EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT

TRANSPORT INFRASTRUCTURE IN ECMT COUNTRIES

Profiles and Prospects (Monographs)

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EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT (ECMT)

The European Conference of Ministers of Transport (ECMT) is an inter-governmental organisation established by a Protocol signed in Brussels on 17 October 1953. It is a forum in which Ministers responsible for transport, and more specifically the inland transport sector, can co-operate on policy. Within this forum, Ministers can openly discuss current problems and agree upon joint approaches aimed at improving the utilisation and at ensuring the rational development of European transport systems of international importance.

At present, the ECMT's role primarily consists of:

– helping to create an integrated transport system throughout the enlarged Europe that is economically and technically efficient, meets the highest possible safety and environmental standards and takes full account of the social dimension;

– helping also to build a bridge between the European Union and the rest of the continent at a political level.

The Council of the Conference comprises the Ministers of Transport of 36 full Member countries: Austria, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, the Former Yugoslav Republic of Macedonia (F.Y.R.O.M.), Georgia, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Moldova, Netherlands, Norway, Poland, Portugal, Romania, the Russian Federation, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and the United Kingdom. There are five Associate member countries (Australia, Canada, Japan, New Zealand and the United States) and four Observer countries (Albania, Armenia, Azerbaijan and Morocco).

A Committee of Deputies, composed of senior civil servants representing Ministers, prepares proposals for consideration by the Council of Ministers. The Committee is assisted by working groups, each of which has a specific mandate.

The issues currently being studied – on which policy decisions by Ministers will be required – include the development and implementation of a pan-European transport policy; the integration of Central and Eastern European Countries into the European transport market; specific issues relating to transport by rail, road and waterway; combined transport; transport and the environment; the social costs of transport; trends in international transport and infrastructure needs; transport for people with mobility handicaps; road safety; traffic management, road traffic information and new communications technologies.

Statistical analyses of trends in traffic and investment are published yearly by the ECMT and provide a clear indication of the situation in the transport sector in different European countries.

As part of its research activities, the ECMT holds regular Symposia, Seminars and Round Tables on transport economics issues. Their conclusions are considered by the competent organs of the Conference under the authority of the Committee of Deputies and serve as a basis for formulating proposals for policy decisions to be submitted to Ministers.

The ECMT's Documentation Service is one of the world's leading centres for transport sector data collection. It maintains the TRANSDOC database, which is available on CD-ROM and accessible via the telecommunications network.

For administrative purposes the ECMT's Secretariat is attached to the Organisation for Economic Co-operation and Development (OECD).

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FOREWORD

As early as 1986, the ECMT drew attention to the problems that might arise for traffic flows in Europe in the future, essentially as a result of the probable development of bottlenecks at a number of locations in the road infrastructure.

In 1993, the publication on European transport trends and infrastructural needs set out various policy measures to gear European transport infrastructure more effectively to requirements.

The present report aims towards a comparative basis of inland transport infrastructures in the ECMT Member countries. It has been presented to the Ministers in Berlin in April 1997 together with political conclusions meant for background elements of a debate on infrastructure development to be held in Helsinki during the 3rd Paneuropean Conference on Transport.

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AUSTRIA

Area: 83 000 km^2
Population: 8 100 000

Question 1: Future trends in passenger and freight traffic

Given its central geographical position, Austria is expecting very high growth in traffic (particularly freight) owing to the opening up of the economies of eastern Europe. The expected growth is a main concern of national transport policy. Specific action has been taken at both national and international level to ensure that a high proportion of the forecast traffic will be carried on environment-friendly modes, such as rail, and that road transport respects the highest possible ecological standards.

With regard to traffic involving its neighbours to the East, Austria has concluded a number of bilateral agreements with Poland, Hungary, Slovenia and Croatia in recent years. These agreements take a multimodal approach to road freight. With other countries, negotiations are under way or nearing completion, as in the case of the Czech and Slovak Republics, Bosnia-Herzegovina, FYROM and Lithuania. Such agreements aim to promote the use of rail and combined transport (road/rail/waterway). Certain exceptional measures have been planned for combined transport users, such as:

- the award of additional quotas for transit traffic;
- the authorisation to carry freight at the week-end and at night (usually prohibited).

Passenger traffic

Forecasting methods

Traffic flows expected by the year 2000 and 2010 between the central and eastern Europe countries (CEECs) and Austria (Rosniak and Snizek, “Traffic growth in the eastern European countries and impact on the major road network, 1989”) will depend largely on the economic development of these countries. Among the factors likely to influence passenger transport demand are: purchasing power in the CEECs, transport costs (price of fuel and tickets), the cost of overnight stays, customs duties on tourist purchases, the volume of business travel, access to the Austrian labour market for CEEC nationals and, to a lesser extent, *vice versa*, as well as the tourism generated by the regions concerned.

The forecast uses both an *integration scenario* and a *stagnation scenario.* These give a range of results which should be viewed as orders of magnitude.

– The *integration scenario* is based on a number of assumptions concerning the political and economic progress of the CEECs and the introduction of market economy structures. It thus assumes that European integration will extend to eastern Europe and result in:

  - economic development in the region after a short transitional phase;
  - growth in real income and a substantial increase in East-West trade;
  - adjustment to western standards of goods produced in eastern Europe;
  - international division of labour;
  - gradual levelling of wage/price differentials;
  - a pattern of alternating migration replacing one-way migrations;
  - heavy flows of westbound and eastbound holidaymakers;
  - gradual levelling out of car ownership and increased pollution.

– The *stagnation scenario* assumes that the positive economic effects forecast in the other scenario will not occur, resulting in a lower level of pollution and tourism (however, even without economic progress in eastern Europe, the pollution level is very high).

In any case, Austria's transport policy will attach great importance to environmental protection and human health.

According to Rosniak and Snizek, the figures in the two scenarios are maxima which are unlikely to be attained. They also find the integration scenario unlikely to be borne out and in fact consider more likely that the positive trends to date will deteriorate or stagnate.

Generally speaking, they think that trends in passenger traffic flows will be similar in magnitude to those previously seen in western Europe. However, on the basis of population trends, this new potential is lower, as the total population of eastern Europe (156 million) is well below that of western Europe (229 million). In 1987, the total population of Austria's three neighbours to the east -- Hungary, the Czech Republic and the Slovak Republic -- was only 27 million as against 148 million in Germany, Switzerland, Italy and the former Yugoslavia, the four neighbouring countries to the West.

The integration scenario results in traffic growth to and from eastern Europe equivalent to that previously recorded to and from West Germany, Italy and Switzerland. According to this scenario, car ownership and mobility in eastern Europe would increase sharply. In 2010, car ownership should therefore be 450 vehicles per 1 000 inhabitants and the average distance covered would be 15 000 km per year. As in western Europe, the future trend in mobility would be greatly to the advantage of the private car.

Some convergence in international travel behaviour is to be expected between the inhabitants of the Czech and Slovak Republics, Hungary, Poland and eastern Germany and those of western European countries. As regards the structure of travel and reasons for travel, the importance of "purchases" should decline as the differences in the availability of goods and price levels between the East and West are reduced. For other kinds of travel (excluding that connected with school holidays), excursions and business trips should also increase. Local flows in the form of home/work commuter traffic between Pressburg (Bratislava) and Vienna should develop.

Under th*e stagnation scenario*, compared with other kinds of traffic, the volume of holiday traffic would not be very different from what it is today. For car ownership, the assumption is the same as in the integration scenario (450 private cars per 1 000 inhabitants), although the average annual distance covered would be less (about 10 000 km).

Traffic forecasts

In connection with the PGO (planning programme for the eastern region), a forecasting study on rail and road passenger traffic to and from the Czech and Slovak Republics and Hungary was carried out. It covers the Vienna region and basin and the Burgenland, Weinviertel and Wienerwald regions. The same two scenarios were used. The results are summarised in the table below.

Volume of traffic at Austrian border check points
Number of trips per working day (both ways)

Routes to:	1990	2000/2010
Prague, Brno	48 000	50 000-70 000
Bratislava	28 000	30 000-60 000
Budapest	25 000	25 000-35 000

As part of the PGO, studies have been conducted by Rosniak and Snizek and by the Austrian Regional Planning Institute on various ways of improving rail links in East Austria. These studies included traffic forecasts and the rail/road split between Austria and the Czech and Slovak Republics and between Austria and Hungary, taking into account the upgrading of the Vienna-Bratislava line. The same scenarios were used.

The share of public transport (following upgrading) in traffic to and from the Czech and Slovak Republics should be around 40 to 60 per cent in 2010 and 40 to 50 per cent in traffic to and from Hungary.

Rail passengers, private cars and coaches per day both ways

	1995	2000	2010
Passenger traffic between Vienna and Bratislava			
- Rail passengers	5 000-7 000	5 000-18 000	7 000-43 000
- Private cars	6 000-9 000	4 000-15 000	3 000-19 000
- Coaches	110-160	70-270	40-240
Passenger traffic to and from Hungary*			
- Rail passengers		3 000-6 000	6 000-16 000
- Private cars		6 000-11 000	6 000-14 000
- Coaches		70-270	50-120

* At the Nickelsdorf/Hegyeshalom border check point.

Forecasts were also compiled for rail passenger traffic between Vienna and Prague on the basis of the same scenarios.

Forecasts for annual rail passengers in 2010 on certain routes serving Vienna and Prague

Routes	1990	2010
Vienna-Gmünd-Prague (Franz-Josef line)	237 000	429 000-699 000
Vienna-Breclav-Brno-Prague (northern line)	334 000	614 000-1 043 000

The highest traffic volume is forecast for the northern line, with 3 000 passengers a day, as against 1 900 on the Franz-Josef line. Road traffic is not taken into account.

At the end of 1989, the volume of road traffic recorded in eastern Austria to and from the Czech and Slovak Republics and Hungary already corresponded to the level forecast in the two scenarios.

Transborder road traffic between Upper Austria and the Czech and Slovak Republics was predicted to rise from 1 000/1 500 private cars crossing the border both ways every day in 1990 to 3 500 in the year 2000 and 5 000 in the year 2010.

No forecasts were compiled for waterway and air traffic. However, a very successful rapid waterway service between Vienna and Bratislava is expected to progress further in the future. It is also assumed that air traffic will expand. The Vienna airport is likely to receive strong competition from the Budapest and Bratislava airports owing to the difference in airport taxes. The introduction of a market economy should however eliminate these differences.

Freight traffic

As for passenger traffic, the forecasts should be viewed only as orders of magnitude.

In the study by Rosniak and Snizek carried out for the PGO on rail infrastructure improvements in this region, rail traffic was forecast for the year 2010 on a number of routes. The two tables below summarise the findings, under various assumptions for modal splits.

Forecasts for transborder traffic in 2010
Million tonnes per mode and route

	Split in 1987		In case of a 50/50 split		In case of a 30/70 split	
Routes	Rail	Road	Rail	Road	Rail	Road
Vienna-North Czech.	11.5	1.5	6.5	6.5	3.9	9.1
Vienna-East Czech.	3.6	0.8	2.2	2.2	1.3	3.1
Vienna-Hungary	13.4	3.2	8.3	8.3	5.0	11.6

Forecasts for road freight in 2010
Number of lorries per working day

Routes	Split in 1987	50/50 split	30/70 split
Vienna-North Czech.	520	1 200	1 770
Vienna-East Czech.	300	1 070	1 500
Vienna-Hungary	1 050	2 000	2 700

The relative growth in traffic on each route between 1987 and 2010 is as follows:

- Vienna-North Czech and Slovak Republics, 79 per cent;
- Vienna-East Czech and Slovak Republics, 140 per cent;
- Vienna-Hungary, 149 per cent.

Road improvements and construction of new roads were taken into account. It was assumed that only the eastern motorway (A4), under construction when the forecast was made, would be completed. Problems related to environmental protection and public hostility are expected as a result of road traffic growth. Moreover, if transport policy in fact favours rail, bottlenecks are likely to occur on the rail network. Action must therefore be taken to increase the capacity of the western and southern networks.

Similarly, action must be taken to improve rail traffic conditions in the Vienna region. In both cases the aim is to respond to growth in traffic to and from the East.

Forecasts of transborder road freight between Upper Austria and the Czech and Slovak Republics for the years 2000 and 2010 have also been done. On the Linz-Budweis-Prague route, the average daily number of lorries crossing the border both ways (border check-point counts) was 100 in 1990. It should be 700 in the year 2000 and 1 400 in 2010.

In the case of the integration scenario, it is stressed that the Pyhrn route will become more attractive because of the road upgrading and construction programme in eastern Germany and the Czech Republic. Actual lorry traffic will therefore exceed the forecasts.

The results of a special study on transit in East Austria (Rosniak and Snizek, 1991) are summarised by route and scenario in the table below (it does not include the Vienna region).

Number of lorries in the year 2010, by scenario and rail/road split
Per working day

	Stagnation scenario		Integration scenario	
Route	1987 about 80/20	2010 50/50	2010 50/50	2010 30/70
Czech and Slovak Republics, Hungary, on western motorway via Vienna	250	1 100	400 -2 000*	2 000 -2 600*
Czech and Slovak Republics, Hungary, on southern motorway via Vienna	90	500	950	1 300

* Assuming that 50 per cent of traffic, or 600 to 1 200 lorries, is transferred from the Pyhrn route to the Danube route.

This table shows that, if 30 per cent of total traffic is by road, road transit would increase strongly in the Vienna region. Taking the freight traffic generated by foreign trade between Italy and western Germany into account, transit would be multiplied by a factor of ten. Such volumes would be intolerable to the communities located along these routes.

A study by Platzer (1990) forecasts growth of 253 per cent in transit traffic from eastern Europe across Austria by the year 2000, or 3.5 times the traffic observed in 1984.

From the policy viewpoint, the shift of traffic to roads indicated in the forecasts is undesirable. It is inevitable, however, that certain economic developments will encourage this mode. For instance, the eventual abolition of subsidies to the raw materials industry in the CEECs following the introduction of a market economy should reduce the proportion of mass transport by rail through Austria and beyond. The creation of private road haulage firms and the establishment of western road hauliers in the East should be facilitated. Market economies also attach great importance to rapid deliveries, a service the eastern European railways will not be able to provide. Moreover, road haulage makes it possible to save foreign currency: the fuel is bought in the East where it is less expensive and drivers are paid there; western railway companies charge for the services they provide.

Results of forecasts prepared in 1995

Overall forecasts

According to a study based on the forecasts in the Austrian Transport Infrastructure Plan, international traffic flows will be concentrated on the TEN routes or the priority corridors defined in the second Pan-European Transport Conference (corridors No. 7 and No. 4).

Passenger transport

Passenger traffic should continue to increase. For the period 1990-2000, a recent study for the Ministry of Transport on federal motorway networks in Austria has forecast an increase of 63 per cent (37 per cent between 1993 and 2000) in annual motorway kilometres per vehicle (see table below) and passenger transit traffic will rise by 74 per cent on Austrian motorways (by 44 per cent between 1993 and 2000). It is also forecast that the main increase in terms of total passenger and transit traffic will be on the east-west routes, from Vienna to Salzburg and from Vienna to the Suben border check point, and on a southern route from Vienna to Graz and then to Klagenfurt.

Traffic on the Austrian motorway network
Million kilometres per vehicle and per year

	Total passenger traffic	Transit passenger traffic
1990	10 620	556
1993	12 605	670
2000	17 331	966
Change between 1990 and 2000	63%	74%
Change between 1993 and 2000	37%	44%

Freight transport

The modal split for freight traffic in Austria is as follows:

– 60 per cent of traffic is carried by road;
– 20 per cent of traffic is carried by rail;
– the remaining 20 per cent consists of pipeline, waterway and air traffic.

Modal split of freight traffic in Austria in 1991

	Volume carried Million tonnes	**Volume carried** % of total	**Traffic carried** Billion t-km
Road	190.5	60.5%	13.1
Rail	64.1	20.3%	12.7
Pipeline	53.6	17.0%	11.5
Waterway	6.8	2.2%	1.5
Air	0.1	0.0%	
Total	315.1	100%	38.8

About half of the total volume carried is domestic traffic, while the other half is international traffic in the form of bilateral and transit flows.

Most of the freight transit traffic crosses the western part of Austria (Brenner route and, to a lesser extent, the Tauern route). Freight transit traffic to and from neighbouring countries in the East is less heavy, but it is growing very rapidly.

As a result, the Austrian government has to take policy measures to make rail and waterway transport on the Danube more attractive, in order to prevent massive transfers to road transport, as occurred in western Austria. These measures will be mainly aimed at:

- improving rail and combined transport infrastructure;
- ensuring fair competition between the various modes by defining real costs.

Question 2: Present situation as regards infrastructure and investment projects

As the problems caused by road traffic cannot be resolved by developing road infrastructure, Austria's transport policy is aimed at influencing traffic demand and promoting the most environment-friendly modes. It is therefore firmly opposed to the idea of systematically responding to traffic growth by increasing road capacity and building new infrastructure. The focus in infrastructure policy is therefore on rail and combined transport. The information on investment projects provided by Austria therefore mainly concerns the rail network.

Rail transport

Austria has carried out and is planning substantial investment programmes to increase the capacity of rail and combined transport. The rail links included in Austria's Treaty of Accession to the European Union will thus be developed as long-distance lines in order to divert some goods traffic from road to rail.

Austria's priority projects therefore concern the main routes for rail and combined transport, as defined in Annex 1 of Protocol No. 9 of Austria's Act of Accession to the European Union:

- the Brenner route;
- the Tauern route;
- the Phyrn-Schober pass route;
- the Danube route;
- the Pontebbana route.

These projects also include extensions to and offshoots from these routes to central European countries, as well as a new high-speed route known as the "*Süd-Ost-Spange*". This line will provide a connection between Graz and Klagenfurt.

All these projects on Austrian territory are included in the EU Council's position on a Decision by the European Parliament and the Council on Community guidelines for the development of the TEN.

This is important with regard to possible Community financial aid since the Council Regulation on such aid will refer to that Decision and provide that Community aid may be granted only for projects of common interest identified as such on the basis of the guidelines.

In 1995, Austria applied for Community financial aid for the main rail and combined transport routes defined in Annex 1 of Protocol No. 9 of Austria's Act of Accession to the European Union. It has also been decided that Community financial aid would be requested in coming years for these same routes.

With regard to links with the CEECs, the Vienna Paper, which was drawn up in the Central European Conference of Ministers of Transport -- to which Croatia, the Czech Republic, Hungary, the Slovak Republic, Slovenia and Austria belong -- and which defines transport infrastructure projects in these countries, gives the programme for Austria's rail links with the Czech and Slovak Republics, Hungary, Slovenia and Croatia. At the Central European Transport Conference held in Bled in the autumn of 1995, the Ministers of Transport decided that a joint list of priority projects should be drawn up.

As regards the development of transport infrastructure, the Austrian Ministry of Transport is preparing a master plan, *Österreichischer Bundesverkehrswegeplan*, which will be used to evaluate projects and define priorities.

Type of work planned on rail links with Hungary

Line	Type of work
Vienna-Hegyeshalom-Budapest	In the medium term: increase in speed to 160 km/h
Wr. Neustadt-(Eisenstadt)-Sopron-Budapest	Additional combined and passenger transport links. Sopron is a junction point for combined transport.

