Contract No TREN/05/FP6TR/S07.41077/513499

Funding Infrastructure: Guidelines for Europe - FUNDING

Instrument: Sixth Framework Programme

Thematic Priority: Sustainable Surface Transport

Deliverable 2
Consortium Funding Scenarios for EU Infrastructure Fund and Mark-ups

June 7 2006

Start date of project: 1 July 2005 Duration: 30 months

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Final [01]

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission	
RE	Restricted to a group specified by the consortium (including the Commission	
CO	Confidential, only for members of the consortium (including the Commission Services)	CO

Version	
Quality Assurance	Andre de Palma
Co-ordinator's review	Stef Proost

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Objectives of the FUNDING project

The main objective of the FUNDING project is to develop a scientifically sound approach to the funding of large transport infrastructure investments in the EU. Two different avenues are explored for the funding of these investments. The first is the creation of an EU transport infrastructure fund financed by mark-ups on transport activities. The second is the use of mark-ups on the costs charged by the infrastructure suppliers that make the investment. The overall structure of the research is outlined in Figure 1.

In WP1 the economics of infrastructure funds and the mark up method were first explored conceptually. For the infrastructure fund we examined three questions: how to spend the resources of the infrastructure fund (what type of projects, subsidies or loans), how to finance the operation of the fund (contributions out of general budget or earmarked taxes on transport) and what decision rules to use for the fund (political body versus agency, accountability issues). These questions were explored using economic theory (political economy, risk pooling, network spillovers) but we also drew upon experience with infrastructure funds and mark-ups in the EU, US and World Bank. The results of this work package are documented in Deliverable 1.

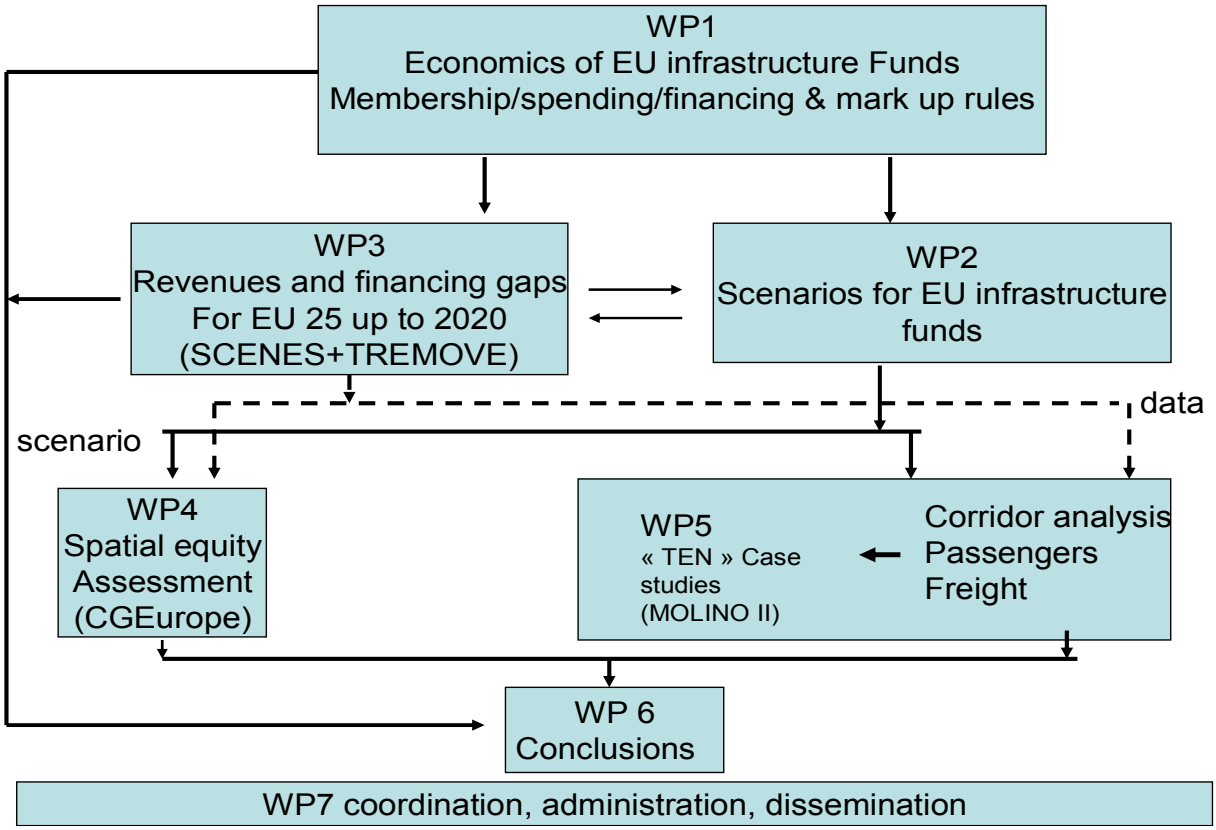

Figure 1 Overall structure of FUNDING project

The conceptual phase leads to the formulation of a limited number of alternative scenarios for a European infrastructure fund and for the use of mark-ups, which will be the subject of this document (WP2). WP3 will study the possibilities of financing a fund by extra charges on

existing traffic using the SCENES – TREMOVE baseline 1995-2020. WP3 generates revenues from different mark-up rules as well as information about the efficiency costs of different ways of generating revenues. As WP3 is based on one accepted baseline scenario for the EU it will also be used as much as possible as baseline for the other modelling workpackages. WP3 cannot evaluate the effect of scenarios on investments as the TREMOVE and SCENES model only accept exogenous investments.

The performance of the alternative infrastructure fund and mark-up scenarios in terms of investments and pricing is tested using two different but complementary modelling approaches. Each of the modelling approaches tests the same set of scenarios defined in WP2 but examines a different dimension.

The first model (CGEurope, WP4) is a multi-modal spatial general equilibrium model of the EU that checks the spatial equity effects of infrastructure aid and mark-ups for more than 1300 regions in the EU at the NUTS-3 level. It does this by translating the infrastructure and mark-up scenarios into lower transport costs between regions and simulating the trade and welfare effects of this cost reduction. The model is in line with the TREMOVE-SCENES baseline used in WP3 and tests scenarios developed in WP2. The main contribution of the model is the spatial equity dimension. The main missing dimensions are the endogenous investment behaviour and the non-competitive behaviour in the transport sector. These will be addressed specifically in WP5.

