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NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING

ROUND TABLE

128

ECONOMIC RESEARCH CENTRE

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on the following topic:

NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING

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INTRODUCTORY REPORTS

NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF GERMANY

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NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF GERMANY

SUMMARY

Karlsruhe, November 2003

1. INTRODUCTION

The EUNET project of the European Commission has shown that the methods applied for establishing transport infrastructure plans in the member countries differ widely[1]. A major reason for this variety of methods is the different institutional frameworks, which accordingly lead to different requirements in the political decision processes. Furthermore, this variety also reflects the wide range of scientific approaches, since one cannot reject any national evaluation procedure through the argument of scientific inconsistency. This paper will focus on the German evaluation method for federal transport infrastructure planning.

The German Standardized Evaluation Scheme for the Federal Transport Infrastructure Plan (BVWP) dates back to the seventies, when the Research Society on Road Transport (FGSV) published a first general assessment procedure for transport investment. Basically, this assessment procedure, entitled Guidelines for Road Planning and Construction -- Economics (RAS–W), consisted of a quantification of the changes in user costs (operation and time costs), infrastructure costs and some external costs (accidents, noise and air pollution). This formed the basis for setting up a standardized scheme for the 1985 Federal Transport Master Plan project assessment[2]. After German unification in 1990, this scheme was employed to assess the projects of the first single German Master Plan in 1992 (BVWP, 1992[3]). The RAS-W was updated in 1997 and renamed EWS (Guidelines for Economic Assessment of Road Transport Projects). As such, EWS presented the basis for developing a revised, standardized BVWP assessment method, which is still applied.

In the year 2003, a revised proposal for the Federal Transport Master Plan was worked out and submitted to the parliaments. This revised proposal was elaborated on the basis of an extended evaluation scheme, which starts from the existing EWS/BVWP approach and adds some new elements for the evaluation of spatial impacts and environmental risk. As the 1992 scheme has been presented already in other papers (for instance, in Rothengatter, 1995, 2000), more emphasis will be placed on the extensions. Furthermore, it is important to note that the EU Commission has launched some projects to improve the impact assessment, in particular in the field of indirect effects of transport investments. Therefore, it is interesting to compare the state of the art reached in Germany with the progress of research achieved by the EU research projects.

The paper is organised as follows. In the second chapter, the institutional aspects of transportation planning in Germany are presented. The third chapter introduces the draft submitted by the BVWP and presents the objectives of the political framework as well as the aggregate results of the plan, including its financial implications. The fourth chapter gives an overview of the evaluation method, including all elements. The fifth chapter concentrates on some details of the approach for the "standard" or "mandatory" parts of the scheme. In chapter six, some information is given on how to finance the master plan. In the seventh chapter, the state of the art achieved is compared with the interim results of ongoing research for the European Commission on the integrated assessment of the indirect effects of transport investments. Chapter eight concludes the findings.

2. INSTITUTIONAL ASPECTS OF TRANSPORTATION PLANNING IN GERMANY

The German constitution defines a federal structure of the nation (federal, state, community = *Bund, Länder, Gemeinden*). The "subsidiarity principle" is the leading rule for allocating responsibilities to the three political levels. This means that, in general, decisions are taken on a decentralised basis. The Federal Government is only competent to decide on matters which are defined and listed in the constitution. All other matters are dealt with at the lower levels. This, of course, has far-reaching consequences for the decision processes in the economic, administrative and political sectors.

Transportation planning in Germany is carried out at all political levels (see Annex, A3). According to the constitution, the responsibility of the federal state for the transport infrastructure in Germany is restricted to the federal roads (motorways, primaries), federal railways (Deutsche Bahn AG network) and inland waterways. Airports and ports are not included and, as a consequence, are not directly addressed in the federal transport master plan. The links connecting airports and ports to the federal transport infrastructure are, however, taken into consideration.

With respect to the federal transport master plan, the Federal Government is responsible for setting up the plan, which is decided on by the federal parliaments. The lower-level political bodies can suggest projects and will, in part, deliver the data for the evaluation process. In the implementation process, the states and the communities play an important role insofar as they control parts of the legal procedure in the implementation phase. The states have to confirm that a transport project can be integrated into their spatial structure without major problems (law of spatial development; *Raumordnungsgesetz*) and the communities participate in the final design of the alignments, which then becomes the legal basis for eventual expropriations, if necessary (law of local specification and final definition of a plan, *Planfeststellung*).

After finalising these legal steps on the three political levels, property rights can be acquired, if necessary, through the expropriation of landowners. As landowners often refuse to sell their property -- either to improve their negotiation position or because they are fundamentally against the idea -- the process can take much time. Furthermore, all people who feel exposed to the impacts of a planned project may go to court and start legal proceedings, which can take years. It may happen that, after years of legal conflicts, the courts or the political bodies decide that project plans should be substantially modified: then the whole process will start again at the beginning. This is why the planning of major projects such as high-speed rail links, new motorways or airports may take decades. A prominent example is the high-speed rail link between Frankfurt and Cologne, for which the first plans were set up in the mid-seventies and the opening took place in 2001. Other examples are Munich airport or the Rhine-Main-Danube canal. The latter was finally constructed, after decades of negotiation (interrupted by the Second World War) between the German Federal Government, the State of Bavaria and the Austrian Government, when the economic need for this canal had already drastically wained.

Non-governmental organisations (NGOs) also have some influence on the process. This holds in particular for public transport enterprises such as the federal railway company, DB AG, the

associations for road transport or inland waterway shipping, automobile clubs and the 'green' movement. DB AG is closely involved because the responsibility of the Federal Government includes the federal road, rail and inland waterway networks. DB AG submits project proposals and delivers data for the evaluation procedure. The other stakeholders influence the process in a less direct manner, through lobby activity and by organising political movements for or against the projected plans.

The planning scheme for the railway sector has changed since the Railway Reform of 1994. In the road and inland waterway sectors, the projects which are approved by the plan can be realised through public activities, while the railway case implies an agreement between DB AG and the Federal State[4]. The general rule is that the Federal State pays for the infrastructure construction costs and the company has to pay back the annual depreciation, but not the interest on capital. If projects proposed by the federal investment plan are not considered financially viable by the company, the State has to pay a financial grant, which is subject to negotiation (the grant can be between 0 and 100 per cent). If the negotiations are not successful, the project concerned is eliminated.

In fact, all new investment projects for interregional rail transport in recent years have been completely financed by the State. However, for some major investments in high-speed rail and city transit, the Federal Government and DB AG have agreed on a fixed-price contract such that the risk of cost overruns is completely assumed by DB AG. This has caused some financial turbulence for the railway company, because the cost overruns for major projects (Cologne-Rhine/Main, Berlin Ring and North-South Tunnel, Nuremberg-Munich) totalled about 3 billion euros, such that the company shifted the necessary reinvestment, maintenance and repair to the future. This resulted in numerous low-speed sections and disturbed the timetables substantially, leading to a decline in the reliability of passenger services. Consequently, at present, not only new investment but also a part of the reinvestment is paid for by the State.

Because of the complexities of the political process, an evaluation method and the setting-up of a master plan cannot be regarded as an economic exercise only. The performance of the method cannot therefore be evaluated merely on the basis of economic rationality. It is also important that the method supports political decisionmaking at the three levels of political responsibility, meaning that it has to be fully accepted by the lower level political bodies. Within the framework of this political process, the sequence of working steps is as follows:

Table 1. **Working steps for the BVWP (Federal Transport Infrastructure Plan)[5]**

1	Scenarios, forecasting of transport development
2	Updating of evaluation method
3	Updating of networks, project definitions
4	Evaluation of projects by CBA and additional methods
5	Setting of priorities subject to available budgets
6	Hearings and co-ordination meetings with Länder, NGOs
7	Cabinet decision, BVWP approval
8	Approval by parliaments, process of legislation

The last BVWP was approved in 1992, i.e. two years after German unification. This long-term development plan for transport infrastructure draws an outline of trunk road railway, waterway and air transport projects under federal responsibility. The whole area of the unified Germany is covered and the time horizon is twenty years, i.e. up to 2012. The original idea was that the BVWP would be a flexible, overlapping and dynamic planning scheme, to be revised every five years (rolling investment plan). However, an updating according to this schedule could not be realised because of the manifold changes in Germany after German unification, such that the first revision of the 1992 plan was started in 2003.

In spring 2003, a draft BVWP was presented by the MoT for the period until 2015, based on data from the base year 1997. Meanwhile, it has been approved by the Cabinet and passed to the parliaments (Parliament of the Elected Representatives, *Bundestag*, and Parliament of the Federal States, *Bundesrat*). If the plan is approved by the parliaments, it will form the basis of binding laws (for rail, road and inland waterways), such that associated projects may enter into the legal planning process at the state and community levels. Projects which are not elements of the BVWP cannot be considered for realisation until the next revision of the plan. An example of the difficulties arising from this rule is given by the so-called Metrorapid project in Northrhine-Westphalia. According to the BVWP, a Maglev link is planned between the cities of Düsseldorf and Dortmund. The State Government has recently abolished this plan, due to financial problems. Now the State Government is planning a "Metroexpress" project, which is based on high-speed rail technology and is expected to be co-financed by the Federal Government. Until now, however, a Metroexpress project has not been an element of the BVWP, so a huge political effort will be necessary to bring this project forward without a major loss of time.

3. POLICY FRAMEWORK, OBJECTIVES AND RESULTS OF THE DRAFT BVWP 2003

3.1. Policy framework and objectives

The objectives of the Federal Transport Investment Plan are to:

- Develop the transport sector towards long-term, sustainable mobility;
- Strengthen the economic power of German industrial locations to improve employment;
- Foster sustainable settlement structures in space;
- Establish fair and comparable conditions for competition between all transport modes;
- Reduce resource consumption from nature, the landscape and non-renewable resources;
- Reduce noise, air pollution and greenhouse gas emissions (in particular CO_2);
- Support the European integration process.

The "Future Mobility" investment programme, decided by the Cabinet in March 2002, is based on these objectives and forms an integral part of the BVWP 2003. It defines the following focal points for investment projects:

- Removal of bottlenecks (e.g. 1 100 km upgrades of motorways from 4 to 6 lanes);
- Reduction of traffic volumes in cities and communities through the construction of 300 orbitals, to increase the quality of life in the areas concerned;
- Strengthening of the quality of maritime ports through the improvement of hinterland connections;
- Increase of reinvestment and maintenance for the networks;
- Fostering new transport technologies (Transrapid, Galileo).

3.2. General procedure and aggregate results

The general evaluation procedure consists of the following steps:

1) Recommendations for projects to be assessed;
2) Traffic forecasting;
3) Economic assessment and cost-benefit analysis;
4) Analysis of spatial impacts and environmental risk;
5) Interdependence analysis;
6) Political trade-offs and rankings.

For step 1), suggestions are received from the *Länder*, the DB AG and the Ministry of Transport. Furthermore, there are a number of projects listed in the previous BVWP which could not be realised at the time, and which are therefore subject to a new evaluation.

Step 2) foresees multimodal transport forecasting for passenger and freight demand, based on a projection of the main drivers of transport demand, for instance: population, economic development or regulations, costs and prices. The BVWP forecasts have produced three scenarios:

- *Laissez-faire* (trend) scenario;
- High-challenge scenario;
- Integration scenario[6].

The *laissez-faire* scenario is based on the general assumption that the State does not take new policy actions. The high-challenge scenario summarises the environmental issues -- it has in particular been put forward by the German Federal Environmental Agency. The integration scenario is a compromise solution, which starts from the assumption that the policy measures proposed in the scenario are likely to be accepted by the public.

After a discussion of the scenarios, it was concluded that the *laissez-faire* scenario can serve as a reference to measure impacts following the policy initiatives of the remaining two scenarios. The high-challenge scenario was regarded as unrealistic because it would overestimate the willingness of people to change their transport behaviour. Lastly, the integration scenario lays stress on the co-ordination of all transport modes to produce a better performance in every respect. It was also hoped that the wording would increase acceptability.

Steps 3) to 5) indicate a substantial change compared with the previous evaluation scheme. The old scheme tried to integrate all impacts into a formal cost-benefit analysis. Spatial impacts and regional employment effects were measured in economic terms and then added to the other CBA benefit elements. The new scheme recognises that it is not possible to generate reliable economic data at the project level for these effects. Therefore, in the new version, this part is treated by means of a

multi-criteria analysis, which marks the projects with respect to their treatment in the following planning process. The environmental analysis is now separated into environmental impacts, which can be translated into monetary terms and included in a CBA, and an environmental risk analysis, which focuses on the disturbances caused in the local areas and their severity.

Step 6) is necessary because the assessment does not result in a final indicator but leaves the summary of results to a political judgement. This might be disappointing from an economic point of view; however, regarding the manifold possibilities for aggregating three indicators, measured in different scales, it is understandable that the Ministry was not keen to create an additional field of conflict.

The results of the procedure can be seen in the maps A1 and A2 of the Annex. Beyond the presentation of the proposed links for federal investment, which shall not be explained in detail, the following points appear remarkable[7]:

- The shares of road/rail/inland waterways in the overall budget are: 51.6%, 43.6%, 6.1%.
- The share of reinvestment activity in the overall budget is 56%.
- In contrast with the previous BVWP, the plan also gives information on the intended financing of the projects.

4. METHOD OF TRANSPORTATION PROJECT EVALUATION

4.1. Components of evaluation

All project proposals are evaluated according to a unified and comprehensive evaluation scheme, which consists of three elements:

- Cost-benefit analysis (CBA);
- Spatial impact analysis;
- Environmental risk analysis.

Furthermore, for DB AG's projects a private rentability calculus is required, which in general is performed by the company.

4.2. Cost-benefit analysis

Cost-benefit analysis is at the core of the evaluation method for the projects of the Federal Traffic Infrastructure Plan (BVWP). Following a forecast and an impact analysis, a "with/without" comparison can be applied on the project scale. Criteria are expressed finally as monetary values; market prices or shadow price calculations are used to attach values to the benefits, which are later divided by the project costs to obtain a benefit-cost ratio. The criteria are derived from major benefit areas, which are abbreviated below using the German acronyms.

Table 2. **Criteria for benefit measurement**

	Criteria for benefit measurement
NB1-NB3	Transportation costs
NW1-NW2	Maintenance and operation of the infrastructure
NS	Traffic safety
NE	Accessibility
NR1-NR4	Spatial monetary impacts
NU1-NU4	Environmental monetary impacts
NI	Induced traffic
NH	Interconnection of sea- and airports

4.2.1 NB Transportation costs

The transportation costs consist of time-dependent vehicle costs (NB1), operating costs (NB2) and intermodal shifts in operating costs.

NB1 Time-dependent vehicle costs

Time-dependent vehicle costs consist of capital costs for depreciation, and interest on capital for commercial vehicles. Furthermore, overhead costs for vehicle parking and administration are included. As soon as time savings, shortening of transport distances or improvements in the occupancy/loading factors of vehicles result from transport projects, these fixed costs are related to a higher volume of traffic activity and thus the average costs will decrease.

NB2 Operating costs

Operating costs are directly dependent on the network activity. Their classification depends on the mode considered. For the road sector, for instance, the vehicles have been classified by:

- Cars;
- Lorries;
- Buses;
- Articulated lorries.

For these vehicle groups the operating costs consist of:

- Operation-dependent depreciation, consumption of tyres and repair costs;
- Costs of personnel for commercial vehicles (time costs of non-commercial transport are treated in NE);
- Speed-dependent fuel consumption.

NB3 Cost of intermodal changes

As soon as traffic is diverted from one mode to another, induced by a transport project, there will occur a cost decrease in the mode which loses traffic and a cost increase in the mode which gains traffic. It is possible to calculate this difference –- which may be positive or negative -- by means of the transport models applied in the forecasting step.

4.2.2 NW renewal and maintenance of the infrastructure

NW1 Costs of renewal of the infrastructure

In general, renewal costs for projects under consideration will not occur because their life-time exceeds the planning time horizon. However, a new project may render the renewal of existing infrastructure unnecessary as, in a consistent with/without impact analysis, it follows that the cost of renewal will be negative.

NW2 Maintenance costs

Maintenance costs consist of:

- Structural maintenance;
- Wear and tear; and
- Other running costs.

Usually, but not as a rule, maintenance costs for a new project are lower than those for the existing infrastructure. An exception is, for instance, high-speed rail.

4.2.3 NS Safety

The external costs of traffic accidents are calculated for the road and rail modes. For road and rail accident forecasting, extensive statistics exist within a wide-ranging classification of vehicle and road/rail types. The evaluation of accident impacts is then performed on the basis of the following typology:

- Costs of recovery of damaged resources and restoration of human health;
- Costs caused by loss of resources and treatments for permanent invalidity;
- Costs of suffering and grief for victims' relatives;
- Loss of net value-added in non-market sectors (e.g. value-added of family employment).

It is important that costs which are recovered by the private sector (e.g. by insurances) are not included in the evaluation, so that the figures show the final uncovered costs to society.

The evaluation factors for severe injuries and fatalities are:

- 87 000 € for a severe injury;
- 1 176 000 € for a fatality.

4.2.4 NE Change of accessibility

In this part of the analysis, only the time savings of non-commercial traffic are evaluated. All time savings which occur for commercial traffic activities are evaluated in NB2. As a consequence, the remaining time savings to be assessed occur in traffic for journeys to work, education, shopping and leisure.

Concerning the determination of the value of time, a willingness-to-pay approach is applied, which leads to a value of 5.47 € per person and per hour. Taking into account that a share of trips will lead to low time savings, which the user does not realise, the above benchmark figure has been corrected by 30 per cent. The final result is a value of time of 3.83 € per person and per hour[8].

4.2.5 NR Spatial impacts

Many projects aim at improving the economic potential of regions which are lagging behind. Therefore, particular emphasis is laid on spatial impacts. A part of these impacts, NR1-NR4, is measured in such a way that the results of the analysis can be transformed into monetary values. Another part is treated differently and will be discussed in section 4.5.

NR1 Employment effects from construction

Employment effects from construction activity are derived from input-output tables and allocated to the regions affected by regional factors. As not all effects apply to the region under consideration, the regional share of the effects is separated. Finally, the share is estimated of the additionally employed persons who would be unemployed in the reference situation without the project. This result will be matched with an employment reaction function, which is derived from the experience with the employment impacts of the national regional structural fund.

NR2 Employment effects from operation

Effects from operation are estimated on the basis of regional potential functions which define immobile regional factors, such as education capital or infrastructure capital, as the relevant drivers of regional development. Based on an econometric estimation of the potential functions, a reaction function is derived which maps the relative change in structural unemployment with the relative change in the infrastructure indicator.

NR3 Impacts on the spatial structure

This indicator is still listed in the NR criteria list but is no longer quantified. It has been replaced by the new procedure described in section 4.5.

NR4 Fostering international relationships

Projects which are important for international relationships receive a maximum bonus of 10 per cent of the total benefits. The relevance for international relationships is measured according to the share of international traffic on the links.

4.2.6 NU Environmental impacts[9]

Environmental impacts are classified into three categories: noise (NU1), exhaust emissions (NU2) and separation effects (NU3). Further impacts, which were included in the old scheme but caused great difficulties with their monetary evaluation, are now included in the non-monetary spatial impact and the environmental risk analysis.

NU1 Impacts of traffic noise

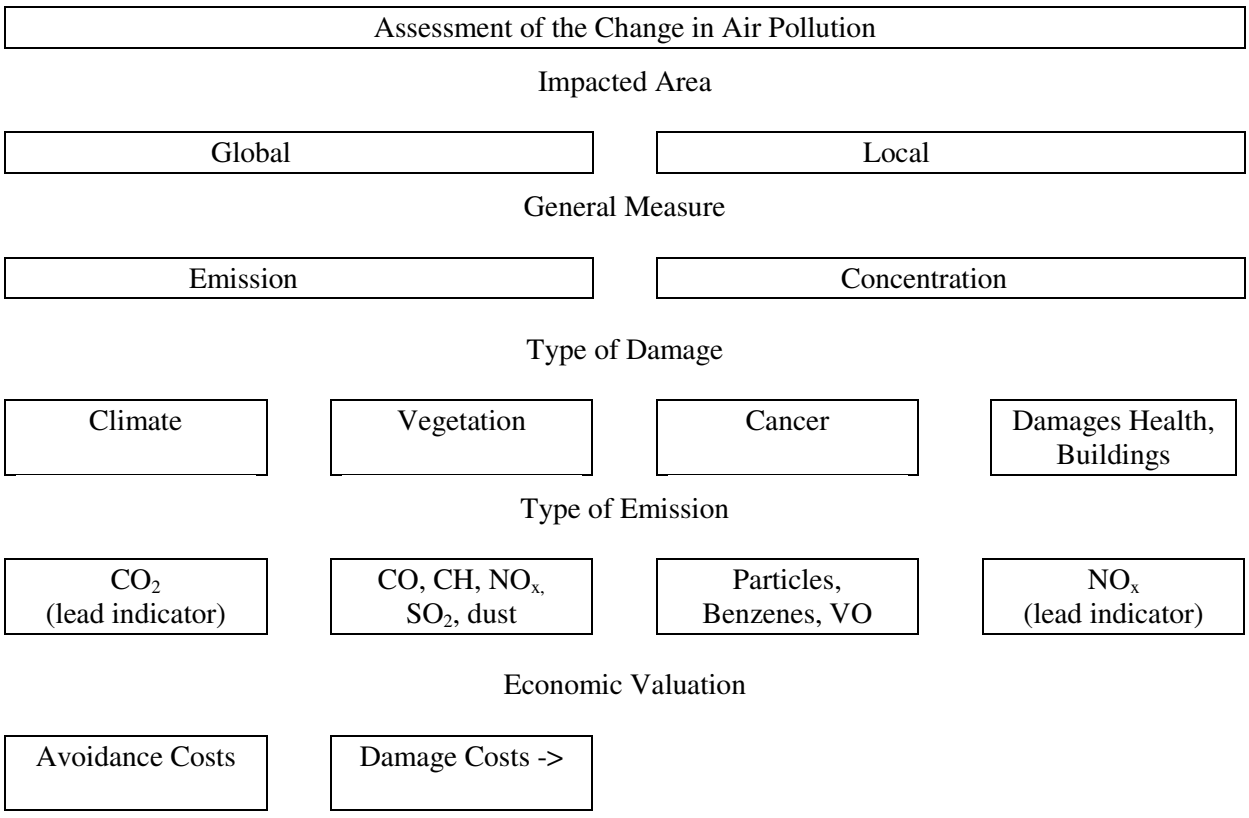
Impacts of noise will be considered if a target value for night-time noise is exceeded and the noise difference between the planning and the reference case exceeds 2 db(A). The monetary value results from four data inputs:

- The degree to which the target noise level is exceeded;
- The number of the exposed population;
- The intensity of noise intrusion;
- A unit cost value for noise impacts, which is derived from the costs of noise-protected windows (avoidance approach).

NU2 Impacts of exhaust emissions

The evaluation follows a very detailed scheme, which is summarised in the following figure:

Figure 1. **Method of measurement and evaluation of NU_2**



From the many single unit values which enter the environmental cost calculation, only the cost of CO_2 is given here: a tonne of CO_2 emissions is valued at an economic cost of 205 €.

NU3 Separation effects

Separation effects are analysed for urban areas where pedestrians may need additional time to cross newly-built expressways. This additional time is calculated through urban traffic modelling and evaluated using the value-of-time approach presented in NE.

4.2.7 NI Induced traffic

An improvement in infrastructure will lead to an increase in traffic, because more kilometres can be travelled within a given time budget. In the literature, a distinction is made between induced traffic of the first and second orders. Induced traffic of the first order consists of additional kilometres travelled, generated by additional trips and longer trip distances. Induced traffic of the second order stems from changes in transport-related economic activities, which result in changes in the technology or the settlement structure. The second type of traffic induction is not considered in the German evaluation scheme, while the first type is treated on the basis of a comprehensive study using a regional disaggregate model of traffic behaviour. The model is restricted to road traffic only.

On the basis of the modelling results, mark-up factors are derived which take into account the positive effects (additional consumer's surplus) and the negative (additional externalities). The type of region, i.e. agglomerations, urban areas of medium population density and rural areas, differentiates the factors.

4.2.8 NH Interconnection of seaports and airports

By the improvement of the federal transport infrastructure, the relative economic position of German seaports and airports may be improved. This is considered in the standard evaluation analysis despite the fact that seaports and airports do not figure in the federal transport infrastructure. Two types of effect are included in the analysis:

- Direct effects of transportation improvements, in terms of better accessibility and interconnection between the ports and the regions;
- Indirect effects, in the form of expected improvements in changes of regional employment, induced by better service conditions.

While in the case of seaports the methodology is advanced and generally applicable, the consideration of such effects for airports is restricted to particular case studies.

4.2.9 K Investment costs

Investment costs are derived from expenditures for the different construction elements of roads, railways or inland waterways. Annuities for the construction elements are computed, assuming an expected life-time of the assets and a social rate of discount (3 per cent real interest rate). Expenditures due to environmental protection are included in the investment costs.

In the final calculation of a benefit-cost ratio, the sum of benefits, NB…NH, is subdivided by the investment costs, K.

4.3. Interdependence analysis

The interdependence between projects can be of the following types:

- Intramodal;
- Intermodal, through changes in traffic volumes on existing links of the competing transport mode;
- Intermodal, through changes in traffic volumes on project links of the competing transport mode.

The analysis is based on defining bundles of projects or links, which are assumed to be interrelated. By this approach, substitutive and complementary relationships between projects can be identified; for example, parallel investments in road and rail or combinations of orbital roads to bypass cities or villages, which, linked together, might form a freeway.

The above subadditivity or superadditivity effects can be measured by a multimodal transport forecasting approach and then allocated to the projects according to their traffic volume.

4.4. Environmental risk assessment

Environmental risk assessment includes the analysis and evaluation of impacts of transport investment projects on nature and the landscape, water and soil, as well as the long-term health and wellbeing of people. It complements the monetary environmental evaluation, which is performed in the cost-benefit analysis.

4.4.1 Pre-assessment and classification

Potential risks should be identified at an early stage of the planning process so that counter-measures can be taken and combined with the investment activity. Therefore, the procedure starts with an early preliminary identification system for potential risks, which is based on a classification matrix developed by the Federal Agency for the Protection of Nature.

Table 3. **Classification of risk in an early preliminary stage**

	Intersection of an area of protection category 1	**Touching of an area of protection category 1**	**Project longer than 10 km**	**Intersection of an area of protection category 2**	**Touching of an area of protection category 2**
New construction	I	II	II	II	III
Upgrade	II	III	III	III	IV

N.B.: Category I = high environmental risk and Category IV = low environmental risk.

4.4.2 Risk assessment

The relevant aggregate criteria are the type of project and the environmental sensitivity of the area concerned. These basic inputs are matched in the form of a matrix to receive a first measure of risk.

Table 4. **Basic matrix for matching intensity of measures and sensitivity of areas**

Sensitivity classification	**Intensity of measures**				
	Very low	**Low**	**Medium**	**High**	**Very high**
Low	1	1	1	2	3
Medium	1	2	3	3	4
High	2	3	4	4	5
Very high	3	4	5	5	5

At the end of the numerical assessment, the classifications of the base matrix are weighed with the length of the associated link sections. The result is again a risk classification, which uses the categories: very low, low, medium, high and very high.

Furthermore, a qualitative assessment, according to the FFH (Flora-Fauna Habitat) guideline, is performed. This ends with a statement as to whether substantial damage to Natura 2000 areas is:

- inevitable;
- possible;
- not to be expected.

4.5. Spatial impact analysis

For spatial planning, the underlying political goals are defined in the Federal Law for Spatial Organisation:

- *Distribution and development*. This means the creation of equitable spatial living conditions and the balanced supply of infrastructure to the regions. Economic development should be fostered by good accessibility and the interconnectivity of regions.

- *Reductions in congestion and traffic diversion*. Measures should be taken to reduce congestion and to divert a part of the growing road and air traffic to more environmentally friendly traffic modes.

4.5.1 Distribution and development

The spatial principle of central locations, developed by Christaller and Lösch, gives the baseline for defining indicators for measuring the equity of spatial distribution and the potential of economic development in a spatial dimension. Therefore, the identification of regional relationships in space, which shows positive prospects with respect to the above criteria, is based on the following principles:

– Interconnection between regions affected by transport investment and central locations;
– Development of networks for cities of the same rank of centrality;
– Accessibility of central locations to the main transport infrastructure.

Infrastructure investment can have a positive impact on these criteria if there are major shortcomings in the present. Therefore, the evaluation procedure is structured as a matrix, which matches the structural deficiencies with the deficits of accessibility.

Table 5. **Evaluation matrix for spatial distribution and development**

Structural deficits	**Accessibility deficits**			
	Non-existent	**Low**	**High**	**Very high**
Non-existent		1	1	2
Low	1	1	2	3
High	1	2	3	4
Very high	2	3	4	5

4.5.2 Reducing congestion and diversion of traffic

Corridors which suffer acutely from traffic congestion on the federal infrastructure, are identified using the criteria:

– Traffic volume on motorway sections, measured in number of vehicles per day;
– Freight traffic volume on motorway sections, measured in number of lorries per day;
– Total traffic volume in the corridor, measured in number of vehicles per day;
– Density of the road network within the corridor, measured in km road length/km^2.

Starting from this definition of highly congested corridors, the projects are evaluated according to their contribution to congestion reduction. Again, after quantifying indicators with the help of traffic forecasting models, an evaluation matrix can be constructed.

Table 6. **Evaluation matrix for the contribution to reduce congestion in highly congested corridors**

Traffic load 2015	**Reduction/diversion effects**			
	Low	**Medium**	**High**	**Very high**
High		1	2	3
Very high	1	2	3	4
Extremely high	2	3	4	5

4.5.3 Reducing congestion in local areas

The sensitivity of local areas is measured through the following set of criteria:

- Quality of urban space, e.g. visual quality, existence of landmarks;
- Quality of land use, e.g. groups of buildings, recreation areas, accessibility to points of local attraction;
- Existence of barriers to the interconnectivity of districts;
- Urban climate, sealing of urban surface, area and variety of vegetation.

The results of the evaluation are transformed into a scale between 1 and 5 points.

4.5.4 Aggregation of spatial impact evaluations

To summarise the three different types of spatial effects, the scores are taken of the area in which the highest benefit from a project is identified.

4.6. Summary, social rate of discount and efficiency criterion

Usually it is assumed that the real benefits per period are a constant, such that the computation problems diminish and the sum of benefits for one representative period of time are compared with the annuity of the investment costs, K. The real social rate of discount is set at 3 per cent. This seems to be low compared with the interest rates applied in other countries and in particular compared with interest rates used for private rentability calculus.

However, one has to consider that the financial rate of interest applied in the private sector relates to the planned or desired yields of capital invested. It does not correspond to the real marginal productivity of capital, which includes an average of successful and unsuccessful investments (for which the actual internal interest rates can be negative). Therefore, the real social rate of discount has been derived from a long-term growth model which considers the limited availability of natural resources in the future, i.e. the need for investment in assets which are not traded on the private market. The empirical result of 3 per cent corresponds approximately to the long-term real interest rate on public bonds in Germany.

The criterion which concludes the monetary analysis is the benefit-cost ratio:

(4.1) $N/K = (NB + NW + NS + NE + NR + NU + NI + NH)/K$

The benefit-cost criterion (4.1) is used for setting priorities for the projects under evaluation. In the BVWP 92, the following thresholds have been applied, which were derived from the expected long-term public budget for transport investment:

(4.2) $N/K > 3$ => high priority, project is foreseen to be realised in the next 20 years;

$1 < N/K < 3$ => low priority, project is allocated to waiting list;

$N/K < 1$ => project is eliminated.

In the new BVWP 2003, only the elimination rule (third criterion in 4.2) is used in the same way. The other outcomes are treated in a more flexible manner: taking the available budget of the time

interval until 2015, the projects are selected in general according to their benefit-cost ratios until the budget is exhausted. Projects with a benefit-cost ratio higher than one, which cannot be selected, are put on the waiting list for realisation after the year 2015.

5. SOME DETAILS OF THE MANDATORY ELEMENTS OF THE EVALUATION PROCEDURE

5.1. Underlying speed-flow relationships

The major part of the benefits stems from savings in generalised costs. In the German evaluation scheme they account for about 70 per cent of the total monetary benefits. The basic information for quantification of generalised cost, consisting of time and vehicle operating costs, is provided by speed-flow curves. These curves are furthermore important for estimating the environmental impacts of noise and air pollution. Therefore, this database plays a most important role in estimating the impacts of investment activities on the traffic network concerned.

The speed-flow curves, which are used in the BVWP, have been calibrated on the basis of traffic conditions in the 80s. These curves suggest that congestion already occurs at medium capacity loads. In 1998, more recent results of speed-flow investigations were published by the Transport Research Society (FGSV: EWS, 1998). These curves show a different characteristic, insofar as the slope is flatter until the capacity limit is approached. In Figure 5.1, BVWP (x) and EWS (o) curves are compared for five different road types. According to the new EWS curves, substantial changes in time or operating costs due to road investments are only identified if the traffic load in the case "without" investment is close to capacity. This has important consequences for the weight of benefits, which are dependent on congestion changes, i.e. the benefits from time savings will be much lower if the EWS functions are used. For the BVWP 2003, a compromise between the two alternative approaches has been established.

