major changes must be evaluated! Security of energy supply is another important issue to be considered.

Since 1990, two thirds of the increase in emissions from Transport have occurred in the Road sector. Emissions from Railways over this period have decreased by 50%.

In absolute terms, CO_2 emissions from Road Transport totalled 900 Million Tonnes in 2006. Cars accounted for 600 Million of these emissions and trucks accounted for the remaining 300 Million Tonnes. From an energy and emissions perspective, rail is many times more efficient than road.

The facts outlined above, would tend to indicate that policy initiatives to shift traffic from road to rail should focus, at least initially, on passengers however this course of action is not recommended as a high priority for the following reasons;

1. The perceived "freedom" brought about by car ownership if difficult to counter with policy measures.

2. Even with the possibility of roadway congestion, European citizens find the perceived service quality of "on demand" point to point travel by car vs the transfers involved with train usage, most compelling.

3. The train frequencies required to improve the competitiveness of rail vs road come with a high cost to environmental efficiency and infrastructure requirements.

4. Once someone has access to a car, the comparison of the cost of travel is usually made on the basis of the incremental cost of petrol vs the price of a train ticket(s).

5. Communicating the benefits of train usage vs the use of high quality European cars to hundreds of millions of citizens of the EU is a daunting (and expensive) ongoing task.

As a result of the above; the current efforts by the European Commission to "encourage" manufacturers to produce more emission efficient cars is the preferred policy option.

Transport & TEN T Policy Formulation - Recommended Methodology:

The rationale outlined above leads to a recommendation to focus on the policies required to shift freight from road to rail.

As a first step towards establishing the appropriate policies the following high level analysis is recommended:

I: Create a database of expected freight transport demand. This database should contain Origin – Destination pairs (Using NUTS codes), commodity groupings and annual volumes.

II: Segment the Freight flows as follows:

a). Individually assign all high volume flows (over 100,000. tonnes/year), regardless of length of haul; to rail, short sea or inland waterway. The criteria of proximity to navigable water at origin and destination would be the primary assignment criteria.

b). Collectively assign 90% of the tonne kms associated with the remaining short haul flows (less than 100 kms) to road.

c). Divide the tonne kms related to medium haul flows (100 – 300 kms) evenly between rail and road.

d). Collectively assign 90% of all tonne kms associated with flows over 300 kms to rail. The 10% of the tonne kms that would be handled by truck would reflect the need for rapid transit times – when required. For the majority of freight shippers, transit time ranks as the 5^{th} most important factor in the modal choice equation. It is the 3^{rd} most important factor for forwarders – after transit time reliability and price.

This assumption (d) would result in considerable tonne kms being shifted to rail since rail market share in Europe decreases as the length of haul increases!

Since modal choice decisions are made by freight shippers, and since transit time reliability is the number one factor in modal choice; the major assumption implied in the process described in a). to d). above is that rail transit time reliability (siding to siding for wagonload and dock to dock for intermodal) would be increased from the current levels of approximately 50% to the 90% range. Some would say that achieving this level of reliability for freight railways is impossible, however it had been done in Sweden and North America – with major commercial success in both cases! There are proven innovative systems that can support this type of transit time reliability improvement. Since transport service providers

must work together to deliver reliable, seamless service, the implementation of these systems would be meet the criteria of "projects of common interest". Current initiatives in this area are limited, slow and fragmented. More focused and intensive efforts are required!

If the results of the process described above resulted in 50% of the tonne kms in Europe shifting from road to rail, net CO_2 emissions would decrease by approximately 100 to 150 million tonnes/yr - at current levels of efficiency. Greater reductions would be achieved as improvements (e.g. more electricity from green sources) and innovations are applied to rail.

Many would point out that this traffic shift would triple the existing freight volume handled by rail (market share would increase from 10 to 33%) which would require three times as many freight trains with a proportionate increase in infrastructure capacity.

In fact, a modal shift of this magnitude could, over time, trigger an environmental and economical transformation of European freight railways. Currently the average freight train in Europe carries approximately 400 tonnes of goods. Even within the existing infrastructure capabilities, proven operating practices to increase train loads (including the reduction of empty wagon flows through the use of backhaul) could increase average train weight to 600 tonnes. This increase in train weight would, in turn, decrease train requirements by 50%. Longer, heavier trains use the same amount of infrastructure capacity as lighter, shorter trains therefore savings in infrastructure requirements would parallel savings in train volumes.

Due to the traditional national focus of European Railways and the lack of data, the empty wagon flow issue has not been seriously addressed. No accurate measurements are available however anecdotal observations indicate that at least 40% of wagon kms in Europe are empty! The haulage of empty wagons is wasteful in many ways; environmentally, fleet costs, train costs and infrastructure efficiency – to name a few.

Improving infrastructure capabilities (e.g. increasing maximum train length) on selected routes would also be cost effective. Tonnes per train could be increased to 1000 and above. As a rough indicator, the average freight train in North America carries 3000 tonnes of goods.

Increasing tonnes/train is the most effective way of increasing the overall productivity of a freight railway. In addition to improving the use of the infrastructure, operating costs would decrease in proportion to increased train weights - to the benefit of the Railways and their Customers – which in turn would lead to reduced logistics costs.

The factors outlined above support the Freight Priority network thrust which is currently under consideration. Network optimization, both in the planning and operating modes would be essential to make modal shift efficient – both economically and environmentally. Proven analytical tools are available which would ensure that individual initiatives are compatible with an interoperable, optimized Freight Priority network. It should be noted that while rail network enhancement will support improved freight rail capacity and productivity, it will not automatically produce quality service to shippers. Separate tools are required to enable service providers to deliver quality service to their customers. Both of these sets of tools would qualify as "projects of common interest".

Clearly, the results of applying the methodology described above would only provide an approximate indication of what could be achieved in terms of reductions in CO_2 emissions and Railway productivity gains. The results from the initial assessment could be fine tuned by running different scenarios such as increasing or decreasing the 100 and 300 km thresholds in steps b) & c) and varying the high volume criteria in step a).