The second approach (WP5) is a case study approach. We aim to analyse five important TEN-T infrastructure projects using the same multi-modal pricing and investment assessment model. For every project, this model is calibrated on the basis of the cost benefit study that has led to the selection of the TEN-T project. The assessment model (MOLINO II) represents the transport flows, pricing, financing and investment decisions related to the project itself. It is complemented with corridor analysis information provided by corridor models for freight and passengers. The case study approach will enable the effect of infrastructure fund scenarios on each of the investment projects to be examined in terms of financial structure, timing of investment decisions, the pricing decisions and on welfare. The corridor models will also be calibrated based on the TREMOVE-SCENES baseline used in WP3.
The different tests lead in principle to consistent and tested guidelines for financing infrastructures via a European transport infrastructure fund and mark-up rules (WP6).

1.2 Background on the TEN-T

The trans-European transport network encompasses the major planned transport infrastructure in Europe. The concept of a trans-European transport network was formally recognised in the Maastricht Treaty (1992) and the first priority list of projects published in the Delors White Book (EC, 1993). In 1996 guidelines for the development of the trans-European transport network, which listed 14 priority projects, were adopted by the EU[1]. Following the report of the Van Miert group (2003), these guidelines were revised to include the current priority list of 30 axes to be launched before 2010 and new financial rules were adopted[2]. A fuller history of the TEN-T can be found in Turro (1999), for example. Investment in transport infrastructure does not, however, end with the TEN-T as the European Commission is also currently consulting on the extension of this network to neighbouring countries and regions (Loyola de Palacio group 2005).

[1] Decision 1996/62/EC

[2] Decision 888/2004 and Regulation 807/2004

To date, the selection and funding of such infrastructure projects has predominantly been the responsibility of the individual member states, although most of them contain (often multiple) cross-border sections. As discussed in Chapter 6 of Deliverable 1, the main existing European Community sources of funding for the TEN-Ts are the TEN-T budget line itself, the Cohesion Fund and the European Regional Development Fund (ERDF). Although, not the only cause of delays in the implementation of the TEN-Ts, under the current funding procedures, by the end of 2003 only three of the priority projects had been completed, only a quarter of cross-border funding had been found and 20 years would be needed to complete the priority axes at the current rate of investment[3].

Given the limitations of the existing funding framework, in this deliverable we will explore funding strategies which combine grants or loans from an EU transport infrastructure fund with mark-ups on the user costs charged by the infrastructure suppliers that make the investment. To do this we will construct a limited number of scenarios which will be applied to the TEN-T.

1.3 The role of Deliverable 2 in FUNDING

The principal purpose of this deliverable is to define a set of scenarios which can be used to answer policy question arising from Work Package 1 and to address the problems of the current funding framework for large European transport infrastructures.

A number of alternative scenarios will be developed, which range between heavy reliance on a European fund and low mark-ups on the new infrastructure and, at the other extreme, a small role for the European fund and an important role for the internal funding of investments via mark-ups. A number of policy questions need to be borne in mind when formulating these scenarios:

- What share of the required investment should be funded by users through charges and what share externally funded through taxpayers?
- What share should be funded by European as opposed to national taxpayers?
- What should be the principles of price-setting in a multi-modal corridor?
- How should capacity and investment be determined?
- How should the decision process on EU aid be organised?

While it is important to take the existing funding framework into account, the scope of this study is somewhat broader in order that important policy questions can be answered. In particular, we consider a single fund, replacing all current EU sources of funding, and a range of methods to finance this infrastructure fund, some of which may not be feasible in the current political climate. Furthermore, the implications of the scenarios for the decision process at the EU level are only considered in a limited way.

The alternative infrastructure fund and mark-up scenarios will be applied to the TEN-T projects using two different but complementary modelling approaches: a case study method, limited to five important axes; and a European wide approach to consider the aggregated effects. The performance of the different scenarios needs to be assessed and compared. Hence, in addition to issues relating to the different organisational rules of the funding

[3] European Commission proposal for a regulation on financial aid for the TENs (COM 2004/0475)

mechanisms in the scenarios, project assessment criteria also need to be developed. This leads to a further set of questions to be answered:

- Do particular infrastructure projects pass tests of political and social practicability?
- Are they good value for money in broad social welfare terms?
- Are they financially feasible?
- Does the funding mechanism guarantee that only the good projects pass?

The political and social feasibility of a project are important selection criteria whatever the proposed funding framework and should form part of the decision process on EU aid. The focus of FUNDING is primarily on the remaining three questions. That is to say assuming that TEN projects are politically feasible, what mixture of funding is best able to deliver the project and its benefits (measured in social welfare terms), whilst encouraging the selection of the best, socially maximising projects? Clearly, the value for money of a project, its social and political feasibility and its fundability are interdependent. Obviously, the benefits and costs of some of the investment projects are highly uncertain (cfr.Ch 5 in D1) and this pleads for a maximum of flexibility in the decision process.

In order to try to answer these policy and project assessment questions, we use three dimensions to define the scenarios: how to spend the money, which comprises level of aid and form and conditionality of aid; how to raise the money for the infrastructure fund; and the organisational structure. These are described in detail in Chapter 2. In Chapter 3 we specify a limited set of scenarios, combining elements of the three dimensions, and discuss their implementation using five models. MOLINO II, the passenger and freight corridor models, TREMOVE and CGEurope[4] are all suited to analyse different aspects of the funding problem and the scenarios are adapted to reflect their individual specialisations.

[4] These models are briefly described in Table 4.

2 DIMENSIONS OF POSSIBLE FUNDING SCENARIOS

In this section, we define the FUNDING scenarios using three dimensions:

Dimension 1: How to spend the money:

This involves different sub-problems:
1.1 The level of grant-aid from the EU and individual member states and the balance with user charging
1.2 The form and conditionality of aid

Dimension 2: How to raise the money for the Fund

Should the fund rely on general contributions from the member states or should the money come from general mark ups on the transport sector?

Dimension 3: Organisational structure:
This requires an outline of the decision makers involved: those that decide the infrastructure investments, those that will implement the various projects and those that control the infrastructure.

2.1 How to spend the money or the level of public aid and the balance with user charges

In order to clarify the discussion we distinguish between the financial questions and the procurement questions. In Table 1 we present the three financial questions. The first financial question is what share of the total investment cost is paid by the public sector (EU and member countries) and what share comes from user charges (see first column in Table 1). The second financial question is who pays for the public share: the EU and or other public bodies (member states, regions etc.). The third financial question concerns the part of the investment cost that is to be covered by user charges. These user charges will only come in the future and there is always a risk that they are insufficient to recover that part of the investment cost. Bridging financially the initial investment cost and the future receipts from user charges will have to be done by a mixture of loans and equity capital. We will return to this question later.