Type of work planned on rail links with the Czech and Slovak Republics

Line	Type of work
Linz-Summerau-Horni-Dvoriste-(Ceske Budejovice-Prague)	In the short term, improvements to signalling system
Vienna-Gmünd-(Ceske-Velenice-Prague)	Reduction in journey time between Vienna and Prague. Work on infrastructure projects.
Vienna-Retz-Satov-(Znojmo-Prague)	Electrification of the Hollabrunn-Unterretzbach line completed
Vienna-Wolfstahl-(Bratislava)	Regional line of which the extension may be financed under a public/private-partnership scheme
Vienna-Parndorf-Kittsee-(Bratislava)	Modernisation and electrification of the Parndorf-Kittsee line. Re-opening of the transborder line between Kittsee and Petrzalka

Road transport

Road investment projects almost exclusively concern bypass roads around built-up areas, particularly those located on roads serving Hungary and the Czech and Slovak Republics, owing to the expected growth in road traffic (resulting from the opening of borders and political and economic changes in these countries).

On the Vienna-Bratislava run, bypasses are also planned between Parndorf and Kittsee. Apart from the extension of the eastern motorway, no other motorways or fast roads should be built on this route owing to the commitment to promote rail transport.

The opening-up of the borders with the Czech and Slovak Republics and Hungary has highlighted the issue of traffic through built-up areas and the need for bypasses.

By and large, investment is not aimed at enlarging the main network but at improving its quality.

Waterway transport

Considerable capacity exists at present on the Danube, amounting to about 90 per cent for the locks.

A basic objective in Austrian transport policy is to include navigation on the Danube in combined transport chains. Two measures in this respect are:

- The setting up by the government, at the end of 1993, of a company specialising in combined transport. Known as “Wasserkombi”, it carries about 10 000 containers a year, mainly for westbound traffic. A back-up road transport system has been set up to guarantee continued operations when the water level falls.
- Co-financing of the extension programmes for two river ports: Enns and Krems.

Question 3: Capacity problems

The problems mainly concern road transport and are extremely urgent as they will not be solved by systematically increasing infrastructure capacity, and railway capacity is affected when the additional traffic (in particular transborder freight) cannot be absorbed by the rail network. For this reason, the following objectives have been defined:

- In road transport

  - the promotion of fair competition between the various transport modes by making them meet the real costs of their activity (including externalities);
  - the transfer of road traffic to rail;
  - the promotion of road vehicles complying with high environmental and safety standards, as seen in the “green lorry” concept, which gives operators using vehicles built to these standards access to the transport market.

- In rail transport

  - the modernisation of existing rail infrastructure and the implementation of major infrastructure projects at European level;
  - the improvement of the competitive position of rail and combined transport by means of practical measures (tax incentives, transfer of checks to terminals, etc.).

Rail transport

Rail capacity problems seem likely to arise from the expected growth in east-west freight. Traffic on the main corridor, which is used for transit through Austria, is already very heavy:

– from Vienna to Linz, the line is saturated, with an average traffic of between 220 and 275 trains a day;
– the Linz-Graz line is also saturated, with average traffic of between 80 and 130 trains a day;
– the Salzburg-Klagenfurt line handles between 120 and 215 trains a day.

Traffic across the Alps is also increasing on a similar scale.

Road transport

A study on the road transport situation for 1990, 1993 and 2000 was conducted in connection with the Austrian Infrastructure Master Plan. It summarises demand for total traffic and transit on Austrian motorways, main roads and expressways. The results for motorways are described below.

Total traffic

In 1990, average daily traffic on Austrian motorways amounted to approximately 24 000 vehicles, of which 3 600 (or 15 per cent) were goods vehicles (delivery vehicles and lorries). The heaviest traffic was recorded in the Linz and Vienna regions, particularly on the A23 (south-east trunk road) with an average traffic of 120 000 vehicles a day, on the A2 (southern motorway) south of Vienna (100 000 vehicles a day), on the A1 (western motorway) between Linz and Traun (56 000 vehicles a day) and on the A7 in the Linz region (75 000 vehicles a day). The highest volumes of freight traffic, of 15 000 to 20 000 vehicles per working day, were recorded on these roads.

The highest traffic volumes were recorded on the A23, with 122 453 vehicles a day, including 23 700 lorries. Traffic is less heavy in western Austria than in eastern Austria, but owing to the topography (the Alps), even a relatively low volume of traffic has a substantial environmental impact.

In 1993 average daily traffic on the federal motorways was 24 500 vehicles, about 15 per cent of which (or 3 750) were utility vehicles. This figure represents average increases of 2.2 per cent in total traffic and 5 per cent in utility vehicle traffic over the period 1990-93. The heaviest traffic was recorded in the Vienna and Linz regions, with traffic of 100 000 vehicles a day on average on the A2 (south of Vienna) and on the A23. The highest figure for road freight was reported on the A23, with 23 700 lorries per working day.

Transit traffic

In 1990, the highest volume of transit traffic was recorded in western Austria. The A13 -- the Brenner motorway -- ranked first with an average of 7 700 vehicles a day, or 60 per cent of total motorway traffic. This motorway carried 3 150 lorries in transit per day. The Salzburg/Walserberg route via the A10, the Enns valley and the A9 to Spielfeld follows.

In 1993, routes to the countries east of Austria accounted for the highest increase in road transit. The heaviest flows, however, were still in western Austria.

Freight transport accounted for over 10 per cent of total transit traffic, with 400 vehicles a day on average. Compared with 1990, an average increase of 3 per cent in total transit was reported in 1993, while the average for freight transit traffic stagnated.

Road transport outcome

In 1990, total road traffic on Austrian motorways was 12.5 billion vehicle-km, with vehicles in transit (private and commercial vehicles combined) accounting for 6 per cent (770 million vehicle-km). The share of freight in this traffic was 15 per cent or 1.9 billion vehicle-km, with transit accounting for 11 per cent, or about 210 million-km. Road freight in transit therefore represented only 1.7 per cent of the total traffic recorded in 1990 on the Austrian motorway network.

In 1993, a total of about 15 billion vehicle-km was recorded on the country's motorway network, including transit traffic of 915 million vehicle-km. These figures represent growth in total road traffic of 18.5 per cent and 20 per cent in total transit over the period 1990-93. Freight accounted for about 15 per cent of total traffic with 2.3 billion vehicle-km, of which 11 per cent in transit (or 244 million vehicle-km).

To sum up, freight traffic on motorways rose by 22 per cent and freight transit by 17 per cent. This relatively low growth in freight transit traffic is due to the fall in traffic from and to the former Yugoslavia.

Question 4: Measures

As there has been no change since 1991-92 with regard to the action planned by the Austrian authorities, the main objectives in Austrian transport policy still apply:

- avoid increases in traffic particularly when other solutions exist, such as identifying the shortest routes by means of intelligent town planning, the use of data transmission networks to avoid empty return trips, and deterring vehicle traffic in town centres by charging high parking rates;
- give priority to environment-friendly modes such as electrified rail, inland waterways and combined transport;
- use the latest technological developments (Austria will continue to draw up environmental regulations setting strict limits on the noise and emissions from transport vehicles);
- gradually internalise the external costs of transport in order to give appropriate pricing signals for the efficient and sustainable functioning of the transport market, beginning with road transport since numerous studies indicate that this mode imposes the highest external costs to society.

DESCRIPTION OF FIVE RAILWAY DEVELOPMENT PROJECTS

Tauern route

This line serves Munich, Salzburg, Bischofshofen, Villach, and Rosenbach towards Ljubljana, via Villach and Tarvisio. The Salzburg-Bischofshofen segment also forms part of the Pyhrn-Schober route. The Villach-Tarvisio segment is also part of the Pontebbana route and comes under the investment programme for that route.

Purpose of work: construction of a second track, and an increase in authorised speed and capacity on this line. The following operations are planned:

– upgrading of the section between Salzburg and Schwarzach St. Veit;
– doubling of the track between Schwarzach St. Veit and Spittal;
– upgrading of the Spittal-Villach-Rosenbach section.

Planning/design phase: completion in 2007.
Construction: completion in 2010.

Cost

	Before 1995	1995	1996	1997	1998	1999	1995-99	After 2000
MECU	151 561	32 500	47 766	48 868	37 772	39 661	206 567	429 267

Pyhrn-Schober route

This line serves Nuremberg, Passau, Wels, Traun, Selzthal, Graz, Spielfeld/Strass and Mariborn, and also Prague, Summerau, Linz, Traun or Munich, Salzburg, Bischofshofen and Selzthal. The Nuremberg-Passau-Wels section also forms part of the Danube route and comes under the investment programme for that route. The Munich-Salzburg-Bischofshofen section also forms part of the Tauern route.

Purpose of work: Doubling of part of the line in order to increase its capacity. The following operations are planned:

– doubling of the track between Spiefeld/Strass and Graz;
– upgrading of the Graz-Bruck/Mur section;

- possible construction of tunnels for the Knoten-Obersteiermark section (Hochalm Tunnel and Traidersberg Tunnel);
- introduction of the second track on the Schoberpass section;
- Selzthal loop line;
- upgrading and partial doubling of the Pyhrn line;
- upgrading of the Enns valley line;
- upgrading of the Wels-Passau line;
- upgrading of the Salzburg-Bischofshofen line.

Planning/design phase: completion in 2007.
Construction: completion in 2010.

Cost

	Before 1995	1995	1996	1997	1998	1999	1995-99	After 2000
MECU	253 547	27 542	26 755	26 370	58 232	49 576	188 476	1 252 563

Danube route

This route comprises the following lines:

- Munich-Salzburg-Wels-Linz-Vienna-Parndorf-Hegyeshalom-Budapest;
- Munich-Simbach-Wels;
- Nuremberg-Passau-Wels;
- Vienna-Marchegg-Bratislava;
- Vienna-Vienna Airport-Wolfsthal-Kittssee-Bratislava;
- Vienna-Ebenfurth-Sopron;
- Parndorf-Kittsee-Bratislava.

The Vienna-Ebenfurth segment is also part of the Pontebbana route and comes under the investment programme for that route. The Passau-Wels section also forms part of the Pyhrn-Schoberpass route.

Purpose of work: Upgrading of the Vienna-Salzburg line (with quadrupling of the track on the Vienna-Wels segment), the Vienna-Bratislava and Vienna-Sopron lines. The following operations are planned:

- upgrading of the Vienna-Hegyeshalom line;
- construction of a new track on the Parndorf-Kittsee-Bratislava line;
- upgrading of the Vienna-Vienna Airport-Kittsee line;
- upgrading of the Vienna-Sopron line;
- construction of a new railway station in Vienna;
- work on the Lainzer tunnel;
- work on the Laaerberg tunnel;
- work on the Inzersdorf terminal;

- construction of a high-quality Vienna-St. Pölten line;
- construction of a loop line around St. Pölten for goods trains;
- quadrupling of the track on the St. Pölten-Wels section;
- upgrading of the Passau-Wels and Wels-Attnang Puchheim sections;
- construction of a wider section on the Attnang-Puchheim-Salzburg line.

Planning/design phase: completion in 2005.
Construction: completion in 2010.

Cost

	Before 1995	1995	1996	1997	1998	1999	1995-99	After 2000
MECU	650 931	295 624	342 901	350 351	362 468	366 356	1 717 699	3 732 487

Pontebbana route

This line serves Prague, Brno, Bernhardsthal, Vienna, Semmering, Klagenfurt, Villach and Tarvisio as well as Prague, Gmund and Vienna.

Purpose of work: Modernisation and increase in the capacity of the line; tunnel construction. The following operations are planned:

- upgrading of the Bernhardsthal-Vienna section;
- upgrading of the Vienna-Ebenfurth-Wiener Neustadt sections;
- upgrading of the Wiener Neustadt-Gloggnitz section;
- work on the Semmering tunnel (Gloggnitz-Mürzzuschlag);
- construction of the Galgenberg tunnel for the Knoten Obersteiermark section;
- work on the Furnitz transhipment centre;
- doubling of the track between St. Veit and Klagenfurt;
- doubling of the track between Arnoldstein and Thorl/Maglern.

Planning/design phase: completion in 2008.
Construction: completion in 2010.

Cost

	Before 1995	1995	1996	1997	1998	1999	1995-99	After 2000
MECU	149 655	73 401	75 724	79 663	54 212	54 342	337 341	588 454

The Graz-Klagenfurt line (Koralmbahn)

The Koralmbahn would be a new line between Graz and Klagenfurt and form part of the Pontebbana route.

Purpose of work: The following operations are planned:

- improvements of Graz junction;
- construction of the new Graz-Klagenfurt line and Koralm tunnel;
- improvements of Klagenfurt junction;
- construction of a loop line around Graz for goods trains;
- connection with Graz airport.

Planning/design phase: under optimal circumstances completion around 2000.
Construction: under optimal circumstances completion around 2012.

Cost

	Before 1995	1995	1996	1997	1998	1999	1995-99	After 2000
MECU	-	1 846	1 846	1 846	1 846	1 846	9 231	1 603 827

BELGIUM

Area: 30 500 km²
Population: 10 300 000

In 1988-89, institutional reforms transferred responsibility for the development and management of motorways, highways, waterways and ports to the regions (Brussels Capital Area, Flemish Area and Walloon Area). However, authority for overall regulations in this area has largely remained in the hands of the State, for example under of the national railway company (*Société Nationale des Chemins de Fer Belges* - SNCB).

The reform has caused some delays in the publication of traffic statistics. In certain instances, data may be available for one region but not for another, and vice versa.

Question 1: Future trends in freight and passenger traffic

Current traffic and recent trends

Road traffic

Traffic on motorways and numbered highways (in general, the former national highway system) keeps increasing, even during periods of economic recession (Appendixes 1 and 2). As of 1 August 1995, the number of motor vehicles per thousand population (exclusive of farm and special vehicles) in Belgium was 466, of which 421 were cars. From 1985 to 1994, motorway traffic by passenger cars and commercial vehicles increased by 68.85 per cent, while traffic on other numbered highways rose by only 37.83 per cent.

In 1993, heavy-vehicle traffic (lorries and tractor trailers) on motorways was estimated to account for 15.3 per cent of the total, up from 14.75 per cent in 1990 and 14.69 per cent in 1985. On the former national highways, it accounted for 10.03 per cent of total traffic in 1990 and 12.19 per cent in 1985.

This means that the number of heavy vehicles on motorways rose faster than that of light vehicles (cars, motorcycles and vans), with some switching of heavy-vehicle traffic from the former national highways to motorways (Appendixes 3 and 4).

Total freight transported by road in 1985 was divided as follows:
- 77 per cent for domestic transport;
- 10 per cent for imports;
- 10 per cent for exports;
- 3 per cent in transit.

In 1991, there was little change, including in the even balance between import and export traffic:
- 70 per cent for domestic transport;
- 13 per cent for imports;
- 13 per cent for exports;
- 4 per cent in transit.

Rail traffic

Contrary to earlier forecasts, passenger and freight rail traffic has not increased in recent years. This is due in part to the fact that the Belgian national railways did not have the budget required to modernise its infrastructure and rolling stock, or to improve its service.

The table below provides figures for passenger traffic (domestic and international).

SNCB passenger traffic (domestic and international), 1990-94

	1990	1991	1992	1993	1994
Passengers (millions)	142.4	145.5	145.0	145.3	142.6
Passenger-km (millions)	6 539	6 769	6 798	6 694	6 638

Source: SNCB.

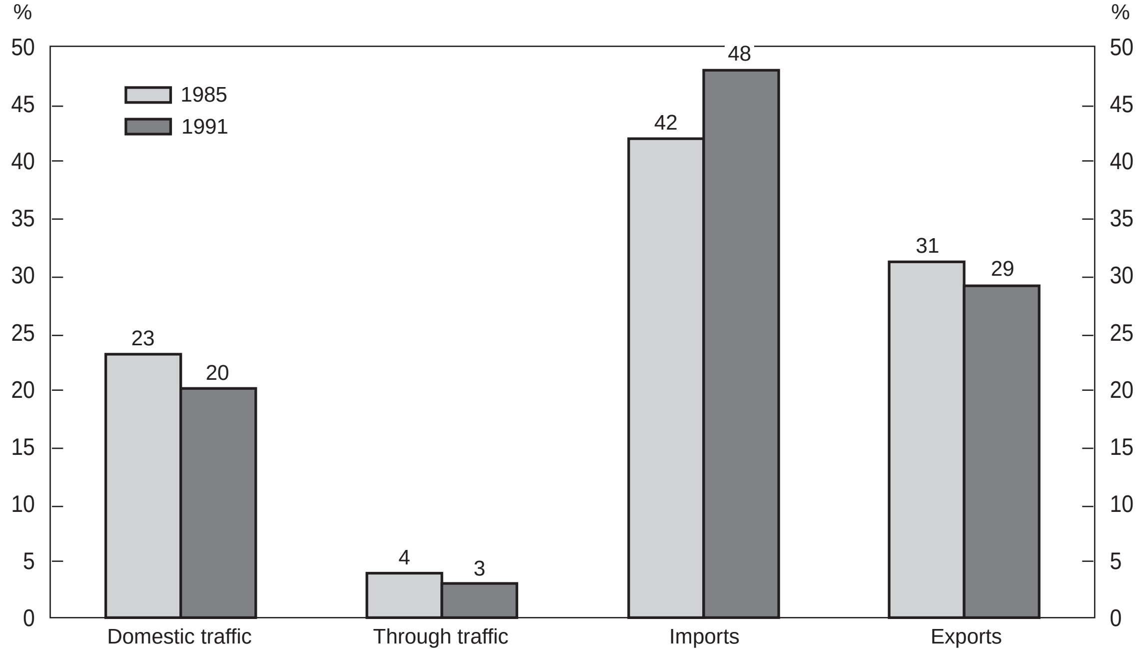
With regard to freight traffic, there has been continued growth to and from ports (principally Antwerp and Zeebrugge) and:

- traditional regions of heavy-industry (Liege and Charleroi);
- neighbouring countries: France, Germany, Luxembourg (steel mills), the Netherlands, etc.;
- certain long-distance destinations such as Italy, Austria, etc. (Appendix 5).

Overall trends in freight traffic since 1991-92 have not favoured rail transport, which declined by about 10 per cent in 1993 from its level of the preceding two years. Although it rose sharply in 1994, it did not return to its 1992 level.

In 1995, the volume of rail traffic fluctuated widely, as did the economy of Belgium and of western Europe in general. After rising during the first half of the year (due to restocking by wholesalers and processing industries), rail traffic declined to a level below that of 1994 in the second half. Labour unrest in France and Belgium in November and December 1995 also helped bring down the overall figure for the year.

Figure 1. **Change in volume of freight transported from 1985 to 1991**



Source: ECMT.

Waterway traffic

Freight traffic fell by 10.4 per cent in volume and by 6.7 per cent in tonne-kilometres over the 1990-92 period. Because data for subsequent years is not available, it is not possible to ascertain whether this decline continued. The total volume of freight shipped by waterway in 1985 was divided as follows:

– 28 per cent for domestic traffic;
– 28 per cent for imports;
– 20 per cent for exports;
– 24 per cent in transit.

In 1991, traffic volume had changed considerably:

– 45 per cent for domestic traffic;
– 18 per cent for imports;
– 31 per cent for exports;
– 6 per cent in transit.