Concentrating modal shift efforts on corridors where the generation of electricity comes from low carbon sources could be another fine tuning exercise that would produce improved results. Note that if the electricity to power a freight train is sourced from facilities that do not use, coal, gas or oil – then the CO_2 generated per tonne km is ZERO. This capability cannot be achieved by road transport. Since electricity generated from coal produces almost twice as much CO_2 per kwh as gas; even a shift of this type is beneficial to freight rail.

There are also many other benefits of shifting freight from road to rail such as reductions in traffic accidents, congestion and infrastructure requirements. Using the EU, 34% traffic growth projection; it would be useful to compare projected combined road and rail infrastructure costs associated with the "modal shift" scenario described above vs what would be required under the current market share projections. "Land take" of road is estimated at 2 – 3 times that of rail on a tonne km basis.

Summary:

Shifting of freight from road to rail offers the potential of significant benefits in many areas especially in reducing CO_2 emissions and logistics costs. Specific Transport and TEN T policy options should be explored using the freight flow analysis methodology described above. Regardless of the policies adopted, projects of common interest involving network optimization and quality rail service delivery will be required.

TABLE OF CONTENTS

1. INTRODUCTION

Trans-European transport network (TEN-T) policy aims to provide the infrastructure needed for the internal market to function smoothly and for the objectives of the Lisbon Agenda on growth and jobs to be achieved. It also sets out to help ensure accessibility and boost economic and social and territorial cohesion. It supports every EU citizen's right to move freely within the territory of the Member States. Furthermore, it integrates

environmental protection requirements with a view to promoting sustainable development.

The €400 billion invested so far in a network that was established by Decision of the European Parliament and the Council in 1996, and last amended in 2004,[1] has helped to complete a large number of projects of common interest, interconnecting national networks and overcoming technological barriers across national borders. There is however still a long way to go to implement the initial plans fully – because of both the intrinsic long-term nature of the projects involved and the considerable delays in the completion of many projects.

Almost a third of the amount invested so far has come from Community sources.[2] The individual European citizen may not however always find it easy to see the results of the overall TEN-T policy or the European added value generated by the contributions from the Community. Objectives have been rather broad, which has made it impossible to meet them in full with the instruments available. In certain respects, they may also have lacked specificity, which has made it difficult to focus action and generate effective impacts and visible results. The Commission therefore believes that it is not only time to ask why the objectives have only been partially achieved but also whether these objectives are still sufficient to give forward-looking answers to future problems, and what means are needed to fully achieve tomorrow's TEN-T policy objectives.

While transport policy aims to promote economically and environmentally efficient, safe and secure transport services within the internal market and beyond, TEN-T policy needs to ensure that they operate to best effect, based on an integrated and innovative infrastructure that keeps pace with technological developments in the energy, infrastructure and vehicle[3] sectors. It should reflect, more than it has so far, established European objectives – not only in the transport sector but also in the wider political, socio-economic, environmental and institutional context.

In addition to strengthening TEN-T's role within the Lisbon Agenda, Europe's growing global role requires due attention to be paid to the development of future TEN-T policy. Europe's economic growth and the creation of jobs also depend on its international competitiveness, which needs to be supported by good transport connections with other parts of the world. Good connections to all of Europe's immediate neighbours, including Africa, are furthermore vital from an economic, political and security point of view.

Over and above everything else, the fight against climate change requires Europe-wide measures to underpin Europe's leading role in the world. Transport and transport infrastructure are areas which offer considerable potential for positive contributions. Climate change objectives should be placed at the centre of future TEN-T policy and be reflected in a truly European approach. Through a process that integrates economic and environmental objectives, is clearly oriented towards the needs of efficient freight and passenger services on a co-modal basis and involves innovation, future TEN-T policy

---

1 Decision No 1692/96/EC of the European Parliament and of the Council on Community guidelines for the development of the trans-European Transport Network, as last amended by Decision No 884/2004/EC of 29 April 2004

2 Grants from the TEN-T budget, the Cohesion Fund and the European Regional Development Fund, plus loans from the European Investment Bank

3 The term "vehilce" as used throughout this paper refers to transportation means of all modes

should provide a sound basis for an effective contribution to the Community's climate change objectives.

All this justifies undertaking a fundamental review of TEN-T policy rather than just reviewing and possibly updating outline plans and priority projects. While building on the experience gained and the results achieved so far, the policy approach needs first to be subject to a broad review. Given the scope of the task – in political, socio-economic, environmental, institutional, geographical and technical terms – the Commission seeks to involve stakeholders on as broad a basis as possible, so as to ensure that available expert knowledge, experience and views are duly taken into account. This is why the Commission is beginning the TEN-T review process with a Green Paper, summarising its current reflections and inviting contributions, before coming up with possible legislative and other proposals.

2. FOUNDATIONS ON WHICH THE FUTURE TEN-T POLICY SHOULD REST

- *The EC Treaty*

Articles 154 – 156 of the EC Treaty define Trans-European Networks policy and its contribution to achieving the objectives of the internal market, social and economic cohesion for the benefit of all its citizens, economic operators and regional and local communities, inter alia by targeting Community action to promote interconnection and interoperability of national networks, and access to such networks. Furthermore, sustainable development must be integrated into the policy. The TEN-T guidelines were subsequently developed to help implement the Treaty provisions stipulating that they identify projects of common interest and that the Community may support projects of common interest supported by the Member States. To further facilitate implementation, the Commission may also take initiatives to promote coordination between Member States.

- *Specifics*

The TEN-T Guidelines envisage the establishment of a single, multimodal network as the ultimate policy objective, covering both traditional ground-based structures and equipment (including intelligent transport systems) to enable safe and efficient traffic. Increasingly, it also involves the deployment of innovative systems that not only promise benefits for transport but also have substantial potential for industrial innovation.

Projects of common interest within TEN-T differ considerably from each other in many respects: planning processes, geographical extension and cost, implementation periods and life span, as well as investment, implementing and operating structures. TEN-T policy has to cater for a broad range of approaches whereby Member States play a leading role in traditional infrastructure provision and work alongside the private sector. The nature of the network itself therefore places particular responsibility on all of the actors involved to share objectives and play their respective parts in achieving those objectives.

