

EUROPEAN TRANSPORT NETWORKS



Results from
the transport research programme



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Common acronyms

ATM	Air traffic management
ERTMS	European rail traffic management system
ETCS	European train control system
ETIS	European transport policy information system
GDP	Gross domestic product
ITS	Intelligent transport systems
PPP	Public-private partnership
RIS	River information services
SEA	Strategic environmental assessment
SPV	Special purpose vehicle
TINA	Transport infrastructure needs assessment
VTMIS	Vessel traffic management and information services

Additional information on the transport research programme is available on the Internet. The programme's Knowledge Centre (<http://europa.eu.int/comm/transport/extra/home.html>) provides:

- structured guides to the results and projects for particular topics;
- summaries and final reports of individual projects;
- access to project web sites and other contact details.

References to some projects are included in this brochure, to help the reader access further information quickly through the Knowledge Centre.

Information on the wider transport activities of the European Union is also available on the Internet. It can be accessed through the Europa server (http://europa.eu.int/comm/dgs/energy_transport/index_en.html).

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THE NEED FOR RESEARCH



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In this brochure discover how research is helping to develop European transport networks, and identify topics worth investigating further on the web

Turning the patchwork of transport infrastructure into a truly trans-European network is vital for the economic and social cohesion of the EU and the achievement of a single market in goods and services¹. Significant progress has been made since the first fourteen investment projects to develop such a network were identified in 1994.

For example, the first guidelines on the development of the trans-European transport network enabled other projects to be identified. They also provided a framework for complementary policy measures, for instance concerning interoperability across the network and the assessment of environmental impacts.

Qualifying projects may include the building of a new section of road or railway, combined rail-road transport terminals, ports or airports. However, a major objective is to upgrade the existing networks and make better use of the existing capacity. Therefore the deployment of Intelligent Transport Systems (ITS) has a prime position in the EU strategy. Today's priorities for infrastructure projects are multi-modal corridors for freight, a rapid passenger network and traffic management plans for major roads. These include a limited number of wide-scale projects strategic for the Community like the Alps and Pyrenees crossings or the rail corridor from Paris to Vienna and then Budapest².

Mechanisms for involving the private sector in order to mobilise financial capital are still an important concern. The enlargement

of the EU and the extension of the trans-European network to the countries of Central and Eastern Europe are also key challenges.

The transport research programme³ has contributed to EU policy on the trans-European transport network by providing support for the planning and financing of the investment programme and the development of new infrastructure and services. Evaluation methodologies and software tools have been provided to help policy makers assess the impacts of different infrastructure plans. New solutions for the efficient operations of networks and terminals have been assessed. This brochure highlights some significant results. The aim is to raise awareness of the progress that has been made, and to encourage readers to obtain further details through a web-based Knowledge Centre at (<http://europa.eu.int/comm/transport/extra/home.html>).



KEY RESULTS

A number of projects have supported the development of European transport networks. Here are some highlights.

Managing traffic on European networks

Harmonised approaches to traffic management are needed at a European level to improve interoperability and make more efficient use of the existing infrastructure in road, air, rail and waterborne transport. The transport research programme has

targeted the use of variable message signs and strategies to manage speeds on European roads. Substantial contributions have also been made to the development of the European air traffic management (ATM) system, the European rail traffic management system (ERTMS), the European vessel traffic management and information services (VTMIS) concept and the river information services (RIS) concept.

Managing speed on European roads⁴



Studies concluded that automated speed enforcement with speed cameras should be installed on European motorways. Busy motorway sections should have variable speed limits changing according to traffic and weather conditions, and variable message signs warning drivers of hazardous situations. Speed limits should be harmonised on European motorways and top speed limiters installed on vehicles in the longer-term.

Strategic assessment of trans-European networks

System-wide and long-term effects need to be taken into account in the assessment of trans-European transport networks in addition to the immediate transport impacts. The transport research programme has provided tools for evaluating wider socio-economic and regional effects. New indicators of regional accessibility have been developed, and different approaches tested for impact assessments that take account of the interaction between transport investment and regional economic development.