Paid by Public sector	1.1 Share EU
	1.2 Share other public bodies
Paid by users	Who takes risk to recover investment costs (loans, equity etc.)
TOTAL INVESTMENT COST	

Table 1 The three main financial questions

We opt for a limited number of scenarios that are differentiated by mode. The public aid we discuss here is expressed as a share of the investment cost and takes the form of a simple grant to start with. The present scheme is summarised in Appendix 1. In terms of Table 1, we discuss first the share of public sector aid and more precisely the share of EU public aid. Note that in both the moderate and high subsidy cases, this EU aid is matched by a public subsidy from the member state.

Total investment cost = I Share of foreign use = X	Present system	Moderate subsidy	High subsidy
Proposal for rail and inland waterways	10% I	30% X I for EU 30% (1-X) for MS	70% X I for EU 70% (1-X) for MS
Proposal for road and airports	10% I	0% X I for EU 0% (1-X) for MS	20% X I for EU 20% (1-X) for MS

Table 2 Level of public aid (grant), split between EU and member state (MS) and differentiated by mode

From Deliverable 1 (Chapters 2, 3 and 4), we know that, for a member state, the economic and financial viability of a project depends mainly on two factors: the returns to scale in capacity extension and the share of foreign users. The returns to scale[5] is the main determinant of investment cost recovery via user charges. The share of transit users will be the main determinant for the share of the EU in the public aid.

The share of public aid and user charges

According to the cost recovery theorem, when the use of a mode is priced according to the marginal social cost, the cost recovery ratio (the share of the capacity costs that can be recovered from user charges), equals the returns to scale in capacity costs under a wide set of assumptions (de Palma and Lindsey (2005)). The returns to scale in capacity costs differ strongly by mode and this is the main motivation to differentiate the share of public aid by mode. For rail (and IWW), returns to scale in capacity costs can be expected to be very significant, so that ε could be as low as 0.30 or so (see Deliverable 1, Chapter 4). This implies that, optimally, 70% of the investment costs needs to come from public aid, the other 30% can come from user charges. In the first line of Table 1 we therefore propose two variants: one where we take a high estimate for ε (close to 0.7), representing relatively modest returns to scale, so that only 30% needs to come from public funds (moderate subsidy); and a variant where ε is around 0.3, such that 70% of the investment costs needs to come from public money (high subsidy).

For road and airports, there is more evidence that the degree of returns to scale is close to 1 (i.e. constant returns to scale). It would appear that airports enjoy increasing returns-to-scale up to approximately 3 million passengers per year, beyond which they reach constant returns-to-scale (Pels (2001). So the moderate aid scenario does not provide any public aid for capacity expansion in roads or airports and provides a maximum of 20% in the high aid scenario. In the case of roads one should not forget that the present fuel taxes are already an important user charge and at airports, airline charges.

The returns to scale are the main determinant of the public aid needed if one relies on social marginal cost pricing (advocated by the European Commission). One could put forward arguments both in favour of more and also of less public aid to rail projects. A case often made is the distortion in pricing of road and air[6]. Road does not have Congestion pricing is not implemented on roads, which leads to prices being too low in the peak period for road use

[5] The degree of returns to scale in the costs of capacity is the percentage increase in total capacity costs when capacity is increased by a given percentage. If ε, equals 0.3 say, this means that a doubling of capacity would increase total cost by $2^{0.3}$=23%. The estimation of the degree of returns to scale can sometimes be difficult.

[6] We are dealing with an investment problem with two or more markets that are close substitutes. For an investment in rail, the primary benefits are on the rail market: a gain in consumer surplus and/or cost reductions for rail. The substitution effect on the other mode(s) will be an extra benefit if it is underpriced (user price <marginal social cost). If, however, the other mode is overpriced, this will be considered an extra cost for the rail investment project.

and this could in principle be a reason to subsidise substitutes like rail. However, this principle does not really apply here. In the case of the Ten-Ts, rail is mostly competing with long distance road transport where congestion is not the main issue so that present fuel prices probably come close to covering the different external costs in long distance trips. Consider now the case of underpriced air transport. Most airports do not price air pollution (Switzerland and Sweden being notable exceptions) and some do not price noise[7] but neither does rail[8]. Air pollution costs may indeed be higher for air but some air fares contain an important monopoly margin, despite competition from low cost carriers, which does rather play against favouring rail.

One could also propose arguments in favour of higher user charges for rail and lower levels of public aid. A higher share of user charges limits the call on costly public funds that have a high efficiency cost if they are raised via extra labour taxes. However, the efficiency cost of relying on higher user charges may very quickly become prohibitively high too (see Chapter 4 in Deliverable 1).

The share of the EU and the member state in the public funding

The major reason to have the EU level involved in subsidizing investment costs is the spill over of benefits when there are many foreign users[9]. For this reason, we suggest making the subsidy share proportional to the share X of foreign users (see Table 2). Lowering the EU share beyond this level could be justified by pointing to the risk of pork barrel politics: the higher the share paid by the EU, the higher the interest of every member state to lobby for unjustified projects (as exemplified by the federal systems in the US and Germany (see Deliverable 1, Chapters 6 and 7)). On the other hand, if the share of foreign users is important and the share of user charging limited, some interesting projects may never be undertaken by the member states.

The presence of many foreign users also implies that there is the potential for misuse of user pricing. Deliverable 1 (Chapter 3) has shown that the pricing inefficiency will be larger when the share of transit is large and when the investment is part of a corridor or a serial network. As the level of EU aid is larger for projects with many transit users, one may need to link pricing restrictions to the investment cost subsidy (see section 2.2.3).

The third question: the financial risk of the user charges will be addressed in the next section (2.2.2)

2.2 The form and conditionality of aid

Three conditions are discussed here: what form should the public subsidy take; who takes the risk on the future user charges; and finally what other conditions can be linked to the EU public aid.

[7] Schiphol Amsterdam, Belgium, Charles de Gaulle Paris, many of the German airports, Fumicino Rome, Arlanda Stockholm, Zurich and BAA initiated noise related charges to fund noise abatement schemes but the rest of the airports in Europe have yet to initiate such charges.

[8] See Levinson et al. (1988) for a discussion of externalities and their comparison among modes.

[9] We do not consider here the use of transport investments as " aid in kind" for poorer countries to full the Cohesion objectives.

2.2.1 Form of the public aid

We suggest that the public aid is given under the form of a grant or a financial equivalent. It is important for EU funding that the member states match the funding and that the subsidy contains sufficient guarantees for an efficient procurement procedure. This could require that the European Commission uses fixed cost estimates by type of infrastructure project so that the incentive for cost minimization is with the member country and the infrastructure owner. This could also involve bundling investment and operation (see EIB, 2005). Deliverable 1, Chapter 7 also details proposed funding rules aimed at increasing the state funded share of highway projects (and reducing the federal contribution).