Maritime traffic

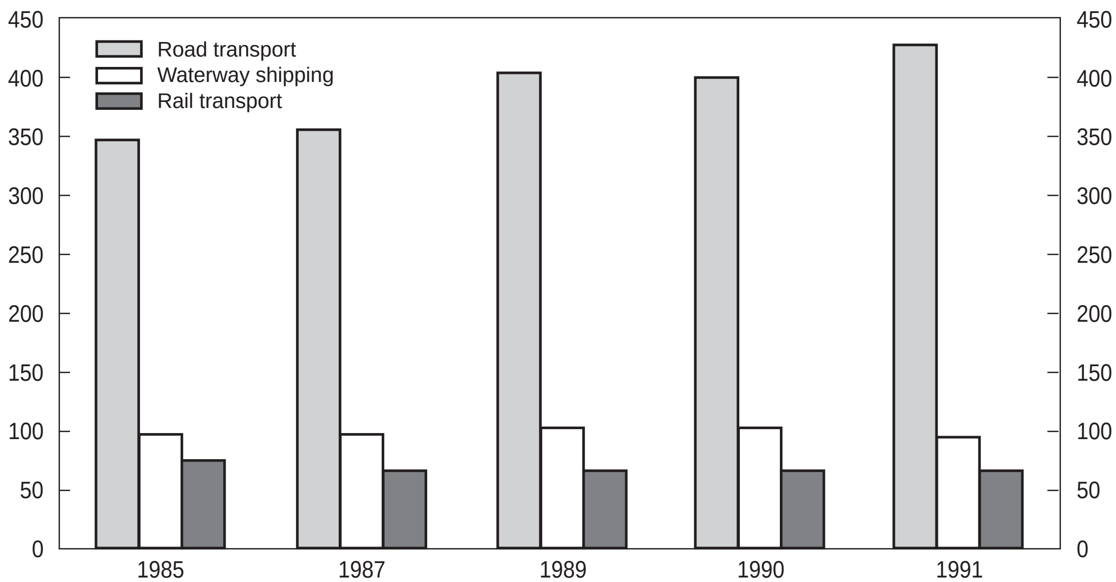
Change in volume of freight loaded and unloaded at Belgian ports, 1970-93
Thousand tonnes

	1970	1980	1985	1990	1991	1992	1993
Antwerp, left bank							
Loaded	23 615	34 188	37 707	38 865	37 131	39 537	41 166
Unloaded	57 107	45 428	47 443	59 488	58 509	59 767	54 928
Ghent + Zelzate							
Loaded	4 521	3 376	6 989	5 212	4 851	4 370	4 400
Unloaded	5 670	15 105	20 043	19 631	20 988	18 544	17 803
Zeebrugge+ Bruges							
Loaded	845	3 398	5 285	8 270	8 165	9 193	9 666
Unloaded	7 382	11 720	8 089	20 290	20 301	22 060	18 984
Others							
Loaded	230	1 862	2 873	2 762	2 384	2 802	2 791
Unloaded	707	2 863	3 676	4 642	4 234	4 907	4 966
Total							
Loaded	29 272	42 826	52 854	55 109	52 531	55 902	58 023
Unloaded	71 073	75 117	79 251	104 051	104 032	105 279	96 681

As in many other countries, there was a sharp increase in containers shipped through Belgian ports from 1980 to 1993, with unloading rising by 188 per cent and loading by 259 per cent.

Ground freight transport

Figure 2. **Changes in freight transport volume by modes, 1985-91**
Million tonnes



Source: ECMT.

Data for the years 1985-91 clearly show the continued increase in road transport of freight and the corresponding stagnation of other transport modes. The table below provides some more recent statistical data that confirm this trend.

Domestic and international freight transport

Million tonnes

	1990	1991	1992	1993	1994
Road transport	329.5	355.2	339.7	343.9	n.a.
Rail transport	67.1	64.5	62.3	57.7	63.4
Internal waterways	99.9	94.9	89.5	n.a.	n.a.
Million tonne-km	1990	1991	1992	1993	1994
Road transport	32 049	34 105	32 871	35 964	n.a.
Rail transport	8 354	8 153	8 074	7 568	8 084
Internal waterways	5 448	5 227	5 083	n.a.	n.a.

Source: INS and SNCB.

Traffic forecasts

The forecasts described below are derived mainly from the January 1992 “Mobilis” report on the movement of passengers and freight commissioned by the joint Belgian motor vehicle industry association FEBIAC (*Fédération Belge de l’Industrie de l’Automobile et du Cycle*). The document summarises several studies of future traffic projections.

In February 1996, the latest statistical data were not available, except for passenger rail transport. Recent data referred to in this report come from a new study by the SNCB national railways, updating its earlier “Star 21” project using revised assumptions.

Passenger traffic

A 1991 study by H. Meersman and E. Van de Voorde contains interesting computations and forecasts. The study shows that:

– passenger transport is significantly affected by the level of national income and the cost of transport;
– overall passenger traffic tends to increase.

The authors also computed price and income elasticity:

– price elasticity (as measured by changes in transport relative to changes in fuel prices) is in a range of -0.2 to -0.3;
– income elasticity (changes in the demand for transport in relation to changes in income) is also reported to have fallen, from 0.82 to 0.54. Economic development is closely related to the growth of travel, even though the correlation between the two diminishes over time.

For the choice of modes, the authors computed cross-price elasticity to show that a relative price increase (the cost of using a car vs. public transport) of 10 per cent caused a reduction of 4 to 6 per cent in the share of total transport accounted for by automobiles.

They also forecast passenger transport (for all modes combined), using four different sets of assumptions.

Under the first set of assumptions, all determinants, with the exception of the trend itself, are based on their value at the end of the period under consideration. This extreme case also provides a measure of the propensity for mobility to increase. Under this set of assumptions, travel would increase by 28 per cent from 1987 to 2000.

Under the second set of assumptions, annual percentage changes in determinants (i.e. population, per capita income, cost of car travel and public transport fares) are expected to be equal to the average percentage variation during the period under consideration, thereby offsetting the impact of cyclical fluctuations. Highs and lows are disregarded. Under this set of assumptions, travel would increase by 35 per cent.

Under the third set of assumptions, future projections are based on trends observed during the last year of the period under consideration. Travel would increase by 43 per cent.

Under the fourth set of assumptions, based on the European Union's Hermes economic model, the average percentage change expected for the 1990-94 period is extrapolated for the years up to 2000. From 1987 to 2000, travel would increase by 45 per cent.

Depending on the set of assumptions used, travel is expected to rise by between 28 and 45 per cent during the period 1987 to 2000.

The National Construction Confederation (*Confédération nationale de la construction*) has also issued a series of forecasts of mobility, based on the Mobibel econometric model and two scenarios. Under the first, percentage changes by economic determinants over the 1986-89 period are applied to the years 1990-2005. The second set uses the 1970-79 period as a base, instead of 1986-89. Under these sets of assumptions, mobility would evolve as indicated in the following table.

Passenger transport forecast under the Mobibel model

in passenger-km

			Share of total	
Passenger travel	Mode	Increase 1990-2005	1990	2005
Scenario 1	Car	+ 53 %	88 %	94 %
	Public transport	- 24 %	12 %	6 %
	Total	+ 44 %		
Scenario 2	Car	+ 44 %	88 %	93 %
	Public transport	- 18 %	12 %	7 %
	Total	+ 36 %		

Source: Confédération nationale de la construction.

These forecasts also point to a sharp increase in travel. Depending on the assumptions used and without any changes in current policies, the overall mobility of persons is projected to rise by between 36 and 44 per cent from 1990 to 2005, or at an annual rate of 2.4 to 2.9 per cent. In terms of modes used, the share of automobile travel is expected to rise to 94 per cent in 2005, from 88 per cent in 1990.

The SNCB national railway company had also forecast future trends, with its STAR 21 project, assuming that transport policy would remain unchanged.

Expected passenger travel as projected by STAR 21
in passenger-km and percentage

	1987		2000		2020	
SNCB	6 271	6.4%	7 103	5.9%	7 384	5.6%
Regional public transport	4 427	4.5%	4 575	3.8%	4 351	3.3%
Urban pubic transport	1 019	1.0%	1 084	0.9%	1 055	0.8%
Intercity buses	4 322	4.4%	5 418	4.5%	6 066	4.6%
Cars	78 958	80.6%	98 967	82.2%	109 839	83.3%
Special buses	2 903	2.9%	3 130	2.6%	3 165	2.4%
Total	97 900	100%	120 397	100%	131 859	100%

Source: SNCB, STAR 21, 1990.

From 1987 to 2020, total passenger travel is expected to rise by 35 per cent, at twice the rate of rail travel. Travel by bus and automobile are expected to increase by 40 per cent and 39 per cent, respectively.

At the end of 1995, the SNCB revised its passenger traffic forecasts, taking into account the fact that the railway company had started a project of structural changes with the aim of balancing its budget no later than 2005.

Assumptions used to forecast traffic include a significant increase in government financing of the capital investment needed to develop a new infrastructure for the TGV, as well as for domestic requirements.

In general, traffic assumptions are based on the notion that there are new opportunities for rail transport, since the rapid and continued increase in road and air transport have made the benefits of train travel, in terms of environmental protection and technology, ever more evident. In this regard, the traffic assumptions take as a given that new initiatives will be necessary both at national and at Community level to enable the railroads to make use of their technical and environmental advantages. One of the key issues has become the social cost of transport.

For the market shares of various transport modes, it is estimated that railways will experience significant gains in international traffic. However, the overall market shares of the various modes of overland transport are not expected to change significantly, given the volume of short-distance travel and the role played by private cars.

The following table shows the new projections for passenger traffic based on those assumptions.

New forecast of rail passenger traffic according to the SNCB
Million passenger-km

		International			
	Domestic	Regular	TGV	Total international	Total domestic + international traffic
1995	5 830	812	79	891	6 721
1996	5 862	731	388	1 119	6 981
l997	5 991	663	641	1 304	7 295
1998	5 920	454	1 059	1 513	7 433
1999	5 949	407	1 333	1 740	7 689
2000	5 978	359	1 465	1 824	7 802
2001	6 014	363	1 561	1 924	7 938
2002	6 056	327	1 594	1 921	7 977
2003	6 104	291	1 627	1 918	8 022
2004	6 158	291	1 660	1 953	8 111
2005	6 220	296	1 791	2 087	8 307

Source: SNCB, 1995.

The table below summarises the principal forecasts referred to above.

Summary of passenger transportation forecasts

Source	Mode	Period	Expected growth in the event of no policy changes
Van De Voorde & Meersman	All modes	1987-2000	+28 % to 45 %
Mobibel	All modes	1990-2000	+36 % to +44 %
STAR 21	All modes	1987-2020	+35 %
SNCB	Rail	1995-2005	+23.5 %

Freight transport

According to Meersman and Van de Voorde, three types of factors determine the breakdown of freight transportation by mode: the nature of the forwarder, the shipment and the supply of transport.

For the first type, the kind of goods shipped is the chief determinant. Railways and domestic waterway transportation play a large role in the transportation of freight with a relatively low value per unit of weight. For other goods, road transport is dominant. Additional factors include volume of goods, time considerations, frequency of shipments, etc.

In terms of shipment, distance is the chief consideration. Distance per tonne is highest in rail transport, at 122 km, as compared with 90 km per tonne for road transport. The lower average distance for road transport is due to the fact that much of the latter consists of loading and deliveries, or else shuttle traffic.

Factors related to the supply of transport are the rates charged by various modes of transport, their dependability, and the risk of damage or loss.

The authors observe that the demand for freight transport is directly related to the level of economic activity and has little to do with cost. Economic activity, as measured by the gross value added to the cost of factors for the categories of activity generating freight transport, has an unquestionable impact on the overall transport of freight. The nature of the demand for transport is clearly indicated by the fact that its elasticity varies between 0.85 and 1.02.

From a statistical viewpoint, the variable used to establish the effect of cost on the demand for freight transport (the price of diesel fuel) does not appear of special significance. The authors consider this a further confirmation of the derivative nature of the demand for transport, in the sense that once a product is manufactured, it has to be delivered and therefore transported.

Lastly, demand for freight transport also seems to changing. With respect to the breakdown between modes, the survey shows that:

- A 10 per cent rise in relative rates for domestic waterway and road transport causes a 5 per cent decline in their share of total transport.
- The share of domestic waterway transport is not materially affected by changes in rail transport rates.
- Economic activity has a positive impact on the share of domestic waterway and rail transport, as the volume of freight shipped increases during periods of economic growth and the average volume of shipments also rises; rail and domestic waterway transport has an advantage in this respect over road transport, owing to the higher capacity per unit of transport of those two modes.
- There has been a gradual shift away from rail and waterway transport and towards road transport; this shift would disappear if the economy grew at an annual rate of at least 3.5 to 3.8 per cent.

Van de Voorde and Meersman have also forecast total freight transport (all modes combined). Under the assumptions used, growth for the period 1987-2000 is expected to range between 5 and 71 per cent for total road transport of freight (respectively 5 per cent, 22 per cent, 71 per cent and 41 per cent for the four sets of assumptions referred to earlier in connection with passenger travel).

Depending on the assumptions used, the Mobibel study projects increases in freight transport of 49 to 124 per cent from 1990 to 2005, almost exclusively in road transport.

Freight transport as projected by the model

Freight mobility	Growth 1990-2005	1990 share	2005 share
Scenario 1			
Domestic waterways	+69 %	13 %	10 %
Railways	+36 %	17 %	10 %
Road	+155 %	70 %	80 %
Total	+124 %	100 %	100 %
Scenario 2			
Domestic waterways	+12 %	13 %	10 %
Railways	-34 %	17 %	8 %
Road	+75 %	70 %	82 %
Total	+49 %	100 %	100 %

Source: Confédération nationale de la Construction.

Road transport's share of freight shipments is expected to rise to between 80 and 82 per cent in 2005, from 70 per cent in 1990. Rail traffic is expected to increase by 36 per cent in absolute terms.

The SNCB, in its 1990 STAR 21 project, also projected the volume of freight transported by rail.

Projected freight transport by rail according to STAR 21
Million tonne-km

	1988	2010
Domestic	30.7	24.5
International	30.2	45 to 63.2

Source: SNCB, STAR 21, 1990.

The composite table below summarises the projections for freight transport.

Summary of freight transport forecasts

	Mode	Period	Expected growth in the event of no policy changes
Van de Voorde & Meersman	All modes	1987-2000	+5 % to +71 %
Mobibel	All modes	1990-2005	+49 % to +124 %
STAR 21	Railways	1987-2010	+14 % to +44 %

Question 2: Current state of infrastructure and capital projects

Roads and motorways

On 1 January 1995, the Belgian road network consisted of some 1 670 km of motorways, 120 700 km of former national roads now administered by the regions (see above), along with about 129 000 km of municipal and provincial roads. It is among the densest networks in the world.

Some motorway links remain to be built on certain routes, in particular a few kilometres to link the A18-E40 motorway to the French network near Dunkirk, a section of the A8 motorway between Brussels and Lille and the connection of the A26-E25 motorway to the existing system in the Liege urban area. Those sections are currently under construction or about to be started.

In the Flemish area, there is a plan to build a second motorway linking Antwerp to Ghent, Bruges and Dunkirk with a parallel section to Belgium's border with the Netherlands, running north of Bruges. The new motorway involves the transformation of the RN49, which currently has double two-way traffic lanes, and the building of a new motorway section near Bruges. A connection to the Zeebrugge seaport is also planned, as well as improved connections to the city and port of Ghent and the completion of a second motorway link to Brussels by transforming the RN177 (currently with double or triple two-way traffic lanes) into a real motorway.

Railways

Many factors affect the capacity of the rail network, depending on the line in question: the nature of traffic (percentage of passenger and freight trains), the line's profile, bypasses and the running time of various trains. At this time, all major SNCB lines have double tracks, with triple or quadruple tracks on certain sections.

The SNCB's ten-year plan (1996-2005), which was approved by the government, calls not only for an overall increase in productivity (see above) but also the replacement and upgrading of the equipment and capital projects, including:

- the integration of Belgium into the high-speed train network by constructing 189 km of new lines and by increasing capacity and top speed on 114 km of existing tracks;

- an increase in the capacity of several line sections in the Brussels area;

- higher cruising speed for trains on certain lines;

- an upgrading of freight-transport equipment on major lines by:
  - gradually adapting lines, bridges and tunnels to allow trains to run at speeds of 120 km/h pulling cars carrying 22.5 tonnes per axle on lines linking seaports (Antwerp, Ghent and Zeebrugge) with major industrial areas (Liege and Charleroi) and border crossings;
  - building one or two additional lines between Ghent, Bruges and Zeebrugge;
  - creating a second access line to the port of Antwerp;

- modernising terminal facilities used for freight transport, by:
  - developing the railway infrastructure in ports;
  - expanding terminals used for combined traffic;
  - creating multipurpose platforms.

Question 3: Capacity problems

Roads and motorways

Traffic tie-up problems on motorways occur at rush hour near Brussels, as well as in Antwerp, where traffic volume is by far the highest (Appendixes 3 and 4).

Railways

The most sensitive points and heavily travelled sections appear clearly on a map of the railways (Appendix 5). The problem is most acute for freight trains at the port of Antwerp.

Question 4: Measures

Roads and motorways

In order to reduce traffic problems on motorways around Brussels, surveys are being conducted with a view to improving rail connections with the suburbs.

Furthermore, there are plans to widen the northern section of the ring road (bypass) around Brussels from a double three-lane to a double four-lane motorway, possibly using the emergency lane in sections, as was done with success some years ago on the A3-E40 motorway between Brussels and Louvain in the direction of the capital.

Railways

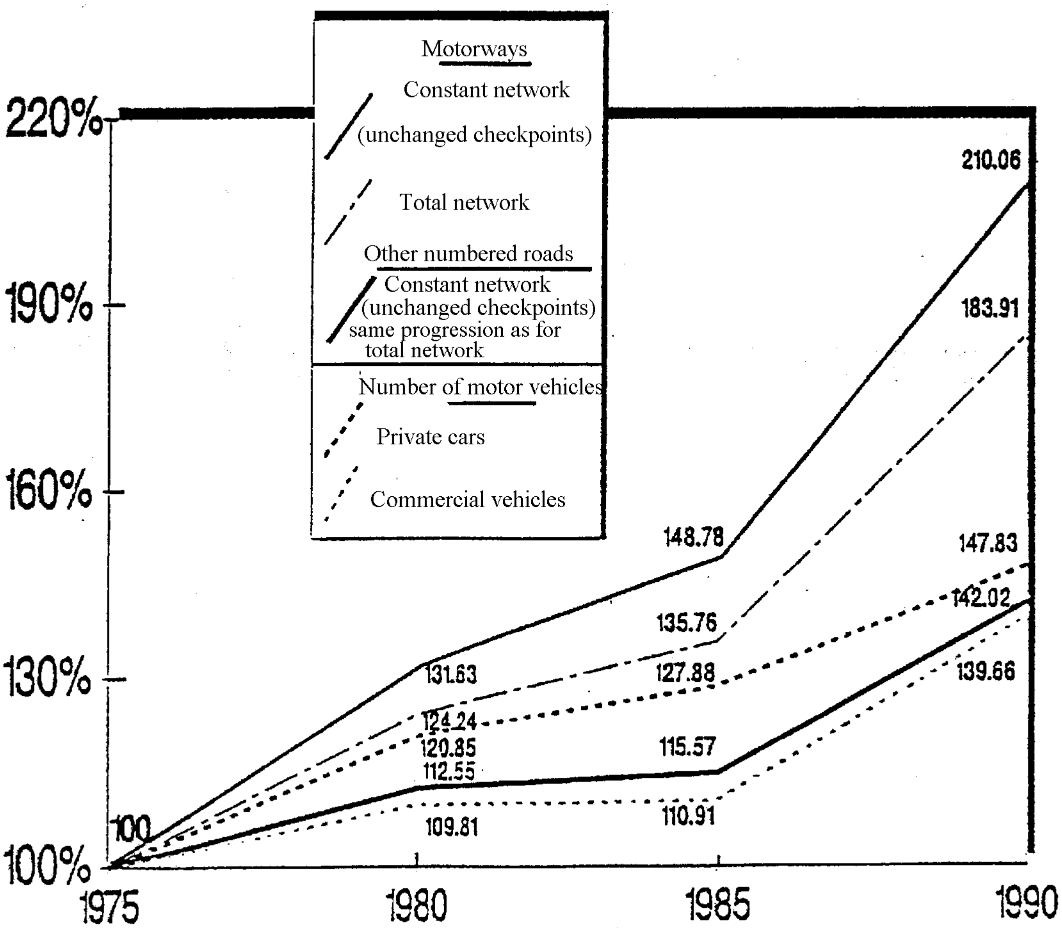
The SNCB has been implementing a series of measures aimed at modernising its equipment and the operation of railways, so as to upgrade services, make the system profitable and increase productivity.