- *Past achievements*

Positive changes resulting from the implementation of TEN-T policy are already visible. National rail and road networks have become interconnected at many points and railways across borders are beginning to become interoperable. Community funding has concentrated on major high-speed rail projects, opening up a new generation of passenger

traffic that can compete successfully with air and private cars. Finance has been channelled, under the Cohesion Fund, into major projects connecting countries and regions with differing levels of development, thereby helping to reduce disparities. It has had a significant catalytic effect and has enabled some of the most challenging and complex projects (geologically, technically, financially, legally/administratively) to be taken forward. It has promoted pilot schemes for public-private partnership solutions, which allow lessons to be learnt in terms of financing and project management.

TEN-T policy has also stimulated the development of intelligent transport systems. Apart from Galileo, this sector has – in the fields of road, rail, air and waterborne transport – made significant progress through TEN-T-supported projects at European or euro-regional level, many of which would otherwise not have been implemented or launched.

TEN-T policy has begun to provide responses to issues in the field of freight transport, where expected growth (an increase of 34% between 2005 and 2020) underlines the importance of introducing real co-modal solutions to overcome problems such as congestion, rising carbon dioxide emissions, infrastructure and organisational gaps. The motorways of the sea concept – truly multi-modal in nature – deserves considerably increased attention in further TEN-T development. It promotes "cleaner" freight transport on a co-modal basis, also linking the EU to the external world.

- *An assessment of strengths and weaknesses*

Network planning

First and foremost, the TEN-T Guidelines are the Community's instrument for policy definition and network planning. The projects of common interest identified in these Guidelines can be defined through their location on outline plans and/or through their characteristics.

The Guidelines, as adopted in 1996 and last amended in 2004, include two planning layers: a comprehensive network layer (outline plans for rail, road, inland waterway, combined transport, airport and port networks) and a second layer of 30 priority projects – i.e. selected projects of common interest.

The **comprehensive network** comprises altogether: 95 700 km of road links, 106 000 km of railway links (including 32 000 km of high-speed links), 13 000 km of inland waterways, 411 airports and 404 sea ports. Most of these links and nodes already exist. However, almost 20 000 km of the road links, over 20 000 km of railway links (overwhelmingly high-speed lines) and 600 km of inland waterway links remain to be built or substantially upgraded – at an estimated cost of €500 billion according to recent estimates of Member States.[4]

"Planning" this Community network has essentially meant adding together significant parts of national networks for the different modes and connecting them at national borders. While certainly appropriate in the early days of TEN-T policy, the adequacy of this approach became progressively weaker with each enlargement. TEN-T network planning has not been driven by genuine European objectives that would ensure that the whole is greater than the sum of its parts. Irrespective of Member States' sovereign responsibility in the field of infrastructure planning and implementation on their

[4] European Commission, Directorate-General for Energy and Transport, TEN-T – Implementation of the Priority Projects, Progress Report, May 2008

territories, the question of how national planning can be combined with a European level of planning that takes account of objectives outside each individual Member State's perspective becomes more and more relevant as the EU expands and networks become increasingly complex.

By and large, the TEN-T **priority projects** cover major rail, road and inland waterway axes that traverse several Member States. Chosen in 2004 for their high relevance to transnational traffic flows, cohesion and sustainable development objectives, they were subjected to a common socio-economic evaluation. However, questions still arise, for example, as to the methodological soundness of their selection, the potential for interconnection and extension (both geographically and modally), the approach to coherent capacity and quality standards, and the means of better stimulating their completion within the planned timeframe.

In addition to defining projects of common interest through their location in outline plans and inclusion in the list of priority projects, the Guidelines set out "characteristics" and specify objectives and criteria for identifying projects of common interest. In the field of intelligent transport systems, this kind of conceptual approach has formed the basis for the definition of projects of common interest.

Network implementation

The TEN-T Guidelines are linked with instruments to facilitate the implementation of projects identified as being of common interest. These are a) various financial instruments based on the relevant legislation, including the TEN Financial Regulation[5] and the Cohesion Fund, ERDF and loans from the European Investment Bank, and b) non-financial instruments, such as coordination initiatives taken by the Commission.

So far, the instruments available have not been sufficient to deliver full completion of projects of common interest within the timeframe agreed in the Guidelines. This is particularly true of the comprehensive network. Responsibility for completing the large numbers of projects concerned rests almost entirely with the Member States, whose investment decisions are essentially driven by national objectives. Community funding under the Cohesion Fund has supported project implementation in eligible Member States, and has thus also contributed to the access function (including access to ultra-peripheral regions); TEN-T funding has only been able to address policy objectives in part. Overall, Community resources spent so far have barely enabled citizens and economic operators to "see the difference" – the European added value – of Community action in relation to the comprehensive TEN-T as a whole. Investment efforts by Member States on their respective territories are mostly seen as national investments rather than as contributions to a Community objective.

The situation has been different with priority projects, which have been at the centre of Community efforts – both financially and in terms of coordination. Although the Community financial resources available are still not sufficient to meet the needs of these projects in full, action – directed towards more limited and commonly agreed objectives – has been far more effective and visible. The approaching completion of some of these projects provides a concrete illustration of the potential benefits of the TEN-T policy

[5] Regulation (EC) No 680/2007 of the European Parliament and of the Council of 20 June 2007 laying down general rules for the granting of Community financial aid in the field of trans-European transport and energy networks

objectives set out in the Treaty. A key TEN-T priority project such as the high-speed railway line linking Paris, Brussels, Cologne/Frankfurt, Amsterdam and London has not only interconnected national networks and marked a breakthrough of a new generation of railway traffic across borders, it has also allowed citizens and business travellers to experience the benefits of free movement within Europe.

