FINAL PUBLISHABLE REPORT

CONTRACT N°: GMA2/2000/32059-SI2.324469

PROJECT N°: GMA2-2000-32059

ACRONYM: INTERMODA

TITLE: Integrated Solutions for Intermodal Transport between the EU and the CEEC

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REPORTING PERIOD: from 01/12/2001 to 31/08/2003

PROJECT START DATE: 01/12/2001 **DURATION:** 21 months

Date of issue of this report: 30/09/2004 **Version**: 2.0 – Final

Project funded by the European Community under the 'Competitive and Sustainable Growth' Programme (1998-2002)

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EXECUTIVE SUMMARY

INTERMODA is a major research project aimed at **strengthening intermodal transport between EU member states and the CEEC** through co-ordinated proposals for transport solutions elaborated on by an international team of research institutes and consultants with the support of the transport sector. Surveys were conducted by means of structured questionnaires especially in the CEEC, considering aspects of both transport demand and supply . An assessment of bottlenecks was made and relevant trend scenarios were developed. A transport model working with an O/D matrix and criteria characterising the intermodal transport scenarios was developed to forecast future transport demand. To overcome the bottlenecks the most appropriate policies in terms of performance and feasibility were identified and prioritised. The high impact policies were put into correlation with the recommendations from expert workshops thus concluding the project with the list of relevant recommendations to promote intermodal transport. The project was executed within the given timeframe of 21 months.

The project itself comprises five Work Packages (WP). The first Work Package was concluded by a report on the current state of the art of intermodal transport through the identification of requirements on intermodal transport. The report outlines a primary Pan-European intermodal network of infrastructure and services between the EU and the CEEC and also defines the indicators needed to measure the performance of an intermodal transport system. The next step of the project covered the survey on the status quo of intermodal transport, organisations and operations between the EU and the CEEC. In 20 European countries interviews were made with forwarders, link operators and terminal operators to collect information on the current intermodal system, including performance indicators, market determinants and parameters for the regulatory framework.

The assessment of the data collected in the first two work packages resulted in the identification of a large number of intermodal bottlenecks. Three types of bottlenecks emerged from the investigation: specific, common and generic bottlenecks. As specific bottlenecks occur only at one location and can be solved through national policies a workshop with experts on intermodal transport discussed then the common and generic bottlenecks and assigned priorities to them. The workshop led to a list of 35 bottlenecks in total, which could be grouped regarding terminals, capacity of links, interoperability and market conditions.

As the next step four major European intermodal transport corridors were identified with the relevant transport flows. From an analysis of the intermodal transport flows in the base year 2000 it can be concluded that:

- The intermodal flows within and in relation with the CEEC are low and concentrated on a limited number of relations;
- Intermodal statistics are not accurate and not complete (in general, but especially not for the CEEC);
- For RoLa (Rollende Landstrasse) flows it is expected that the volumes will decrease in the future when border crossing problems are solved due to the EU enlargement, therefore these flows are no good starting point to base the forecasts on;
- The intermodal flows between Western Europe and the CEEC fluctuate too much for using them as a starting point for a forecast, the reason for this is that the intermodal transport market in the CEEC is not mature yet.

Because of these conclusions an approach for the forecast was applied that determines the **potential future intermodal transport flows** based on characteristics of a forecast of the total future transport demand for two scenarios.

A comparison between the situation in the base year 2000 and the future potential intermodal transport demand in 2015 shows

- The current intermodal transport amounts between 7.5 and 10.5 million tonnes in 2000 (roughly estimated),
- A potential of 66 million tonnes in the reference scenario 2015 (6.3 to 8.8 times higher than in the base year) and
- A potential of 87 million tonnes in the alternative scenario 2015 (8.3 to 11.6 times higher than in the base year).

It should be noted that the year 2000 figures are based on an estimate of information that is neither accurate nor complete and the 2015 figures are based on estimation procedures. The comparison however presents a rough indication of the potential growth of intermodal transport between 2000 and 2015.

In the reference scenario the total of 66 million tonnes consists of **30 million tonnes continental intermodal transport** (transport flows for which all legs of the journey are carried by land modes (including inland water ways) with both origin and destination in Europe) and **36 million tonnes maritime intermodal transport** (transport flows for which at least one part of the journey is carried by sea). In the alternative scenario the total of 87 million tonnes consists **of 42 million tonnes continental intermodal transport and 45 million tonnes maritime intermodal transport.** For the continental intermodal transport between the CEEC and Western Europe a number of relations have high volumes: Poland – Germany, Czech Republic – Germany, Poland – Italy, Poland – Spain, Slovak Republic – Germany and Hungary – Germany. For the maritime flows a further distinction has been made between the hinterland flows as part of a maritime chain and the short sea flows. The hinterland flows are the legs of a journey that are carried by inland modes, these flows concern transport from a seaport to the destination or from the origin to the seaport. The short sea flows are that part of the maritime chain carried by sea with both origin and destination in Europe.

High hinterland flows through the Baltic States are going to and coming from Russia and (to a less extend) Belarus. Besides there are high hinterland flows in Poland between the port regions and other regions in Poland and between Romania and Hungary. Hinterland flows between the CEEC and Western Europe are rather limited, except for hinterland flows between Hamburg in Germany and Poland and Czech Republic.

The short sea flows within the CEEC are rather limited, between Poland and Russia, Romania and Russia and between Latvia and Estonia substantial potential intermodal transport occurs. The short sea flows between the CEEC and Western Europe are much higher. Especially related to Latvia, Lithuania, Estonia and Poland on the CEEC side and Germany, Sweden, UK, Finland, Italy and the Netherlands on the Western European side. It is noticed that the short sea flows are concentrated on the northern part of the CEEC (the Baltic States and Poland), the short sea flows in the southern part of the CEEC are less high.

As the next step the assignment of transport flows for the base year 2000 and the two future scenarios for 2015 onto the infrastructure network was made. The network assignment shows a significant increase of 72% respectively 80% in total tonne kilometres from the base year 2000 until 2015. The mode split does not change dramatically, but there are clear indications of a **shift from rail transport to road transport**: The share of tonne kilometres by road is expected to increase from 28% to 32% in the Reference scenario and to 34% in the Alternative scenario. The share of short sea shipping will increase from 33% to 35% for the two future scenarios. Inland waterways have 5% of the tonne kilometres in the base year, and will remain on this level – the future share of tonne kilometres by inland waterways is estimated to 4%. Rail is expected to decrease from 34% in the base year to 28% and 27% for the Reference and Alternative scenario respectively.

The future transport flows were assigned to the AGTC network and the Helsinki corridors. From this analysis, it can be concluded that the **Helsinki corridors will still remain important in the future**. The network assignment resulted in the identification of an

important route not yet defined as a corridor: The Moskva – Baltic countries with further transfer to sea transport. This route involves rail as main mode between Moskva and the Estonian and Latvian ports and road as main mode between Moskva and Lithuanian ports.

Separate analyses were carried out for intermodal transport[1]. There are no reliable statistics for intermodal flows for the Base year, but forecasts of these flows for the future scenarios were made. For the future Reference scenario, the share of intermodal tonne kilometres is about 5% of the total tonne kilometres, while for the future Alternative scenario, the share of intermodal tonne kilometres is about 6%. The transport pattern and the average travel distances for intermodal transport are similar for the two future scenarios; analysis of modal split of tonne kilometres shows 1% road transport (mainly pre and end haulage), 56% rail transport, 2% inland waterways transport and 40% short sea shipping for both future scenarios. In other words, the main part of the future intermodal freight flows will be transported by rail and short sea shipping. Inland waterways will have only a very small fraction of the intermodal transport.

The external cost assessment shows that external costs on freight transport will increase until 2015, because road is expected to increase in the future whilst at the same time a decrease in the share of rail and inland waterways is to be expected. Short Sea Shipping will increase slightly its share of tonne-km and with the low external costs associated with this mode, its share in external costs will decrease. The expected growth in tonne-km from 2000 until 2015 is about 80%, the expected growth in external costs is about 170%. In terms of GDP the external costs of freight transport will have a higher share in 2015 than today.

In 2015 the average external costs for a tonne-km for intermodal transport are expected to be the same in the EU15 and the CEEC (about 0.035 €/tkm), whereas for all continental transport they will be about 20% higher in the CEEC (0.096€/tkm) than in the EU15 (0.079€/tkm). A main reason for this is the noticeable modal shift towards road transport in the CEEC. By using intermodal transport instead of road transport in the CEEC, where appropriate, the average potential for the reduction of external costs has been calculated to be about 3.5.

To propose a series of interventions (means and measures) for intermodal transport and to set up a framework for implementation of a primary pan European intermodal network the results of all steps were merged and analysed. An assessment and ranking of individual policies to remove bottlenecks in intermodal transport has been carried out. In order to find out on which O/D transport routes these policies may have an positive impact a sensitivity analysis on the future intermodal network has been carried out. To set the policies into action on these highlighted O/Ds recommendations for the further development of intermodal transport between the EU15 and Central and East European Countries (CEEC) were formulated.

Out a total of 70 policies which have been assessed and ranked towards their performance and feasibility to eliminate bottlenecks in intermodal transport, 19 are high-impact policies, 30 are medium-impact policies and 21 are low-impact policies.

The 19 high-impact policies are primarily targeted at changing and standardising legislation or at creating financial possibilities for the development of intermodal transport. The creation of financial possibilities for the building of new infrastructure is considered to be much less feasible than the upgrading of existing infrastructure. The high-impact policies are also generally targeted at improving operations by better utilising or upgrading infrastructure and equipment. Policies targeting bottlenecks that do not concern either infrastructure or equipment are expected to have low impact. The intermodal transport experts involved in the assessment process also concluded that a marketing campaign aimed at encouraging the

[1] Intermodal transport refers to the Eurostat/ECMT definition of intermodality: “Intermodal transport is the movement of goods (in one and the same loading unit or vehicle) by successive modes of transport without handling of the goods themselves when changing modes”.

use of intermodal transport and support for the increased use of ICT are expected to have little impact.

Out of the 19 high-impact policies 7 have good feasibility for implementation. These are targeted at 8 out of the 16 high-importance bottlenecks. These 7 policies are:

- Introduce fund for replacing of obsolete handling equipment
- Set standards for combined-transport equipment
- Introduce fund for restructuring terminals
- Introduce fund for restructuring terminals operations
- Introduce fund for restructuring railroad networks
- Set safety standards
- Check safety at departure and arrival

Acting on the assumption that the policies assessed may have a direct impact on changing transport times and transport costs for intermodal transport the sensitivity analysis shows following results:

1. By far the lowest transport volumes result from a change only in transport times. A change only in costs already holds a high potential for additional intermodal transport.
2. A change in time and costs has the highest potential whereas the difference to the cost case is comparably low.
3. There are 13 countries which can be named for having high potentials for intermodal transport which are Austria, Germany and Italy within the EU15 and the Czech Republic, Hungary, Poland, Slovenia, Lithuania and Latvia within the group of the Accession Countries as well as Ukraine, Romania, Belarus and Russia.
4. Taking into account only the highest potentials 7 countries can be considered - Austria, Germany, Poland, the Czech Republic, Hungary, Lithuania and Russia. On the O/D relation on country level there are five O/Ds which have a comparable high potential. These are the O/Ds between Germany and Poland, Germany and the Czech Republic, Russia and Lithuania, Austria and the Czech Republic and Austria and Hungary.
5. Striking is the small difference between the potentials for the two cases change in costs and change in costs and time. The potentials which can already be achieved with a change only in costs make it questionable to justify the extra amount of resources necessary for the additional potential which can be achieved by a parallel change in transport time.
6. An additional argument to use the potentials for additional intermodal transport is the reduction in road transport. Two of the five exposed O/Ds hold a relative reduction of more than 10% and the three left hold a reduction of more than 5% after all. If one takes into account the high amount of transport volume on these O/Ds the reduction of road transport which can be achieved can be considered as respectable.

To achieve these potentials for intermodal transport and to implement the high impact policies into action following **recommendations** are suggested to remove bottlenecks which hinder the development of intermodal transport between the EU and the Accession Countries:

- Increase capacity of terminals
- Transport Infrastructures for better access of terminals
- Harmonization of opening hours
- Investments in modern standardised intermodal equipment

- Consideration of intermodal transport in technical, operational and administrative procedures
- Improved border procedures for intermodal transport
- Harmonization of loading units

Further on the following recommendations shall be applied to stimulate the discussion for future related strategies and ideas to promote and stimulate the development of intermodal transport:

- Connect road network to major terminals in main rail corridors
- Implementation of new handling procedures
- Introduction of European-wide transport tariffs
- Consideration of external costs for fair prices
- Criteria for investments in infrastructures
- Overcome mental bottlenecks
- Measures towards concentration of intermodal rail transport on a limited number of international transport corridors
- Introduction of a new international transport corridor between Moskva and the Baltic Countries with further transfer to sea transport
- Development of an intermodal network connecting sea and hinterland transport
- Promotion of extended port cooperation
- Introduction of one-stop-shops for intermodal transport

1 INTRODUCTION

The following Final Publishable Report aims to present a technical overview of the INTERMODA project covering its main activities, problems and achievements within the project duration of 21 months. Chapter 2 summarises the objectives and strategic aspects of the project, chapter 3 gives a concise overview of the deliverables of the work and chapter 4 describes the scientific and technical results of INTERMODA. The comparison between planned activities and the work actually accomplished is made in chapter 5. Aspects of project management and co-ordination are dealt with in chapter 6. The exploitation activities and dissemination of results are described in chapter 7, while chapter 8 completes the report with the conclusions and findings of the research project.

The INTERMODA project started at the beginning of December 2001 and was completed in September 2003.

2 OBJECTIVES AND STRATEGIC ASPECTS

The development of Trans-European Transport Networks towards intermodal Pan-European transport networks requires a solid, efficient integration of different infrastructures, systems, equipment and means of transport. During the previous research work a number of obstacles pertaining to the use of intermodal transport in Central and Eastern Europe and the interconnection with the Trans-European transport network were identified. These include a lack of a coherent network of modes, of technical interoperability between and within modes and of a variety of regulations and standards for transport means. They also include a lack of data-interchange and procedures, uneven levels of performance and service quality between modes, different levels of liability and a shortage of information about intermodal services.

The main targets of INTERMODA include the creation of co-ordinated proposals for transport policy solutions, using GIS techniques on current performance, improvement and alignment measures, future scenarios on transport demand for the specified network through 2015 and a framework for implementation of prioritised measures.

Societal need: current trends in transport, like the ongoing growth in volume, are likely to be unsustainable in relation to their environmental impact. As part of a framework for sustainable mobility, intermodality has been identified as a key issue which needs to be enhanced. The improvement of intermodality between the EU and the accession countries will be an important contribution to the development of sustainable transport.

Community added value: Among others, INTERMODA contributes to the following EU-policies:

Enlargement: Within the enlargement process there remains a significant gap in levels of development between the EU and the CEEC, as well as a number of other disparities in the transport sector. For instance, the modal split in the CEEC is moving quickly from non-road transport to road transport, which contradicts the intentions of EU's transport policy. Particularly between EU member states and the accession countries, missing links in infrastructure still persist. INTERMODA is setting important steps for the urgent need to develop and improve transport infrastructure, organisation and operation by identifying measures and needs for improving intermodal transport on a European level.

Pan-European strategy on infrastructure: INTERMODA is following the Community guidelines for the development of the trans-European transport network (Decision No. 1692/96/EC). The decision emphasises principles for interoperability of modes for transport and encourages intermodality between different modes.

INTERMODA also contributes to the objectives of the Common Transport Policy (CTP): Part of the aim will be to promote the development of TEN-T in terms of an **intermodal network**

to achieve integrated transport systems across Europe. The screening of framework conditions within the network will help to identify necessary adaptations and to support their realisation. The inclusion of common standards, especially technical standards, will improve the interoperability between the EU and the CEEC within the field of intermodal transport.

Technical and scientific objectives and the innovative aspects: The development of scenarios for possible intermodal supply chains on the main transport links between the CEEC and the EU and the forecast on future demand through 2015 are fundamental for the elaboration of transport solutions (intervention measures) in the proposed framework. A major achievement of the project will be the development of a Geographic Information System for mapping the results of the research work.

Contribution to the European technological progress: Competitive intermodal transport solutions require the integration of information technologies, telematic systems, suitable trans-shipment technologies, the harmonisation of different systems, open standards etc. Both the dissemination of project output by a state of the art information technology and the implementation of measures for intermodal transports proposed in the project will contribute to the European technological progress. Reference is made here to the EU programme on intermodality PACT (completed in 2001) and Marco Polo (2003 – 2010).

3 LIST OF DELIVERABLES

The project INTERMODA resulted in the elaboration of following deliverables:

Deliverable	Type	WP	Nature of deliverable and brief description	Status
D1	Report	1	Report on the state of the art of intermodal transport research including best practice guidelines	public
D2	Report	7	Detailed dissemination plan	confidential
D3	Report	1	Report on the Electronic Workshop with expert panel and intermodal industry	confidential
D4	Web page	7	INTERMODA project information, communication platform on the project web site	online since April 2002
D5	Workshop	7	Organisation of workshop on current status of intermodal transport in Budapest	2/3 Oct. 2002
D6	Database	2	INTERMODA GIS database and maps including information of current standard of infrastructure, organisation and operations, supply and demand, regional profiles	confidential
D7	Report	3	Report outlining the methodology for identifying and prioritising bottlenecks and constraints and the use of the methodology	public
D8	Workshop	7	Organisation of Workshop II on scenarios of intermodal transport in Brussels	28 Jan. 2003
D9	Report	4	Determination of future transport demand and forecast of intermodal transport	public
D10	Report	4	Determination of intermodal future network and assignment of future transport demand to network	public
D11	Report	5	Documentation of ranked needs and proposition for measures for the development of a Pan-European sufficient quality network of intermodal transport between EU and CEEC for the period 2001 to 2015	public
D12	Report	7	Mapped reference scenario for a Pan-European sufficient quality network of intermodal transport between EU and accession countries 2001 to 2015, visualized on a geographical information system	public
D13	Workshop	7	Organisation of final workshop presenting the draft final report in Vienna	2 June 2003
D14	Conference	7	Organisation of final conference, going public with the final results	10 July 2003
D15	CD ROM	7	Conference reader, CD ROM including GIS data and functions	public
D16	Toolbox, Software	7	A transport model for simulating different scenarios for intermodal transport	confidential

Details on the work accomplished are described in the following chapter.

4 SCIENTIFIC AND TECHNICAL DESCRIPTION OF RESULTS

4.1 SUMMARY OF SPECIFIC OBJECTIVES

INTERMODA's primary objective is to assess the prospective availability of intermodal transport means and a proper infrastructure within the CEEC. This is required in order to set up a framework for the implementation of a sufficient quality network on intermodality. In addition, INTERMODA proposes the implementation of suitable measures for the improved co-operation on Trans-European intermodal transport links between the EU and CEEC. This includes a number of secondary aims which are elaborated on within the following Work Packages (WPs):

WP 1: Identification of requirements on intermodal transport (operational framework),
Work started in December 2001.

WP 2: Survey of the status quo with respect to intermodal transport infrastructure, organisation and operations:
Initial activities started in March 2002.

WP 3: Assessment of status quo:
First part of work started at the beginning of 2002.

WP 4: Network scenarios, assignment and assessment:
Preliminary work started in the first half of 2002.

WP 5: Setting-up of a framework for implementation of a Primary Pan-European intermodal network
Work started in October 2002.

WP 6: Project management:
Work started beginning of December 2001.

WP 7: Dissemination: Implementation of co-operation on Trans-European intermodal transport.
Work started in December 2001.

The following chapter deals with the work performed in WP 1 to 5 and the results achieved so far. Much emphasis was put on the coherent methodological approach of all Work Packages and on a successful project completion in time.

The activities undertaken within the reporting period tackled specific objectives in the respective Work Packages, i.e.:

WP 1:

- Identification of parameters for criteria to define a Pan-European intermodal network
- Identification of the main transport arteries and nodes based upon the main trans-continental links and the main links from the EU to the CEEC

WP 2:

- Set-up of a database which will serve the GIS development and analyses to be conducted in the project
  The nature of the data to be collected was identified within WP1. Furthermore, WP 1 defines those parts of the infrastructure and service network for which further information regarding intermodal transport is needed
- Collection of data (performance indicators, market determinants and parameters for the regulatory framework) that were identified in WP 1 for later assessment of bottlenecks and potential for intermodal transport between EU member states and the CEEC (WP 3)

WP 3:

- Assessment of the status quo of integral parts, the network, market realities and framework conditions for intermodal transport
- Identification of bottlenecks
- Deduction of measures for improvement and alignment of the network

WP 4:

- Identification of intermodal supply chains for the major transport links in the EU member states and the study area
- Consideration of technical issues, environmental and economic effects and impacts of transport in various scenarios
- Forecast of transport demand, intermodal and potential intermodal shares
- Identification of future bottlenecks

WP 5:

- Identification and derivation of interventions (means and measures)
- Mapping of suitable measures to improve future intermodal transport for the years 2005, 2010 and 2015
- Derivation of a Reference Scenario of Intermodal Transport between the EU and the CEEC

The following measures were identified to achieve the objectives of WP 1:

a. General review of technical literature
b. Detailed examination of previous research projects and studies
c. Review and consideration of a number of regulations to define the legal and regulatory framework
d. Structuring suitable criteria for the definition of an intermodal network
e. Survey of existing main service links (and nodes) where transport is operated using intermodal means
f. Definition of a suitable Pan-European intermodal transport network based on the results of the above steps
g. Definition of the most appropriate technical and operational indicators to describe the quality of transport infrastructure (network, terminals etc.), management and service by relevant review
h. An Electronic Workshop with an expert panel to validate the findings of WP 1 and agree on technical performance indicators, market determinants and parameters for regulatory framework conditions

The outcome of WP 1 is the D1 (Deliverable 1) report: “Identification of requirements on intermodal transport”, a report on the state of the art of intermodal transport research.

For WP 2 the following measures were undertaken in order to achieve the objectives.

a. A survey carried out by means of questionnaires in order to estimate the intermodal transport customers´ perception of service quality on different routes
b. A second survey covering the supply side issues such as infrastructural needs in the study area’s networks, link operators and terminals
c. A workshop with the expert panel on the status of intermodal transport infrastructure, organisation and operations at the end of WP 2 (D5) aimed at providing of a clear view and common understanding of the current situation

The major results of WP 2 are incorporated into the INTERMODA database (D6 - GIS database.

The following measures are to be undertaken to achieve the objectives of WP 3:

a. Analysis of the technical performance on the main parts of the network
b. Definition of main relations and preparation of an origin-destination matrix

c. Preparation, organisation and conduct of a workshop with an expert panel to discuss bottlenecks of intermodal transport organisation, operations and infrastructure
d. Assessment of technical bottlenecks
e. Assessment of capacity constraints
f. Assessment of legal and administrative bottlenecks

The outcome of WP 3 is comprised in the report on the methodology for identifying and prioritising bottlenecks (D7).