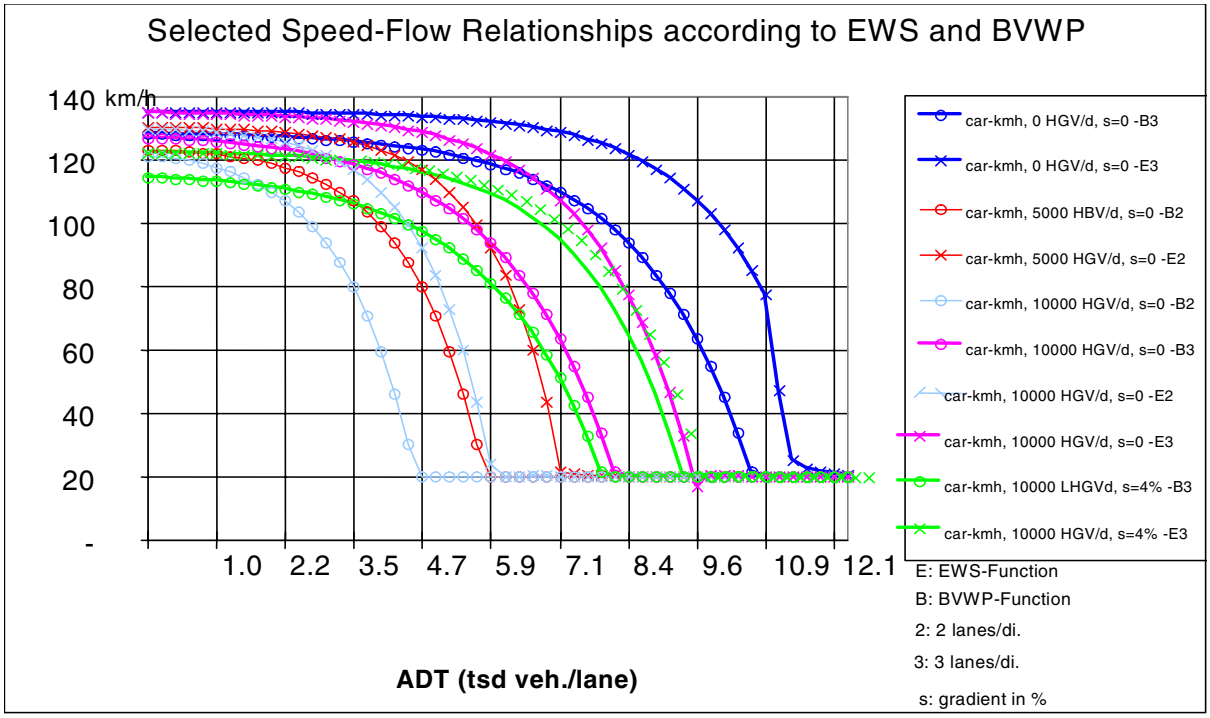
The speed-flow curves also provide the basis for calculation of fuel consumption or emissions of pollutants and CO_2. For the latter, the traffic flow conditions are modelled in more detail by introducing speed cycles which are associated with a characteristic average speed.

The network simulation model for roads includes about 300 000 sections, which are classified according to a nine-digit typology:

- level/level-free crossings, separated/non-separated lanes;
- motorised traffic only/mixed traffic;
- number of lanes;
- quality index;
- speed limit;
- no by-pass for trucks;
- gradient;
- tunnel;
- type of urban settlement.

Figure 2. **Speed-flow curves for BVWP and EWS for different road types**

ADT: Average daily traffic; HGVs: Heavy Goods Vehicles



Also the rail network is modelled by using a highly differentiated typology of network sections such that the conditions for passenger and freight train movements can be simulated in a realistic way.

6. FINANCIAL ASPECTS

6.1. Finance from taxes/general credits

The usual method of financing the projects of a transportation master plan is to fund the projects from the federal budget. This method was formerly called “tax finance”. For several years now, the total investment budget of the Federal Government has almost equalled the federal credits to finance the additional yearly debt. In other words, overall federal public investment, including transportation, is practically financed by credits. As the German debt position has already exceeded EU limits, additional methods of finance are being studied for the new master plan. Furthermore, experience from the last BVWP 1992 has shown that, from the total investment budget for federal transportation of about 250 billion Euros, less than 200 billion Euros could be financed by direct public funding.

To counter these difficulties, the MoT has set up a High-Level Commission to investigate the possibilities for the long-term, stable financing of transport investment. This group, called the "Pällmann Commission" after its chairman, suggested switching from tax finance to the user-pays principle. The German Ministry has in part followed this general advice and introduced some important changes, such as motorway tolling for HGVs, F and A models for road finance and the establishment of an infrastructure finance agency, the VIF[10].

6.2. Motorway tolling for Heavy Goods Vehicles

The Federal Government plans to introduce kilometre-based motorway charging for Heavy Goods Vehicles (HGVs) (lorries of 12 tonnes gross weight or more). Due to technical problems, the system's starting date has been postponed from August 2003. This system would replace the time-based Euro-Vignette scheme and lead to additional revenues which could be used for financing transport investment.

Directive 1999/62 EG provides the legal basis for the pricing scheme and allows a maximum allocation of total infrastructure costs, taking the average cost for each vehicle category as a benchmark for charging. It is possible to vary the charges according to congestion rates and the environmental performance of the vehicles (Euro-emission standards). A road infrastructure cost allocation for Germany (Prognos and IWW, 2002) resulted in a benchmark figure of 15 cts on average per vehicle-km, which was spread according to the vehicle axles and Euro emission categories.

The revenues from this charging were calculated at 3.4 billion Euros per year, without taking into consideration the cost of the charging system and the potential losses through technical failure, manipulation or diversion of traffic. The net revenue was estimated at about 2.5 billion Euros, which is about 2 billion Euros higher than revenues from the Euro-Vignette (which was abolished[11] in September 2003). This budget has already been allocated to individual transport investment programmes, so the implementation plans will have to be shifted if the pricing system cannot be introduced in the near future.

6.3. F and A models

European law allows for private or mixed public/private investment in tunnels, bridges and alpine passes outside the motorway network. For such undertakings a law was established in Germany in 1994 and revised in 2001. About ten projects are under consideration to be financed on this basis, one is under construction, a second is being planned and the remaining ones are still undecided. For F models, a BOT (Build Operate Transfer), BOOT (Build Own Operate Transfer) or DBFO (Design Build Finance Operate) is established and financed from user charges raised from cars, LGVs and HGVs.

In Germany, the potential for F models is limited because of technical problems with charging, public regulations on pricing and the possibilities of traffic diversion on the denser networks. Therefore, the A model has been created, the name stemming from *Autobahn* (motorway). This indicates that the model is restricted to the extension of motorways from, for example, 4 to 6 lanes, including a major quality upgrading to modern standards. A private or public/private company obtains the concession for building, operating and financing a motorway section and is offered two sources of funding: firstly, a state grant for part of the investment costs and, secondly, the revenues from HGV tolling, according to the tolling scheme presented in 6.2. On average, the revenues from tolling would recover about 50 per cent of the total cost, therefore a public grant of 50 per cent is calculated.

6.4. Infrastructure financing agency

The MoT has prepared a law for the establishment of an agency or company under private law with the following responsibilities:

- To collect and administrate the revenues from motorway tolling;
- To spend a defined share of the revenues on federal transport investments;
- To co-ordinate activities for establishing A and F models.

Progress on bringing this institution to life is stagnating at present because of numerous problems with motorway tolling. It also has to be considered that the EU Commission holds a different view of the responsibilities of an infrastructure agency and the tolling scheme, expressed in a draft revision of Directive 1999/62 EG.

7. COMPARISON WITH THE ISSUES OF INTEGRATED ASSESSMENT DEVELOPED IN EU-SPONSORED RESEARCH

7.1. Characteristic results of the CBA

The following tables show the contribution of different criteria to the overall benefits in the BVWP 1992. A similar synopsis for the new plan does not yet exist. From the tables one can conclude that:

- The generalised costs, which are expressed by the benefit components NB and NE, clearly dominate the picture (for rail: 85.7%; for road: 71% of the benefits);
- The contribution of environmental benefits is very modest[12];
- The contribution of spatial development benefits, NR, is considerable for rail projects, in particular for small projects, while it is modest for road.

Table 7. **Evaluation results for railway investments by type of effects; in % of total benefits**

Project type	**NB**	**NW**	**NS**	**NE**	**NR**	**NU**
Large projects	79.4	- 7.0	1.9	9.6	13.5	2.6
Small projects	65.4	- 3.4	1.2	9.6	25.1	2.2
All projects	75.5	-7.3	1.8	10.2	17.3	2.4

Table 8. **Evaluation results for road investments by type of effects; in % of total benefits**

Project location	NB	NW	NS	NE	NR	NU
West Germany	52.1	- 1.2	9.8	26.5	5.7	6.9
East Germany	39.1	- 1.1	14.3	23.6	15.9	8.2
Germany	45.9	- 1.1	12.0	25.1	10.6	7.5

NB: Benefits from reduction of vehicle operation costs.
NW: Benefits from reduction of infrastructure costs (operation, maintenance).
NS: Benefits from reduction of accident costs.
NE: Benefits from time savings.
NR: Benefits from improvement of spatial structure.
NU: Benefits from environmental improvements.

7.2. Issues for an integrated assessment in the EU research projects, IASON and TIPMAC

The European Commission has launched two large research projects, IASON and TIPMAC, to study the indirect effects of transport investments. The basic proposition of the research approach is that the conventional CBA assessment methods are restricted to the direct impacts, and that indirect impacts follow in second and third rounds in a dynamic feedback process, which may modify the direct impacts substantially. Reference is made to the SACTRA Committee of the UK Department of Transport, which discussed in particular the question of to what extent the conventional CBA underestimates the overall benefits of transport investment. A prototype model by Venables and Gasiourek (2000) suggested that the overall benefits might be about 30 per cent higher than the direct benefits, measured on the basis of generalised costs.

The German evaluation scheme is different from the SACTRA prototype model insofar as it includes not only the direct benefits, measured by changes in generalised costs, but also indirect effects in terms of spatial benefits or environmental improvements. Furthermore, the German method goes beyond the pure efficiency-oriented measurement of generalised costs (eventually transformed into consumers' surplus or equivalent variation measures) and includes spatial employment, equity and international effects, which are evaluated using the change in generalised costs as inputs. Clearly, this procedure will cause some double-counting of effects. The overall result of the German evaluation procedure in the BVWP suggests that road projects (about 1 500 projects) achieve an average benefit-cost ratio of about 2 and the projects which fit into the future investment budgets achieve an average benefit-cost ratio of about 4. The magnitude of these figures indicates that the German evaluation method goes far beyond the pure measurement of efficiency and economic rentability. But it uses simplified partial modelling approaches for the assessment of indirect impacts. Therefore, by applying a more sophisticated method for measuring all indirect economic impacts, it might be possible that the final result of an integrated assessment comes out with much lower results than the German CBA based on partial analysis.

In the EU projects, IASON and TIPMAC, integrated approaches to measure indirect effects are measured by combined models:

– CGE Europe (a computed general equilibrium model, using a detailed regional but a rough sector modelling) combined with SASI, a dynamic simulation model, which includes endogenous models for population and sector economies[12];

– E3ME (a macroeconometric model including detailed input-output tables for the EU countries) combined with SCENES (a transport and regional model with explicit modelling of origin-destination flows and traffic assignment)[13];

– ASTRA (a system dynamics model, including population, macroeconomic development, sectoral and regional differentiation, input-output analysis, foreign trade and environmental impacts), combined with VACLAV (a transport model using a detailed modelling of regions and a multimodal network model)[14].

The general results presented by the interim reports so far show:

– The scale of the indirect economic effects of transport investment is modest on average;

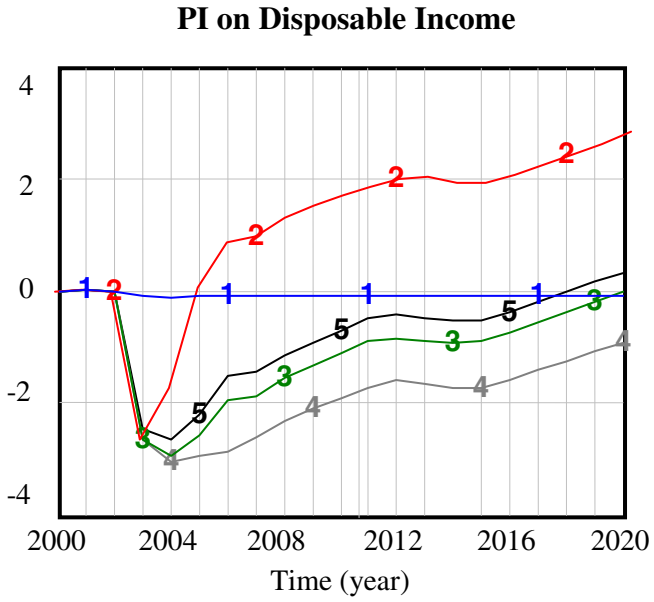
– There is a high variance in results, i.e. some projects may appear with high indirect economies while others show negative indirect effects;

– Comparing the relative economic effects (percent changes in GDP), these are higher in accession countries than in industrialised western European countries. This does not hold for the absolute magnitude of indirect effects.

Without going into details, the results shown in Figure 3, of the overall effect of investments in Trans-European Networks on disposable national income, characterise the basic differences between the partial approaches of conventional CBA and the integrated approaches. Conventional CBA completely abstracts from the way of financing the investment activity and the time path of adjustments through economic feedback processes. The integrated model (here, the ASTRA system dynamics model) is able to simulate the effects of "complete" policies, i.e. investment and finance (through taxes, charges on the basis of social marginal cost pricing or credits). Consequently, an investment policy as such does not necessarily come out positive for economic growth, as the money used for its finance has to be extracted from the private sector. The opportunity costs of transferring money from the private to the public sector are considered explicitly in the integrated modelling scheme and lead to different benefit profiles over time.

Figure 3. **Output of an integrated assessment model**
(here: ASTRA/VACLAV)

PI: per cent increase (normalised)



1 = TIPMAC Fuel Tax Scenario
2 = TIPMAC SMCP replacing tolls and tax
3 = TIPMAC SMCP replacing tolls only
4 = TIPMAC SMCP on top
5 = IASON SMCP replacing tolls only.

7.3. First lessons

Taking the aggregate results of the integrated assessment schemes, the indirect effects are modestly positive if efficient and fair pricing of infrastructure use will generate the revenues for financing the projects. In the case of financing through income taxation, or indirect taxes on fuel or value added, this positive effect is not guaranteed. Benefit-cost ratios of more than 2, as with the average of the German evaluation method, are not possible in the complete analysis using integrated approaches. In particular, it is not conceivable that projects are associated with a high benefit-cost ratio of 2 or more, but cannot be financed by private money. Note that the savings of generalised costs account for more than 70 per cent of the benefits in the German method. These savings represent direct benefits to the users and should reflect the willingness to pay of the users for the improvement. Therefore such a result, which states that private benefits are several times higher than costs but private finance is not possible, simply indicates that there are appraisal biases and double counting in the German method. The results of the German CBA cannot be interpreted in the usual economic way but rather in terms of political rankings.

Comparing these more politically based figures with the results from integrated modelling brings two new insights:

1. An indication of the magnitude of overestimation caused by mixing efficiency and equity in the German scheme;

2. An indication of the monetary evaluation of the spatial impacts, which are evaluated using a multi-criteria analysis and which, in the present form of the overall appraisal, cannot be traded off with the monetary results.

8. CONCLUSIONS

The German standardised evaluation scheme for transport infrastructure projects was one of the most advanced concepts in the 1980s. It was not developed further at the beginning of the nineties because German unification set other priorities. The update for the Federal Transport Infrastructure Investment Plan 2003 includes some new and remarkable elements. The spatial impacts of transport investment are now evaluated in a new way, taking into account the changes in spatial gravity patterns. The consideration of environmental risks, through a detailed environmental impact assessment, is a second achievement of the updated method.

The treatment of the spatial and environmental elements shows that the German method is on the way to a more system-based analysis. The interdependence analysis for interrelated projects also tends in this direction. However, the basic approach is still comparatively static and provides only a partial analysis, based on measuring changes in the transport sector. Therefore, a number of double counts still occur and there is no clear distinction between efficiency gains and equity improvements.

The development of integrated assessment modelling, as initiated in the research activities of the EU Commission, can contribute towards generating more realistic figures on the overall economic benefits of transport infrastructure and its spatial allocation. It can be expected that integrated assessment will complement direct CBA assessments in the future so that better support can be provided to public and private decisionmakers.

NOTES

1. See the special issue of *Transport Policy*, 7, 2000, in particular, the contribution of Bristow and Nellthorp.

2. See *Forschungsgesellschaft für das Straßen- und Verkehrswesen*, 1986, 1997.

3. See Bundesminister für Verkehr, 1992a, 1992b, 1993.

4. The Deutsche Bahn AG is, since 1994, a company under private law, owned by the Federal State.

5. See Bundesminister für Verkehr, Bau- und Wohnungswesen, 2003a, 2003b.

6. See Bundesminister für Verkehr, Bau- und Wohnungswesen, 2000.

7. See Bundesminister für Verkehr, Bau- und Wohnungswesen, 2003a.

8. The assessment of time savings presupposes an accurate measurement of congestion, see Bovy, 1998; Goodwin and Dargay, 1998; IWW, NEA *et al.,* 1997.

9. Substantial improvements to the 1992 method were presented in a PLANCO 2000 consultants' report.

10. VIF means *Verkehrsinfrastruktur-Finanzierungsgesellschaft*, or agency for financing transport infrastructure.

11. This law is called *Fernstraßenbauprivatfinanzierungsgesetz*. This explains the name, F-models.

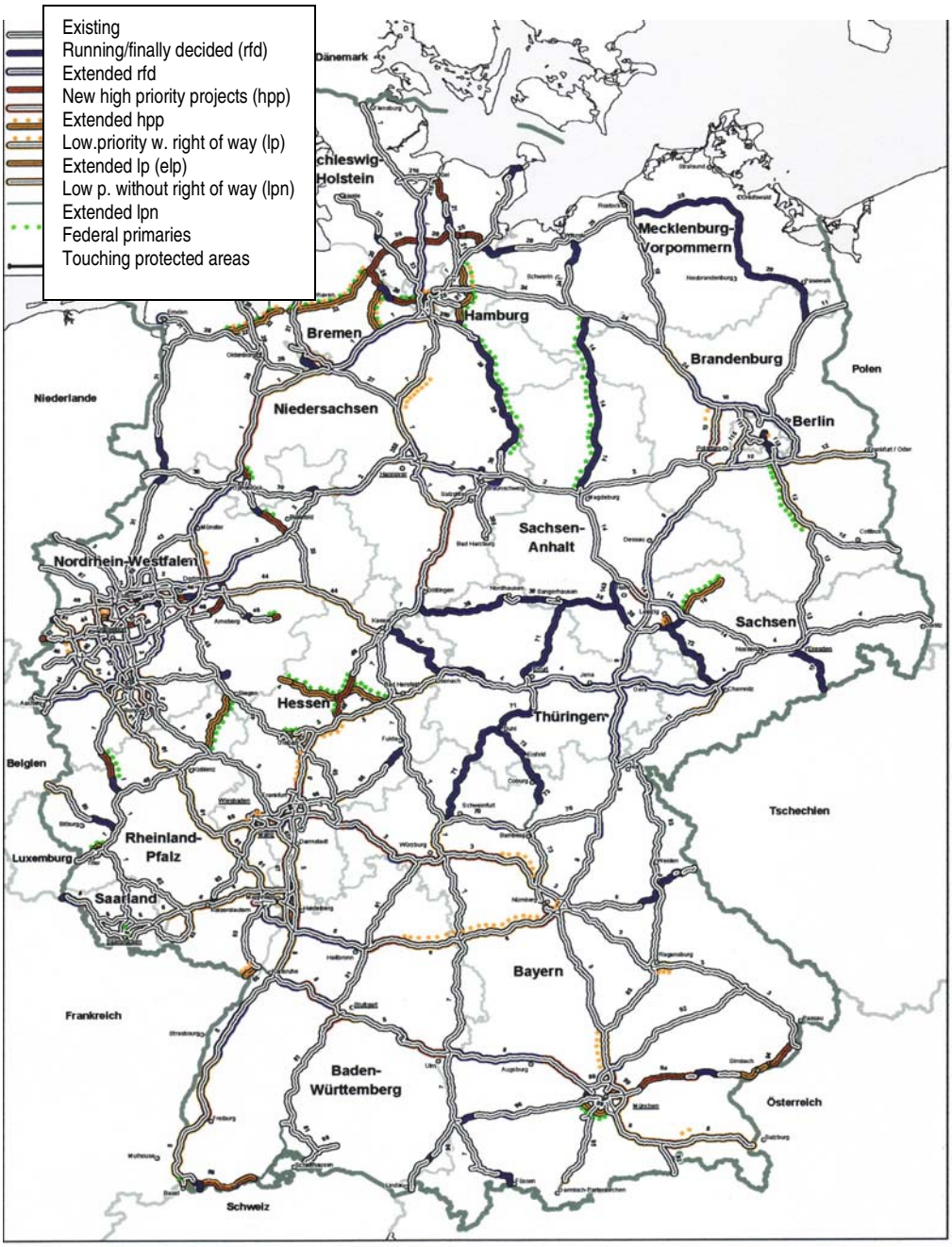
13. Developer of CGE Europe: University of Kiel, Prof. Bröcker. Developer of SASI: University of Dortmund, Prof. Wegener.

14. Developer of E3ME: Cambridge Econometrics. Developer of SCENES: Marcial Echenique and Partners, Cambridge.

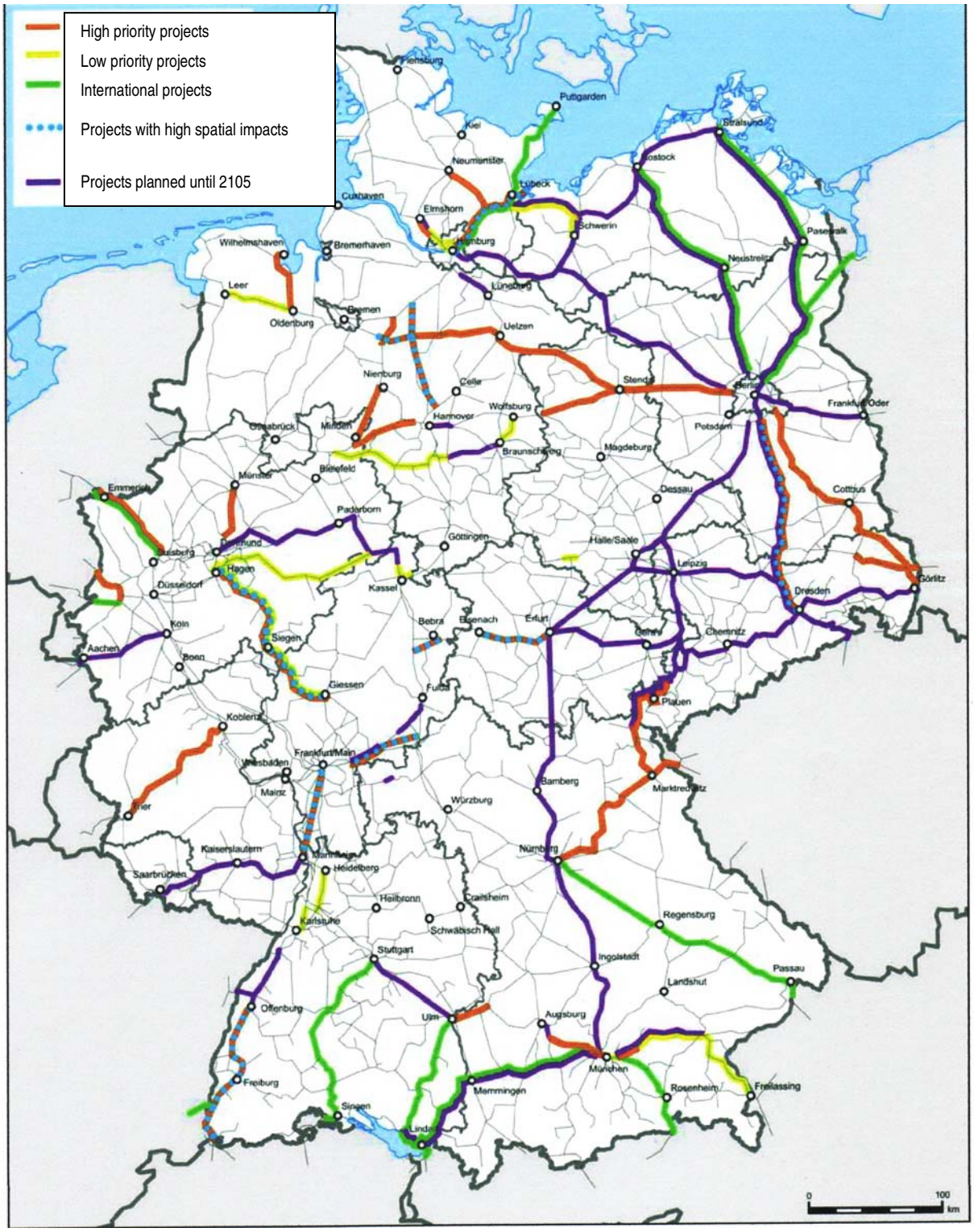
15. Developer: University of Karlsruhe, IWW Institute of Economic Policy Research.

ANNEX

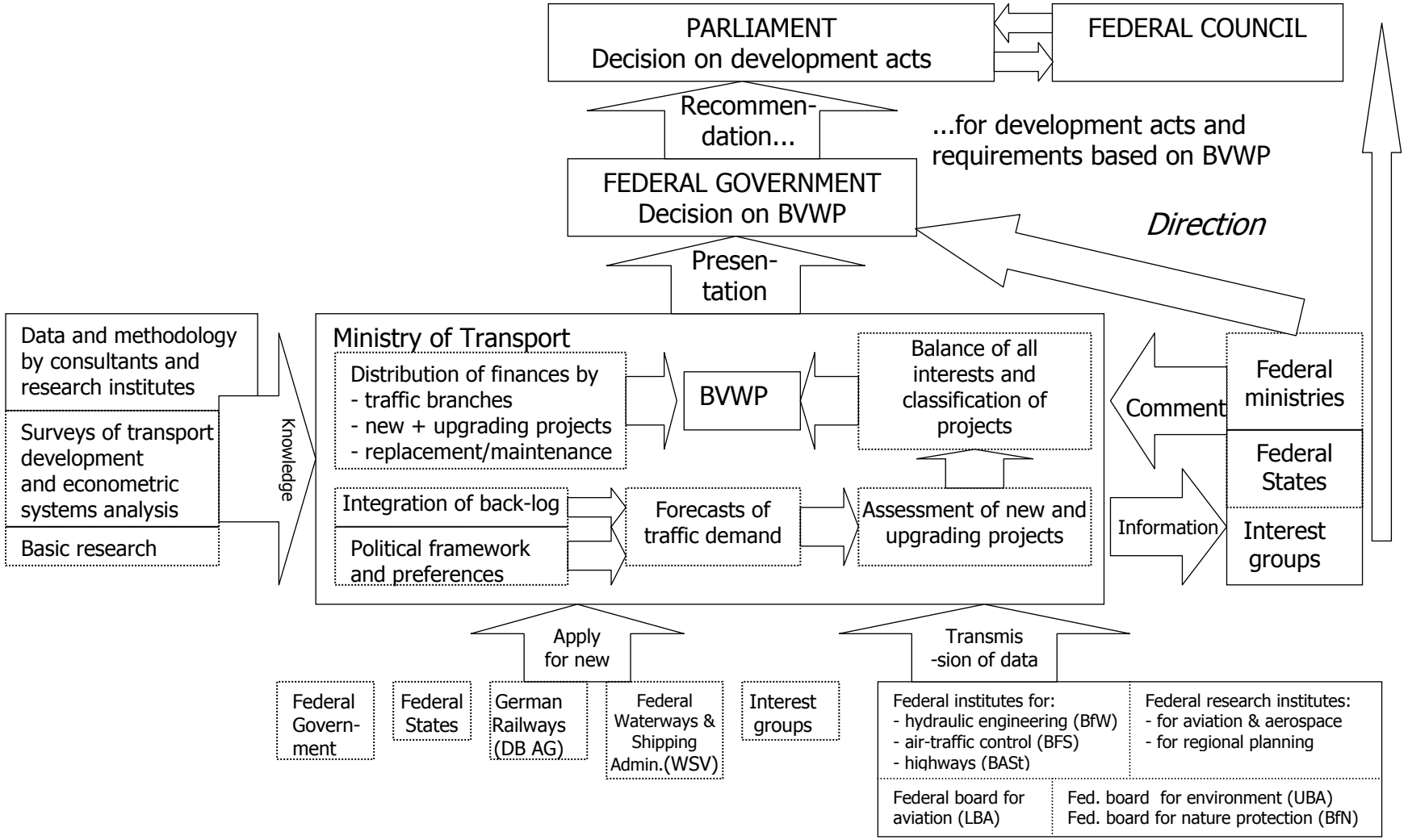
A1: Master Plan for Federal Motorways



A2: Master Plan Federal Railways



A3: Political Process of Transport Infrastructure Planning in Germany



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NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF SPAIN

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NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF SPAIN

SUMMARY

Madrid, November 2003

1. CURRENT TRANSPORT INFRASTRUCTURE POLICY IN SPAIN: A NEW APPROACH

1.1. The starting point in early 1996: the economic and budget models in crisis

Spain's transport infrastructure policy changed radically in 1996. When the then government left office that same year, the country found itself facing a bleak economic situation. Joining the European Economic and Monetary Union as a full member presented it with an even greater challenge. With the budget deficit deepening -- to over 7 per cent of GDP in 1995 -- debt and public spending growing, interest rates high and public investment declining as a percentage of GDP from 1990 on, it became clear that the economic model had hit crisis point and that the budget model had been drained dry.

A new economic model, which would bring macroeconomic variables back to acceptable levels, was urgently needed. The iron budgetary discipline that the European Union had imposed on those Member States which wished to be part of the first phase of monetary union, Spain among them, required the adoption and application of economic convergence criteria, the real impact of which, at macroeconomic level, proved to be very positive.

Up until 1996, Spain's model for financing and managing its public works had been the conventional one, through which government administrations managed and financed infrastructure out of their budget appropriations. Under the legislation, concession schemes allowing state roads to be run by private operators were the exception rather than the rule. The end result was that in the climate of economic crisis at the time, with high interest rates which were far from conducive to private sector involvement and, in essence, for political reasons, the socialist government froze the Toll Motorway Programme in 1982.

The conventional model had been able to continue functioning as expected as long as there were no serious budgetary problems. However, the climate described above forced government administrations to begin to revise their initial approach. They had to fall back on arm's length management systems, typically following the concession model, to relieve the pressure on their budgets for investment.

This, briefly outlined, was the situation in Spain at the beginning of 1996. It lagged far behind the more advanced Member States of the Community in terms of infrastructure, as can be seen from the figures attached: its economic model was in crisis, there was a great deal of state intervention in infrastructure management and its budget-financing model had been drained and was under severe pressure from the economic convergence criteria set by the European Union as a condition for Spain's membership of the monetary union.

1.2. 1996, the beginnings of change: the introduction of new funding and management systems for infrastructure provision

In view of the difficulties outlined above -- the requirements imposed by the State's economic policy and the European Union's convergence criteria -- one of the priorities set by the new

Government of Spain, which took office in May 1996, was to lay the groundwork and establish the mechanisms for a new policy for funding and managing public works infrastructure so that they would cease to be a burden on the general government budget. That policy would be based, to a large extent, on the participation of the private sector and would again make use of the concession model, in what was to be a complete departure from the previous, wholly budget-financed model.

In order to inject new life into government procurement contracts and boost economic recovery, the Government decided to introduce a whole package of urgent initiatives. These initiatives would, firstly, enable the creation or development of public corporate bodies, which would be financed by capital contributions from the State or the money and financial markets, not from the general government budget and, secondly, would attract more private sector involvement in infrastructure provision. The introduction of a further package of structural measures was left to a later date, as it would require lengthy political debate and a longer time to implement.

The new corporate public bodies introduced as part of the first package of measures would have to meet the requirements specified in Eurostat accounting standard ESA95 in order to ensure that capital contributions from the Government would be shown as financial transfers (Chapter VIII) and not consolidated into the national accounts under the public deficit.

As regards the initiatives to be introduced over the course of the 1996-2000 legislative period, so that participation by the private sector would be a more attractive proposition, the Government phased in major amendments to the Toll Motorways Act, which was in any case outdated following the freeze on the motorway plan referred to above. Among these measures, new budget financing formulae, based on deferred payments and/or phased payment for the works, warrant particular mention. These enabled a faster pace of infrastructure investment, by transferring public debt to future generations and avoiding placing a strain on the budget during the years required for construction. None of this prevented the Ministry for Public Works from pressing ahead at the same time with the introduction of Phase 1 of the new Toll Motorway Programme, which included the construction of 442 km of new motorway.

1.3. In 2000, consolidation of change: a new approach to infrastructure policy

With the nominal convergence imposed by Maastricht achieved, in a framework of macroeconomic stability and sustainable development, with interest rates low and fiscal policy in the hands of the European Union and not of central governments, infrastructure has now become a major tool of economic policy. For Spain, the main objectives of that policy today are to achieve real convergence with our most developed Community partners and full employment, making up the historic lags in infrastructure construction which have accumulated over the years, all while ensuring strict adherence to the budgetary restrictions imposed by the Stability and Growth Pacts signed with the European Union (Stability Programme, Kingdom of Spain 2004-2006) and by Spain's own Budget Stability Act.