2.2.2 The risk on the future user charges

Future user charges are uncertain because of many factors: demand may not be realised or there may be operational problems. In order to advance the realisation of TEN-T's, the EU may be tempted to cover the risk on future user charges by guaranteeing private loans or give loans to particular projects itself. As the EU is no better informed of the risks than the other parties involved, member states and operators may be tempted to present inferior projects with a high probability of lower than expected user payments.

It may be preferable that the EU does not take on the risk on future user charges so that these risks are born either by the member states or by the private partners involved. The experience in the US (FHTF) and in Europe points to the large risk of federal funds being misused to favour local interests. Private partners can be involved via PPP constructions. This requires a case by case discussion[10]

2.2.3 Pricing restrictions

In Deliverable 1, Chapter 3, we see that in the case of corridor projects (where one infrastructure project runs through different member countries), member states have a tendency to set excessively high prices. The main problem is that every member country (or regional government) will try to use its monopoly power to extract revenue from transit. In addition if every member country acts this way, the sum of monopoly margins will be higher than a single monopolist would ever charge. The reason is that every single monopolist does not take into account the negative effects on the profits of the neighbours ("double marginalisation") and this produces a result that is worse for the users and for the monopolists.
The double marginalization problem can be avoided by ensuring that corridor projects are carried out by one company operating in several member states. In addition the European Commission could add pricing restrictions to those projects that have an important share of transit users. These are also the projects that will receive, in our suggested scenarios (Table 2), the highest share of EU funds.

2.3 Sources of funds

The grant paid by the EU identified in Table 2 has to come from public means, which, for the purposes of our study, is a single European transport infrastructure fund, replacing all existing sources of funding at the EU level. There are two questions here. Firstly, do we establish a once and for all fund or do we consider a fund that is fed every year with EU contributions. Secondly, how is the fund to be financed?

[10] See the documentation of the British and EIB experience in EIB (2005).

2.3.1 Structure of the Infrastructure fund

There are advantages and disadvantages associated with the one-off fund and the regular payment fund.

The annual payment fund bears some similarity to the current system, in which the budget for the different EU activities is agreed annually. In addition, most existing infrastructure agencies in Europe and the US Federal Highway Trust Fund (FHTF) have annual budgets, albeit (in the European case) with an initial capital allocation to support the establishment of the fund. We think a fund fed regularly (annually) has several advantages. First it is easier to implement. Second the annual fund can still flatten out revenue and expenditure streams by using the capital market. One disadvantage of an annually fed fund may be the discontinuity in EU decision making as the European parliament or member states may change priorities. .

2.3.2 Financing the fund

Given the levels of subsidy proposed in Table 2, particularly for the high subsidy rail/IWW investment case (24 of the 30 priority TEN-Ts involve these modes and many are cross-border), it is likely that any European infrastructure fund would require greater resources than those presently available. We therefore consider a range of sources of funds, some of which are currently politically unacceptable but which are worthwhile to explore.
As potential sources of annual contributions to the fund one can distinguish between the following:

- General budget of EC (financed by VAT revenues, GNI based contributions and own resources)
- Extra charge on rest of transport sector (motor fuels levy, road tolls, Eurovignette)
- Revenue from TEN-Ts projects that have been financed by funds
- Extra contributions from member states to the European fund

The existing sources of European Community funding for transport infrastructure come from the general budget. Since, as stated above, depending on the size of the subsidy and the criteria for project selection, more money would be needed than is currently available for these existing sources, either resources would have to be diverted from other areas of expenditure or the general budget increased.

The US example of a federal transport infrastructure fund, the Federal Highway Trust Fund (FHTF), is financed by levies on motor fuels and additional taxes on HGVs (see Deliverable 1, Chapter 7). Currently taxes on the transport sector in the EU are levied by member states. A rough calculation indicates that the cost of constructing the priority TEN-T projects would be approximately 18% of the total transport tax revenue for the EU25 at the current subsidy level[11]. The TREMOVE model (WP3) will provide further information on the cost of funding the TEN-Ts by mark-ups on the transport sector. The revised Eurovignette (see Deliverable 1, Chapter 7) already allows member states to toll HGVs on the TEN-T and competing routes with the revenues earmarked for the transport sector. However these revenues are still controlled by the member state. In some European countries, levies are already raised on the transport sector and earmarked for transport purposes (see Deliverable 1, Chapter 6).

[11] Own calculation using GDP weighted ECMT data on transport taxes and assuming first best cost recovery for rail (i.e. 30% from user charges) with 10% EU subsidy of remaining annual equivalent investment costs (to be elaborated in D3).

Besides subsidies, the fund could theoretically provide loans that are in principle paid back with interest. However, as advocated above, the EU should not be relied on to take the risks on user charges. This means that this procedure will not be considered as a potential source of financing.

Both an increase in the general budget of the EC and extra charges on the transport sector would in reality entail extra contributions from member states to the European fund. However, these would be proportionate to GNI or the size of their transport sector[12]. Extra contributions to the fund would probably be necessary if the fund was a "one-off" fund rather than a "regular payment" one but could also be a means of funding the latter. As discussed in Deliverable 1 (Chapter 7), based on US experience, this has implications for the decision process. Without strong safeguards on how projects are selected, common pool problems are likely to arise, where member states compete to for funding for projects in their own country rather than for projects which are most beneficial in social welfare terms. There may also be costly negotiations over contributions to the fund and a donor/receiver situation could occur since richer countries have a relatively smaller share of the votes in the European Council.

In the following table we add some qualifications to the possible sources of funds:

Level of EU aid	Present system	Moderate	High
General budget EC	Only source		
Extra charge on road			50%
Extra charge on all traffic flows		50%	25%
Contributions from member states		50%	25%

Table 3: Qualifications on sources of funds

Table 3 sketches some simple alternatives. Firstly we make the somewhat arbitrary assumption that, in the case of moderate subsidies, it is reasonable to expect that the desired level of funds can be obtained from an extra charge on the transport sector as a whole and additional contributions from member states[13]. Then, for the high subsidy case, it is assumed that only a lower percentage of the funds can be expected from these two sources as the overall level of funding required is much larger. It is clear that if a lot more funds need to be collected from the transport sector, an important share has to come from the road sector as this sector has by far the largest market share.

The European infrastructure fund is clearly multi-modal in the sense that it is able to fund road, rail, IWW and air projects and receive funding from user charges on these transport sectors. The public acceptability of cross-financing of modes is a political question. Such transfers between modes are currently the subject of debate in some member states (see

[12] The consequences of member states choosing to finance extra contributions by raising taxes, reducing their transport budget or transferring funds from another budget allocation is beyond the scope of this study.

[13] We could construct variants where the 50/50 share is altered.