WP 4 objectives are to be achieved through the following measures. Identification of intermodal supply chains for the major transport relations in the EU member states and the study area

a. Consideration of technical issues, environmental and economic effects of transport in various scenarios
b. A workshop with an expert panel on the assessment of the bottlenecks and the definition of scenarios for the transport forecast
c. Forecast of transport demand, intermodal and potential intermodal shares
d. Development of a transport model describing the relationship between input parameters and the volume of intermodal transport
e. Assignment of the future transport flows onto the network
f. Identification of future bottlenecks

The outcome of WP 4 is covered in a report on the future transport demand (D 9), the future intermodal network (D 10) and the toolbox for simulation (D16).

The following measures are to be undertaken to achieve the objectives of WP 5:

a. Identification of interventions and feasibility analysis of proposed means and measures
b. Priority assessment of measures
c. Sensitivity analysis
d. Development of a time line from 2005 to 2015 for the implementation

The results of the Work Package are laid down in a report on prioritised needs and propositions for measures for the development of a Pan –European intermodal network (D 11) and the manual for the operation of the final version of the GIS (D12).

4.2 OVERVIEW OF THE SCIENTIFIC AND TECHNICAL RESULTS OF WORK

The following is a survey of the work carried out during the project period and its main results.

4.2.1 Project work structure

The first activity within the consortium dealt with the elaboration on the study methodology, a more detailed project structure and a work plan for each Work Package. The WP leaders were requested to establish work plans including defining work steps and allocating subtasks to each partner within the respective WPs. An initial assessment of the work plans were made in order to identify shortcomings and/or overlapping activities. Subsequently meetings were held between the partners to finalise the methodology for scientific work as well as to develop a conceptual framework ensuring an analytically structured process.

4.2.2 Identification of requirements on Intermodal transport

The project started with a kick-off meeting on 17 December 2001 in Vienna, Austria. At this meeting, administrative and technical issues about the project as well as general issues on the European transport policy were discussed. In further meetings held in January 2002 the partners involved in WP 1 discussed the main aspects which can be grouped into following tasks:

Task 1.1: Identification of past research projects relevant for review
Task 1.2: Definition of intermodality
Task 1.3: Identification of the legal framework, market determinants and regional parameters
Task 1.4: Definition of a primary intermodal network (physical and service)
Task 1.5: Identification and selection of performance indicators to measure intermodal transport and the calculation of associated benchmark values (relative benchmark values by comparing, for example, intermodal transport vs. road transport).
Task 1.6: Conduct of an electronic workshop with an expert panel

The **Deliverable 1 report** is the first research output of the INTERMODA project. It provides a brief introduction into the project (a basic understanding of the project to the reader), but most importantly it contains the first research results forming the fundament for the rest of the project. This document presents a state of the art of intermodal research, identifies a primary Pan-European intermodal network on infrastructure and services, and defines indicators to measure the performance of the intermodal transport system. The review of previous research projects showed that a lot of useful information is available for the EU member states only, but not for the CEEC.

Although the concept of intermodality is at the heart of modern transportation systems, there are various views on the exact meaning of this term. In addition there are many concepts used to cover the same (or similar) issues, such as combined transport and multi-modal transport. **Intermodal transport within the INTERMODA project refers to the characteristic of a transport system that allows at least two different modes to be used in an integrated manner in a door-to-door transport chain**. The intermodal transport system consists of the physical subsystem (infrastructure and transport equipment) and the intermodal service subsystem. Interconnectivity and interoperability are important issues determining the quality of intermodal transport. The general objective(s) of intermodality, interoperability and interconnectivity are to establish a framework for an optimal integration of different freight transport modes so as to enable an efficient and cost-effective use of transport system through seamless, customer-oriented door-to-door services whilst favouring competition and quality between transport modes.

Research has been one of the most important actions to achieve an improvement of intermodal transport. Research results suggest that the quality of infrastructure (such as railways and terminals) is not satisfactory. Freight operators are dissatisfied with the presence of numerous administrative and institutional barriers at terminals, the quality of operations and sub-optimal transhipment processes. Accessibility of the infrastructure and the speed of handling should be improved. The interoperability and interconnectivity of the transport system can be improved by means of further liberalisation and deregulation. Organisational structures need to be harmonised. One of the ways to realise this is the standardisation and modernisation of transport equipment. Important to the performance of intermodal transport is also the role of new technologies. Many studies have been carried out towards the application of new technology in intermodal transport. It can improve all elements of the intermodal transport chain. One of the areas is the improvement of intermodal transport services important to customers (electronic booking, tracking and tracing etc.). Intermodal equipment consists of specific vehicles, loading units and rolling stock where further standardisation is promoted.

The results reveal what determines the quality of intermodal transport and on which aspects the current performance of intermodal transport is not satisfactory. Important indicators defining intermodal quality are among others the time needed for goods to be transported, reliability of the system, flexibility, safety and control (frequency of information). The weakest performances of intermodal transport are in the areas of reliability (both length and frequency of delays) and of transport time. Improvement may come from uniform regulation (e.g.

custom formalities), less complex documentary and administrative procedures, and standardisation of intermodal equipment. In addition, accessibility to the sector for transport companies and clear communication to customers is important. The work in WP1 resulted in INTERMODA adopting the following definition of intermodality (INTERMODA, 2002):

> *"Intermodality is a characteristic of a transport system that allows at least two different modes to be used in an integrated manner in a door-t-door transport chain. In addition, it is a quality indicator of the level of integration between different transport modes. In that respect more intermodality means more integration and complementarity between modes, which provides scope for a more efficient use of the transport system".*

4.2.3 Survey of Status Quo on Intermodal Infrastructure, Organisation and Operation

At the beginning 2002, the WP 2 leader defined the activities and formulated the tasks as follows:

Task 2.1: Elaboration of questionnaires / guidelines for structured interviews to collect the performance indicators, market determinants and parameters for framework conditions identified in work package 1

Task 2.2: Preparation, co-ordination and conduct of two surveys on the current organisation, operation and infrastructure of transports between the EU and the CEEC

Task 2.3: Design of GIS structure according to WP 1, incorporation of collected data and geographic map information resulting from WP 1.4-1.5 and 2.2 into the INTERMODA GIS

Task 2.4: Quantitative spatial analysis of specified indicators, generation of regional profiles (supply and demand)

Task 2.5: Preparation of papers for and participation in the workshop with the expert panel (D 5) to discuss the current status of intermodal transport organisation, operations and infrastructure

On 1 March 2002, WP 2 leader started to elaborate on the first draft questionnaire for the survey on the status quo of intermodal infrastructure, organisation and operation. It became apparent during a discussion between the WP 1 and 2 partners about important performance indicators that 3 separate questionnaires had to be developed according to the categories of performance indicators:

- Questionnaire on network links for rail infrastructure managers, rail operators, inland waterway operators
- Questionnaire on network nodes for terminal operators
- Questionnaire on intermodal services for forwarders and operators

WP2 collected data to determine the current values of the performance indicators, including data on the infrastructure and rolling stock, on service networks, and on legal constraints and requirements. This information was collected in part from desk research and in part from interviews with forwarders, terminal operators, and link operators. The results of the survey are presented in two ways:

- In the GIS data bank with a final version at the end of the project
- In Deliverable 7 outlining the methodology for identifying and prioritising bottlenecks and constraints as well as the practice of methodology.

4.2.4 Assessment of Status

In February 2002, WP 3-leader prepared the work plan including the following tasks:

Task 3.1: Development of a framework to identify bottlenecks and prioritise the need to remove them
Task 3.2: Preparation of an O/D-matrix for the current situation of transport flows in order to identify the main relations
Task 3.3: Organisation of a workshop to discuss bottlenecks
Task 3.4: Identification of gaps between current and target values of performance indicators
Task 3.5: Identification of bottlenecks
Task 3.6: Assessment and prioritisation of bottlenecks, the outcome of which will be used as input for WP 5
Task 3.7: Preparation of the relevant report (D7)

Part of the framework development (task 3.1) is already embedded in the conceptual framework of the D1 report. It proposes that the identification of bottlenecks is achieved by determining the "current gaps" and prioritising them. The methodology is specified in more detail in the first task. It is necessary to determine various types of bottlenecks, which indicators are best to identify them, and how they are to be prioritised. The WP 3-leader prepared the framework in which bottlenecks are defined, and performance indicators, target values, gaps and priorities can be determined. A gap is defined as the (negative) difference between the target value for an indicator and its current value. A bottleneck is defined as a combination of one or more gaps. This framework serves as an input to WP1, where the performance indicators are defined.

In WP 3 work started with an overview of possible bottlenecks in the intermodal transport system and the definition of a top-down approach for the collection of information on freight flows in all CEEC. This was based on the statistical year 2000. The partners and subcontractors in the CEEC were requested to check the availability of relevant freight flow data on a regional level and according to commodity groups, preferably by NSTR 2-digit level (52 groups).

In the course of the project it became clear that the methodology of WP 3 had to be revised, in particular with regard to the benchmark approach. Revision of the approach was required because the amount and types of data being gathered in WP 2 differed from initial assumptions.

WP3 analyses the information from the WP2 interviews with an identification of the most important freight transport corridors in Europe. The methodology consists of four steps:

1. Identification of the major corridors and their associated freight flows, based on the primary intermodal network of WP 1, the O/D matrix and the assignment of O/D flows to the network
2. Link the identified routes described by the forwarders to these major corridors
3. Select those routes that lie on the important corridors and have the greatest potential for bottlenecks by comparison of the main characteristics of the intermodal routes (cost, time) and the comparison of the intermodal route with their road alternative
4. Investigate the selected routes in greater depth by various small corridor project teams in the area, and to identify generic bottlenecks in particular

The main outcome of WP 3 is the **Deliverable 7 report** on methodology for identifying and prioritising bottlenecks dealing with the following:

- current transport flows in Europe by constructing the O/D matrix, and
- assigning of the O/D flows to the intermodal network
- data obtained by the questionnaires and interviews
- methodology for determining bottlenecks

- selection and analysis of corridors and routes
- identification and prioritisation of bottlenecks

The Consortium defined an intermodal bottleneck as *an actual or perceived negative characteristic of an intermodal door-to-door transport chain that makes intermodal transport less attractive than unimodal transport*. Although some bottlenecks affect all types of transport (unimodal, multi-modal, intermodal, combined transport), the main focus was on those that have an impact on the choice for intermodality.

Three types of bottlenecks emerged from the investigation: specific, common, and generic bottlenecks:

- **Specific bottlenecks** are bottlenecks that occur only at one location and can be solved through national policy.
- **Common bottlenecks** occur at multiple locations but are specific to their location. No general action can be undertaken to eliminate common bottlenecks at all locations.
- A **generic bottleneck** is a bottleneck that is inherent to the system. It occurs at multiple locations but is identical in nature at all locations.

The Consortium convened a workshop with experts on intermodal transport to discuss the common and generic bottlenecks identified, to add ones that they thought were missing, and to assign priorities. This approach led to a final list of 23 common bottlenecks and 12 generic bottlenecks (in total, 35 bottlenecks), which were divided into four groups:

- Terminals
- Capacity of links
- Interoperability
- Market conditions

Each group contains bottlenecks of a comparable or homogeneous type that can be addressed using similar policies. In fact, it is possible that a single policy will have effects on some or all of the bottlenecks in a group.

At the workshop, each of the 35 bottlenecks was assigned an importance classification (high, medium, and low) by the experts, and the members of the consortium. These ratings were then combined, to produce an overall rating (high, medium, or low) for each of the bottlenecks.

This process resulted in the categorisation and prioritisation shown in Table 4-1. It must be noted that within their level of rating (high, medium, low) the bottlenecks are not ranked; they are bundled into the four above-mentioned groups.

Priority	Group	Bottleneck
HIGH	**Terminal** – access	**G1** Limited opening times of terminals
	Terminal – capacity	**C8** Shortage of (intermodal) terminals
		C9 Insufficient terminal capacity
		(C23) Lack of appropriate combined-transport (internal) equipment
	Terminal – operations	**C7** Long marshalling time due to short tracks and a limited number of tracks
	Capacity of links – general	**(C17)** Inadequate width and height of tunnels
	Capacity of links – rail	**C11** Insufficient railroad capacity
	Capacity of links – inland waterways	**(C18)** Shallow sections on waterways
	Interoperability – border crossing	**G2** Different and inconsistent border crossing procedures
		(G10) Countries have different weight limits
		(G12) Lack of interoperability across national networks
	Interoperability – technical interoperability	**G7** Interoperability in general
	Market conditions – inadequate market information	**(G8)** Lack of sufficient demand for intermodal services
	Market conditions – unfavourable cost structure	**G6** Unequal market conditions for road and intermodal transport
		(G9) Lack of return freight, and cabotage
	Market conditions – legislation	**(C16)** An inadequate legislative framework
MEDIUM	**Terminal** – access	**C5** Poor road access to terminals
	Terminal – access	**C1** Poor railway connection between main line and terminal/port
	Terminal – operations	**C3** Large distance between terminal and marshalling yard
	Terminal – operations	**C6** Longer handling time due to poor equipment
	Capacity of links – rail	**C10** Inefficient layout of the railroad network
	Interoperability – border crossing	**G4** Different gauge width of railway systems in different countries
		G5 Different voltages in different countries
	Interoperability – technical interoperability	**(G11)** Operational differences (signalling)
	Market conditions – inadequate market information	**(C20)** Tariff setting takes too long
	Market conditions – legislation	**(C22)** Not all terminals can handle dangerous goods
LOW	**Terminal** – access	**C2** Large distance between the terminal and the main infrastructure network
	Terminal – operations	**C4** No electrified tracks at terminals
		G3 Remote location of customs offices
	Capacity of links – general	**(C21)** Lack of qualified personnel (especially locomotive drivers)
	Capacity of links – inland waterways	**C12** Narrow sections on waterways
		C13 Limited capacity of locks at hydropower stations en-route
		C14 Low bridges on waterways
		(C19) Spatial planning does not include the industrial parts of the inland waterways
	Market conditions – inadequate market information	**C15** Too complex and cumbersome data exchange

(in parenthesis are those bottlenecks that were ranked by only one expert)

Table 4-1 Final categorisation and prioritisation of bottlenecks

4.2.5 Network Scenarios, Assignment and Investment Requirements

By January 2002 the WP leader prepared the work plan and description of the following tasks:

Task 4.1: Intermodal supply chains for the major transport relations
Task 4.2: Scenario development and expert meeting on scenarios
Task 4.3: Forecast future transport demand
Task 4. 4: Assign demand to the network based upon the scenarios.

The results of the work is concluded in two deliverables. The **Deliverable 9 report** as one output of the scope of work describes the methodology for determining the potential future intermodal transport demand in 2015 followed by an overview of the potential future intermodal transport demand for a reference scenario and an alternative scenario. In the reference scenario it is assumed that the current and already foreseen growth patterns and exogenous developments will take place up to 2015. In the alternative scenario the same assumptions as in the reference scenario are made with on top of that the assumption that the European integration process proceeds at a more rapid pace.

From an analysis of the intermodal transport flows in the base year 2000 it can be concluded that:

- The intermodal flows within and in relation with the CEEC are low and concentrated on a limited number of relations;
- Intermodal statistics are not accurate and not complete (in general, but especially not for the CEEC);
- For RoLa flows it is expected that the volumes will decrease in the future when border crossing problems are solved due to the EU enlargement, therefore these flows are no good starting point to base the forecasts on;
- The intermodal flows between Western Europe and the CEEC fluctuate too much for using them as a starting point for a forecast, the reason for this is that the intermodal transport market in the CEEC is not mature yet.

Because of these conclusions an approach is applied that determines the potential future intermodal transport flows based on characteristics of a forecast of the total future transport demand.

The forecast procedure

The forecasts are based on scenarios. The reference and the alternative scenario are based on a combination of the PRIMES/ACE scenario, the Forecasting 2020 reference scenario and the “Traffic forecast on the ten pan-European transport corridors of Helsinki” reference scenario. These scenarios are consistent with the scenarios used in the TEN-STAC project.

For the determination of the future intermodal transport demand the intermodal flows are defined as the transport of standard loading units (containers, swap body, semi-trailer,...) according to the definition of EUROSTAT and ECMT which is as follows: *“Intermodal transport is the movement of goods (in one and the same loading unit or vehicle) by successive modes of transport without handling of the goods themselves when changing modes”.*

In the applied approach to make forecasts of the potential intermodal transport demand the forecast of the total transport demand is considered as a reservoir of conventional and intermodal transport flows. In order to determine what part of this reservoir belongs to the future intermodal transport demand a number of criteria like transport distance, transport volume, commodity types and intermodal market shares are applied on the total forecasted future transport flows. The flows fulfilling the different thresholds of the criteria are being indicated as future potential intermodal transport. The overview of the future potential intermodal transport demand is a good indication of where developments of intermodal transport can be expected in the future. How large the actual intermodal transport demand in

2015 finally will be depends not only on technical conditions related to transport flows but also to a large extent on the decisions taken by actors in the market, local governments, EU policy and the interaction between them.

The reference scenario results show where intermodal transport flows can be expected in the future (under the assumption that the current and already foreseen growth patterns and exogenous developments will take place up to 2015). Since there are many future situations possible, the alternative scenario results show where the intermodal transport flows can be expected in a more 'optimistic' intermodal scenario (under the same assumptions as in the reference scenario with on top of that assumption that the European integration process proceeds at a more rapid pace) in order to obtain a broader view of the range of possible outcomes.

A comparison between the situation in the year 2000 and the future potential intermodal transport demand in 2015 shows that the intermodal transport amounts between 7.5 and 10.5 million tonnes in 2000 (roughly estimated), 66 million tonnes in the reference scenario 2015 (6.3 to 8.8 times higher than in the base year) and 87 million tonnes in the alternative scenario 2015 (8.3 to 11.6 times higher than in the base year). It should be noted that the year 2000 figure is based on an estimate of information that is neither accurate nor complete and the 2015 figures are based on estimation procedures. The comparison gives a rough indication of the potential growth of intermodal transport between 2000 and 2015.

In the reference scenario the total of 66 million tonnes consists of 30 million tonnes continental intermodal transport (transport flows for which all legs of the journey are carried by land modes (including inland water ways) with both origin and destination in Europe) and 36 million tonnes maritime intermodal transport (transport flows for which at least one part of the journey is carried by sea). In the alternative scenario the total of 87 million tonnes consists of 42 million tonnes continental intermodal transport and 45 million tonnes maritime intermodal transport.

From the continental intermodal transport related to the CEEC 43% is transported within the CEEC and 57% is transported between the CEEC and Western Europe (in the reference scenario). It appears that the largest part of continental intermodal transport within the CEEC concerns domestic transport, both in the reference and the alternative scenario about 80% of these flows is domestic transport. Large intermodal domestic transport volumes occur in Poland, Romania and Bulgaria. The continental intermodal transport within the CEEC on international relations is rather low; besides a limited number of relations with intermodal volumes occur. Although international transport within the CEEC almost doubles up to the forecast year 2015, it stays relative low (compared with the situation in Western Europe). Therefore, the international transport flows within the CEEC do not fulfil the requirements applied for determining potential intermodal transport (not even in the alternative scenario which is an 'optimistic' scenario regarding intermodal transport). For the continental intermodal transport between the CEEC and Western Europe a number of relations have high volumes: Poland – Germany, Czech Republic – Germany, Poland – Italy, Poland – Spain, Slovak Republic – Germany and Hungary – Germany.

For the maritime flows a further distinction has been made between the hinterland flows as part of a maritime chain and the short sea flows. The hinterland flows are the legs of a journey that are carried by inland modes, these flows concern transport from a seaport to the destination or from the origin to the seaport. The short sea flows are that part of the maritime chain carried by sea with both origin and destination in Europe.

High hinterland flows through the Baltic States are going to and coming from Russia and (to a less extend) Belarus. Besides there are high hinterland flows in Poland between the port regions and other regions in Poland and between Romania and Hungary. Hinterland flows between the CEEC and Western Europe are rather limited, except for hinterland flows between Hamburg in Germany and Poland and Czech Republic.

The short sea flows within the CEEC are rather limited, between Poland and Russia, between Romania and Russia and between Latvia and Estonia substantial potential intermodal transport occurs. The short sea flows between the CEEC and Western Europe are much higher. Especially related to Latvia, Lithuania, Estonia and Poland on the CEEC side and Germany, Sweden, UK, Finland, Italy and the Netherlands on the Western European side. It is noticed that the short sea flows are concentrated on the northern part of the CEEC (the Baltic States and Poland), the short sea flows in the southern part of the CEEC are less high.

The results of the reference scenario show that there are a limited number of relations that have potential for intermodal transport in 2015. The elimination of bottlenecks and the promotion of intermodal transport should mainly focus on these specific relations since the chances to achieve a shift to intermodal transport are highest on these relations.

From the comparison between the results of the reference scenario and the alternative scenario it can be concluded that the future potential intermodal transport in 2015 will be higher in a 'more optimistic' scenario, but that the increase of the potential intermodal transport largely occurs on the same relations and in the same regions that have already high potential intermodal transport flows in the reference scenario. This result confirms the conclusion that the potential intermodal transport flows are limited to a specific number of relations and regions and that most of the effort put in promoting intermodal transport should be addressed to these relations and regions.

The assignment procedure

The **Deliverable 10 report** is the second output of INTERMODA work package 4 "Network scenarios, assignment and assessment". This deliverable presents the assignment of transport demand for the base year (2000) and two future scenarios (2015) onto the infrastructure network. Based on these results, key figures for transport volumes and mode split are calculated, and the performance of the present and future networks is assessed through external costs.

The network assignment shows a significant increase in total transport volumes from the base year 2000 until 2015. The total tonnage transported in the base year is 1 234 mill tonnes. This will increase by 56% to 1 922 mill tonnes in the future Reference scenario, and by 65% to 2 036 mill tonnes in the future Alternative scenario. The total tonne kilometres increase even more, by 72% (from 865 460 mill tonnekms to 1 491 225 mill tonnekms) for the Reference scenario and by 80% (to 1 558 950 mill tonnekms) for the Alternative scenario. This indicates longer transport distances in the future scenarios than in the present situation. An analysis of the flow pattern shows that this is mainly caused by a large increase in transport to and from Russia. The main growth is in flows between Russia and CEE countries, however growth is also expected in flows between Russia and countries within the EU15 (in particular Portugal, Spain, France, Italy and the Benelux countries.)

The mode split does not change dramatically, but there are clear indications of a shift from rail transport to road transport: The share of tonne kilometres by road is expected to increase from 28% in the Base Year to 32% in the Reference scenario and 34% in the Alternative scenario. The share of short sea shipping will increase from 33% in the Base year to 35% for the two future scenarios. Inland waterways have 5% of the tonne kilometres in the Base Year, and will remain on this level – the future share of tonne kilometres by inland waterways is estimated to 4%. Rail is expected to decrease from 34% in the Base year to 28% and 27% for the Reference and Alternative scenario respectively.