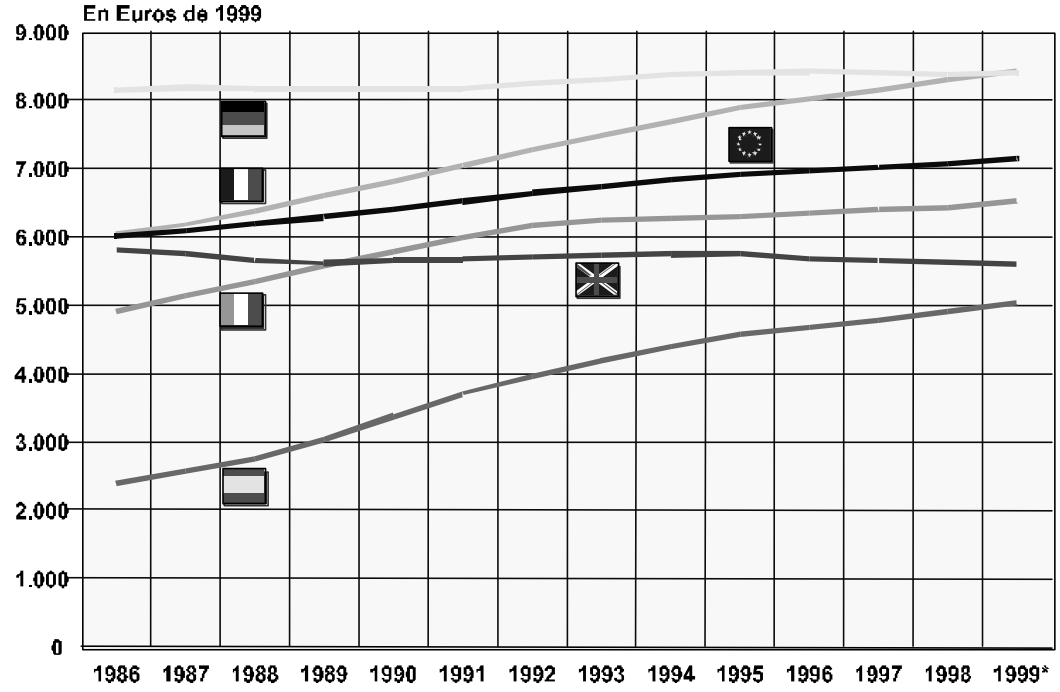
The aim of these restrictions was to attempt to curb the implementation of Keynesian policies which, by influencing aggregate demand, made use of budget deficits as a means of expanding and revitalising the economy. They ushered in a new economic model, based on the supply economy and the positive effects generated by structural policies (including infrastructure policy), over which governments still have wide-ranging powers.

From this standpoint, public investment and infrastructure in particular have become factors which trigger major economic effects, helping to maintain steady economic growth and which, in periods of crisis, can act as countercyclical stabilising factors. This said, it is quite true that until only recently, as long as the Keynesian model was so prevalent, their main effect tended to be as instruments of pro-cyclical policy, in that they were used for budgetary adjustment.

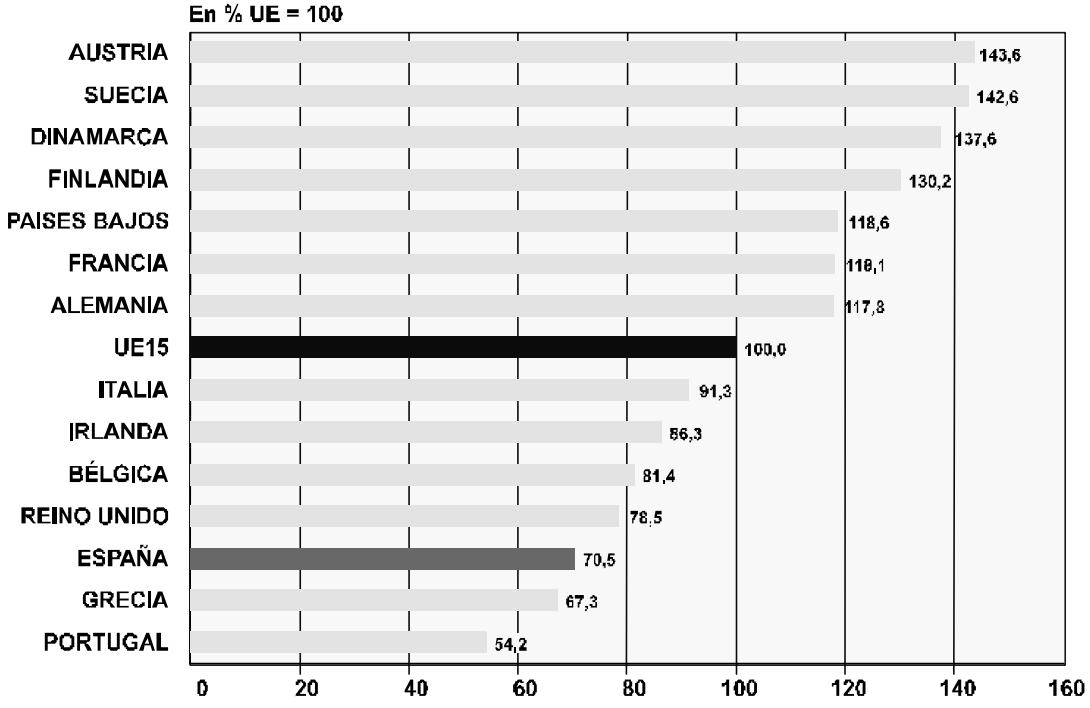
The very close correlation between public investment in infrastructure and productivity and the crowding-in effect that public investment exerts on private investment -- stronger than the crowding-out effect generated by an increase in aggregate demand -- shows that public investment can stimulate economic development and help the Government to achieve its economic policy objectives, as listed above.

Based on the foregoing, in 2000 -- after the four-year period of economic readjustment from 1996 to 1999 -- the Ministry for Development focused its efforts on stimulating infrastructure development, by promoting the participation of the private sector in the financing and management of transport infrastructure while maintaining the stability of the economic model and meeting its commitments to the European Union, as well as on establishing an adequate normative framework which would provide the system with legal certainty.

Trends in public physical capital stock in the EU
(in 1999 Euros)



Public physical capital stock in the EU in 1999



2. THE MINISTRY FOR DEVELOPMENT'S AMBITIOUS INFRASTRUCTURE PLAN 2000-2006

2.1. Scope and objectives of the Infrastructure Plan

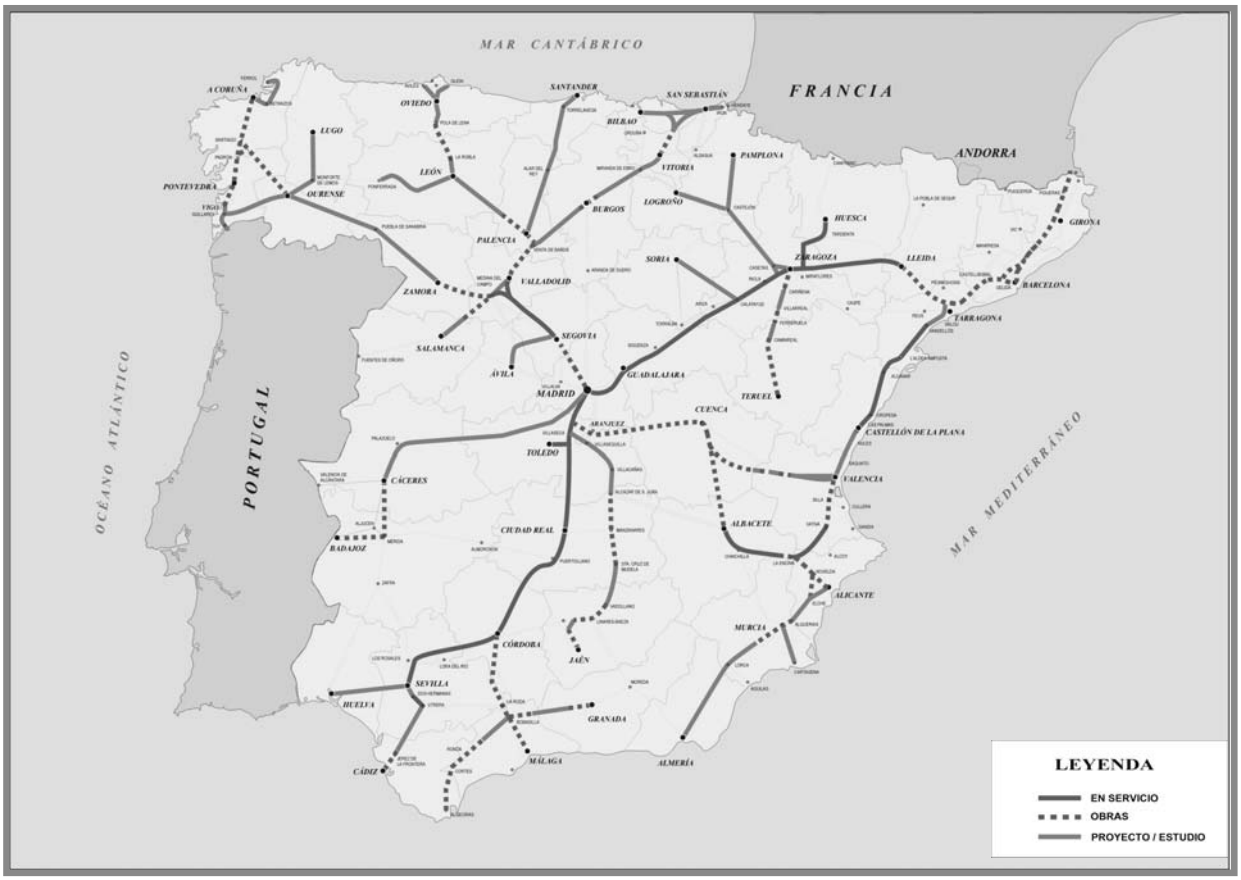
In order to meet these challenges, the Government launched an Infrastructure Master Plan for the period 2000–2006 in line with the timeframes and commitments under the European Union's Financial Perspectives for Agenda 2000, which provides for investment totalling €114.5 billion in constant 1999 euros. The cornerstone of the Master Plan is the Ministry for Development's Infrastructure Plan for 2000–2006, for which the budget horizon and full entry into service is 2010. Total planned investment for the ten-year period under consideration, by the Ministry itself and the public corporate bodies attached to it (GIF, AENA, Puertos del Estado, etc.) will amount to €103 billion in constant 1999 euros. This includes €60.3 billion for the period 2000–2006, which represents more than 50 per cent of the total investment to be made by general government overall.

The principal objectives of the Master Plan, still from the stance of budgetary discipline and public deficit control, are as follows:

Current Situation of Spain's High-capacity Road Network

- To complete and modernise the high capacity road network, extending it from 8 000 km in 2000 to 13 000 km by 2010. In addition to operations on densely trafficked sections and on sections to complete the existing motorway and expressway network, the Plan includes new routes to provide a more closely interconnected network and facilitate its integration into the trans-European road network;
- To modernise and extend high-performance rail links so that rail transport can be fully competitive with road and rail transport. The high-speed rail network, which will be extended to 7 300 km by 2010, on UIC gauge track, will enable the integration of the rail network into the Trans-European Tansport Network and hence Spain's integration into European markets. The main objective is to improve long-distance and regional passenger transport services in order to increase rail's share of the aggregate demand for inter-city transport relative to other transport modes;
- To develop and improve airport infrastructure in order to deal with saturation problems and respond to the dramatic growth in air traffic;
- To modernise state-owned ports to accommodate future traffic and compete with ports in other countries, transforming them into true logistics nodes, able to provide better services and fast connections to other modes of transport.

High Capacity Rail Network (March 2004)



Legend: In Service / Under Construction / Planned/Under Study

One point which warrants mention is that, in line with European Directives, the Master Plan demonstrated a clear commitment to modern, high-performance, environmentally friendly rail transport as the mode of the future, promoting high-speed rail as an alternative to air for long-distance travel.

The four principles on which the new infrastructure policy and, consequently, the Ministry for Development's Infrastructure Plan are based are:

- That infrastructure finance be consistent at all times with the restrictions imposed by budget equilibrium criteria;
- That there be a stable legal framework, providing the system with adequate guarantees to ensure the efficient management of the public and private resources available and make private sector participation more attractive;
- That Spanish national transport networks be interconnected with the Trans-European Transport Network so that Spanish operators and economic sectors will have access to European markets under more competitive conditions;
- That all levels of general government participate in the provision and funding of infrastructure.

2.2. The Investment Programme: proceeding faster than forecast

As outlined above, planned investment by the Ministry itself and by the public corporate bodies attached to it (GIF, AENA, *Puertos del Estado*, etc.) for the ten-year period under consideration amounts to a total of €103 billion in constant 1999 euros. Of this, €60.3 billion is to be invested over the seven-year period 2000-2006, a sum which represents more than 50 per cent of total investment by the whole of general government (for the legislative period 2000-2004, the figure is of the order of €43 billion).

The Infrastructure Plan is Spain's most ambitious yet and will be a major challenge which will call for a substantial investment effort from all of the actors involved. In order to meet this challenge, the Plan will be able to draw not only on finance from public agencies -- the Ministry, through its budget, and Development Group Enterprises (AENA, Puertos del Estado and ADIF), through the resources that they themselves generate -- but also on European funding of as much as 22 per cent and private finance, which is expected to bring in between 15-20 per cent of investment over the entire period. This effort assumes an annual average investment of over €9 billion, i.e. the equivalent of 37 per cent of GDP, compared with a figure of around 0.9 per cent of GDP over the previous ten-year period.

It should be noted that the latest European Community regulation on structural funds and cohesion permits the use of these funds for the co-funding of income-generating projects in which the private sector participates. Properly managed, not only has this resulted in better allocation of resources earmarked for investment, it has also had a very high multiplier effect on investment, contributing effectively to the implementation of the Infrastructure Plan.

The breakdown of investment by programme over the three periods shown in the attached table -- legislative period, the seven-year period covered by European Union financial perspectives and the period to construction -- is as follows.

Ministry for Development: Investment Programme

PROGRAMMES	2000-2004		2000-2006		2000-2010	
	10^9 €	%	10^9 €	%	10^9 €	%
Expressways and motorways	17.0	38.9	25.2	42.0	39.8	38.6
Railways	14.7	33.3	21.3	36.0	40.5	39.8
Airports	6.3	15.3	7.5	12.0	11.4	11.1
Ports	3.3	8.3	3.9	6.0	7.5	7.0
Other operations	1.7	4.2	2.3	4.0	3.6	3.5
TOTAL	**43.0**	**100.0**	**60.3**	**100.0**	**102.9**	**100.0**

Source: Ministry for Development.

As previously stated, the Rail Transport Programme, which accounts for 39.8 per cent of investment, is the showcase programme of the Infrastructure Plan. Its commitment to the railway of the future -- in line with community transport policy, as outlined in the White Paper adopted by the European Commission in September 2001 on "*European Transport Policy for 2010*" -- is quite probably the single most crucial policy decision in the Infrastructure Plan and a substantial challenge for the Government.

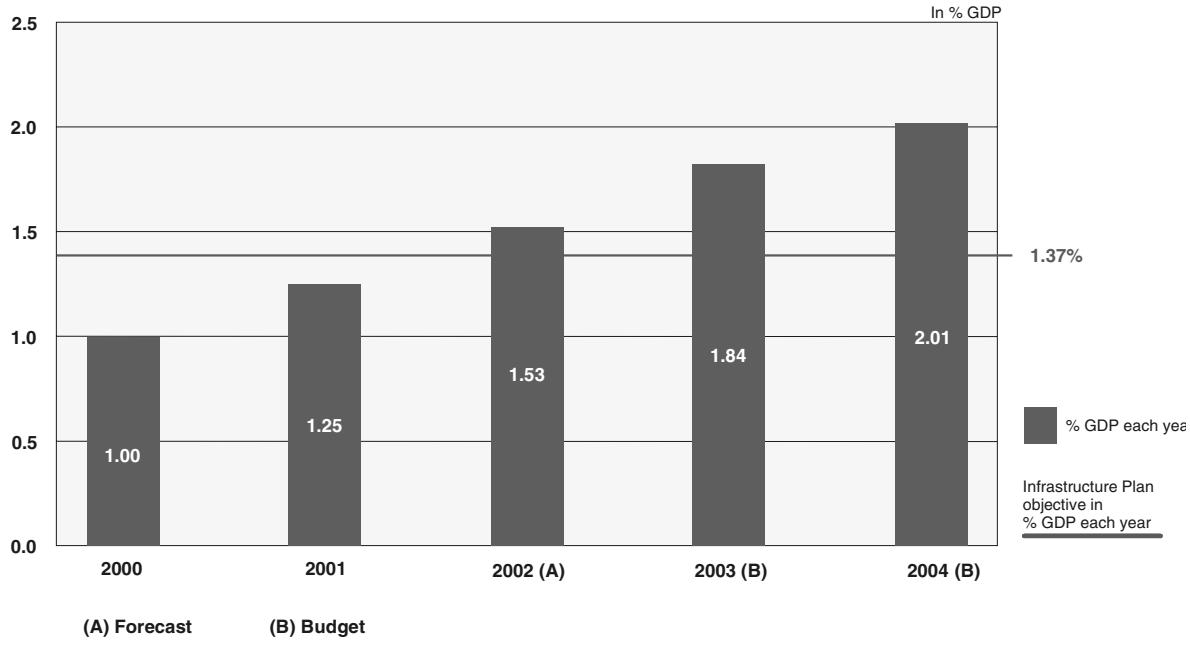
Investment in road transport planned for the period 2000-2010, under Spain's High-Capacity Road Programme (motorways and expressways), accounts for 38.6 per cent of total investment. The principal objective of this investment is to extend the current network of high-capacity roads and increase the links on the network.

Likewise, the investment efforts planned for ports and airports under the Infrastructure Plan warrant mention. For ports, the aim is to enlarge, modernise and optimise port infrastructure so that it can meet the requirements of growing demand and to integrate ports into the overall transport system. The financial models envisaged are joint (public-private) models with 40-45 per cent of total investment coming from the private sector. This type of financing will itself require the formulation of a new economic model and a model for the provision of services in the ports. The same applies to airport infrastructure, of which the new Madrid and Barcelona airports warrant mention.

To date, progress in implementing the Plan has been highly satisfactory. As at 31 December 2002, i.e. by the end of the first three years, implementation of the Plan had exceeded 104 per cent in terms of investment volume. This was mainly because of the higher forecasts for the ports programme. Counting investment budgeted for the current year (2003) and forecasts under the General Government Budget for the year 2004 (already approved), the volume of investment for the period 2000–2004, in current euros for the relevant financial year, will total €54 673 million euros compared with the €48 605 million forecast for the same period (€43 000 million in 1999 euros). This is an increase of 12.5 per cent. Worth noting is the substantial increase -- almost 24 per cent -- in investment in ports, largely due to the increase in concession-type investment.

From 2002 on, the rate of average annual investment expected for the period 2000-2004 is over 1.37 per cent of GDP, rising to 2.01 per cent of GDP in 2004, based on budgeted investment.

This said, there have been some changes to the Infrastructure Plan over the course of these first four years, including the addition of new lines specifically for high-speed rail transport. Among them are the new rail line from Galicia to the Basque Y along the Cantabrian coast, as part of the Galicia Plan.



2.3. Financing the Plan: New opportunities under the Regulations for Concession Contracts for Public Works Act of 2003

As we pointed out earlier, in order to avoid budget debt, financing for the Infrastructure Plan will require the mobilisation of private funds amounting to an estimated 20 per cent of total investment.

The concession system is the only viable formula for channelling private investment. The finance models which had been developed and used during the period 1996-2000, so as not to slow down the pace of construction of public works, are based on deferred payments or instalment payments to concessionaires and are, in reality, public finance systems. They end up being a burden on government budgets and are shown on the accounts as a public deficit.

Having said this, in practice, Spain's traditional concession model, which by law was applicable only to toll motorways, was inadequate and incapable of mobilising the high volume of private investment that the Plan would need, despite the various changes which had been made to the concession system from 2000 onwards. As well as this, the high risks which the concessionaire of a public works project has to take on, coupled with the low financial returns on these projects, made new joint public-private financing formulae and new sources of finance which would attract private capital an absolute necessity.

A new legal framework to update and supplement the regulations applicable to concession contracts was therefore required. The new Public Works Concession Contract Regulatory Act, which has been in force since 15 March 2003, was introduced in response to this need. It focuses strongly on funding methods, expanding the wide range of methods which were already available to public

financing, joint public-private financing -- during both the construction phase and the infrastructure operating phase -- and to private finance through a concession system which is applicable to infrastructure of all kinds. One point which should be noted is that the Administration is permitted to absorb all or part of the price that the user should pay for using the infrastructure, which opens the way to shadow tolls and soft tolls. All of these systems are supplemented by co-ordination mechanisms which the Act has introduced in order to encourage the various territorial administrations to take an active part in infrastructure funding.

Another source of finance allowed under the legislation and which can help to make a project more economically viable is revenue from any additional commercial or industrial activities which, as part of the concession package, are carried on within what are known as the additional zones of commercial operation. These activities must be necessary or useful to infrastructure users and of a kind which bring an economic benefit distinct to that of the concession.

The Act also offers new opportunities, for both private agents and other public administrations, to make proposals to central government for the construction and operation of public works under the concession system. Another innovative way of financing public works which are unlikely to be profitable to operate is to compensate the concessionaire, through the award of a public domain concession for the provision of services in the hinterland of the concession.

In addition, it is worth noting that in certain cases the legislation allows the administration to have recourse to what could be termed cross-financing, whereby the concessionnaire must assume the additional obligation of constructing another infrastructure in addition to that covered under the primary concession agreement, when that infrastructure is functionally related to and has an impact on the concessionnaire's operation.

In order to enable concessionnaires to put together a finance package, the Act also regulates a series of sources of financing available on the capital market. Some of these are more or less traditional sources: for example, the issue of securities, bonds, debt recovery rights, etc., by the concessionaire; while others are more novel: such as credit rights relating to infrastructure operation, in other words to toll revenues, concession mortgages and the possibility for the concessionnaire to access participatory loans in order to meet financial liabilities. It was important, not to say essential, to clarify relations between concessionnaires and finance providers or investors, particularly institutional investors, given the huge number of financial products the market calls for. These products require tailor-made financial packages and the involvement of new agents such as credit rating agencies, mono-line insurers, etc., who can rate and guarantee bonds in accordance with the risk inherent in projects and consequently ensure their placement on the market.

In short, the amendments and improvements which have been introduced into Spain's concession system ever since 1996 -- which were needed in order to implement the Infrastructure Plan -- culminating with the new Public Works Concession Contract Regulatory Act, have resulted in a greater diversity and flexibility of financing mechanisms and greater sharing of the risks involved, which will, and is already, making the involvement of the private sector in the provision of transport infrastructure a much more attractive proposition.

3. INTEGRATING SPAIN'S INFRASTRUCTURE INTO THE TRANS-EUROPEAN TRANSPORT NETWORK: THE PYRENEES, AN IMPENETRABLE BARRIER AND A CONSTANT FACTOR

Given Spain's geographical location and economic situation and the structure of its productive system, the impetus that the Trans-European Transport Network can provide is extremely important, and linking the Spanish transport system into the Trans-European Network is a strategic priority for the economic development and welfare of the country. The reasons that this is so important for Spain are, chiefly: our location as a peripheral country makes access to central European markets more difficult and makes transport less competitive; the economic importance of tourism means that Spain requires good transport links; and our location on the southern borders of the European Union makes us a transit country for the Maghreb region.

In the light of the above, it is hardly surprising that the interconnection and interoperability of Spain's transport systems with the Trans-European Transport Network (cross-border connections with Portugal and France), figure among the priorities of the Ministry for Development's Infrastructure Plan for 2000–2006.

With the forthcoming revision of the "Community guidelines for the development of the Trans-European Transport Network", the Ministry for Development has been making strenuous efforts within the European Union to accelerate the completion of cross-border projects, and more specifically the trans-Pyrenees links, which have been seriously delayed by the French administration. Meanwhile there is no sign from the French Government that it has the political will to complete the links.

The addition of one new, high-capacity rail line dedicated to cross-Pyrenees freight transport, which was proposed in the White Paper on European Transport Policy for 2010 and again in the Van Miert Report which goes beyond 2010, will do nothing to solve the congestion problems now being experienced by trans-Pyrenees traffic. These require solutions in the nearer term.

That is why the Spanish Government firmly believes that cross-Pyrenees transport should not be limited solely to the construction of the new rail line proposed. It should also include a series of new, high-capacity road and rail links, which are an absolute priority for Spain. Among these links the following warrant special attention:

- The central link by motorway through the Somport Tunnel as well as via rail through Canfranc, which could be considered as the first phase of the new rail link proposed by the Commission;

- The improvement of current overland connections with France via both the Mediterranean and Atlantic routes;

- New road connections: between Barcelona and Toulouse via Puigcerdá; Lerida and Toulouse via Vielha; Saragossa and Pau via the Somport Tunnel (as mentioned above); and between Pamplona and Orthez via Roncesvalles.

As well as this, given that Spain's Infrastructure Plan provides for the extension of the Spanish high-speed network to the French border by 2010, it would be advantageous if the French high-speed network could be extended to the Spanish border by the same year, despite the economic effort involved, so as to complete the Trans-European Transport Network as rapidly as possible, in line with the recommendations made by the last European Council in Brussels in October 2003, as part of the Growth Initiative.

4. MODERNISATION OF THE RAIL SYSTEM: A NEW MODEL AND A NEW LAW FOR THE RAIL SECTOR

Another of the main objectives of the Ministry for Development during the current legislature has been to modernise the transport system and, more specifically, to revitalise rail transport, which is the most efficient mode of transport with the least environmental impact, as well as to increase its share of the modal split.

This has required action on two fronts simultaneously: first, the implementation of a rail infrastructure plan which would enable efficient operation of transport services; second, structural and institutional reform of the railways in accordance with European Union regulations which required the adaptation of Spain's legal framework to the new "Rail Package" Directives.

As mentioned in Chapter 2, the Ministry's Infrastructure Plan includes the high-speed rail plan. The objective for 2010 is the provision of a high-performance network for passenger transport of over 7 300 km on UIC gauge track, and to optimise the use of the conventional rail network on Spanish gauge track for goods transport.

Also worth special mention are the connections with the Trans-European Transport Network, of which we have spoken above, which will give Spain easier rail access to Community markets as well as enabling Spanish companies to be more competitive internationally and reducing the country's peripherality. This will effectively contribute to real convergence and full employment, which are the ultimate aims of the Government's economic policy.

With this end in view, as stated time and time again to the Commission and the Van Miert Group, it is essential for Spain that the French Government's infrastructure programme include connections from its high-speed network to the Spanish network and give a definitive date for completion, as well as speeding up the construction of the Bordeaux/Dax sections on the one hand, and the Nîmes/Montpellier/Perpignan sections on the other, making use of the aid which can be granted under the TEN budget line for priority projects of a trans-national nature. Given its long experience with the concession model and now with the advantages that the new Concession Contracts Act offers, Spain has proposed that some of these projects could be built under the concession system, the most recent example of which is the rail tunnel between Figueras and Perpignan.

In order to complete the process of reforming the rail sector, the Government recently passed the new Rail Sector Act. The Act has put in place a new model which is designed to make the rail transport sector more efficient by opening it up to competition from the commercial sector in line with EU directives.

Although it departs from the subject of infrastructure as such, we thought it would be interesting to present the basic principles behind Spain's new model for the rail sector and its broad outlines, given that the ultimate performance of the high-speed network will depend on how well the new rail system functions. These principles are as follows:

- The institutional separation of infrastructure provision and management and the operation of rail transport services on rail infrastructure;
- Gradual admission of new operators, both national and international, to the freight transport market, leaving passenger transport until the European Union takes the relevant decisions;
- The institution of a flexible system for granting licences to operators for the provision of transport services;
- The establishment of charges to be paid by operators for rail infrastructure use.

Based on these principles, the structure of the new rail sector model is as follows.

- Rail Infrastructure Manager -- ADIF -- a public corporate body comprising the former RENFE and the current rail infrastructure manager, GIF, whose main purpose is to build most (approximately 75 per cent) of the high-speed network and to manage the entire railway infrastructure. This comprises both the conventional network and the remainder of the high-speed network, both of which are state-owned;
- RENFE-Operadora, a newly-created public corporate body comprising the old rail transport service units of RENFE;
- The Ministry for Development, which is responsible for the overall organisation and regulation of the railway system, for granting licences and establishing the scale of charges;
- The Railway Regulatory Committee, a body under the Ministry for Public Works which oversees the proper operation of the system and acts as arbitrator in the event of disputes between the various actors concerned;
- The new rail operators, from the public or private sectors, who will enter the market.

Among other things, the new Act regulates the authority and functions of the various actors, the sources of economic resources, the requirements that new companies in the rail sector will have to meet, the penalty system and the gradual opening of the market.

As we have said before, the Infrastructure Plan is highly ambitious and its implementation is now more than 7 per cent ahead of schedule, which is evidence of the optimisation of the infrastructure provision system as a result of improvements in financing methods and project contracting methods. This has prompted the Government to consider extending and lengthening some of the routes initially provided for under the Plan, which would enable a more densely linked network.

5. PORTS AND AIRPORTS, KEY FACTORS IN THE COMPETITIVENESS OF THE ECONOMY

Spanish public ports are a key factor for foreign trade and hence for the competitiveness of the Spanish economy in the context of globalisation. Around 50 per cent of trade with the European Union and more than 90 per cent of trade with third countries transits through Spanish ports.

The Spanish port system, which is state-owned, comprises the public corporate body, *Puertos del Estado*, under the Ministry for Development and the Port Authorities, which have management autonomy in economic and financial matters.

In actual fact, as well as being state-owned sites where economic activities relating to maritime traffic take place, commercial ports are also modal interconnection nodes and logistics platforms, both in the transport chain and in the value-added chain, which are integral components of the overall intermodal transport system.

In its new guidelines for Trans-European Transport Networks, the European Commission proposes to include "highways of the sea", as they have been called, among the priority projects. The highways-of-the-sea concept refers to a number of routes between selected seaboards in places where it would be feasible to organise logistics chains with simplified customs and administrative paperwork and the introduction of common traffic control systems. Two such highways in Europe are relevant for Spain: the western European seaway from the Iberian Peninsula to the North Sea and the Irish Sea and the southwest European seaway which connects Spain, France and Italy and goes on to Malta. Both of these two seaways are linked at the port of Algeçiras which, for Spain, is a key node on the Trans-European Transport Network and on the land-sea link between Europe, Africa, the Middle East and America.

Changes to the Spanish port system, in the wake of the major growth seen by infrastructure and the process of liberalising access to transport services for all modes of transport under the new Community regulations, have made the introduction of a new legal framework necessary. What was needed was a stable and consistent legal framework regulating the economic and financial systems for the provision of services and the use of state-owned assets in order to boost the competitiveness of ports and, at the same time, guarantee the principles of free competition.

This was the aim of the new Act on service provision in state-owned ports (*Ley de Régimen Económico y de Prestación de Servicios en los Puertos de Interés General*), which was passed recently. The main objectives of the Act are as follows.

- To work towards a more efficient and productive port management model in which the public sector is responsible for the provision and management of state-owned ports and the private sector is responsible for the provision of all services under a free competition framework;
- To develop competition between ports, while encouraging autonomous economic and financial management of the ports so that they become economically self-sufficient;
- To introduce major innovations in the regulation and management of state-owned ports, in order to develop the concession model to the full so as to promote the highest socioeconomic returns among all port usage from the state-owned sector;
- To maximise private investment in port infrastructure, installations and equipment.

It should be stressed that Spanish ports, like Spanish airports, do not receive any budget appropriations and finance their activities solely from the revenues collected by the public corporate body, Puertos del Estado, either as port charges or as commercial income. Depending on its income, this body can borrow on the financial markets in order to meet the costs of major infrastructure investment, but must always maintain financial equilibrium. This method of financing will be maintained and reinforced in the future, not only for budgetary reasons but also because it encourages the management of ports and airports in line with commercial criteria.

As is the case for seaports handling cargo, the role of airport infrastructure in passenger transport is crucial for the competitiveness of Spain's economy. Integrating a more dynamic commercial fabric into the global economy will depend largely on the availability of efficient air transport connections and on adequate airport services in particular.

Airport infrastructure management in Spain is the responsibility of a public corporate body, Aeropuertos Españoles y Navegación Aérea (AENA), attached to the Ministry for Development, which is responsible for the management of all civil airports and for installations and networks for air navigation. It may also carry on additional activities which enable it to make a profit on its investments.

This is public management in line with commercial criteria, which enables the management and construction of new airport infrastructure with no impact on the budget. As it is national, the model enables co-ordinated management of all airports and also underpins a policy of regional balance, so that the positive balance sheets of major airports enable smaller airports to continue in operation. However, one of the problems with AENA's current charging system is the rigid structure for updating airport taxes, which is subject to an administrative decision that bears no real relationship to trends in the air transport market.

Among the strategic actions that AENA is undertaking, those implemented as part of the Master Plans for Madrid and Barcelona airports warrant mention, as they will have to provide a rapid response to the problems of saturation and growth in air traffic. Investment in airports of intermediate size is also regarded as a priority, again with the aim of optimising the use of the capacity of Spain's airport system overall.