These measures seek to speed up freight transport in order to improve flow and integrate it into overall traffic. In order to augment the capacity of lines, the SNCB will gradually separate freight traffic from passenger traffic on various routes.

For passengers, measures under consideration concern services and include:

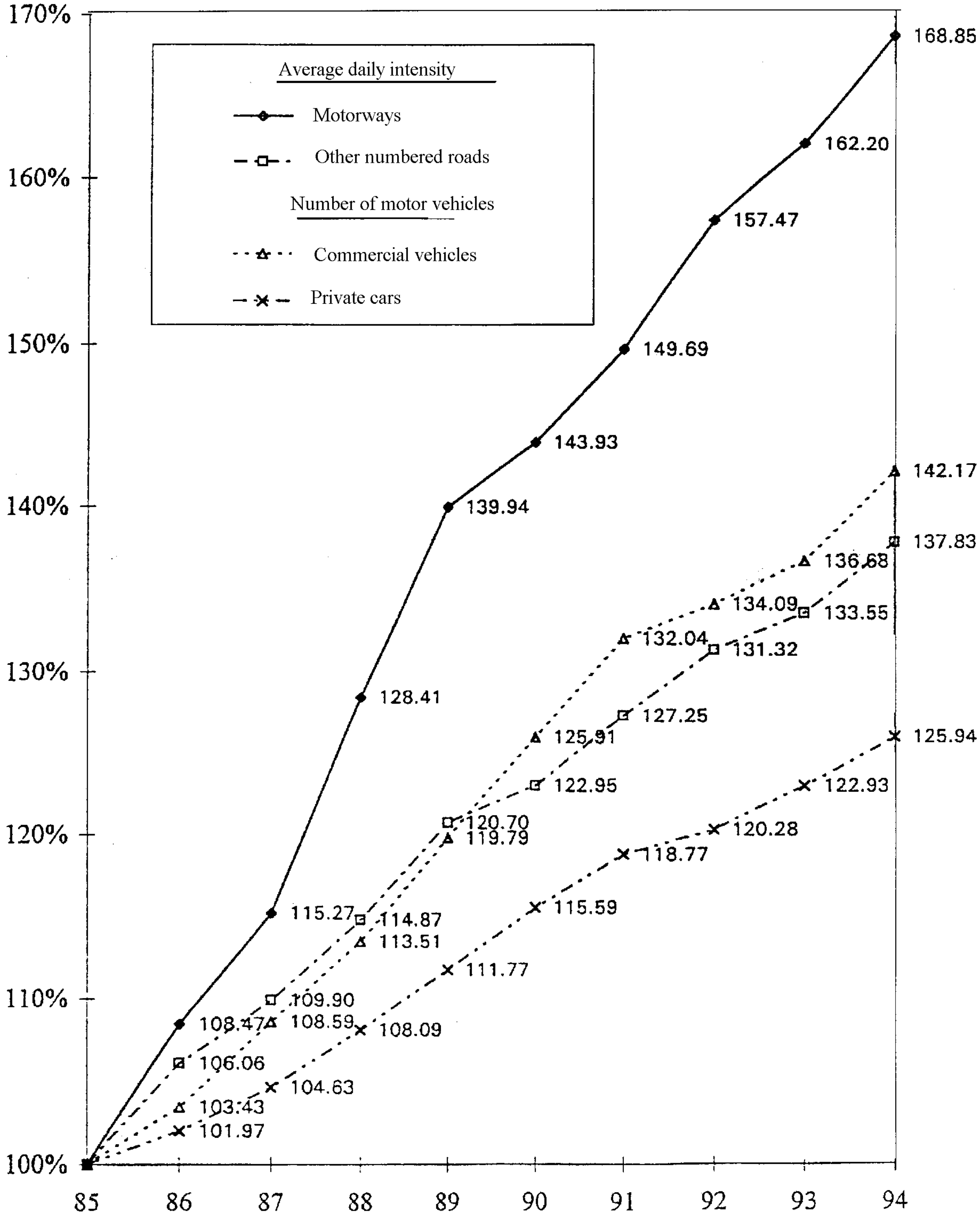
- raising train cruising speeds on long distances (high-speed trains);
- running trains at shorter intervals over short stretches;
- improving passenger facilities by renovating stations (ten-year plan);
- developing interconnections among transport modes through proven measures such as the building of car parks;
- developing co-ordination with urban transport systems;
- using promotional fares for short trips;
- improving rail connections to the Brussels National airport.

Appendix 1: ***Changes in traffic intensity, 1975-1990***



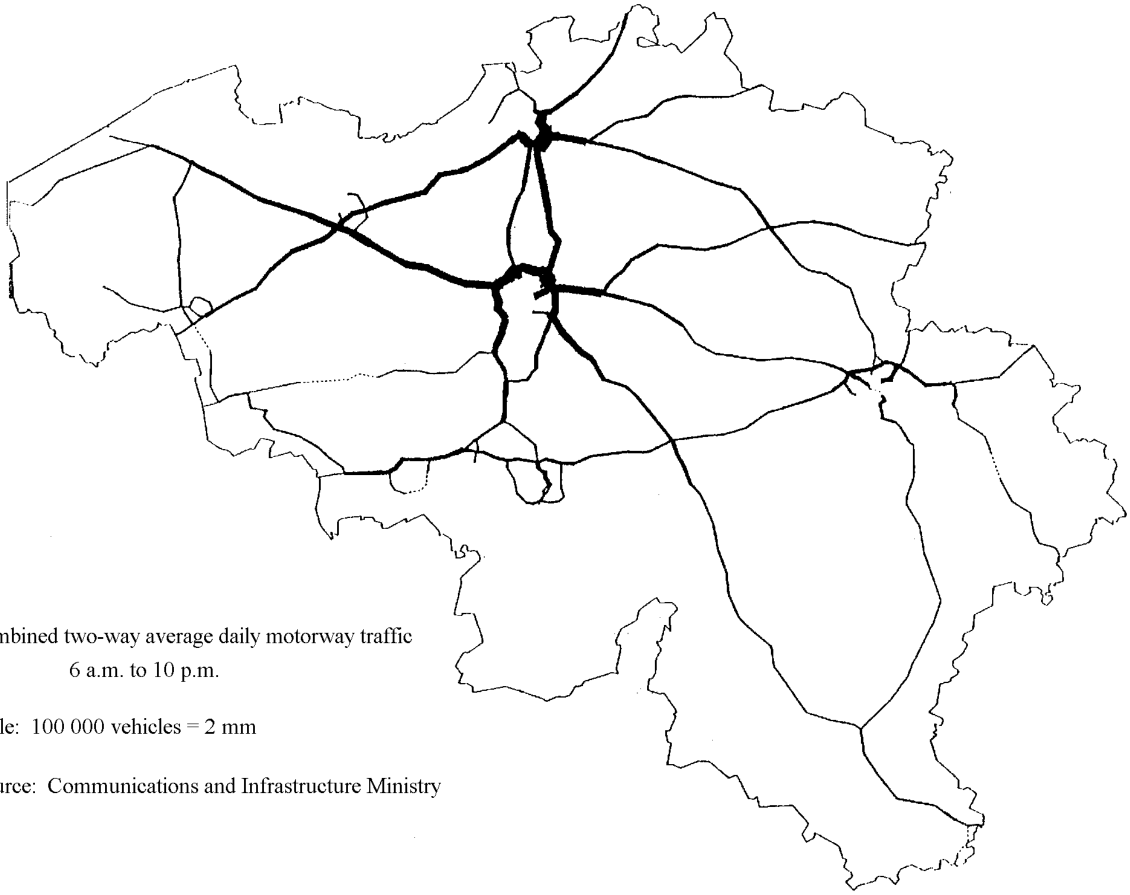
(Source : Communications and
Infrastructure Ministry)

Appendix 2: ***Changes in traffic, 1975-1994***



(Source : Communications and Infrastructure Ministry)

Appendix 3: ***Schematic diagram of traffic patterns on motorways in 1994***

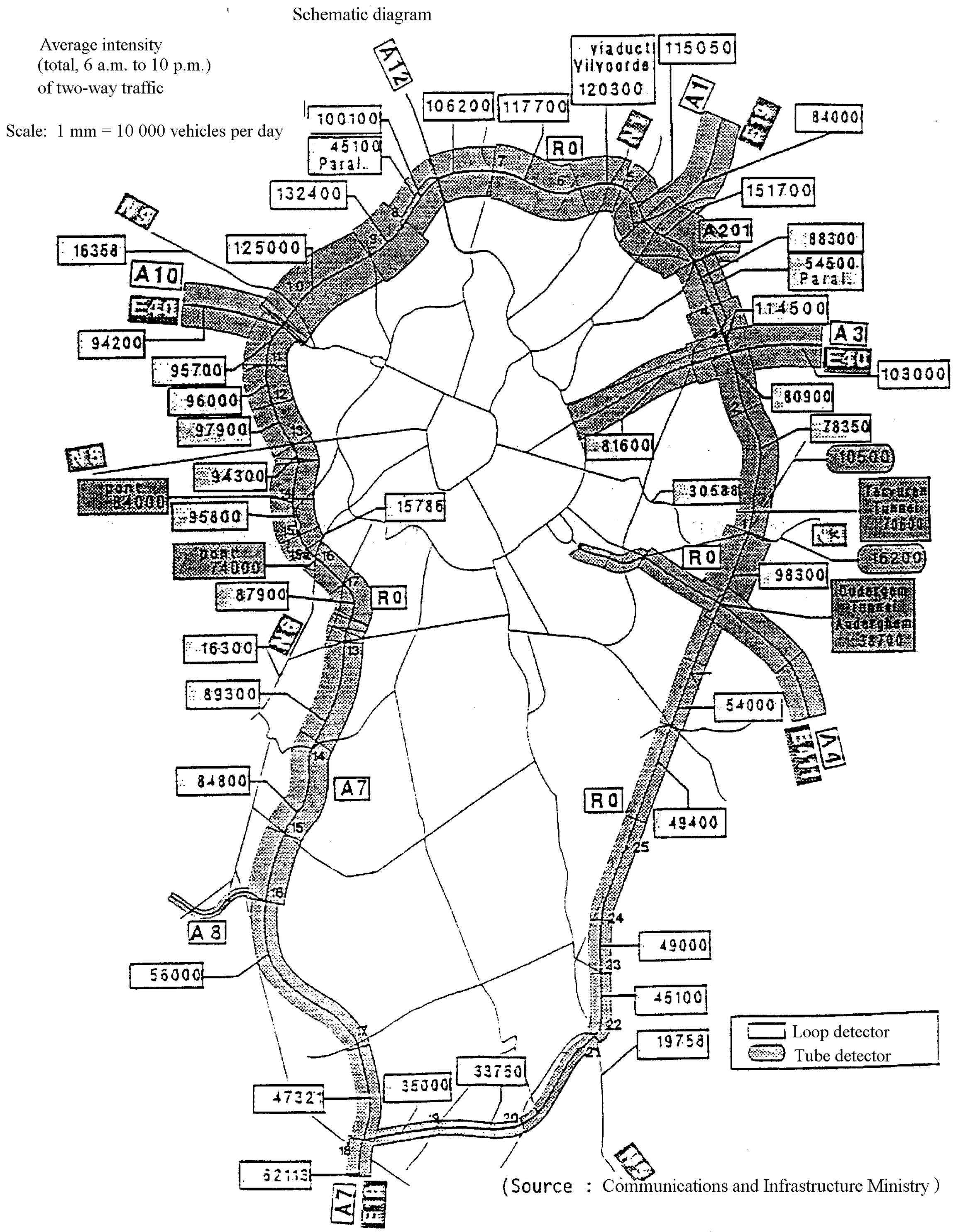


Combined two-way average daily motorway traffic
6 a.m. to 10 p.m.

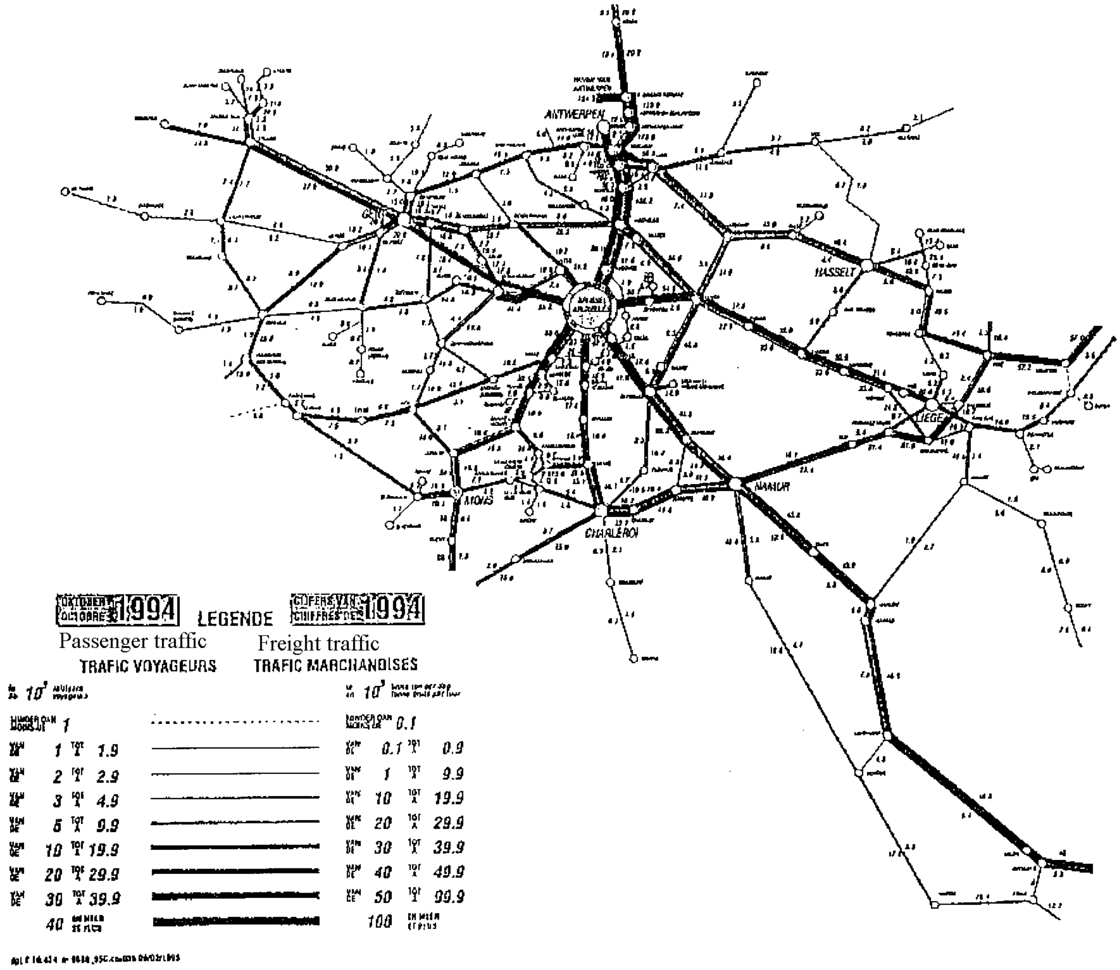
Scale: 100 000 vehicles = 2 mm

Source: Communications and Infrastructure Ministry

Appendix 4: ***Schematic diagram of traffic patterns around Brussels***



Appendix 5: ***Geographic pattern of passenger and freight rail traffic in 1994***



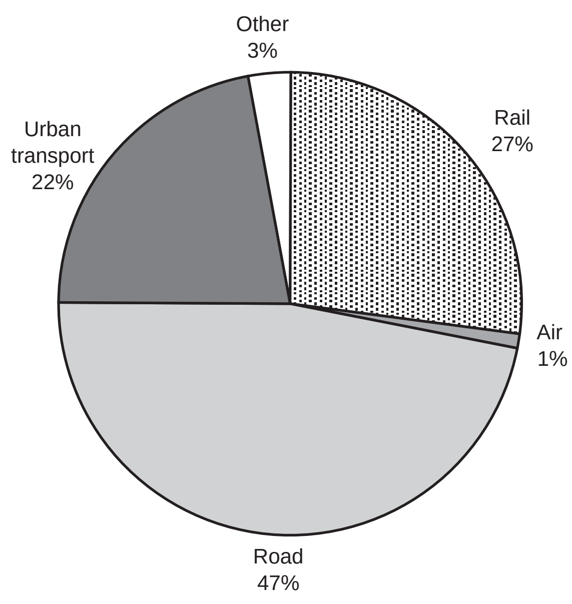
BOSNIA AND HERZEGOVINA

Total area: 51 129 km²
Population: 4 300 000

The war in the former Yugoslavia has caused considerable damage to the country's economic and industrial fabric as well as to its transport infrastructure. The conflict has also had a significant impact on data collecting and processing. The most recent statistical data available are for 1990 and, for certain indicators, 1991.

In 1990, the transport and communications sector represented 6.1 per cent of the nation's GDP, down from 7.7 per cent in 1984, or a decline of 26 per cent; industrial output only dropped by 6 per cent over the same period. The transport and communications sector was clearly very hurt by the war years.

Figure 1. **Share of gross domestic transport income by mode in 1990**



Source: ECMT.

Question 1: Future trends in goods and passenger traffic

Given the extent and number of difficulties involved in the country's reconstruction and economic recovery, it is not easy to prepare any kind of timetable. Furthermore, much of the population has been displaced or exiled and little is known as to when and how people may return. For these reasons, it is impossible to forecast future traffic trends.

Passenger traffic

Statistical data on passenger traffic are based on the entire rail network and services provided by registered road transport companies. In the case of urban and suburban transport in certain cities, the figures do not distinguish among modes of transport, i.e. bus, streetcar or trolley.

No statistical data are available on individual means of transport (automobile, motorcycle, bicycle).

Road passenger traffic

The information available refers exclusively to mass-transport.

Mass transport by road, 1984-91

	Passengers (thousands)	Passenger-kilometres (millions)
1984	68 912	3 083
1985	71 548	3 104
1986	73 188	3 156
1987	50 990	2 717
1988	71 662	3 137
1989	70 854	3 070
1990	66 165	2 737
1991	49 564	1 479

The share of total passenger traffic accounted for by road transport has increased gradually from 78.4 per cent in 1984 to 83.4 per cent in 1990 and 86.8 per cent in 1991.

Even though no forecast of future traffic is available, the Bosnian authorities are expecting a steep increase in road traffic in coming years, for three reasons:

- social and economic changes;
- the new geopolitical situation in the region;
- the time required to restore the rail network as compared to repairing roads.

Rail passenger traffic

Rail passenger traffic, 1984-91

	Passengers (thousands)	Passenger-kilometres (millions)
1984	18 994	1 654
1985	18 964	1 644
1986	18 828	1 646
1987	17 000	1 568
1988	15 404	1 459
1989	14 287	1 433
1990	13 171	1 382
1991	7 527	637

Rail transport's share of total passenger traffic has declined gradually since 1984 (by 21.6 per cent) to reach 13.2 per cent just before the start of hostilities. Political developments hastened the decline. Since the end of the war, there are plans to restore and relaunch this mode, but it is not possible to forecast a timetable or to know whether passenger volume will revert to its pre-war level. In the long run, this form of transport is expected to decline further.