The future transport flows were compared to the Helsinki corridors. From this analysis, it is clear that the Helsinki corridors will remain important in the future. The network assignment results do identify an important route not defined as a corridor: The Moskva – Baltic countries with further transfer to sea transport. This route involves rail as main mode between Moskva and the Estonian and Latvian ports and road as main mode between Moskva and Lithuanian ports.

Separate analyses were carried out for intermodal transport[2]. There are no reliable statistics for intermodal flows for the Base year, but forecasts of these flows for the future scenarios were made. For the future Reference scenario, the share of intermodal tonne kilometres is about 5% of the total tonne kilometres, while for the future Alternative scenario, the share of intermodal tonne kilometres is about 6%. Due to lack of statistics describing the present situation, it is not possible to give an estimate of the expected increase or decrease of intermodal transport, however it is possible to compare the two future scenarios. Key figures show that there are larger intermodal flows in the future Alternative scenario (71 mill tonnes), than in the future Reference scenario (52 mill tonnes). The transport pattern and the average travel distances for intermodal transport are similar for the two future scenarios; analysis of modal split of tonne kilometres shows 1% road transport (mainly pre and end haulage), 56% rail transport, 2% inland waterways transport and 40% short sea shipping for both future scenarios. In other words, the main part of the future intermodal freight flows will be transported by rail and short sea shipping. Inland waterways will have only a very small fraction of the intermodal transport.

The external cost assessment

In order to assess the performance of the networks, external costs covering noise, accident costs, air-pollution, global warming and upstream processes[3] for the forecasted traffic flows for all three situations were calculated. The calculations show that the total external costs increases by 154% from the Base year to the future Reference scenario (from 37 419 mill Euro to 95 160 mill Euro), and by 173% from the Base Year to the future Alternative scenario (from 37 419 mill Euro to 102 276 mill Euro). The high increase in external costs is caused by the increase in total tonne kilometres and the increased share of road transport. The Alternative scenario has higher external costs than the Reference scenario. This effect is mainly caused by the larger volumes transported in the Alternative scenario.

In the Base year, road transport contributes with less than 1/3 of the tonne kilometres but more than 60% of the external costs. By 2015, the road share of tonne kilometres will be about 1/3 and the proportion of external costs will increase to about 70%. For the same period and scenarios, rail is expected to loose its leading position in the share of tonne kilometres from 34% to 27-28%, and decrease its share of external costs from 19% down to 14-15%. Short sea shipping will increase slightly it share of tonne kilometres, but with the low external costs associated with this mode, its share of external costs will decrease.

Calculations of external costs were carried out for intermodal flows separately. For the Reference scenario, intermodal flows contribute to about 2% of the total external costs, while for the Alternative scenario intermodal flows contribute to about 3% of the external costs. The partial contribution to the external costs from the different modes are 4% from road, 59% from rail, 2% from Inland waterways and 35% from short sea shipping for both future scenarios.

The network assignment and external costs analysis carried out show that for the study area, both the future Reference scenario (where all current and foreseen growth patterns have taken place) and the future Alternative scenario (where in addition the European integration takes place at a more rapid pace) represent situations where a significant increase in freight flows is expected - the increase is related to both tonnage and travel distance. With regard to external costs, the development is not very positive – both the increased amount of transport and the expected increase in share of road transport will lead to higher external costs and less environmentally friendly transport. In the future scenarios described here, the expected share of future intermodal transport is very low and does not influence or compensate the negative development of the total traffic flows.

[2] Intermodal transport refers to the Eurostat/ECMT definition of intermodality: “Intermodal transport is the movement of goods (in one and the same loading unit or vehicle) by successive modes of transport without handling of the goods themselves when changing modes”.
[3] Energy production and distribution, vehicle production and infrastructure construction and maintenance

4.2.6 Set up of a Framework for Implementation of a Intermodal Sufficient Quality Network

On the basis of methodologies from the previous WP and the output of work, the WP leader prepared a work plan in November 2002 identifying the following tasks:

Task 5.1: Analysis and merging of results of WP 3 and WP 4
Task 5.2: Comparison of results of forecast scenarios with status quo in terms of needs and measures for framework conditions, organisation, management, operations and infrastructure
Task 5.3: Economic analysis of measures in terms of direct costs and macroeconomic assessment
Task 5.4: Ranking of results in terms of feasibility and importance with cross reference methods, and derivation of a time line for 2005 to 2015
Task 5.5: Mapping of suitable infrastructure for status quo (base year) and future years 2005, 2010 and 2015
Task 5.6: Transfer of results to a reference scenario for 2000 to 2015 (documentation and GIS)
Task 5.7: Final presentation to the expert panel

During the project it has became clear that the information required for the tasks as described above would have had to be much more detailed than it was possible to obtain within the former work packages.

Taking into account the available information and data and the project's progress a number of meetings of the WP5 consortium took place to adjust the work package's approach. The Commission's decision to combine parts of the work of the INTERMODA project with the STAC project let to a time target which narrowed the planned time for the work package for that the project's consortium finally choose the following alternative approach: The tasks 5.2 and 5.4 have been merged to an assessment and ranking of individual policies. The approach about an economic analysis has been changed to an economic sensitivity analysis using the model developed in work package 4. Instead of a reference scenario which has been the former objective of task 5.6 the subject has been changed to identify recommendations for the further development of intermodal transport between the EU15 and the CEEC.

The **Deliverable 11 report** concludes the work carried out in the INTERMODA project to set up a framework for implementation of a primary Pan European intermodal network.

Therefore an assessment and ranking of individual policies to remove bottlenecks in intermodal transport between the EU and the CEEC has been carried out. In order to find out on which Origin/Destination (O/D) transport links these policies may have an positive impact a sensitivity analysis about the future intermodal network has been carried out. To set the policies into action on these highlighted O/Ds the report concludes with the derivation of recommendations for the further development of intermodal transport between the EU15 and CEEC.

A total of 70 policies have been assessed and ranked towards their performance and feasibility to eliminate bottlenecks in intermodal transport. According to the impact classification,

- 19 are high-impact policies,
- 30 are medium-impact policies and
- 21 are low-impact policies.

The 19 high-impact policies are primarily targeted at changing and standardising legislation or creating financial possibilities for the development of intermodal transport. The creation of financial possibilities for the building of new infrastructure is considered to be much less feasible than the upgrading of existing infrastructure. The high-impact policies are also

generally targeted at improving operations by better utilising or upgrading infrastructure and equipment. Policies targeting bottlenecks that do not concern either infrastructure or equipment are expected to have low impact. The intermodal transport experts, involved in the assessment process, also concluded that a marketing campaign aimed at encouraging the use of intermodal transport and support for the increased use of ICT are expected to have little impact.

Out of the 19 high-impact policies 7 have a good feasibility for implementation. These are targeted at 8 out of the 16 high-importance bottlenecks.

These 7 policies are:

- **Introduce fund for replacing of obsolete handling equipment**
- **Set standards for combined-transport equipment**
- **Introduce fund for restructuring terminals**
- **Introduce fund for restructuring terminals operations**
- **Introduce fund for restructuring railroad networks**
- **Set safety standards**
- **Check safety at departure and arrival**

Acting on the assumption that the policies assessed may have a direct impact on changing transport times and transport costs for intermodal transport the sensitivity analysis shows following results:

1. By far the lowest transport volumes result from a change only in transport times. A change only in costs already holds a high potential for additional intermodal transport.
2. A change in time and costs creates the highest potential whereas the difference to the cost case is comparably low.
3. There are 13 countries which can be considered for having high potentials for intermodal transport which are Austria, Germany and Italy within the EU15 and the Czech Republic, Hungary, Poland, Slovenia, Lithuania, Romania and Latvia within the group of the Accession Countries as well as Ukraine, Belarus and Russia.
4. Taking into account the highest potentials 7 countries can be considered - Austria, Germany, Poland, the Czech Republic, Hungary, Lithuania and Russia. On the O/D relations on country level there are five O/D relations which have a comparable high potential. These are the O/Ds between Germany and Poland, Germany and the Czech Republic, Russia and Lithuania, Austria and the Czech Republic and Austria and Hungary.
5. Striking is the small difference between the potentials for the two cases change in costs and change in costs and time. The potentials which can already be achieved with a change only in costs make it questionable to justify the extra amount of resources necessary for the additional potential which can be achieved by a parallel change in transport time.
6. A further argument to use the potentials for additional intermodal transport is the reduction in road transport. Two of the five exposed O/D relations hold a relative reduction in road transport of more than 10% and the three other hold a reduction of more than 5% after all. Taking into account the high amount of transport volume on these O/Ds the reduction of road transport can be considered as respectable.

To achieve these potentials for intermodal transport and to implement the high impact policies into actions the following recommendations are suggested. These recommendations are considered to be highly valuable and shall be applied in order to contribute to the identification of objectives and definition of projects to remove bottlenecks still hindering the development of intermodal transport between the EU and the Accession Countries:

List of high valuable recommendations:

- Increase capacity of terminals
- Transport Infrastructures for better access of terminals
- Harmonization of opening hours at terminals
- Investments in modern standardised intermodal equipment
- Consideration of intermodal transport in technical, operational and administrative procedures
- Improved border procedures for intermodal transport
- Harmonization of loading units

Further on the following recommendations shall be applied to stimulate the discussion for future related strategies and ideas to promote the development of intermodal transport:

List of other important recommendations:

- Connect road network to major terminals in main rail corridors
- Implementation of new handling procedures
- Introduction of European-wide transport tariffs
- Consideration of external costs for fair prices
- Criteria for investments in infrastructures
- Overcome mental bottlenecks
- Measures towards concentration of intermodal rail transport on a limited number of international transport corridors
- Introduction of a new international transport corridor between Moskva and the Baltic Countries with further transfer to sea transport
- Development of an intermodal network connecting sea and hinterland transport
- Promotion of extended port cooperation
- Introduction of one-stop-shops for intermodal transport

4.2.6.1 Special Achievements

The Terms of Reference of the INTERMODA project state as innovative approach the following key points:

- give a comprehensive overview about current intermodal services between the EU and the CEEC
- merge existing databases in order to create a harmonised infrastructure network and node database for the study area, covering 15 CEEC
- give a comprehensive analysis of the quality of intermodal procedures in the CEEC
- identify bottlenecks for the current situation and for future scenarios
- make a prioritisation of measures to eliminate the bottlenecks and their feasibility
- give access to the results via internet information system
- set-up a comprehensive database in the INTERMODA GIS.

4.2.7 The Geographical Information System

The **Deliverable 12 report** outlines one of the major achievements of the project, the **Geographical Information System (D6).** The system provides data about railway, road and inland waterway transport networks, available and planned facilities and present and forecast traffic flows on the transport networks, and software tools to process and display these networks and their attributes in map form.

The INTERMODA GIS offers a sophisticated and immediately operative computerized tool to transport planners and decision makers in order to assist in the process of transport analysis and planning, the preparation of transport policies and projects.

The INTERMODA GIS is structured into three major parts: Data Management, Maps and Analysis.

- DATA MANAGEMENT (transport infrastructure and service databases) offer access to transportation databases. The user can edit and review textual information or select directly from the map any element of the network and obtain the available information attached to it.
- MAPS offer the possibility to get access to all thematic cartography. Transport infrastructure networks, transport service networks and countries' spatial data have been included. Within each of these datasets, the system offers a much more detailed selection by layers (i.e. according to service type…). Free zoom utilities have been implemented as well, in order to visualize the cartographic information at any scale.
- ANALYSIS allows the user to analyse the results using several representation utilities. The system allows the user to combine these representations and various datasets to create completely personalized maps.

INTERMODA GIS presents an easy-to-use interface, and allows to locate easily all the information managed by specially designed tools. The data review forms provides all of the necessary data to speed the search process. The system is easy to operate even for users not experienced with computer systems.

The INTERMODA GIS requires, in its current version, approximately 60 MB for core GIS software and databases and standard PC computer compatible with Windows-based operating system such as Windows 98 or higher. The system has seven menus, the most interesting ones for the user are Network, Organisations, Services and Analyses. The menu Analyses provides the link to the NEA toolbox in order to display the NEA toolbox results.

The main part of the INTERMODA GIS system is a detailed database of transport and services information. This database includes a wide variety of detailed textual and graphical information about transport systems and other related issues like information on roads, railways, airports, ports, terminals, administrative and legislative boundaries, economic and social indices, etc.

4.2.7.1 The Toolbox

Another major achievement is the development of the NEA **Toolbox (D16),** whose features can be described as follows:

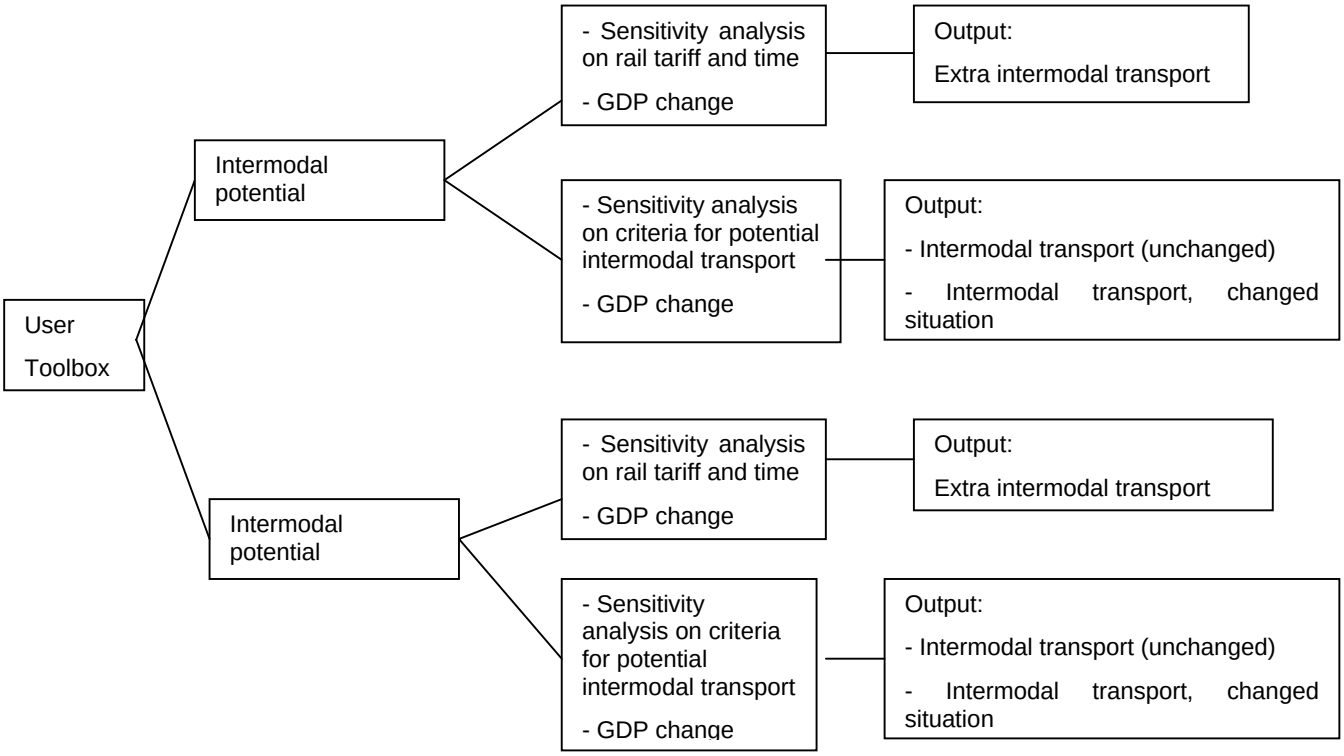
- The user has the possibility to evaluate the effect of changes in input parameters;
- The user has the possibility to evaluate the differences between the scenarios;
- The toolbox has an instrument that provides the user better insight in the results.

The toolbox offers a number of possibilities to evaluate the effects of changes in parameters in future intermodal transport situations. At first a selection shall be made between potential intermodal transport in the reference scenario and in the alternative scenario. Given the selected scenario the user can choose between a sensitivity analysis based on changes in rail transport time and tariff and a sensitivity analysis based on changes in the criteria applied for the determination of potential intermodal transport. Both these sensitivity analyses can be combined with different economic growth (change in GDP growth). These different options are shown in the figure below.

In case of a sensitivity analysis on changes in rail tariff and time, the intermodal transport is zero in the base situation. Due to decreases of rail transport tariff and time, intermodal transport starts growing. The output of this exercise is intermodal transport on country-to-country level.

In case of a sensitivity analysis on the criteria applied to determine the potential intermodal transport, the potential intermodal transport in the selected scenario is the base situation. By changing the criteria, the potential intermodal transport will also change. The output of this exercise is the potential intermodal transport in the unchanged situation (base situation), the

potential intermodal transport resulting from the changed criteria and the difference between these two situations. These results will be shown on country-to-country level.



5 COMPARISON OF PLANNED ACTIVITIES AND WORK ACTUALLY ACCOMPLISHED

This chapter provides the comparison of achieved objectives and stated objectives (see chapter 4.2.) with reference to the output.

Basic research activities

Based on the conceptual framework of Work Package 1 the first activities covered the definition of intermodal transport, the system and its elements. A major element was to obtain an overview of previous research projects and studies. The review of past research projects (APRICOT, EUFRANET, EUROBORDER, EUROSIL, IMPREND, IQ, LOGIQ, REDEFINE, SCANDINET, SORT-IT, TERMINET, TINA Report, TNO-Inro) revealed that previous research projects hardly cover the study area of the CEEC and in case studies where it existed, quality requirements were not satisfactory.

Other important aspects were the identification of market determinants and the regulatory framework existing in the European Union and within the study area and the definition of indicators for intermodal performance

In order to define a primary Pan-European intermodal transport network the following activities were carried out:

- classification of the criteria of the network (nodes and links)
- the selection of relevant existing networks
- an initial survey to selected forwarders to identify the service network

Between February and March 2002 the WP leader sent out the first draft reports of Deliverable 1 (D1) to all partners for comments. On reviewing this report it was revealed that a major revision was necessary in order to cope with the emerging facts:

- Difficult identification of target values (benchmarks) for the indicators
- The service network could not be easily identified (a general physical infrastructure network was identified with the links and nodes of the TEN, TINA networks and the ten Pan-European corridors)
- Low return rate of the questionnaires sent due to time constraints
- Lack of relevant information from the CEEC on market determinants and legal framework

As the basic research work took longer than anticipated a new timetable for finalising WP 1 was set up and agreed upon by all participants. On 26 April 2002, according to the newly agreed timetable, WP 1 leader submitted a new version of the D1 report for discussion within the framework of the Electronic Workshop with the expert panel. An additional document including the introduction of the intermodal transport system and related questions was presented for discussion on the virtual platform. The Electronic Workshop, designated as milestone 2 (M2), was planned to validate the findings of the work and scheduled for the last three weeks in May 2002.

By end of May the Electronic Workshop was due to be terminated. Two main problems can be pinpointed:

- Technical problems in down/up-loading documents at the beginning resulted in low acceptance.
- The level of contributions from the members of the expert panel was moderate; the expectations for better results were too high.

Possible reasons might be:

- The concept of an electronic workshop requires technologically advanced standards and may create problems within countries (i.e. the CEEC) where the computer/internet networks are not in line with the network standards within the Western European countries i.e. lower transfer rates, very long download rates, interruptions of the lines, etc.
- The majority of the members of the expert panel are senior officials of international organisations and institutions and usually not used to working with this medium.
- The document itself was initially too large (about 100 pages) and the experts simply do not have sufficient time to read and comment on such documents.
- Experts prefer to receive documents via email in order to comment on and discuss them in meetings rather than replying via email.

As a consequence, the project co-ordinator decided to extend the workshop and up-load an executive summary of the report as a short version. However, the feedback from the panel remained low. So the Electronic Workshop (EWS) with the expert panel (Deliverable 3) was organised, however, the results of the virtual discussion can be regarded as unsatisfactory. It can be concluded that the EWS has required standards which are too technologically sophisticated as only a few contributions were received.

During the research work of WP 1 a large number of performance indicators were identified and selected according to priority for intermodal transport in the CEEC.

This issue was the main focus of a co-ordination meeting held on 12 June 2002 in Vienna. It was agreed that on the basis of the final list of performance indicators, more detailed questionnaires for the survey should be developed. In July 2002 a quality check of the draft D 1 report was made by TINA which resulted in a major commentary on its structure and content. By the end of July 2002 the WP 1 leader presented the revised version, which was submitted on the 14 August 2002 to the Task Manager for comments. The final version of the D 1 report was submitted to the Commission by the end of October 2002 and has been approved.

The survey

In order to obtain the status quo in intermodal transport work started with the elaboration on comprehensive questionnaires and guidelines for structured interviews in the 15 countries of the study area, in selected member states of the EU and in Turkey.

In order to get information on customer's perception and supply side on intermodal transport 3 comprehensive questionnaires were developed. A workshop with the expert panel should provide a clear and common understanding of the current situation.

The survey was performed from September to November 2002. On 13 September 2002, TINA Vienna organised an information meeting with the CEEC partners and the subcontractors. The main topic was the briefing of experts on the survey approach and the content of the questionnaires in order to achieve a common understanding of the aims of the exercise and possible results.

The survey took place in the 15 CEEC, and in 5 EU member states, namely The Netherlands, Germany, Austria, Italy and Greece.

In a co-ordination meeting in Leiden (NL) on 3 September 2002 a strict time table and a common interview-approach was agreed on among the participants in order to compensate for the project delay of about 6 months.

Initial interview results were presented in the workshop with the expert panel on 3 October 2002 in Budapest.

Despite a preliminary estimate of 150 interviews needed to be carried out in order to properly assess bottlenecks, the actual number of interviews was about 50% of this. The reasons for the lower rate of interviews are:

- The questionnaires were very comprehensive, requiring detailed information and lengthy communication with companies.
- Due to the severe market competition, a number of companies were not interested in providing company data for the project.

However, the content of information received can be regarded as satisfactory enough to perform the relevant assessment of the status quo. In particular, high value is placed on the opinions and statements collected from forwarders, and terminal and link operators. Data on infrastructure, services and several performance indicators were successfully collected and used to create a comprehensive database using GIS techniques

Taking into consideration the depth of the required information, the results of the survey are on the whole satisfactory. Valuable information were obtained pertaining to a wide spectrum of issues that play a role in the intermodal transport business. Furthermore, the survey covered a wide range of subjective opinions from people that work in the transport industry. The elaboration on all this information provide a highly informative field for the analysis that was used in the next steps of the project. However, due to the delay and difficulties in collecting complete data in the second Work Package, the original approach concerning the methodology of subsequent work steps had to be revised. In a number of meetings consensus on the revised methodology approach has been reached between the partners, in order to maintain the quality of the research and the anticipated solutions, as well as the project time schedule of 21 months.