6. MAJOR CHALLENGES FACING THE NEXT LEGISLATURE, 2004-2008

It is not easy to predict the direction that infrastructure policy will take with a new legislature so imminent. Whichever party comes to power, given the current stage of development of the Infrastructure Plan and the results it has delivered to date with respect to economic development, there may well be a degree of continuity in the broad thrust of policy. Assuming that this is the case, and bearing in mind that this is the author's own personal opinion, the following points may well be among the broad policies and challenges which lie ahead for the Ministry for Development over the next few years:

- Consolidation of the current economic and budgetary model and, consequently, maintenance of the iron budget discipline followed to date, in accordance with the European Union's Stability and Growth Pact and Spain's Budget Stability Pact, as regards the Ministry for Development;

- Maintenance of the current supply-based infrastructure policy, stimulating economic activity and territorial cohesiveness, which continues to play an effective part in our real convergence with the most advanced Community countries and in full employment;

- Acceptance of the new, less rigid and less interventionist role that the public sector is now beginning to play, involving the private sector in the planning stages as well as in the financing and management of infrastructures and services;

- Encouraging the participation of the private sector in the management and financing of infrastructure, taking advantage of the new financial instruments introduced under the recent Act Regulating Public Works Concession Contracts, including the concession system;

- The design of new joint public-private financing formulae which enable the implementation of socially and economically viable projects, even when these are not financially viable;

- The full and proper use of Community funds, which must be absorbed by the budget of the Ministry before the end of 2006 and which, used with any of the financing formula, will increase its multiplier effect;

- Maintenance of the objectives of the Infrastructure Plan for 2010 and the pace of award of contracts and investment, principally as regards the high-speed rail network;

- Breaching the barrier of the Pyrenees with new road and rail connections, so that our transport links can interconnect and be interoperable with the Trans-European Transport Network and bring us closer to Europe's centre;

- Inland connections with Portugal so as to complete the Portugal-Spain-Rest of Europe multimodal corridor planned as part of the Trans-European Transport Network;

- The study of a possible new link with Morocco via the Strait of Gibraltar, which has to be a strategic objective not just for Spain but for the whole of the European Union, if we are to build a Europe-Mediterranean Transport Network;

- The maintenance of road transport assets by improving the current condition of infrastructure, chiefly roads, and introducing to this end new models of management and finance for their upkeep;

- The wider use of the concession system for public works at national level and the exportation of that system to other countries, particularly the new Member States of the European Union;

- The development of the Rail Sector Act, the new railways model and the institutions set up for this purpose (ADIF, RENFE-Operadora, the Rail Regulatory Committee, etc.);

- Promoting transport liberalisation policy, particularly for rail and port services;

- Promoting intermodal transport and the development of "highways of the sea", which will require the improvement of land access to the main sea ports and the development of inland logistics terminals or "dry ports".

NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF FRANCE

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NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF FRANCE

SUMMARY

Paris, December 2003

THE NATIONAL TRANSPORT INFRASTRUCTURE PLANNING SYSTEM IN FRANCE

This report on the French system will address recent trends and the system currently in force regarding:

- The planning of major national infrastructure projects (Chapter 1);
- The programming (Chapter 2) and assessment of projects (Chapter 3);
- The role of local bodies and authorities within a context of ever-greater decentralisation (Chapter 4);
- In conclusion, the results achieved, needs still to be met and decisions recently taken by the Government to meet those needs.

1. MAJOR NATIONAL INFRASTRUCTURE PLANNING

Planning in France has progressed from the use of national infrastructure plans drawn up by mode of transport (1.1.) to the new concept of national multimodal transport service plans in which infrastructure planning is based on the services expected by users (1.2.).

1.1. Until 2002, national transport infrastructure plans were customarily established for individual modes

As a result, the following plans were drawn up:

1.1.1 National road master plan

The first of these plans was drawn up in 1971.

The last version of this plan (adopted in April 1992), specified the major corridors within the motorway network up to the year 2015 (over 12 000 km, of which 3 500 km of intercity toll motorway and 2 600 km of toll-free motorway providing linkages within the motorway network), other major links relating to territorial development (4 400 km) and the remainder of the national network (i.e. 38 000 km in all). This network was designed to meet the objectives of fluid traffic flow, a balance in the provision of transport links and the provision of access to landlocked areas throughout the national territory as well as infrastructure to ensure the continuity of international links at the European level.

In addition to the 38 000 km of roads within the national network, there are also 245 000 of roads at the level of *départements* and 425 000 km at the level of the communes interconnecting the 550 000 km² of the territory of France.

1.1.2 National master plan for high-speed train links

This document (adopted on 1 April 1992) charted the network of high-speed train lines (4 700 km of which 1 260 already in service or under construction at the time) with planned extensions at the European level.

However, the plan made no mention of other rail links and notably those for freight services.

1.1.3 National master plan for inland waterways

This document, dated 17 April 1985, stressed the need to give priority to restoring and improving the maintenance of the existing network and to the continued development of valleys. It also referred to the new wide waterways that had been decided upon at the time but subsequently abandoned (Rhine-Rhone link) or under study (Seine North and Seine East).

A Guideline Act on territorial development, adopted in 1995, provided for further additions to the three existing plans in the form of national infrastructure plans dedicated to rail, port and airport infrastructure, respectively, up to the year 2015.

In the meantime, a new overall legal system has been adopted.

1.2. Since 18 April 2002, "Multimodal plans for public passenger and freight transport services" are now the reference documents for planning to the year 2020

1.2.1 General principles for service plans

The new guideline Act on territorial development (LOADDT) of 25 June 1999 provided for the drawing up of nine public service plans, designed to provide a detailed account of territorial development policy, including, in the case of transport, a multimodal passenger services plan and a multimodal freight services plan.

These two plans, drawn up in conjunction and presented in a single document, have replaced the previous national transport infrastructure plans described above, since their adoption under a Decree issued on 18 April 2002.

Under the terms of the above-mentioned Act, the plans "determine, in a multimodal approach, the various objectives of transport services for users, the procedures for implementation as well as the criteria for the selection of the actions recommended, notably for the purpose of ensuring the long-term coherence of the networks specified for different modes of transport and of establishing priorities with regard to operation, upgrading, adaptation and extension".

The service plans therefore outline the long-term directions for transport policy. In this respect they constitute a planning document for State intervention in this sphere of activity up to the year 2020. They are constraining in that all major infrastructure projects must meet their requirements, particularly the largest projects (new high-speed train lines, new canals and new airports

that have not been specified in the plans cannot be built unless the plans are revised accordingly). Conversely, the inclusion of a project in the plans does not, in itself, mean that the decision has been taken to proceed with that project, which will subsequently be subject to individual approval, based on specific assessments and on the conclusions drawn by the Government from a public enquiry into the appropriateness of the project (see 3.1.3 below).

1.2.2 Procedure for establishing plans

First convened in early 1998, an interministerial steering committee drew up a framework document for the drafting of transport service plans; this document was subsequently circulated to *préfets* in the regions.

On the basis of the reports received from *préfets* and examination of various issues of national importance, in October 2000 the Government issued a draft plan for passenger and freight transport public services.

This draft was then widely circulated among regional councils and the regional bodies within the National Territorial Development Council, as well as the Development Delegations of both the National Assembly and the Senate, as part of a wide-ranging consultation process.

The Interministerial Territorial Development Committee (CIADT) of 9 July 2001 adopted the plans and the amendments resulting from the consultation process. After examination for the Council of State, the plans were approved under the Decree of 18 April 2002.

The highly detailed discussions which took place at the regional level during the preparation of these plans made it possible to harmonize national transport policy directions with the objectives of territorial development.

1.2.3 Service plans: Options and objectives

The plans are based on specified objectives with regard to the level and quality of services. They encourage planners to seek to optimise the use of existing networks before considering the construction of new infrastructure. The objectives for both freight and passenger transport are presented in terms of both general policy directions and specific goals for improving services.

The service plans endorse the options previously chosen, namely:

- a European approach to networks instead of a vision restricted solely to France;
- a multimodal approach, instead of a compilation of sectoral plans [roads, high-speed trains (TGV), inland waterways, etc.].

They are reformulated into government objectives presented:

- multimodally (irrespective of whether the activity is the development of international links, the organisation of freight flows at the national and European levels, the proper operation of major interregional and international transport corridors, the organisation of trans-Alpine or trans-Pyrennean links or the organisation of transport in urban and peripheral areas);
- territorially (specified by territory for seven major interregional areas: Parisian Basin, North, East, South-East, South-West and the overseas *départements*);

– cartographically (illustrated by three maps, attached as Annexes A, B and C respectively, representing the development of international passenger links, the multimodal organisation of freight transport at the national and European levels, and the proper operation of the main interregional inland corridors).

They are summarised in the table below.

General objectives of transport service plans

- **Development of international passenger links**, based on a network of air transport platforms for international movements distributed throughout the territory and on the development of a European high-speed train network (TGV).
- **Organisation of freight transport at the national and European levels**, in order to promote alternative modes of transport to road (rail, inland waterway, maritime, combined transport) with the aim of doubling the volume of rail freight within the next ten years (which at present is proving to be unrealistic).
- **Proper operation of major international corridors** such as Belgium-Paris-Bordeaux-Spain, Germany-Lyons-Marseilles, the Mediterranean arc.
- **Multimodal organisation of trans-Alpine and trans-Pyrennean links**, giving priority to rail transport and maritime cabotage.
- **Organisation of traffic flows in urban and peripheral urban areas**, by giving priority to the development of public transport and other alternative modes to the use of private motor cars.
- **Consolidation of metropolitan areas and other large regional conurbations outside the Paris Basin**, by developing, in addition to access to Paris, effective links between these major units and to European poles: international links from the main regional airports, high-speed rail services, development of interregional road links, etc.
- **Improved services to remote areas**, by meeting the needs for access to higher-grade services (universities, hospitals, etc.) and facilities of national interest (ports, airports, rapid transit networks, etc.).

1.2.4 Originality of service plans

It should be noted that the approach to implementing public service plans is innovatory, in that it gives priority to the quality of services and to seeking to optimise the use of existing networks before giving consideration to the construction of new infrastructure.

The priority given to service quality encompasses:

– Quality objectives for passenger and freight transport services, for example, with regard to the efficiency of transport chains, protection of sensitive areas, conservation of reception capacities, intermodal connections, frequency of services, safety, comfort, etc.;

– The management of strategic challenges and territorial objectives through diverse measures relating to the security and safety of transport, reduction of nuisances, development of traffic operating and management systems, matching of tariff systems, development of traffic on

non-road routes and transport modes, co-operation between operators or authorities providing transport services, etc.;

– Reference to objectives regarding regulations and the intermodal distribution of transport demand at a 20-year horizon, expressed in multimodal scenarios for trends in overall transport flows.

The planning of new major infrastructure (Chapter 2) must now, therefore, take account of these principles and must also be based on project assessments (Chapter 3).

2. NATIONAL INFRASTRUCTURE PLANNING

Infrastructure planning in France has changed from a system of successive pluriannual plans (2.1.) to one based on planning contracts between central government and the regions; pluriannual planning has therefore been replaced by contracts with local authorities (2.2.). The Government has recently drawn up a new medium-term planning framework.

2.1. From the "golden age of French planning" to the demise of national pluriannual plans

The French planning system, put in place by Jean Monnet and described as a "burning obligation" by General De Gaulle, has set the pace for the reconstruction, modernisation and development of the French economy for almost a quarter of a century.

This system was characterised by a highly consensual and original procedure, applied within large commissions, in which expert representatives from all the major parties involved (administrations, firms, unions, academics, researchers) were free to express their opinion. However, although this procedure remained consensual, it gradually assumed the form of a strategic exercise generating benchmark economic and social forecasts for the medium and long term (or at any rate until 1988), proposing policy directions for the competitive sector and setting selective priorities for public action, notably with regard to investment (or at least until 1992).

2.2. The role assumed by pluriannual contracts between the State, the Regions and other territorial authorities

2.2.1 Planning contracts between the State and the regions

The institutional reform of 1972, under which the regions were awarded legal personality, and the decentralisation Acts introduced in 1982, made the 22 regions, 95 *départements* and 36 000 communes (now increasingly combined into "urban communities" in regional metropolitan areas, "communities of conglomerations" in other major cities and "communities of communes" in other towns), autonomous actors in local development.

The regional dimension and territorial development were progressively taken into account in the planning process. The latter now takes place at both the national level (under the aegis of the State)

and the regional level (under the responsibility of the regions). The translation of the planning process into programmes takes the form of planning contracts entered into by the State and the individual regions. These planning contracts set out the mutual obligations of the State, the regions and other territorial authorities (*départements* and major towns, but also the European Union in the case of structural funds). They provide for the implementation of a limited number of programmes considered to be a priority by the contracting parties, in a wide variety of areas (territorial development, economic development, environmental protection, action in the areas of education, social affairs, culture, sports, etc.). As one plan has followed on from another, the partners have endeavoured to identify a smaller number of strategic options whose implementation requires measures in all kinds of area (regulations, operations, investment).

2.2.2 The role of infrastructure in planning contracts between the State and the regions

The development of major national transport infrastructure has been a core component of planning contracts since the latter were first introduced.

The only infrastructure not to have been programmed within this framework has been the very large infrastructure projects which have the greatest structural impact, such as toll motorways (financed by users), certain major interregional road corridors, deemed to be a national priority, or new TGV lines (covered by specific contracts such as TGV Est).

The transport infrastructure component accounts for approximately half of the total funding made available in the last two contracts between the State and the regions (1994-99 and 2000-2006), which reflects the importance attached to transport by the State's partners, who lobbied strongly to retain this large share for transport. From 2000 onwards, the share of road has been significantly reduced in favour of rail and public transport in urban areas and peripheral urban areas, thereby reflecting a shared desire for a multimodal approach and a rebalancing of the modal split, each mode in its own particular area of relevance.

The development of the national road network nonetheless remains strongly dependent on planning contracts, which provide four-fifths of their total funding.

2.2.3 Results obtained by introducing planning contracts between the State and the regions

The use of these contractual procedures has ensured that local authorities are closely involved in the choice of operations. As co-financers, they are directly involved in optimising each government project from both an economic and an environmental standpoint. The funding provided by local authorities, usually half of the amount required for projects covered by planning contracts, also eases the financial burden on the State.

This system has demonstrated its merits but also has shortcomings, arising from the complexity and disempowerment inherent in any co-financing and cross-financing system, as well as the State's relative loss of control over the choice of projects it chooses to implement, or has implemented, in networks for which it has prime responsibility.

2.2.4 New directions for planning contracts between the State and the regions

The difficulties encountered in implementing the projects listed in the 2000-2006 planning contract between the State and the regions currently in force (due to severe budgetary constraints), combined with the decentralisation process currently being discussed by Parliament (which will transfer greater powers to local authorities, notably with regard to transport infrastructure), as well as

the guidelines laid down by the European Commission for a new contract-based system for the implementation of European regional policy, have prompted the French Government to take the decision to reform planning contracts between the State and the regions.

The new system will require action over shorter time periods (three years). It will include a greater variety of programmes which are better adapted to the distinctive characteristics of individual regions. The transfers of power should also be accompanied by a reduction in funding, with each party assuming control for the programming and funding of infrastructure for which he is responsible.

The new regime is due to enter into force on 1 January 2006.

2.3. Towards a new medium-term planning framework (2004-2012)

The Government wished to introduce a new practical approach to the development of transport infrastructure. Accordingly, at a meeting of an interministerial committee on 18 December 2003, it was decided to:

- confirm the objective of implementing the 2000-2006 planning contracts currently in progress;
- adopt a list of major projects due to be implemented from 2004 to 2012;
- take into consideration the indicative planning charts for national infrastructure by the horizon 2025 (these maps are appended to the present report).

The service plans described above will have to be revised in order to approve the small number of major infrastructure projects which had not previously been planned.

3. PROCEDURES FOR PROJECT SPECIFICATION AND ASSESSMENT

The development of major transport infrastructure now consists in, firstly, a continuous and concerted process of recognition of the utility of new projects (3.1.) and, secondly, a process of project assessment which combines economic calculation with a multicriteria approach in accordance with an ever more stringent methodology, in order to shed a clear light on the final political decision (3.2.).

3.1. From public enquiry to public debate: ever-closer collaboration in the justification and specification of new projects

3.1.1 Public enquiry

Under the old, traditional procedure, the final stage of the public enquiry held before issuing a declaration of public utility for projects -- thereby providing a legal basis for the purchase of land on which to build the works -- took place once technical studies had been completed in sufficient detail to be able to specify the characteristics of major infrastructure works with the requisite degree of accuracy (a strip of land 300 metres wide in open country, but significantly less in urban settings).

Since 1977, the documents submitted to the enquiry include what has now become an extremely comprehensive impact assessment. This assessment must justify the interest in proceeding with the project in terms of cost, demonstrate its advantages compared to the other solutions considered, describe the expected or possible adverse impacts of all kinds, as well as the measures planned to enhance the positive impacts and reduce or offset the negative ones (notably with regard to the environment and future local residents).

3.1.2 Development of collaboration

Over the past twenty years or so, the desire to listen and discuss matters with elected representatives, the organisations and associations concerned and local residents has gradually spread to various stages in the project design process and, subsequently, to the monitoring of progress with the work. Formal procedures for such consultation and collaboration are now included in the technical instructions regarding the preparation of road or rail infrastructure projects.

The "1% landscape and development" policy (under which 1 per cent of the cost of major linear infrastructure projects, such as motorways and high-speed train lines, must be assigned to landscaping and territorial development) also provides an extremely favourable framework in which to develop an active partnership with local actors, with a view to reconciling the construction of infrastructure with the enhancement of landscapes and the development of local economies and tourism.

3.1.3 Widespread use of public debate

A step forward was taken with the adoption of the Act of 27 February 2002, which now regulates the participation of the general public in all stages of major infrastructure projects planning.

This legislation provides for a public debate to be organised as early as possible on the timeliness, objectives and main characteristics of the project and the specifications for subsequent studies.

Under the terms of this Act, provision must be made for the public to participate in all the later stages of project development, from the initiation of the preliminary design studies until completion of the public enquiry. The public must also be kept fully informed during the construction stage until the final entry into service of the infrastructure.

An independent administrative authority, the National Commission for Public Debate (CNDP), is charged with the task of ensuring that these principles are respected and of organising the relevant procedures. In particular, according to the scale of the project and its overall impact in all areas, the Commission determines whether the public debate should be organised by the Commission itself, a special commission or the Owner acting under the supervision of the Commission.

The entire system is a clear advance towards "participatory" democracy. At the same time, it poses an additional challenge to the owners of works whose collaborators must, without hesitation, be open to and both available and prepared for this additional debate.

One of the prerequisites for success will also be to reconcile the desire to organise the public debate at the earliest date possible with the need to inform that debate with a sufficiently detailed project assessment, to be able to discuss the forecast cost and expected benefits in full knowledge of the relevant facts.

A fair balance must also be struck between this form of "participatory" democracy and the traditional organisation of "representative" democracy, in that the role, prerogatives and eminent responsibilities of those elected to office by universal suffrage must be properly respected.

3.1.4 The growing complexity and length of procedures requiring a response

The public debate system is in addition to numerous other procedures, which themselves often involve public enquiries that were neither simplified nor abandoned when the public utility procedure was reformed and systematic public debate introduced.

There are dozens of successive procedures. A report published by the Council of State in 1999 listed 29 different procedures necessitating an enquiry, of which 16 were subject to special enquiry regulations. The guide to the main procedures to be followed before performing work on inland waterways, drawn up by the *Direction des Transports Terrestres*, shows that a single inland waterway infrastructure project can involve over twenty procedures. The list of instructions applicable to the construction of a toll motorway appended to a franchise contract consists of 19 pages, specifying all the legal, regulatory and technical requirements that must be met, of which those laid down by the Waterways Act are by no means the least constraining.

This growing complexity leads to confusion, mistakes and disputes. While it has not prevented those transport infrastructure projects recognised as essential from being successfully completed in France, it nonetheless generates hidden costs and wasteful delays.

A chart representing the overall length of the design and construction process for toll motorways has shown that it is not unreasonable to expect a lead time, provided all goes well, of approximately ten years between the start of the design phase and that of the construction phase and therefore approximately 14 to 15 years between the initiation of design studies and the commissioning of a 50-kilometre section of motorway. It took three times less to build the Paris to Tours (COFIROUTE) and Tours to Poitiers (ASF) motorways in the 1970s.

It is for this reason that the French Government has decided to nip this problem in the bud by starting to devolve decisionmaking powers to *préfets* and by simplifying and shortening procedures for discussions, firstly, between individual administrations and, secondly, between administrations and the local territorial authorities concerned.

3.2. Procedures for assessing new infrastructure projects

The utility of new projects is justified by assessing their potential benefits on the basis of an economic assessment combined with a multi-criteria approach, pursued in accordance with increasingly demanding procedures.

3.2.1 Increasingly severe requirements

The time has long since passed in France when the decision to proceed with major transport infrastructure projects could be taken solely because provision to that effect had been made in a national infrastructure plan.

Public authorities must now take account of the need to persuade the general public of the merits of each new project through a process of continuous and two-sided public debate, given the severe budgetary constraints which more than ever before require strict control to be exercised over public

spending; the level of infrastructure provision that had already been reached offers increased scope for improved management of existing infrastructure capacity through closer and better control of the use made of existing infrastructure; the rules set out in the legislation provide details of the documents that must be submitted, under the close scrutiny of the magistrate, in applications for a declaration of public utility (notably, the impact study).

3.2.2 An increasingly comprehensive approach

The combination of all these aspects has strengthened the French Government's resolve to have all the relevant assessments at its disposal before deciding on whether or not to proceed with each of the many projects currently planned, although not yet approved.

Accordingly, at the end of 2002, the French Government asked:

- the *Inspection Générale des Finances* (IGF) and the *Conseil Général des Ponts et Chaussées* (CGPC) to jointly audit the hundred or so major motorway, rail, inland waterway and road construction projects that are planned but not yet approved;
- the *Délégation à l'Aménagement du Territoire et à l'Action Régionale* (DATAR) to chart infrastructure requirements in relation to needs in terms of the sustainable development of transport and territorial development;
- several members of parliament -- Messrs. Haenel and Gerbaux in the case of rail freight and Mr. De Richemont in the case of maritime transport -- to draw up a series of operational proposals;
- Parliament to debate overall guidelines.

It was on this basis that on 18 December 2003 the French Government set out the strategic guidelines to the year 2025 and drew up a list of the major projects on which work would start in the medium term (by the year 2012), as described above in section 2.3.

3.2.3 A comprehensive methodology for project assessment

A number of points regarding the methodology used for the audit by the CGPC and IGF are worth mentioning here because they clearly illustrate the approach that is now the rule for the assessment of major projects.

a) The analytical framework for projects included all aspects of sustainable development in order to ensure that these concerns were properly addressed.

The existence of an intermodal approach to the utility of new motorways was therefore confirmed.

The auditing team verified that owners had taken appropriate account of environmental constraints.

It also noted that, as a general rule, these constraints had been properly taken into account in the actual design of projects, as in the case of noise for example, and therefore incorporated into the cost of the works (a process known as “internalising” the account taken of environmental concerns).

In cases where there was a risk of large-scale residual impacts, this risk was addressed specifically as additional studies recommended.

b) *The same method of presentation and analysis was used for all projects, irrespective of mode, and they were subject to all the criteria applicable to the assessment of project utility.*

c) *A realistic analysis was made of project progress and the technical constraints of schedules* (there is no point in assigning high priority to ill-defined projects), although it should be stressed that project concepts for which design studies are lacking, such as the central crossing of the Pyrenees, fell outside the scope of the audit.

This review revealed that the consequences of extending the length of studies and mandatory procedures had been under-estimated until now.

d) *The need for each project, in terms of demand for passenger and freight transport services, and the accuracy of long-term project forecasts were rigorously examined.*

This examination required the greatest account possible to be taken of the threat of congestion, in view of the inevitability of the forecast traffic growth rates with the framework of transport service plans (by the year 2020, at least +50 per cent growth in various modes including road, even in the most activist scenarios for the development of alternative modes).

e) *The ever-present concern to use public funds efficiently and economically was taken into account through two additional, although separate, analyses: first, a socioeconomic impact analysis and, secondly, a cost-benefit analysis and assessment of the impact on the public purse.*

The socio-economic analysis is designed to verify that the investment costs (and subsequently the project operating costs) generate sufficient benefits for the community, both in monetary terms and in terms of benefits that can be expressed in monetary terms (for example, the role that a project can play in improving road safety or in reducing environmental nuisances whose value can be determined from scales agreed upon jointly, including agreements with the Ministry of the Environment, as discussed in the most recent work of a *Commissariat du Plan* working party, chaired by Mr. Marcel Boiteux).

It is indeed essential that the discounted benefit arising from the decision to proceed with a project (that is to say, the difference between the discounted sum of the benefits and the sum of the construction costs) be positive, which means that the socioeconomic rate of return on the project must be greater than the discounting rate; if not, as Marcel Boiteux has pointed out, the cost of proceeding with the project will simply act as a drain on society's resources.

This is not an “accounting” or financial approach, but a socioeconomic approach which takes account of the environmental impacts that can be expressed in monetary terms and which provides a guarantee of the utility of public expenditure.

In view of the above, the socioeconomic analysis must not be viewed as an approach focused exclusively on the interest of a given project. While, admittedly, it has an important role to play, it needs to be supplemented by other considerations which have a bearing on the choices made by policymakers. It is perfectly feasible for a project to be approved even if the discounted benefit is lower than that of another operation -- or indeed negative. In such cases, the difference between the two values measures the monetary value implicitly assigned by the decisionmaker to the considerations which could not be expressed in monetary terms and on which his decision was based.

The cost-benefits of projects, and consequently the determination of public funding requirements (funded under the budgets of the Government, territorial bodies or other bodies, notably Europe) has been examined.

The order handed down by the Minister was itself partly the outcome of a realisation that a wide discrepancy existed, and needed to be determined, between the cost of the projects agreed and the funding that had been assigned to those projects.

An investment can benefit the community without necessarily being financially balanced in terms of the income it generates. It is therefore necessary to determine the impact that completion of the project will have on the financial balance of the infrastructure manager and to calculate the amount of public funding which will have to be provided to ensure that the project does not adversely affect the owner's accounts.

This financial analysis also provides useful input for the analysis of projects from the often-neglected standpoint of sustainable transport development.

The reason for this is that sustainable development, in which account is taken of the impact that decisions taken today will have on future generations, also has an economic and a financial component. Burdening future generations as users, and above all as taxpayers, for the induced charges arising from anti-economic over-investment, that is to say, generating insufficient future wealth to repay the long-term loans entered into for that purpose, would be as contrary to the principle of sustainable development as making such future generations pay for future environmental nuisances. This issue is all the more pressing in that these generations will already have to support the increased pensions burden and costs of ageing of the larger numbers of survivors from previous generations.

3.2.4 Formalising methodological rules

a) For initial assessments

The decisions by government whether or not to proceed with the construction of new infrastructure are based on in-depth analyses combining a quantitative, cost-benefit approach with a qualitative, multi-criteria approach, in accordance with rules which will shortly be formalised in a ministerial instruction designed to update the one signed in 1995 by Mrs. Idrac, the Secretary of State for Transport at that time. These rules will be introduced through special instructions for individual modes of transport, through updates to existing texts (in the case of motorways and rural roads) or through the publication of new rules.

These decisions are also, and above all, based on the strategic choices and value judgements made by those with the requisite power within the political sphere, after taking due account of the insight provided by the assessments performed.

b) For assessing the impact of completed projects

Under the law it is now mandatory to review the impact of major infrastructure projects three to five years after their entry into service.

A report by the *Conseil Général des Ponts et Chaussées* has shown that this requirement has been allowed to lapse slightly, partly due to a lack of clarification regarding methodology. An opinion issued in 2003 on the basis of this report therefore clarified requirements with regard to the objectives and contents of reviews, by stressing that relevance was more important than comprehensiveness of coverage. The aim of these reviews is therefore to clearly state the extent to which initial forecasts had been respected, the expected outcomes achieved (notably in terms of traffic levels and environmental protection) and to gain an insight into the main reasons for any discrepancies noted.

The administration has introduced measures to ensure that owners comply with these principles and to reduce the backlog in terms of review.

3.2.5 Future advances in methodology

Procedures for the assessment of infrastructure projects are still evolving.

An international benchmarking exercise has begun with regard to the methods used by major OECD member countries and international organisations (World Bank). This work addresses both the choice of methods, whether they are properly used and the values adopted (discounting rates, social values for effects such as time lost or gained, which cannot be expressed in monetary terms, noise nuisances or air pollution).

Other French administrations, and notably the *Commissariat Général du Plan*, have been invited to take part in joint discussions on the choice of discounting rates.

In response to the conclusions of the Boiteux report on how to take better account of environmental impacts, design departments and research organisations have been asked to examine in greater depth such important issues as: procedures which take greater account of long-term considerations; the redistributive effects between territories and individuals; the conciliation of spatial equity (which calls for homogeneous services for all regions) and economic profitability (which is higher where traffic levels are already very high); the impacts of improvements in accessibility on the more distant localisation of housing from activities; risk, irreversibility and cumulative impacts. They have also been asked to undertake new work on the ranking of values (time gains, greenhouse effects, personal safety).

To support the socioeconomic assessment, which covers a period of over thirty years from the time at which the decision is taken to construct new infrastructure, there is also clearly a need for a prospective approach. In view of this, the *Conseil Général des Ponts et Chaussées* has started to examine a number of priority issues within a projected timeframe extending to 2050 (demographics, car technology, the system of production and distribution, territorial organisation, behaviour and lifestyles, infrastructure supply and European flows).

Lastly, the translation into French law of the European Directive on the assessment of plans and programmes should shortly be accompanied by the development of a methodology for the environmental and economic assessment of transport infrastructure plans and programmes.

4. DEVELOPMENT OF THE ROLE OF TERRITORIAL BODIES

4.1. Greater responsibilities for both transport organisation and infrastructure development

4.1.1 Transport organisation

Since 1 January 2003, the regions have been made the competent authorities for the provision of regional rail passenger services. They decide upon the organisation of such services and bear the financial burden of their provision under pluriannual contracts entered into with the SNCF. They can also subsidize rolling stock.

The following bodies also used to have responsibility for organising transport services:

- The *départements* for school buses and coach services;
- Communes working in association as an authority organising urban transport for public transport in urban areas (bus, underground rail and, increasingly, tramways).

Despite the scope afforded for the creation of mixed unions made of different organising authorities, this system needs to be better ordered or, at the very least, better co-ordinated at the two levels: that of the urban area (that is to say, the conurbation and communes within its sphere of influence) and that of the region.

4.1.2 Infrastructure development

Besides their contribution to the construction of national infrastructure (described in section 2.2. above), territorial bodies play an increasingly important role as owners of infrastructure works or as bodies to whom responsibility for an increasingly large number of works has been devolved as a result of the process of decentralisation currently being discussed by Parliament.

These bodies already had responsibility for infrastructure projects for public transport services in urban areas (creation of dedicated bus lanes, construction of tramways or even underground railway lines, and construction of interchange hubs).

The *départements*, which already have responsibility for 245 000 km of highways, should within a few years be given responsibility for over 15 000 km of national highways.

The responsibility for narrow-gauge waterways (now primarily used for recreational and water resource uses), airports (the nine largest outside the Paris area[1]) and ports (apart from the eight major ports[2] with autonomous status) will also be transferred to territorial bodies which so request, with priority being given to regional authorities.

These transfers will obviously be accompanied by transfers of resources.

Consequently, all infrastructure networks of regional and local importance will be developed in close proximity to users by elected officials at the regional and local levels as well as that of the

départements, with provision made for overall co-ordination of these networks at the initiative of the regions.

4.2. New responsibilities for the State within a context of decentralisation: from a policy of national infrastructure to a national policy for transport infrastructure?

For the obvious reasons of comfort and safety, users need to travel on roads with uniform geometrical characteristics, identical signing and co-ordinated operating conditions, notably during adverse weather conditions (snow, black ice, etc.).

This consistency was implicitly ensured as long as government departments had responsibility for both national roads and roads at the *département* level (on behalf of the authorities for the *département*). Henceforth, local authorities will be given responsibilities along with their autonomy and will provide their own services.

As a result, the State will have to lay down, in accordance with procedures yet to be agreed and after discussion regarding their drafting, a corpus of common rules for road development and management.

Similar provisions will doubtless have to be made, in due time, for port or airport platforms as well as narrow-gauge waterways.

CONCLUSIONS

The system described in this report has clearly demonstrated its effectiveness.

Within a period of some forty years, the basic backbone of the motorway network has been put in place.

Over the past thirty years, a network of high-speed train lines has been built to provide interconnections between the North, South-East, West and South-West of France, as well as links to London, Brussels and Amsterdam, Cologne, Basel, Berne and Geneva, plus, in 2007, Luxembourg.

The airport platforms have adjusted to cope with rapid growth in traffic volumes; ports have been modernised, and the existing wide-gauge waterway network restored to good condition.

In terms of infrastructure density, and above all congestion levels, the situation in France is better than that in the most densely-populated countries in Europe.

Nevertheless, there is still a great need to:

- maintain the quality of existing networks through an increased and high-priority maintenance effort;
- eliminate areas of congestion in the road and rail networks;

– accommodate the inevitable growth in traffic volumes (+50 per cent within 20 to 25 years), related primarily to growth in trade as a result of the increased levels of intra-European trade generated by the single market.

Meeting both existing and future transport needs is a major challenge for the French economy if it is to make the best use possible of its position within an enlarged Europe.

Government authorities must step up their efforts to develop and improve the management of France's transport networks in response to the following arguments: the need to improve road safety and the quality of the service supplied to users in terms of comfort, reliability, safety and information; the desire to rein in the excessive use of road transport for intercity services, and also car use in cities; and the need to ensure that all territories within France are treated fairly in terms of the supply of transport services.

These needs can only be met by asking for a greater effort from not only users but also present or future taxpayers (through the repayment of loans).

This additional effort is not beyond our reach, particularly if account is taken of the tax revenues from the transport sector and the expected dividends on the shareholdings in motorway franchise operators held by the State.

In order to facilitate the financing of the new major infrastructure projects expected to be launched between now and the year 2012, the Government has decided to set up an agency to supply funding from the State. Accordingly, the share of dividends from motorway franchise operators payable to the State by virtue of its shareholdings, as well as budget appropriations, will be assigned to this agency which will also have a managed borrowing capacity.

There will still remain the task of providing a secure, long-term basis for the resources of this agency, despite the other national priorities and several budgetary constraints which will place a heavy burden on public finances in the long term.

NOTES

1. Paris airports, Strasbourg, Bâle-Mulhouse, Nantes, Lyons, Marseilles, Toulouse, Nice, Montpellier.

2. Dunkirk, Le Havre, Rouen, Nantes-Saint Nazaire, Bordeaux and Marseilles-Fos, Paris and Strasbourg.

ANNEXES: MAPS

See ECMT Web site:

http://www.cemt/org/pub/pubrt.htm

1. **Earlier national transport infrastructure master plans:**

   - National master plan for roads;
   - National master plan for high-speed rail;
   - National master plan for inland waterways.