Accessibility and economic impacts⁵

Research has produced a model able to forecast the effects on regional production and employment resulting from better accessibility brought by trans-European network investment. Results show that as a consequence of the trans-European network projects, the trend towards economic polarisation of the EU would only be mitigated, with a slightly less polarised distribution of accessibility and economic growth among the regions than in other scenarios. All regions would benefit from increased accessibility, with higher gains for the Iberian peninsula. Most regions in

cohesion countries would experience gains in GDP while the richer regions would experience losses.

Other research has developed a model for assessing the long-term effects of stepwise implementation of policy packages. Construction of the trans-European transport network was assessed to be profitable in the long run, comparing the change in GDP in 2026 with the total investment. The result applies to a scenario where fuel taxes are earmarked for investment in the network.

Evaluating environmental sustainability

A pilot strategic environmental assessment carried out in the transport research

programme has provided the first comprehensive, quantified forecasts of the impacts of trans-European network policies and infrastructure on travel demand and emissions at the EU level.

Pilot strategic environmental assessment⁶

In a baseline scenario, growth of tonne-kilometres in the EU is projected at 42% from 1994 to 2010, exceeding the 24% growth in person-kilometres. Air is the mode with the highest growth in passenger travel, while road has the highest growth in freight transport. Aggregate emission levels of CO₂ and SO₂ would continue rising overall, by 40% and 60% respectively from 1994 to 2010, while all other emissions would fall.

Implementation of trans-European network projects would increase further the overall rate of growth of freight transport, with significant shifts to rail and inland waterways. Total passenger transport would grow less than in the baseline scenario, with a shift from car



and air to rail. As a result, the negative trends in overall CO₂ and SO₂ emissions would be mitigated but not reversed.

Revitalising European railways

Development of a European traffic management system, liberalisation of the rail sector and improved organisation

of services are elements of the EU strategy to improve the competitive position of railways. A trans-European rail network dedicated to freight has been proposed and evaluated.

Dedicated trans-European network for rail freight⁷



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The dedicated network includes three sub-networks according to their exclusive or mixed utilisation by freight and

passenger trains. Traffic assignment modelling has shown that less than 22% of the network could support about 60% of the present volume of freight traffic. The dedicated network could reverse the decreasing trend in rail modal share, taking the share back up to 20% by the year 2020. In addition, time-savings in 2020 could be up to 50% relative to the current trend scenario. The increase of rail tonne-kilometres would bring a pro-rata increase in the environmental burden of up to 80%, but this would be outweighed by the environmental benefits from reduced road traffic.

Financing trans-European networks

Public-private partnership (PPP) can offer an attractive option for successful and

accelerated implementation of trans-European network projects. Guidelines have been provided to assist in the decision-making process on the use of PPP to finance and operate such projects.

Implementing public-private partnerships⁸

Three types of PPP have been identified as most common to trans-European network projects: joint ventures, concessions, and hybrid types where the project is split into several project components with a public SPV (special purpose vehicle) in control of the overall project. Recommendations have been

provided on how to organise the different phases of the PPP process to avoid possible barriers, and on criteria to allocate different types of risk to parties. It is recommended that the Commission takes a co-ordinating role regarding user charging and network-level effects in cross-border projects.

Heading East

Development of pan-European corridors is a key step in the integration of the EU

accession countries. In-depth assessment of transport markets within the broader socio-economic and political context is needed to aid prioritisation of infrastructure investments.

Evaluating East-West European corridor developments⁹

Research has developed a tool for strategic assessment of pan-European corridors. Images of the future were built combining two socio-economic scenarios (low and high growth) with two political scenarios (slow and fast integration). Various alternatives for corridor developments were then assessed, focusing on accessibility, environmental and socio-economic factors. Combinations of road

and rail projects were found to offer the greatest benefits, while at the same time meeting the objectives of the national transport policies. Results stressed the role of intermodality and patterns of inter-regional co-operation. Creation of a single pan-European regulatory framework is a key strategy for increasing the use of the Danube waterway for East-West cargo flows.