The first workshop in Budapest

The first workshop with the expert panel was organised on 2 –3 October 2002 in Budapest. The consortium appreciated the discussions with the experts bringing a broader, more political than technical thinking in the project This included inter alia to consider the importance of intermodal liability and the legal framework. The aspect of mental bottleneck among the single mode operators was also of particular interest. Further important aspects were border crossing problem, missing infrastructure and the identification of investment in infrastructure and equipment in order to achieve added value in transport for Europe.

The assessment of status quo

The Work Package Description in the Technical Annex shows six tasks. In order to get a more clear approach the tasks were reorganized, ending up with the five tasks that are listed below:

3.0. Create a work plan
3.1. Develop a framework;
3.2. Prepare an O/D-matrix;
3.3. Identify bottlenecks;
3.4. Prioritise the bottlenecks;
3.5. Prepare the final report.

Task 3.0 has been added to those appearing in the Work Package Description in the Technical Annex. Tasks 3.1 and 3.2 are essentially unchanged. Task 3.3 in the Work Package Description has been incorporated as a subtask of the Task 3.3 shown above. Tasks 3.4 – 3.6 of the Technical Annex have been restructured and now comprise Tasks 3.3 and 3.4 shown above. Task 3.5 is not identified as a separate task in the Technical Annex.

The information obtained in the survey formed the basis for the assessment of the status quo as the main task of Work Package 3. In an initial step, the framework was developed to identify bottlenecks and to prioritise needs to remove them. The analysis of the survey results brought up a large number of bottlenecks hampering the development of intermoda transport. Parallel to the survey, data were collected on the current transport flows by the subcontractors in the CEEC to prepare an origin/destination (O/D) matrix. The quality of data differs from country to country. In many cases, data could not be supplied. In order to fill the

gaps data from the NEAC Western Europe and NEAC Eastern Europe freight transport databases were used. Then the assignment of the O/D flows to the intermodal network was carried out to identify major flows between the EU and the CEEC. Since, at that stage of the project, the data collection was not completed, the assignments were based on preliminary networks and a preliminary O/D matrix. As no information on costs or transport system performance indicators were available, the shortest-path assignment was carried out.

Two main differences between the preliminary version of the matrix and the final version can be stated: the final matrix is more detailed on a geographical level. The preliminary matrix describes transhipment regions on a country level, while the final matrix describes transhipment regions on a NUTS2 level.

The scenario development

In order to fulfil the objective of forecast future transport demand the work started with the conception of intermodal supply chains for major transport links. Based upon the performance indicators and the assessment of the current status quo two scenarios consider different economic, technical and environmental aspects. The first scenario is based on the moderate integration of the new members of the EU; the other scenario focuses on the total integration of the CEEC.

The second workshop in Brussels

The second workshop with the expert panel was organised on the 28 January 2003 in Brussels. The current bottlenecks, policies for solving the intermodal bottlenecks and the scenarios were discussed and verified by the experts. The discussion among the experts provided valuable information to the project. The Task manager of the EC concluded the results of the meeting as follows:

- With this workshop the Consortium has identified all bottlenecks
- It is important to develop measures to resolve these bottlenecks on a European level.
- 2003 is an important year for DG-TREN and the revision of the TEN guidelines.
- A strong position of intermodal transport is envisaged in the revised guidelines.
- The future corridor management structure is under discussion within the EC
- The Marco Polo programme is closely connected to the project

Mid Term Review Meeting

Project work in the second year was much influenced in particular by the conclusions of the Mid Term Review Meeting held in Brussels on 29 January 2003. During this meeting the European Commission requested that INTERMODA shall cooperate with the TEN-STAC (Scenarios, Traffic Forecasts, and Analyses of Corridors on the Trans-European Transport Network) project as much as possible. The TEN-STAC project forms a basis for the revision of the TEN-Guidelines and thus is of high importance for the European Commission. Therefore the forecast for INTERMODA, and in particular the scenarios, have to be synchronised with TEN-STAC.

The objectives of the STAC project are:

- traffic forecast and assignment for 2020, including intermodal transport,
- review of national infrastructure plans,
- detailed analysis of 25 corridors on an international level.

The harmonisation of the methodology and work approach of both projects with regard to the forecast resulted in a delay for INTERMODA of about 6 weeks compared to the revised project time schedule. WP 4 and 5 were affected by this delay. A revision of the timetable for WP 4 resulted in a new completion date of the draft deliverables for WP 4 at the end of May 2003. The relevant draft report on the assignment to the network was available for review at the end of May 2003.

The forecast procedure

Before forecasts were produced, the current intermodal transport market and available intermodal statistics have been analysed in order to see whether a forecast for intermodal transport within and in relation with the CEEC can be based on the current situation. Based on this analysis it was decided not to use the available intermodal base year information in the forecasting process. The reasons for this decision are:

- The intermodal flows within and in relation with the CEEC are low and concentrated on a limited number of relations;
- Intermodal statistics are not accurate and not complete (in general, but especially not for the CEEC);
- For RoLa flows it is expected that the volumes will decrease in the future when border crossing problems are solved due to the EU enlargement, therefore these flows are no good starting point to base the forecasts on;
- The intermodal flows between Western Europe and the CEEC fluctuate too much for using them as a starting point for a forecast, the reason for this is that the intermodal transport market in the CEEC is not mature yet.

Since the information about the current intermodal transport flows within and in relation with the CEEC are no good base for making a forecast of the future intermodal transport flows, an approach is applied that determines the potential future intermodal transport flows based on characteristics of the total future transport demand. Therefore, first a forecast of the total transport demand has been made followed by a forecast of the intermodal transport demand. A number of criteria like transport distance, transport volume, commodity types and intermodal market shares are applied on the total future transport flows. The flows fulfilling the different thresholds of the criteria are being indicated as future potential intermodal transport. For flows that do not fulfil the thresholds of the criteria intermodal transport is not competitive, while for flows that do fulfil the thresholds of the criteria intermodal transport is competitive.

The overview of the future potential intermodal transport demand is a good indication of where developments of intermodal transport can be expected in the future. However, the fact that intermodal transport is competitive for specific flows does not necessarily mean that market actors actually start using intermodal transport alternatives. Due to for instance lack of knowledge or organisational problems the market actors might not want to use intermodal transport. In this respect, the future potential intermodal transport can be regarded as an upper limit of the future intermodal transport. The method has been applied on the Western European situation and the results have been compared with available statistics for Western Europe. The conclusion of this exercise was that the method produces results for the Western European situation that are – on an aggregate level – close to the ‘actual situation’ described in statistics.

The assignment procedure

In general, assignment procedures simulate traffic behaviour and the procedures seek to minimise the cost for shipping cargo between any given origin-destination pair. Usually, when doing intermodal network assignments a simultaneous mode and route choice is carried out. That implies that the freight flow will choose the route (whatever mode combination) between its origin and destination that offers the most favourable transport alternative from a generalised cost perspective. In other words, the mode combination and route choice that represents the least perceived costs are chosen. The model is calibrated by adjusting the present generalised costs until the model is able to reproduce the present transportation pattern.

In the INTERMODA project, an adjustment of this approach was necessary. The reason is that the OD matrix does not only contain information about the origin, the destination, commodity types and amount of freight to be transported. The matrix also contains

information about mode use and transhipment region for most flows and it was decided to let this information rule mode and route choice in the assignment. The use of this information will then overrule the principle of choosing the mode/route combination with lowest generalised costs. The reason for making an assignment in the INTERMODA project is then mainly to visualise the transport flows in the OD matrices and provide input for the toolbox (INTERMODA deliverable 16).

With the input available in the INTERMODA project, it was possible to do an all-or-nothing assignment showing which routes (corridors) would be preferred for the different types of commodities in an ideal situation without infrastructure capacity restrictions. The results from this assignment can be interpreted as preferential flows – that is: the resulting flows if the infrastructure were equal or of similar quality and did not have capacity constraints.

The models applying an all-or-nothing assignment method presuppose that the network is not limited by capacity constraints - all the quantities to be transported included in the O-D matrix are assigned without any such restrictions. Assigning an OD matrix to a transportation network means also that the demand for traffic between every pair of zones is allocated to available routes connecting the zones only.

Means and measures to set up a framework for implementation

The leader of WP 5 started his work with the development of the conceptual framework in October 2002. As this part of the project has to present the findings and conclusions of the work of the project the methodology of this work package was depending on the results of the former work. In a number of coordination meetings in Bremen (Dec 2002), Brussels (Jan 2003), Vienna (Feb2003), and Leiden (April 2003) clarifications and modifications on the work plan and the expected output were made by taking into consideration the problematic situation with the data collection.

The tasks as specified in chapter 3.2.6. had to be modified accordingly. With regard to task 5.2, there are different ways to find solutions for the elimination of bottlenecks:

a) Some solutions to eliminate bottlenecks are already developed in WP3. It has to be assessed if these solutions can be applied to all bottlenecks which are identified
b) Additional solutions can be provided through research on projects which dealt with bottlenecks, in particular regarding intermodal transport.
c) Experts should be involved to develop a solution regarding bottlenecks having certain relevance for an intermodal transport network.

The Commission's decision to combine parts of the work of the INTERMODA project with the STAC project let to a time target which narrowed the planned time for the work package. Therefore the project's consortium finally choose the following alternative approach: The tasks 5.2 and 5.4 have been merged to an assessment and ranking of individual policies. The approach about an economic analysis has been changed to an economic sensitivity analysis using the model developed in work package 4. Instead of a reference scenario which has been the former objective of task 5.6 the subject has been changed to identify recommendations for the further development of intermodal transport between the EU15 and the CEEC.

Due to time constrains task 5.7 has been skipped in consultation with the Commission's project officer as this presentation would have been parallel to the final conference.

The third workshop in Rotterdam

The third workshop with the expert panel was organised on 2 June 2003 in Rotterdam on the special topic Short Sea Shipping. This workshop was not foreseen in the Technical proposal, but was organised upon request by the Scientific Project Manager. It was also agreed to skip the Final workshop.

NEA as WP leader 4 and organiser of the workshop gave a brief introduction on the subjects and the aim of the workshop, emphasizing the core questions of the workshop:

- How should short sea improve in order to attract cargo from road transport?
- What barriers should be solved to arrange for a good integration of short sea shipping in door-to-door flows?
- Who is stakeholder for removing these barriers?
- Are there specific barriers for a prosperous short sea development in relation with countries who will access the EU in this decade?

Interesting conclusions from the discussions were considered as an input for the D11 report on the set up of framework for implementation.

The Final Conference in Vienna

The final Conference on the results of the INTERMODA project was organised on 10 July 2003 in Vienna. The conference was organised in two sessions, whereby the morning session presented the current situation and constraints in intermodal transport through presentations by members of the consortium and a panel discussion of experts. The afternoon session then concentrated on the policies and measures for the promotion of intermodal transport with the presentation of the results of the project and a discussion in an expert panel.

6 MANAGEMENT AND CO-ORDINATION ASPECTS

This section contains information on project co-ordination activities, such as communication between partners, meetings, conference attendance, possible co-operation with other projects/programmes, and other activities related to WP 6 project management.

6.1 PROJECT MANAGEMENT

6.1.1 Project Structure

In December 2001 the main activities were directed towards structuring of project management activities and the organisation of the kick-off meeting in Vienna on 17 December 2001. The structuring of management activities included the following:

- Definition of four management levels and responsibilities:
  - Expert panel
  - Steering committee
  - Scientific PM committee
  - Project management
- Standards for communication between partners and subcontractors
- Quality management structure

6.1.2 Management Activities

The following substantial management activities were carried out within the first project months:

- Assistance in the provision of bank guarantees by three partners, LoGIS, PMI and GROWTH
- Settlement of payments between the DG TREN, the project co-ordinator and the partners and subcontractors
- Conclusion of subcontracting agreements between TINA Vienna and
  - TRI, responsible for Estonia, Latvia and Lithuania
  - ViaPont, responsible for the Czech Republic and Slovakia
  - CIP, responsible for FR Yugoslavia
  - IN-PUMA, responsible for FYR Macedonia

    and between LoGIS and
  - CTC, responsible for Bulgaria
  - REMACO, responsible for Romania

6.1.3 Project Meetings

The progress of the INTERMODA project was co-ordinated and monitored through a number of project management and technical meetings. Following the provision of the management plan stated in the Technical Annex of the contract, the following types of meetings were held:

- Project management meeting: to co-ordinate and monitor the progress of the project and take necessary strategic decisions concerning the structure, objectives, methodology and work approach of the project, such as the kick-off and the consortium meetings.
- Technical meetings: to plan detailed activities and tasks within one WP or between two and more WPs, such as the co-ordination of meetings and bilateral meetings with single partners.

The following meetings took place:

Meeting	Date	Place	Scope
Kick-off meeting	17 Dec 2001	Vienna (A)	Official project launch
Co-ordination meeting	15 Jan 2002	Leiden (NL)	Conceptual framework of project, WP methodology
Co-ordination meeting	22 Jan 2002	Rijswijk (NL)	Discussion of methodology for WP 1
Consortium meeting	10 Apr 2002	Vienna (A)	Coordination of work approach for WP 1, 2, 3, 4, 6, and 7
Co-ordination meeting with the Commission	15 Apr 2002	Brussels (B)	Status of project, comments on the work structure
Co-ordination meeting	21 May 2002	Vienna (A)	WP 2 Work plan, QM review of the draft report D1
Co-ordination meeting	12 June 2002	Vienna (A)	Finalisation of WP1, activities in WP2, 3, and 4
Co-ordination meeting	03 Sep 2002	Leiden (NL)	Status of work, preparatory work for the workshop in Budapest, revised time schedule
Co-ordination meeting with the Commission	04 Sep 2002	Brussels (B)	Status of project, subsequent activities, comments on deliverable 1, management report
Co-ordination meeting (Instruction meeting)	13 Sep 2002	Vienna (A)	Instructions to partners/ subcontractors for the interviews
Consortium meeting with the Commission	4 Oct 2002	Budapest (H)	Review of workshop, preparations for Barcelona conference, comments D1, expected results from WP2 and impact to WP3 and 4
Co-ordination meeting	24 Oct 2002	Rijswijk (NL)	Work plan and expected output of WP 4, preparations for next workshop on scenarios
Co-ordination meeting	13 Dec 2002	Bremen (GER)	Work plan and expected output of WP5, coordination with output of WP4, preparation of the next workshop
Mid Term Project Review meeting with the Commission	29 Jan 2003	Brussels (B)	Review of the workshop, discussion and clarifications of the work and progress of WP3, 4, and 5
Co-ordination meeting	7 Feb 2003	Vienna (A)	Coordination of activities in the WP 4 and 5, based on the conclusions made in the Mid term project review meeting, adaptation of timetable
Co-ordination meeting	17 Apr 2003	Leiden (NL)	Clarifications on the work output of the WP4 as input for WP5
Co-ordination meeting	24 Apr 2003	Cologne (GER)	Coordination of contributions to chapters of deliverable 11
Co-ordination meeting	3 June 2003	Rotterdam (NL)	Review of the workshop, coordination activities of work between the WP 4 and 5
Co-ordination meeting with the Commission	3 June 2003	Brussels (B)	Review of the status of project and preparation of the programme for the Final Conference
Coordination meeting	3 July 2003	Vienna (A)	Review of deliverable 11 and the presentations for the final Conference
Co-ordination meeting with the Commission	9 July 2003	Vienna (A)	Review of Final Conference programme, comments to D9 and 10

6.1.4 Milestones

The following project milestones were achieved within the project period:

Milestone	Planned date	Brief description of milestone objectives	Remarks	Actual date
M 1- Action	Jan 2002	Expert panel established	Invitation letters, reminder letters sent out	Feb 2002
M 2 - Workshop	Feb 2002	Electronic workshop with expert panel and intermodal industry	Workshop postponed due to delay in the finalisation of D1 report, not satisfactory	May to June 2002
M 3 - Website	Feb 2002	Website available on the Internet	Launch of start version on 28 December 2001	Jan 2002
M 4 - Database	June 2002	GIS database on performance indicators, market determinants and framework conditions for intermodal transports between the EU and the CEEC	Start of development of GIS database was hampered by the delay of WP1 and 2	1st version developed in Oct 2002, completed by end of project
M 5 - Workshop	July 2002	Workshop on current status of transport infrastructure organisation and operations conducted	As a result of the delay of the D1 the workshop was postponed, satisfactory	Oct 2002
M 6 - Workshop	Nov 2002	Workshop on scenarios especially concerning organisational and regulatory matters – mid term assessment	Agreement on scenarios, satisfactory	Jan 2003
M 7 - Action	Dec 2002	Assignment of future transport demand to the intermodal network	Availability and quality of actual data in all relevant CEEC; control checks on validity of model results are completed	Jun 2003
M 8 - Action	Mar 2003	Prioritised catalogue of suitable means and measures for intermodal transports between EU and the CEEC for 2001 to 2015 completed	Agreement with the expert panel on priorities	Jun 2003
M 9 - Conference	Jul 2003	Final conference, going public with the final results	Presentation of results, in line with the time schedule	July 2003
M 10	Aug 2003	INTERMODA completed, Conference conducted, CD ROM including GIS data and functions available	The finalisation of final documents was slightly delayed	Oct 2003

6.2 PERFORMANCE OF THE CONSORTIUM

The INTERMODA consortium is a multidisciplinary team consisting of by eleven partners with the main focus on sustainable transport solutions. When assembling the consortium it was aimed at maximising the experience in national and European transport policies. Special attention was given to the combination and complementation of theoretical knowledge in transport research and its practical application in the CEEC. Therefore 5 consortium members are internationally recognised research institutes, 6 consortium members are consultants highly experienced in the development and implementation of transport solutions

(infrastructure, organisation and operations) and with the common focus on intermodal transport between the EU and the CEEC.

The distribution of the roles of the consortium members is shown in the following:

Participant		**Country**	**Role in project (RTD, other functions)**
Partner	Nr		
TINA	1	A	Project co-ordinator, Leader of WP's 6 and 7
BIBA	2	D	Principal contractor, WP5 leader, contributions to WP's 1, 3, 4, 7
GROWTH	3	IT	Principal contractor, contribution to WP's 2, 3, 5, 7
NEA	4	NL	Principal contractor, WP4 leader, contributions to all other WP's
RAND	5	NL	Principal contractor, WP3 leader, contributions to WP's 1, 4, 5, 7
SINTEF	6	NO	Principal contractor, contributions to WP's 3, 4, 5
ESI	7	NL	Principal contractor, WP 1 leader, contributions to WP's 3, 5, 7
LoGIS	8	EL	Principal contractor, WP2 leader contributions to WP's 3, 4, 5, 6
KTI	9	HU	Principal contractor, contributions to WP's 1, 2, 3, 4, 5, 7
PMI	10	PL	Principal contractor, contributions to WP's 1, 2, 3, 4, 5, 7
EIM	11	SI	Principal contractor, contributions to WP's 1, 2, 3, 4, 5, 7

6.3 CONTACT DETAILS

Concerning details of the project and the follow-up on the project the following contact details are given:

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The deliverables, newsletters and other interesting information can be downloaded from the INTERMODA homepage.

7 EXPLOITATION AND DISSEMINATION OF RESULTS

The exploitation and dissemination of INTERMODA is the main focus of Work Package 7 and includes the following objectives:

- Ensuring widespread information on the project for major participants in the transport sector in order to prepare the basis for all future measures (e.g. addressing the relevant ministries, major companies, international organisations, defined user groups)
- Maximization of the recognition and acceptance of the project's findings and conclusions, targeting providers, users, relevant national and international organisations and financing institutions
- Achieving a common consensus between all relevant parties on strategic targets of intermodality in Europe

In order to fulfil these objectives a number of actions were made.

7.1 PROJECT FOLDER, QUARTERLY NEWSLETTER

7.1.1 Project folder

The aim of the project folder was to provide brief information about the project. The folder provides brief information on top–tier project issues. The 1st issue presented the project objectives and partners and was published in March 2002.

7.1.2 Quarterly Newsletter

The objective of the quarterly newsletter is the spreading of information and results of INTERMODA. These newsletters are distributed both through conventional means (as hardcopy at conferences and meetings) and through the internet (download from www.intermoda.org and distribute through mailing list as pdf-file). It was planned to publish the newsletters in quarterly intervals, starting with the first issue in June 2002. In total it is planned to issue five newsletters over the project period. The newsletters are distributed at conferences, meetings and relevant trade fairs. About 2000 copies of each issue are printed for dissemination to the following institutions/representatives:

- European Commission DG TREN and related services;
- European Parliament:
  - relevant committees (AFET/RETT), NGOs, representatives of the EU-delegations, representatives of the European Commission in the EP-committees, permanent representatives of the countries, territorial authorities;
- EU-delegations within the study area;
- INTERMODA consortium to distribute at meetings and conferences;
- 2nd annual European Energy & Transport Conference "Building Energy & Transport Infrastructure for Tomorrow's Europe" in Barcelona, 12 – 13 November 2002

In addition, the newsletter is sent to the National Contact Points responsible for the GROWTH Programme, Key Action 2.

INTERMODA Newsletter Issue #1

Issued: June 2002. Main topics:

- Presentation of aim and purpose of the project
- Status quo of the project's achievements after six months

- Listing of relevant conferences, meetings and workshops with particular focus on intermodality in 2002

INTERMODA Newsletter Issue #2

Issued: October 2002

The main objective of the second issue was, together with the first issue, to present the INTERMODA project to the audience of the 2nd annual European Energy & Transport Conference "Building Energy & Transport Infrastructure for Tomorrow's Europe" in Barcelona, 12 – 13 November 2002. Main topics:

- General description of the project's progress
- Analysis of the surveys conducted to assess the status quo of intermodal transport, infrastructure, organisation and operations
- Description of subsequent work steps

INTERMODA Newsletter Issue #3

Issued: January 2003. Main topics:

- Review of the 2nd annual European Energy & Transport Conference "Building Energy & Transport Infrastructure for Tomorrow's Europe" in Barcelona, 12 – 13 November 2002
- Presentation of the capabilities of the INTERMODA GIS (Geographic Information System)
- Description of subsequent work steps

INTERMODA Newsletter Issue #4

Issued: April 2003. Main topic:

- Review of the INTERMODA workshops held together with the expert panel and the European Commission and presentation of results.

7.2 INTERMODA WEBSITE

On the INTERMODA website, the project and its results are presented to a worldwide audience with the particular interest for specific groups working in the transport sector. The INTERMODA web site (www.intermoda.org) gives an overview of the project, and information about partners.