2. **Maps showing multimodal plans for passenger and freight transport services (2002):**

   - Development of international passenger links (Annex A);
   - Multimodal organisation of freight transport and the national and European levels (Annex B);
   - Operation of major interregional land corridors (Annex C).

3. **Maps showing state of progress with network development:**

   - Construction of the motorway network (1970-2000);
   - State of progress in the development of high-speed rail.

4. **Maps showing objectives for 2025:**

   - Road infrastructure in 2025;
   - Long-term plans for rail, port, river and maritime infrastructure.

NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF ITALY

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SUMMARY

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1. BACKGROUND

1.1. The first National Plan

"Infrastructure planning" was an activity carried out by single "modal" agencies (railways, road administration, etc.) up to 1983, the year which saw the first National Transport Plan (*Piano Generale dei Trasporti*, PGT)[1]. The initial rationale behind this operation is of some interest. The Transport Ministry set up a scientific committee, but also asked the major public and private companies "dominant" within each transport mode to present their own proposals, which the committee would evaluate and discuss in the appropriate order. The underlying assumption was that, since the lobbying capacity of these "dominant" companies was substantial, it was better to have their goals made explicit, within a scientific and, in some respects, transparent and democratic framework. The public resources allocated for the Plan were considerable (in the region of €8 million in real terms), and the experts and academics involved quite prestigious (the Nobel prize-winner, Wassily Leontief, even being appointed for one set of seminars).

Nonetheless, the results were disappointing. First, the state railways refused to co-operate and the director in charge, Ing. Misiti, made a public statement to the effect that the Plan's approach was too "strictly economic", whereas they considered themselves to be providing a social service. Second, the main companies involved soon realised that the Plan could take no real responsibility for the allocation of public funds (no legislative framework was in fact foreseen for implementing its recommendations).

So they produced rather sloppy documents (mainly infrastructure "shopping lists"), without making any attempt to evaluate alternatives, etc. Finally, the minister in charge himself decided that the planned final debate was not really needed, since his goals were also directed towards maximising the funds allocated to his ministry (a clear case of "rent seeking" in progress, see Ponti, 2001[2]).

A specific example can be found in the "railways" component of the Plan: the present author was asked to draft it for Ansaldo (the main rolling stock producer), after the state railways had abandoned the task.

This part of the Plan was the only one to contain a (simplified) economic analysis of the alternatives and to recommend limited expenditures based on foreseeable transport demand. The "final" document of the PGT ignored this part without any public debate and proposed instead a network of new, high–speed lines, with a 25 000 volt power supply (as against the existing 3 000 volts). But, in fact, an endless list of new infrastructure was proposed, exceeding any realistic availability of public funds.

1.2. The second National Plan

After some years, notable for an (abortive) attempt to set up a technical body (CIPET) aimed at implementing the first National Plan, a second one was launched in 1993 (Tebaldi, 1999).

Nevertheless, the rationale of the "shopping list", aimed at maximising the funds allocated to each agency, had already caused serious damage, with the regions and the administrative bodies for roads, ports and airports beginning to define "plans" along those lines. The new National Plan started with the aim of opposing that rationale: infrastructures have to be defined and prioritised within an overall transport policy encompassing the regulatory and fiscal aspects and evaluated with modern economic tools. This second National Plan (PGTL, since the term "Logistica" has been added) was promoted by the centre–left government, developed under three different transport ministers (Burlando, Treu, Bersani), and finally approved by Parliament just before the 2001 national elections, which saw a change of majority in favour of a centre–right coalition.

For the PGTL, a technical committee was set up (of which the present author was a member). However, the resources allocated were extremely limited (in the region of one-tenth of the previous plan), with the result that the Plan was conceived mainly as a set of scientific and technical papers, with all the quantitative analysis derived from a model running within the Ministry, but without any real economic evaluation (this came later).

One of the main features of the plan related to environmental goals (and the present author was in charge of this issue). A widespread assumption at the time was that environmental goals had to be achieved via a radical shift in modal split from road to rail (or another form of collective transport), and that road infrastructure had therefore to be kept to a minimum, while railways had to be expanded in order to accommodate much increased traffic. But this was a highly questionable assumption: efforts to reduce the unit fuel consumption of road vehicles can be both a more sensible and a more realistic way of approximating the Kyoto standards, i.e. technology can be better than constraints and taxes (Ponti, 2000).

This, given the extreme rigidity of demand for road transport, implies in turn large benefits for users of this mode. These benefits have to be taken into account as part of any sound economic evaluation and weighed against the environmental costs.

Anyhow, this second approach was judged "politically unacceptable" (i.e. too favourable to the automotive industry) and the final compromise was a generic "goodwill" text, plus a calculation showing that, even in the most optimistic case of modal split change, the Kyoto quantitative goals would remain out of reach.

Other relevant issues dealt with in the Plan concerned the liberalisation of those services that are not "natural monopolies" (mainly rail and urban transport) and the proper regulation of infrastructure concessions (natural monopolies), including efficient tariffs, aimed not only at *productive* efficiency (price caps, etc.) but also at *allocative* efficiency (congestion, etc.). However, this part of the plan too had a limited impact both on actual policies and on infrastructure decisions. These were in fact suggested by a "rule of thumb" at the start of the planning process: available capacity against forecast demand. So far, so good: at last a clear rule had been set, although it was questionable, since responding to 100 per cent of demand is in general far from efficient, and moreover efficiency also depends on the cost of the individual infrastructure.

But not even this "general" rule was really adhered to in the course of the political process. As the plan underwent scrutiny from the regions, parliamentary commissions, ministries, etc., the list of "recommended" infrastructures lengthened. Within the process, the same basic rule changed: to "demand–capacity ratios" were added "standards" and these "standards" assumed, for example, that capitals of regions or provinces have to be linked by a certain type of infrastructure, even if forecast demand by no means justifies the size of that infrastructure.

Near the eve of the general elections, the list of "promised" infrastructure became still longer and, at the time, the appointed technical/scientific commission was kept completely out of the picture.

It is paradoxical that, through the years, the longer the list of "promised" infrastructure was, the smaller became the real budget allocation and the corresponding investment. This was in part due to the new European budget deficit constraints, and in part due to environmental factors -- local resistance, quite often characterised by a good deal of "free riding" (if a local administration had a veto, waiving it might bring some compensation, even if actual local damages were negligible[3]).

1.3. The present "Objective Law"

This law (Law 443/01) is in fact a national plan for major infrastructure projects. Its core goes back to a television appearance by Mr. Berlusconi during his successful electoral campaign, in which he signed a "pact" with his electors, which contained a list of (main transport) infrastructures. Under the law, the context surrounding this public investment gives it high priority, simplified environmental rules and a reduced role for local approval, etc. In general, a "fast lane" approach dominated the proposal. But the list immediately began to expand, at first to more than eighty projects (from the original twenty) and then to over two hundred, under pressure from local and sectoral interests. Finally, the number of "super–priority" projects was reduced to around twenty again. Special emphasis was laid on private financing, given the limits of the public purse. All in all, almost nothing remained of the previous (and formally still valid) National Transport Plan.

Super–priority projects (CIPE, 2001)
Frejus Rail Tunnel and high-speed line
Sempione rail link
Brennero Rail Tunnel
High speed railway line Turin–Milan–Venice–Trieste
Highway Milan–Bergamo–Brescia and Mestre bypass
Railway line Ventimiglia–Genoa–Milan
Railway line Tirreno–Brennero
Highway Tirreno–Brennero
Venice mobile dams (Mo.Se.)
Nuova Romea road link
Quadrilateral highway system Umbria–Marche
Highway Cecina–Civitavecchia
Multimodal transport system – Rome
Multimodal transport system – Naples
Multimodal transport system – Bari
Highway Salerno–Reggio Calabria–Palermo (mainly revamping)
High-speed railway line Salerno – Sicily
The Messina Strait Bridge
Hydraulic projects in southern Italy

No details were provided (or at least made public) to justify the chosen priorities, as if these were self–evident.

Many of the investment projects were in fact self–evident priorities, like some toll–road links bypassing extremely congested parts of the network (the new Milan–Brescia highway, the Mestre bypass, the new Bologna–Florence link[4], even if this one can be questioned, since there are both modal and route alternatives). But many more were the subject of debate within the previous plan, and more still were "brand new" projects. Others were linked with the European TEN scheme, but were nonetheless under scrutiny (the Brenner and Frejus railway high-speed lines and the corresponding Alpine tunnels). A "special" case was the Messina Strait bridge, on which no final decision had been taken by the previous government.

No hint was given of any relationship with a new, overall transport policy (but, as stated above, nor was there any hint confirming the, albeit vague, guidelines of the previous PGTL.

2. ONGOING TRANSPORT POLICY

Even if never made explicit (at least in an official document), a definite transport policy is developing in Italy. Let us look at its main features in order to better understand the overall rationale for the infrastructure projects [the "Objective Law" (OL)].

2.1. The rationale for the infrastructure projects

As already seen, several projects had been launched or proposed under the previous administration (mainly the high-speed rail network and some highway links), while many more were under discussion (the Messina bridge, the Alpine corridors). Others, however, are new: a highway system in the Umbria region, a highway along the Tuscany coastline, other highway links in the North–East, a high-speed rail line from Naples to Sicily. The presence of a green party in the previous government did, in fact, have the effect of limiting new highways, this being part of a strategy of modal shift in favour of the railway system. This attitude seems to have definitely changed. The only major "new" railway project, as we have seen, is the extension (from Salerno) to the Messina bridge and beyond, of the high-speed rail line. But this (very expensive) project has not been included among the "priorities", even if it is still on the list. A strange development concerning this project was that the same "Ferrovie dello Stato", the state company which is the "net receiver" of the funds for the new line, declared it impracticable for want of sufficient demand, and counter–proposed the upgrading of the existing (and underutilised) line. This counter–project, which is far less expensive, has been rejected by the interministerial economic planning body (CIPE), which has the final say on any state investment.

At all events, the combined effect of financial shortages and the inertia of the bureaucratic approval process has, in fact, rendered impossible the intended acceleration of the scheduled investment in the first two years of the new government's period of office. This is despite the environmental evaluation process having been simplified (and, as a result of "green" party opinion, the related standards having been sharply lowered).

2.2. Liberalisation of transport services and regulation of infrastructure concessions

This is an area where the contradictions of the right-wing coalition government appear more conspicuous. The "right" seems far less free–market oriented than the "left".

In the road freight sector, the liberalisation process has been postponed, both for entry barriers and for mandatory tariffs. Moreover, the more vociferous representative of an anti–liberalisation union of truck owners/drivers has been made responsible for the sector within the Ministry.

In the rail sector, after the progress made by the previous government in freight services (some twenty small new entrants are at present operating), everything has ground to a halt (with respect to both passenger services and the separation of the network from services). The limited opening-up of local rail passenger services to competitive bidding ("Demsetz competition") has been postponed initially for two years, and is now apparently no longer mandatory at all, together with the entire concession regime for local transport. In the airline sector, everything has been kept as it was, with slot allocations still based on "grandfather's rights", duopoly ("code sharing") on intercontinental routes and state ownership of the ailing "flag" carrier[5].

As regards infrastructure, the decision to open up the main building contracts for new high-speed lines to competition (decided by the previous government) has been reversed.

A new public company responsible for the construction and operation of toll highways has been created on the basis of the former state road agency (ANAS), while private companies are numerous in the sector.

Airport concessions have been extended for forty years without any competition (except that in the highway sector an existing law, albeit questionable in many details, makes competitive bidding for the renewal of expiring concessions mandatory).

A regulatory authority for transport was planned under a 1993[6] law, which set up the energy and telecommunications authorities, but nothing has been implemented for the said sector. Regulation is the responsibility of the existing ministries, with limited technical effort and widespread "capture" phenomena.

2.3. Financing the new infrastructure

Given the severe budget constraints already referred to, great confidence has been placed in the capacity of the new infrastructure to be self-financing through tolls. A special state company has been set up to organise and, if necessary, provide technical help and guarantees for the financing process ("Infrastrutture SpA")[7]. The main problem here lies with the "guarantees". If a large share of the commercial and industrial risk is taken by the State, private financing of an investment in fact becomes a loan to the State. In this way, budget constraints can easily be circumvented. But there is another implicit risk, no less serious than the previous one: even the stakeholders (electors, future taxpayers) can easily be made to believe that the investment is self-financing. For example, it is sufficient to say that the public money allocated to a project "will be 100% recovered in the long run". The crucial role of the real amount of the compound interest involved will in some way disappear. These problems are further accentuated by all the vested interests focussing on showing the degree to which the projects are self-financing (these interests include the builders, the banks involved, local and central policymakers and the users who are expecting some transport benefit, etc.), while the "residual claimants" (future taxpayers and sometimes the environment, the "polluted ones", to use a green logo)

have no political voice. (The pressures to show that financing possibilities for public expenditure are favourable, and likewise for the schemes which follow, are termed "creative finance" in Italy). In fact, it is well known that large transport infrastructures usually have limited self-financing possibilities (see the Oresund Bridge, but likewise the Channel Tunnel). Recent surveys (Rothengatter, 2003) show that, around the world, large infrastructures "suffered" from underestimated costs of the order of 30 per cent, and from similar figures for overestimated traffic.

2.4. The role of the regions

At the same time as the new government was defining its highly centralised and resource-consuming list of priority projects, Italy's whole institutional system was shifting toward a decentralised, region-based structure. This movement had in fact already begun under the previous government, but has recently accelerated[8]. The transport sector is one of the areas where regional autonomy is most strongly asserted. As a consequence, there began to be serious disagreements with the regional authorities on the priority projects, and the list changed several times. But the fact that the "list" in any case meant a transfer of funds from the centre to the regions certainly helped to smooth the conflict. Even so, radical disagreements remain on some projects: the Tuscany highway and the Umbria highway scheme, which both regions consider basically over-dimensioned and anyway too damaging to their valued landscapes, and a "tunnelled" highway link in Veneto (on top of a new surface link along the same route).

A specific issue concerns the financial implications of the highly "centralised" funding procedure which characterise the "Objective Law" (apart from the contradiction with the ongoing regionalisation of institutional structures).

This centralisation, as opposed to the allocation of financial resources directly to the regions, encourages them to maximise the transfers (even to the point of inflating the costs of the infrastructure). The regions are in fact not seeing any "opportunity cost" for the public funds involved, which contrasts with the case of cash transfers.

This "perverse incentive" already played a role in the high-speed railway project, inflating the cost of crossing Florence and Bologna due to local pressures in favour of extremely expensive underground solutions[9].

3. AN INDEPENDENT ECONOMIC ANALYSIS

3.1. The rationale for the operation

With very few exceptions, economic and financial analyses of infrastructure projects are carried out by those promoting them: ministries or public agencies for each transport mode (airports, railways, etc.). If we assume a "public choice" approach (as opposed to a "social choice" approach implying a "benevolent and omniscient prince"), this means favouring independent feasibility studies awarded via a competitive process to "external" engineering companies. This is similar to the approach imposed on borrowing countries by the World Bank. Obviously, for the Italian Objective

Law case, the lack of any economic study (or at least of any economic study used as a real tool in the decisionmaking process and, above all, for setting priorities) makes an independent analysis highly advisable .

3.2. Some notes on the type of analysis performed[10]

In Italy, the scientific debate on economic analysis of public investment[11] has taken a hostile stance towards the predominant cost–benefit approach (CBA). This is for two, apparently conflicting, reasons: the promoters of investment are opposed to a method which might well produce negative results, or result in comparisons between projects or priorities "unfavourable" to their projects (a "rent-seeking" attitude, if we remain within the "public choice" approach referred to above). On the other side (on the political left), the environmentalists are against CBA, on the grounds that this method is supposed to under-emphasize, or completely overlook, environmental costs. Both reasons are obviously hardly acceptable and the second one in particular ignores the vast scientific capital built up over the years on environmental economic appraisal.

As we have seen, the actual result is a "cultural void" on this issue within public administration (and in "educated" public opinion as well).

This said, let us briefly summarise the main approaches proposed as alternatives to the CBA.

a) "Value added" analysis (also known by the more generic term of "economic impact" analysis)

This method is mainly based on input-output matrices and implicitly assumes zero opportunity costs for both labour and capital: the "value" of a public project consists of the net increase in the remuneration of these two factors of production. A first paradox is that the greater the expenditure, by definition, the greater the "added value" generated. Secondly, the opportunity cost of these factors can be well below the market value, but generally far from zero. (See, on this issue, the decisive debate in the seventies between Bela Balassa of the World Bank and two French scholars, M. Le Gall and D. Chervel[12].) In any event, this approach necessarily involves a comparison with other uses of public funds, since it gives clearly "positive" results in just about every case. This is also the reason why it is favoured by investment promoters and, in particular, as we shall see, has been used for the Messina Bridge project.

b) Multi-criteria analysis

Assuming, *a priori*, the impossibility (or extreme difficulty) of putting economic values on public goods, this method "gives back" to the decisionmaker the task of attaching weights and priority to the public goals involved in the project. But this approach leaves a lot of room for both arbitrary and inconsistent evaluations (there are a large number of different weight-setting techniques and different models) and, moreover, leaves room for opportunistic behaviour. In fact, as investment is, on the whole, funded from the central government purse, it is sufficient to give low weights to costs and high weights to benefits for positive results to be guaranteed.

c) The "black box" approach and its problems

The scientific limitations of cost-benefit analysis (mainly its assumption of "perfect markets" upstream and downstream from the project) have recently been dealt with by the development of sophisticated new tools. These range from integrated economic transport and land-use transport models, from static to "comparative static" to fully dynamic ones (both within the CGE family and the "disequilibrium" approach). So far, so good. The problem here is the transparency and effectiveness of the process involved. Since these models are far from devoid of critical (even ideological) assumptions, but are also extremely complex, decisionmakers and stakeholders are usually only left with the alternative of rejecting or accepting the entire "package" (and they generally decide on the basis of whether the results are deemed favourable to them or not).

3.3 Limits and possible improvements to CBA

The limitations of the CBA[13], as we have seen, relate mainly to the "perfect markets" assumption. Another limitation has to do with certain objectives to which monetary values cannot be attached, and rightly so. These are the distributive objectives (both between social groups and between regions), and the landscape aesthetics objectives and constraints. Income distribution has to remain a purely political objective. But CBA may well help the decisionmaker with this aspect too: since total net welfare gains are measured by adding up gains and losses for a wide range of subjects (and even intertemporally), it is rather easy to use the results as a tool to assist distribution-oriented decisions (there are good examples from the World Bank). Other approaches cannot achieve any transparency on this issue. On the aesthetic-landscape side, CBA can only "show" the opportunity cost involved in such considerations (for example, a tunnel solution instead of a surface solution for a road, etc.). But this seems a far from negligible result.

On the "perfect markets" issue[14], some improvements are possible. "Shadow prices" for labour opportunity costs are in fact already in use. But in large infrastructure projects today, the weight of the cost of labour is limited and, moreover, the proportion of low-skilled jobs in new job creation is small, whereas the opportunity cost of such workers can be very different from the nominal value.

A more recent "shadow price", not yet in widespread use, is known as the "marginal opportunity cost of public funds" (Ponti, 2001), which can be derived from the level of public debt (it is, in fact, the shadow value of the budget constraints, i.e. of the Maastricht Treaty thresholds for public debt, set for EU members). This opportunity cost, even if derived in a very approximate way, has been used in the analysis carried out.

Research is still in progress on the opportunity value of building or built areas, the market for which is characterised by widespread rent phenomena (i.e. values far from the marginal costs of producing or building these goods). The problem here is made more complex by the fact that the rents referred to are in fact "scarcity values", determined in turn mainly by land-use constraints, i.e. by public action. Another issue which is still the subject of research is the use of "option values"[15] to take account of the flexibility of investment changing course during its lifetime (i.e. the implicit advantage in transport of "technology-oriented" solutions over "reinforced concrete" alternatives). In the analysis presented here (financial and economic), in addition to the provisional inclusion of an opportunity cost for public funds, "switch values" (the values needed for crucial parameters to reverse the results) have also been shown in order to underline the "robustness" of the final economic indicators.

3.4. Projects analysed and the results of the evaluations

Only a sub-set of the 19 "priority projects" has been evaluated, but it is a meaningful one: seven of the more controversial transport infrastructure projects, as we have seen, covering the different Italian macro-areas (north, centre and south). Let us analyse each case in greater detail (see map in Annex).

The Tuscany toll highway (Cecina–Civitavecchia)

In response to the project proposed by the Ministry (an inland alternative to the existing SS1 Aurelia Road), a coastal alternative has been submitted by the regional authorities. The coastal alternative is shorter and less expensive than the inland route, but would result in delays for existing traffic during the construction period, since the coastal route interferes with the existing road in several places. For both these projects and for the "do nothing" road, the length is of the order of 200 kilometres. The cost of the time for the delays has been calculated and is less than the difference in the cost of the two projects.

Analysis has therefore been confined to the coastal alternative, the inland one being "inferior" in every way ("Pareto-dominated").

Existing and forecast traffic is limited because of the low density of the area and its lack of industrial activities, and because of the existence of two long-distance alternative highways (Milan-Rome–Naples and the Adriatic coastal highway).

The economic net present value (NPV) is negative, and in the region of a quarter of the total investment (with a 4.5 per cent discount rate). If we consider that the financial net present value, with a moderate 6 per cent discount rate, is also negative, and even larger, assuming a marginal opportunity cost of public funds of 1.13, the economic negative NPV becomes greater still.

On top of that, the landscape affected by the project, even if less prized and intact than in the case of the inland alternative, is considered to be one of the most beautiful in Italy.

The tariff for heavy vehicles plays a critical role here; in fact, the mere existence of a "slower", toll-free alternative creates the risk that all heavy traffic will remain on the existing road, making both the financial and economic results of the investment worse still (as happened with the Adriatic highway).

The high-speed Venice to Trieste rail line

This line is part of the "Fifth Corridor" of the European Commission transport scheme, and is supposed to conclude the high-speed route linking Lyons-Turin-Milan-Venice. The main problem here is the limited volume of rail traffic to Trieste at present (ten long-distance trains per day, compared to the capacity of a high-speed line of more than 300 trains per day). Furthermore, there are already plans to widen the existing toll highway from four to six lanes. This will eliminate any congestion on that road, taking substantial time (and environmental) benefits away from the new line for long-distance freight traffic heading towards the East and Russia; the recently upgraded Tarvisio line is, in fact, a competitor of the project and is greatly underutilised.

Time saving will be the main expected benefit, and we have assumed this will also apply for local traffic, although there are doubts as to whether local traffic will be served at all, the results being extremely negative on both the financial and the economic sides. With this project, even the internal rates of return are negative, with negative net present values exceeding half of the value of the investment.

The high-speed rail line Salerno–Strait of Messina–Sicily

This project faces two relevant problems: the existing rail line, albeit relatively slow, is underutilised and potential demand for the new line would have to contend with both strong modal competition and limited total numbers (at least compared with those of dense regions and regions where through-traffic has an important role: these two conditions are both missing).

Where freight transport is concerned, the strong modal competition stems from short sea-crossing services (less expensive and rapidly growing) and, where passengers are concerned, from air services which already predominate in the south of Italy and will probably grow more with the entry of low-cost carriers.

Furthermore, the new line is very long (more than 600 km) and its route is entirely over hilly or mountainous areas, where the high design speed requires extensive tunnelling and bridges. The total cost is therefore extremely high in relation to potential traffic.

Both the economic and financial results are very negative (the corresponding values total more than half of the investment) and, as we have seen, the project has been opposed (unsuccessfully) even by the state railways, which suggested simply improving the existing line.

The Strait of Messina Bridge

This highly controversial (but highly symbolic) project has been under discussion for more than ten years. Under the previous government, an extensive technical and economic evaluation was carried out via public bidding for external advisory services (an exceptional and commendable initiative) (Advisor, 2001). Nevertheless, the economic analysis required was generic and a cost-benefit analysis (CBA) was not specified in the announcement. (Apparently, in an initial phase, a CBA was required, but has been cancelled following an "internal" conflict on the possible negative results.) A more optimistic value-added analysis was carried out, resulting in inconclusive recommendations.

The "independent" cost-benefit analysis is based on the consultant's traffic forecast (which seems very accurate) and on cost figures mainly from the same source.

The forecast volume of traffic is limited, partly for the same reasons as we have already seen for the high-speed rail line to Sicily (i.e. strong modal alternatives to train traffic). But the bridge is both for trains and for road traffic.

Even road traffic, too, will be limited, short to medium-distance freight traffic suffering from the reduced amount of trade between Calabria and Sicily (where production figures are similar); passenger car traffic will suffer even more with the long-needed route via the bridge between the two coastal cities facing the Strait (Messina and Reggio Calabria). In general, a modern, rapid ferry service will be both quicker and cheaper than the bridge alternative.

On the technical and cost side, the bridge will have a span, between the two 300-metre steel pillars, of more than three kilometres (the longest suspension bridge in the world). The area is particularly prone to earthquakes, and the environmental context is also critical. It is therefore necessary to adopt a very prudent attitude as regards both the final costs and the construction time.

The toll issue has been the subject of a special analysis: by introducing an opportunity cost for the public funds involved, it is possible to calculate the trade-off between the social surplus loss due to reduced traffic and the welfare loss due to the bigger public deficit. In the Messina Bridge case, a moderate toll seems the optimal solution (even if it will further reduce the transport effects of this big investment).

Recently, and probably also because of the pressure resulting from the effects of the independent analysis presented here, a cost-benefit analysis has been carried out by the Ministry for Infrastructure and Transport. Even if the estimated investment cost has been brought down and the expected benefits increased (quite far from an "on-the-safe-side" approach), the results have been so negative that, to make them positive, the benefits of the previous "value added" analysis have to be included. But this is obviously devoid of economic meaning: the cost-benefit analysis assumes that labour and capital have an opportunity cost, while the value-added approach implies costs equal to zero for these factors.

The Brenner Rail Tunnel

For this project, (50 kms of alpine tunnel), the existing dense traffic seems to justify the investment. The high-speed passenger trains, permitted by the lower grade of the line, will serve important regional centres. Trade between Italy and Germany is also very intense and growing, and the tunnel will accommodate heavier, more regular and more rapid freight trains. Energy consumption will be lower, as will noise pollution. Traffic with Austria will benefit as well. The amount of investment required is considerable (more than €2.5 billion), but the existing line up to the entrance of the new tunnel has recently been extensively upgraded.

On the financial side, the project will not pay for itself (as is usual for rail investment), but even taking into account the opportunity cost of the public funds required, the economic result remains positive.

The new highway link from Milan to Brescia ("Brebemi")

This project will bypass the most congested route on the Italian highway network, Milan-Bergamo–Brescia, via a direct link to Brescia in the middle of the Po Plain.

For this project, the evaluation carried out was not an academic exercise[16], since from its very beginning the financing was assumed to be mainly private, and the promoters were local authorities and chambers of commerce. The length of the new route is limited (50 kilometres) and the investment remains of the order of €700 million. But the role of this link seems crucial in eliminating one of the main traffic bottlenecks in one of the most industrialised areas of Italy.

Both the economic and the financial indicators are largely positive, even taking into account the planned rival investment in a semi-parallel local road, and the widening of the existing route via Bergamo. No opportunity cost of public funds is involved here, since no public money is required. The tendering has already taken place, resulting in the winning group offering lower fares and a

shorter concession period. Another positive aspect of the detailed financial and economic analytical tools available from the beginning of the design phase has been their regular use in the selection of many alternative routes and the technical characteristics of the project.

The only puzzling aspect that remains is the fact that the bidders (and the winning team in particular) are partially public (local authorities). This is one of the drawbacks of the sector's regulatory law which, in this way, implicitly permits an uneven playing field, since public bidders are obviously disproportionately less risk-averse than private investors.

The Frejus Rail Tunnel

This analysis, as in the case of the Milan-Brescia highway, is a "real" one performed by an Italian-French ministerial team with abundant resources (CIG, 2000), and the implicit objective of achieving positive results. The project is similar to the Brenner tunnel in length (about 50 km), but is much more expensive because of the cost of the new high-speed lines up to the tunnel entrance. Freight traffic is slightly less, while passenger traffic is less than half. Other parameters are similar, but not exactly so.

The results have been negative to the point that: a) a special environmental tax of €100 has been assumed for road freight, and b) to the freight traffic calculated for the project using a complex assignment model, "extra" traffic has been added exogenously, of the same order of magnitude as the existing figure, assuming a vague and unrealistic implementation of piggy-back services for trucks, but stating candidly that this assumption needs "further in-depth analysis". This shows, at least for the high-growth scenario, a somewhat positive economic result.

These negative results are strongly linked to the fact that the existing line is far from saturated and its capacity is sufficient, with minor improvements, to take up to double the existing traffic. The project nevertheless is a link in the Lisbon-Kiev, "fifth corridor" defined by the European Commission, and is presented as being vital to Italian interests, even if existing and foreseeable long-distance traffic on this route seems minimal compared to short to medium-distance traffic (of the order of 5 per cent). But the European financing mechanism remains tied to this pseudo-concept of a "corridor", which is of limited functional and economic meaning.

4. SOME STRATEGIC CONSIDERATIONS

4.1. Industrial policy

The Objective Law is by far the most important plan for public investment in Italy, and therefore implies that the civil engineering sector and the related industry deserve the highest priority. But doubts concerning this priority are quite legitimate: let us consider the main ones.

a) The sector has little innovative capacity: the related technology has been basically the same for many years, and this is also demonstrated by the growing presence of developing country firms in the international market;

b) The sector is no longer labour-intensive, especially for large infrastructures, i.e. the direct employment effect is now limited;

c) Furthermore, the employment created presents severe "peak" phenomena, and this fact generates social tensions which, in southern Italy, often result in "never-ending sites", with heavy public costs;

d) The sector is not "footloose", i.e. many crucial components have to be procured locally: earth-moving equipment, cement, sand, the unskilled workforce, often reinforcing irons, etc. This in turn implies "cosy links" between local politicians and local firms, frequently bordering on corruption and, especially in southern Italy, the widespread presence of organised crime.

e) Large civil engineering projects are, in general, very aggressive on the environment and on the landscape in particular, which is a precious resource in Italy.

4.2. Growth and counter-cyclical policy

The literature on the impact of transport infrastructure on economic growth is, at the very least, inconclusive[17], in the sense that the causal chain is often unclear. To consider some contradictory examples: the Los Angeles region suffers from some of the worst traffic congestion in the world (i.e. suffers from insufficient infrastructure in relation to demand) and, since the problem emerged some forty years ago, its rate of growth has been constant and impressive. But the same can be said for South-East Asia (Bangkok, Taiwan) and, in Italy, for the Veneto region, which has been one of the faster growing areas in the last twenty years.

There is an economic factor underlying these observations, which is that transport costs are declining in relative terms as the value added of industrial production increases. Effective logistical chains are far more valuable for modern production than infrastructure capacity, given also the fact that congestion costs are often "internalised" by the trucking industry, which is very competitive and, especially in Italy, has very little "market power" (being highly fragmented).

The counter-cyclical role played by major infrastructure investment is also highly debatable: the timing of the design, financing and implementation of these projects is very long drawn out and is, in any event, far from certain. The economic impact may therefore well be felt during a future period of economic expansion (unless we forecast an extremely protracted recession, which hopefully will not be the case).

Finally, an outstanding example of a country where the main effort to revamp a stagnating economy has focused on large civil works programmes is Japan. Here, several major civil engineering projects have been launched in the past 15 years, specifically with the aim of triggering an economic recovery. The results have been dismal (see several articles in *The Economist*): no visible impact on growth, a rapidly rising public debt and the banking system's "bad loans", substantial damage to the environment and landscape and, above all, examples of "special relations" between the political world and the building industry which are judged by many commentators, even in Japan, as hard to tolerate.

Furthermore, the so-called "golden rule", which states that investment expenditure should be subtracted from the public deficit figure, implies that this investment is profitable in economic terms. Otherwise, the assumption that investment is just deferred economic profit is untenable.

5. CONCLUSIONS

The rationale of the Objective Law has its roots, at least partially, in the excessive inertia of past administrations in dealing with the Italian transport network's urgent and severe bottlenecks (principally "missing links" in the main trunk routes). Even so, it seems a symmetrical and excessively simple way to approach the country's transport problems, and one prompted by a preoccupation with image and electoral considerations.

In particular, the same "strategic project" concept, on which the law is based, seems questionable: transport demand (and the resulting potential congestion) is dominated by short-range traffic considerations. Long-range traffic may well be a strategic issue, but anyway its costs depend much more on locally-generated congestion than on the insufficient capacity of the links between regions or between nations. A different balance between long-distance infrastructure and regional and urban projects may be advisable.

The above observations point, in turn, to a bigger role for the regional authorities -- a role which is even consistent with the ongoing change in Italy's administrative structures. This bigger role will, in any case, be reinforced by a very recent statement by the Supreme Court which seems to confirm that the regions have considerable power to veto state investment.

Three other key issues probably need to be both better co-ordinated with investment policy and set at the same level of priority.

The first is the liberalisation of transport services (rail, road trucking, air, local transport). This could well be carried out for some time and for some services in a "soft" form [for example, "Demsetz competition" (Demsetz, 1968)]. Even so, it would change the entire structure of the sector and, in turn, the related infrastructure priorities.

The second issue concerns the concession regimes for the same infrastructure: sound, incentive-giving regulation of these "natural monopolies" is crucial to lowering the overall costs of the sector and, in turn, this policy can also be linked effectively to the associated investment strategies. (The specific tools may be both competitive periodic bidding for the concessions, or effective price-capping schemes, even assuming that the privatisation of the assets is not deemed advisable.)

The last issue has to do with "efficiency pricing". This strategy is one of the main tools proposed by the European Commission (Commission of the European Communities, 2001) for the future transport policy of the Union. Its implementation, even seen as a gradual process, can really change the spatial and temporal distribution of transport demand and, in turn, the priorities and location of the investment required to cope with this future demand.