The Motorways of the Sea priority project (covering infrastructure, facilities, procedures, technologies and services) is intended to foster quality and high-capacity integrated multi-modal, door-to-door transport services with a maritime leg. It is defined in the TEN-T Guidelines by way of a conceptual approach setting out objectives and procedures for identifying projects of common interest. This has helped the Community to develop practical application of a co-modal transport solution aimed at improving accessibility and reducing emissions from road freight transport. Various Community and national instruments are available, including the TEN-T budget, which mainly addresses super- and infrastructure in ports and hinterland connections. The complexity of procedures for obtaining public financial support and the lack of clear objectives and criteria have however hindered any broad implementation of the concept so far.

As regards intelligent transport systems, TEN-T policy has helped in particular to prepare Galileo and the Single European Sky Air Traffic Management Research (SESAR) – major European projects which, once operational, are expected to make the use of transport infrastructure far more efficient. In road, rail and air transport, as in Vessel Traffic Management and River Information Services, ITS projects have been developed in a flexible way, on the basis of characteristics set out in the TEN-T Guidelines. This conceptual approach makes it possible to incorporate technological developments, market needs and cooperation initiatives between partners from different Member States and, combined with the 50% funding possibility for project preparation, has had a significant impact on the development of cross-border projects which might not have existed otherwise. This kind of flexible approach to project development, based on pre-established objectives and criteria, should also be lend itself to achieving other transport policy objectives – the provision of efficient (both economically and environmentally), safe, secure and high quality transport services.

- *Expected transport demand*

The planning of future transport infrastructure is closely linked to demand forecasts – whether at national or EU level. However, while aiming to provide transport infrastructure that responds in full to future demand, planning authorities face a range of uncertainties regarding factors that drive demand, such as economic and population trends, energy prices, transport pricing and taxation, the development of urban and territorial structures, behavioural changes, and technological developments. On the policy side, demand management measures are gaining increasing importance and should also be taken into account in infrastructure planning. These include in particular infrastructure charging, the internalisation of external costs and the application of intelligent transport systems.

Business-oriented development of transport services in an evolving internal market should also encourage efficient use of infrastructure, and have an impact on the development of demand. Building on a co-modal approach that involves both effective coordination across national borders and ITS applications, services of this kind are growing rapidly. EU transport policy focuses on a range of initiatives in the field,

including the Freight Logistics Action Plan, the proposal for a Directive on Rail Freight Corridors and the Single European Sky policy.

Business activities may be able to grow within the existing infrastructure framework in the shorter term, but as they evolve, the transport policy response will need to evolve too, which could impact both on transport infrastructure provision and its "phasing". The future TEN-T policy needs to be sufficiently flexible to link transport policy and transport infrastructure development in the short, medium and long term.

Q1 Should the Commission's assessment of TEN-T development to date cover any other factors?

A1 a. How effectively is existing infrastructure capacity being utilised?

b. How much has infrastructure capacity been increased for each mode?

c. When costs and time to implement are considered, what has been the relative effectiveness of work done to date?

d. Since dock to dock or siding to siding transit time reliability is such an important factor – what are the current levels of reliability – mode by mode and/or corridor by corridor?

3. ISSUES AT STAKE FOR FURTHER TEN-T DEVELOPMENT

Reviewing TEN-T policy – with the central question of how to shape the future multi-modal network and how to ensure timely completion – requires a sophisticated combination, at the different levels involved, of planning approaches, implementation capacities and know-how. While duly respecting Member States' sovereign rights for projects concerning their territories, the increasing complexity, innovative nature and geographical scope of the tasks at stake also call for a strong Community role.

Based on the above assessment of policy, a number of issues for the future are outlined below.

3.1 Network planning

- *The future of the comprehensive network*

The current comprehensive network has been essential for fulfilling the “access function” referred to in the Treaty, and it has proven its worth as basis for support under the Cohesion Fund. Furthermore, it has formed an important basis for the implementation of Community legislation in the transport sector – e.g. rail interoperability and road tunnel safety. Its shortcomings, on the other hand, have been the discrepancy between the overall planning ambitions and the means of stimulating and monitoring implementation, and a lack of focus from a European perspective.

Maintaining the comprehensive network layer of the TEN-T would involve reviewing the methodology for updating and monitoring it, and reviewing the instruments needed for full and timely implementation, whereby Member States would certainly have to assume more binding responsibility. Abandoning it, on the other hand, would for instance require special attention to be given to ensuring the network access function.

Q2 What further arguments are there for or against maintaining the comprehensive network, and how could the respective disadvantages of each approach be overcome?

A2 ***There is no doubt that a comprehensive network approach is required. Undertaking individual "priority projects" without a network optimization process will produce sub-optimum results. Priority projects should be considered in light of comprehensive network requirements.***

- *Possible incorporation of a 'priority network'?*

The current priority projects approach reflects major traffic flows between a starting and an end point, without taking account of their continuity, and fails therefore to capture successfully any additional 'network benefits'. To do so, and thus also to enhance the economics of TEN-T projects of high Community interest, the current priority projects approach could evolve towards a priority network approach. This kind of network approach would also allow more systematic incorporation of the nodes (which are often the main source of congestion and other inefficiencies), ports and airports as the network's entry points and the main inter-modal connection points that underpin strong network integration. By combining existing infrastructure links and nodes with planned infrastructure in a single network, the past achievements of TEN-T policy could also generate additional value.

Any approach towards such a network should, as a starting point, build on common agreement on clear **goals** and on a transparent and objective planning methodology. These should take account in particular of major traffic flows, both within the Community and with other parts of the world, of cohesion objectives through connections between regions with different levels of development and different territorial features, of connection to pools of economic development, of the "value of efforts already spent" on TEN-T development, of environmental objectives, of other Community policy objectives (e.g. competition), of progressive efforts towards more efficient infrastructure use, of the diversity of Member States' situations, and of the sharing of planning responsibility at Community and national level.