Chapter 6, Deliverable 1). However, the new Eurovignette, for example, allows for funds to be ploughed back into the transport sector as a whole. In this study we focus on determining practical and effective methods for financing large transport infrastructure rather than political issues.

2.4 Organisational questions

2.4.1 Implications for decision process

As previously discussed in Deliverable 1, Chapter 6[14], the current funding framework for TEN-T projects consists of funds being allocated at the EU level by several Directorate Generals, while responsibility for project selection, management and implementation lies mainly with the member state. In the preceding sections, we have assumed that a European transport infrastructure fund will be created, replacing all these European Commission sources of funding for such infrastructure. In this section we discuss the organisation and administration of the fund and its impact on the decision process.

A number of member states have already established transport infrastructure funds via financing agencies as a means of managing and providing infrastructure financing independent of public budgets (Deliverable 1, Chapter 6). The European Commission itself has also proposed the creation of an executive agency[15] to manage the expanded TEN-T budget line, In the US, the FHTF provides funds for the Interstate highway system (Deliverable 1, Chapter 7). In addition to this experience, we can also draw upon political economic theory in order to propose rules for how the European fund should be organised and administered. In terms of the implementation of scenarios (discussed in Chapter 3 below), we can only take account of the impact of the fund on the decision process in terms of the scenario dimensions (i.e. the level of aid, the conditions put on it and the source of public funds) and the social welfare generated by a given investment.

Clearly it is possible to distinguish between the fund and the bodies that administer it. Indeed there are a number of candidates in the EU: the European Commission, the EIB, a specialised executive agency, etc. However, the simplest case, in line with current experience, is that a single agency administers the fund and we only discuss the rules and tasks relating to this simple set-up. We will use fund and agency interchangeably from here on.

The existing infrastructure funds in Europe are at best only partly involved in the selection of projects. In the US, the FHTF effectively acts as a cash transfer program, in which states compete for funding. The systems for revenue raising and allocation for the FHTF in the US lead to a permanent donor/receiver set-up, which could also happen with the European fund if decisions were made at European Council level, where a similar voting system is in place. Problems of asymmetric information support the argument for a specialised agency with technical expertise being involved in the project selection process. However, they are still subject to lobbying and may also propose too many projects if tolls from these are a source of revenue for the fund. In Section 2.1 we suggest that the European infrastructure fund provides grants as a function of share of foreign users, which should give some indication of the expected European added value of a project. If, in addition, the grant is capped according to some fixed cost formula for each type of infrastructure, this should decrease the risk of moral hazard and decrease the risks of adverse selection.

[14] See Appendix 1 of this document.

[15] Commission draft decision and press release published July 2005.

Although the scenario results will be able to tell us the social benefits of a project financed according to the rules of a given scenario, it is beyond the scope of this study to determine whether a member state would choose not to go ahead with a project if it was considered to have moderate spillover benefits based on the proportion of foreign users and therefore only qualified for a small amount of EU aid.

The political and financial autonomy of the fund are two important related questions. Most existing funds are not politically autonomous. Political autonomy not only has an impact on project selection but the ability of the fund to offer long term support can also be important for attracting private capital. Financial autonomy is crucial if money is to be borrowed on the capital markets or if money for the funds is raised from user charges and transport sector taxes. Even if political and financial autonomy at the European level can be assumed, the implementation of the infrastructure project will involve member states[16]. Furthermore, PPP is already the planned form of implementation vehicle for some priority TEN-T projects. Of particular interest are two types of implementation, which could be modelled using MOLINO II:

a) *Public provision/private finance* – such as toll motorways or commercial rail projects funded mainly by users but provided by public companies.
b) Private provision/public finance – such as motorways provided by concession companies remunerated either through shadow tolls or through a mixture of shadow and actual tolls. Some of the revenue streams (the grant element) are unconditional in nature; others are conditional on the actual project performance in terms of construction, operating and traffic.

The form and conditionality of the European aid can to some extent control the risk for private capital. Grants will have to be matched by member state contributions, pricing restrictions could be imposed on routes with high transit traffic and the type of concession pre-defined (e.g. a single operating company on cross border sections). Further, while responsibility for setting user charges remains predominantly the domain of the member state, pricing restrictions can be imposed by the agency to prevent excessive tolls (Section 2.2.3). We assume that the agency is responsible for the form of the EU grant committed to a given project and the conditions on it, according to pre-defined rules. The role of the EU institutions is limited to more political aspects, such as how the money is raised and allocated.

The way in which money is raised for the infrastructure fund also has implications for the decision process. Should the member states have any control over how the money they contribute, either directly from the public budget or from taxes on their transport sector, is spent? As discussed above, we try to obviate this problem in the way the level of aid is set. However, if project selection is made politically, this does prevent potentially long and costly negotiations over how much each member state contributes and which projects are put forward for funding (whether or not member states then decide to go ahead or not). We could impose simple rules such as:

1) member states contribute according to GNI and receive funding for projects according to, for example, foreign use of the national transport network.
2) money from transport taxes allocated at the discretion of the fund

[16] In the present system all implementation is carried out via the member states.

In addition, once the project is implemented, there need to be transparent processes by which finance passes to the agent under contractual rules, and subject to audit.

2.4.2 Assessing the results of the scenarios

As set out above, there are three acid tests for the delivery of a project:

- Does the project promote social welfare, as measured by some form of cost-benefit or multi-criteria analysis?
- Is the project financially feasible – either through internal funding by users or through a combination of internal funding and grant-aid?
- Is the project practically feasible? Can it be realised considering likely political or social objections?

In FUNDING, we focus primarily on the first two of these acid tests. We set up models which generate cost-benefit and financial results for projects against a base case and considering various pricing scenarios. This indicates clearly the funding envelope which is necessary in order for the project to proceed. This ought to be useful in ensuring realistic expectations regarding the availability of finance, a major barrier to date to the TEN-T progress.

3 SCENARIOS

3.1 Model implementation

The starting point for the assessment of the FUNDING scenarios using the various modelling tools, briefly described in Section 1.1, is the representation of the present system in the modelling framework: the reference scenario. The TREMOVE model will be used to calculate the reference scenario for the period 2003-2020, during which most of the construction of the priority TEN-Ts is expected to be completed. A crucial preliminary question is whether we should apply the scenarios to entire national networks or only consider the TEN-Ts as incremental additions. We concentrate on the TEN-T projects, whilst the rest of the transport sector develops over time within the reference scenario (the 'partial White Paper' implementation reference scenario, see www.tremove.org and Appendix 2 of this document).

Five different models are used in the FUNDING study, each of which has a particular role to play[17]. Having explored the different possible dimensions of the scenarios in some detail, we now need to consider how these dimensions can be implemented in the various models and what policy questions they are best suited to answer, before making our final selection of scenarios. In Table 4 below, we summarise the models in terms of their ability to represent the dimensions of the scenarios and the TEN-T projects themselves.