A final possible recommendation: the evaluation of large investment projects should be made transparent by means of a process of competitive appointment of independent consulting companies which have to submit their results to contested public hearings. Furthermore, the process should deal with several projects at a time, allowing for a real setting of priorities and, for each project, more than one technical alternative should be considered. In any event, the cost and time required for this

procedure would be trivial compared to the amount of resources involved and the duration of the construction.

Nothing will be "guaranteed" in this way, not even of course the neutrality of the evaluators; furthermore, the final decision has to remain mainly, and quite rightly, a political one. But, as we have seen, it is important to keep in mind the systematic overestimation of traffic and the corresponding systematic underestimation of costs resulting worldwide for large transport projects.

NOTES

1. See *Il Nuovo Piano Generale dei trasporti e della Logistica*, in www.infrastriutturetrasporti.it
2. See Seul and Transtalk papers.
3. See M. Ponti and A. Boitani (2000), La spesa pubblica per investimenti nel settore dei trasporti.
4. The new Bologna–Florence (*variante di valico*) link is not formally part of the Objective Law programme, since it is already fully financed.
5. This may be changing, since there have been some very recent privatisation schemes.
6. See Law 29/93.
7. Infrastrutture SpA has been operating since 16th April, 2002 (Article 47, Law 448/01).
8. Italian Constitutional Law (1948), title V.
9. See M. Ponti and A. Boitani (2000) (*op. cit.*).
10. Workshop "Valutazione dei progetti e legge obiettivo", Università Cattolica del Sacro Cuore, Milan, 16 September 2003.
11. See the European Commission research project, IASON.
12. See B. Balassa and M. Chervel (1976), The Effects Method of Project Evaluation.
13. See SACTRA (1999), *Transport and the Economy*.
14. Aside from the Lipsey–Lancaster theorem.
15. See Pindyke–Dixit.
16. The analysis was carried out by TRT -- Trasporti e Territorio, Milan.

17. See, for example, ECMT (2002), *Round Table 119, Transport and Economic Development*, OECD, Paris.

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ANNEX

The annex shows the findings arrived at by an independent analysis of some large investment projects contained in the "Objective Law", which at present constitutes Italy's main investment plan. Only the main parameters and results are shown in order to summarise the type of analysis carried out. For three of the projects, moreover (the Frejus Tunnel, the Milan-Brescia Highway and the Messina Bridge), the analysis is much more detailed than for the other four, although the parameters are slightly different.

Highway A12 Cecina – Civitavecchia

Table 1. **Traffic and physical data, economic and financial data**

alternatives		Reference Solution	Project	Ministry Project (see text)	units
Traffic and physical data					
Length		197	200	200	km
Commercial speed	light vehicle	90	130	130	km/h
	heavy vehicle	70	90	90	km/h
Travel time	light vehicle	2.18	1.54	1.54	hours
	heavy vehicle	2.81	2.22	2.22	hours
Reference traffic	light vehicle	9 850			vehicles/day
	heavy vehicle	2 800			vehicles/day
Elasticity of perceived cost	light vehicle		-1	-1	
	heavy vehicle		-1	-1	
Traffic growth rate		1.45	1.45	1.45	%
Load factors	light vehicle	1.7	1.7	1.7	pax/vehicle
	heavy vehicle (drivers)	1	1	1	pax/vehicle
	loading	50	50	50	%
	real loading	26	26	26	tons/vehicle
Economic and financial data					
Investment cost (financial)		0	1 980	2 898	M€
Residual value		0	792	1 159	M€
Investment costs (economic)			1 812	2 489	
Period of analysis		30	30	30	years
Construction time		0	4	6	years
Marginal economic infrastructure costs		0.019	0.025	0.025	€/vehiclekm
Economic operating costs (long-run)	light vehicle	0.21	0.21	0.21	€/vehiclekm
	heavy vehicle	1.05	1.05	1.05	€/vehiclekm
Financial operating costs (short-run)	light vehicle	0.19	0.19	0.19	€/vehiclekm
Financial operation costs (long-run)	heavy vehicle	1.55	1.55	1.55	€/vehiclekm
Toll	light vehicle	0	0.048	0.048	€/vehiclekm
Toll	heavy vehicle	0	0.116	0.116	€/vehiclekm
Transport tariff	heavy vehicle	1.705	1.705	1.705	€/vehiclekm
Value of time	passengers	10.00	10.00	10.00	€/hour·pax
	freight	2.07	2.07	2.07	€/hour·ton
External costs	light vehicle	0.17	0.17	0.17	€/vehiclekm
	heavy vehicle	0.47	0.47	0.47	€/vehiclekm
Marginal opp costs of public funds		0.13	0.13	0.13	
Total perceived cost	light vehicle	74.49	73.75		€/pax
	heavy vehicle	410.78	424.00		€/ton
Total economic cost	light vehicle	115.53	107.10		€/pax
	heavy vehicle	378.10	368.75		€/ton

Table 2. **Intermediate economic results**

Costs			**units**
Total discounted investment costs (including shadow cost for labour)		1 245 414 865	€
Benefits	**Light vehicle**	**Heavy vehicle**	
Discounted benefits from traffic in reference solution	542 827 673	171 171 851	€
Travel time	707 477 390	288 957 824	€
Vehicle operation costs	-45 998 199	-65 378 151	€
External costs	-37 236 637	-29 264 506	€
Infrastructure operating costs	-81 414 880	-23 143 316	€
Discounted benefits from traffic generated in the project scenario	-20 986 134	-313 680 061	€
Total discounted benefits	521 841 539	-142 508 210	€
Discounted residual value		138 978 897	€

Table 3. **Principal results (economic discount rate 4.50% and financial discount rate 6.00%)**

Alternatives	**Reference Solution**	**Project**	**Ministry Project**	**units**
Economic NPV		-584.594		M€
Marginal Opp. Cost of Public Funds		-102.940		M€
Economic NPV with MOCPF		-687.535		M€
Financial NPV		-791.847		M€

Table 4. **Switch values**

	Growth rate	**Value of time**		**Commercial speed**	
	Traffic	**Passengers**	**Cargo**	**Passengers**	**Cargo**
Switch value	%	€/hour·pax	€/hour·ton	Km/h	Km/h
Economic NPV	5.809	20.66	4.91	Not admissible	Not admissible
Economic NPV with MOCPF	6.018	22.16	5.33	Not admissible	Not admissible

High-speed railway line Venice – Trieste

Table 5. **Traffic and physical data, economic and financial data**

Alternatives		reference solution	project	units		main alternative mode (highway)	units
Traffic and physical data							
Length		120	120	km		115	km
Commercial speed	passenger train	80	200	km/h	light vehicle	130	km/h
	freight train	60	80	km/h	heavy vehicle	90	km/h
Travel time	passenger train	1.50	0.60	hours	light vehicle	0.88	hours
	freight train	2.00	1.50	hours	heavy vehicle	1.28	hours
Passenger waiting time	passenger train	0.25	0.25	hours	light vehicle	0.00	hours
Reference traffic	passenger train	38		trains/day	light vehicle	6 500	vehicles/day
	passenger train	1 387 000	1 581 428	pax/year	light vehicle	4 033 250	pax/year
	freight train			trains/day	heavy vehicle	2 500	vehicles/day
	freight train	3 000 000	4 185 269	tons/year	heavy vehicle	11 862 500	tons/year
Elasticity of perceived cost	passenger train		-1				
	freight train		-1				
Traffic growth rate	passenger train	1.45	1.45	%	light vehicle	1.45	%
	freight train (ante 2010)	7.30	7.30	%	heavy vehicle (ante 2010)	7.30	%
	freight train (post 2010)	2.00	2.00	%	heavy vehicle (post 2010)	2.00	%
Load factors	passenger train	100	100	pax/train	light vehicle	1.7	pax/train
	heavy vehicle				heavy vehicle	0.5	
	freight	15	15	tons/vehicle	freight		tons/vehicle
	freight	315	450	tons/train	freight	26	tons/vehicle

Economic and financial data							
Investment cost (financial)			4 300	M€			
Residual value			1 720	M€			
Investment costs (economic)			3 935	M€			
Period of analysis		30	30	Years			
Construction time			3	Years			
Marginal economic infrastructure costs	passenger	0.00338	0.00338	€/paxkm	light vehicle	0.02500	€/vehiclekm
	freight	0.00107	0.00075	€/tonkm	heavy vehicle	0.02500	€/vehiclekm
	trains (average)	0.3384	0.3384	€/trainkm			
Economic operating costs (long-run)	passenger train	0.06	0.08	€/paxkm	light vehicle	0.21	€/vehiclekm
	cargo train	0.011	0.011	€/tonkm	heavy vehicle	1.05	€/vehiclekm
Financial operating costs (short-run)	passenger train			€/paxkm	light vehicle	0.19	€/vehiclekm
Financial operating cost (long-run)	freight train	0.0124	0.0087	€/tonkm	heavy vehicle	0.1192	€/tonkm
Transport tariff	passenger train	6.82	12.39	€/pax			
	freight train	0.0137	0.0096	€/tonkm	heavy vehicle	0.1312	€/tonkm
Access track charging	passenger train	0.0185	0.0254	€/paxkm	light vehicle	0.0282	€/paxkm
	freight train	0.0048	0.0048	€/tonkm	heavy vehicle	0.0089	€/tonkm
Value of time	passenger trip	10	10	€/hour·pax	passenger trip	10	€/hour·pax
	passenger waiting	20	20	€/hour·pax	passenger waiting		
	freight	2.07	2.07	€/hour·ton	freight	2.07	€/hour·ton
External costs	passenger train	0.023	0.023	€/paxkm	light vehicle	0.10	€/paxkm
	passenger train	2.3	2.3	€/trainkm	light vehicle	0.17	€/vehiclekm
	freight train	0.0293	0.0293	€/tonkm	heavy vehicle	0.083	€/tonkm
	freight train	9.2295	13.185	€/trainkm	heavy vehicle	1.079	€/vehiclekm
Marginal opp.cost of public funds		0.13	0.13			0.13	
Total perceived cost	passenger train	44.91	41.48	€/pax		42.30	€/pax
	freight train	29.13	27.60	€/ton		27.38	€/ton
Total economic cost	passenger train	51.54	44.94	€/pax		46.60	€/pax
	freight train	29.00	27.93	€/ton		31.96	€/ton

Table 6. **Intermediate economic results**

Costs			**units**
Total discounted investment costs (including shadow cost for labour)		3.606.251.796	€
Benefits	**Passenger train**	**Freight train**	
Discounted benefits from traffic in reference solution	164.034.017	92.625.367	€
Travel time	223.682.750	89.288.955	€
Vehicle operating costs	-59.648.733	0	€
External costs	0	0	€
Infrastructure operating costs	0	3.336.412	€
Discounted benefits from traffic generated in the project scenario	-3.320.674	1.958.314	€
Discounted benefits from traffic from main alternative mode	53.242.450	452.445.978	€
Total discounted benefits	213.955.793	547.029.668	€
Discounted residual value		301.822.857	€

Table 7. **Principal results (economic discount rate 4,50% and financial discount rate 6,00%)**

Alternatives	**reference solution**	**project**	**units**	**main alternative mode (highway)**	**units**
Economic NPV		-2 543 443	M€		
Marginal opp cost of public funds		-439.811	M€		
Economic NPV with MOCPF		-2 983.254	M€		
Financial NPV		-3 383.165	M€		

Table 8. **Switch values**

	Growth rate	**Value of time**		**Commercial speed**	
	Traffic	**Passengers**	**Cargo**	**Passengers**	**Cargo**
	%	€/hour·pax	€/hour·ton	Km/h	Km/h
Economic NPV	15.98	119.35	68.30	Not admissible	Not admissible
Economic NPV with MOCPF	16.51	13.99	78.13	Not admissible	Not admissible

High-speed railway line Salerno–Sicily

Table 9. **Traffic and physical data, economic and financial data**

Alternatives		reference solution	project	units		main alternative mode (highway)	units
Traffic and physical data							
Length		609	600	km		625	km
Commercial speed	passenger train	130	180	km/h	light vehicle	130	km/h
	freight train	60	80	km/h	heavy vehicle	90	km/h
Travel time	passenger train	4.68	3.33	hours	light vehicle	4.81	hours
	freight train	10.15	7.50	hours	heavy vehicle	6.94	hours
Passenger waiting time	passenger train	0.25	0.25	hours	light vehicle	0.00	hours
Reference traffic	passenger train	38		trains/day	light vehicle	6 966	vehicles/day
	passenger train	3 661 680	4 087 194	pax/year	light vehicle	4 322 403	pax/year
	freight train	50		trains/day	heavy vehicle	4 467	vehicles/day
	freight train	5 748 750	7 001 906	tons/year	heavy vehicle	21 195 915	tons/year
Elasticity of perceived cost	passenger train		-1				
	freight train		-1				
Traffic growth rate	passenger train	1.77	1.77	%	light vehicle	2.65	%
	freight train (ante 2010)	2.38	2.38	%	heavy vehicle (ante 2010)	2.68	%
	freight train (post 2010)	2.38	2.38	%	heavy vehicle (post 2010)	2.38	%
Load factors	passenger train	264	264	pax/train	light vehicle	1.7	pax/train
	heavy vehicle				heavy vehicle	50	
	freight	15	15	tons/vehicle	freight		tons/vehicle
	freight	315	450	tons/train	freight	26	tons/vehicle

Economic and financial data							
Investment cost (financial)			12 291	M€			
Residual value			4 916	M€			
	Investment costs (economic)		11 249	M€			
Period of analysis		30	30	Years			
Construction time			3	Years			
Marginal economic infrastructure cCosts	passenger	0.00128	0.00128	€/paxkm	light vehicle	0.02500	€/vehiclekm
	freight	0.00107	0.00075	€/tonkm	heavy vehicle	0.02500	€/vehiclekm
	trains (average)	0.3384	0.3384	€/trainkm			
Economic operating costs (long run)	passenger train	0.06	0.08	€/paxkm	light vehicle	0.21	€/vehiclekm
	freight train	0.011	0.011	€/tonkm	heavy vehicle	1.05	€/vehiclekm
Financial operating costs (short run)	passenger train			€/paxkm	light vehicle	0.19	€/vehiclekm
Financial operating cost (long run)	freight train	0.0124	0.0087	€/tonkm	heavy vehicle	0.1192	€/tonkm
Transport tariff	passenger train	35.95	45.00	€/pax			
	freight train	0.0137	0.0096	€/tonkm	heavy vehicle	0.1312	€/tonkm
Access track charging	passenger train	0.0070	0.0096	€/paxkm	light vehicle	0.0282	€/paxkm
	freight train	0.0048	0.0048	€/tonkm	heavy vehicle	0.0089	€/tonkm
Messina bridge toll	passenger train	274.20	274.20	€/vehicle	light vehicle	10.80	€/vehicle
	passenger train	4.15	4.15	€/pax	light vehicle	6.35	€/pax
	freight train	165.80	165.80	€/vehicle	heavy vehicle	41.30	€/vehicle
	freight train	11.05	11.05	€/ton	heavy vehicle	3.18	€/ton
Value of time	passenger trip	10	10	€/hour·pax	passenger trip	10	€/hour·pax
	passenger waiting	20	20	€/hour·pax	passenger waiting		
	freight	2.07	2.07	€/hour·ton	freight	2.07	€/hour·ton
Externalcosts	passenger train	0.023	0.023	€/paxkm	light vehicle	0.10	€/paxkm
	passenger train	6.072	6.072	€/trainkm	light vehicle	0.17	€/vehiclekm
	freight train	0.0293	0.0293	€/tonkm	heavy vehicle	0.083	€/tonkm
	freight train	9.2295	13.185	€/trainkm	heavy vehicle	1.079	€/vehiclekm
Marginal opp.cost of public funds		0.13	0.13			0.13	
Total perceived cost	passenger train	110.04	105.58	€/pax		199.18	€/pax
	cargo train	74.72	66.60	€/ton		113.73	€/ton
Total economic cost	passenger train	124.35	122.08	€/pax		201.33	€/pax
	freight train	76.36	70.31	€/ton		128.19	€/ton

Table 10. **Intermediate economic results**

Costs			**units**
Total discounted investment costs (including shadow cost for labour)		10 308 571 399	€
Benefits	**Passenger train**	**Freight train**	
Discounted benefits from traffic in reference solution	156 942 972	725 570 812	€
Travel time	933 689 563	657 736 049	€
Vehicle operating costs	-791 846 704	11 870 544	€
External costs	14 302 990	31 618 813	€
Infrastructure operating costs	797 123	24 345 407	€
Discounted benefits from traffic generated in the project scenario	-39 993 114	4 530 734	€
Discounted benefits from traffic from main alternative mode	0	0	€
Total discounted benefits	116 949 858	730 101 546	€
Discounted residual value		862 769 059	€

Table 11. **Principal results (economic discount rate 4,50% and financial discount rate 6,00%)**

Alternatives	**reference solution**	**project**	**units**	**main alternative mode (highway)**	**units**
Economic NPV		-8 598.750	M€		
Marginal opp.cost of public funds		-1 261.727	M€		
Economic NPV with MOCPF		-9 860.478	M€		
Financial NPV		-9 705.594	M€		

Table 12. **Switch values**

	Growth rate	**Value of time**		**Commercial speed**	
	Traffic	**Passengers**	**Cargo**	**Passengers**	**cargo**
	%	€/hour·pax	€/hour·ton	Km/h	Km/h
Economic NPV	22.92	98.29	Not admissible	Not admissible	Not admissible
Economic NPV with MOCPF	22.51	110.91	Not admissible	Not admissible	Not admissible

Brennero Tunnel

Table 13. **Traffic and physical data, economic and financial data**

Alternatives		**reference solution**	**project**	**units**		**main alternative mode (highway)**	**units**
Traffic and physical data							
Length		225	210	km		224	km
Commercial speed	passenger train	90	120	km/h	light vehicle	120	km/h
	cargo train	60	80	km/h	heavy vehicle	80	km/h
Travel time	passenger train	2.50	1.75	hours	light vehicle	1.87	hours
	freight train	3.75	2.63	hours	heavy vehicle	2.80	hours
Passenger waiting time	passenger train	0.25	0.25	hours	light vehicle	0.00	hours
Reference traffic	passenger train			trains/day	light vehicle	8 000	trains/day
	passenger train	4.200	4.448	Mpax/year	light vehicle	4.964	Mpax/year
	freight train			trains/day	heavy vehicle	4.100	trains/day
	freight train	10.700	12.614	Mtons/year	heavy vehicle	25.000	Mtons/year
Elasticity of perceived cost	passenger train		-1				
	freight train		-1				
Traffic growth rate	passenger train	1.45	1.45	%	light vehicle	1.45	%
	freight train (ante 2010)	4.20	4.20	%	heavy vehicle (ante 2010)	4.20	%
	freight train (post 2010)	2.00	2.00	%	heavy vehicle (post 2010)	2.00	%
Load factors	passenger train	200	200	pax/train	light vehicle	1.7	pax/train
	heavy vehicle				heavy vehicle	0.5	
	freight	15	15	tons/vehicle	freight		tons/vehicle
	freight	315	450	tons/train	freight	26	tons/vehicle

Economic and financial data							
Investment cost (financial)			2 582	M€			
Residual value			1 032	M€			
Investment costs (economic)			2 181	M€			
Period of analysis		27	27	Years			
Construction time			6	Years			
Marginal economic infrastructure costs	passenger	0.00169	0.00169	€/paxkm	light vehicle	0.02500	€/km
	freight	0.00107	0.00075	€/tonkm	heavy vehicle	0.02500	€/km
	trains (average)	0.3384	0.3384	€/trainkm			
Economic operating costs (long-run)	passenger train	0.06	0.08	€/paxkm	light vehicle	0.21	€/vehiclekm
	freight train	0.011	0.011	€/tonkm	heavy vehicle	1.05	€/vehiclekm
Financial operating costs (short-run)	passenger train			€/paxkm	light vehicle	0.19	€/vehiclekm
Financial exercise cost (long-run)	freight train	0.0124	0.0087	€/tonkm	heavy vehicle	0.1192	€/tonkm
Transport tariff	passenger train	15.80	15.80	€/pax			
	freight train	0.0137	0.0096	€/tonkm	heavy vehicle	0.1312	€/tonkm
Access track charging	passenger train	0.00925	0.0127	€/paxkm	light vehicle	0.0282	€/paxkm
	freight train	0.00521	0.00521	€/tonkm	heavy vehicle	0.0089	€/tonkm
Value of time	passenger trip	10	10	€/hour·pax	passenger trip	10	€/hours·pax
	passenger waiting	20	20	€/hour·pax	passenger waiting		
	freight	2.07	2.07	€/hour·ton	freight	2.07	€/hour·ton
External costs	passenger train	0.023	0.0194	€/paxkm	light vehicle	0.10	€/paxkm
	passenger train	4.6	3.887	€/trainkm	light vehicle	0.17	€/vehiclekm
	cargo train	0.0293	0.0240	€/tonkm	heavy vehicle	0.083	€/tonkm
	cargo train	9.223	10.812	€/trainkm	heavy vehicle	1.079	€/vehiclekm
Marginal opp cost of public funds		0.13	0.13			0.13	
Total perceived cost	passenger train	45.80	38.30	€/pax		67.55	€/pax
	freight train	26.15	22.68	€/ton		37.17	€/ton
Total economic cost	passenger train	46.56	41.24	€/pax		69.40	€/pax
	freight train	26.71	22.59	€/ton		42.91	€/ton

Table 14 **Intermediate economic results**

Costs			**Units**
Total discounted investment costs (including shadow cost for labour)		1 999 073 108	€
Benefits	**Passenger train**	**Freight train**	
Discounted benefits from traffic in reference solution	1 162 313 948	1 016 002 919	€
Travel time	1 326 453 221	573 637 640	€
Vehicle operating costs	-248 357 199	40 644 213	€
External costs	82 307 833	381 080 140	€
Infrastructure operating costs	1 910 093	20 640 926	€
Discounted benefits from traffic generated in the project scenario	159 305 337	59 870 736	€
Discounted benefits from traffic from main alternative mode	0	0	€
Total discounted benefits	1 321 619 286	1 075 873 654	€
Discounted residual value		181 234 097	€

Table 15. **Principal results (economic discount rate 4.50% and financial discount rate 6.00%)**

Alternatives	**reference solution**	**Project**	**Units**	**Main alternative mode (highway)**	**Units**
Economic NPV		3 017.540	M€		
Marginal opp. cost of public funds		-216.089	M€		
Economic NPV with MOCPF		2 799.174	M€		
Financial NPV		-1 662.228	M€		

Table 16. **Switch values**

	Growth rate	**Value of time**		**Commercial speed**	
	Traffic	**Passengers**	**Cargo**	**Passengers**	**Cargo**
	%	€/hour·pax	€/hours·ton	Km/h	Km/h
Economic NPV	(to be calculated)	"	"	36.72	29.19
Economic NPV with MOCPF	(to be calculated)	"	"	40.49	30.92

Frejus Tunnel and high-speed rail line (see text)

Table 17. **Entry data**

Entry data	value	units
Passenger rail traffic (reference)	1 264 128	Pax/year
Cargo rail traffic (reference)	16.9	MTons/year
Light vehicle fuel	17.3	M€/vehiclekm
Heavy vehicle fuel	75.3	M€/vehiclekm
Light vehicle maintenance	68.6	M€/vehiclekm
Heavy vehicle maintenance	150	M€/vehiclekm
Light vehicle depreciation	21.3	M€/vehiclekm
Heavy vehicle depreciation	included in per hour cost	
Cost per hour for good transport	31	€/hour·pax
Light vehicle infrastructure use cost	9.1	M€/vehiclekm
Heavy vehicle infrastructure use cost	25.9	M€/vehiclekm
Passenger value of time (train 1st class)	35.9	€/hour·pax
Passenger value of time (train 2nd class)	14.1	€/hour·pax
Passenger value of time (car)	8.6	€/hour·pax
Passenger value of time (plane)	63.6	€/hour·pax

Table 18. **Economic analysis**

Elements	**with PiggyBack traffic**				**without PiggyBack traffic**			
Discount rate	*0%*	*5%*	*8%*		*0%*	*5%*	*8%*	
	values			**EIRR**	**values**			**EIRR**
	M€	**M€**	**M€**	**%**	**M€**	**M€**	**M€**	**%**
Present investment cost	-1 920	-3 878	-4 746		-2 153	-4 206	-5 117	
Rail operating cost variation	-2 824	-1 224	-815		-3 867	-1 772	-1 219	
Road operating cost variation	1 906	916	649		1 906	916	649	
Passenger time saving	1 721	834	593		1721	834	593	
Freight time saving	154	71	50		154	71	50	
Good punctuality improvement	1 150	619	466		1150	619	466	
Safety improvement	149	71	50		149	71	50	
Reduction of road congestion	1 139	569	411		1139	569	411	
Reduction of air congestion	328	159	113		328	159	113	
PB rail operating costs					613	330	248	
PB safety improvement					39	20	15	
PB road congestion reduction					24	11	8	
Total benefits excluding environment	**-1 802**	**-1 866**	**-3 229**	**2.11**	**1 202**	**-2 378**	**-3 734**	**1.40**
Environmental benefits								
Scenario 1	1 166	552	388		1 166	552	388	
Scenario 2	2 061	1 323	1 377		2 061	1 323	1 377	
PB Environmental benefits								
Scenario 1					3 120	1 644	1 225	
Scenario 2					7 350	3 933	3 204	
Economic results (NPV)								
Scenario 1	**2 968**	**-1 313**	**-2 841**	**3.10**	**5 488**	**-182**	**-2 120**	**4.77**
Scenario 2	**3 863**	**-543**	**-1 852**	**3.74**	**10 613**	**2 878**	**847**	**10.78**

Table 19. **Financial results**

Data	**M€**
Financial investment	3 472
Reference solution	
Passenger operating cost	45
Goods operating cost	87
Project	
Passenger operating cost	58
Goods operating cost	52
PB	28
Tunnel operating cost	25
Revenues	
Reference solution	1 676
Project without PB	1 856
Project with PB	1 753
Present benefits	
Rate of discount 5% without PB	-2 867
Rate of discount 8% without PB	-4 023
Rate of discount 5% whit PB	-2 077
Rate of discount 8% without PB	-3 545
Financial IRR without PB	0.0017
Financial IRR with PB	0.0205

Messina Strait Bridge

Table 20 **Traffic level in 1999 across the Messina Strait**

Mode of transport	Vehicles
Motorcycle	237
Car	6 300
Bus	70
Duty vehicle	3 328
Train	58

Table 21**. Project scenario – Financial investment costs**

Cost	M€
Suspension bridge	3 079
Complementary works	333
Railway and highway links	1 431
Total cost	4 843

Table 22. **Project scenario – Operation costs**

Cost	M€/year
Maintenance costs	21.85
Operating costs	5.63

Table 23 **Reference solution – Financial investment costs**

Reference year	M€
2012	356
2022	90
2032	589

Table 24 **Economic Net Present Value**

Investment costs	Economic Net Present Value [M€] at 4.50% rate of discount	
	30 years	50 years
Source advisor [€4.84 billion]	-1 391	-1 108
Source Il Sole 24 Ore – January 2002 [€3.87 billion]	-835	-552
Sensitivity analysis: +20% traffic and +50% value of time		
Source advisor [€4.84 billion]	-753	-156
Source Il Sole 24 Ore – January 2002 [3.87 €billion	-197	399

Table 25. **Variation in the economic net present value – Scenario without toll**

	Present economic losses without toll [M€]	
	30 years	50 years
High economic growth	195	233
Low economic growth	138	158
Sensitivity analysis: +20% traffic and +50% value of time		
High economic growth	297	337
Low economic growth	210	230

Brescia–Bergamo–Milan highway (see text)

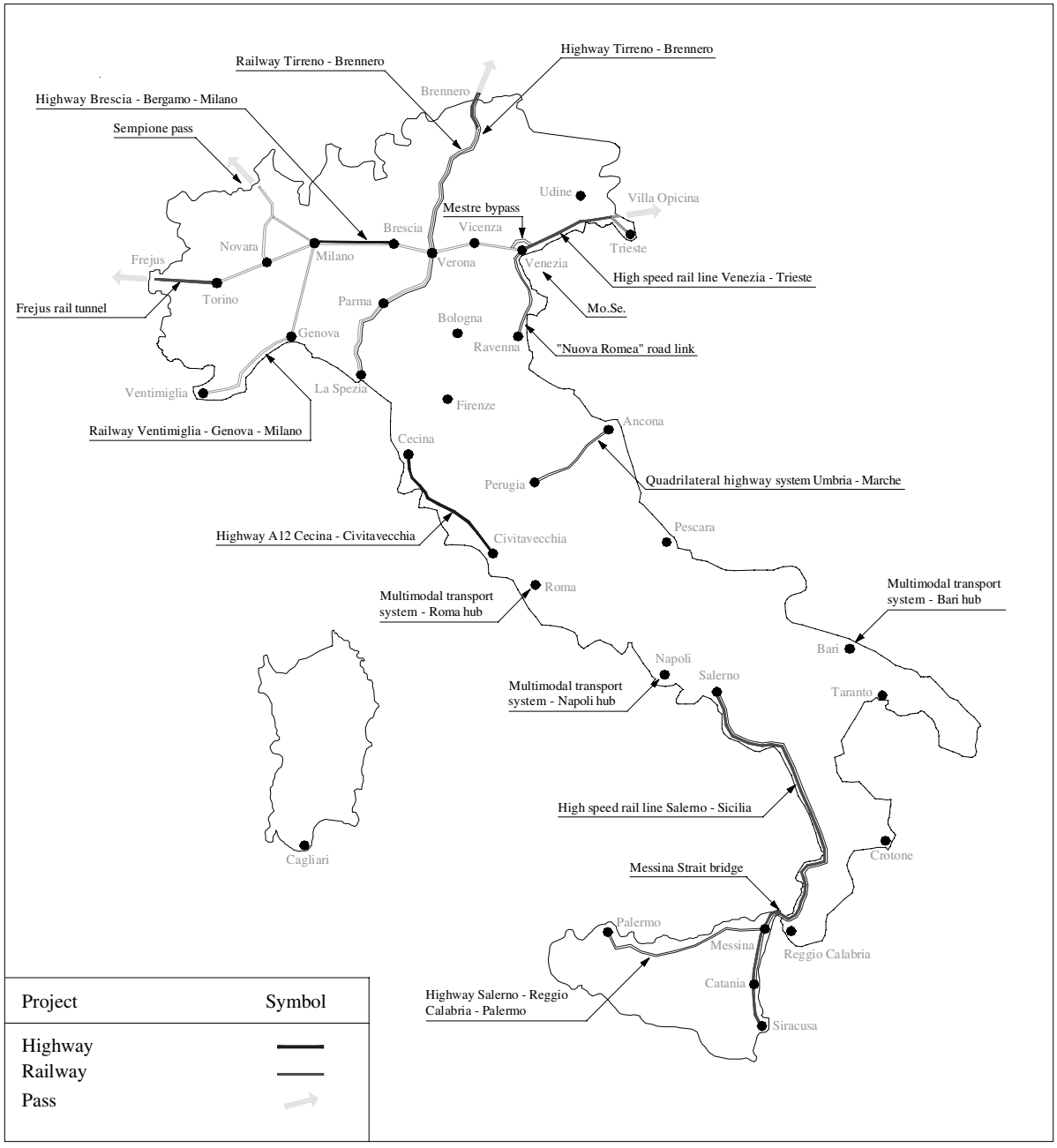
Table 26. **Alternative projects in 1997**

Projects	Investment cost [M€]	Length [km]	EIRR [%]
Tunnel 1 – bypass south of Bergamo	2 900	77.1	3.5÷5.3
Tunnel 2 – bypass north of Bergamo	3 400	75.2	1.1÷2.4
New highway link	955	75.2	11.0÷14.7
Upgrade highway A4	474	70.5	9.8÷13.1

Table 27. **More recent alternative projects**

Year	Investment cost [M€]	Length [km]	EIRR [%]
1998	816	43	4.7
1998	676	54	21.1
1999	851	60.9	13 ÷ 14
2002	680	50	11.5

Map 1. **"Objective Law" Priority Projects**



NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF THE NETHERLANDS

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NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF THE NETHERLANDS

SUMMARY

Rotterdam, November 2003

1. INTRODUCTION

Transport infrastructure concerns everyone: not only users, but also those living in the vicinity of transport infrastructure. Consequently, transport infrastructure planning in the Netherlands, as in many other countries, is conducted in close collaboration with local inhabitants, their representatives and other social bodies.

This paper describes the procedures which apply to transport infrastructure planning. It also describes how the public is involved in the process, as well as the links between transport infrastructure planning and other policy areas such as land-use planning and environmental affairs.

Transport infrastructure planning in the Netherlands is divided into three stages.

The first stage consists in general transport policy planning and the production of a long-term Key Planning Decision (*Planologische Kern Beslissing* or PKB), a plan which has to be adopted by Parliament. This plan is valid for 20 years, but may be altered or updated during that period. Besides setting out general long-term policy, this PKB describes infrastructure projects which might be implemented in coming years and requisitions the land on which to build them. This stage of the planning process is discussed in Chapter 2.

The second stage (discussed in Chapter 3) is the so-called Mid-term Programme on Infrastructure and Transport (*Meerjarenprogramma Infrastructuur en Transport* or MIT), which also has to be adopted by Parliament and which develops the PKB over the longer term. The MIT looks at the medium term and is updated every year. It contains, *inter alia*, a table of infrastructure projects which have been recognised as (probably being) necessary and which are therefore either under study or in construction. It allocates to the different infrastructure projects the money due to be spent during the initial years. In addition to national bodies, regional authorities can also draw attention to traffic or transport problems and ask for projects to be included in the MIT table, provided that infrastructure measures will solve those problems and that the projects are large enough to qualify for central government funding.