A – geographically defined – priority network should ensure continuity of the current priority projects and build on them where justifiable. Climate change objectives should first and foremost guide any approach towards the development of a possible priority network. This kind of network should therefore be truly multi-modal, enabling major freight and passenger traffic flows to cross the European Union as efficiently – economically and environmentally – as possible, on a co-modal basis. This calls for optimal interconnection of modes – for example, through hinterland connections of maritime and inland waterway ports or through railway connections to airports – and the inclusion of major projects in intelligent transport systems. While seeking to make a noticeable contribution to the Community's 20/20/20 climate change objectives, TEN-T policy should also take account of the need to adapt to the possible consequences of climate change (such as rising sea levels or changing heat patterns). The vulnerability of the TEN-T to climate change and potential adaptation measures should therefore be assessed, and attention should be given to the question of how to "climate proof" new infrastructure. Furthermore, in order to assess fully environmental impacts of the TEN-T, the requirements set out in the UNECE Protocol on Strategic Environmental Assessment to the ESPOO Convention should be met.

This priority network should be distinguished by full interoperability (i.e. implementation of European Rail Traffic Management and all other Technical Specifications in the railway sector; implementation of the Single Sky policy and the ATM Master Plan; interoperability in other ITS sectors) and, furthermore, target agreed capacity standards

for all infrastructure components involved. (Currently, the TEN-T Guidelines only include target standards in the inland waterway sector.) Other Community action that interrelates with infrastructure design – such as the possible introduction of larger and heavier road vehicles or intelligent motorways – should also be taken into account.

A priority network would bring past achievements and current and future challenges of TEN-T policy closer together. Within this framework, the EU could streamline the identification of projects of common interest and determine more objectively its support for them through Community instruments, provided projects are evaluated on a harmonized basis. It would, after all, combine infrastructure measures of different scales – from large long-term projects to projects of smaller scope that can be implemented in the shorter term and thereby enhance the effectiveness and visibility of Community action.

Q3 Would this kind of priority network approach be better than the current priority projects approach? If not, why not and what are the particular strengths of the latter? If so, what (further) benefits could it bring, and how should it be developed?

A3 As mentioned in A2 above, a comprehensive network approach is required. Priorities could then be established within the comprehensive network.

Note: Goals are mentioned above. It is most important to articulate and quantify goals.

In the introduction of this paper, goals are stated as; "Over and above everything else the fight against climate change…." Also stated " Climate change objectives should be placed at the centre of future TEN T policy…"

"Through a process that integrates economic and environmental objectives.."

These goals and objectives should be more clearly quantified though efforts such as putting a price on CO_2 and providing return on investment criteria.

- *A "conceptual pillar"*

The conceptual approach of TEN-T could be considerably broadened in order to cater for infrastructure needs resulting from business-oriented measures in the different transport service sectors. Sector-related policy objectives and criteria, as set out in the TEN-T Guidelines, could guide operators in the development of projects of common interest. Aiming mainly to optimise the use of existing infrastructure capacities initially, this approach could reflect evolving infrastructure needs, alongside growing demand, in the longer run. It could also introduce more flexibility into the concept of projects of common interest, thus making it possible to respond to market developments that are currently difficult to foresee. It would establish a direct link in particular between the Community's transport policy objectives (such as the promotion of sustainable freight transport through various legislative and policy actions, efficient and sustainable air transport through the Single Sky policy and SESAR) and its infrastructure policy and thereby direct TEN-T towards its main objective of serving as a basis for transport services that meet established Community objectives.

Q4 Would this kind of flexible approach to identifying projects of common interest be appropriate for a policy that, traditionally, largely rests on Member States' individual infrastructure investment decisions? What further advantages and disadvantages could it have, and how could it best be reflected in planning at Community level?

A4 It is very difficult (impossible) to optimise a network by focusing on individual components. Both in a planning and daily operations modes. There must be a means to access the impact that changes to individual components will have on the overall network.

There are proven tools to make these assessments and it is essential that they be applied to this situation given the immense funding that is required and the important goals that have been established (e.g. emissions and logistics costs).

These types of network optimization tools as well as "innovative systems" required to support service quality in terms of transit time reliability, tracking and tracing, ETAs etc should be considered as projects of common interest.

- *Infrastructure issues of particular relevance to future TEN-T development*

Regardless of the future "shape" of TEN-T, there are a number of specific issues that should be duly addressed in future TEN-T planning. These include, in the Commission's opinion, the following:

Differing needs of passenger and freight traffic

Passenger and freight traffic present different characteristics. Freight traffic is expected to grow faster than passenger traffic, average transport distances for freight are longer than passenger journeys and connecting points between modes and between long-distance and local traffic require different measures. Congestion problems on infrastructure sections may call for the separation of passenger or freight railway lines. In ports and airports, the handling of passengers and freight involves different infrastructure requirements, both within the nodes and also in access to these nodes. Freight access by lorry to cities requires environmental and urban planning issues to be taken increasingly into account. Whereas each individual case should be evaluated from an economic and environmental point of view, the question may arise as to whether, and to what extent, separate planning approaches for freight and passenger traffic should be addressed within overall TEN-T policy. In both cases, nodes as transfer points between long-distance and urban traffic will need to be considered in future TEN-T policy.

Airports and ports as Europe's connecting points to the world

Airports play a key role in passenger traffic (particularly, in view of Europe's growing global role) and are also gaining in importance in freight transport as part of co-modality and the logistics chain. They are expected to face significant capacity constraints in the coming years. Air transport is particularly sensitive to fuel price, security and economic development, and the type and scale of "projects of common interest" within airports may therefore be changing.

As the origin and destination of the overwhelming proportion of the Community's international trade flows and a key component of freight logistics chains, maritime ports have seen steady growth in traffic in the last 30 years. The expansion of port

infrastructure, including the creation of proper maritime access infrastructure, involves long preparatory phases and high cost, however, and therefore poses problems to many ports. Insufficient inland connections, in particular for rail, have also been identified as a key obstacle to the proper integration of ports into logistics chains. Infrastructure capacity problems in certain ports and land access to them may have an impact on land transport flows across Europe, since, for example, incoming trade flows may concentrate on a few major ports only. The distribution of goods via land routes may then aggravate congestion problems and have a negative impact on overall transport emissions.