AREAS OF RESEARCH



Research on trans-European transport networks has aimed at supporting the evaluation and implementation of the investment programme, including:

- development of tools and methodologies to assist the planning and funding of infrastructure, and
- demonstration of innovative technological and operational solutions for traffic management and intermodality.

The main research lines are listed below.

Interoperable European networks

Identifying organisational strategies to improve interoperability, and developing innovative technologies for freight terminals and combined transport.

Managing traffic and navigation

Assessing speed management systems for road transport, developing European systems for traffic management in air, rail and waterborne transport, and assessing the potential for Galileo.

Evaluating trans-European networks

Assessing regional and economic impacts and barriers to implementation, and developing strategic tools and methods for forecasting traffic and environmental impacts.

Interconnecting multi-modal networks

Identifying new solutions for freight terminal operations, seaport-hinterland connection and pre- and end-haulage.

Developing trans-European networks

Assessing the potential of dedicated freight railway networks and inland waterways, providing guidelines on the implementation of public private partnerships, and assessing alternative developments for pan-European corridors.

INTEROPERABLE EUROPEAN NETWORKS

Interoperability is a key prerequisite for the provision of transport services across modes, organisations and national borders and for the achievement of seamless travel across trans-European networks. The transport

research programme has targeted strategies to improve network interoperability. Inputs have been provided to the standardisation process for combined transport and to the development of the new EU Directive on the access to rail infrastructure.

Organisation and regulation¹⁰

Harmonisation of different organisational structures has been identified as a key strategy for reaching an optimal level of interoperability, in the light of its low implementation costs. Policy measures that can help achieve common organisational structures include stimulation of co-operation, standardisation of transport equipment and further privatisation of transport-related markets. Harmonisation of the regulatory frameworks between EU and third countries in terms of common customs requirements and regulations regarding driving bans would also be helpful. Harmonisation and

standardisation are needed in the field of telematics, in particular for information and trip planning systems that require static and dynamic data on public and private modes.



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Technological innovation for combined transport¹¹



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New automated handling equipment and a modified intermodal wagon with variable carrying capabilities and adjustment to different loading schemes have been successfully tested. Recommendations have been made for the optimised design and operation of rolling stock and the functional layout of future intermodal terminals. Recommendations have also been provided to standardise a future European loading unit that is stackable and has the main dimensions of current swap bodies.

MANAGING TRAFFIC AND NAVIGATION

Advanced traffic management systems help travellers, freight distributors and transport operators make a more efficient use of the networks. Navigation and positioning systems have the potential to offer added value services

in a vast range of applications. The transport research programme has demonstrated advanced solutions and contributed to the development of European traffic management systems in all modes.

Land transport ¹²

Advanced telematics solutions for management of road speed have been tested, including warning systems, recording systems to register speed and controlling devices. It is recommended that speed limits are harmonised at European level and that further research is carried out on how to make drivers voluntarily choose speeds that are closer to socially optimal speeds. Guidelines have been provided for the deployment of variable message signs on European road networks. Specifications for signalling and

communications subsystems of the European rail traffic management system (ERTMS) have been developed and tests carried out on the high-speed link Madrid-Seville. A pilot installation of the European train control system (ERTMS/ETCS) has been made on the Vienna-Budapest line. The extension of the European ITS concept for inland waterways (RIS, river information services) from traffic management to logistics activities has been supported by demonstrations of new traffic and transport services, including terminal, voyage and lock planning.

Maritime and air transport ¹³

Research has established an embryonic network at European level for information exchange in the field of VTMIS (vessel traffic management and information services). The potential of the network for exchange of maritime traffic information, vessel and cargo data and marine pollution information has been demonstrated.

The functions and services of an operational concept for the European ATM system addressing gate-to-gate planning and achievable by 2010 have been identified. The viability of the concept has been proved by technical, operational and economic assessments.