7.3 NATIONAL AND INTERNATIONAL DISSEMINATION

During the reporting period the following conferences were attended in order to disseminate INTERMODA project information:

Date	Location	Title	Organised by	Attended by (partner)	Presentation / Dissemination of INTERMODA (yes/no)	Cost relevant for the project
2001						
5/6 Dec	Frankfurt/Oder (D)	"Zukunft des kombinierten Verkehrs in Richtung Osteuropa" („The future of combined transport towards the CEEC")	DVWG	TINA VIENNA	Yes	Yes
2002						
31 Jan/ 1 Feb	Vilnius (LT)	Steering Committee Meeting for the Pan-European Transport Corridor IX (Middle Section)	Corridor IX	TINA VIENNA	Yes	Yes
20 Feb	Berlin (D)	Verkehrsmärkte der Zukunft	Wirtschafts förderung Berlin	BIBA-PLT	Yes	Yes
20 Mar	Brussels (B)	Public hearing on the White Paper of Transport in the European Parliament	EP	TINA VIENNA	Yes	No
21 Mar	Zagreb (HR)	Meeting with HZ (Croatian Railways)	HZ	TINA VIENNA	Yes	No
2 Apr	Budapest (HU)	Meeting with UN/ECE – TER	TER	TINA VIENNA	Yes	No
5 Ap.	Beograd (YU)	Meeting of SECI	SECI	TINA VIENNA	Yes	No
9/10 Apr	Magdeburg (D)	Gemeinschaftsinitiative INTERREG IIIB	Ministerium für Raumordnung Sachsen Anhalt	BIBA-PLT	Yes	Yes
12 Apr	Lisboa (P)	Meeting of UCUE	UCUE	TINA VIENNA	Yes	No
19 Apr	Firenze (I)	1st AER Workshop on Regions and Sustainable Transports	AER	TINA VIENNA	Yes	No
15 May	Dresden (D)	CERMAT Congress	European Council	TINA VIENNA	Yes	no
16 – 19 May	Mohacs (HU)	Conference of ARGE Donauländer	ARGE D	TINA VIENNA	Yes	No
22 May	Dresden (D)	Acceptability of Transport Pricing Strategies Conference		TINA VIENNA	Yes	No
04 - 06 June	Valencia (E)	Surface Transport Technologies for Sustainable Development	DG TREN	TINA VIENNA	Yes	Yes
19 June	Magdeburg (D)	BalCadNet	Landesplanung Berlin/Brandenburg	BIBA-PLT	Yes	Yes

26 - 28 June	Constanza (RO)	THE DANUBE SUMMIT (incl. EIA workshop)		TINA VIENNA	Yes	No
17 – 19 July	Munich (D)	Workshop on promotion of the freight village concept and development of activity of CT-operators	UN/ECE	TINA VIENNA	Yes	Yes
28-31 Aug	Dortmund (D)	European Regional Science Conference	ERSA	ESI-VUA	Yes	No
24 - 27 Sep	Berlin (D)	INNOTRANS – International Trade Fair for Transport Technology Innovative Components – Vehicles - Systems		TINA VIENNA	Yes	No
24 Sep	Berlin (D)	EEARS (East European - and Asia Rail Summit)	MoT Germany	GROWTH	Yes	no
7 Oct	Vienna (A)	Seminar “Infrastructure in Albania, Bosnia Herzegovina, Bulgaria, Croatia, FYR of Macedonia, Romania and FR Yugoslavia”	WKÖ	TINA VIENNA	Yes	No
17-18 Oct	Balatonvilagos (H)	XVII. International Conference for Transport Organisation	Hungarian Association for Transport Sciences	KTI	Yes	No
23 - 25 Oct	Madrid (E)	Eurailspeed 2002 - 4th World Congress on High Speed Rail		TINA VIENNA	Yes	No
30 Oct	The Hague (NL)	KP6: Internationale Samenwerking met pré-accessielanden Verkeer & Vervoer	EG Liaison	RAND Europe	Yes	No
7/8 Nov	Berlin (D)	1st European Transport Congress		TINA VIENNA	Yes	No
11 - 13 Nov	Barcelona (E)	Conference on Energy and Transport	DG TREN	TINA VIENNA, NEA	Yes	Yes
11 – 12 Nov	Luxembourg (L)	Working group on Intermodal Transport Statistics	EUROSTAT	NEA	Yes	Yes
12 Dec	Rotterdam (NL)	EUTP Clustering Meeting	EUTP	KTI	Yes	No
2003						
3 Feb	Bremen (D)	Research Colloquium at the University of Bremen	University of Bremen	BIBA-PLT	Yes	No
12 Feb	Berlin (D)	Improvement of railtrack linked transports	VDV	BIBA-PLT	Yes	Yes
14 March	Berlin (D)	European Perspectives in Intermodal Transport Telematics with specific attention to CEEC	EPIC	BIBA-PLT	Yes	Yes
10-11 Apr	Vilnius (LIT)	4th International Conference TRANSBALTICA 03	Vilnius Gediminas Technical University	TINA VIENNA	Yes	Yes
15 Apr	Budapest (H)	The development of transport & logistics according to the EU enlargement (conference)	Hungarian Association. for Economy	KTI	Yes	No

23-25 Apr	Uzgorod(UK)-Zahony-Nyiregyhaza(H)	Innovation in the East-West Trade and Transport Logistics (conference)	KIUT Regional Development Association	KTI	Yes	No
21 – 23 May	Munich (GER)	International Trade fair Transport logistics	Germany, Donau Transport Achse	TINA VIENNA	Yes	Yes
4 – 6 June	Budapest	Workshop: „From East to West and from West to East“	DVWG Junges Forum	BIBA-PLT	Yes	Yes
24 June	Groningen (NL)	Northern Maritime Corridor Annual Conference	NMC INTERREG	NEA	Yes	No
30 June – 1 July	Budapest (H)	SECI Expert Group on Combined Transport, First Session	UNEC	KTI	Yes	No
3 July	Budapest (H)	2nd European Meeting of the “Young Forum” of the German Scientific Association of Transport	Hungarian Association Transport Sciences	KTI	Yes	No
2 – 3 Sept	Karlskrona (S)	Baltic Gateway kick-off Conference	INTERREG IIIB	TINA VIENNA	Yes	Yes
18 – 19 Sept	Szczecin (PL)	Translog European Transport Conference	PMI	TINA VIENNA	Yes	Yes
10 – 12 Dec	Balatonvilagos (H)	XVIII. International Conference for Transport Organisation	Hungarian Association Transport Sciences	KTI	Yes	No

Besides these conferences, the INTERMODA project was also presented to transport providers and users, relevant organisations and institutions in the course of interviews with forwarders and terminal and link operators conducted for WP1 and 2. The enormous importance of these activities was reflected in presentations given by local CEEC partners during Workshop I on 3 October 2002 in Budapest highlighting the following aspects:

- Top level national transport organisations are already familiar with the project and its objectives..
- There is understanding for the necessity to implement a common functional infrastructure and a common working methodology value towards integration in the EU.
- The operators agree on the harmonization efforts within the intermodal transportation framework.

The presentations covered the following issues:

- Good dissemination of information and results of the project will support the relevant markets in the CEEC.
- The need to maintain close relations with the actors in the market is essential in order to establish a trusting partnership and collaboration on the project.
- The project is to change the existing insulated mentality of local players.
- In a competitive environment, the local transportation market has to understand the European intra/inter-regional transport development policies in order to adjust its strategies in time towards an integrated European market.

Dissemination of project results was also made through interviews and articles published in newspapers, particular in East European Countries. Some examples from Lithuania, Hungary and Austria are presented in Annex B.

7.4 WORKSHOPS

During the project period several workshops were planned. The main purpose of these workshops is to gain knowledge from the expert panel to enhance the progress of the project. On the other hand, the experts can also benefit from the results of INTERMODA for their own work.

Four workshops were planned in the duration of the project.

The first Workshop (Electronic Workshop) with the expert panel was organised in electronic form. The objective and programme for this workshop was to review and assess the initial results of INTERMODA. However, the results of this workshop can be regarded as unsatisfactory. The possible reasons are explained in chapter 5. 1.

The Electronic Workshop, designated as Milestone 2 (M2), was scheduled for the last three weeks of May 2002.

The second Workshop (Workshop I) took place in Budapest on 3 October 2002. The main items discussed were:

- the current status of intermodal transport between the EU and the CEEC
- assessment of the initial results by the representatives of the expert panel
- agreement on the methodology and the priorities of bottlenecks for the intermodal network
- a definition of the subsequent approach.

Furthermore, it was the first opportunity for the European Commission, the consortium and the subcontractors to become familiar with the members of the expert panel.

The third Workshop (Workshop II) took place in Brussels on 28 January 2003. The main items due to be discussed are:

- Identification and prioritisation of current bottlenecks
- Policies for solving intermodal bottlenecks
- Selection of intermodal scenarios for further elaboration

The fourth Workshop took place in Rotterdam on 2 June 2003. The main objective of this meeting was the current situation on short sea shipping and its future role in the intermodal transport chain.

7.5 FINAL CONFERENCE

The final conference was held on 10 July 2003 in Vienna.

The main aim was to disseminate and promote the effective use of the results of INTERMODA. This conference brought together key decisions makers from the public sector and representatives from European institutions and international organisations, national, regional and local authorities as well as research, transport and infrastructure organisations.

The Consortium presented the results of the INTERMODA project, the present situation in transport intermodality between the EU and the CEEC, the current bottlenecks the potential for intermodal transport and proposals for policies and measures to improve the intermodal transport chains.

The morning session covered the issues of the current situation and constraints in intermodal transport in Europe with a podium discussion of experts from different institutions. The podium was chaired by the PCO of the UN/ECE-TER office in Budapest. Experts from Lithuania, Serbia and Montenegro, Germany, and Austria provided an overview of the current situation of intermodal transport on rail, road, inland waterways and ports in the CEEC.

The afternoon session dealt with the promotion of intermodal transport policies and measures with a podium discussion of experts from international organisations and transport companies. The podium was chaired by the European Intermodal Association (EIA). Experts from the UIRR, EIA, EC DG TREN, KTI from Hungary, Berlin, ICF and Shell Chemicals commented the possibilities to promote means and measures to increase the share of intermodal transport on the overall transport volume.

The Final Conference was designated as Milestone 9 (M9) and Deliverable 14 (D14). The results of the conference are published as a Conference Reader on a CD ROM. (D15)

8 RESULTS AND CONCLUSIONS

8.1 CURRENT SITUATION OF INTERMODAL TRANSPORT

Intermodal transport is one of the key topics in current European transport policy. One of the principal measures identified by the European Commission is to turn intermodality into reality and make it really competitive with road transport. This goes together with the aim to revitalise the railways and promote the use of short-sea shipping ("sea motorways") and inland waterway transport. This should contribute to an optimal integration of different modes so as to enable a more efficient and sustainable use of the transport system.

Research has been one of the most important actions to achieve an improvement of intermodal transport. In order to provide high-quality solutions for the development of transport systems and particularly integrated transport systems, the EU has launched numerous policy initiatives. Infrastructure, management, information and communication technology and intermodal transport equipment are among the most studied aspects indicating their importance for the determination of the performance intermodal transport. Research results suggest that the quality of infrastructure (such as railways and terminals) is not satisfactory. Freight operators are dissatisfied with the presence of numerous administrative and institutional barriers at terminals, the quality of operations and sub-optimal transhipment processes. Accessibility of the infrastructure and the speed of handling should be improved. The interoperability and interconnectivity of the transport system can be improved by means of further liberalisation and deregulation. Organisational structures need to be harmonised. One of the ways to realise this is the standardisation and modernisation of transport equipment. Important to the performance of intermodal transport is also the role of new technologies. Many studies have been carried out towards the application of new technology in intermodal transport. It can improve all elements of the intermodal transport chain. One of the areas is the improvement of intermodal transport services important to customers (electronic booking, tracking and tracing etc.). Intermodal equipment consists of specific vehicles, loading units and rolling stock. It seems that their contribution to intermodal transport is in the field of a further standardisation.

The results reveal what determines the quality of intermodal transport and on which aspects the current performance of intermodal transport is not satisfactory. Important indicators defining intermodal quality are among others the time needed for goods to be transported, reliability of the system, flexibility, safety and control (frequency of information). The weakest performances of intermodal transport are in the areas of reliability (both length and frequency of delays) and of transport time. Improvement may come from uniform regulation (e.g. custom formalities), less complex documentary and administrative procedures, and standardisation of intermodal equipment. In addition, accessibility to the sector for transport companies and clear communication to customers is important.

So the situation of intermodal transport can be summarised briefly as follows

- The intermodal flows within the EU and in relation with the CEEC are low and concentrated on a limited number of relations;
- The intermodal flows between Western Europe and the CEEC fluctuate too much, the reason for this is that the intermodal transport market in particular in the CEEC is not mature yet.
- Intermodal statistics are not accurate and not complete (in general, but especially not for the CEEC);
- For RoLa (Rollende Landstrasse) flows it is expected that the volumes will decrease in the future when border crossing problems are solved due to the EU enlargement,
- To many bottlenecks hamper the development of intermodal transport

- Intermodal transport is often not taken into consideration when choosing the transport modes (mental problem)

8.2 CURRENT TRANSPORT FLOWS

The current transport flows between the EU and the CEEC (year 2000) amount to a total of around 716 million tonnes per year. The largest share, around 30%, originates in Russia. This is followed by 13% originating in Poland and 10% in the Czech Republic. In total around 250 million tonnes originates in one of the CEEC and has either another CEEC or any other country as destination. These flows represent 45% of all international flows in the O/D matrix. Around 357 million tonnes, 49% of all flows, find their destination in one of the CEEC having their origin in either another CEEC or another country. For a complete analysis of transport in Europe involving the CEEC the transport with Russia should definitely be taken into account. However, within INTERMODA only routes from the EU to CEEC and back are taken into account. Links with Russia are therefore not investigated further.

Figure.8-8-1 and Figure.8-8-2 provide an overview of the transport between Western Europe and Eastern Europe by region for all modes and all commodities. Figure.8-8-1shows the transport flows from Eastern Europe to Western Europe. The transport flows with the highest volumes mainly originate in Poland, the Czech Republic, Latvia, Hungary and Yugoslavia. The destinations with the highest volumes are located in the Eastern part of Germany, Austria, Denmark, Sweden, the northern part of Italy and Greece. These figures also give a clear overview of the regional detail in Western and Eastern Europe. Figure.8-8-2 shows the transport flows in the other direction -- from Western Europe to Eastern Europe. In general, the same pattern is visible as in Figure.8-8-1, but the volumes of the transport flows are smaller. Origins are especially located in Austria, Germany Northern Italy and Greece. Destinations are mainly located in Poland and the Czech Republic. The above two figures show the transport flows for all modes and all commodities together.

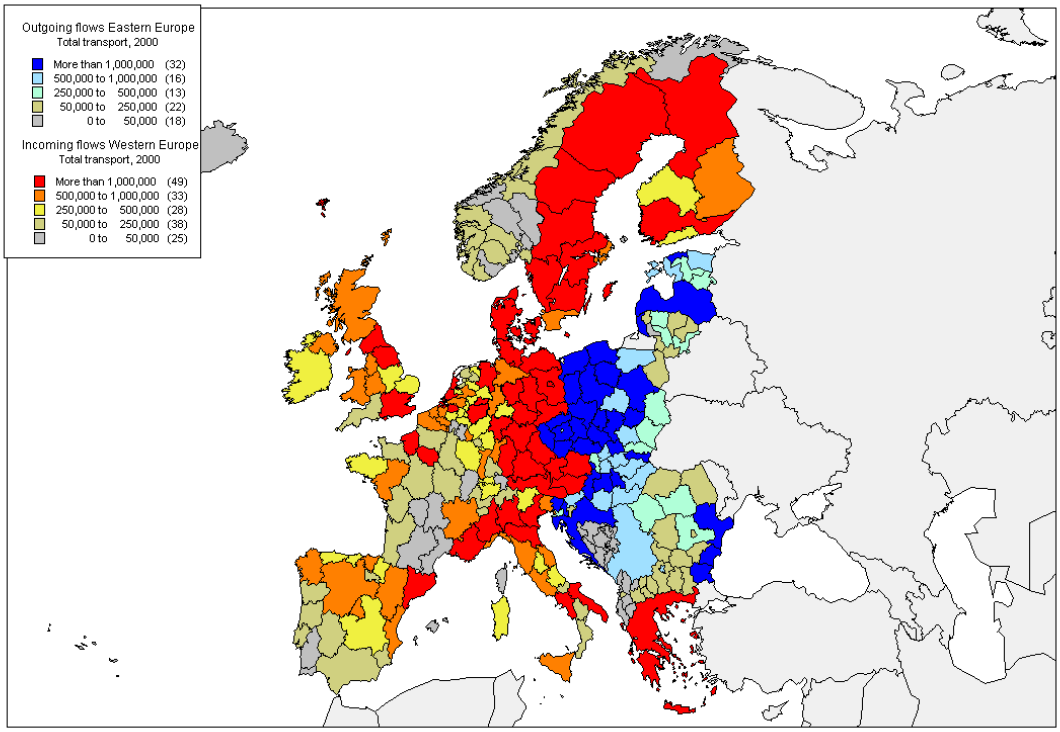

Figure.8-8-1 Transport by all modes from Eastern Europe to Western Europe, all commodities, tonnes (2000)

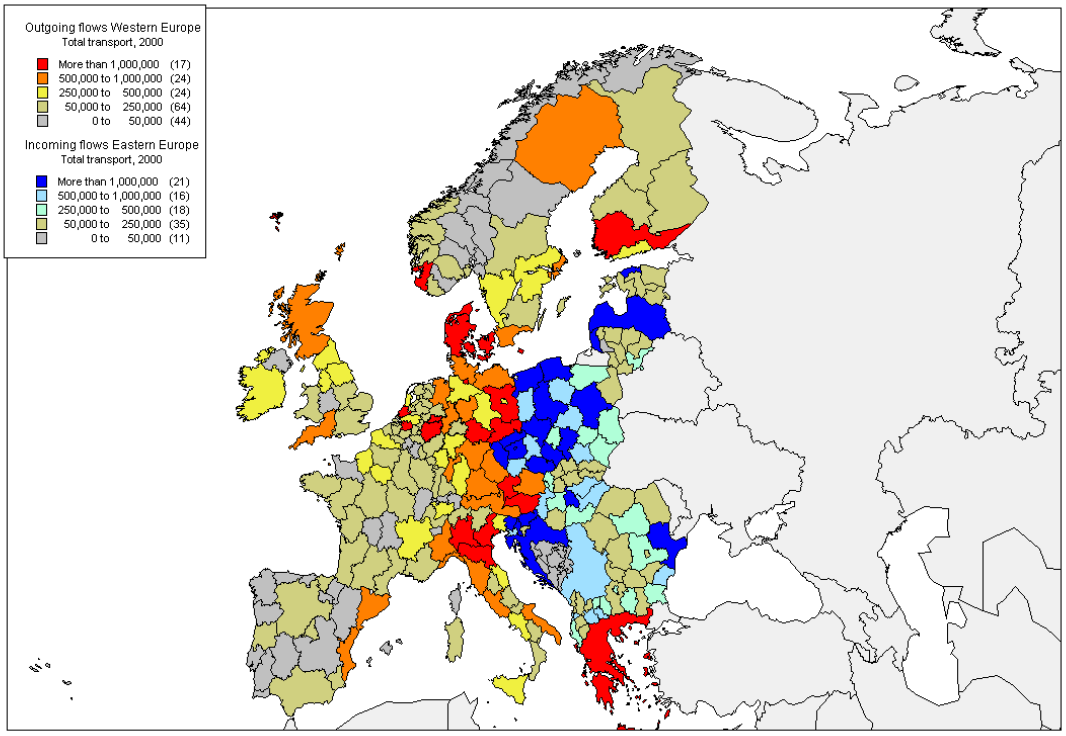

Figure.8-8-2 Transport by all modes from Western Europe to Eastern Europe, all commodities, tonnes (2000)

8.3 THE ADVANTAGES AND DISADVANTAGES OF INTERMODAL TRANSPORT

Interviews with forwarders on the advantages and disadvantages of intermodal transport show that 11 aspects influence the intermodal performance:

- Costs
- Travel time
- Flexibility
- Scale/volume
- Safety
- Security
- Legislation
- Reliability
- Use of infrastructure
- Service of terminal
- Tracing of freight

The survey results were used to determine the influence of the each of the identified aspects on the choice between unimodal and intermodal transport. Two preliminary rankings together with a prioritisation given by the users can be constructed. The first contains those aspects for which intermodal transport is already strong. For these aspects, suboptimal performance is likely to have a substantial impact on the development of intermodal transport.

1) Costs (very high priority)
2) Scale and volume (high priority)
3) Safety (high priority)
4) Security (high priority)

Costs are the most important factor in the decision making of forwarders, because they determine the competitive strength of the firm. Scale and volume is especially important, because intermodal transport becomes exponentially more competitive with large consignments of freight. For example, a large volume of transport makes possible the use of block trains at lower costs and shorter transit times. As such, scale and volume is closely related to the use of own infrastructure and the service of terminals. Although they do not favour either intermodal or road transport, these indicators capture capacity problems as well as the degree to which a company has control of the entire process of transport or —conversely— has to depend on others to perform vital services.

The second ranking relates to the disadvantages of intermodal transport. Improvements in these aspects are a vital precondition if intermodal transport is to increase its market share.

1) Travel time (very high priority)
2) Flexibility (high priority)
3) Legal requirements (low priority)

Intermodal transport generally takes longer, it is not universally available and has a clear disadvantage in the provision of door-to-door transport.

The remaining aspects show a rather balanced influence in the choice for intermodal transport.

8.4 BOTTLENECKS IN INTERMODAL TRANSPORT

Intermodal transport is viewed by the European Commission as one important way of helping to achieve the objectives of the Common Transport Policy, however the share of intermodal transport to the overall continental freight transport is still low. and there are many bottlenecks that stand in the way of achieving this objective. In this part of the INTERMODA project, major bottlenecks have been identified and prioritised.

The project defined an intermodal bottleneck as *an actual or perceived negative characteristic of an intermodal door-to-door transport chain that makes intermodal transport less attractive than unimodal transport*. Although some bottlenecks affect all types of transport (unimodal, multi-modal, intermodal, combined transport), the project team focused on those that have an impact on the choice for intermodality. Three types of bottlenecks emerged from the investigation: specific, common, and generic bottlenecks:

- **Specific bottlenecks** are bottlenecks that occur only at one location and can be solved through national policy. We used them as examples, but did not include them in the prioritisation.
- **Common bottlenecks** occur at multiple locations but are specific to their location. No general action can be undertaken to eliminate common bottlenecks at all locations.
- A **generic bottleneck** is a bottleneck that is inherent to the system. It occurs at multiple locations but is identical in nature at all locations.

The project team convened a workshop with experts on intermodal transport to discuss the common and generic bottlenecks identified, to add ones that they thought were missing, and to assign priorities. This exercise plus subsequent analysis led to a final list of 23 common bottlenecks and 12 generic bottlenecks (in total, 35 bottlenecks), which were divided into four groups:

- Terminals
- Capacity of links
- Interoperability
- Market conditions

Each group contains bottlenecks of a comparable or homogeneous type that can be addressed using similar policies. In fact, it is possible that a single policy will have effects on some or all of the bottlenecks in a group.