Waterborne transport in the EU

On the other hand, the inland waterway network has ample free capacity that is already available or can be activated with relatively limited financial resources. It connects the major seaports and links the main industrial centres in the hinterland, often along heavily congested transport corridors. However, full and efficient use of inland waterways is still hampered by a number of bottlenecks and shortcomings.

As regards the further development of motorways of the sea, they need to be defined in terms of objectives, scope and criteria for public support as the stimulus for public and private initiatives. The "green dimension" of motorways of the sea should be accentuated, possibly as part of the green freight corridor concept. Their economic viability should also be highlighted, and funding through various instruments (at national and Community level) should be streamlined.

Freight logistics

Freight logistics have become crucial for the Community to meet the economy's transport needs in a sustainable way. Based on the principle that each mode is used according to its comparable advantages within efficient co-modal transport chains, they play an important role in helping the Community to achieve its climate change objectives. They support economic growth while making freight transport more efficient – from both an economic and an environmental perspective. To enable freight logistics to utilise their growth potential to the full, TEN-T policy needs to ensure the right infrastructure basis, in particular in terms of inter-modal terminals, rail, sea and river port capacity (including land access to seaports), parking areas for commercial vehicles and ITS systems as both infrastructure components and means of tracking and tracing goods. The development of green corridors, within the freight logistics concept, is expected to strengthen the environmental and innovative dimensions. Co-modality, however, is also an important issue for passenger traffic, where seamless flows should be ensured between the different means of public transport (e.g. rail – air), road and public transport and long-distance and urban traffic.

Q5 How can the different aspects outlined above be best taken into account within the overall concept of future TEN-T development? What further aspects should be taken into consideration?

A5 Quality of service is vital to achievement of the goals that have been established. Proven "innovative systems" are available to support the delivery of quality (and lower cost) freight logistics which includes tracking and tracing as well as the provision of shipment ETAs.

Intelligent transport systems

Intelligent transport systems are applicable to all modes of transport, as they help to optimise the individual modes and make for seamless connection. ITS has the clear potential to enhance the efficiency of operations and to improve safety, security and comfort for the user – as EGNOS in 2009 and then Galileo in 2013 become fully operational, these effects will be increased. They form the bridge between the hard infrastructure and the increasingly intelligent vehicles making use of it. But most importantly, ITS is also key to achieving major Community policy objectives in transport and beyond, in the field of safety (better informed and supported users), security (tracing, identification), efficiency of operations, tackling congestion (effective demand management and cross-modal network balancing through pricing, implementation of legal provisions) and fighting climate change (energy efficiency, eco-driving, green corridors and a more efficient and effective European co-modal transport system through e-freight, e-maritime). In the air sector, for example, a European network system approach is essential if the targets of efficient, safe and environmentally sustainable traffic performance are to be achieved.

Given their relatively low cost compared to hard infrastructure building, and the opportunity of combining and optimising public and private sector investment, social benefits and the return on investment are considerable – on condition that deployment is concerted, cross-sector and rolled out all over Europe.

Q6 How can ITS, as a part of the TEN-T, enhance the functioning of the transport system? How can investment in Galileo and EGNOS be translated into efficiency gains and optimum balancing of transport demand? How can ITS contribute to the development of a multi-modal TEN-T? How can existing opportunities within the framework of TEN-T funding be strengthened in order to best support the implementation of the ERTMS European deployment plan during the next period of the financial perspectives?

A6 As mentioned in A4, individual technologies should be assessed in light of their potential impact on network optimisation and the delivery of quality logistics at lower cost.

- *Innovation*

Transport infrastructure, including ITS, and the vehicle sector have considerable potential for innovation, and thus the traditional borderlines between infrastructure and vehicles may be shifting. As regards TEN-T development over the coming decades, questions arise as to how infrastructure will need to adapt to new generations of ITS and vehicles (e.g. infrastructure implications of intelligent vehicles) and what consequences innovation in infrastructure may have on rolling stock.

New energy forms in transport may well call for infrastructure to be adapted (e.g. filling stations). The latest research on electric and hybrid vehicles is encouraging, because of the possibility of shifting the CO_2 emissions problem from vehicles to power plants, where it can be treated more effectively. In the longer term, hydrogen technologies could be very helpful for aviation and shipping.

Besides technological innovation, the objective of ensuring the most efficient use of infrastructure may also call for organisational innovation.

Q7 Do shifting borderlines between infrastructure and vehicles or between infrastructure provision and the way it is used call for the concept of an

(infrastructure) project of common interest to be widened? If so, how should this concept be defined?

- ***A7 Yes! A project of common interest should be an initiative that enhances the functioning of a network – either in a planning and/or operational mode, plus supports the delivery of quality logistics.***

- *A TEN-T "core network"?*

To make TEN-T an effective basis for all relevant transport policy objectives and hence highlight its added value as an integral part of the common transport policy, the different "pillars" referred to above could be combined to form a TEN-T core network. Such a network could include both a priority network and a conceptual pillar, thus reflecting the need for flexibility and market orientation. It may also evolve over time, ensure optimal integration of all infrastructure ("hard" and intelligent) and interconnection between modes, and act as a vector for innovation – both technological and organisational. It could also become the basis for the deployment of various innovative approaches, for example in terms of transport pricing. A core network, with clear European objectives and the highest priorities in the field of transport and other EU policies (Internal Market, Cohesion, Sustainable Development/Climate Change etc.), could thus be the centrepiece of the Community's efforts in relation to TEN-T policy.

Q8 Would this kind of core network be "feasible" at Community level, and what would be its advantages and disadvantages? What methods should be applied for its conception?

A8 It is not clear how the concept of a "core network" differs from a comprehensive network with priorities for individual projects.

3.2. Implementation level

TEN-T policy is only credible for the European citizen if planning options and implementation capacity match. The planning option chosen and the instruments for its implementation must therefore correspond.

- *Overall financing of the projects of common interest established in the TEN-T plans*

Despite all efforts to significantly enhance the efficiency of infrastructure use and respond to demand in the most efficient and sustainable way, completion of TEN-T remains a major financial undertaking.