European satellite navigation and positioning system (Galileo) ¹⁴

The main policy requirements and preferred options for public-private partnerships in the design, building and operation of Galileo have been identified.

A comprehensive database of more than 50 applications and their related services has been compiled. Galileo has been estimated as profitable, as the increased turnover due to satellite navigation applications will greatly exceed the initial and recurring costs.



EVALUATING TRANS-EUROPEAN NETWORKS

Strategic assessment of trans-European networks

The development of the trans-European transport network requires an integrated assessment that goes beyond the direct traffic impacts usually taken into account in the appraisal of infrastructure investments. The transport

research programme has developed tools for assessing the impacts of investments in the network on socio-economic activities and development, including spatial and temporal distribution of impacts. Different approaches to modelling able to take into account the interaction between transport investment and regional economic development have been tested.

Assessing economic and spatial impacts¹⁵

Research has predicted the location behaviour of individuals and businesses resulting from changes in accessibility. From these, forecasts for economic performance in terms of regional production and employment have been derived. Results show that the full trans-European network scenario would be able only to mitigate the trend towards economic polarisation of the EU, with a slightly less polarised distribution of accessibility and economic growth among the regions than in other scenarios. Accessibility of all regions would benefit from trans-European network investment. The greatest gains appear in the periphery and in particular in the Iberian peninsula. The effects on GDP development hint at a convergence effect of the trans-European network. Most regions in the European core and

the Northern European countries encounter losses in GDP per capita, while most regions in the cohesion countries (with the exception of Ireland) experience considerable gains.

Other research has applied system dynamics to assess the long-term effects of phased implementation of the trans-European network. One scenario tests the impacts of earmarking fuel taxes for investments in the trans-European networks. Comparison of the change in GDP in the year 2026 with the overall infrastructure investment shows that construction of the trans-European network is profitable in the long run. However, transfer of funds from one region to another is required, as there is an imbalance between the regional source of tax revenues and the location of investment.



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Predicting European traffic flows

Scenario and traffic analysis are key tools for informed decision-making in transport policy. The transport research programme has developed software tools to estimate future transport demand and traffic flows. This allowed the effects of different policy options and alternative socio-economic scenarios to be assessed. Forecasts have been produced for a baseline scenario of current policy trends without trans-European networks.

Baseline European traffic forecasts¹⁶

The overall growth from 1995 levels for passenger-kilometres is projected at more than 20% by 2010 in the baseline scenario. Long-distance trips are expected to increase at twice the rate of short trips (less than 40 km). Roughly 70% growth is projected for international passenger travel. Freight travel shows a higher growth

rate than passenger demand. Total tonne-kilometres are expected to increase by roughly 40% by 2010 and 65% by 2020. Nearly 100% growth is projected in cross-border traffic. The increasing average length of haul, brought about by globalisation of production and markets, is expected to favour railways. However, the length of routes suffering serious congestion is predicted to increase significantly unless policy action is taken.

Environmental assessment of trans-European networks

Appropriate methods for strategic environmental assessment (SEA) at the EU level are among the requirements of the guidelines for the development of the trans-European network. Major achievements of the transport research programme have been the development of a methodology for SEA and a software tool for assessment of air pollutant emissions, energy consumption, noise and safety impacts.

The tool has incorporated methodologies for traffic and emission forecasting developed elsewhere in the programme.



Pilot strategic environmental assessment¹⁷

Projections for the European baseline scenario show the following impacts:

- improved technology outweighs the growth in road travel, and all road emissions fall except CO₂;
- emission increases in air transport are correlated with the level of traffic because technology changes are offset by the relative growth of shorter distance travel;
- emission increases in waterborne transport are also correlated with the level of traffic because of the slow turnover of the fleet;
- overall, aggregate emissions from all modes fall from 1994 levels, with the exceptions of CO₂, with roughly 40% growth by 2010, and SO₂ with growth closer to 60% by 2010.