It is clear that the models are defined on different scales. MOLINO II provides the most detailed financial analysis but can only do this on a case study basis; selection of the case studies will be discussed in WP5 (see Appendix 3 of this document for a brief discussion). It will also allow risk and uncertainty to be taken into account, as explained in Deliverable 1, Chapter 5. At the network level, the corridor models will examine the effect of different subsidy and pricing strategies on the TEN-Ts and the effect of financing the infrastructure fund by levies on the transport sector. The corridor models will also deliver inputs to and interact with the MOLINO II case studies. The TREMOVE model will indicate the cost, in terms of welfare per member state, of alternative strategies for financing the infrastructure fund (levies on transport). CGEurope is the most disaggregate model of the set of models in terms of the representation of regions (NUTS-3) and networks (through the use of the RRG GIS transport network database). CGEurope assesses the combined impact of developing particular TEN-T's and sourcing the fund from mark-ups on the transport sector by looking at social welfare on a detailed regional basis and allowing for alternative revenue uses. The model will also consider the regional welfare effects of the level and form (mainly pricing rules) of aid of a given scenario. As noted earlier, the TREMOVE baseline will be used as a basis for the calibration of the other models.

[17] For more details on all these models, see www.econ.kuleuven.be/funding.

	MOLINO II	Corridor freight	Corridor passenger	TREMOVE	CGEurope
Timing	Annual basis		2020	2005-2020	Calibrated on 2000 with output for 2020
No of TEN-Ts projects modelled	5 case studies modelled separately	Baseline, 5 case studies separately and then together with one network model. Or larger set	Baseline, 3 case studies separately and then together with one network model	All priority TEN-T projects	Baseline, 5 case studies separately, all priority TEN-T and some subsets thereof
Can take account of different levels of aid	yes	yes	yes	no	yes
Form and conditionality	Public/private infrastructure managers/operators, subcontracting, tolls, 2 levels of government	Public/private infrastructure managers/operators, subcontracting, access charges	Public/private infrastructure managers/operators, subcontracting, access charges	No, model level per country and mode, not separate links for TEN-Ts,	
Can take account of risk	Yes, via Monte Carlo simulations +NPV	no	no	no	no
Source of funding for Fund	Yes, government subsidies/infrastructure manager taxes to fund, taxes on transport sector (at infrastructure user level)	Yes, government subsidies, operator charges, user charges	Yes, government subsidies, operator charges, user charges	Yes, country level modal shift, detailed subsidies and taxes for all modes, vehicle stock etc	Yes, revenue data from TREMOVE. Redistribution schemes
Includes organisation/decision making	no		no	no	no
Output	SWF +prices, volumes, profit Revenue use via MCPF	SWF + prices, volumes, profit of transport operators + revenues and capacity of infrastructure operators	SWF + prices, volumes, profit of transport operators + revenues and capacity of infrastructure operators	SWF at country level +prices etc per country and mode	SWF and GDP per capita at NUTS 3 level.
What question is answered?	How is a particular TEN-T project affected by pricing and investment in competing modes?	How does the freight market (total and modal shares) respond to subsidy and pricing decisions on the TEN-Ts? How does the freight market (total and modal shares) respond to a financing levy on the freight transport sectors?	How does the air and rail network respond subsidy and pricing decisions on the TEN-Ts? How does the network respond to a financing levy on the air and rail sectors?	What is the potential revenue from extra taxes in all modes? How does this taxation affect welfare (including external costs)?	What is the welfare effect (per region) of a given subsidised TEN-T development scenario? What is the welfare cost (per region) of a price mark-up on existing transport flow?

Table 4 Summary of model implementation of scenario dimensions

SWF=Social welfare function, MCPF=Marginal cost of public funds

3.2 Scenario selection

In the following table we present two basic scenarios (A and B), which consist of moderate or high subsidies (as specified in Table 2) from the EU infrastructure fund, with their corresponding sources of funds (from Table 3). These scenarios will be compared with the present system. Further refinements are then applied to scenario B, in which the form and conditionality of the funding from the EU fund is varied: pricing restrictions are applied and both public and private provision and operation of the infrastructure are considered. The actual details of these will be examined on a case by case basis. The lower section of Table 5 indicates which scenarios will be implemented by each of the models.

	Present system (Appendix 1)	Scenario			
		A	B	B1	B2
Level of aid (Table 2)	10%	Moderate	high	high	high
Form and conditionality				Pricing regulation	Public/private provision
Source of funds (Table 3)	DG-TREN, DG-REGIO, member states	Moderate	high	high	high
model					
MOLINO II	x	X	x	x[1]	x[1]
Corridor - passenger	x	X	x	x	x
Corridor – freight	x	X	x	x	x
CGEurope	x	X	x		
TREMOVE	x	x[2]	x[2]		

Table 5 Scenarios

[1] limited set of model runs
[2] sources of funds only

The purpose of WP2 has been to develop a limited set of scenarios that can be implemented in the different models to provide answers both to the practical questions of funding the TEN-Ts and to interesting research questions. The models are all suited to analyse different aspects of the funding problem but need to do so in a consistent manner. On a practical level, this means that a common set of parameters may need to be agreed and a common approach on other technical aspects. These technical details are not the subject of this document, however, but will be presented in their appropriate context in deliverables 3, 4 and 5.

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APPENDIX 1

TEN-Ts Funding – Present situation

The main existing European Community sources of funding for the TEN-Ts are the TEN-T budget line itself, the Cohesion Fund and the European Regional Development Fund (ERDF), which is part of the Structural Funds. The Marco Polo II programme is able to fund the Motorways of the Sea and the Pre-Accession Structural Instrument (PASI) also has a role to play in the wider TEN-T context. These sources of funds all provide aid in the form of grants.

The rules governing the TEN-T budget line are summarised in Table A1 below. For the period 2000-2006, available funding was of the order of €600-700 million/year, whereas the priority TEN-T investment costs were estimated at €80 billion. The latest proposal (COM (2004) 0475), which has had its first reading in the European parliament, clearly asks for a significant increase in funding to €2.9 billion/year for the period 207-2013, in order to finance a larger proportion of investment costs. It is envisaged that an agency would be established in 2006 to manage the existing budget and then expanded from 2007[18].

Member states present financing proposals to the Commission, which makes a selection based on the available resources and requirements of the TEN-T regulation (Turro 1999). According to Turro there are always many more applications than funds and the distribution of funds tends to be weighted demographically.

