to state that TEM and TER process has been successful, but the work is ongoing. Further work in some aspects is necessary and technical assistance is needed in order to monitor progress.

First of all, there is still considerable difficulty in presenting the complete shape of the TEM and TER Backbone Networks in the different time horizons of 2010, 2015 and 2020, due to lack of adequate information of the current status and the planned progress in some parts of the respective networks. The existence of this currently missing information could provide valuable information for the decisions makers, concerning the future development of a complete Backbone Network.

Therefore, in the future, certain action in some main fields might be necessary:

- Any missing or insufficient data should be completed with direct inputs of countries that did not provide data in order to support the decision-making process and complete the design of the TEM and TER Backbone Networks
- In addition to the above task, Backbone Networks and priority projects' monitoring and implementation should be followed from time to time. This would enable to keep the investment plan, elaborated under the TEM and TER Projects' Master Plans, updated. To facilitate this process, countries not yet members to the TEM and TER Projects, should seriously consider their full membership
- On the basis of the network outline endorsed in TEM and TER, establishment of transport sector priorities amongst possible investment measures using the criterion of sustainable mobility and an investment project pipeline for external financing
- Promotion of institutional building, and of organizational and regulatory measures favouring the competitiveness of rail
- Promotion of PPP schemes

- Monitoring of the development of the TEM and TER Network and its usage, with the publication of regular information on progress
- Maintenance of a Geographical Information System (GIS) and an Expert Network in the field of monitoring TEM and TER Network development and use.

The TEM and TER Projects' Master Plan current work, its methodological tools or the specific results, can be considered as valuable inputs to the EC High Level Group No.2 work, as well as to the Euro Asian Transport Linkages development process.

Moreover, the TEM and TER Projects' Master Plan results as well as the recommended follow-up actions will assist the countries involved when planning their medium and long-term national and regional transport infrastructure and investment strategies.

Last but not least, the existence of a complete TEM and TER Projects' Master Plan, in terms of time plan and financial plan, could be of benefit for both countries and funding and lending institutions, in terms of financial contracts signature procedures.

9. THE WAY AHEAD

The implementation of this work is a long-term process that requires first and foremost political will and commitment from the countries concerned.

To see it to fruition will also require continued close cooperation between the TEM and TER member countries, between them and their immediate neighbours, the respective TEM and TER PCOs and the UNECE. This particularly relates to missing information on individual country plans, priorities and to missing data in general.

Regular monitoring of the progress of implementation of the identified TEM and TER region Backbone Networks, as well as monitoring of the progress in bringing the TEM and TER Backbone Networks up to the required international standards could be among the permanent tasks of the TEM and TER Projects in the future.

A review of the identified investment strategy for developing of the transport infrastructure in the countries concerned, by 2008, and the presentation of the shape of the TEM and TER Backbone Networks in 2010, 2015, and 2020 and beyond should be among the major targets of the TEM and TER Projects in the following years.

The TEM and TER Projects' long-lasting, flexible, effective and self sustainable structures, in combination with the strong desire and commitment with the projects of their country members, provide an ideal framework for the development and monitoring the progress of implementation of the TEM and TER Projects' Master Plan Backbone Networks as an outstanding example of an intercountry cooperation in the field of transport.