In a scenario with all trans-European network projects and related policies implemented, the total tonne-kilometres transported increase more than in the

baseline scenario but a substantial shift to rail is foreseen. Inland waterways are able to achieve a 12% growth of tonne-kilometres by 2010 compared with 1.5% growth in the baseline scenario. Total passenger transport would grow less than in the baseline scenario with a shift from car and air to rail.

Improvements on the baseline scenario are predicted in terms of overall CO₂ and SO₂ emissions, although the upward trends in these emissions cannot be reversed. A 35% growth is projected for CO₂ by 2010, while a 55% growth is projected for SO₂, both lower than in the baseline scenario. Fewer fatalities than in the baseline scenario are predicted for road, air and water while a significant increase of fatalities is predicted for rail. A scenario of rail-only trans-European network investment would bring further, although small, advantages in terms of CO₂.

Strategic information systems

The planned European transport policy information system (ETIS) is intended to support decisions on transport policy and the trans-European networks. Data are needed on traffic flows, the supply of infrastructure and logistic

services. However, the existing data, models and related software found at international, national and local levels are generally inconsistent and need to be integrated. The transport research programme has supported several projects which have produced specifications for the ETIS.

Developing the European transport policy information system¹⁸

An open and modular architecture has been proposed for the ETIS to enable continuous upgrading as new databases and models become available. New methods for data collection have been

proposed and a system for data sharing across the EU has been defined.

Research has also provided software to support the connection process, and applications to simplify the interface with the end users. Trade and transport databases were successfully harmonised in a demonstration tool focused on trans-Alpine traffic.

Evaluating costs on European routes

The evaluation of external costs is a prerequisite for the implementation of pricing measures aimed at charging users according to the costs they impose on the transport system and on society. Research has demonstrated methods for evaluating the different external costs for journeys along specific corridors, including accidents, air pollution, noise and global warming. Recommendations for appropriate price signals in the light of all relevant internal and external costs have been provided.



Charging infrastructure use¹⁹

Methods for estimating costs have been demonstrated for the Milan-Frankfurt and London-Lille routes. The relative importance of each type of externality was found to vary significantly with mode and the characteristics of the various sections of the route, such as the local population density and the power plant used to generate electricity for trains. In these two corridors, external cost per 1000 passenger-kilometres varied for rail between 0.8 and 8 euro, and for road between 24 and 75 euro.

In areas with low population densities and little congestion on roads, current taxes and charges on private cars might be too high whereas for congested inter-urban routes in dense areas the opposite holds. Fares for inter-urban passenger transport are generally too high. In contrast, long-distance road freight is generally undercharged and there is a clear case to introduce a charge based on vehicle characteristics and distance travelled. Rail freight tariffs may need to increase or decrease depending on the current level of subsidy.



INTERCONNECTING MULTI-MODAL NETWORKS

The poor quality performance affecting today's intermodal freight transport calls for new concepts for bundling of flows across networks.

Therefore research has looked at innovative bundling solutions and the necessary innovation in terminals. The management of pre- and end-haulage to and from terminals

has also been studied, as this part of the logistic chain is costly and non-transparent. New concepts for the rail connection between seaports and the hinterland have been targeted since this link will become more and more a critical factor as the transport of containerised cargo continues to increase.

New concepts for freight networks and terminals²⁰

If the volumes of freight flows are not sufficient to fill a direct begin-end train or barge at the required frequency, complex bundling at one or more intermediate nodes can be used as an alternative to trucks. Complex bundling concepts integrate small flows and allow operations with small begin-end terminals, while at the same time achieving the quality and cost features of large-scale operations.

The high investment costs of new-generation terminals require a redistribution of income from the links



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to the nodes. Tariff differentiation is needed to stimulate spreading of operations over the day. Additional innovations such as automatic wagon identification are required to avoid time-consuming manual activities.