Countries whose per capita GDP is less than 90% of the EU average and who are implementing economic conversion programmes are eligible for help from the Cohesion Fund[19]. Environment and TEN-T projects can be funded up to 85% of the total cost. Each MS is responsible for implementing the projects, managing the funds and meeting the timetable. For the period 2007-2013, the Cohesion Fund with be integrated into the Structural Funds and provide money for programmes rather than projects.

Structural funds from the ERDF are mainly available to “Objective 1” regions (NUTS II level) where per capita GDP is less than 75 % of the EU average. The ERDF provides financial aid in the form of non-reimbursable assistance (grants). The aid is channelled through development programmes. The Member States appoint management authorities, which are responsible for implementing the programmes and selecting the projects to be funded. The programmes cannot be fully funded by the EU and have to be co-financed by other public or private money.

The payment of the fund is made to a MS designated payment authority (separate from the management authority), which is then responsible for making payments to the ultimate beneficiary. The Commission will make and advance payment of 7% of the total and the remainder is paid as reimbursement of expenditure. Some kind of auditing of the management and payment authorities is required.

[18] Commission draft Decision and press release, July 2005.

[19] As of 1/5/2004 Greece, Portugal, Spain, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia and Slovakia are eligible. (Ireland is no longer eligible.)

These funds can often contribute more than 50% of the total cost of a project. For the period 2000-2006, their joint contribution to TEN-T projects will be €20 billion.[20] PASI funding for same period is expected to be €1 billion.

Other sources of income include the EIB, which has loaned around €50 billion to TEN-T projects over the last decade and is expected to continue this rate of lending, although these have been predominantly to road. The latest publication from DG-TREN, *'TEN-T priority axes and projects 2005'*, supposes that 20% of funding could come from the private sector, with the remainder from national governments.

Type	**Period appli-cable**	**Financing rules**	**Other conditions**	**Legal base/source**
Grant	1995-99	Total community funding max 10% total cost (including 50% studies)	Allows for interest subsidies on EIB or other loans. Fee contributions for EIF loan guarantees	Council Regulation 2336/95
	2000-06	Total community funding max 10% total cost with >=55% rail, <=25%road	Tighter controls - Project can be cancelled if not started with 2 years. Supply risk capital to investment funds (max 1%)	Council Regulation 1655/99
	2004-06	Can fund max 20% of projects which are cross-border or cross-natural barrier	Introduces motorways of sea. European Coordinator	Council Decision 884/2004 Council Regulation 807/2004
	2007-13	Total community funding max 30% total cost or 50% for cross-border if started before 2010	Funding can be reclaimed if project not completed after 10 years. Guarantee fund[21].	COM (2004) 0475 (Commission proposal for Directive)

Table A1 TEN budget line

[20] *TEN-T priority axes and projects 2005,* DG-TREN.

[21] Covers commercial risks specific to TENs in the post construction phase.

APPENDIX 2

FUNDING reference scenario: TREMOVE "partial White Paper implementation"

1 TREMOVE MODEL AND BASELINE OVERVIEW

1.1 TREMOVE overview

TREMOVE is a transport and emissions simulation model developed for the European Commission. It is designed to study the effects of different transport and environment policies on the emissions of the transport sector. The model estimates the transport demand, the modal split, the vehicle fleets, the emissions of air pollutants and the welfare level under different policy scenarios. All relevant transport modes are modelled, including air and maritime transport. The model covers the 1995-2020 period, with yearly intervals. Moreover, it covers all EU15 countries, plus Switzerland, Norway, the Czech Republic, Hungary, Poland and Slovenia.

1.2 The TREMOVE baseline

The development of the TREMOVE baseline involved the construction of a coherent reference case for transport demand, vehicle stocks and emissions. This reference case has been developed for all countries and model regions considered. It includes every year from the base year 1995 until 2020. The baseline transport volumes have been extracted to a large extent from the SCENES transport model, and further calculated towards national statistics.

1.2.1 TREMOVE version

The latest version is TREMOVE 2.40. This version has been available at www.tremove.org since December 2005. The baseline that has been used in the TREMOVE 2.40 model is the "ASSESS Partial A scenario". It is fully described in the report on TREMOVE 2.4[22].

The reference scenario in the TREMOVE demand module – called the baseline – is based on output of the European transport model SCENES[23] [24]. The run that has been used, is the P-scenario from the ASSESS project[25], October 2005[26].

1.2.2 Base year 2000

The base year 2000 was calibrated up to the most recent Eurostat and DG TREN statistics, e.g. the Statistical Pocketbook of DG TREN.

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[22] De Ceuster G., Van Herbruggen B.,, Logghe S., TREMOVE v2.4 Description of model and baseline, March 2006.

[23] SCENES (2000). *SCENES European Transport Forecasting Model and Appended Module: Technical Description*. SCENES Deliverable D4, funded by the European Commission (DG TREN). Project Leader: ME&P (now WSP Policy & Research), Cambridge. http://www.iww.uni-karlsruhe.de/SCENES/

[24] SCENES (2001). *Transport Forecasting Model: Calibration and Forecast Scenario Results*. SCENES, Deliverable D7, funded by the European Commission (DG TREN). Project Leader: ME&P (now WSP Policy & Research), Cambridge.

[25] Mid-term assessment of the White Paper on transport.

[26] Ying J., Deane G., Zhu Y., Jakimovska V., Martino A., Fiorello D. (2005), Results from the SCENES model, Annex VI of ASSESS Final Report, DG TREN, European Commission.

1.2.3 Forecasts 2010 - 2020

The TREMOVE model currently uses the ASSESS Partial A forecast. This forecast has been developed during the ASSESS project fro DG TREN, end of 2005[27]. ASSESS is study for the mid-term assessment of the White Paper on transport. In that project, 4 transport scenarios were developed, which were modelled in SCENES, TREMOVE and other models. The actual transport forecast was done with the SCENES model.

The ASSESS Partial A implementation scenario includes all follow-up activities already implemented or planned to be implemented before 2010 by the EC or by member states. This means that the measure is already implemented or that there are clear indications that implementation will take place soon. The latter is the case when approved EU-directives include deadlines for Member States to adapt national legislation accordingly. Under the ASSESS Partial A scenario, road freight costs rise by 18% on average in 2010 relative to those in 2000, and by 20% in 2020.

The most important elements in this scenario are:

- All measures that have been given a follow up by means of a directive that is approved by the European institutions and that has to be implemented by the member states before 2010 (or 2020) are included in the partial implementation scenario 2010 (or 2020).
- Measures that have been given a follow up by means of a proposal that is still waiting for approval by the European institutions are only included in the partial implementation scenario 2010 (or 2020) when it can be expected that acceptation can be achieved before 2010 (or 2020). The expectation is based on the number of times that a proposal with regard to the particular measure is already rejected and the debate in various media on the issue.
- All TEN-projects that, following the estimation published in 2004, are planned to be finalised before 2010 (or 2020) are included in the partial implementation scenario 2010 (or 2020).