At the workshop, each of the 35 bottlenecks was assigned an importance classification (high, medium, and low) by the experts. These ratings were then combined, to produce an overall rating (high, medium, or low) for each of the bottlenecks.

This process resulted in the categorisation and prioritisation shown in the following table . It must be noted that within their level of rating (high, medium, low) the bottlenecks are not ranked; they are bundled into the four above-mentioned groups.

Priority	Group	Bottleneck
HIGH	**Terminal** – access	**G1** Limited opening times of terminals
	Terminal – capacity	**C8** Shortage of (intermodal) terminals
		C9 Insufficient terminal capacity
		(C23) Lack of appropriate combined-transport (internal) equipment
	Terminal – operations	**C7** Long marshalling time due to short tracks and a limited number of tracks
	Capacity of links – general	**(C17)** Inadequate width and height of tunnels
	Capacity of links – rail	**C11** Insufficient railroad capacity
	Capacity of links – inland waterways	**(C18)** Shallow sections on waterways
	Interoperability – border crossing	**G2** Different and inconsistent border crossing procedures
		(G10) Countries have different weight limits
		(G12) Lack of interoperability across national networks
	Interoperability – technical interoperability	**G7** Interoperability in general
	Market conditions – inadequate market information	**(G8)** Lack of sufficient demand for intermodal services
	Market conditions – unfavourable cost structure	**G6** Unequal market conditions for road and intermodal transport
		(G9) Lack of return freight, and cabotage
	Market conditions – legislation	**(C16)** An inadequate legislative framework
MEDIUM	**Terminal** – access	**C5** Poor road access to terminals
	Terminal – operations	**C6** Longer handling time due to poor equipment
	Capacity of links – rail	**C10** Inefficient layout of the railroad network
	Interoperability – border crossing	**G4** Different gauge width of railway systems in different countries
		G5 Different voltages in different countries
	Interoperability – technical interoperability	**(G11)** Operational differences (signalling)
	Market conditions – inadequate market information	**(C20)** Tariff setting takes too long
	Market conditions – legislation	**(C22)** Not all terminals can handle dangerous goods
LOW	**Terminal** – access	**C2** Large distance between the terminal and the main infrastructure network
	Terminal – operations	**C4** No electrified tracks at terminals
		G3 Remote location of customs offices
	Capacity of links – general	**(C21)** Lack of qualified personnel (especially locomotive drivers)
	Capacity of links – inland	**C12** Narrow sections on waterways

	waterways	**C13** Limited capacity of locks at hydropower stations en-route
		C14 Low bridges on waterways
		(C19) Spatial planning does not include the industrial parts of the inland waterways
	Interoperability – border crossing	**(C21)** Lack of qualified personnel (differences in qualifications and requirements)
	Market conditions – inadequate market information	**C15** Too complex and cumbersome data exchange

(in parenthesis are those bottlenecks that were ranked by only one expert)

8.5 FUTURE TRANSPORT DEMAND

Before forecasts were produced, the current intermodal transport market and available intermodal statistics have been analysed in order to see whether a forecast for intermodal transport within and in relation with the CEEC can be based on the current situation. Based on this analysis it was decided not to use the available intermodal base year information in the forecasting process. The reasons for this decision are:

- The intermodal flows within and in relation with the CEEC are low and concentrated on a limited number of relations;
- Intermodal statistics are not accurate and not complete (in general, but especially not for the CEEC);
- For RoLa flows it is expected that the volumes will decrease in the future when border crossing problems are solved due to the EU enlargement, therefore these flows are no good starting point to base the forecasts on;
- The intermodal flows between Western Europe and the CEEC fluctuate too much for using them as a starting point for a forecast, the reason for this is that the intermodal transport market in the CEEC is not mature yet.

Since the information about the current intermodal transport flows within and in relation with the CEEC are no good base for making a forecast of the future intermodal transport flows, an approach is applied that determines the potential future intermodal transport flows based on characteristics of the total future transport demand. Therefore, first a forecast of the total transport demand has been made followed by a forecast of the intermodal transport demand. A number of criteria like transport distance, transport volume, commodity types and intermodal market shares are applied on the total future transport flows in order to determine the potential future intermodal transport demand. The transport flows being indicated as potential intermodal transport fulfil a number of requirements. The actual intermodal transport in 2015 depends on actors in the market, local governments, EU policy and the interaction between them. The overview of the future potential intermodal transport demand is a good indication of where developments of intermodal transport can be expected in the future.

Aggregate figures for the potential intermodal transport are given in Table 8-1.

Transport type	Reference scenario	Alternative scenario
Continental intermodal transport	30	42
Maritime intermodal transport	36	45
Total transport	66	87

Table 8-1: Overview of potential intermodal transport, reference and alternative scenario, transport volumes in millions of tonnes

The reference scenario results show where intermodal transport flows can be expected in the future. Since there are many future situations possible, the alternative scenario results show where the intermodal transport flows can be expected in a more 'optimistic' intermodal

scenario in order to obtain a broader view of the range of possible outcomes. The results have been presented visually by figures and more detailed by tables. From the presentation of the results a number of conclusions can be drawn.

From the continental intermodal transport related to the CEEC 43% is transported within the CEEC and 57% is transported between the CEEC and Western Europe (in the reference scenario). It appears that the largest part of continental intermodal transport within the CEEC concerns domestic transport, both in the reference and the alternative scenario about 80% of these flows is domestic transport. Large intermodal domestic transport volumes occur in Poland, Romania and Bulgaria. The continental intermodal transport within the CEEC on international relations is relatively low; besides a limited number of relations with intermodal volumes occur. Although international transport within the CEEC almost doubles up to the forecast year 2015, it stays relative low (compared with the situation in Western Europe). Therefore, the international transport flows within the CEEC do not fulfil the requirements applied for determining potential intermodal transport (not even in the alternative scenario which is an 'optimistic' scenario regarding intermodal transport). For the continental intermodal transport between the CEEC and Western Europe a number of relations have high volumes: Poland – Germany, Czech Republic – Germany, Poland – Italy, Poland – Spain, Slovak Republic – Germany and Hungary – Germany.

High hinterland flows through the Baltic States are going to and coming from Russia and to a less extend also Belarus. Besides there are high hinterland flows in Poland between the port regions and other regions in Poland and between Romania and Hungary. Hinterland flows between the CEEC and Western Europe are rather limited, except for hinterland flows between Hamburg in Germany and Poland and Czech Republic.

The short sea flows within the CEEC are rather limited, between Poland and Russia, between Romania and Russia and between Latvia and Estonia substantial potential intermodal transport occurs. The short sea flows between the CEEC and Western Europe are much higher. Especially related to Latvia, Lithuania, Estonia and Poland on the CEEC side and Germany, Sweden, UK, Finland, Italy and the Netherlands on the Western European side. It is noticed that the short sea flows are concentrated on the northern part of the CEEC (the Baltic States and Poland), the short sea flows in the southern part of the CEEC are less high.

The potential continental intermodal transport flows consist of combined road-rail transport flows. The main part of the journey of these flows is carried out by rail and the pre and end haulage is carried out by road.

From the total amount of 30 million tonnes[4], 13 million tonnes is transported within the CEEC and 17 million tonnes is transported between the CEEC and Western Europe. About 80% of the continental intermodal transport flows transported within the CEEC concerns domestic transport. The international transport flows within the CEEC fulfil the requirements for intermodal transport to a less extent than the domestic transport flows. The highest continental intermodal transport volumes within the CEEC are for domestic transport in Poland, domestic transport in Romania and domestic transport in Bulgaria. For the continental intermodal transport flows between the CEEC and Western Europe Poland and Czech Republic have high volumes on the CEEC side, Germany, Italy, Greece, Spain and Austria have high volumes on the Western European side.

Figure 8.3 give a detailed overview of the continental intermodal transport in the reference scenario 2015[5].

Figure 8-3 gives an overview of the total continental potential intermodal transport flows arriving in and departing from each of the distinguished regions. The regions with the highest

[4] Because the INTERMODA project focuses on intermodal transport within the CEEC and between the CEEC and Western Europe, the flows between the CEEC and Russia, Ukraine and Belarus have left out of the analysis.
[5] Maps showing the distinguished regions in the CEEC together with the region names are included in appendix G.

potential intermodal transport flows are highlighted in this figure. This figure shows the high domestic volumes in Poland, Romania and Bulgaria. Also high volumes between Poland and Germany (area Ruhrgebiet, Hamburg and area Berlin) and between Austria and Czech Republic are shown. Flows with lower volumes, but with many different relations are visible in the northern part of Italy, the western part of Spain, Greece, Belgium (Antwerp region) and the Netherlands (Zuid-Holland region).

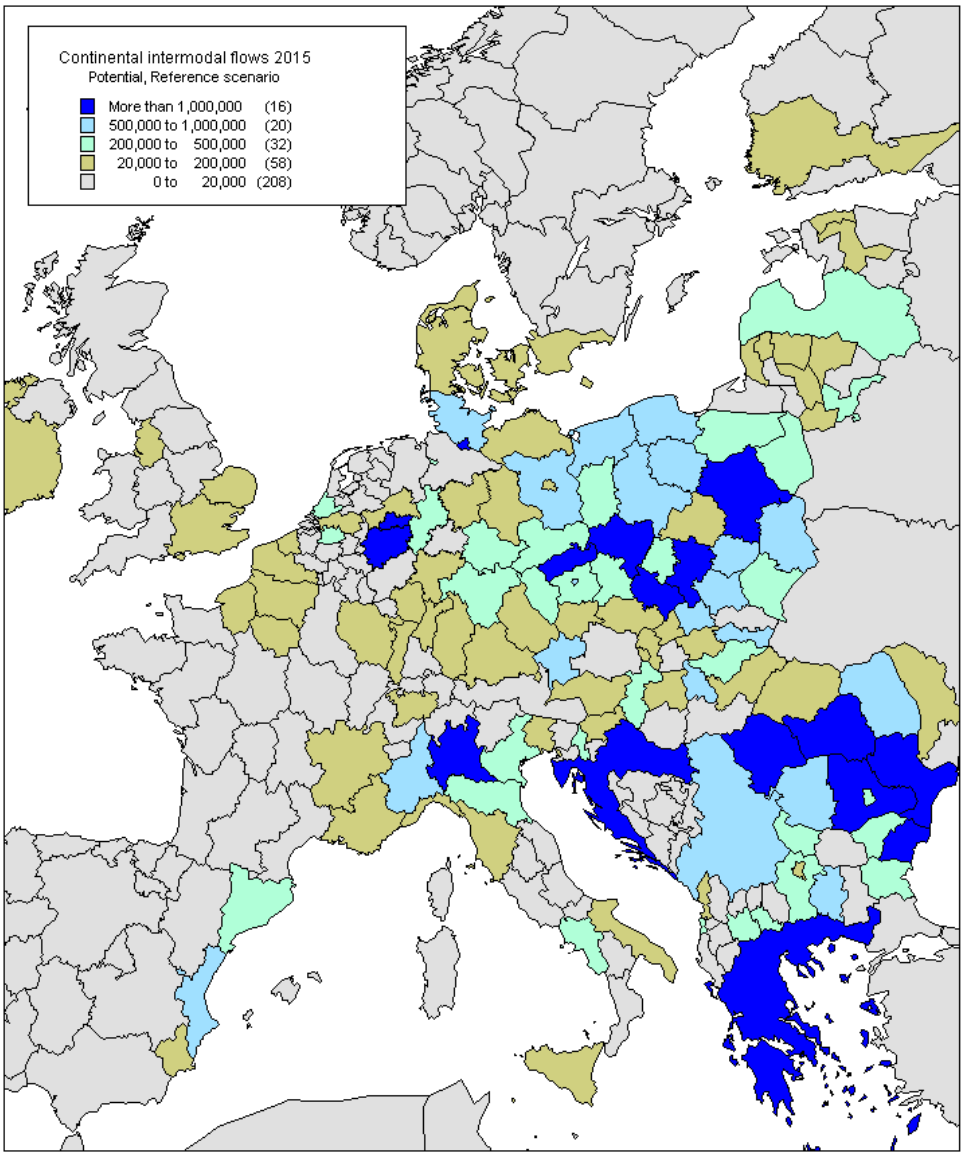

Figure 8-3: Overview of continental intermodal transport in 2015, reference scenario, total arriving and departing transport volumes by region (annual weight in tonnes)

The potential short sea transport flows being part of a maritime transport chain have a volume of 19 million tonnes of which 3 million tonnes is transported within the CEEC and 16 million tonnes is transported between the CEEC and Western Europe. For the short sea flows between the CEEC and Western Europe Latvia, Lithuania, Estonia and Poland have high volumes on the CEEC side, Germany, Sweden, UK and Finland have high volumes on the Western European side.

Figure 8-4 give a detailed overview of the short sea transport flows in the reference scenario 2015. This concentration of short sea flows in the northern part of Europe is visible in figure 8.4 showing the total intermodal transport arriving and departing in each region.

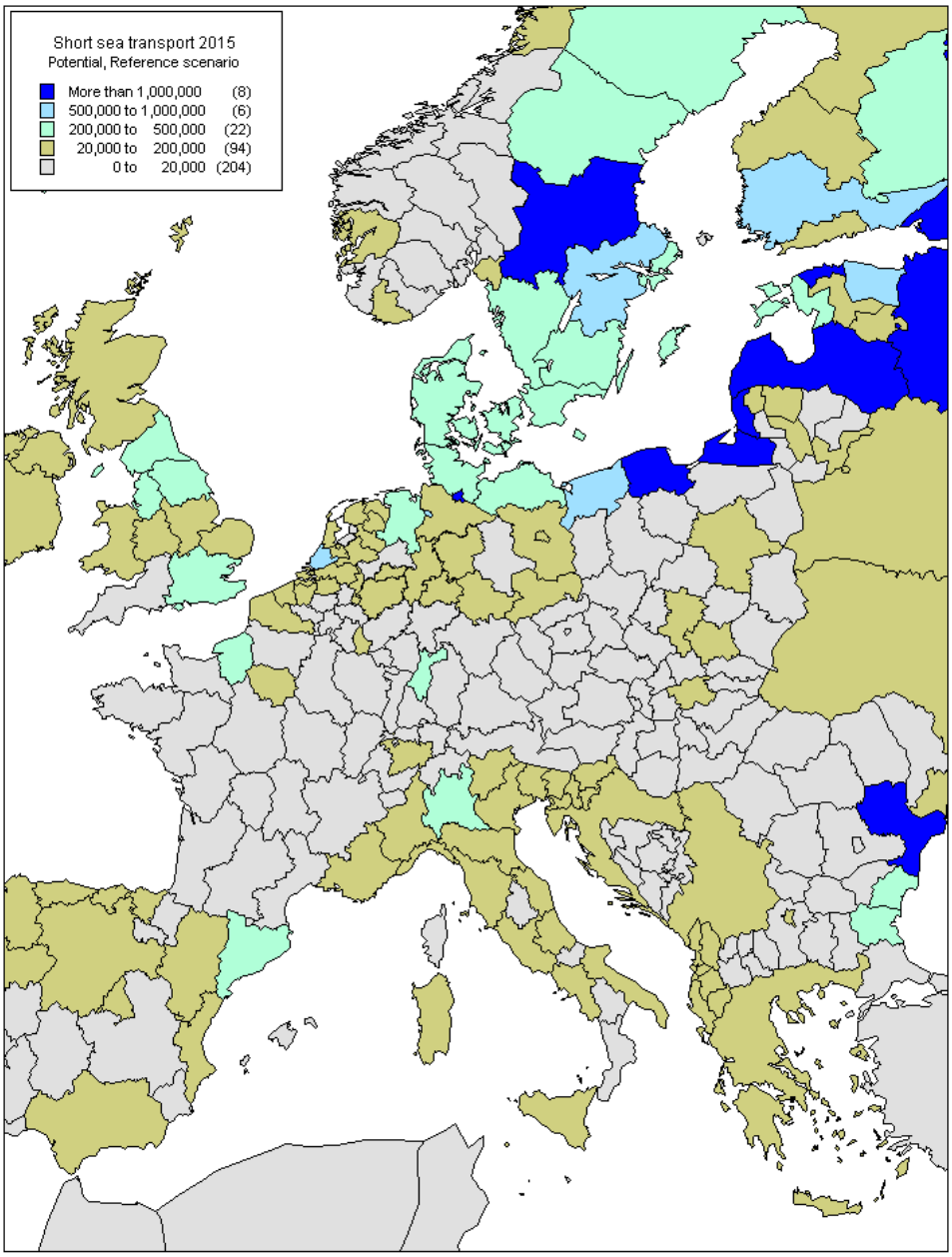

Figure 8-4: Overview of short sea transport in 2015, reference scenario, total arriving and departing transport volumes by region (annual weight in tonnes)

Alternative scenario: The potential continental intermodal transport flows consist of combined road-rail transport flows. The main part of the journey of these flows is carried out by rail and the pre and end haulage is carried out by road.

From the total amount of 42 million tonnes[6], 18 million tonnes (reference scenario 13 million tonnes) is transported within the CEEC and 24 million tonnes (reference scenario 17 million tonnes) is transported between the CEEC and Western Europe. About 80% of the continental intermodal transport flows transported within the CEEC concerns domestic transport, this share is the same as in the reference scenario. For the reference scenario the conclusion was already drawn that the international transport flows within the CEEC fulfil the requirements for intermodal transport to a less extent than the domestic transport flows.

[6] Because the INTERMODA project focuses on intermodal transport within the CEEC and between the CEEC and Western Europe, the flows between the CEEC and Russia, Ukraine and Belarus have left out of the analysis.

Even in a more 'optimistic' scenario for intermodal transport the potential intermodal transport within the CEEC related to international transport flows is limited. A reason for this is that international transport within the CEEC is relative low compared with domestic transport within the CEEC, although international transport within the CEEC almost doubles up to the forecast year 2015, it stays relative low (compared with the situation in Western Europe).

Figure 8-5 give a detailed overview of the continental intermodal transport in the alternative scenario 2015[7]. For continental intermodal transport the highest differences between the reference and the alternative scenario for continental intermodal transport volumes within the CEEC occur for domestic transport in Poland and domestic transport in Romania. For the continental intermodal transport flows between the CEEC and Western Europe the highest differences occur for Poland, Czech Republic and Hungary on the CEEC side and for Germany, Austria and Italy on the Western European side.

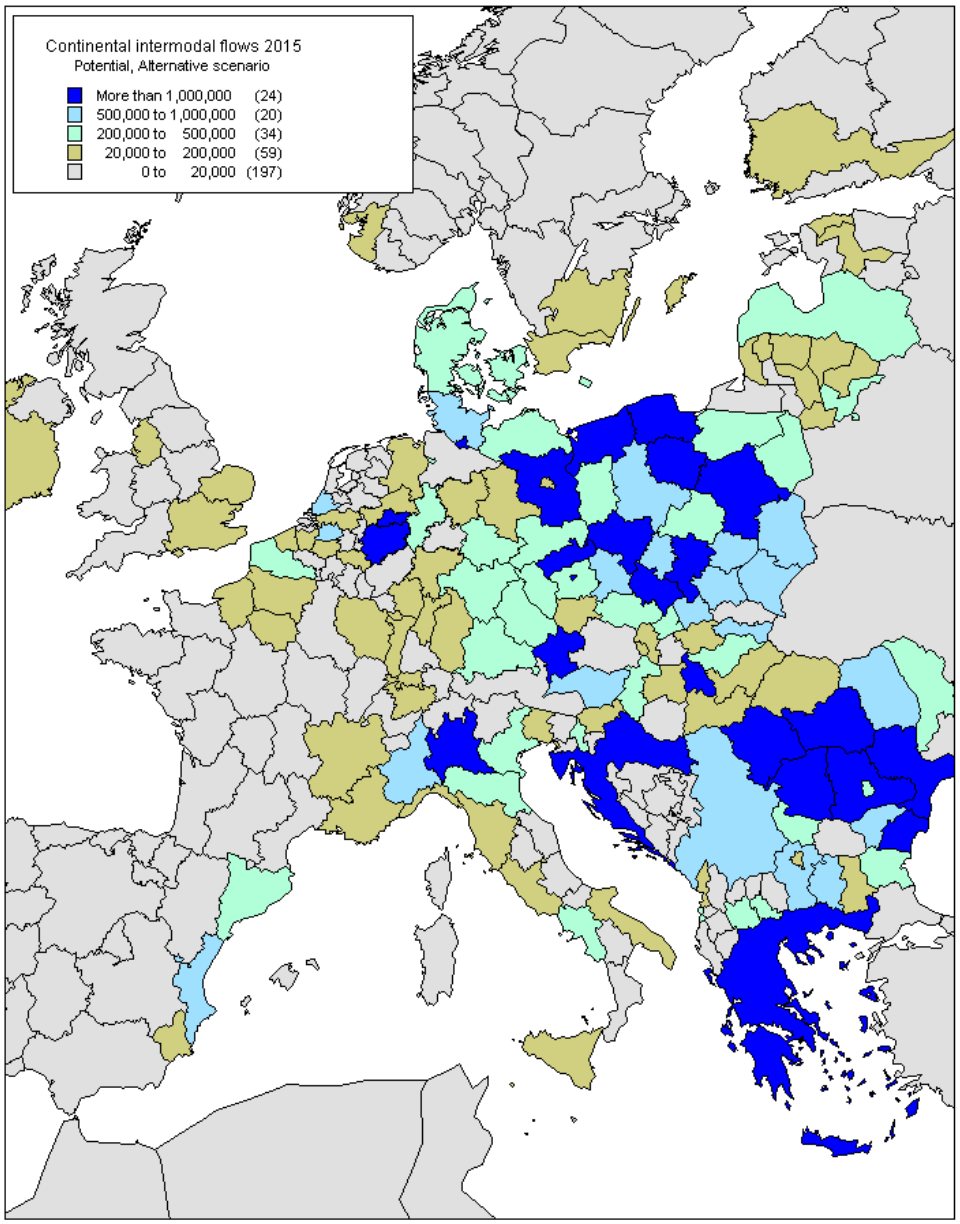

Figure 8-5: Overview of continental intermodal transport in 2015, alternative scenario, total arriving and departing transport volumes by region (annual weight in tonnes)

[7] Maps showing the distinguished regions in the CEEC together with the region names are included in appendix G.

The potential short sea transport being part of a maritime chain have a volume of 25 million tonnes (reference scenario 19 million tonnes) of which 4 million tonnes (reference scenario 3 million tonnes) is transported within the CEEC and 21 million tonnes (reference scenario 16 million tonnes) is transported between the CEEC and Western Europe.

Figure 8-6 give a detailed overview of the short sea transport flows in the alternative scenario 2015.