Accessing intermodal terminals²¹

Solutions for improvement of pre- and end-haulage have to provide added value for all participating actors in the intermodal chain. Organisational solutions seem most promising. Better

communication and co-operation between the various parties involved should be encouraged to reduce the cost of operations and increase the use of intermodal transport. One measure is the initiation of regular round table meetings between companies in the sector.

Innovative rail-sea port connection²²

A new rail solution between sea ports and their hinterland has been proposed to help solve the bottleneck problems of the European road network close to major ports. The new type of connection integrates various innovations including

hub-and-spoke systems, private rail carriers and advanced information systems. A market for the concept is predicted on many long- and medium-distance transport links in Europe.

DEVELOPING TRANS-EUROPEAN NETWORKS

Rail freight networks

Rejuvenation of the European railway network is being addressed by the development of ERTMS and the liberalisation of the sector. However,

the question arises whether improvements in competitiveness could also be achieved by innovative organisation of traffic. The transport research programme has identified a trans-European rail network dedicated to freight transport and has outlined a strategy for its implementation.



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Dedicated trans-European network for freight²³

A European railway dedicated to freight has been identified based on three sub-networks:

- a core network strongly dedicated to freight, covering the industrial regions of central Europe,
- an intermediate network mainly dedicated to freight but also carrying local passenger trains, and
- a mixed network on which passenger trains would normally have priority.

In the proposed solution, less than 22% of the network would support about 60% of the present volume of freight

traffic. Under a current trend scenario, rail would continue to lose share in the freight market, falling from 14% in 1998 to 9% in 2020. In the dedicated network scenario, rail could reverse the declining trend and reach by the year 2020 a modal share of as much as 20%, the same level as at the beginning of the Eighties. This would need improvements in the quality of rail services combined with price reductions of up to 30%. Time-savings in 2020 could be up to 50% relative to the current trend scenario. The increase of rail tonne-kilometres would increase the environmental burden by up to 80%. However, this would be outweighed by the environmental benefits from reduced road traffic.

Inland waterways

Increasing the use of European inland waterways is an objective of transport policy. However, negative effects may occur in terms

of atmospheric pollution, damage to infrastructure, risk of accidents and congestion. An in-depth study has analysed these impacts and evaluated different measures to reduce them.

Strategies to cope with traffic growth²⁴

Predictions for 2010 show that there is still enough capacity for main European inland waterways to handle growth in the volumes of freight traffic, despite the total capacity of the European fleet being expected to decrease. Marginal costs of pollution and infrastructure maintenance seem to increase very rapidly once the traffic reaches a 60%

increase in volume. Regulation aimed at separating recreational and commercial shipping is considered the most effective way of reducing accidents and congestion. On-board technological solutions to reduce fuel consumption and financial incentives for the use of clean products are better at reducing atmospheric pollution.

Intermodal freight transport corridors

Advanced solutions for the integration of inland waterways and peripheral areas into door-to-door transport chains would improve the competitiveness of European intermodal freight transport. Research has assessed

the potential for tri-modal transport chains including road, rail and inland waterways, along corridors between the North and the South and South-East Europe. The viability of operating intermodal transport services in Scandinavian countries has been demonstrated, in spite of small flows and sparse population.

Advanced multi-modal transport chains ²⁵

Tri-modal transport chains should be set up on the Rhine and Danube axes to exploit the capacity of the inland waterways. Key success factors for the integration of inland waterway transport into multi-modal transport chains include innovative tri-modal terminal design, improvements of design and techniques for barges, and the introduction of a European-wide intermodal transport unit that is suitable for all transport modes. Intermodal freight transport between the European mainland and the Nordic countries requires adaptation of port terminals in the Baltic Sea to handle complete block trains, and new low-cost communication solutions to overcome the differences in technical levels between the operators.



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Barriers to trans-European network implementation

The development of the trans-European transport network and its geographic spread

exacerbate the conflicts inherent in decision-making processes. The transport research programme has developed a methodology to help anticipate barriers in network implementation.