It is at this stage that individual infrastructure projects are developed. Their development can be divided into four sub-stages:

1. Describing the transport-problem and finding a solution in terms of infrastructure;

2. Developing solutions and alternatives, calculating costs and so on, pending a decision (national allowance) to build it (and for national government to pay for it either wholly or in part);

3. Planning construction (including land-use procedures);

4. Construction and project evaluation.

Projects are included in the MIT table during all these stages.

This procedure applies to larger road, rail and waterway infrastructure, as well as to infrastructure for regional public transport. Smaller infrastructure projects (costing less than €11.5 million) are subject to other regulations described in chapter 4. Chapter 5 discusses financial procedures, and chapter 6 describes the limits to the Dutch planning system and a number of solutions currently being worked on.

2. GENERAL TRANSPORT POLICY PLANNING

2.1. *Planologische Kernbeslissing* (PKB)

As stipulated in the Dutch Land-Use Planning Act (*Wet op de Ruimtelijke Ordening*), all major policy decisions affecting land use and spatial planning must be set out in a Key Planning Decision (*Planologische Kern Beslissing*, or PKB). The PKB involves a special procedure to ensure that all relevant bodies are involved in the process, and must be adopted by Parliament.

A PKB applicable to a specific sector (such as traffic and transport) must contain the following information:

- The main policy directions with regard to that sector and the general principles of national spatial planning policy;
- The medium-term outlook regarding the spatial impacts in that sector (such as the effects of infrastructure);
- One or more maps showing the spatial impacts of the policy.

Regional and local authorities have their own responsibilities with regard to land-use planning, and draw up their own land-use plans within the framework of national PKBs.

2.2. PKBs for transport infrastructure

Since transport infrastructure has major spatial impacts, the PKB procedure must be followed both for policy reasons and with regard to infrastructure construction decisions. At present there are three kinds of PKBs in force:

- The second Traffic and Transport Structural Plan (*Structuurschema Verkeer en Vervoer*, SVV-2), which sets out national policy for traffic and transport;
- The MIT, including a table listing the individual infrastructure projects envisaged;
- Individual PKBs, which apply solely to very large infrastructure projects, such as the high-speed railway line from Amsterdam to Paris and to the two main ports of Schiphol and Rotterdam.

2.3. SVV-2 -- the "policy" PKB

In 1990, the Dutch Parliament adopted the SVV-2, or rather the fourth part of this plan -- Part D -- was submitted to and adopted by Parliament, given that there are four parts in all:

- Part A: government policy objectives;
- Part B: comments by a wide-ranging group of social organisations;
- Part C: opinions handed down by advisory bodies;
- Part D: decision by government requiring approval by parliament.

Since it took about two years to progress from the draft policy stage to final adoption, and work on preparing the Government's draft policy had taken some time before that, the entire procedure was quite lengthy and indeed first started in the mid-1980s.

The general public, interest groups and social organisations are formally involved in the procedure when moving on from Part A to Part B. Influence may also be applied (*inter alia* through lobbies) when preparing Parts A, C and D. Obviously, intervention is also possible during the parliamentary debate of the PKB.

The links between transport planning and land-use planning, as well as environmental protection, are also of particular interest. When the Dutch Parliament discussed Part D of SVV-2, it was concurrently considering:

- An update of the land-use PKB in force at the time, the so-called VINEX (which stands for Fourth Policy Paper on Land-Use Planning, an update of the ordinary Fourth Policy Paper);

- The National Environmental Policy Plan (NMP).

These three plans were prepared together and jointly brought before Parliament by the Minister of Transport, Public Works and Water Management and the Minister of Land-Use Planning and the Environment. As a result, the content of the SVV-2 has been influenced by, and in turn has influenced, both land-use planning and environmental policy, as described below.

In preparing the SVV-2, an analysis showed that there were two main problems with regard to traffic and transport: declining accessibility and the adverse impact on the environment (pollution and road safety). The aim of the SVV is to help build a sustainable society. The strategy adopted to achieve this goal consists in:

- Reducing vehicle emissions and noise;

- Reducing and controlling mobility, *inter alia* through road pricing and regulation of land-use policy for habitation, working, etc. (new residential areas, large office developments and other mobility-generating activities to be located in the vicinity of public transport facilities; high-mobility activities to be located in peripheral areas);

- Improving alternatives to car use (both passenger and goods transport);

- Selecting the improvements to be made in terms of car accessibility (limited number of road-widening schemes and, if necessary, special measures to encourage car-pooling, bus use, etc.).

This strategy is translated in the SVV-2 into practical measures and measurable goals; although part of the SVV-2, they are not included in the PKB.

Over ten years down the line, there is much to say about the implementation of this strategy which, in fact, has not been pursued. One point is worth mentioning, however. Road was initially seen as one of the pillars of this policy, but until now social resistance has been so powerful that this part of the strategy has not been taken forward.

Part of the SVV is a list of infrastructure projects which may need to be implemented to meet policy goals. This list covers road, waterway, railway and regional public transport infrastructure projects. Where responsibility lies with national bodies, as in the case of trunk roads, railways and waterways, this list is restrictive, which means that no other projects can be carried out unless the PKB SVV-2 is amended and the changes approved by Parliament. Maps showing the sites of these possible infrastructure projects are therefore included in the PKB, and space claimed in this PKB for their construction. Regional authorities are obliged to adjust their land-use and transport plans to accommodate such claims.

As for other projects for which regional bodies are responsible, the boundaries are specified in regional land-use and transport plans, and the SVV list is restrictive.

The fact that projects are indicated on SVV maps does not mean that their implementation, or even consideration, is mandatory. The list is therefore merely indicative with regard to both projects for which national bodies are responsible and regional infrastructure projects.

The SVV-2/PKB part also contains a section on the funding of measures. A cost estimate is provided as well as a breakdown of different types of measure. However, this is the most flexible part of the PKB since it is very difficult to foresee all financial possibilities and policy changes over a period of twenty years.

2.4. The successor to the SVV-2: The National Traffic and Transport Plan (NVVP)

Although the validity of the SVV-2 can be extended until 2010, work has been proceeding since around 1997 on a new "policy" PKB. Apart from the introduction of the Planning Act (*Planwet*) discussed below, there were a number of other reasons for doing this. The social impact of traffic and transport was becoming increasingly severe and the SVV policy did not seem to be sufficient to deal with these problems. Constructing new infrastructure was very difficult. However, technical developments allowed planners to focus their efforts on optimising infrastructure use and on regulating mobility through road pricing rather than by building new infrastructure.

Because of this, the approach to transport policy has radically changed since the SVV-2 was first adopted. People seemed to be less amenable than originally thought in the 1980s. It was felt that, where the SVV-2 had tried to reduce mobility, and especially car-use, in order to reduce pollution and other disamenities attributable to traffic, it would be preferable to facilitate mobility, since this is very important to society and, at the same time, reduce the impact on living areas and the environment as much as possible. Moreover, it was felt that regional authorities should play a more active role in policy formulation in order to make them a partner in policy implementation.

Since 1997, the name of the planned new PKB has also recently been changed from SVV-3 to the National Traffic and Transport Plan (*Nationaal Verkeers- en Vervoersplan* or NVVP) under a new Ministerial Policy Paper on Traffic and Transport (*Nota Mobiliteit*). In 1998, the Planning Act

(*Planwet*) was passed, and made it obligatory to draw up a national plan with PKB status which regional authorities could then link to their Regional Traffic and Transport Plans (which are also mandatory under the Planning Act).

As the first stage in the preparation of Part A (the Government's policy objectives) of the new PKB, in early 1999 a Policy Outlook (*Perspectievennota*) was published. This was the outcome of lengthy, wide-ranging discussions between all parties involved in traffic and transport on the possible directions of future policy in the Netherlands on traffic and transport and related infrastructure.

The Policy Outlook (*Perspectievennota*) was an intergovernmental project, conducted by the Dutch Ministries of Transport, Public Works and Water Management, Land-Use Planning and Environment, Agriculture and Management of Nature, and Economic Affairs, in collaboration with organisations representing regional and local authorities. Besides these governmental partners, a wide range of social organisations, sometimes with opposing interests, also took part in the discussion.

By participating in the Policy Outlook project, the various authorities assumed joint responsibility for agreement on a national transport policy, to be implemented in tandem with their policies in this area. The agreement by the parties to subscribe to a jointly developed national policy alongside their own areas of competence had to be set out in the National Traffic and Transport Plan.

In tandem with preparation of the new Traffic and Transport PKB, work also started on drawing up a new Land-Use PKB (Fifth Policy Paper on Land-Use Planning). As work started on the drafting of the Policy Outlook (*Perspectievennota*), a start was made on preparing the initial Land-Use Plan. The concepts discussed in this document are set out in the Policy Outlook (*Perspectievennota*) as guidelines for the development of future transport policy, and a change in spatial planning policy announced in the initial document is applied to the transport sector in the Policy Outlook (*Perspectievennota*). The policy objective is to devolve responsibilities to the greatest extent possible from national to regional level. The result, with regard to infrastructure for example, is to raise the ceiling on the amount of funding which regional authorities, responsible for their own new infrastructure, will have to provide for new projects: at present, the ceiling on the funding commitment to regional projects stands at €11.5 million, and in the future will be raised to €225 million. At the same time, earmarked funding for spending by regional authorities on infrastructure will also be increased (see chapter 4).

The Policy Outlook (*Perspectievennota*) stresses the new emphasis placed on transport policy. Mobility is seen as indispensable to society, and accessibility as being of great economic and social interest. Further growth in mobility is expected, and must be facilitated within a triangular framework of continued efforts to improve accessibility, living conditions and safety. Better utilisation of the infrastructure network[1], combined with pricing mechanisms, is seen as an interesting possible approach to this issue. Building new infrastructure is seen as a last resort. Innovative technology should help to further improve accessibility. Technology should also help to improve road safety, as well as the safety of other modes, so as to reduce environmental damage. Lastly, greater co-operation between different levels of government -- national, regional and local -- should lead to more effective regional transport policy and tailor-made improvements at the regional level.

At the end of 2000, the Government's policy objectives, based on the *Perspectievennota*, were published in Part A. The results of the obligatory consultation round and the comments received from national advisory bodies were brought together in Part B, which was published together with Part C, setting out the position adopted by the Government in May 2001.

The *Planwet* provides for regional and local authorities to assist in drawing up the Plan. This was the case not only for the *Perspectievennota* and the consultation round, but also for the preparation of Part C. The drafts of this part have been discussed with the representative bodies of these authorities, and letters containing their replies are found in the appendix to the Plan. These documents also show how the results of the consultation and advisory round are processed.

Improving the quality of the traffic and transport system, so that it has a less harmful impact on the population and the environment, is the challenge which this Plan must meet. Its aim is to offer a properly adapted, safe and sustainable traffic and transport system, whose quality for individual users is commensurate with its quality for society as a whole.

With regard to infrastructure, the Plan concludes that improvements must be made to infrastructure, together with the introduction of pricing mechanisms, to accommodate forecast growth in mobility. As noted in the *Perspectievennota*, this improvement does not necessarily require the construction of new infrastructure, but rather improvements to the existing network and the way in which it is used. To combat bottlenecks in the trunk road network, smart measures should improve capacity; rail infrastructure should be used more intensively by introducing a new safety system and an improved system of slot allocation.

The National Plan also includes a policy agenda (*beleidsagenda*) setting out the issues at stake over the upcoming period. The *Planwet* prescribes such an agenda and provides for it to be updated every two years.

Every year, an adapted mid-term programme for infrastructure and transport (MIT) is approved by Parliament. This programme covers infrastructure under construction or review. The MIT and its procedures will be discussed in the following chapter.

Part C of the National Traffic and Transport Plan was ultimately rejected in March 2002 for political reasons (upcoming elections), and objections to the limited accessibility objectives, value financing arrangements and the introduction of pricing mechanisms.

2.5 And next … a policy paper on Traffic and Transport

The new government has started a procedure to establish a new PKB, now known as a Policy Paper on Traffic and Transport (*Nota Mobiliteit*). Generally, this procedure is the same as that for the NVVP with the formal involvement of regional authorities. Since it is clear that achieving the goals of this policy paper depends to a large extent on their integration into regional traffic and transport plans, the paper will again be prepared in collaboration with the regional authorities.

The policy paper will consist of:

- the joint national policy goals, premises and strategies towards mobility;
- the contribution of national bodies to this national policy;
- the contribution of regional authorities to national policy, as far as it is relevant at the national level.

Regional mobility policy is developed in regional traffic and transport plans.

Part A of the new PKB/Policy Paper on Traffic and Transport is due to be brought before Parliament in 2004.

The paper covers the period 2004-2020. Until 2010, implementation follows the MIT programme. For 2020, goals as well as policy options will be formulated for upcoming problems, but no choices have as yet been made.

With regard to infrastructure and the traffic and transport system as a whole, three separate levels have been identified:

- The international level, in relation with TENs, which are vital to the competitiveness of the Netherlands;
- The national level, where the quality of the network is important for the development of economic centres;
- The regional level, where a good intermodal network is an essential for the continued existence of areas and door-to-door accessibility.

These three levels should be mutually enhancing.

The main goal of the policy paper is to improve the reliability of the whole system for door-to-door travel, in accordance with the social prerequisites regarding safety and the environment. Mobility is permitted (and to be facilitated), but not always and everywhere. The main policy focus is on the economic and social welfare of the Netherlands.

Reliability and predictability are seen as important, as uncertainty over journey time seems to be a bigger problem than congestion itself. Co-operation between stakeholders, the cohesion and flexibility of modes and, above all, the assumption by each individual of his or her responsibilities are crucial to achieving sustainable traffic and transport. The policy thrust has shifted away from major infrastructure to ensuring greater cohesion in network operation and door-to-door travel time. The emphasis in the policy paper is placed more firmly on good management, maintenance and organisation of the system as a whole.

3. MID-TERM PROGRAMME (MIT)

3.1. Introduction of the MIT

The Mid-term Programme on Infrastructure and Transport (MIT) develops the long-term PKB. It is a coherent and fully funded (until 2010) programme of projects concerning the construction or improved utilisation of infrastructure (road, rail, waterways and regional public transport). It is updated and discussed in Parliament every year. If a need is felt for a new or improved infrastructure link -- either by the National Road Administration or by regional bodies -- the Minister will propose a Preliminary Exploration within this framework.

This chapter discusses the various stages in implementation of the MIT, emphasizing the involvement of the public in individual projects and the problems this poses. This section is based on

a contribution to PIARC report C4.3, written by our colleagues, Lindy Molenkamp and Hans Tinselboer of Rijkswaterstaat AVV Transport Research Centre. It concentrates on road projects.

3.2. Stages in the MIT

The MIT process is divided into three stages:

- Preliminary exploration;
- Planning stage;
- Execution stage.

The initiating party (e.g. the National Road Administration) carries out a *preliminary exploration*[2] and reports to the Minister on traffic and transportation problems in the area investigated and on possible solutions. This may take from one to five years. When the MIT is next updated, the Minister of Transport can promote the project to the planning phase, which is what usually happens in practice.

The *planning stage*[3] is quite extensive and, as a rule, takes several years to complete. It is divided into four sub-stages: initiating memorandum, feasibility study/EIA, decision on the proposed route, detailed design specification[4]. At the end of each of the first three sub-stages, it is a legal requirement that a public enquiry be held.

The initiating party draws up an initiating memorandum for both professionals and the public. This memorandum explains why the project was started, what its aims are and how subsequent study and design activities will be conducted. It defines the scope of the study and specifies which proposed solutions will be considered. The public is advised of both the procedures and the opportunities for discussion and comment.

Ideally, the initiating party informally consults with stakeholders while preparing the memorandum. Apart from that, the law requires that the public be accorded a formal opportunity to comment once the memorandum has been written.

The Committee for Environmental Impact Analysis (a standing committee of experts appointed by the Government) and various advisory bodies[5] are also consulted. Based on all of this, the competent authorities (the Minister of Transport and the Minister of Regional Development) issue directives for the Environmental Impact Analysis: basic assumptions, limiting conditions and criteria on which to assess and compare proposed solutions.

The initiating party now describes in detail each of the alternative solutions set out in the memorandum, specifies variations where appropriate, and studies the impacts of each alternative and its variations. This generally includes the study of mitigations and compensations for any adverse impact on the environment, including social and living conditions[6]. The actual work is usually performed by a contractor and is, to a large extent, determined by the directives for the Environmental Impact Analysis. The results are published in a public report.

The initiating party organises public information sessions. Stakeholders (individuals and special interest groups) again have a legally required opportunity to present their views and comment on the report. The Committee for the EIA is consulted, as well as the advisory bodies. Based on all of the above, the competent authorities (as mentioned earlier) decide on a preferred solution.

The initiating party develops the preferred solution into an overall design, known as the Proposed Routing Decision, which has a maximum deviation of two metres horizontally and 0.5 metres vertically. This will then again be presented for comments to the public and other stakeholders, who now explicitly include provincial and municipal authorities whose co-operation is requested.

The competent authorities either adopt the Routing Decision as it stands or with minimal changes, or they ask the initiating party to draw up a new proposal, in which the law requires that the public be given another opportunity to comment.

Stakeholders who have expressed their views on the Proposed Routing Decision and who disagree with the Routing Decision adopted by the competent authorities may file an appeal with the Council of State. Only once this has been dealt with does the Routing Decision become final.

The design will be detailed by the initiating party and translated into a specification for the contractor. There is no more formal public participation from now on.

The Minister of Transport decides on a starting date for the execution phase, after consulting Parliament and taking into account the estimated cost, available budget and political priorities. Execution must start within 13 years of a Routing Decision becoming final.

There are no specific legal requirements for involving the public in the *execution phase*. In practice, the initiating party informs the public about the progress of the work, temporary measures and construction-related nuisances.

3.3. Inherent difficulties in the public debate on road projects

Often the exploration and planning process of road infrastructure *takes 10 years or more*, i.e. from the moment a preliminary exploration is proposed until the execution phase starts -- if at all. This has several negative effects. The original problem is not solved and usually grows worse over time; the project's purpose and need is discussed repeatedly by decisionmakers and lobbyists; the project may eventually be dropped and participants from the public will find their efforts to have been in vain. And finally, stakeholders (especially people living in the neighbourhood of the road, i.e. frontages) live in uncertainty about their future environment and find the sale value of their homes considerably reduced.

The long duration of the process is partly caused by the political prioritisation process between the planning and execution stages. Stakeholders (citizens, NGOs and even city councils) contesting routing decisions in court are also a contributing factor. Even so, to a certain extent the long duration is an inevitable side-effect of any careful (administrative) process. Scrutiny of a project's purpose and the need for repeated debates may even indicate that too little time had been taken to prepare the early stages of the project, resulting in severe delays later on.

The *outcome* of the long and tedious exploration and planning processes is often somewhat disappointing. The initiating party may have bent over backwards to fit the projected road into the environment with as little damage as possible and, in a few rare cases, the result may actually enhance environmental quality. The often disappointing intrinsic quality of the outcome may also be attributed to several causes, one of them being that the public participation required under the law is reactive in nature. Furthermore, the existence of a wide information gap between initiating party and commentator is all too common. As a result, the views of stakeholders will often be considered too late in the process and will either be (unjustly?) dismissed by the experts or lead to cost-inefficient

modifications during construction, instead of being taken into account in the design stage. Another cause for disappointing quality may be that most road infrastructure projects are developed in isolation, i.e. not actually as part of a larger regional planning effort; the focus is too narrow. Much attention is paid to environmental damage control instead of to endeavouring to achieve synergies.

A road, or at least its trajectory, can be expected to remain in place for tens, probably hundreds of years. This calls for a sustainable design of durable quality. Many a mitigating measure, originating from the prevailing public participation procedure, primarily relates to the present. Thus sustainability is inadequately served.

The initial estimate of the project's cost is usually based on *the cost* of the basic infrastructure plus mitigations and compensations for adverse effects on a limited number of legally recognised aspects (e.g. noise nuisance). At the end of the planning stage, the projected cost of the road project may have risen considerably due to additional adaptation in response to comments. The cost-benefit balance may then have changed dramatically, meaning that the project will never be executed. The high and seemingly uncontrolled cost of projects seems partly inevitable in a highly-developed society of assertive citizens, attributing ever more value to their immediate living environment. High cost may be the price to be paid for quality and sustainability, even if these goals are only partly achieved. The gap between initiating party and citizens may also be a contributing factor, especially if the initiating party is a national government agency that hardly anyone in the public identifies with.

Well-educated male citizens of age 50 and over, opposing the project or certain parts of it, tend to be over-represented amongst commentators. Whether this is to be viewed as a problem remains debatable.

Many projects are delayed by *lawsuits*, filed by stakeholders who have already had their say earlier in the process (but were not happy with the outcome). Government administrations and legal experts hold diverging opinions on what is responsible for the relatively high number of lawsuits filed against routing decisions. Some attribute it to misgovernment, whereby objections made by members of the public are too readily dismissed in the course of the process. Others claim that assertive and calculating citizens will go to any lengths to fight a decision that they don't agree with or to try to get more than their fair share of the cake.

During or after even a careful process including all the public consultation required under law, the *competent authorities and/or Parliament may sometimes choose a different solution* from the one originally advised. This can be very frustrating to all participants and may have a negative impact on social acceptance of the final decision. Political interference stems from the fundamental incompatibility of two types of democracy: direct stakeholder participation on the one hand and parliamentary representation on the other. Politicians may not like the outcome of a process with direct stakeholder participation if they either failed to define dominant boundary conditions in the first place or did define them long ago but now find that conditions have changed.

Possible remedies[7] for these problems are:

Properly informing the public early in the process

It was found that people who join the public participation process generally have a more positive attitude towards the process and its results if they have been informed at an early stage, if they have been properly informed, if the initiating party and authorities have been open and honest about their plans and decisions, etc. This might also improve the quality of the public's reactions and suggestions.

Keeping in touch

Between the legally required contact moments in the planning process, many months or even years may pass. It is important that the authorities keep in touch with interested members of the public in the meantime, e.g. by issuing information bulletins and/or by providing an information hotline.

Scrupulousness

The authorities must ensure that the procedures are implemented scrupulously, that no comments are lost, etc.

Integrity

The authorities must always be open and honest, provide all relevant information, etc., even in cases where this is not in their interests. Integrity defines the credibility of government.

Respect

A decision can only be acceptable to society if there is general respect for the way in which it was taken, and authorities seeking respect for their decisions need to respect their citizens first. Public participants and their comments must always be taken seriously. Civil servants and administrators can and should be trained to do their utmost in this respect.

Intelligible presentation

A "layman-friendly" presentation of problems, plans, alternatives and considerations is of crucial importance in acquiring social acceptance for the process and final decision. On the other hand, too glossy a presentation will only "raise hackles" in that the public may feel the authorities are trying to win their approval for a decision which has already been taken.

Discussion

The authorities must "talk back" and let the public know what they think about certain criticisms and views put forward by others during the process.

Clarity

The authorities must clearly state what has already been decided and what is still open for discussion.

Lack of prevarication

The authorities must maintain decisions which have been taken, and not return and reconsider them all over again. Stakeholders tend to prefer a clear decision to many years of agonising uncertainty.

Generous financial compensation

Even a highly interactive and creative development process will not prevent some people from suffering adverse impacts on their living environment. The (financial) annoyance suffered by those living in the vicinity of a (lengthy) construction project can be offset through a policy of generous

financial compensation for any project-related impacts on the value of (living in) a given house. This will in itself raise the level of public support for the project and may help avoid large-scale legal proceedings against the routing decision, which in turn may reduce the time from project inception to execution. On the downside, however, it may increase project costs.

4. SMALLER INFRASTRUCTURE PROJECTS

4.1. The situation until now

Regional authorities are responsible and have to pay for infrastructure projects costing less than approx. €11.5 million. This applies to road, bicycle and public transport infrastructure.

Regional authorities receive earmarked funding for road and bicycle infrastructure of approximately €250 million a year, to be divided between 12 provinces and six larger city regions. Until 2002 there was additional earmarked funding for road safety measures.

Lastly, regional authorities receive a small national budget allocation for transport management measures.

In the Netherlands, the regional authorities finance the provision of urban and regional transport services within their region. They are responsible for the quality of public transport services, award a contract to a transit operator to operate a service network and provide the transit operator with a financial contribution.

Since infrastructure determines, *inter alia*, the quality and operating costs of public transport, improving it can increase the quality of services and/or decrease the regional authorities' contribution towards its operating costs. They are therefore extremely keen to make such improvements. At present, however, the lion's share of the funding for investment projects, worth over €11.5 million, is provided by central government and so it is central government which decides.

Until 2001, €90 million a year was spent on regional public transport infrastructure projects worth less than €11.5 million (this funding has now ceased). Apart from that, the regional authorities as a whole receive central government funding of about €1 billion a year to cover public transport operating costs, part of which can also be spent on public transport infrastructure.

4.2. Developments

According to the proposals contained in the National Traffic and Transport Plan, it is planned to amalgamate all funding for mobility into a single allocation to regional authorities to cover all types of spending on mobility. The regional authorities can therefore set their own priorities and take cross-cutting decisions so that the best fit can be found in each region between investment in (road, bicycle and public transport) infrastructure and safety measures, on the one hand and, on the other hand, public transport services and subsidies for other measures (e.g. encouraging mobility management by private companies). The same applies to the choices made with regard to network

optimisation. Decisions as to whether to give priority to the development of the road, bicycle or public transport networks, interconnections between those networks or road safety can now be made at the regional level.

Another proposal in the National Traffic and Transport Plan is to broaden the powers of regional authorities so that they can decide on and assume financial responsibility for larger infrastructure projects. The ceiling is due to be raised from €11.5 million to €112.5 million or even €225 million. Central government will only be involved in very large infrastructure plans.

In addition, the national grant to regional authorities is due to be increased. This will replace the subsidies from central government for individual regional infrastructure projects, which are now covered by MITs.

5. FINANCIAL ASPECTS AND EVALUATION METHODS

5.1. Financial aspects of individual infrastructure projects in the MIT

The cost of each project is calculated during the MIT period. This is a rough estimate in the MIT exploratory phase, which then becomes more specific in the MIT planning phase.

In the MIT planning phase, alternative solutions to a traffic and transport problem are developed, estimates are made of expenditure and the capacity of the alternative proposals to resolve the problem are compared between each other as well as to a zero option. As noted earlier, account is also taken of the environmental, economic and safety impacts. In this way, the most appropriate and cost-effective solution to a problem can be identified. Despite these measures, sometimes political expediency or the influence of related policy areas, such as spatial planning, mean that the solution chosen is not always the best one.

5.2. Integrating projects into the national context (OEI[8])

If a particular solution is chosen for a project, consideration must be given to the question of whether or not the project is of sufficient value to society to proceed.

To calculate this value to society, in 2000 a Research Programme on the Economic Impacts of Investment in Infrastructure (*Onderzoeksprogramma Economische Effecten Infrastructuur* or OEEI) was introduced by the Ministry of Transport, Public Works and Water Management and the Ministry of Economic Affairs. This is a new, relatively sophisticated and integrated version of the familiar cost-benefit analysis (CBA). It is more advanced and comprehensive because it also covers wider safety, environmental and other impacts, and emphatically avoids providing highly suggestive and arbitrary final cost-benefit ratios, but instead aims to give overviews of relevant societal effects.

Parliament and the Government have decided that all major national infrastructure projects should be "given the OEEI treatment", and the same approach is strongly recommended for smaller projects. Although the official function of the OEEI is to provide transparent policy information for

the preparation of infrastructure projects, and public administrators are not formally bound to the results of the studies, ministers who do not act in accordance with the results have some explaining to do.

To stress that it is not only the economic impact of a project which is at stake, the name of the OEEI was recently changed to the OEI, the Research Programme on the Impacts of Investments in Infrastructure.

To determine the societal value of a regional public transport project and compare the value of projects and set priorities, the Ministry of Transport developed THOMPIOV, an analytical programme consisting of two instruments: THOM and PIOV.

The THOM instrument is an aid to determining the most suitable public transport mode (for instance, bus lane, tram or people mover) in a practical situation. This is particularly helpful in the exploratory phase and the early planning phase of the MIT.

PIOV is an instrument designed to test and establish the priority of several different projects. As with THOM, this analysis looks at the potential impact of implementing the project or, in other words, the difference in terms of public transport use, operating costs, revenue, etc., between proceeding with the project or doing nothing.

PIOV is based on a CBA, followed by a multi-criteria analysis MCA. The result of the CBA is a measure of the project's societal value.

The criteria taken into account in the MCA include:

- Road safety;
- Quality and comfort of public transport services;
- Environmental issues;
- Consistency with the Ministry of Transport's policy;
- Consistency with governmental planning policies.

PIOV is primarily designed for use by central government in the decisionmaking and prioritising process. The results of the social CBA are relevant to decisionmaking, in that a low score will argue in favour of a negative response while a high score will encourage, but of course will not guarantee, a favourable one.

Since financial means are limited, not every project can be carried out, regardless of how valuable it might be. The results of the societal CBA are only one of the considerations which will be used to decide whether or not a project will be included in the implementation section of the MIT national programme.

Other considerations, for example, include the consistency of the project with the policy set out in the "policy" PKB, as described earlier, and its subsequent updates. Depending on that, a certain balance must be struck between road, railway, waterway and regional public transport as well as in regional spread.

5.3. Financial planning

As described above, the MIT sets out a coherent programme of planned infrastructure measures over the next few years. Once the decision has been taken to proceed with a project, provision is made to fund the project through the Infrastructure Fund (*Infrastructuurfonds*) in the national accounts.

The estimate of costs and revenues in the Infrastructure Fund is incorporated into the national estimate. The 2004 estimate, for example, amounts to almost €6 billion (including maintenance and management), broken down as follows[9]:

- National roads: € 1 710 million
- Railways: € 1 420 million
- Regional infrastructure: € 540 million
- Waterways € 940 million
- Very large projects € 1 210 million (Betuwe route, high-speed train).

Until now, the cost of building infrastructure has been accounted for in a single year, or a short period of several years, without depreciation. This means that the expenditure must be paid by that year's taxpayers, the current generation, despite the fact that the long lifetime of the infrastructure will allow other generations to benefit from it.

After previous experiments with public-private partnerships, another trial scheme was recently launched, in which a private company was contracted to increase the capacity of a trunk road (widening the two-lane N-31 to four lanes) and to provide management and maintenance services for the next thirty years in return for fixed yearly payments.

6. SPECIAL PROGRAMMES

6.1. The need for faster planning procedures

Chapter 3 described the length of the infrastructure planning process as being an inherent problem in Dutch infrastructure planning, with its careful public debate, and one which has a number of adverse effects. The problem still has not been resolved (in fact, it is actually getting worse) in that discussions are endlessly repeated and the involvement of stakeholders simply ceases to have any effect.

Since traffic problems are highly visible to (and complained about by) almost everyone, national government tries periodically, especially at the start of a new term of office, to speed up procedures.

6.2. Special programmes to speed up procedures

A series of special programmes has been introduced to expedite planning procedures. For example, the past ten years have seen the introduction by the national authorities of the *Bereikbaarheids Offensief Randstad* or BOR programme (designed to improve accessibility in the *Randstad*, the conglomeration formed by the four largest cities where most of the congestion is

concentrated), and similarly the *Samenwerken aan Bereikbaarheid* or SWAB programme ("working together to improve accessibility"). As its name indicates, the latter was a joint effort by national and regional bodies to introduce tailor-made regional measures regarding infrastructure and public transport in order to improve accessibility.

In 2002, a fresh attempt was made with a programme called "Visible, Smart and Measurable". A special Act was passed to make faster procedures possible for eleven specified projects.

6.3. "Visible, Smart and Measurable" in a Special Act

The goal of the "Visible, Smart and Measurable" programme is to mitigate the problems of congestion in our national highway system in a visible (for the road users) and measurable (people should really recognise the improvements) way and, in doing so, to improve the reliability of the transport system, especially in terms of time lost during congestion. The measures taken are designed to reduce both the amount of congestion and time lost as a result of congestion, and to eliminate the problems road users face so that the road transport system will become more user-friendly. This will be done by increasing road capacity and by improving traffic flows during peak periods. At eleven selected locations, there will be built peak lanes (where the shoulder will be opened for normal traffic during peak periods), temporary additional lanes (additional lanes during peak periods marked by different striping) or buffer lanes (short additional lanes close to a junction, serving as a buffer during periods of congestion). Other measures to foster a better and smart use of the road infrastructure will be taken, such as ramp metering, improving traffic management or an extension of the ban on overtaking by lorries during morning and afternoon peak periods.

A budget of €460 million has been made available for the years 2002 to 2006 to speed up procedures for eleven projects. In June 2003, a Special Act was adopted, which makes it possible to process the implementation of 34 highway projects under one relatively short procedure. Instead of a Routing Decision (see previous chapter), a Road Adjustment Decision is taken. This can shorten the planning procedure by up to two years, while still ensuring the requisite degree of carefulness. The eleven projects are selected on the basis of the top 50 congestion locations in the Netherlands in recent years, the feasibility of projects and the budget available. The Special Act is a provisional piece of legislation. A distinction is made between three categories of project: permanent projects (type A projects), semi-permanent projects (type B projects) and temporary projects (type C projects). The Act expires as soon as all eleven specified projects have been completed.

NOTES

1. In two ways:

   - increasing the capacity of the existing roads, railways, etc., by creating, for instance, additional but narrower lanes on motorways;
   - by increasingly treating all the individual components of a network more as part of a single entity and improving the linkage between different networks (e.g. regional road networks and the main (national) road network or the public transport network to the main road network.

2. In Dutch: *Verkenning*.

3. In Dutch: *Planvorming*.

4. In Dutch: *Startnotitie*; *Trajectstudie/m.e.r.*; (Ontwerp-)Tracébesluit; Detailontwerp and Bestek, respectively.

5. Well-established interest groups with regard to certain policy areas, e.g. logistics or tourism, are represented in these consultative bodies.