For transport within the CEEC Latvia, Romania and Russia show the highest differences between the reference and the alternative scenario. For transport between the CEEC and Western Europe especially Latvia, Estonia and Lithuania and to a less extent also Poland, Romania and Bulgaria show high differences on the CEEC side, on the Western European side especially Sweden and to a less extent also Italy, UK and the Netherlands have high differences.

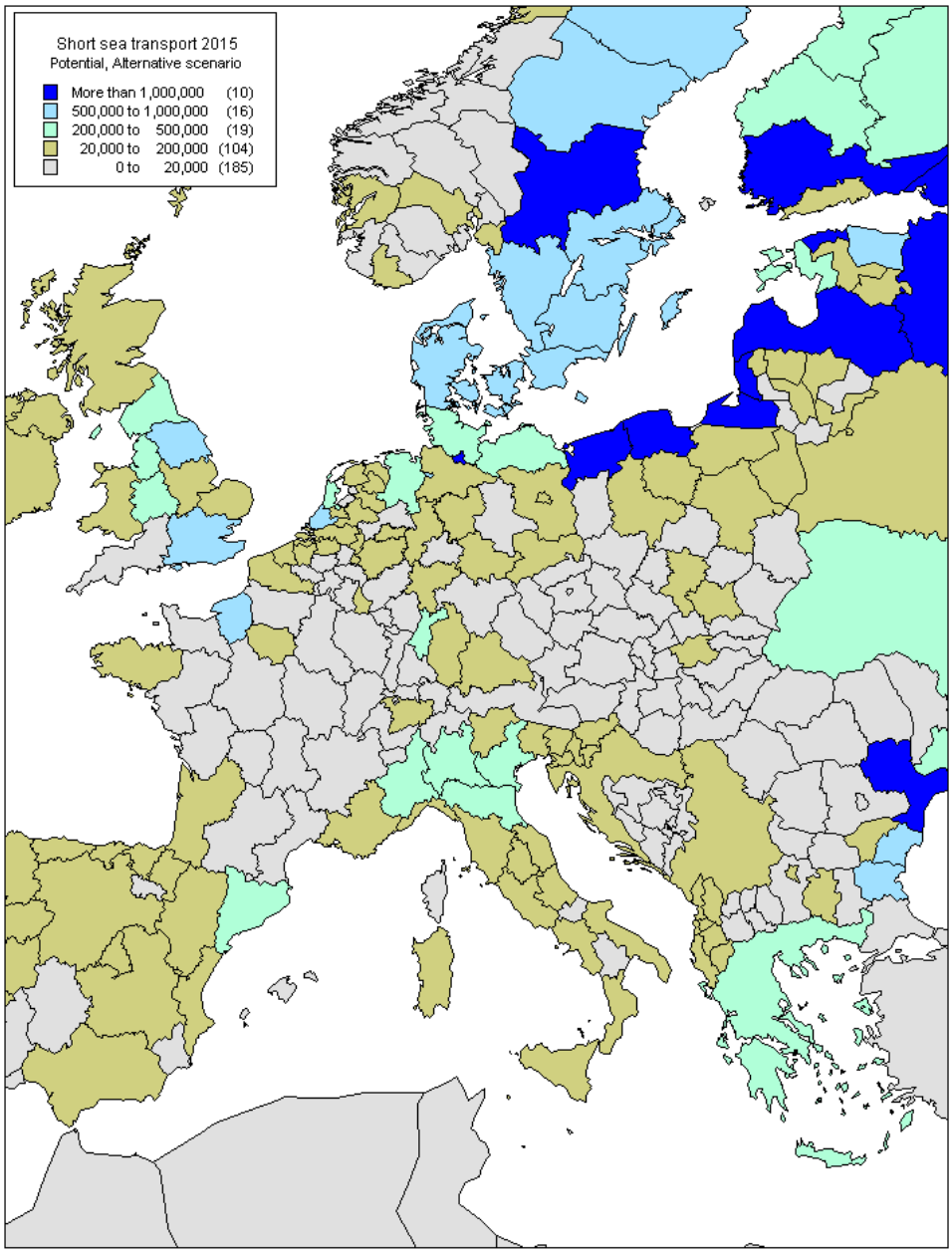

Figure 8-6: Overview of short sea transport in 2015, alternative scenario, total arriving and departing transport volumes by region (annual weight in tonnes)

8.6 NETWORK ASSIGNMENT

In order to analyse transport demand, a network assignment model covering the EU member countries, the accession countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia), the candidate countries for accession (Bulgaria, Romania and Turkey) and the third countries (Albania, Bosnia and Herzegovina, Croatia, Former Yugoslav Republic of Macedonia, Federal Republic of Yugoslavia) has been developed.

Three different situations are assigned with the assignment model:

- The Base Year
  This situation represents the situation for year 2000 and is used as reference values when analyzing results for the future scenarios.
- The Reference scenario
  This scenario describes a future situation (time horizon 2015) where all current and already foreseen growth patterns and exogenous developments have taken place.
- The Alternative Scenario
  This scenario describes a future situation (time horizon 2015) with the same developments as the Reference scenario, but in addition it is assumed that the European integration process proceeds at a more rapid pace.

The network assignment model is used to analyse the three situations listed above. The main components of the INTERMODA assignment model are:

- *Modal networks* covering infrastructure for road, rail, inland waterways and short sea shipping. It is an intermodal network, and 438 terminals are included to allow transfers between modes.
- *OD matrices* for eleven commodity groups are included: Agricultural products, Foodstuffs, Solid Mineral Fuels, Crude Oil, Ores/Metal Waste, Metal Products, Building minerals and material, Fertilisers, Chemicals, Machinery and manufacturing and Petroleum products.
- *Cost functions* are defined separately for each combination of mode, link type and product.
- *The assignment procedures* simulate traffic behaviour using the modal networks, the OD matrices and the cost functions.

The assignment results are presented as traffic flows on maps. The next plot Figure 8-7 shows the assigned total flows in the future Reference scenario (2015).

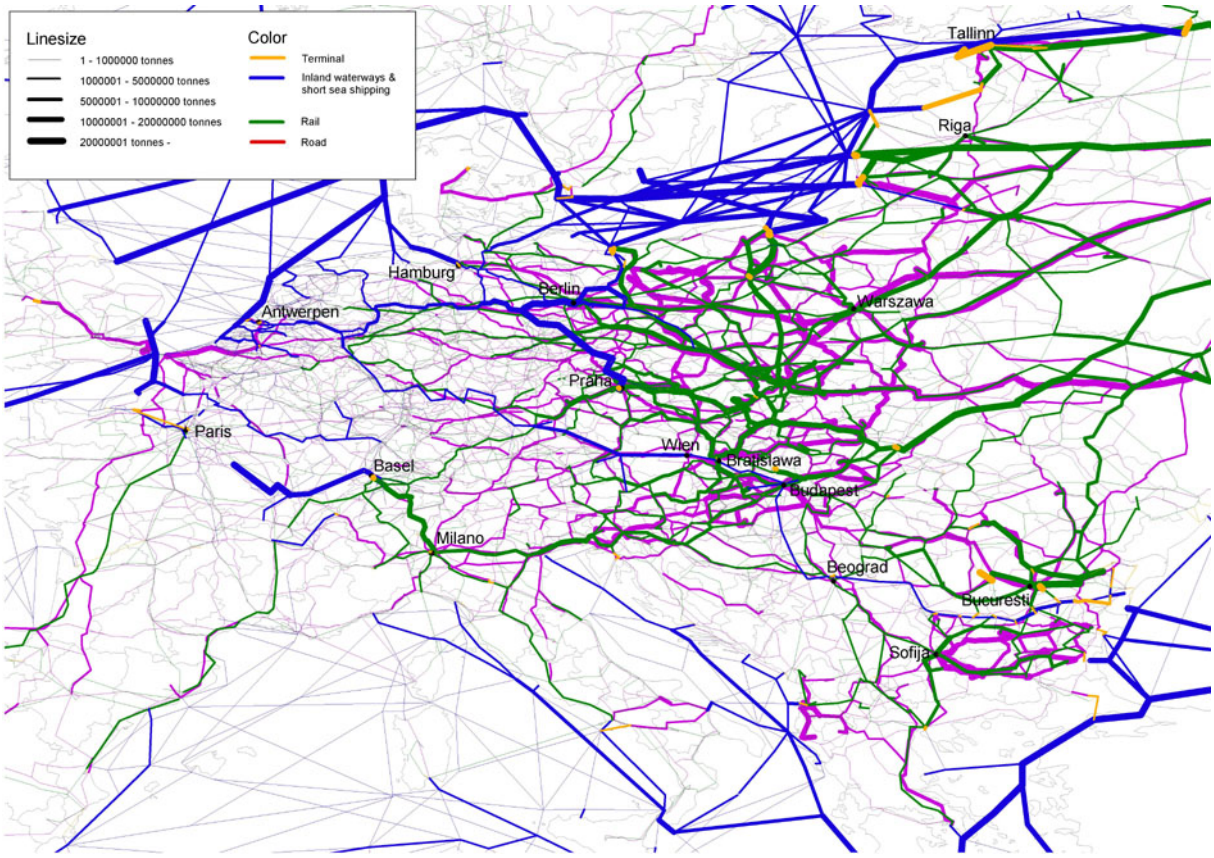

Figure 8-7: Total flows, Reference scenario (2015)

The figures from the assignment show that the transport volumes will increase significantly from the base year 2000 until the future scenarios in 2015. Key figures illustrating the increase and the resulting mode split are presented in the next table.

Total flows	Base year (2000)	Reference scenario (2015)	Alternative scenario (2015)
Assigned volumes [mill tonnes]	1 234	1 922	2 0355
Tonnekilometres [mill tonnekms]	865 460	1 491 225	1 558 950
Mode split [% of tonnekms]:			
Road	28%	32%	34%
Rail	34%	28%	27%
Inland waterways	5%	4%	4%
Short sea shipping	33%	35%	35%

Table 8-2 Key figures comparing total flows in the three assigned situations

As shown in the table, the share of road is expected to increase, while the share of rail is expected to decrease. The volumes transported and the resulting tonnekilometres is expected to increase significantly from the Base year to the two future scenarios.

The next Figure 8-8 shows a plot of the potential intermodal transport in the future Reference scenario.

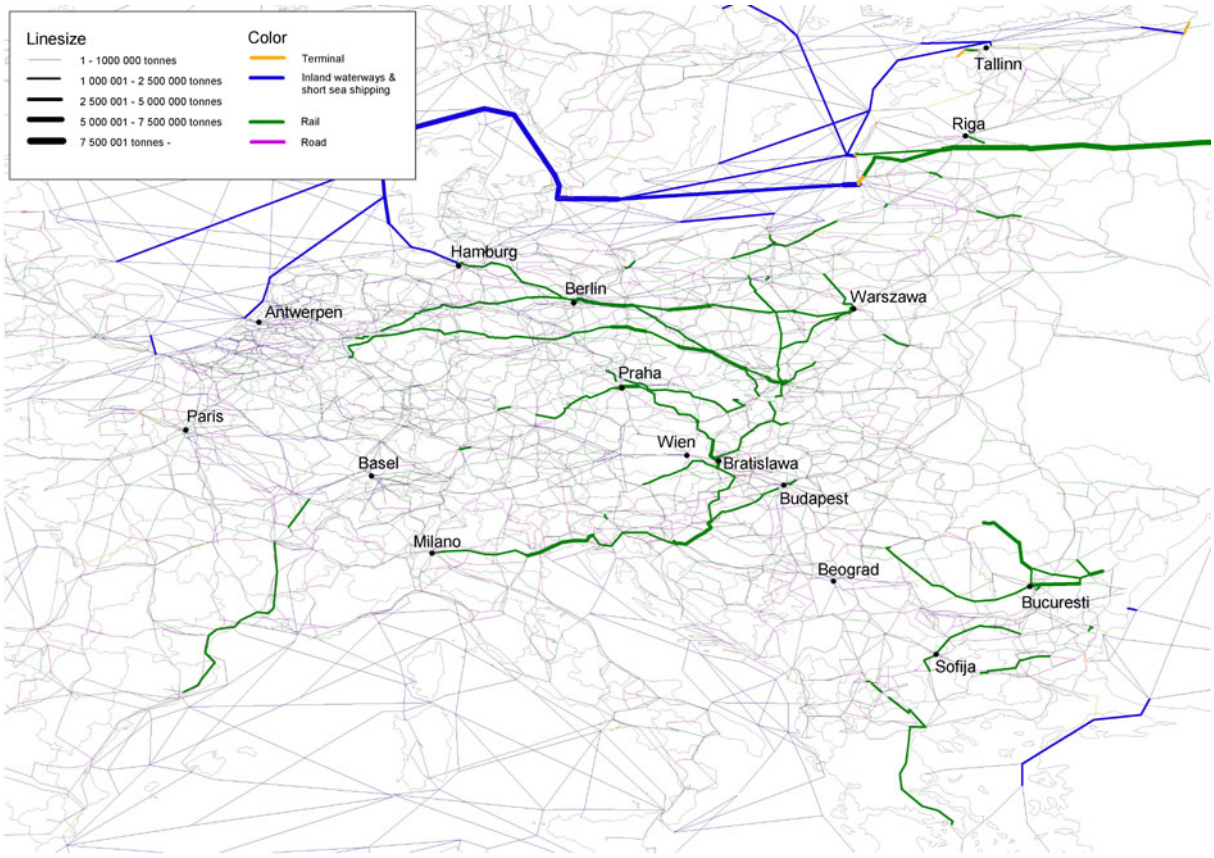

Figure 8-8: Intermodal flows, Reference scenario (2015)

Table 8-3 gives key figures illustrating the expected effects for intermodal flows. (Due to lack of reliable statistics, no data describing intermodel transport is available for the Base year.)

Intermodal flows[1)]	Reference scenario (2015)	Alternative scenario (2015)
Assigned volumes [1000 tonnes]	52 467	71 463
Tonnekilometres [mill tonnekms]	68 342	93 567
Mode split [% of tonnekms]:		
Road	1%	1%
Rail	56%	56%
Inland waterways	2%	2%
Short sea shipping	40%	40%

1) Figures for potential intermodal transport do not exist for the Base year.

Table 8-3 Key figures comparing intermodal transport in the three assigned situations

It is clear that regarding intermodal flows, the main difference between the two future scenarios is the volumes transported and the resulting tonnekilometres. The mode split is the same for these two scenarios.

A comparison of the expected flows according to the assignments with the Helsinki corridors clearly shows that these corridors will still be important for the future situation. The main freight flows correspond with the Helsinki corridors, although not always by the exact links specified in the corridors. In most corridors, the road alternative dominates over rail. The assignment results include an important route not defined as a corridor: The Moskva – Baltic countries with further transfer to sea transport involves rail as main mode between Moskva and the Estonian and Latvian ports, and road as main mode between Moskva and Lithuanian port.

In order to assess the future network, external effects for the forecasted traffic flows are calculated. The calculations cover the following elements:

- Noise (human health impact and annoyance)
- Accident costs (medical care, material damages, administrations costs and production losses)
- Air-pollution (human health impact, environmental damage and damage to building structures)
- Global warming (climate change, impact on agriculture, impact on energy use, impact on water supply and water and management)
- Upstream processes (energy production and distribution, vehicle production and infrastructure construction and maintenance)

The next table summarize the main findings from the assessment of the total flows.

Total flows	Base year (2000)		Reference scenario (2015)		Alternative scenario (2015)	
	External costs	Tonnekm	External costs	Tonnekm	External costs	Tonnekm
Road	62%	28%	68%	32%	69%	34%
Rail	19%	34%	15%	28%	14%	27%
Inland waterways	3%	5%	2%	4%	2%	4%
Short sea shipping	16%	33%	16%	35%	15%	35%
Total (mill)	37419	865460	95160	1491225	102276	1558950
Average cost (Euro pr tonnekm)	0.043		0.064		0.066	

Table 8-4 Key figures from external cost assessment of the total flows

The external cost assessment for the total flows assigned shows that the main part of the external costs in the present situation is caused by the high share of road transport. As this share is expected to increase in the future, also the external costs will increase. The table also shows the effect on external costs of the expected decrease in the share of more environmentally friendly modes as rail and inland waterways.

The next table summarizes the main findings from the assessment of the intermodal flows. (For intermodal flows, there are no reliable available statistics for the base year.)

Intermodal flows	Reference scenario (2015)		Alternative scenario (2015)	
	External costs	Tonnekm	External costs	Tonnekm
Road	4%	1%	4%	1%
Rail	59%	56%	59%	56%
Inland waterways	2%	2%	2%	2%
Short sea shipping	35%	40%	35%	40%
Total (mill)	2194	68342	3004	93567
Average cost (Euro pr tonnekm)	0.024		0.024	

Table 8-5 Key figures from external cost assessmen of the intermodal flows

The future scenarios are very similar. The freight volumes are larger in the Alternative scenario, but the mode split are the same. Due to the larger volumes, the external costs for the Alternative scenario are higher than external costs for the Reference scenarios, but the share of external costs for each mode is determined by the mode share of tonnekilometres and is hence the same.

Even for the future, the intermodal transport will only constitute a small fraction of the total transport. For the future Reference scenario, the share of intermodal tonnekilometres is about 5%, while for the future Alternative scenario, the share is about 6%. The main part of

the intermodal transport will also in the future be transported by rail and short sea shipping. Inland waterways have only a very small fraction of the intermodal transport.

For the future Reference and future Alternative scenario, a growth in road transport is expected for the EU 15, the accession countries and the CEEC alike. This contributes to increased external costs.

The distribution of external costs and the mode split for the continental flows (road, rail and inland waterways) is described in the following figure.

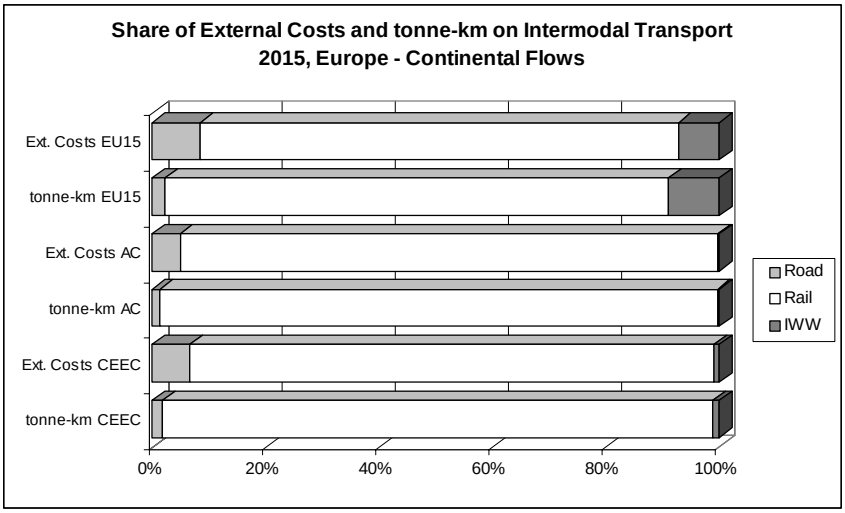

Figure 8-9: Distribution of external costs and mode split for future Reference scenario (2015). Road, rail and inland waterways.

The expected difference in average external costs for the total flows and the intermodal flows are described in Table 8-6.

		EU15	Accession countries	CEEC
Reference scenario (2015)	Total continental flows	0.079	0.096	0.096
	Intermodal continental flows	0.036	0.035	0.036
Alternative scenario (2015)	Total continental flows	0.077	0.098	0.099
	Intermodal continental flows	0.036	0.035	0.036

Table 8-6 Average external costs in Euro per tonnekm for total and intermodal continental (Road, rail and inland waterways) flows.

The figures in Table 8-6 show that for the EU15, the average external costs for continental intermodal flows is less than ½ of the average costs for the corresponding total flows. For the accession countries and the CEEC, the situation is different: the external costs of continental intermodel flows are only about 1/3 of the costs for the corresponding total flows. The relative lower share of intermodal external costs for the accession countries and the CEEC are caused by lower share of road transport.

The assignment results indicate differences on country level, but this is not explored in detail in this deliverable. The results will however be available for more detailed exploration through other deliverables in the INTERMODA project, in particular deliverable 6: INTERMODA GIS database, and deliverable 16: INTERMODA GIS toolbox.

8.7 POLICIES TO ELIMINATE THE BOTTLENECKS

Based on the previous results an assessment and ranking of individual policies to remove bottlenecks in intermodal transport between the EU and the CEEC has been carried out. In order to find out on which Origin/Destination (O/D) transport links these policies may have an positive impact a sensitivity analysis about the future intermodal network has been carried out. To set the policies into action on these highlighted O/Ds the report concludes with the derivation of recommendations for the further development of intermodal transport between the EU15 and Central and East European Countries (CEEC).

A total of 70 policies have been assessed and ranked towards their performance and feasibility to eliminate bottlenecks in intermodal transport. According to the impact classification,

- 19 are high-impact policies,
- 30 are medium-impact policies and
- 21 are low-impact policies.

The 19 high-impact policies are primarily targeted at changing and standardising legislation or creating financial possibilities for the development of intermodal transport. The creation of financial possibilities for the building of new infrastructure is considered to be much less feasible than the upgrading of existing infrastructure. The high-impact policies are also generally targeted at improving operations by better utilising or upgrading infrastructure and equipment. Policies targeting bottlenecks that do not concern either infrastructure or equipment are expected to have low impact. The intermodal transport experts, involved in the assessment process, also concluded that a marketing campaign aimed at encouraging the use of intermodal transport and support for the increased use of ICT are expected to have little impact.

Out of the 19 high-impact policies 7 have a good feasibility for implementation. These are targeted at 8 out of the 16 high-importance bottlenecks.

These 7 policies are:

- Introduce fund for replacing of obsolete handling equipment
- Set standards for combined-transport equipment
- Introduce fund for restructuring terminals
- Introduce fund for restructuring terminals operations
- Introduce fund for restructuring railroad networks
- Set safety standards
- Check safety at departure and arrival

Acting on the assumption that the policies assessed may have a direct impact on changing transport times and transport costs for intermodal transport the sensitivity analysis shows following results:

- By far the lowest transport volumes result from a change only in transport times. A change only in costs already holds a high potential for additional intermodal transport.
- A change in time and costs creates the highest potential whereas the difference to the cost case is comparably low.
- There are 13 countries which can be considered for having high potentials for intermodal transport which are Austria, Germany and Italy within the EU15 and the Czech Republic, Hungary, Poland, Slovenia, Lithuania, Romania and Latvia within the group of the Accession Countries as well as Ukraine, Belarus and Russia.
- Taking into account the highest potentials 7 countries can be considered - Austria, Germany, Poland, the Czech Republic, Hungary, Lithuania and Russia. On the O/D relations on country level there are five O/D relations which have a comparable high potential. These are the O/Ds between Germany and Poland, Germany and the

Czech Republic, Russia and Lithuania, Austria and the Czech Republic and Austria and Hungary.