Overcoming barriers to implementation ²⁶

Many of the barriers for the trans-European network occur in the field of financing. Other barriers originate from different technical standards and allocation of regional responsibilities. Conflicting socio-economic and environmental objectives may also give rise to barriers to implementation. Phasing of trans-European projects can be a better solution than public-private

partnerships (which may be difficult to implement). Phasing or splitting into independent elements also helps to restrict the international part of the project. The positioning of the environmental appraisal procedure in the decision process shapes both the strategies of the actors involved and the solutions they reach. Mediation can be an effective way to resolve conflicts of interest if it represents a process of institutional learning rather than relying on charisma or personality.

Financing trans-European networks

The gap between socio-economic and financial profitability is a major barrier in the development of the trans-European network. When a project is not sufficiently profitable for the private sector, direct government contributions or the introduction of user charges can be used to let the private sector participate. However, even when a project offers a sufficient financial return for the private investor, the public sector could still be involved, for example to improve the project's viability by mixing public and private skills. Research has produced a handbook aimed at government officials on the application of public-private partnership (PPP) approaches to financing and operating trans-European network projects.



Implementing public-private partnerships²⁷



Three types of PPP have been identified as most common to trans-European network projects:

- joint ventures, where investment is shared between the public and the private sector,
- concessions, where investment is fully undertaken by the private sector through concession agreements,
- hybrid types, where the project is split in several project components with a public SPV ("special purpose vehicle") in control of the overall project.

Recommendations have been provided on how to organise the different phases of the PPP process and avoid possible barriers pertaining to the regulatory framework, market and financial factors and the political environment. A methodology (the "public private comparator") has been presented to enable decision-makers to compare PPP with conventional tendering for a specific project.

Risk allocation is at the core of successful PPP specification; each stakeholder should bear the risks it is best able to control, manage and carry. The public sector must be prepared to shoulder political and legislative risk. Major uncertainties affecting PPP decisions are user charging and other network level-effects. There is a strong case for the Commission taking a co-ordination role regarding these issues in cross-border projects.

Heading East

Transport is a key area for integration of the EU with Central and Eastern European countries and the Baltic States. The strategic planning of multi-modal corridors is of vital importance to

start to close the gaps existing in the networks of the accession countries.

Therefore research has investigated different infrastructure strategies for the development of major pan-European corridors.

Strategic assessment of pan-European transport corridors ²⁸

A strategic assessment methodology has been proposed to complement project-specific assessments. Images of the futures have been elaborated under four scenarios:

- “renaissance”, where a virtuous circle will develop, facilitating growth and integration;
- “dilution”, where high growth is sustained by successful reforms but interventions aimed at cohesion and shared political structures weaken;
- “solidarity”, with low growth rates in both Western and Eastern Europe and fast integration;
- “fragmentation”, with low growth and slow integration.

In-depth studies have been carried out for the ten multi-modal pan-European corridors that form the backbone of the network adopted in the transport infrastructure needs assessment (TINA) process. Results have suggested that it is important to support multi-modal solutions, while at the same time paying attention to positive boundary conditions,



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including intermodality and patterns of inter-regional co-operation. Combinations of road and rail projects were generally found to offer the greatest benefits, with road projects bringing greatest benefits in terms of accessibility and rail projects in terms of safety improvement and air pollution reduction. Diversification of the investment in different types of infrastructure was also found to have greater success in achieving national transport policy objectives.

Making better use of the Danube waterway ²⁹

Cargo volume on the Danube could grow by more than 170% from 1995 to 2010 if substantial improvements in navigational conditions and transshipment were achieved. Major infrastructure and organisational bottlenecks include the restricted width and depth on the upper Danube and the entrepreneurial weaknesses of the transition countries.

Key conditions for the intensified use of the Danube include:

- creating a single pan-European regulatory framework,
- launching a trans-national investment programme,
- fostering the liberalisation of market access and co-operation among service providers, and
- better integration of inland navigation in long-distance transport chains.

CURRENT DEVELOPMENTS IN TRANSPORT RESEARCH

This section identifies some of the current research in the field of trans-European networks. Further details are available from the Links section of the web-based Knowledge Centre.