The Partial A scenario includes all follow-up activities already implemented or planned to be implemented before 2010 by the EC or by member states. This implies:

- In the road sector the measures with regard to driver training, social harmonisation of legislation and the introduction of the digital tachograph has been implemented. However, the further harmonisation of driving times and weekend bans on lorries have not been implemented. There are also no minimum clauses in commercial road transport contracts concerning oil price risks.
- The European freight rail sector is liberalised and the quality of freight services is improved. The liberalisation with regard to passenger transport is starting and will be completed in the (partial) scenario 2020 only. Rail safety has been improved by technically harmonisation, interoperability within the high speed rail network has been improved. A majority of the TEN-rail projects that were given priority in 2001 with a completion date by 2010 will be finished in 2010. Almost all projects that were added

[27] De Ceuster G. et al (2005), ASSESS Final Report, DG TREN, European Commission.

in 2004 will not be ready. There are few dedicated freight railways (such as the Betuwe line in the Netherlands) or with priority to freight.

- The award of public service contracts regulation will have been adopted and some more passenger services contracts will be granted through competition.
- Airport charges to redistribute traffic over the day are implemented but they have marginal financial effects on the air carriers. Qualifications for air traffic controllers are harmonised. Safety measures are better enforced by means of a new European Aviation Safety Agency. The European management of the airspace and the introduction of slots at community airports are included in the partial scenario for 2010. Airport capacity expansion has not been realised. A joint transatlantic aviation agreement with the US has been signed with increased competition on transatlantic routes (even stronger growth in number of passengers due to liberalisation of single air transport market with the entrance of low cost airline business model).
- The motorways of seas included in the TENs will be ready in 2010. Ship and port security is improved and the European maritime safety agency is operational. Double-hull oil tankers are phased out in European waters and there is an oil pollution damage compensation fund. Improvement of inland waterways such as fixing inappropriate gauges, bridge heights, operation of locks etc and also greater harmonisation of boat master certificates will be finalised after 2010 and are therefore included in the partial scenario 2020. Port services, among others the cargo handling, are partially liberalised.
- There have been experiments to improve and promote combined transport. Integrated ticketing and improvements in baggage handling is improved in the air and rail sector.
- A large majority of the TEN projects are finalised in conformance with original planning.
- There is a community action programme on road safety. However, road safety remains the responsibility of the member states and efforts to harmonise legislation, penal sanctions etc. have not been effective yet.
- There is a community policy on transport charging for the use of infrastructure but its impacts are limited. The revision of the Eurovignette directive includes only some possibilities of differentiation of charges for some sensitive areas and for the most polluting vehicles. Pricing for passenger modes is not a White Paper measure, so only pricing for freight modes is considered. There is no harmonisation of fuel taxes.
- Clean urban transport is promoted by EU-funded research and experiments. The impact on a European scale is limited.

Next to these White Paper measures, general assumptions were taken on the population, economic growth and crude oil price. These numbers were derived form the most recent Eurostat forecast.

The forecast of the crude oil prices is derived form the Energy Outlook / PRIMES model, June 2005, which is a draft version of new, forthcoming, Energy Outlook[28].

[28] We preferred using the new and updated versions above the old (but official) version.

1.3 Transport baseline figures

The reference scenario in the TREMOVE demand module – called the baseline - is based on output of the European transport model SCENES[29] [30]. The run that has been used, is the P-scenario from the ASSESS project, October 2005[31].

Compared with 2000, the road freight growth rates are respectively 21% and 43% for 2010 and 2020 in EU25. The average demand elasticity with respect to price changes is around 0.1 for 2010 and 0.3 for 2020. As a result of road cost increases, and the improvements on rail, shipping and inter-modal transport, rail freight is expected to grow by a modest amount (3% by 2010 and 11% by 2020 in EU25.

Under the partial scenario, the modes that see significant demand growths would be car (17% and 36% respectively for 2010 and 2020, in EU25) and air (51% and 105% respectively for 2010 and 2020, in EU25). Train, bus and walking/cycling are expected to grow more slowly in terms of passenger-km. Passenger train/metro/tram services may still rise in some countries, especially in those where commuting and other journeys have been getting longer but road congestion has constrained the growth of peak time road travel. In NMS10, bus and train demand is likely to decline.

[29] SCENES (2000). *SCENES European Transport Forecasting Model and Appended Module: Technical Description*. SCENES Deliverable D4, funded by the European Commission (DG TREN). Project Leader: ME&P (now WSP Policy & Research), Cambridge. http://www.iww.uni-karlsruhe.de/SCENES/

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APPENDIX 3

FUNDING: Selection of WP5 Case Studies

There are currently 30 priority TEN-T axes. Five of these are to be selected for the case studies. These are to be decided in conjunction with stakeholders. Aside from the quality of the available cost benefit studies, which is clearly important for the calibration of the MOLINO II model to the reference case, the main selection criteria are:

- Studies not yet completed: we are interested in the effect of infrastructure fund subsidies on project timing, pricing and welfare.
- Modal competition: the method of financing new infrastructure for one mode has implications for existing modes serving the same route. This could also include parallel competition between roads with different pricing regimes.
- Passenger/freight: the optimal funding scenario for passenger transport infrastructure may well differ from that for freight transport. Investment in passenger transport infrastructure will also have consequences for existing freight transport and vice versa. These issues need to be taken into consideration in the case study selection.
- Cross-border: the problem of funding cross-border infrastructure has recently been highlighted in the new financial rules for TEN-Ts. The investment, timing and pricing decisions of one country will be affected by the decisions of the second country as well as the infrastructure funding scenario adopted.

Since one goal of the White Paper on Transport is modal switching, the selected case studies should also be representative of the available transport modes. It would also be preferable for the case studies to cover a wide geographical range. The approach to funding may differ between the new member states and the pre-accession EU15.

The following list of TEN-T axes fulfils most of the above criteria. Unfortunately a direct shipping option has been ruled out as the Motorways of the Sea do not involve major infrastructure spending and there is currently little information available on them.

No.	Route of axis	type	completion by	cross-border	competition
1	Berlin-Verona (Brenner axis)	high speed train /combined transport	2020	yes	road/air
3	Madrid-Montpellier	high speed train	2020	yes	road/air
5	Betuwe line	conventional rail /combined transport	2010	no	IWW/ road
25	Gdansk- Vienna	motorway	2020	yes	rail (air)
30	Seine-Scheldt	IWW	2020	yes	short sea shipping/road/ rail

Table A2 Shortlist of TEN-T axes