If the comprehensive network is to be retained, the financial implications for completing it would be immense. Community financial instruments in their current form have not been able to bring about full and timely completion of all the projects involved. For the Community to ensure, despite this constraint, that any future decision of the European Parliament and the Council on this matter is properly implemented, Member States would have to ensure completion of the major part of the projects concerned themselves. Given the delays in the completion of this network in the past, a more binding responsibility for Member States might be called for. The "access function" of TEN-T, as referred to in the Treaty, might also need to come under the full responsibility of the Member States concerned.

Projects included in a core network – less extensive than the comprehensive network and concentrating on elements of high relevance to achieving the TEN-T policy objectives –

would of course also come at a high cost. Each individual project of common interest, however, should have strong backing in established Community objectives and help to increase the soundness of the overall cost estimate of TEN-T implementation.

TEN-T planning should allow as accurate as possible a cost estimation for the network as a whole. Implementation targets and cost estimates for the TEN-T Guidelines, which usually have a timeframe of 15 to 20 years, could be split into short, medium and long-term perspectives. This could provide a sound basis for discussions on TEN-T financing as a whole, where Member States, Community grant instruments and the European Investment Bank will continue to have major roles to play. Given the long-term nature of the largest TEN-T projects, it is also important to look beyond any one period of Community financial perspectives, in order to provide investors with more certainty for the entire project implementation period.

Implementation of TEN-T so far has been marked by enormous cost increases. These have been caused by difficult geological conditions, challenging technical solutions, changes in alignment for reasons of public acceptance, uncertainty about capacity standards at the outset, measures to ensure compliance with environmental legislation or pro-active environmental measures, implementation delays and various other problems. If TEN-T capacity standards are set at the planning level, this may reduce uncertainty. Pro-active assistance by the Commission, by way of its coordinating role, could address the various problems and promote exchanges of best practice, thereby enhancing the soundness of estimates and facilitating project implementation.

The wide range of different project types involved in TEN-T development calls for different financing solutions. With increasing market orientation in the transport sector and efforts towards infrastructure optimisation, a growing number of projects with full self-financing potential should now emerge. Implementation of Community legislation in relation to infrastructure charging and internalisation of external costs should give Member States additional possibilities both for better managing available capacities and optimising the transport system, and for financing new infrastructure and technologies. The role of the private sector in project delivery could also be intensified where appropriate. Community instruments supporting public-private partnerships should be further developed where efficiency gains can be expected. The recently created European Public-Private Partnership Expertise Centre is expected to help further disseminate experience and encourage the broader development of public-private partnership schemes.

Q9 How can the financial needs of TEN-T as a whole - in the short, medium and long term - be established? What form of financing – public or private, Community or national – best suits what aspects of TEN-T development?

A9 No comments.

Q10 What assistance can be given to Member States to help them fund and deliver projects under their responsibility? Should private sector involvement in infrastructure delivery be further encouraged? If so, how?

A10 No comments>

- *Community financial instruments in support of TEN-T implementation*

Grants, in particular under the TEN-T budget line and the Cohesion and European Regional Development Funds, play a major role in both project preparation and

implementation. Grants are allocated to studies (from feasibility studies to comprehensive technical and environmental studies and costly geological explorations), thus helping to overcome early stage project difficulties, and to the works phase. A key issue for the future as regards implementation of TEN-T policy is to streamline the allocation of grants and to link it to the European added value of projects so as to ensure the best value for Community money.

All projects of common interest might therefore be subjected to a harmonised and commonly recognised cost-benefit analysis that establishes the European added value. This analysis should cover both external costs and network or cohesion benefits, and take account of geographical asymmetries between benefits and the financial cost of investments (one Member State may, for example, be faced with particularly high costs for implementation of a project on its territory, while other Member States may draw disproportionate benefits from this investment). It would allow grants from the Community budget to be allocated fairly and objectively, and to be limited to projects with established Community added value. Furthermore, in order to obtain maximum leverage from Community funding towards TEN-T objectives, the management of all available budgetary resources (TEN-T budget, Cohesion Fund, ERDF and EIB loans) needs to be better coordinated.

In addition to grant support, other instruments such as the Loan Guarantee Instrument introduced in 2007 and the Risk Capital Facility (a pilot initiative for equity provision activity under the TEN-T budget) make for innovative and promising ways of supporting TEN-T projects. Diversifying the portfolio of instruments, in a bid to increase the leverage effect of Community support, to adjust support to the particular needs of a project and to enable effective project structuring, might also be considered. Innovative instruments could include Eurobonds.

Q11 What are the strengths and weaknesses of existing Community financial instruments, and are new ones needed (including "innovative" instruments)? How could the combined use of funds from various Community resources be streamlined to support TEN-T implementation?

A11 No Comments.

- *Community non-financial instruments in support of TEN-T implementation*

Coordination – European coordinators and "corridor coordination"

European coordinators, appointed by the Commission to help prepare and implement certain priority projects, have proven to be effective in a number of instances. Their role could be expanded to help stimulate the implementation of more major TEN-T projects (in combination with well targeted funding under EU financial instruments). Critical cross-border sections should certainly remain particularly important in this respect, thereby heightening the prospects for the entire project.

Coordination could play a vital role in any core network approach. Apart from the "traditional" priority project coordination through European coordinators, business-oriented "bottom-up" projects – such as rail freight and Green Corridors – also clearly call for solid cross-border coordination. This kind of "corridor coordination approach" would need to involve all the relevant stakeholders – infrastructure providers, operators, users and local and regional authorities – if solutions are to be developed that are both acceptable to all and technically, economically and financially feasible. For them to be sustainable, they should include all the relevant infrastructure components (e.g. in the

case of rail freight corridors: bottlenecks to be removed, inter-modal terminals, connections to ports, ERTMS and ITS equipment). For Community funding purposes, such projects could be treated as a new kind of "European project", to be dealt with as a whole rather than receiving fragmented support.