6. In theory, the position of the road can be moved -- in the next sub-phase -- anywhere within 100 metres of the projected trajectory; in most areas this is merely theoretical, as small changes in the trajectory would have a major environmental impact.

7. Most of the suggestions in this chapter originate from the report: "*Ambities bundelen*" (Combined ambitions), on integrating infrastructure into its environment. It was written by the Council for Traffic, Public Works and Water Management, an independent advisory body to the Dutch Ministry of Transport.

8. The text of this paragraph is part of a paper by Martin de Jong and Harry Geerlings, entitled "The remarkable return of comprehensive policy analysis for transport infrastructure to the centre of administrative practice".

9. Figures not yet approved by Parliament.

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NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF ENGLAND

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NATIONAL SYSTEMS OF TRANSPORT INFRASTRUCTURE PLANNING: THE CASE OF ENGLAND

SUMMARY

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OUTLINE

This paper describes the Department for Transport's Ten-Year Plan for Transport, which sets the strategic framework for the planning and delivery of infrastructure in England. It explains how the Plan was formulated in terms of expected outcomes rather than in the context of the more conventional measure of inputs, such as the number of schemes completed. It outlines the process for the physical planning of new infrastructure and for implementing other policy measures. The requirement for rigorous project appraisal on a consistent basis plays an important role in ensuring value for money and the contribution of each initiative to the overall targets in the Plan.

1. NATIONAL INFRASTRUCTURE PLANNING AT A STRATEGIC LEVEL: THE GOVERNMENT'S TEN-YEAR PLAN FOR TRANSPORT

The Government's Ten-Year Plan for Transport was published in July 2000: (http://www.dft.gov.uk/stellent/groups/dft_transstrat/documents/page/dft_transstrat_023008.hcsp. The aim of the Plan was to shift from a system concerned, to a large extent, with priorities between competing demands on public finances over the immediate future. Many commentators had criticised this process as being dominated by the short-term considerations of public finances and lacking in any strategic view about the longer term.

The Plan provided a strategy for investment in infrastructure and other policies for the period 2000-2010. The Plan included:

- The contributions of trunk roads;
- Local transport policies and investment in local transport schemes;
- Investment in rail infrastructure and services;
- The role of other stakeholders such as the freight haulage industry.

The level of funding envisaged by the Plan amounted to £180 billion, with £59 billion on national and local roads, £60 billion on rail and £59 billion on local transport. The effectiveness of this expenditure would be enhanced by other policies without a direct public sector cost. These included more effective use of logistics in the road freight industry, the strengthening of the implementation of land-use policy to co-locate housing developments with other activities and the pursuit of "soft" policies aimed at reducing car use.

The Plan did not consist of a package of individual investment projects, each clearly identified and accompanied by a full cost benefit analysis. It is not possible to plan in such detail over a ten-year time frame. Full information on transport outputs in terms of travel time savings and safety improvements was available only for the high-priority schemes in the Plan, as these were already in

the detailed planning stage. But the intention of the Plan was to extend over a longer time period so as to set the strategic direction for the future.

In drawing up the Plan, the Department for Transport developed a series of outputs or targets, which the Plan would deliver. This is consistent with the widespread shift in the UK and other countries away from focusing on the inputs for infrastructure planning -- kilometres of road built, the number of rail bottlenecks improved -- to measuring the outputs in terms of indicators such as improved conditions for transport users. As noted above, insufficient information was available on every component of the Plan to enable the Department to provide full information on the scheme-related benefits and costs of every project and policy which might be funded or implemented within the Plan's framework. But by using a strategic National Transport Model, conclusions could be drawn about the performance of the UK transport network in ten years' time and the likely impact on performance of measures aimed at increasing the capacity of these networks or influencing demand on them.

The outputs of the Plan are expressed in terms of reductions in congestion and increases in public transport patronage, together with estimates of changes in emissions from transport sources. The Department developed a strategic-level National Transport Model in order to demonstrate how expenditure on the different programmes -- trunk roads, local transport and rail and the implementation of other policies -- would contribute together towards these objectives.

The Plan set out the following targets for 2010:

- Congestion on trunk roads to be no higher than in 2000, despite traffic growth of 26 per cent on this part of the network;
- Congestion in the larger urban areas to be no higher than in 2000;
- Rail patronage to increase by 50 per cent over 2000 levels;
- Bus patronage to rise by 10 per cent over 2000 levels.

2. THE DEPARTMENT FOR TRANSPORT'S NATIONAL TRANSPORT MODEL AND ITS ROLE IN STRATEGIC TRANSPORT PLANNING

As noted above, the Department for Transport formulated the basis for a National Transport Model in order to assess the level of expenditure and mix of policies needed to deliver the Ten-Year Plan targets set out above. Following the completion of this work, an extensive programme of research was undertaken to develop a fully multi-modal strategic model. This programme has now reached a stage as a fully operational National Transport Model which is made up of a number of modules. For a full description of the current version of the model, see:
http://www.dft.gov.uk/stellent/groups/dft_econappr/documents/page/dft_econappr_024012.hcsp

The road traffic and road user costs module includes an extensive database derived from surveys of traffic volumes at around 20 000 locations in Great Britain. These sites, disaggregated by road type, area type (rural and nine categories of urban area) and region are assumed to be typical of all links in the road network. Data on traffic at these sites is therefore grossed up in the model to

represent total flows on the network. This database is combined with data on variations in traffic volumes by time of day/day of the week and information on the capacity of each road link in the survey. Using speed/flow curves which are validated against specially conducted speed surveys, the model is used to estimate traffic speeds in the base year.

Congestion is defined in terms of traffic travelling on the network at below the typical free-flow speed for the relevant road and area type. It is expressed in terms of time lost (when compared with free-flow speeds) per vehicle-kilometre. The model estimates base-year levels of congestion and is used to forecast future-year levels. There is no presumption within the model or as part of the overall policy objective that the delivery of free-flow conditions is a desirable outcome.

There are several ways through which transport policies and infrastructure improvements can be shown at this strategic level to deliver reductions in forecast congestion. Increases in road capacity (most commonly delivered through the widening of existing busy motorways) are depicted in the model as adding to the capacity, most commonly from three lanes to four, of the motorways shown in the database as being the most congested. The model takes these increases in capacity into account when re-estimating 2010 levels of congestion. The impact of the consequent reduction in road user costs is taken into account through the model's incorporation of the relationship between travel costs and trip length. In addition, because increases in road capacity reduce road-user costs, its effect on other modes is taken into account through the interaction between transport costs and demand by mode in the multi-modal demand model.

Demand management, through urban cordon charging, parking policies and "soft" measures, reduces traffic volumes and hence reduces congestion levels predominantly in urban areas. Soft measures include such local initiatives as car pooling, household travel planning, work-based and school-based travel plans. Land-use planning policies, by locating housing closer to workplaces, shops and other amenities, are also included in the model for their potential contribution to reducing trips by car.

The central multi-modal demand module of the National Transport Model incorporates extensive data on travel by a sample of household members. This demand module is calibrated using data on generalised travel costs from the UK National Travel Survey and a wide range of other sources. Generalised costs include direct money costs on fuel and fares as well as the cost of the time spent in travelling, in accessing transport services and in waiting. Account is taken of the additional disutility of travelling in crowded conditions on public transport. Estimates of travel cost changes, in response to policy-related or other factors, allow the model to predict changes in trip length and the mode used.

Investment or other policies to reduce the user costs of other modes is shown, in the multi-modal demand model, to make other modes relatively more attractive. This reduces levels of car travel for those trips and places where public transport offers an alternative to the car and hence has an impact on the levels of congestion predicted by the model.

A separate model of the rail network, based on a rail passenger OD matrix, a detailed rail network and train schedule, together with information on train capacity, provides for forecasts of rail passenger patronage. The rail module interacts with the main demand model so that changes in the generalised cost of rail services impact upon other modes.

Overcrowding on rail services has an influence on rail user costs and hence on rail's share of the market. Rail overcrowding is measured in terms of passengers in excess of the seating capacity of longer-distance trains and in terms of passengers in excess of the comfortable level of standing capacity for shorter trips. Infrastructure investment is input to the model in terms of increases in

capacity and reductions in travel times for identified parts of the network. Because of the special nature of rail schemes, it is not possible to treat them generically as is done with the highways and local transport parts of the model.

3. THE REPORT ON THE TEN-YEAR PLAN AND FORTHCOMING REVIEW

The Ten-Year Plan was not intended to be written on tablets of stone, unchanged from the day on which it was published. It was concerned with the broad direction of transport policy and what it could deliver rather than with the details of every scheme which would deliver the target.

A Report on the Plan was published by the Department for Transport in December 2002: http://www.dft.gov.uk/stellent/groups/dft_localtrans/documents/page/dft_localtrans_022473.hcsp. This reflected a number of changes in the composition of schemes which could be developed and completed within the time scale, new data on traffic volumes and higher forecasts of the growth in GDP over the planning period. The assessment of the Plan's contribution to congestion showed that the 2010 congestion targets were less likely to be achieved, with the expected change in trunk road congestion being between 1 per cent and 15 per cent higher than in 2000. Rail patronage was expected to be between 34-49 per cent above the 2000 level. Bus trips were forecast to increase by between 11-12 per cent.

Further analysis is in hand, continuing to review the Plan in the light of more recent projections for public expenditure. In addition, the Plan is being rolled forward to include the effects of income, population and other relevant forecasts to 2015. The fundamental objectives of providing for growth in public transport use and reducing the growth in congestion, while limiting transport's contribution to greenhouse gases, remain unchanged.

4. ROAD PRICING AND LORRY ROAD-USER CHARGING

There are limits on the extent to which cost beneficial increases in road capacity can reduce congestion. Since the Report of the Smeed Committee to the then UK Ministry of Transport in 1964, road pricing has been seen as an option for allocating the use of road space more efficiently than by building new capacity or queuing. But while the theoretical case for road user charging was generally accepted, the practical problems associated with its widespread implementation were for a long time seen as insurmountable. Gradually, certain cities introduced cordon charges, based largely on the technology used on conventional toll roads, with the revenue often being used to fund transport infrastructure.

Legislation introduced in 1999 gave UK local authorities (including London) the power to implement congestion charging on roads within and adjacent to their boundaries. A small scheme was implemented in part of the City of Durham in 2002, followed in 2003 by the much larger area charging

scheme in Central London. The Ten-Year Plan assumes a number of local authorities will implement urban congestion charging schemes to contribute towards meeting the urban congestion target.

In the summer of 2003, the Government announced a one-year feasibility study of options for widespread road pricing throughout the country. The study reviews a range of options, assessed against a number of criteria, including economic efficiency, fairness, contribution to regional economic growth and the delivery of environmental benefits. The study also reviews the practical issues involved in the different technologies for charging and for their administration and operation.

The Government is currently undertaking a further study on options for lorry road-user charging. This study is investigating options for switching some of the tax paid by hauliers on diesel fuel purchased in the UK with a kilometre-related charge. Diesel tax in the UK is set at a level among the highest in the EU (current pump price is around Euro 1.05 per litre). International hauliers tend to enter the UK with their tanks full and minimise their purchases of fuel from UK pumps. A reduction in the duty on diesel fuel is not an option, as this would encourage a shift to diesel cars with adverse consequences for the environment, for traffic volumes and for government revenues. Hence the study is assessing the option of repaying part of the tax paid by hauliers on diesel fuel purchased in the UK and replacing this tax with a kilometre-based charge.

5. THE PROGRAMME OF MULTI-MODAL STUDIES

The Ten-Year Plan, the forthcoming Plan Review and the Road Pricing Feasibility Study represent initiatives which look towards the longer-term strategic level. They provide a general assessment of the trends against which a range of policy options might be assessed. The Ten-Year Plan was not intended to determine a list of transport schemes, ready to be built as soon as funding was available. Rather, it was concerned with what various options, including investment in infrastructure, could deliver in terms of improved conditions for transport users.

In 1998, the Department had set up a programme of multi-modal studies to identify the causes of specific transport problems on the more congested part of the country's transport networks and to provide solutions to help to resolve these problems. Some studies were relatively local in character, covering, for example improving access to the town of Hastings or to the City of Hull, whereas others, such as the South and West Yorkshire study or the study of the M25 London orbital road, took a regional perspective. The aim of the studies was to identify a number of options and to make recommendations about which of these should be taken forward to the stage of detailed design and final appraisal.

The studies were conducted by transport consultants under the guidance of the Regional Planning Bodies, which included representatives of a wide range of regional interests, such as local authorities and regional development agencies. The consultants followed recommendations on multi-modal modelling and appraisal methods issued by the Department for Transport to ensure best practice and consistency between all the studies. Details are provided at:
http://www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_023653.hcsp. and at:
www.webtag.org.uk.

Each study recommended a programme of trunk and local road capacity enhancements, rail and other public transport measures to relieve the transport problems identified in the study area. The consistency of these proposals with the strategic level assumptions made in the Ten-Year Plan is now being assessed as part of the current review of the Plan. The Review will also assess estimates of the costs and feasibility of delivery of the recommendations made in the multi-modal studies with the more strategic level estimates made in the Plan.

In conclusion, while the Ten-Year Plan started with a top-down strategic level of assessment, the multi-modal studies provide the bottom-up analysis of the individual schemes needed to realise the Plan's objectives.

6. ROLES AND RESPONSIBILITIES

Responsibility for delivering transport infrastructure and policies is shared between a number of agents. The Secretary of State (Minister) for Transport is responsible for overall transport policy and for the funding of expenditure on trunk roads, local transport, rail passenger support and other rail schemes. Thus the Department for Transport provides advice on such issues as modelling and appraisal methods to be used in the assessment of infrastructure and other projects.

The procurement of trunk road schemes and the management of this network are undertaken by the Highways Agency. As noted above, the programme of multi-modal studies identified a number of trunk road schemes which would be needed to remedy actual or anticipated transport problems. The Highways Agency is now developing these proposals and drawing up the detailed designs needed to take forward the necessary statutory procedures and to place the contracts for their construction. The Agency is headed by a chief executive, who is responsible to the Secretary of State for Transport. The trunk road network makes up only 2.5 per cent of all road mileage, but being the busiest part of the network, it carries one-third of all traffic and two-thirds of all heavy goods vehicle traffic. The Secretary of State approves all major road schemes, included those funded by local authorities.

Funds are approved by the Secretary of State to finance local transport plans. Local authorities are responsible for all roads other than those designated as trunk roads, a wide range of local traffic management policies including parking provision, the promotion of public transport and some limited subsidies to bus services (which outside London are deregulated and provided in a competitive market). Each year, local authorities bid for funds by submitting to the Secretary of State a Local Transport Plan. This Plan sets out the problems facing the Authority, the objectives to be addressed, which measures are best suited to addressing those objectives and the funds needed to finance the measures. The Plan might include infrastructure schemes such as new bypasses to reduce congestion and improve road safety, bus priority measures and, in exceptional cases, investment in light rail. Funding is approved by the Secretary of State having regard to the quality of the local authority's bid, the overall availability of funds and the relative needs of each local authority bidding for funds.

Rail services in Great Britain are owned and provided by the private sector. Services are procured through franchising by the Strategic Rail Authority. Most of the funding of rail services is spent on the operation of services and the upkeep and renewal of the existing infrastructure. Proposals for new schemes are made from time to time by various organisations, including local authorities and

the private sector. The Strategic Rail Authority is responsible for taking these forward; developing such proposals as might appear to offer value for money and, in consultation with the Secretary of State for Transport, working them up as schemes which can be funded. Ultimate responsibility for approving such schemes rests with the Secretary of State.

7. APPRAISAL OF INFRASTRUCTURE PROJECTS

The Department for Transport uses a multi-criteria approach to the appraisal of infrastructure schemes. All schemes are appraised against the same criteria using a common methodology to ensure a level playing field between projects and between modes. The criteria against which schemes are appraised relate to the main objectives of UK transport policy, namely, the contribution of schemes to:

- The economy;
- The environment;
- Safety;
- Accessibility;
- Integration.

Each of these criteria is divided into a number of sub-criteria. These provide a comprehensive assessment of the impacts of the transport scheme. The performance of the scheme against each of the sub-criteria is recorded in the Appraisal Summary Table (see Annex). The completed table, together with other supporting information, is used by decisionmakers when prioritising projects and when reaching a decision on whether to proceed with the project or not.

The sub-criteria are measured in a number of different ways. Some can be quantified in terms either of money values or in terms of numbers, such as the numbers of people affected by changes in local air quality or noise. Time savings are valued in money terms, using information on wage rates for those who drive in the course of their work, or estimates based on stated or revealed preference studies for deriving a value for time savings outside the course of work. Some sub-criteria are assessed using qualitative comments, comprising brief descriptions of the impact, using a format and guidance issued by the Department for Transport. In such cases an assessment score of the importance of the site and the size of the impact is used, ranging from large through moderate and slight to neutral. Such scores are used primarily to assess such environmental aspects as the impact of a scheme on bio-diversity.

The measure of the contribution of the scheme to the economy is split into the following sub-criteria:

- Time savings and changes in vehicle operating costs;
- Reliability/predictability of travel time;
- Regeneration of economically deprived areas;
- Project costs.

At present, only the travel time and vehicle operating cost savings and the project costs are measured in money terms. Regeneration benefits are measured using an estimate of the number of

jobs created in areas of policy priority. Work is in hand on valuing the benefits of improved reliability. Until this is complete, the analyst responsible for the appraisal of a trunk road scheme notes in the Appraisal Summary Table whether the scheme relieves high levels of congestion and the prevailing peak volume to capacity level on the road. Research has shown that the higher the level of congestion, the greater the variance of travel times along that link.

The environmental impacts are broken down into the following categories:

- Noise;
- Local air quality;
- Greenhouse gases;
- Landscape;
- Townscape;
- Historical heritage;
- Bio-diversity;
- Water resources;
- Physical fitness;
- Journey ambience.

Noise, local air quality and greenhouse gases are at present measured in terms of changes in the number of people affected by the scheme. These data are collected as part of the standard of designing and engineering a scheme and the associated mapping of traffic flows in the "with scheme" and "do-minimum'"comparator.

All of the other sub-criteria are measured against a descriptive scale, as explained above, which is intended to provide a robust measure of the relative significance of the impact. The measure also records whether the impact is generally beneficial (e.g. taking traffic out of an historic city) or adverse (new infrastructure which crosses a site of special scientific interest). Schemes which improve the quality of a journey, for example, the provision of new railway rolling stock, are noted under the journey ambience criterion. Concerns about the benefits to health of schemes which facilitate or encourage walking and cycling are taken into account through the physical fitness criterion.

The safety criterion uses well-established and widely accepted methods of deriving the value of statistical life and injury costs to provide a money value of the changes in accident costs attributable to a scheme.

The accessibility measure is designed to assess those changes in accessibility which are not already covered in the measure of travel time savings. These include changes in community severance, changes in the availability of public transport as measured through the concept of option values and changes in accessibility to a private car and to public transport. These sub-criteria are each measured in terms of the extent of the impact, ranging from neutral to large, and in terms of the direction of the impact, whether adverse or beneficial.

The integration criterion concerns the extent to which the transport scheme assists in the achievement of other government policies. Among the more relevant of these is the scheme's contribution to land-use planning policies. The Appraisal Summary Table records the extent to which the scheme contributes to the improvement of passenger and freight interchange facilities. Also recorded under this objective is the extent to which the project is integrated with land-use policies and generally contributes towards national and local land-use planning policies and the contribution of the scheme, if relevant, to other government policies.

CONCLUSIONS

The UK, like many other countries, has a well-established system for the appraisal of individual transport schemes. In recent years, the use of cost benefit analysis has been extended to include some form of assessment of those impacts which cannot at present be given reliable money values. Work is in hand to provide money values for some of these impacts, although policymakers will inevitably need to exercise informed judgement in deciding on priorities.

The Department of Transport's National Transport Model has made it possible to assess, at a strategic top-down level, the effects of a wide range of policy options on indicators of the performance of the transport system, including measures of congestion, public transport patronage, emissions from traffic and economic welfare. This model provided the basis for reaching decisions about infrastructure planning at a strategic level as part of the Government's Ten-Year Plan for Transport.

The recently completed programme of multi-modal studies provides an example of infrastructure planning at an intermediate level. These studies identified transport-related problems in the context of the regions' economic and transport strategy. Infrastructure schemes and other solutions were proposed; detailed designs for these proposals are now being drawn up and refined.

ANNEX – Appraisal Summary Table

Option		Description	Problems	Present value of costs to public accounts, £ million
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
ENVIRONMENT	**Noise**			net properties win / lose
	Local Air Quality			Concs wtd for exposure
	Greenhouse Gases			Tonnes of CO_2
	Landscape			Score
	Townscape			Score
	Heritage of Historical Resources			Score
	Biodiversity			Score
	Water Environment			Score
	Physical Fitness			Score
	Journey Ambience			Score
SAFETY	**Accidents**			PVB £m
	Security			Score
ECONOMY	**Public Accounts**		Central Govt PVC, Local Govt PVC	PVC £m
	Transport Economic Efficiency: Business Users & Transport Providers		Users PVB, Transport Providers PVB, Other PVB	PVB £m
	Transport Economic Efficiency: Consumers		Users PVB	PVB £m
	Reliability			Score
	Wider Economic Impacts			Score
ACCESSIBILITY	**Option values**			PVB £m
	Severance			Score
	Access to the Transport System			Score
INTEGRATION	**Transport Interchange**			Score
	Land-Use Policy			Score
	Other Government Policies			Score

SUMMARY OF DISCUSSIONS

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SUMMARY

SUMMARY OF MAIN POLICY CONCLUSIONS

The Round Table discussed major changes in national systems of transport infrastructure planning and the lessons to be learned for a further improvement of the planning processes. Background papers were provided by rapporteurs from France, Germany, Italy, the Netherlands, Spain and the United Kingdom. The basic themes of the Round Table were: the rationale of infrastructure planning and the related reform needs; the decentralisation of planning institutions; reforms of planning and evaluation methods; as well as reforms of infrastructure financing and pricing.

Functions of Planning and its Reform

While it is generally agreed that the transport infrastructure planning process is a precondition for the rational use of the resources allocated by transport policy, there are at times remarkable differences between planning outcomes and implementation results. To increase the effectiveness of the planning process there is still a need to broaden the set of statistical data on which the planning is based. The planning process sometimes suffers from being isolated from other relevant policy areas, and from being too limited in scope. The latter problem is often a result of the fragmentation of the overall process into planning exercises for individual modes. More public consultation and stakeholder involvement helps to avoid planning processes being understood as merely technical exercises with ensuing acceptability problems.

Decentralisation

In many member countries transport policy is being decentralised. The decentralisation helps to overcome problems of acceptance of infrastructure policies. It has, however, the downside of a growing disregard for the interjurisdictional spillovers which follow from most transport infrastructure projects. If decentralisation is not accompanied by a transfer of fiscal responsibility, it may weaken the impact of planning on the implementation of transport infrastructure projects.

Planning and Evaluation Methods

The Round Table agreed that the core of the planning methods should be cost benefit analysis. What makes the cost benefit analysis of infrastructure investment projects demanding and costly is the fact that they are fraught with problems in evaluating non-monetary effects. The relative importance of qualitative evaluations for the planning outcomes should be made explicit and should be verifiable by political decisionmakers and the public. This is also recommended for the weighting of distributional effects. For large projects, the planning methods should allow for the inclusion of the secondary effects of trade and spatial reorganisation.

Finance and Pricing

Efficiency requires that the transport infrastructure services should be priced according to marginal cost. As in many cases marginal cost pricing does not cover full costs, it should be implemented by two- or multi-part tariffs. As private providers of transport infrastructure services will often enjoy considerable discretion in setting prices and quality standards, the privatisation has to be accompanied by suitable regulatory measures.

Transport infrastructure planning and construction practices vary considerably from one country to another, both in Europe and worldwide, due to the influence of differing historical, geographical, sociological, demographic and economic factors. Institutional arrangements are undergoing considerable change, with many governments re-defining the roles of the public and private sectors in deciding on the allocation of resources to improve the efficiency of the transport sector. Trends vary widely between different transport modes, between different levels of government and according to the relative importance of transport infrastructure projects. Consequently, there are limits to the potential for drawing up standard planning procedures. Within these limits, however, lessons can be drawn from the experience of infrastructure planning systems in a sample of ECMT member countries. These lessons concern the general function of the planning system, institutional reform, planning methods and models of financing infrastructure, and can be applied not only at national but also at international level.

1. FUNCTION OF PLANNING AND ITS REFORM

National systems of transport infrastructure planning have been introduced in order to rationalise the allocation of resources to transport infrastructure investment and achieve the objectives of transport policy. Data collection and sound forecasting are fundamental to this task. To avoid simplistic predict-and-build conclusions, the forecasts have to be based on policy projections to identify sustainable solutions which can satisfy mobility needs whilst taking into account environmental, demand management, regional development and distributional objectives.

The importance of collecting appropriate data for the assessment of transport infrastructure needs, of preparing robust forecasts of future developments in the transport sector, and of developing adequate technical solutions as a basis for sound financing decisions have been reiterated many times, notably in the Conclusions and Resolution of the ECMT Council of Ministers in 2001 and in the Declaration on Transport Infrastructure Planning in a Wider Europe, of 2004.

Current reforms focus on the following objectives:

- National transport infrastructure planning processes should try to limit the risk of long-run transport investment decisions being subjugated to short-run considerations of public finance. National experiences suggest that in cases where comprehensive transport infrastructure planning systems have been established, annual investment levels tend to be less volatile and higher.

- National transport infrastructure plans have a greater political impact the more they are integrated with long-term plans for other policy areas. This applies in particular to land-use planning and territorial development, as well as for strategic environmental plans.

- The political weight of national transport infrastructure investment plans is strongly increased if the plans are multi-modal and, where modal shift is an objective, incorporate an analysis of the costs and benefits involved. Such an analysis must include the relative advantages and disadvantages of the different modes with respect to achieving environmental objectives, including forecasts of technological developments. Concretely, this requires a careful examination of assumptions about the evolution of the relative economic and environmental performance of the different modes. In some countries where national plans were traditionally developed for individual modes, these have been substituted by multi-modal plans, as, for example, in France.

- To be effective, national transport infrastructure investment planning should not be understood as a technical or technocratic process. The acceptability of the planning results and subsequent implementation depend on a transparent public debate on the costs and benefits of the transport infrastructure policy, including the environmental and distributional side-effects. Formal procedures of public consultation have recently been introduced in many member countries. The accommodation of demands in such a process must aim at balancing benefits granted to special groups with the costs to be borne by those groups. Formal processes of consultation with stakeholders have, for example, been introduced in the United Kingdom, Germany and the Netherlands.

- The *ex-post* evaluation of past planning and implementation cycles can allow for an evolutionary improvement of national transport infrastructure planning systems. A regular *ex-post* evaluation has been introduced into the planning process in some countries (France, UK) and is increasingly used by the International Financial Institutions (IFIs).

- Finally, the planning systems themselves have to pass the test of effectiveness. Given the potentially high costs of the planning processes, they have to be scaled to their function. The updating of long-term plans should, for example, employ fewer resources than the development of a long-term strategic plan.

2. INSTITUTIONAL ASPECTS

In addition to opening the planning process to political debate, involving stakeholders and the public at large, institutional changes in member and associate countries mainly concern the participation of the different layers of government in national planning, at federal or community level, for example.

Where such institutional changes have taken place, they aim at greater decentralisation of transport planning and policymaking. Decentralisation can include transfers of planning competencies and the right to decide on transport infrastructure spending with or without the right to raise local taxes. The reform processes which have taken place differ widely in these respects: in some cases, decentralisation has involved a top-down approach, where broad national plans are complemented by more detailed plans at the local level. At the other end of the spectrum, low-level jurisdictions receive the right to propose projects, which are aggregated to infrastructure investment plans at the higher jurisdictional level. There are two critical issues here:

- First, decentralisation is inevitably associated with a basic trade-off: the transfer of planning and policy competencies to lower-level jurisdictions offers the advantage of exploiting detailed local knowledge. Moreover, in many cases, the more direct stakeholder involvement eases the political process. On the other hand, most transport infrastructure investment projects also imply costs and benefits for the populations of other jurisdictions whose interests tend to be under-represented in local planning processes. Furthermore, for projects of more than local importance, a strong involvement by local interests can slow down the planning process substantially, due to frequent "not in my backyard" conflicts.

- Second, decentralisation requires a fiscal structure which supports the achievement of overall planning objectives: the decentralisation of transport infrastructure planning to lower-level jurisdictions, including a material influence on decisionmaking, without an adequate sharing of the burden of finance, often leads to an overestimation of infrastructure needs. In some cases, lower levels of government have had a strong influence on project proposals, which, when accepted, were financed by the central government. Some of these investment decisions have been distorted by political conflict between jurisdictions and a bargaining process to find a compromise between local demands and central resources. In other cases, the bargaining process has lost its focus on overall transport infrastructure policy objectives.

In conclusion, while decentralisation may lead to a greater political accountability at the local level, the strong interjurisdictional spillovers associated with most local transport infrastructure projects require mechanisms to ensure the co-operation of lower-level jurisdictions. Such mechanisms require a fair assignment of fiscal entitlements and obligations. Co-ordination mechanisms are required for all levels of a hierarchy of jurisdictions, from the community to the international level. A consistent framework at the upper level is required.

3. PLANNING AND EVALUATION METHODS

In principle, national systems of transport infrastructure planning have to be built on the same basic rationale as any other investment decision. The allocation of funds, labour and physical resources to (capital) goods such as infrastructure, which reduces present consumption, should at least lead to benefits in the future which compensate for the present loss. However, several factors complicate investment analyses as part of national transport infrastructure planning. First, not all costs and benefits of transport infrastructure investment projects can easily be expressed in monetary terms. Second, costs and benefits might accrue to different parties with drastically different income opportunities, and an equal weighting of the interests of these groups is perceived to be unfair. Third, transport infrastructure investment projects or policies lead to structural changes in regional and national economies.

There is broad agreement that the basic evaluation method for setting up national investment plans or deciding on investment projects should be a cost-benefit analysis.

- Cost-benefit analysis proceeds from the basic value judgement that the economic consequences of infrastructure policies for the individuals affected should be summed, discounted and compared to net present values of alternative projects or policies. The methodology postulates that all effects, even if they are non-monetary, should be expressed in monetary terms. Transport infrastructure investment projects abound with such

non-monetary effects: increases in air pollution, changes in accident and injury rates, time savings, etc. Due to the technical difficulties of translating these effects into monetary values, ethical considerations (evaluating life, for example) or the prohibitive costs involved, the demanding principles of CBA have been weakened in applied work. In these cases, multi-criteria analyses have been adopted, complementing the CBA through qualitative evaluations of non-monetary effects.

- A second complication of CBA relative to a standard investment analysis is based on the fact that distributional objectives (in particular in the geographical dimension) are at least as important politically as the objective of economic efficiency. The postulate that political decisionmakers should quantify distributional objectives by group-specific weights to be part of the CBA has often proved impractical. In these cases, the contribution of transport infrastructure investment to the achievement of distributional objectives is included in a non-quantitative way. In French and German infrastructure planning documents, for example, there is the formal requirement to include special chapters on effects on disadvantaged groups.

- Major infrastructure programmes, on a scale which changes location and settlement patterns as well as regional specialisation in industrial production, require planning and *ex ante* evaluation methods which go beyond a standard cost-benefit analysis. Pilot applications of these methods in the United Kingdom suggest net benefits 30 per cent higher than indicated in a standard CBA. A parallel analysis in Germany came to a similar but less substantial quantitative result. The high costs of these studies will require decisions as to whether such analysis should be confined to a qualitative estimation of the effects.

If qualitative or political aspects are included in the investment studies as part of a multi-criteria analysis, the public should be able to verify how the considerations were included in the analysis. If criteria which are considered to be non-quantifiable lead to the acceptance of a project which would otherwise be rejected, the imputed subsidy, which is required to make the project viable, should be made explicit by comparing the multi-criteria or qualitative analysis with a CBA that contains all quantifiable effects. Such a procedure would, in particular, highlight the relative importance of non-monetised returns in appraising railway investment projects.

4. INFRASTRUCTURE FINANCING AND PRICING

Cost-benefit analyses do not, in principle, depend on an analysis of how transport infrastructure is financed, unless the cost of public funds is greater than that of private funds. A positive net present value for a transport infrastructure programme or project indicates that an increase in taxes in order to fund the project would nevertheless result in an overall increase in incomes. However, the objective of transferring the financing and operating of transport infrastructure to the private sector has led to modifications of national systems of transport infrastructure planning and implementation, primary examples being Spain and Italy. Proceeding from the objective of attracting private capital, transport infrastructure planning becomes closely linked to the introduction of user charges. Moreover, it has an impact on the discussion of which pricing policies should be applied.

In principle, only marginal social cost pricing can ensure the economic efficiency of transport infrastructure provision. The returns from social marginal cost pricing can, however, fall short of the costs of the provision of infrastructure. A higher degree of cost recovery by other pricing rules is associated with the disadvantage of a sub-optimal use of the existing stock of transport infrastructure as well as negative distributional consequences, particularly for regions with a relatively low population density. To cover full costs, marginal cost pricing therefore might require an additional fixed charge, in the form of a (private) fee or a (public) tax. If infrastructure service providers enjoy monopolistic powers, the absence of restrictions on fixed charges or fiscal transfers may substantially reduce efforts to minimise costs, optimise maintenance expenditures or adopt new technologies. Regulatory measures then have to be introduced to guide service providers in making efforts to reduce costs.

Private financing and operation of new infrastructure raises the issue of risk sharing between public agencies and private investors. Contracts between government authorities and private investors should protect the latter from political risks, which would charge private investors with incalculable risks about future business conditions. On the other hand, economic risks have to be borne by the private investors. Any prospect of soft budget constraints is likely to result in privatisation simply transferring current fiscal problems to the future.

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