- Striking is the small difference between the potentials for the two cases change in costs and change in costs and time. The potentials which can already be achieved with a change only in costs make it questionable to justify the extra amount of resources necessary for the additional potential which can be achieved by a parallel change in transport time.
- A further argument to use the potentials for additional intermodal transport is the reduction in road transport. Two of the five exposed O/D relations hold a relative reduction in road transport of more than 10% and the three other hold a reduction of more than 5% after all. Taking into account the high amount of transport volume on these O/Ds the reduction of road transport can be considered as respectable.

To achieve these potentials for intermodal transport and to implement the high impact policies into actions the following recommendations are suggested. These recommendations are considered to be highly valuable and shall be applied in order to contribute to the identification of objectives and definition of projects to remove bottlenecks still hindering the development of intermodal transport between the EU and the Accession Countries:

List of high valuable recommendations:

- Increase capacity of terminals
- Transport Infrastructures for better access of terminals
- Harmonization of opening hours at terminals
- Investments in modern standardised intermodal equipment
- Consideration of intermodal transport in technical, operational and administrative procedures
- Improved border procedures for intermodal transport
- Harmonization of loading units

Further on the following recommendations shall be applied to stimulate the discussion for future related strategies and ideas to promote the development of intermodal transport:

List of other important recommendations:

- Connect road network to major terminals in main rail corridors
- Implementation of new handling procedures
- Introduction of European-wide transport charges
- Consideration of external costs for fair prices
- Criteria for investments in infrastructures
- Overcome mental bottlenecks
- Measures towards concentration of intermodal rail transport on a limited number of international transport corridors
- Introduction of a new international transport corridor between Moskva and the Baltic Countries with further transfer to sea transport
- Development of an intermodal network connecting sea and hinterland transport
- Promotion of extended port cooperation
- Introduction of one-stop-shops for intermodal transport

8.8 SENSITIVITY ANALYSIS

The following analysis is based on the O/D matrixes for three cases (namely, change of costs by –10%, change of times by –10% and change of costs and times by –10%) as the most interesting ones. The first part of the sensitivity analysis presents the results for the potential intermodal transport per country (EU member countries and Accession countries). The second part presents the results on Origin – Destination relations aggregated on a country level between the EU and the CEEC.

8.8.1 Potential Intermodal Transport per Country

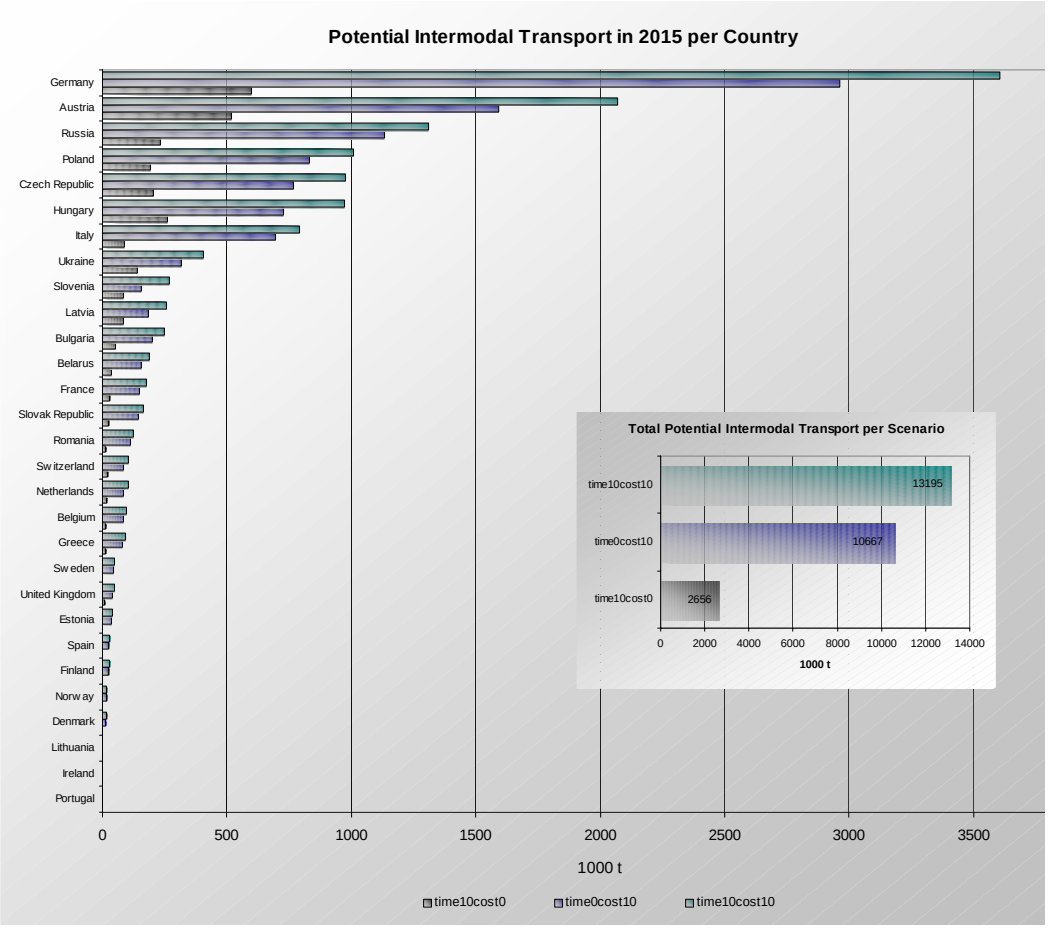

Figure 8-10: Potential intermodal transport in 2015 per country

The diagram above shows the potential intermodal transport in 2015 per country. All three cases (change of costs, change of times and change of costs and times) are represented. The bars for each country show the aggregated potential transport in tonnes for all O/Ds from and to the country. In total the highest potentials (more than 500.000 t/p.a.) are in:

- Germany, Austria, Russia, Poland, the Czech Republic, Hungary and Italy.

When comparing the three cases the case with changes in **cost and time** (green bars) shows the highest total potential.

8.8.2 Potential Intermodal Transport per O/D

- Potential Intermodal transport between origin and destination countries by change of transport time

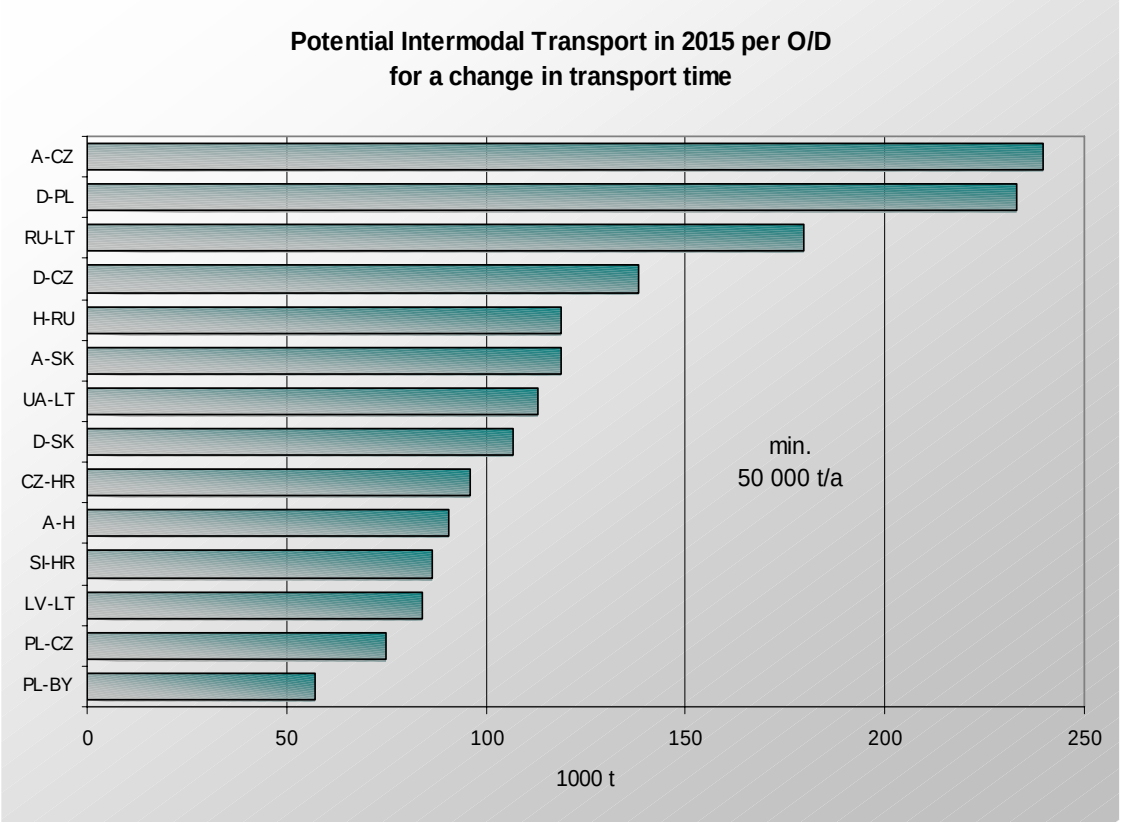

Figure 8-11: Potential intermodal transport in 2105 per O/D for a change in transport time

As the overview about the total potential of each country does not give information about the related O/Ds the above diagram shows those O/Ds with a minimum of 50 000 tonnes per year for a change in transport times. The highest potentials are between Austria and the Czech Republic, Germany and Poland, Germany and the Czech Republic, Hungary and Russia and Russia and Lithuania.

- Potential Intermodal transport between origin and destination countries by change of transport cost

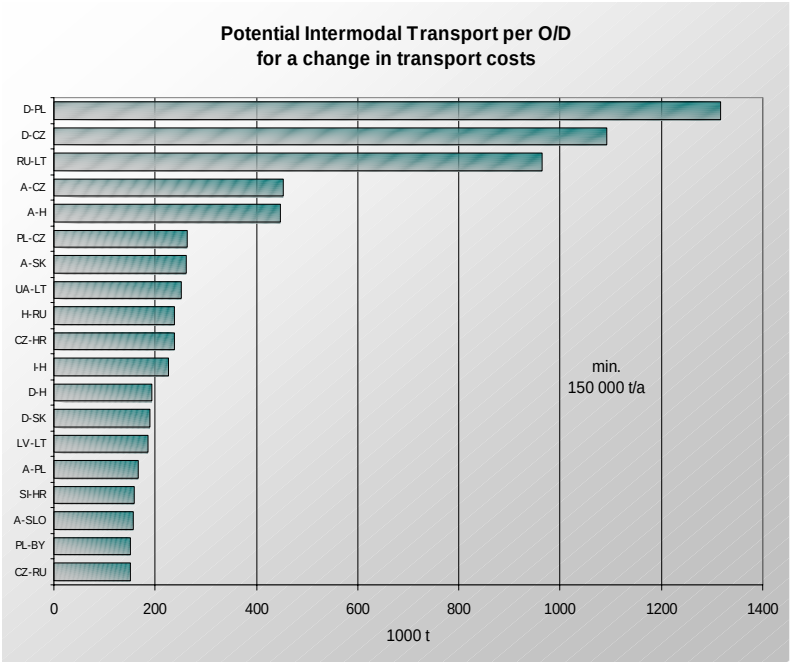

Figure 8-12: Potential Intermodal Transport in 2015 per O/D for a change in transport costs

For a change in transport costs the highest potentials with a minimum of 150 000 tonnes per year are between Germany and Poland, Germany and the Czech Republic, Austria and Czech Republic, Austria and Hungary and Russia and Lithuania.

- Potential Intermodal transport between origin and destination countries by change of transport time and cost

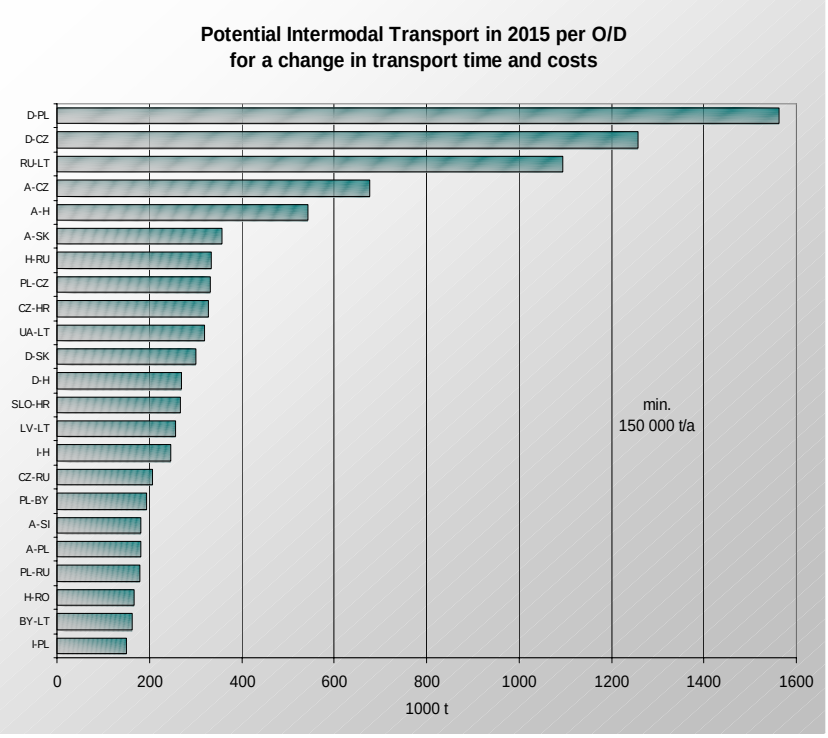

Figure 8-13: Potential intermodal Transport in 2015 per O/D for a change in transport time and costs

For a change in transport time and costs the highest potential with a minimum of 150 000 tonnes per year are between Germany and Poland and Germany and the Czech Republic, Austria and Czech Republic and Austria and Hungary and Russia and Lithuania.

8.8.3 Reduction in Road Transport

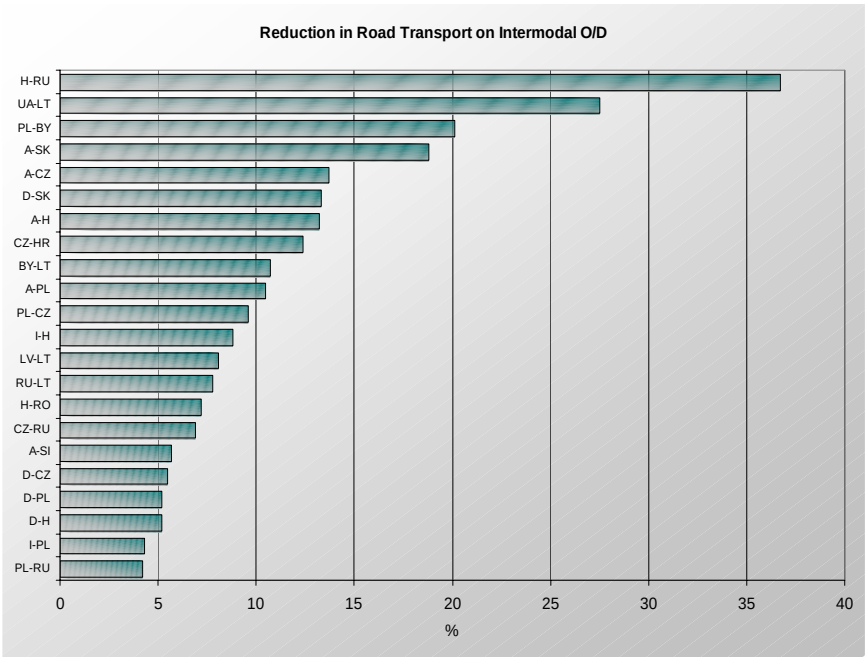

Figure 8-14: Reduction in road transport

As the potential intermodal transport indicates a change from road to rail transport the above diagram shows those O/Ds with the highest reduction in road transport for the case that transport times and costs are being changed. The O/D between Hungary and Russia has by far the highest relative potential for a reduction in road transport. Other O/Ds with a high potential are those between Ukraine and Lithuania, Poland and Belarus and Austria and Slovakia. The potentials have to be interpreted relative to the total transport on the O/D. It is more likely that most of the volume of an O/D with a low transport by road can be easily shifted to rail than most of the volumes from an O/D with high share of road transport.

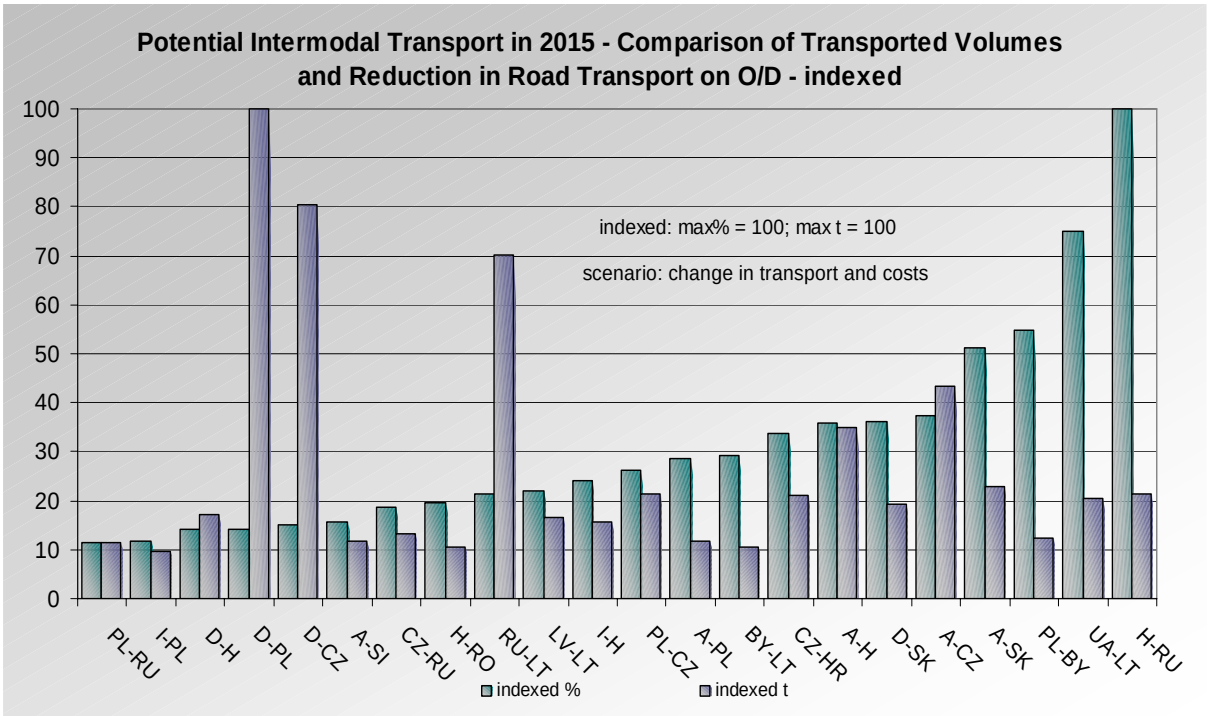

Figure 8-15: Potential intermodal transport in 2015 – Comparison of transported volumes and reduction in road transport on O/D

To verify this thesis the above diagram has been chosen showing the indexed relative reduction in road transport (green bars) and the potential intermodal transport on the O/Ds (blue bars), whereas 100 represents the highest index. The O/D relations with the four highest potentials for a reduction in road transport have comparable low transport volumes, which are on the following relations: Hungary – Russia, Ukraine – Lithuania, Poland – Belarus, and Austria – Slovakia.

On the other side the O/Ds with the three highest transport volumes have a comparable low relative reduction in road transport, which are on the following relations: Germany – Poland, Germany – Czech Republic and Russia - Lithuania.

On the other hand the O/Ds between Austria and the Czech Republic, Austria and Hungary, the Czech Republic and Croatia and Poland and the Czech Republic have comparable high indexes for a reduction in road transport and for potential intermodal transport.

8.9 INTERPRETATION OF RESULTS

There is a significant difference between the three cases in the potentials for intermodal transport. By far the lowest transport volumes result from a change only in transport times. A change only in costs already holds a high potential for additional intermodal transport. A change in time and costs has the highest potential whereas the difference to the cost case is comparably low.

For all results given above there are 13 countries which can be named for the high potentials for intermodal transport which are

- Austria, Germany and Italy within the EU15 and
- the Czech Republic, Hungary, Poland, Slovenia, Lithuania, Romania and Latvia within the group of the Accession countries as well as
- Ukraine, Belarus and Russia.

Taking into account only the highest potentials 7 countries - Austria, Germany, Poland, the Czech Republic, Hungary, Lithuania and Russia - remain.

On the O/D level there are five O/Ds which have a comparable high potential for all three cases. These are the O/Ds between Germany and Poland, Germany and the Czech Republic, Russia and Lithuania, Austria and the Czech Republic and Austria and Hungary. Striking is the small difference between the potentials for the two cases change in costs and change in costs and time. The potentials which can already be achieved with a change only in costs make it questionable if the additional potential which can be achieved by a parallel change in transport time justifies the extra amount of resources.

An additional argument to use the potentials for additional intermodal transport is the reduction in road transport. Whilst only two of the five exposed O/Ds hold a relative reduction of more than 10% and none of the O/Ds is in the group of those with the highest potentials the remaining three hold a reduction of more than 5% after all. If one takes into account the high amount of transport volume on these O/Ds the reduction of road transport which can be achieved can be considered as respectable.

As main Conclusions of the research project it can be stated the

- The European Commission's role in solving intermodal bottlenecks is mainly **indirect**
- Mechanisms are needed primarily to **facilitate**
  - –capital improvement
  - –Standardisation
- Initial focus should be put on relations with **high potential flows**

9 ACKNOWLEDGEMENTS

The INTERMODA Consortium herewith thanks the following institutions, organisations and companies for their support in the elaboration of the deliverables, their valuable contributions to the work and for hosting workshops and the Final Conference:

- European Commission, DG TREN, Brussels
- United Nations Economic Commission for Europe, UNECE, Transport Division Geneva and TER PCO, Budapest
- Ministry of Transport – Hungary, Budapest
- Ministry of Transport – Turkey, Ankara
- Union International de Chemin de Fer (UIC), Paris
- International Union of Road Rail Transport Companies (UIRR)
- European Intermodal Association (EIA), Brussels
- EURIFT
- Hellenic Railways (OSE), Athens
- Siemens Transportation Systems Group, Munich
- Shell Chemicals, Rotterdam
- Intercontainer Interfrigo (ICF), Basel
- Kombiverkehr, Representation East Europe, Germany
- BILK, Budapest
- Klaipeda State Seaport Authority
- Multinaut Donaulogistik, Vienna
- Short Sea Shipping Promotion Center, Rotterdam
- Port of Rotterdam, Rotterdam
- Port of Vienna, Vienna
- City of Vienna, Vienna

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