Clearing bottlenecks in railway networks and at airports, exploiting the potential of waterborne transport and connecting effectively the candidate countries are important challenges that still lie ahead.

Priorities and current research lines include the following:

Infrastructure development and maintenance – specifications for technical and administrative interoperability within and across modes, and optimisation of terminal operations.

Traffic management systems – solutions for interoperable road traffic information and management systems, development of a supervisory railway management facility along European corridors, development of

new functions for the RIS and VTMS concepts to support the overall management of the transport chain, large-scale demonstrations of validated ATM concepts, and demonstration of Galileo applications.

Decision support tools for infrastructure plans – enhancement of guidelines for SEA including specifications of indicators and data sets and calculation methods for transport environmental costs, and development of new methodologies for the assessment of indirect and distributional impacts of transport investment projects.

Innovative transport services – assessment of the potential for rail-air freight services, and demonstration of operational solutions for European rail freight freeways.

Assessing spatial and socio-economic impacts ³⁰

Research is underway to provide a methodology for the analysis and measurement of the network effects stemming from qualitative improvements and introduction of new capacity in trans-European network schemes. Other research will combine transport and

macro-economic modelling to assess the impacts of infrastructure investments on economic growth, including employment and industrial competitiveness, and the distribution of these impacts among citizen groups, industries and regions.

Intermodal transport chains on the Danube corridor ³¹

Research is seeking to increase the use of the Danube waterway. Work is underway to set up and run highly integrated logistic networks and implement

an advanced European concept to manage door-to-door intermodal transport chains with inland navigation as the core transport mode.

References

Further information on the following projects can be obtained from the web-based Knowledge Centre.

Other key documents referenced in the brochure are available on the DG Energy and Transport web site (http://europa.eu.int/comm/dgs/energy_transport/index_en.html).

1. *White Paper "European transport policy for 2010: time to decide", COM(2001)370*
2. *Proposal for a Decision of the European Parliament and of the Council amending Decision 1692/96/EC on Community guidelines for the development of the trans-European transport network, COM(2001)544*
3. *The transport research programme is part of the fourth framework programme for Community activities in the field of research, technological development and demonstration for the period 1994 to 1998*
4. *MASTER project*
5. *ASTRA and EUNET-SASI projects*
6. *COMMUTE and STREAMS projects*
7. *EUFRANET project*
8. *PROFIT project*
9. *CODE-TEN and EUDET projects*
10. *MINIMISE and SORT-IT projects*
11. *IMPULSE and UTI-NORM projects*
12. *EMSET, ETCS-VB, INDRIS, MASTER and TROPIC projects*
13. *TORCH and VTMS-NET projects*
14. *TRANSINPOL and VAST projects*
15. *ASTRA and EUNET-SASI projects*
16. *SCENARIOS and SCENES projects*
17. *COMMUTE and MEET projects*
18. *INFOSTAT and MESUDEMO projects*
19. *QUITS, PETS and TRENEN projects*
20. *TERMINET project*
21. *IMPREND project*
22. *OSIRIS and IRIS projects*
23. *EUFRANET project*
24. *SHIFTING CARGO and IMMUNITY projects*
25. *APRICOT and SCANDINET projects*
26. *TENASSESS project*
27. *PROFIT project*
28. *CODE-TEN project*
29. *EUDET project*
30. *IASON and TIPMAC projects*
31. *ALSO DANUBE project*

The programme's Knowledge Centre is available at:

<http://europa.eu.int/comm/transport/extra/home.html>

It provides:

- structured guides to the results and projects for particular topics;
- summaries and final reports of individual projects;
- access to project web sites and other contact details.

Brochures on results from the transport research programme

are available for:

1. Sustainable mobility
2. Clean urban transport
3. European transport networks
4. Single European sky
5. Maritime safety
6. Freight intermodality
7. Getting prices right
8. Road safety
9. Intelligent transport systems



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