Urban and suburban mass transport

Mass transport (streetcar, bus and trolley) in urban areas, 1984-91

	Passengers (thousands)	Number of locations
1984	495 545	46
1985	503 333	51
1986	514 192	51
1987	523 872	51
1988	504 740	45
1989	515 464	44
1990	496 243	44
1991	458 606	40

It is difficult to give an opinion on this type of traffic, as the number of cities and towns taken into consideration for statistical purposes has changed several times over the period. Furthermore, the lack of data on the population's use and ownership of motor vehicles makes it impossible to draw conclusions as to the intensity of urban and suburban traffic and the breakdown between modes.

Air passenger traffic

For the period under review, domestic air passenger traffic was essentially non-existent. Three airports (Sarajevo, Banja Luka and Mostar) handle international air traffic and flights to and from other republics of the former Yugoslavia. At the present time, the Banja Luka airport is not operational. In 1991, 700 000 passengers travelled through the Mostar and Sarajevo facilities, of which 550 000 for Sarajevo alone. Air traffic is expected to increase by 8 per cent a year between the end of 1996 and 2005.

Freight traffic

The trends are the same for the transport of goods as for that of passengers. The two principal modes for shipping freight in Bosnia are rail and road transport. Other forms of transport play an insignificant role.

Road freight traffic

Data on road traffic include the flow of goods shipped by firms on their own behalf and for third parties.

Road freight traffic volume, 1984-91

	Tonnes (thousands)	Tonne-kilometres (millions)
1984	35 519	4 335
1985	36 404	4 288
1986	40 993	4 486
1987	34 296	4 203
1988	30 429	3 926
1989	27 603	3 955
1990	19 427	3 066
1991	13 717	2 205

In 1991, public road transport firms accounted for a much smaller share of total traffic than for passenger transport:

– 44.2 per cent of volume transported by all modes;
– 47.6 per cent of total tonne-kilometres of combined modes.

In addition, their share of combined freight traffic has declined from 52.7 per cent in volume terms in 1984, although their share of tonne-kilometres has remained unchanged since 1984 at 47 per cent.

Rail freight traffic

The pre-war economic and industrial structure of Bosnia-Herzegovina largely favoured the flow of goods by rail owing to the heavy industry and mines of this region of the former Yugoslavia. It is therefore not surprising that rail transport accounted for 52.4 per cent of total volume as well as tonne-kilometres in 1991. Its share of total freight transport is particularly noteworthy in view of the fact that the Bosnian railway network is not very extensive.

However, according to the Bosnian authorities, the situation is not expected to last. Instead, the share of rail transport is likely to decline in coming years, owing to changes in the country's industrial structure.

Rail freight traffic volume, 1984-91

	Metric tonnes (thousands)	Tonne-kilometres (millions)
1984	31 825	4 889
1985	31 828	5 037
1986	32 464	5 235
1987	30 230	4 816
1988	29 397	4 891
1989	29 630	4 728
1990	26 253	4 005
1991	17 307	2 424

River freight traffic

River freight traffic, 1984-91

	Domestic shipping (thousand tonnes)	Exports and imports (thousand tonnes)
1984	2 128	337
1985	1 759	179
1986	1 528	303
1987	2 927	198
1988	2 366	134
1989	2 903	242
1990	736	19
1991	310	-

The traffic figures refer to shipments passing through the ports of Brcko and Bosanski, on the Sava river, the country's only navigable waterway. This border river is used for trade with neighbouring countries. Consequently, as the political situation in the former Yugoslavia deteriorated in the 1990s, river traffic was quickly and strongly affected. Between 1989 and 1990, the volume of domestic shipments fell by three-fourths. In 1991, freight imports and exports had ceased completely.

Question 2: Current state of the infrastructure and capital projects

In 1991, the transport infrastructure of Bosnia and Herzegovina included:

- 1 040 km of railways;
- 21 677 km of roads;
- two river ports;
- five airports, of which only three were used for civil aviation.

Road infrastructure

Domestic road network, 1984-91
Kilometres

	1984	1986	1988	1990	1991
Main	3 666	3 724	3 722	3 722	3 722
Regional	3 748	3 756	3 682	3 683	4 104
Local	13 109	13 196	13 439	13 763	13 851

Domestic road network surface, 1984-91
Kilometres

	1984	1986	1988	1990	1991
Total roads of which:	20 523	20 676	20 843	21 168	21 677
- concrete, asphalt	9 317	10 108	10 728	11 436	11 751
- gravel	8 692	8 536	8 549	8 146	8 233
- dirt	2 514	2 032	1 566	1 568	1 693

Of the 21 677 km of roads in Bosnia and Herzegovina, 54.2 per cent have a concrete, asphalt or similar surface. The density of the road network is 0.42 km per km^2 and 4.96 km per 1 000 population.

In the period 1984-91, the road network grew by 5.6 per cent, and that of surfaced roads by 26.1 per cent. There are currently no motorways in Bosnia and Herzegovina. A major project is the building of a motorway between Capljina and Samac, which would become part of the TEN.

Rail infrastructure

The rail network of Bosnia and Herzegovina extends over 1 032 km, of which 94 km of double tracks. Three-fourths of the network (777 km) are electrified with alternating current at 25 kV/50Hz, 88 per cent consists of tracks with a D4 load capacity (225 kN/axle, 80 kN/m), and the balance of 12 per cent consists of tracks with a load capacity of between B2 and D3, or 180 to 225 kN/axle and 64 to 72 kN/m.

Trains may travel at a maximum speed ranging from 60 to 120 km/h, depending on the line segment. The characteristics of the rail network reflect the country's geography, with its hills and mountains.

The rail infrastructure has been severely affected by the war. It suffered heavy damage in some parts and in others lines were made impracticable. Priority has therefore been placed on restoring the damaged sections and repairing structural work along the most important lines.

In a second phase, reconstruction will focus on modernising the railways (lines, train speeds, electrification, signalling system, safety equipment, telecommunications systems, etc.).

On the main Vrpolje-Sarajevo-Mostar-Ploce line (important for Europe), the Bosnian government is considering laying a second track on the remaining single-track sections between Vrpolje and Sarajevo, as well as improving the line in order to enable trains to travel at higher speeds. Long-range plans also call for rebuilding tracks to the south of Sarajevo (known as the "Bradina Ramp"). However, in light of events in the region, it now seems necessary to revise earlier plans.

Air traffic infrastructure

Bosnia and Herzegovina have five airports in Sarajevo, Mostar, Banja Luka, Tuzla and Bihac. The last two are military airports. All were heavily damaged during the war. Repair work is scheduled to start in 1997 at Sarajevo and Banja Luka so that they will be ready to handle passenger traffic by the summer of 1997. Work is expected to be completed by the end of 1998, with chiefly emergency repairs done in 1997.

The Mostar airport was partly repaired by the international peacekeeping forces stationed in Bosnia and Herzegovina.

River traffic infrastructure

Rehabilitation work is currently in the planning stages for the ports of Brcko and Bosanski Samac.

Question 3: Capacity problems

Owing to the war and the destruction it caused, the transport infrastructure of Bosnia and Herzegovina faces a number of capacity problems.

Road transport

Capacity problems are primarily a result of damage to the basic infrastructure. A total of 51 bridges and several tunnels were destroyed during the war. Road surfaces were heavily damaged.

Rail transport

The situation is even more serious in the rail network, as 20 bridges were destroyed during the fighting, three of which spanned the Sava river and two the Neretva.

Links with neighbouring countries were cut off and lines were destroyed in several places. Electrical, signalling, safety and telecommunications facilities have to be rebuilt. Most buildings were damaged or destroyed. Rolling stock located in combat zones was significantly damaged or completely destroyed.

Other capacity problems are not due to the war but to the nature of the Bosnian railway system. In mountain areas, for instance, the steep gradients and very sharp curves require double or triple traction.

Air transport

No capacity problem exists at this time or is expected to arise in the near future for this mode of transport, as Bosnia and Herzegovina has enough airports with proper facilities.

River transport

The Sava river is not a recognised international waterway for navigation, so that commercial shipping is limited. The equipment and infrastructure of its two ports require restoration.

Question 4: Measures

One of the priority tasks of the government and of other concerned institutions is to restore the transport infrastructure. Reconstruction and the extension of networks will depend to a large extent on the country's financial resources. Given the current situation, the Bosnian authorities cannot rely exclusively on financing from foreign sources.

Rehabilitation of the various transport networks is expected to take several years, as damage is extensive and the country's economy remains shaky. At first, emphasis is to be placed on initial repairs required to restore traffic, with more general restoration work to come later. Following the reconstruction period, the government is expected to take certain steps aimed at improving the overall transport level, including building major roads, increasing the speed and comfort of trains, eliminating bottlenecks, improving safety, developing international air transport, taking into consideration environmental impacts, and making the system more energy-efficient.

SOURCES

1992 Statistical Annual of the Republic of Bosnia and Herzegovina.

ZIZ Statistics for 1992.

Internal statistics of the Bosnia and Herzegovina Railways.

IPSA documents (Transport Institute, Sarajevo).

BULGARIA

Area: 111 000 km²
Population: 8 500 000

It is fairly difficult to define trends in the transport sector, as well as for the Bulgarian economy as a whole. In May 1996, some international observers thought that the general economic situation of the country would stabilise somewhat, but a few months later a number of indicators were still fluctuating sharply. Although GDP grew by 2.5 per cent in 1995, inflation is at a low of 2.6 per cent on average, and unemployment is down by 1.8 per cent, the country is in the throes of a severe banking crisis and the currency has been sharply devalued.

Question 1: Future trends in passenger and freight traffic

The information on Bulgaria relates only to traffic trends between 1990 and 1994. There are no data on future prospects. For passenger traffic, changes in statistical methods explain in part the steep fall in traffic. Nothing is said in this respect about freight traffic (and road transport in particular), and yet the large fall in this traffic is very difficult to account for.

Passenger traffic

Between 1990 and 1994 the volume of passenger traffic fell by half, all modes combined.

Inland waterway-maritime transport, with a total of 266 000 passengers in 1990 (90 per cent by maritime transport), carried only 61 000 passengers in 1994. Inland waterway transport lost 60 per cent of its traffic volume and maritime transport 80 per cent.

Although it is negligible, inland waterway transport doubled its traffic in terms of passenger-km during this period. Maritime transport lost 84 per cent of its 1990 passenger-km. In 1994 it carried less than half the traffic, in passenger-km, of inland waterways, i.e. 3 million as against 6 million passenger-km.

Passenger traffic trends, 1990-94

	1990	1991	1992	1993	1994
Thousands of passengers:					
- road	2 167 090	1 359 310	1 306 667	1 096 158*	973 652
- rail	102 399	72 787	75 909	76 085	65 730
- urban transport (tramway and trolley)	485 496	352 146	409 494	277 648*	258 357
- air	2 534	1 217	1 460	1 848	1 542
Total	2 757 815	1 785 588	1 793 607	1 451 820	1 299 342
Thousands of passenger-km:					
- road	25 955	19 026	16 957	14 062*	12 817
- rail	7 793	4 866	5 393	5 837	5 059
- urban transport (tramway and trolley)	1 632	1 164	1 319	978*	949
- air	3 760	2 677	2 999	4 173	3 604
Total	39 162	27 744	26 679	25 064	22 438

* Introduction of a new method of counting passengers with travel passes in the Sofia area.

Road transport

While the number of passengers carried fell by half, the number of buses in operation in 1994 was only down by 30 per cent from 1990.

Changes in the number of vehicles, 1990-94

	1990	1991	1992	1993	1994
Number of buses	13 232	12 716	11 360	10 287	9 521
Number of trolleys	836	844	845	836	822
Number of cars	1 317 437	1 358 976	1 411 278	1 505 451	1 587 873
Number of private cars	1 276 751	1 316 644	1 361 306	1 443 153	1 517 579

The number of private cars on the road increased by 18 per cent in four years.

Rail transport

Changes in rolling stock and capacity, 1990-94

	1990	1991	1992	1993	1994
Number of locomotives	1 111	965	943	939	878
Number of powered rail vehicles	94	93	90	90	88
Number of wagons	1 932	2 009	1 905	1 797	1 736
Number of seats	124 772	132 253	131 845	132 890	119 951

Although traffic and rolling stock figures seem less alarming than the figures for road transport, the Bulgarian railways seem to be in deep crisis and on the verge of bankruptcy.

Freight traffic

The volume of freight traffic has fallen considerably, irrespective of mode. In 1994 it was only 27 per cent of the volume in 1990. However, as international trade is growing and the distances travelled are lengthening, traffic in tonne-km was only 12 per cent down from the 1990 figure.

Maritime transport seems to be the mode that has weathered the economic transition most successfully. In 1994, maritime freight tonnage was still 83 per cent of the 1990 volume, whereas road freight tonnage was divided by six, that of rail by two, and that of inland waterways by four over the same period.

The present trend in road transport is all the more disquieting in that traffic in tonnes as well as in tonne-km is still falling sharply, whereas the decline is at least slowing for other modes. Rail transport in tonne-km increased by 1 per cent between 1993 and 1994.

Freight traffic, 1990-94

	1990	1991	1992	1993	1994
Thousand tonnes carried:					
- road	295 867	151 280	96 627	74 101	51 673
- rail	63 253	35 238	32 261	31 417	30 274
- inland waterway	2 630	1 552	1 238	768	608
- maritime	20 349	18 609	15 966	15 807	17 087
Total	392 580	215 049	152 033	130 427	108 254
Million t-km :					
- road	9 821	6 307	5 448	4 050	3 679
- rail	14 132	8 685	7 758	7 702	7 774
- inland waterway	1 606	1 024	837	457	360
- maritime	65 093	62 475	63 363	67 963	68 600
Total	91 332	78 976	77 708	80 529	80 824

Road transport

	1990	1991	1992	1993	1994
Number of HGVs	37 830	35 062	27 014	20 667	16 387
Capacity in tonnes	378 298	361 699	304 942	252 419	215 750
Volume of freight transported	295 867	151 280	96 627	74 101	51 673
Traffic in million t-km	9 821	6 307	5 448	4 050	3 679

The figures supplied by the Bulgarian authorities only cover public firms, so that there are no figures on the new private firms. However, many small road transport companies have recently been set up, and, according to the same authorities, road haulage is the sector of transport that has coped the most successfully with the economic transition and privatisation.

Latest figures for the number of road haulage firms (including passenger transport)

	1994	1995
Number of private enterprises	15 477	21 141
Number of state enterprises	197	185

In March 1996, there were 6 126 firms engaged in international road haulage, of which 5 747 had only from one to five lorries. Only 29 had more than 50 vehicles.

Furthermore, the participation of foreign hauliers in the transport of Bulgarian exports and imports is tightly regulated, and hence very small, less than 1 per cent. The entry of foreign operators into the Bulgarian market is subject to bilateral agreements based on the principle of reciprocity.

Rail transport

Four types of freight accounted for more than 60 per cent of rail tonnage in 1994: coal and coke (8 060 000 tonnes), liquid fuels (4 485 000 tonnes), metals (3 337 000 tonnes) and quarry products (2 488 000 tonnes). The last type of cargo has suffered particularly from the recession; in 1990 it was the second largest rail freight market, with 9 770 000 tonnes carried.

Inland waterway/maritime transport

The Bulgarian transport authorities are relying on the lifting of the embargo on the Danube to revive inland waterway transport.

Tonnage loaded and unloaded in inland waterway terminals by destination, 1990-94

	1990	1991	1992	1993	1994
Import	3 138	1 735	1 912	2 274	1 612
Export	479	253	305	105	139
Transit	5 772	2 039	1 065	1 094	1 215

Ro-Ro transport on the Danube is growing, especially on the following routes:

- -- Bulgaria-Reni (Ukraine)
- -- Bulgaria-Passau (Germany)

For this type of traffic there are three regular services on the Danube, between Romania and Bulgaria, in the regions of Ruse-Giurgiu, Vidin-Kalafat and Oriakhovo-Beket. They are primarily used for TIR international freight transport.

Tonnage loaded and unloaded in maritime ports by destination, 1990-94

	1990	1991	1992	1993	1994
Import	19 006	12 683	10 224	12 912	13 034
Export	4 169	4 110	5 009	5 507	6 926

Maritime transport currently seems the best placed (including financially) to weather the economic difficulties.

Scheduled Ro-Ro services are also operated to Poti in Georgia and Novorosiisk in Russia from Burgas and Varna. The Bulgarian company “Bulcon” still operates a service from Varna to ports in Western Europe.

Combined transport

Since 1970, combined transport has been a priority of Bulgarian transport policy. Up to 1990 priority was given to developing the use of 20-foot ISO series 3 containers (i.e. gross weight of 5 tonnes). However, TEU traffic fell by two-thirds between 1990 and 1994.

	1990	1994
Number of TEU carried	146 050	52 766

However, new combined transport services are being introduced on the corridors defined in Crete. They are part of the PACT (Pilot Actions of Combined Transport) programme.

Question 2: Present situation as regards infrastructures and investment projects

Description of existing infrastructure

The level of infrastructure is increasing very slowly in all modes.

Road infrastructure

Bulgarian road infrastructure by type of road

	1990	1991	1992	1993	1994
Total length of network	36 922	36 930	36 932	36 935	36 911
Length of motorway	273	276	276	277	277
Roads					
- category I	2 933	2 933	2 933	2 933	2 924
- category II	3 798	3 797	3 797	3 796	3 789
- category III	6 263	6 263	6 263	6 261	6 261
- category IV	23 655	23 661	23 663	23 668	23 660

Since 1990, road density per 1 000 km² has been 332.6, and 92 per cent of the network is paved (asphalt, macadam, etc.). In four years, only 11 km of roads were built, and about 80 km were paved.

Rail infrastructure

	1990	1991	1992	1993	1994
Length of network	4 299	4 299	4 294	4 294	4 291
Length of 1435 mm gauge track	4 054	4 054	4 294	4 294	4 291
- of which twin track	960	960	960	960	964
- of which electrified	2 640	2 640	2 650	2 650	2 645

Rail density per 1 000 km² is 38.7 km and has not changed since 1990. Sixty one per cent of the network is electrified, and 87 per cent of freight tonnage is carried on electrified lines.

The rail system is to be reorganised under the PHARE programme.

Evaluation of present and future infrastructure needs

It is difficult to predict public funding for transport infrastructure given the present economic instability. According to studies carried out for the European Commission (the TINA group), Bulgaria would spend ECU 50 and ECU 60, respectively, per year per inhabitant on infrastructure in 2000 and 2005 compared with an average of ECU 200 and ECU 250 in the EU. These figures seem all the smaller in that needs are very great. Moreover, in real terms, public revenue fell steeply by between 50 and 60 per cent between 1989 and 1993. Consequently, the budget for infrastructure investment and maintenance was slashed by 80 per cent. Public spending on infrastructure in 1994 ECU per inhabitant thus fell from 42 in 1989 to 15 in 1993.

At 25.6 MECU in 1992, spending on road infrastructure was barely sufficient to cover basic maintenance.

A 1992 World Bank study showed that more than half of the Bulgarian road network required upgrading and repair, and that an average expenditure of 500 MECU would be needed for widening roads, improving safety, and bridges. However, it is difficult to evaluate these figures precisely, notably those regarding the proportion of the network that requires repair.