Corridor approaches might cover both corridors where the infrastructure implications are relatively small, but where significant benefits can be achieved in the short term, and corridors involving critical long-term projects such as trans-Alpine and trans-Pyrenees projects. In the latter cases, the approach may involve intermediate infrastructure solutions, thereby helping to improve the economics of the entire project.

Open method of coordination

Applying the Open Method of Coordination (OMC) to TEN-T could help to establish a common working framework for the Commission, the TEN-T Executive Agency and the Member States, and provide a common knowledge base on the TEN-T network. Implemented through the TENtec Information System and its portal, the OMC will allow the main user groups to have access to the data stored in the TENtec database and to GIS maps with TEN-T data, and to update them. Allowing public access (e.g. to reports and maps with information on the network) could also be a useful communications instrument for providing information on the Commission's work in relation to TEN-T. More systematic and comprehensive information about TEN-T policy development overall is important to raising citizens' awareness of its benefits.

Benchmarking could also be considered as a way of encouraging Member States to invest in TEN-T. The establishment of performance standards, for example, could help to determine capacities for the different types of infrastructure and serve as a basis for the optimisation of infrastructure use and identification of bottlenecks. Positive experience has already been made in this respect in the Air Traffic Management Sector whereas it has proved very difficult to identify infrastructure capacity in the rail sector. The exchange of best practice promises a number of opportunities for the facilitation of project implementation – in the field of the management of major projects, public-private partnership approaches, and consideration of environmental aspects in infrastructure planning.

Q12 How could existing non-financial instruments be improved and what new ones might be introduced?

A12 No Comments.

4. POSSIBLE OPTIONS FOR FURTHER TEN-T DEVELOPMENT

From the points made under point 3, the Commission considers three options for further TEN-T development to be possible:

(1) Maintaining the current dual layer structure with the comprehensive network and (unconnected) priority projects

(2) Reducing the TEN-T to a single layer (priority projects, possibly connected into a priority network)

(3) Dual layer structure with the comprehensive network and a core network, comprising a – geographically defined – priority network and a conceptual pillar to help integrate the various transport policy and transport infrastructure aspects.

Table 1 sets out the benefits and disadvantages of these three options.

Q13 Which of these options is the most suitable, and for what reason?

A13 As explained above – an optimized comprehensive network with priorities for individual projects established accordingly.

5. INFORMATION FOR THOSE RESPONDING TO THE GREEN PAPER

Consultation on the issues outlined in the Green paper will be open until 30/04/2009.

Contributions may be sent to:

European Commission

DG Energy and Transport

TEN-T

B-1049 Brussels

E-mail address: TREN-B1-GREEN-PAPER-TEN-T@ec.europa.eu

The European Commission will analyse the results of this consultation and use them as input for its work on the shaping of this policy area. Please note that contributions and the names of the authors may be published on the internet, unless respondents explicitly refuse their consent to publication when sending their contributions.

Structural options for the shaping of TEN-T

Option	Title	Description	Expected benefits/disadvantages to be addressed
(1)	Dual layer: comprehensive network and priority projects (current structure)	Layer 1: Comprehensive network (modal outline plans and traffic management systems as included in current TEN-T Guidelines) maintained in current form. Layer 2: Priority project approach maintained in current form. Review and possible revision based on provisions of current TEN-T Guidelines, Articles 22 and 23(3): Comprehensive network and priority projects may be revised as part of the review of the Guidelines on the basis of the two-yearly implementation reports. Priority projects will be subject to a progress report by 2010; amendments to the project list may be proposed if necessary.	Benefits: Layer 1: important "medium" for various transport policy objectives (implementation of interoperability, safety and other legislation) and, in the future, possibly, for new technologies, infrastructure charging, etc. Also ensures access function for regions. Layer 2: "visible part" of TEN-T policy: subject to concentrated Community financial support and coordination initiatives of the Commission. Measurable results with noticeable effect on internal market, cohesion and sustainable transport objectives. Disadvantages: Layer 1: no means at Community level of ensuring full and timely implementation of projects. Layer 2: network effect at European level is not optimised.
(2)	Single layer: priority projects – possibly in extended form	Single Layer: Priority projects in current form (amended as necessary), complemented by priority infrastructure needs resulting from requirements of various transport services. Priority projects might possibly be connected, and amended as appropriate, into a priority network.	Benefits: Allows concentration of Community instruments on highest priorities, offering better prospects for full completion of network within scheduled timeframe. High visibility and credibility of Community policy. Disadvantages: Comprehensive network with transport policy and access functions disappears as Community network due to the lack of means of ensuring proper implementation.

(3)	Dual layer: comprehensive network and "core network"	Layer 1: Comprehensive network (modal outline plans and traffic management systems as included in current TEN-T Guidelines) maintained in current form. Layer 2: "Core network" consisting of: a) a "geographical pillar" (defined in concrete geographical terms). This includes a "priority network" (starting from the current priority project approach) which links up and extends as necessary major trans-national axes, important nodes as inter-modal connecting points (ports, airports, freight terminals, etc.) and major European action in the field of ITS; b) a "conceptual pillar" providing the basis for the identification of projects, corridors and network parts over time; based on short, medium and long-term service needs; highly business-oriented. This pillar is defined through conceptual features such as objectives, criteria, etc., and provides a basis for transparent and objective project identification (also as a basis for possible Community funding)	Benefits: Layer 1: as set out in option (1). Layer 2: has greater potential for achieving true network effects and subsequent underscoring of MS commitment to completing this network. Also provides a reference basis for transport policies, future innovations (efficient infrastructure use, co-modality, logistics, new technologies, etc.) and emission reduction objectives. Overall: Allows concentration of Community instruments (financial and coordination) on full network completion; enhances effectiveness, visibility and credibility of policy. Establishes sound basis for negotiations on Community budget for 2014-2020. Disadvantages: Layer 1: lack of means to ensure full and timely implementation, while ensuring important functions for transport policy and network access Layer 2: inclusion of "uncertain" factors in TEN-T planning, which can only be defined through objectives and criteria rather than concrete projects.