Estimated cost of raising the Bulgarian infrastructure to European standards

	Roads			Rail		
	Length (km)	Cost (MECU)	MECU/ km	Length (km)	Cost (MECU)	MECU/ km
Corridors defined in Crete	1 054.2	3 727	3.54	1 262	2 074	1.64
All corridors	1 511.2	5 310	3.51	1 534	2 429	1.58

Estimated investments for Bulgarian road and rail infrastructure, 1996-2005, by scenario

	Scenario 1 *	Scenario 2 *
Road rehabilitation	1 004	1 004
Rail rehabilitation	214	214
Upgrading of main roads	1 738	2 433
Upgrading of local roads	588	1 177
Upgrading of railways (main network)	357	500
Upgrading of TEN roads	1 593	2 124
Upgrading of TEN railways	729	972
Total rehabilitation + upgrading	6 222	8 422

* The two scenarios for the evolution of the economy to 2005 are those of Michel Gaspard, *Le financement des infrastructures de transport en Europe centrale et orientale*.

Infrastructure projects on TEN corridors

There are 14 priority projects for all modes:

1. Project No. IV/12:

Construction of a new road and rail bridge to the west of the common border with Romania, between the town of Lom (Bulgaria) and Rast (Romania), or between Vidin and Kalafat.

The purpose of the project is to facilitate freight flows between Central European countries and Greece and Turkey. It has medium-term priority and would cost about $140 million. It is still in the design phase pending an agreement between the two countries concerned.

2. Project No. IV/14:

Electrification and modernisation of the railway line between Plovdiv and Svilengrad; reconstruction of the track and installation of signalling and telecommunications equipment to make it possible to raise train speeds. Electrification is a medium-term priority, whereas reconstruction and modernisation to raise train speeds is a long-term priority. All told, $358 million would be required.

The design has been approved and electrification of the Plovdiv-Dimitrovgrad section is under way.

3. Project No. IV/16a and No. IV/16b:

Both of these are combined transport projects:

Project 16a: construction of a modern terminal near Sofia with storage areas, refrigerated warehouses and modern combined transport equipment. The priority is long-term, and the cost would be $50 million. The design phase has not yet been completed.

Project 16b: modernisation and reconstruction of the existing terminal in Dimitrovgrad, expansion of the storage area and acquisition of new equipment. The priority is also long-term and the project should cost $30 million.

4. **Project No. IV/20:**

Reconstruction and modernisation of certain sections of one of the main international highways, the I-1/E-79, in the west of the country. It is planned to double the number of lanes and to build motorway sections, bypasses around urban areas, and road tunnels. Priority is being given to widening the Vladaja-Dragichevo section (8.353 km) to four lanes.

Priority is medium-term and the estimated cost is $440 million. Progress varies widely according to the sections.

5. **Project No. VII/3:**

Upgrading of the two main Danube ports, Ruse and Lom. The estimated investment is $20 million for the port of Lom and $30 million for the port of Ruse. The preliminary technical and economic studies have been completed only for Lom.

6. **Project No. VII/5:**

This project concerns the container terminal in the port of Varna. The aim is to improve the efficiency of the container handling facilities and to increase the terminal's capacity to cope with increased traffic. The project provides for the purchase of new gantry cranes and modern equipment. It has medium-term priority, at an estimated cost of $52.8 million. The preliminary studies have been completed and the construction master plan is being drawn up.

7. **Project No. VII/6:**

This project concerns the container terminal in the port of Burgas. It includes the construction of an additional wharf, construction of new loading and unloading areas and the acquisition of modern equipment capable of handling over 120 000 TEU per year. The project has medium-term priority at a cost of $42 million. The preliminary studies have been completed.

8. **Project No. VIII/10:**

Construction of a rail link from Gyueshovo to Kumanovo in F.Y.R.O.M. For the Bulgarians, it involves building a 2 km section on Bulgarian territory along its border with F.Y.R.O.M. For this, a rail tunnel has to be completed. The project has short-term priority, at an estimated cost of $12 million. The preliminary design work and constructions plans have been approved, and work is starting.

9. **Project No. VIII/1:**

This project is related to the previous one since it involves the reconstruction of the line between Gyueshovo and Radomir: 80 km of track must be electrified in order to increase train speeds from 65-75 km/h at present to 120-140 km/h. Until now this was a secondary line but the planned upgrading will allow it to handle international rail traffic. The cost is estimated at $100 million. The feasibility and engineering studies have been completed.

10. Project No. VIII/12a:

Modernisation of the port of Varna and in particular its grain terminal, and acquisition of additional equipment -- conveyors, silos and other equipment. The investment is fully warranted given the increase in traffic since a market economy was put in place. The preliminary studies have been incorporated in a master plan for all the port installations in Varna. The project has medium-term priority at a cost of $15.6 million.

11. Project No. VIII/12b

This project concerns the port of Burgas and particularly its bulk cargo terminal. Initially, the terminal will be moved as it is too near to residential areas. A new 200 x 400 m wharf with five berths will be built, and modern facilities, including 12 new cranes and an additional 200 000 m^2 storage area will be provided. A dike will be built and the entrance to the harbour will be dredged. The project has long-term priority, the aim being to provide high-quality services and to reduce the disturbance to residential areas. It should cost $80 million and is still in the design phase.

12. Reconstruction and modernisation of Sofia international airport

Sofia international airport will have to be rebuilt and modernised to cope with the projected increase in domestic and international air traffic, to improve safety, and to reduce environmental damage. The airport aims to become a hub for transcontinental long-distance flights. The project is a short-term one. ECU 140 million are needed to rebuild the runways and 120 million to rebuild the passenger and freight terminals and airport infrastructure. The entire project has been approved by all the authorities concerned and the preliminary work should start very shortly.

13. Development and reconstruction of Burgas international port

The project concerns all the transport infrastructure in the Burgas area: reconstruction of the freight terminal and of the runways of Burgas airport, and upgrading of its access roads. The aims are the same as for the previous project: to improve safety, to enable the port to cope with increased traffic and to reduce the impact on the environment. The project has short-term priority, with an estimated cost of ECU 60 million. The feasibility studies were carried out jointly by an English firm, Mott MacDonald, and the Air Transport Institute. Work is about to start.

Question 3: Capacity problems

The Bulgarian documents lack data on infrastructure. However, other documents stress the structural problems facing the various modes.

The degree of privatisation varies in different parts of the transport sector; the state still plays an important role in regulating market access and the conditions under which firms operate.

Road transport

Programme of withdrawal of the State from road transport undertakings
Percentage

	1996	1997	1998	2000	2005
Freight transport undertakings	95	80	70	50	34
Passenger transport undertakings	99	85	80	60	50
Service and repair companies	80	30	20	10	10
Total	98	96	94	88	68

Maximum fares are set for passenger transport. For intercity transport, prices can be set freely up to the maximum. For urban transport, however, the local authority sets fares. Passenger road transport contracts are awarded by tender in accordance with Decree No. 1 on the organisation of bus passenger transport, as approved by the Bulgarian Council of Ministers. The State is responsible for ensuring the roadworthiness of vehicles and road safety, and the local authorities for the quality of services.

Market access is granted only to carriers licensed to engage in transport in accordance with the 1991 Business Act. Natural and legal persons, whether Bulgarian nationals or not, must prove that they have been duly authorised. Licences are valid for one to three years and can be withdrawn by the Ministry of Transport in the event of failure to comply with legal requirements. Compliance with regulations is verified by the municipalities and a specialised road transport inspectorate under the Ministries of Transport and the Interior.

International passenger transport, scheduled bus and shuttle services also have to be licensed by the Ministry of Transport.

Freight transport rates are entirely deregulated.

Rail transport

In accordance with the 1995 Act, the newly constituted Bulgarian State Railways Company is both carrier and operator for domestic and international rail transport. Modelled after the European Union Directive 91/440, this Act separates infrastructure management from operation. From the accounting standpoint, the separation will take place in 1997.

Only ancillary services and activities such as wagon and container repairs, catering and sleeper services, will be privatised. The State will remain the principal owner of the railways.

Consequently, prices, especially for freight transport, are set subject to approval by the Ministry of Transport. Rail managers complain that they cannot compete on equal terms with road hauliers, who are free to set prices and, according to the rail managers, do not have to bear the user and maintenance costs of road infrastructure. The competition from road transport undertakings, especially in passenger transport, is considered all the more unfair in that these undertakings start new services alongside the existing rail services but with much lower prices.

Question 4: Measures

While a number of laws and regulations have been adopted since 1990, operating conditions still vary widely among modes and types of traffic. The situation for charges and taxes levied on transport undertakings is equally varied and complex. For Bulgarian road hauliers, the situation is fairly clear: they pay an annual tax for the use of infrastructure, calculated according to the engine capacity, age and type of vehicle. The (very few) foreign hauliers are subject to a completely different taxation system. Vehicles registered in countries with which Bulgaria has not signed a bilateral agreement are subject to a wide range of taxes and charges:

- entry tax;
- charges for using motorway and three and four-lane highways;
- a tax on vehicles with a gross weight of over 38 tonnes;
- a tax on vehicles more than 2.5 m wide, more than 4 m high and more than 22 m long;
- a tax on vehicles whose loading weight is high and badly distributed over the various axles (more than 10 tonnes/axle);
- a bridge toll on the Danube between Giurgiu and Ruse;
- charges for using roadside car parks and rest areas.

Total taxes and charges vary according to the type of vehicle (HGV, private car or bus), the category of road, vehicle dimensions, weight and axle load. Between the maximum and minimum amount of taxes and charges that can collected, the ratio is 15 to 1. The system favours domestic carriers, since a very large Bulgarian vehicle of over 38 tonnes with an axle load of 10 tonnes will pay only half the above-mentioned taxes and charges.

With financial assistance from the PHARE programme, the Bulgarian Transport Ministry is in the process of implementing the TOL system. It will come into service in 1997, initially on the Sofia-Plovdiv section of the Trakia motorway. This should shorten border crossing times since it is at border crossings that the taxes of the Road Tax and Licences Division of the Transport Ministry are collected.

Negotiations are currently under way with the European Union on the signature of an agreement that would make it easier for Bulgarian road hauliers to travel through the EU and for EU vehicles to travel through Bulgaria. It is also planned to sign an agreement on "Interbus" road operators.

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CROATIA

Area: 56 610 km²
Population: 4 784 265

Since 1991, the Croatian economy as a whole has experienced a steep decline. Most occupied territories were liberated by military action ("Bljesak" and "Oluja") and have once again become part of the political and legislative system of the Republic of Croatia. However, from an economic point of view, military action has replaced earlier priorities in the nation's budget, with the result that 60 per cent of GDP has been used for government spending. In 1995, foreign trade resulted in a trade deficit of $2 877.2 million. Exports amounted to $4 632.7 million (up 8.7 per cent over 1994) and imports to $7 509.9 million (an increase of 43.5 per cent over 1994). The trade deficit could not be offset by income generated from sources such as services, travel and tourism, and Croatia reported a balance-of-payments deficit for the year.

Economic data for 1995 indicate an increase of 3.9 per cent in the cost of living over the figure for November 1994. Unemployment rose from 1994 to 1995, with a 5.4 per cent drop in the number of jobs in 1995.

GDP was estimated at $17 billion for 1995. Industrial production rose by 0.3 per cent over 1994. Inflation was particularly low in 1995, but prices have risen by 3.7 per cent since 1994.

The economic situation of the Republic of Croatia appears about to turn around, and the country has begun to attract foreign investors, including from outside the European Union. A strong desire to become integrated and measures taken by Croatia at the European and international levels are the main reasons for this.

Question 1: Future trends in goods and passenger traffic

In terms of performance and organisation, transport in Croatia lags far behind that of the more developed systems of European Union countries. The share of transport costs in GNP is very high (16-20 per cent) in Croatia, as compared with that of other European countries (6-8 per cent).

Passenger traffic

In 1995, public transport traffic had declined by 55 per cent (in passenger-km) from its 1990 level, with a decline from 10 631 million passenger-km in 1990 to 5 719 million in 1995.

Only short-term forecasts are available for air transport.

Overland transport suffered considerably during the war and from the trade embargo. It is not surprising that growth only occurred in maritime transport.

At the end of the 1980s, tourism in the former Yugoslavia generated 60 million guest nights in hotels and revenues of $3 billion a year. Croatia accounted for the lion's share of this business, by virtue of its long Adriatic coastline. Military action in 1995 caused tourism to collapse again (8.5 million guest nights, as against 34 million in 1994). However, the Ministry of Tourism expects the sector to recover significantly in 1996 and anticipates that it will generate 17.2 million guest nights and revenues of $2 billion. The Croatian government is relying on income produced by this sector to restore its balance of payments.

Domestic and international public transport

Million passenger-km

	1990	1995	1997
Road	7 004	4 052	
Rail	3 429	943	
Maritime	198	280	
Air		444	625
Total	10 631	5 719	

Public transport

Thousands of passengers

	1990	1995	1997
Road	148 408	83 652	
Rail	40 248	17 455	
Maritime	8 101	5 591	
Air		679	900
Total	196 757	107 377	

Road passenger traffic

The considerable increase in the number of motor vehicles in Europe since the Second World War and the growth of individual travel has resulted in an expansion in automotive tourism from northern and western European countries to those of the south of Europe, in particular the regions of the Adriatic coast. Most tourists visiting Croatia arrive by car.

Motor vehicles in Croatia have increased at a rate comparable to that of other European countries, rising by 100 per cent since the end of the Second World War. In 1994, 825 852 automobiles, 1 861 buses and 2 943 commercial vehicles were registered.

Passenger road transport

	Passenger-km (millions)		Passengers (thousands)	
	1990	1995	1990	1995
Total	7 004	4 052	148 408	83 652
Domestic	6 743	3 372	147 558	82 141
International	261	680	850	1 511

Passenger rail traffic

A comparison of the combined volume of all forms of domestic passenger traffic and the share of the total accounted for by rail transport before and after the war reveals that rail transport has declined by 11 per cent.

In 1995, rail transport accounted for 21.9 per cent of total overland transport. While the number of passenger-km for all modes fell by one half from 1990 to 1995, the number of passenger-km declined by more than two-thirds.

This transport mode has been the most affected by the hostilities of the past four years, as measured in terms of both the destruction of the infrastructure and the volume of traffic (there being a strong correlation between the two). The Croatian railways will have to acquire new rolling stock with the help of international financial assistance. A number of international railway lines link Croatia with many European countries.

Passenger rail transport

	Passenger-km (millions)		Passengers (thousands)	
	1990	1995	1990	1995
Total	3 429	943	40 248	17 455
Domestic	3 137	913	38 965	16 725
International	292	30	1 283	730

Passenger maritime traffic

Maritime transport is very important in that it provides regular service to 47 Croatian islands off the Adriatic coast with a permanent resident population. Regular connections to the mainland are indispensable to the development of life on those islands.

River passenger traffic is insignificant, owing to competition from other modes, especially road transport.

Passenger maritime transport
Thousands of passengers

	1990	1995
Total	8 101	5 591
Domestic	6 815	5 487
International	1 296	104

Passenger air traffic

Croatia Airlines is the Republic of Croatia's only air carrier for domestic and international transport of passengers and freight. It started regular service in May 1990, linking Split, Dubrovnik and later Pula, Zadar, Rijeka and Osijek to Zagreb, the capital, for domestic traffic. At the time, it had also developed international service to Frankfurt, Zurich, Paris, London and, later on, other European capitals. It was forced to suspend operations during the war years. However, in the spring of 1992, it began to restore some domestic service and, gradually, service to other parts of Europe. At present, the airline has 20 scheduled international flights (Europe and Mediterranean countries), five scheduled domestic flights and unscheduled service to some 20 countries.

Traffic is expected to increase substantially in 1997, with a 32 per cent rise projected (38 per cent in the case of international flights alone).

Passenger air transport
Thousands of passengers

	1995	1997
Total	679	900
Domestic	333	420
International	346	480

Freight traffic

Freight traffic declined considerably from 1990 to 1995, owing to the war. The volume of freight shipped fell by 69 per cent during the period.

Domestic and international freight traffic volume
Million tonne-km

	1990	1995	1997
Road	2 852	1 251	
Rail	6 535	1 974	
Maritime	175 994	195 986	
Air	-	5	6
River	527	33	2 150

Freight traffic volume
Thousand tonnes

	1990	1995	1997
Road	15 053	5 127	
Rail	35 796	13 318	
Maritime	29 118	38 121	
Air		5	4
River	2 713	776	

Road freight traffic

The geographic location of Croatia makes it a key zone for through traffic along two axes. The horizontal axis links western and central Europe to the countries of the south-east. The vertical axis links the Baltic region to the Adriatic through the Danube area.

The total volume of road traffic, and particularly domestic transport, has dropped substantially, falling by 66 and 72 per cent, respectively, between 1990 and 1995, as measured in tonnage hauled.

Road freight traffic volume

	Tonnes-km (millions)		Tonnes (thousands)	
	1990	1995	1990	1995
Total	2 852	1 251	15 053	5 127
Domestic	2 241	575	14 320	4 049
International	611	676	523	1 078

Rail freight traffic

The decline in rail freight traffic is due primarily to the war. The share of total transport accounted for by this mode fell by 7 per cent (from 66 per cent) between the pre-war period and 1995. Consequently, the Croatian government has had to cut back service on certain lines. This applies to cross-border lines, such as those linking Cakovec and Lendava or Rogatec and Durmanec, as well as to transit rail freight service from the port of Rijeka.

Rail freight traffic volume

	Tonnes-km (millions)		Tonnes (thousands)	
	1990	1995	1990	1995
Total	6 535	1 974	35 796	13 318
Domestic	3 943	458	21 510	2 726
International	2 592	1 516	14 286	10 592

Maritime and river freight traffic

At present, there is an excess loading capacity of some 30 per cent in Croatian ports, which are not adapted to modern freight technology; ports compete with each other and there is a shortage of links with the rest of the country.

The port of Rijeka is still Croatia's largest, handling primarily intercontinental freight traffic (94 per cent); another 5 per cent involves Mediterranean countries and 1 per cent coastal shipping.

River traffic, with 3 per cent of the total volume for this mode, is negligible. Domestic traffic accounts for 80 per cent of the total and 20 per cent for international traffic.

Maritime and river freight traffic
Thousand tonnes

	1990		1995		1997	
	Maritime	River	Maritime	River	Maritime	River
Domestic	3 473	2 424	4 318	445	-	2 000
International	26 533	289	10 573	26	-	150

Air freight traffic

The geographical location of the Republic of Croatia contributes significantly to the development of this mode of transport. The average annual growth rate was about 3 per cent in 1990 and the share of freight volume was half of what it is in other European countries. Available projections show an expected increase of 5 per cent a year.

Air freight
Thousands of tonnes

	1995	1997
Total	5	6
Domestic	2	2
International	3	4

Question 2: Current state of the infrastructure and capital projects

Since 1995, considerable sums have been spent on the transport infrastructure. However, many structures and facilities were destroyed during the war and need to be replaced. The Republic of Croatia intends to make capital investments with the help of loans from the World Bank, the EBRD and other international sources.

As a result, the government of Croatia has agreed to grant concessions for certain routes, including the Adriatic route in Istria, known as the "Istrian Y".

Current state of the infrastructure

Road infrastructure

The road network covers 27 379 km, with 4 788 km of primary roads, 4 431 km of which meet motorway technical standards. The density of the network is 48.4 km per 100 km² and 5.82 km per 1 000 population.

During the coming ten years, 3 382 km of roads will have to be built, of which 2 071 of motorways, 927 km of main roads and 384 km of roads on Croatian islands.

Rail infrastructure

The war had drastic consequences for rail transport, as 29 per cent of tracks are no longer operational.

The embargo on the main rail lines from Zagreb to Tovarnik and from Zagreb to Split, Sibenik and Zadar caused total volume to fall by half and revenue from transport to decline by 60 per cent from pre-war levels. Direct and indirect damage to equipment and facilities has been estimated at about $353 million and $789 million, respectively.

Rail lines cover 2 973 km, with 2 726.2 km of open track, of which 2 478.5 km are single-track lines and 247.7 km double-track lines. A five-year programme of capital expenditure on infrastructure has been budgeted at $648.4 million.

Maritime and river infrastructure

Croatia has a 1 777.5 km coastline on the Adriatic and more than 350 ports. The seaports of Pula, Rijeka, Zadar, Sibenik, Split, Ploce and Metkovic are capable of handling large ships.

Two waterways of international significance run through Croatia. They are the Danube, over 137.5 km, and the Drava (198.6 km). On the latter, only 14 km (E-80-08) are considered of international importance. Ports for international traffic are at Vukovar, Osijek, Slavonski Brod and Sisak. The border ports are Vukovar and Osijek.

River network

No. of navigable waterways	Name	Distance open to navigation (km)						
		I	II	III	IV	Va	VIb	Total
1	Dunav	-	-	-	-	-	137.5*	137.5
2	Drava	47.6	129	8	-	14*	-	198.6
3	Sava		170	276	-	-	-	446.0
4	Kupa	131.0	-	5	-	-	-	136.0
5	Danube-Sava Canal	-	-	-	60**	-	-	60.0

* Waterway of international significance.
** Construction project.

Airport infrastructure

Croatia has 11 international airports, of which eight are located on the Adriatic coast. Seven are first-category facilities rated 4E. The Zagreb airport handles one-third of total air traffic. It is the main hub for domestic and international air traffic for passengers and freight. The Split and Dubrovnik airports together account for most of the combined traffic; flights to the three facilities represent 95 per cent of all air transport.

The Republic of Croatia intends to build small airports (for aircraft transporting 50 passengers or less) on the islands of Hvar and Korcula and to rebuild the Losinj airport runway, in order to boost tourism.

National priority projects

Priority road corridors in the Republic of Croatia

1. Kiev-Budapest-Gorican-Zagreb-Rijeka

In terms of the European road network, the section running across Croatia from Gorican to Rijeka via Zagreb is included in the international European road system (E-71, E-65 and E-63). The road spans a distance of 268 km in Croatia. To date, 87.3 km have been completed, 41.6 km are under construction and 139 km still have to be built. This is to be a road with separate lanes 26 to 28 m in width and with a speed limit of 100 km/h.

2. Nuremberg-Graz-Maribor-Zagreb-Karlovac-Bihac-Knin-Split

This road [Zagreb-Karlovac-(Zadar, Sibenik)-Split-(E-69)] will carry traffic from north-western and central Europe across Croatia to the Adriatic and the Middle East. It will link the developed industrial countries of Europe and developing countries and will cover a total of 388.05 km in Croatia. To date, 75.5 km have been completed, 19.5 km are under construction and 295.05 km still have to be built.

3. Ljubljana-Zagreb-Slavonski Brod-Belgrade-Athens-Istanbul

The Ljubljana-Zagreb-Slavonski Brod-Lipovac segment is a TEN longitudinal axis and one of the main roadways linking north-western Europe with Athens and Istanbul, via Belgrade. It also connects south-eastern and north-eastern Europe (E-70). It covers a total distance of 306.9 km, of which 220 km have been completed. At this time, 13.7 km near the border with Slovenia need to be built, as well as 73.2 km to the border with the “new” Yugoslavia.

4. Venice-Trieste-Rijeka-Split-Tirana-Athens

This road is part of the longitudinal axis to the Adriatic and a segment of the E-63, which is part of the international network. It runs along the Croatian coastline and is not designed exclusively as a through road. It plays an important economic role for Albania, F.Y.R.O.M. and Greece, offering access to Turkey and the Middle East.

5. Warsaw-Budapest-Osijek-Sarajevo-Metkovic-Ploce

This road links central European countries to the southern Adriatic and provides an opportunity to include Bosnia and Herzegovina in the European road network, along with a part of Croatia (including Osijek, the largest city in the eastern region of Slavonia, and the river ports on the Drava). The section to be built in Croatia covers 97.7 km (see the annex map for 2010, showing roads).

Priority rail corridors in the Republic of Croatia

1. Budapest-Zagreb-Karlovac-Rijeka-Trieste

This is the main link between central and eastern European countries and the port of Rijeka.

2. Graz-Maribor-Zagreb-Split

This is the main line linking the central Adriatic region with central Europe.

3. Ljubljana-Zagreb-Belgrade

This is the main line linking the countries of south-eastern Europe with those of north-western Europe (see the annex map for 2010, showing railways).

Question 3: Capacity problems

Road safety

Traffic accidents have reached a particularly alarming level in terms of injuries and fatalities. In 1990, there were 67 952 reported road accident in Croatia and 1 175 fatalities. For the same year, railways reported 2 308 accidents, with 89 fatalities. There were no reported accidents in maritime, river or air transport. The adverse trend abated in 1995, further to substantial spending for infrastructure, which helped improve the safety and quality of transport. However, the chief factor in accidents is still human error. The situation is of concern to the Croatian government.

Energy consumption

Total energy consumption is increasing gradually, with road transport the leading user. The current rate of increase in the number of motor vehicles makes it appear impossible to reduce energy consumption in the foreseeable future.

Environmental impact

There has been a considerable increase in the use of lead-free fuel by motor vehicles, as advocated for environmental protection. A survey has shown that road transport (all forms) accounted for more than 50 per cent of total emissions of toxic gases. Therefore, the Croatian government wishes to develop rail transport, which is less polluting, and make it more attractive.

Question 4: Measures

The restructuring of the transport sector requires first and foremost the adoption of regulations aimed at creating structures better adapted to competition in transport. To achieve this goal, a number of resolutions have been adopted.

Croatia's transport policies are based on a number of socio-economic objectives:

- the development of public transport services that are less harmful to the environment;
- the improvement and development of transport services corresponding to needs, in terms of capacity as well as quality and environmental protection;
- a growing contribution to GNP from the transport sector, through the creation of new services, more international transport and through traffic, and the promotion of international rail connections;
- the development of the transport infrastructure within a competitive market.

On the domestic market, the emphasis is on increasing the use of public transport systems:

- by a restructuring of the sector;
- by eliminating losses incurred by these transport modes, which are of strategic interest to the government (public road transport, rail transport, public maritime transport).

More generally, the objectives of Croatia's transport policy include:

- improving the quality of all transport systems to bring them up to European standards;
- linking up domestic traffic on the Bosnia-to-Croatia corridors to the TEN scheme, in the following directions:

  - *west to east:*
    - Trieste-Ljubljana-Zagreb-Belgrade-Skopje-Athens/Middle East;
    - Trieste-Rijeka-Zadar-Split-Dubrovnik-Bar-Tirana-Athens;
    - (Trieste/Ljubljana)-Jajce-Zenica-Sarajevo-Gorazde-(Albania);
    - (Trieste/Ljubljana)-Zagreb-Bihac-Glarnoc-Livno-Tomislavgrad-Mostar-Ploce-(Albania);

  - *north to south:*
    - Budapest-Osijek-Sarajevo-Mostar-Ploce;
    - Budapest-Zagreb-Rijeka-Trieste;
    - Nuremberg-Linz/Vienna-Maribor-Krapina-Zagreb-Split;
    - (Budapest)-Balathon-Virovitica-Banja Luka-Split.

Rail transport

The Croatian government reports a set of measures taken as part of a major overall project to restructure the national railway company.

Independent legal entity

The law on railways, enacted by the Croatian Parliament on 28 June 1994, made the nationalised company HZ Croatian Railways an independent corporation, to be managed as efficiently, diligently and economically as possible.

Separation of infrastructure and operational management

The Croatian Railway Act requires the national company to manage the infrastructure separately from its transport operations.

Entry of new operators

Local and municipal governments, towns, counties and other legal entities or individuals may carry out the maintenance of railway facilities (at least in part), on condition that they invest funds in this business activity, pursuant to Article 7 of the Railway Act. The Act also authorises the Ministry to subcontract transport services to third parties.

Payment for the use of the infrastructure

Fees are to be paid for the use of the railway infrastructure and equipment, with income earned going to the division in charge of managing the infrastructure and adding to the annual revenue of the national railway corporation. Fees are to be set by the Croatian Ministry of Maritime Affairs, Transport and Communications, in agreement with the Finance Ministry, based on a fee schedule submitted by the national corporation.

Participation by foreign corporations

This matter has not yet been considered. In accordance with Croatian law, foreign operators must obtain permission. However, as very large subsidies are required for the operation of all services, the issue of allowing foreign corporations to operate in the sector will largely depend on the availability of financial resources. The possibility exists to license firms for the building and management of the railway infrastructure, but this requires the consent of Parliament.

Rights of access for the development of a combined transport service

The issue has not yet been considered, but the principle seems acceptable. The conditions under which this could be done must be negotiated.

Financial recovery of railway companies

As part of a restructuring plan for the Croatian railway system ("Program of Restructuring and Financial Recovering of the Croatian Railways") short-term and long-term measures have been designed to put the national corporation on a sound financial footing over the period 1997-2000. In January 1994, the Croatian government adopted a programme which has three main steps:

- drafting the Railway Act, particularly in terms of the restoration of the infrastructure;
- reducing the number of employees;
- increasing productivity.

It is too early to assess the impact of these measures. The government's objectives are to create the conditions for economies of scale, to complete the development of the two axes referred to above and to privatise the national company.

The government is also seeking to promote other economic goals, with an obvious impact on the railway business. They include freeing market access and relations between the European Union and the transition economies.

The economic development of the Republic of Croatia, that is, its productive capacity and equipment, the skills of its work force, the opening up of its industrial markets to foreign investors, etc., are factors affecting the growth of rail transport. Furthermore, this growth can take place only in a framework of harmonious relations between transition economies and the European Union.

The priorities of the Croatian government in terms of transport policies are:

- to review the existing or planned pattern of European corridors, taking into consideration suggestions or remarks made by all countries concerned;
- to define the role of railways in combined transport, along with an intermodal transport policy at the European level.

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CZECH REPUBLIC

Area: 78 864 km²
Population: 10 400 000

The Czech Republic is experiencing fast growth, fuelled as much by an investment and consumer "boom" as by faster growth in the construction and processing industries. In contrast, growth in the services sector has been low.

This growth trend now appears to be definite and revised forecasts suggest that GDP may be as high as 5.1 per cent in 1996. Inflation has now stabilised and unemployment figures are down slightly.

GDP trends

	Actual			Forecast		Scenario
	1993	1994	1995	1996	2000	2005
Total in million CZK	400.7	411.2	431.1	453.4	553.2	742.1
Annual growth (%)	-0.9	2.6	4.8	5.1	5.7	6.4

At the same time, the trade gap has widened and there are now signs of a balance of trade deficit (still covered, however, by foreign capital inflows and larger foreign currency reserves). However, the Czech budget surplus is adequate to cover inflationary trends.

Question 1: Future trends in passenger and freight traffic

The transport market has been radically affected by the division of the former Czechoslovakia and the need to adapt to free market principles. All transport enterprises have been privatised, except the railways.

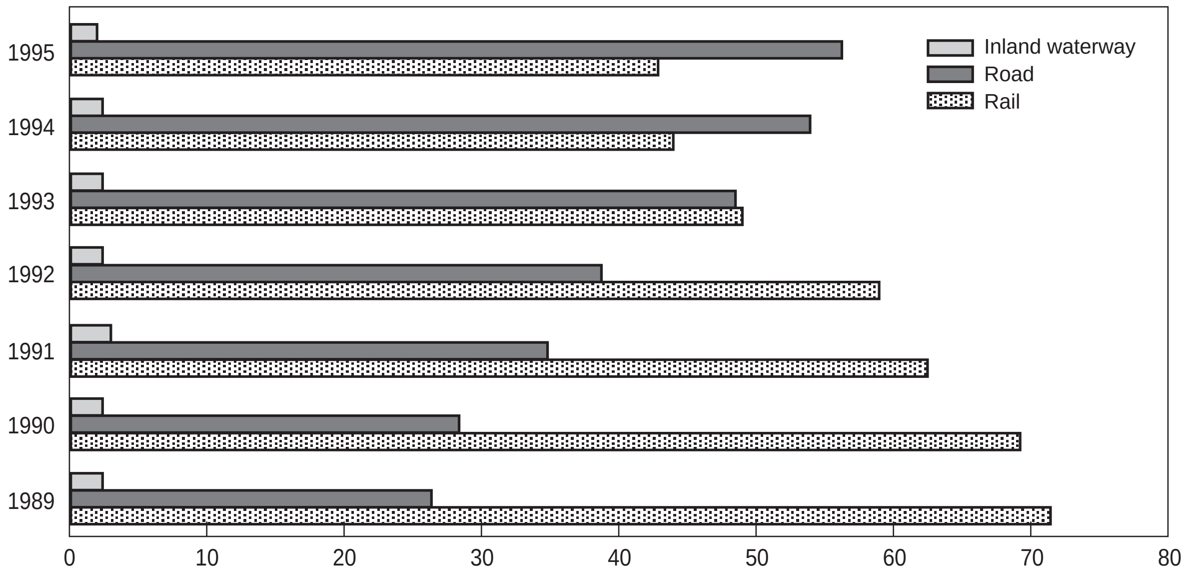
Freight transport

The changes have had a number of consequences, especially for freight traffic (by rail in particular). The downsizing of the heavy industry sector, for example, has reduced one of rail's principal markets.

The various studies carried out for the Czech Transport Ministry show that there is a correlation between transport demand and the main economic indicators. For example, GDP and traffic growth curves show the same pattern: a decline of over 20 per cent from the end of the 1980s to 1993, levelling off again in 1994. The total volume of freight carried increased slightly in 1993 and again in 1995 when there were signs of a recovery, with growth up 3.6 per cent up on 1994.

The main feature of the recovery of the transport market has been the shift of domestic demand to road transport. Rail and waterway transport are now falling back on international traffic where they seem to be more competitive in terms of price and, in the case of rail, speed.

Figure 1. **Trends in modal split**
% tonnes-km



Source: ECMT.

Road transport

From 1989 to 1995, the total volume transported by road (own account plus transport for hire) declined by approximately 25.3 per cent. However, this traffic again picked up over the period 1993-95 when the total volume increased by 7.2 per cent.

Trends in total road transport, 1990-95

	1990	1991	1992	1993	1994	1995
Billion t-km	16.8	18.2	20.25	25.26	29.81	32.50
Million tonnes	743	615	580	585	601	627

A distinction should be made between own account transport and transport by state-owned hauliers. After a decline in demand between 1989 to 1992, transport by state-owned hauliers is making a strong comeback in its own market (total volume transported up 35.6 per cent between 1992 and 1994, and 17.9 per cent between 1993 and 1994). This is the result of highly satisfactory standards of service which have won it a share in markets that were previously the preserve of rail transport.

Trends in road transport by state-owned hauliers, 1990-95

	1990	1992	1994	1995	1995/89	1995/93
Billion t-km	8.81	12.51	19.76	22.90	265.3 %	36.9 %
Million tonnes	198	160	217	247	10.5 %	34.2 %

The volume of own account transport is still declining, but at a slower rate since 1993.

Trends in own account road transport, 1990-95

	1990	1992	1994	1995	1995/89	1995/93
Billion t-km	8.01	7.74	10.05	9.60	34.2 %	12.4 %
Million tonnes	545	420	384	380	-38.3 %	-5.3 %

These statistics indicate that the number of HGVs on the road is rising very slowly, whereas average distances travelled have lengthened substantially, particularly in transport by state-owned hauliers. Still, 1995 marked a real turning point compared with previous years.

Trends in the HGV fleet
Millions of units

	1989	1990	1991	1992	1993	1994	1995
Vehicles	261.51	271.42	276.64	278.25	276.94	286.12	307.5
% annual change		+3.7	+1.9	+0.6	-0.5	+3.3	-

Trends in the average distance travelled per vehicle
Percentage

1994/89	1994/92	1994/93
+67.1	+39	+30.9

Rail transport

Rail was the mode worst hit by the economic changes, as can be seen from the 51.8 per cent decline in volume transported over the period 1989-95. However, in terms of volume and tonne-kilometres, freight traffic appears to have stabilised from the end of 1993. The change between 1993 and 1995 was only -1 per cent in both cases.

Trends in rail transport, 1990-95

	1990	1991	1992	1993	1994	1995
Billion t-km	41.14	32.67	31.11	25.64	24.39	25.39
Million tonnes	200.67	155.40	139.76	123.72	108.76	108.86

In terms of types of product transported, rail's markets have not changed, but all have declined in volume (tonnage):

- solid fuels accounted for 39 per cent of rail's market in 1994, as opposed to 49.8 per cent in 1992;
- minerals and metallurgical products declined by 48 per cent from 1992 to 1994, construction materials by 68 per cent and miscellaneous products by 70 per cent.

The volume of crude oil, tar and petroleum products was up 1.1 per cent over the same period. The timber transport market grew by 22 per cent.

From 1989 to 1992, the volume of most export goods transported by rail doubled, but fell by 19.6 per cent from 1992 to 1994 and by 6.8 per cent from 1993 to 1994.

However, the largest decline in traffic was in import and transit flows.

Trends in rail traffic
Million tonnes

	1992	1993	1994	1994/92 (%)
International traffic	67.37	53.73	49.11	-27.1
Import	26.63	18.75	18.15	-31.9
Export	31.38	27.05	25.23	-19.6
Transit	9.36	7.93	5.73	-38.8
Domestic traffic	72.39	69.98	59.63	-17.7
Average distance (km)	200.20	203.80	206.90	+3.3

Waterway transport

The demand for waterway transport declined steadily from 1989 (down 43 per cent over the period 1989-95 in terms of volume transported, 8 per cent in terms of tonne-km), particularly for fuels. However, waterway traffic stabilised in 1994 (up 0.8 per cent on 1993) when international flows began to pick up, increasing by 7.9 per cent from 1992 to 1994, particularly export and transit flows. In 1995, the upward trend was confirmed, but only in terms of tonne-km, with 1.23 billion compared with 1.18 billion in 1994. In terms of tonnage transported, waterway traffic again declined in 1995 when it totalled only 4.55 million tonnes.

Trends in waterway traffic, 1989-94
Million tonnes

	1989	1990	1991	1992	1993	1994
International traffic	1.73	1.31	1.12	1.13	1.10	1.22
% change from previous year		*-24.3*	*-14.5*	*+0.9*	*-2.7*	*+10.9*
Import	0.62	0.64	0.49	0.36	0.37	0.35
Export	0.68	0.53	0.47	0.53	0.55	0.67
Transit	0.43	0,14	0.16	0.24	0.18	0.20
Domestic traffic	6.17	5,06	4.72	3.98	3.80	3.72
% change from previous year		*-14,9*	*-10.2*	*-15.7*	*-5.6*	*-2.2*
Total traffic	7.90	6.7	5.85	5.12	4.90	4.94
% change from previous year		*-19.4*	*-8.2*	*-12.5*	*-4.3*	*+0.8*

Combined transport

There are currently 16 road/rail transhipment centres in the Czech Republic, of which two are rolling roads, and six road/waterway terminals, including two Ro-Ro terminals.

There was a substantial and rapid decline in large container traffic by rail until the Czech Republic became independent, owing to deteriorating trade relationships with its former partners (Russia, the Ukraine, and others) at a time when combined transport flows were high because of differences in track gauge from one country to another.

However, from 1994 on, the situation improved for the combined transport sector in general and tonnage transported has picked up substantially.

Trends in combined transport
Million tonnes

	1989	1990	1991	1992	1993	1994
Combined transport overall	3 953	3 542	1 902	1 506	1 040	1 540
% change from previous year		*-10.3*	*-46.6*	*-20.9*	*-31*	*+48*
Rail	3 900	3 500	1 870	1 490	1 035	1 528
% change from previous year		*-10.3*	*-46.6*	*-20.4*	*-30.5*	*+35.8*
Waterway	0.053	0.042	0.032	0.016	0.005	0.012
% change from previous year		*-21.7*	*-24.3*	*-49.7*	*-68.8*	*+140*

Air transport

Air transport began to recover earlier than other modes. In 1992, air freight traffic picked up by 13 per cent. This trend was confirmed in the following years, with an average growth of 3.7 per cent. However, air's share of the overall market relative to other modes is still around 0.1 per cent.

Domestic airlines' share of the market declined in 1994 to 38.4 per cent compared with 39.4 per cent in 1993. Similarly, the annual figures in tonne-km are somewhat uneven. Despite the growth trend, the Czech air market does not yet appear to have stabilised.

Passenger traffic

Public passenger transport by train and bus were until recently the only forms of public transport. Patronage has declined, however, for a number of reasons related to socio-economic change:

- the emergence of new transport financing methods;
- the rapid development of private bussing services;
- the unprecedented increase in private car ownership levels.

In fact, the number of private cars rose by 36 per cent over the period 1989-95, bringing the total to 3.11 million, at a rate of over 10 per cent per year from 1992 to 1994, but the rate appears to have stabilised at around 5 per cent in 1995.

The modal split in public passenger transport is very much the same as in 1989, with buses carrying 82 per cent of the total traffic and rail carrying 18 per cent. Private car traffic increased by 33.8 per cent over the period, reversing the modal split between public and private passenger transport.

Public transport	1989	1995
Million passengers	1 666.67	1 235.31
Million passenger-km	38.60	27.65
Private car		
Million passengers	1 270.00	1 700.00
Million passenger-km	38.10	54.50

Road transport

With 82 per cent of passengers transported, bus transport is still the dominant mode in public passenger transport overall, despite a 27.1 per cent decline in patronage over the period 1989-95 and a 33.4 per cent decline in passenger-kilometres.

The legal status of bus service operators varies. The largest operators date back to the wave of privatisations of state-owned undertakings. This is the case for CSD.

Between 1989 and 1994, the number of vehicles declined sharply (down by 11.3 per cent or as much as 20 per cent for regional service operators) as the bus fleet rapidly became obsolete.

The number of passengers transported increased by 5 per cent over the period 1989-92. However, it was down by 23.6 per cent between 1992 and 1994.

Network density, in terms of connections and kilometres travelled, decreased proportionately to the decline in patronage, with the result that access to bus services is now becoming more difficult for those in rural or outlying areas.

Trends in public passenger transport by road, 1989-95
Million passengers

	1989	1990	1991	1992	1993	1994	1995
Total passenger traffic	1 376	1 358	1 352	1 422	1 195	1 086	1 004
% change from previous year		*-1.3*	*-0.5*	*+5.*	*-16*	*-9.*	*-7.5*
Scheduled services	1 319	1 309	1 310	1 382	1 161	1 053	
Unscheduled services	56.68	49.41	42.1	39.2	34.6	32.43	
Mobility coefficient (number of trips/year per person by bus)	132	131	131	137	115	105	

Trends in public passenger transport by road, 1989-95
Passenger-kilometres

	1989	1990	1992	1994	1995
Billions of passenger-km	25.18	28.18	26.00	18.84	16.77

Rail transport

Since 1989, rail transport has declined by 21.7 per cent in terms of passengers and by 40.2 per cent in terms of passenger-kilometres, largely owing to the abolition of special fares (mainly for workers). This measure was an economic necessity for the rail companies. As a result, the number of passengers paying standard fares (no reductions) on domestic journeys rose by 31.4 per cent over the period 1989 to 1994. Travel distances are very short, but are lengthening slightly.

The number of passengers making international journeys has fallen by three-quarters over the period 1989-94, mainly owing to increased competition from foreign railways, which offer cheaper fares and better services.

Trends in rail passenger transport, 1989-95
Million passengers

	1989	1990	1991	1992	1993	1994	1995
Total passenger traffic	290.04	289.17	295.01	289.55	242.18	228.72	227.09
Domestic traffic fares	285.71	285.51	291.74	288.13	241.05	227.63	
standard	101.94	103.29	107.80	85.54	109.41	134.04	
student	41.7	42.32	48.91	44.5	45.33	41.52	
others	33.74	35.07	35.45	48.12	86.31	53.16	
worker	108.25	104.82	99.56	109.96			
International traffic	4.33	3.65	3.27	1.42	1.12	1.08	
Passenger-km (billions)							
Total	13.42	13.36	13.61	11.76	8.54	8.48	8.02
Domestic	11.71	11.92	12.35	11.34	8.28	8.21	
International	1.71	1.44	1.26	0.42	0.26	0.27	

Air transport

Prague-Ruzyne airport handles 95.2 per cent of all flights from the Czech Republic. Since 1989, this mode has been growing steadily (number of passengers up 44.3 per cent between 1993 and 1995) for a number of reasons:

– access to new markets;
– liberalisation of services on domestic airlines;
– simplified customs formalities;
– more tourist and business travel to Prague.

International passenger traffic rose by 70 per cent between 1992 and 1994.

The partitioning of the former Czechoslovakia into two independent states in 1993 should substantially limit future growth in Czech domestic air traffic, even though this has not yet happened.

Comparative performance of airlines, 1993-95
Million passengers

	1993	1994	1994/93	1995
Total passenger traffic	2 371	2 913	+ 22.8	3.42
By domestic airlines	1 339	1 718	+ 28.3	
By foreign airlines	1 032	1 195	+ 36.6	

Urban transport

The development of urban public transport is in the hands of specialist companies and mainly concerns the 18 largest towns in the Czech Republic. Urban transport managed to maintain its share of traffic over the 1989-95 period, with 2.27 billion passengers per year and a 27.1 per cent increase between 1993 and 1995. Prague, with 1.36 billion passengers in 1994, accounts for the largest share of traffic, although urban public transport declined substantially between 1989 and 1995. This has not happened in other towns, or only to a very limited extent.

However, since 1992, all public transport modes have declined (down 10.8 per cent from 1992 to 1994, no doubt as a result of fare increases) and there has been a return to the old “stand-bys” (cycling or walking) in small towns.

Trends in public transport (bus, tram, metro), 1989-94
Million passengers

	1989	1990	1991	1992	1993	1994
Total all modes *% changes from previous year*	2 868.73	2945.26 *-0.8*	3 207.54 *+8.9*	3 075.02 *-4.2*	2 876.35 *-6.5*	2 744.79 *-4.6*
Total bus	1 428.09	1 403.18	1 455.01	1 324.34	1 236.19	1 145.21

Traffic forecasts

The Czech Ministry of Transport has developed only an outline forecast because of the unreliability of the statistical data available and because there is no national economic forecasting agency. Two documents, a study of overall demand for freight transport in the Czech economy and transport market estimates to the year 2005 provide a general framework which each part of the transport sector can use for its own forecasts.

Freight traffic forecasts

The forecasts are based on an existing study and on economic growth estimates for the Czech Republic from 1994. They take account of the main thrust of EU transport policy. The economic indicator selected was GDP. The findings cover three periods:

- the short-term, 1995;
- the medium-term, 2000;
- the long-term, 2005 (three growth scenarios, "pessimistic, realistic and optimistic", were considered).

Traffic forecast by mode, 1996-2005

Million tonnes

	1996	2000	2005 / I	2005 / II	2005 / III
GDP (billion CZK)	453.4	553.2	734.5	742.1	759.8
Total freight transported	752.49	818.47	900.15	919.80	941.96
State-owned enterprise, of which:	368.49	423.34	489.65	501.96	519.86
Rail	104.30	112.40	124.70	131.70	142.40
Road	261.20	306.80	360.20	365.10	372.10
Waterways	2.95	4.10	4.7	5.10	5.3
Air	0.039	0.045	0.050	0.056	0.059
Private enterprise (road)	384.00	395.13	410.50	417.84	422.10
Total road transport	645.20	701.93	770.70	783.24	794.20

On the basis of these scenarios, demand for freight traffic overall could total between 900 and 942 million tonnes a year in 2005. For all the scenarios, performance in tonne-kilometres would also be substantially higher than at present.

Traffic forecasts, 1996-2005

Billion t-km

	1996	2000	2005 / I	2005 / II	2005 / III
Total	61.19	68.81	75.57	78.23	80.39
Total public transport	51.29	58.51	64.67	66.93	68.98

Modal split projections for future traffic were based on current trends and the capacity of the two principal modes, road and rail, to compete with each other.

Modal split projections for each scenario in 2005

	Scenario I	Scenario II	Scenario III
Rail	37.58	37.70	38.18
Road	60.07	59.95	59.46
Air	0.09	0.11	0.11
Waterway	2.25	2.24	2.24

Rail transport

The forecasts for rail show that traffic will increase under all three scenarios, providing that the railways can adapt to market conditions (price, organisation, development of combined transport).

Combined transport

For the Czech Republic, the use of combined transport is essential in view of the environmental consequences of over-reliance on road transport. However, in the view of the Czech authorities, it will be difficult to develop combined transport without a strong lead from European Union countries.

Waterway transport

Despite the rather poor current figures, the Czech Ministry of Transport thinks that there is a real possibility that waterway traffic will pick up as trade relations with other countries develop.

Passenger traffic forecasts

In this area, too, environmental considerations play a role. If nothing is done to modernise and improve public transport standards and services, there will be an explosive increase in private car use.

The forecasts for the modal split of passenger flows have taken this consideration into account, as well as the introduction of a transport policy which aims to restrict private car use and encourage travel by other modes (principally rail), as in the major European Union member states.

Public transport by road

However, all the scenarios expect a decline in public transport from 1997, when increasing unemployment is expected to result in fewer home/work trips. Bus traffic should also decline steadily up to 2005.

Trends in passenger traffic, 1996-2005

			2005		
	1996	2000	Scenario I	Scenario II	Scenario III
Millions of passengers	970.00	954.10	853.40	873.10	920.70
Billions of passenger-km	15.30	15.00	14.80	14.90	15.20

Rail transport

The decline in the number of rail passengers should level off in 2000, when demand is expected to pick up as a result of improved standards of service and equipment upgrades.

Trends in passenger traffic

	1996	2000	2005 Scenario I	2005 Scenario II	2005 Scenario III
Millions of passengers	222.50	182.90	241.90	248.20	254.90
Billions of passenger-km	7.64	6.84	8.40	9.30	10.70

Air transport

Forecasts for air traffic were obtained by a different method, in order to better reflect international demand and the situation on the international air transport market. This method also used three scenarios for 2005.

Passenger traffic growth assumptions for air transport, 1996-2005

	1996	2000	2005 Scenario I	2005 Scenario II	2005 Scenario III
Millions of passengers	3.80	5.47	6.10	7.60	8.60
Billions of passenger-km	3.20	4.00	5.10	5.80	6.20

The strong recovery in demand from 1993-94 justifies an optimistic outlook. Scenarios II and III for 2005 estimate passenger traffic at 7.6 and 8.6 million, respectively, compared with 3 million today. Scenario I estimates passenger traffic at only 6 million, for the same year, despite indications of a big increase in tourism and trade. However, this scenario seems unlikely, since it also assumes that a high-speed train line linking the Czech Republic to major European cities will be brought into operation.

Question 2: Present situation as regards infrastructure and investment projects

The Czech Republic's transport infrastructure currently comprises:

- 9 430 kilometres of rail track, density 0.12 km/km²;
- 303 kilometres of navigable waterway, density 0.004 km/km²;
- 55 418 kilometres of road and motorway, density 0.71 km/km²;
- 92 airports (nine international), 13 heliports.

The Czech Republic is particularly interested in extending and upgrading infrastructure on the multimodal corridors defined at the Second Pan-European Transport Conference in Crete:

- multimodal corridor no. IV, i.e. the Berlin-Prague-Brno-Breclav-Vienna/Bratislava section and the Nuremberg-Prague branch (IVA);
- multimodal corridor no. VI, i.e. the Gdansk-Katowice-Ostrava-Zilina section and the Ostrava-Breclav-Vienna branch (VIB).

Road infrastructure

The priority for the Czech road network modernisation policy is to complete the country's motorway and dual-carriageway network by 2007. The construction programme was approved by Government Resolution No. 631/1993 and the construction schedule is reviewed annually. The main planning criterion is traffic density.

According to a recent preliminary report on the construction of the motorway network, it will be extended by 678.2 km by 2005, bringing its total length from 424.6 km in 1996 to 1 102 km in 2005.

The construction of the D5 Prague-Plient-Rozvadov motorway (in the direction of Nuremberg) is receiving special attention. The last section towards Germany is to be opened to traffic in 1997, although work will not be fully completed until 1998 (until 2002 for the Plzen bypass).

The D8 Prague-Usti motorway (in the direction of Dresden)is also one of the Czech Republic's major road traffic routes. The motorway section towards Germany is to be brought into service in 2002.

The construction of the D47 motorway is due to begin. It will be part of a north-south corridor which crosses the Polish border at Ostrava, with a link to the D1 motorway at Brno, and continues via the R52 dual-carriageway to Austria.

Breakdown of existing and planned investment

MECU

				Investment plans for the year				
	1994	1995	Budget 1996	1997	1998	1999	2000	Total programme
Motorways	86.266	128.637	143.092	161.291	190.978	252.959	302.439	1 263.663
Prague motorway bypass	0	0.146	0.958	14.053	28.495	24.682	74.084	142.418
Dual carriageways	53.678	48.674	52.005	46.324	65.237	98.787	107.988	472.694
Motorway upgrades	2.734	14.782	14.982	20.006	31.740	21.490	29.057	134.791
Improving conditions on international roads	0.106	3.291	0.996	12.616	11.114	12.738	5.986	46.848
Improvements to the Czech network	81.915	63.939	67.955	102.555	102.168	90.898	111.099	620.529
Renovations to urban roads	24.462	20.549	56.663	60.664	55.753	58.853	67.510	344.453
Total	249.114	279.976	336.604	417.469	485.427	560.319	698.067	3 026.975
Of which from the state budget	223.537	263.194	306.849	384.000	476.125	548.614	692.485	2 894.802

Rail infrastructure

As for road infrastructure, the main objective of the country's rail policy is to upgrade lines that are on both domestic and trans-European multimodal corridors. Upgrading should bring these rail corridors up to the standards set by the European Agreement on Main International Railway Lines (AGC) and the European Agreement on Important Combined Transport Lines (AGTC) and by Community guidelines on rail infrastructure policy. The four domestic corridors considered to be the most important for international transit traffic are:

- Corridor I: Berlin-Decin-Prague-Ceska Trebova-Brno-Breclav-Vienna/Bratislava;
- Corridor II: Vienna-Breclav-Prerov-Ostrava-Katowice;
- Corridor III: Nuremberg-Cheb-Plzen-Prague-Olomouc-Ostrava-Zilina;
- Corridor IV: Berlin-Decin-Prague-Vesli No. I-Horni Dvoriste/Ceske Velenice-Vienna.

The total length of priority corridors is 1 442 km. Upgrading work will be carried out on corridors I and II, but will be staggered to avoid disrupting traffic. Once work on corridor I is completed, in the year 2000, work will commence on corridor III. Similarly, in 2002, once work on corridor II is completed, work on corridor IV will commence. In this way upgrading work on the corridors should be completed by the year 2007.

There are also plans to build a high-speed line between Prague and Nuremberg after 2005. Other high-speed lines are now being studied and could be included in European high-speed network plans.

Breakdown of existing and planned investment
MECU

	1994	1995	Budget 1996	Investment plans for the year 1997	1998	1999	2000	Total programme
Corridor I	24.551	34.477	172.146	237.520	164.068	98.461	102.333	833.556
Corridor II	0.130	0.679	3.382	7.390	49.826	53.207	54.685	387.115
Rebuilding of some lines	78.829	47.590	38.311	48.000	44.316	58.970	72.808	388.823
Rolling stock modernisation	0	31.043	80.993	70.822	16.509	0	0	199.367
Safety and reliability of passenger and freight services	0	0	5.469	11.233	2.956	3.547	5.912	29.116
Total	103.440	113.748	300.266	374.923	277.635	214.132	235.673	1619.817
Of which state finance	100.808	95.218	108.844	131.126	155.897	158.144	181.200	931.237

Waterway infrastructure

These projects are mainly on the Elbe-Vltava route to Germany. Given the forecast increase in international waterway traffic, this infrastructure should be modernised and extended along the Elbe towards the Pardubice industrial zone, particularly since Germany itself has plans to review its infrastructure on the Elbe between Magdebourg and the Czech border in or around the year 2000. This will require a total investment of CZK12.2 billion.

Furthermore, if Austria and the Slovak Republic agree, the Czech Republic is planning to make the Morava river navigable and to develop the port of Hodonin. Work could begin sometime after the year 2000.

Breakdown of existing and planned investment
MECU

	1994	1995	Budget 1996	Investment plans for the year				
				1997	1998	1999	2000	Total programme
Modernisation of navigable waterways	-	-	0.036	6.371	4.328	7.121	18.506	36.562
Total	-	-	0.036	6.565	4.325	7.115	18.490	36.530
Of which state finance	-	-	0	6.462	4.307	7.094	18.475	36.338

The development of combined transport infrastructure

The Czech Republic supports the European Union's moves to promote a combined transport system that is sufficiently extensive to provide a real alternative to road transport. The measures adopted to promote the development of this mode in Community directives, European agreements (AGTC) and ECMT resolutions have gradually been incorporated into Czech transport policy. The first step towards securing the best climate for the development of this mode in the Czech Republic is the publication of the *Support Programme for Combined Transport in the CR for the years 1996-2000.* The two main objectives of the programme are:

- to improve rail transport conditions;
- to improve working conditions for combined transport operators.

It also provides for the development of basic combined transport technologies and the construction or modernisation of terminals sited on the main international corridors.

Breakdown of existing and planned investment
MECU

	1994	1995	Budget 1996	Investment plans for the year				
				1997	1998	1999	2000	Total programme
Mode development	-	-	2.208	3.399	4.789	5.498	6.326	22.220
Total	-	-	2.208	3.399	4.789	5.498	6.326	22.220
Of which state finance	-	-	1.862	3.399	3.902	4.493	5.173	18.829

The development of air transport infrastructure

The government's two priorities are:

- to improve the Czech Republic's air traffic control system, principally by installing more reliable and more powerful radar and communications equipment;
- to improve air infrastructure as quickly as possible and ensure that it complies with ICAO standards.

The main focus of this work will be the rebuilding and modernisation of Prague-Ruzyne airport, particularly its runways. The sums required will be particularly high since for years the only work carried out was on military air bases.

Breakdown of existing and planned investment
MECU

				Investment plans for the year				
	1994	1995	Budget 1996	1997	1998	1999	2000	Total programme
Air traffic control	44.321	14.408	12.180	4.018	15.467	13.269	13.935	117.509
Rebuilding of arrival halls	0.118	46.799	62.752	36.675	10.310	3.961	3.281	163.896
Total	44.310	61.194	74.922	40.689	25.764	17.218	17.204	281.301
Of which state finance	27.845	9.920	13.597	10.098	11.398	4.951	3.872	81.682

Question 3: Capacity problems

The recovery in demand for passenger and freight transport as of 1993-94 should not pose any insurmountable problems as regards infrastructure capacity.

Road transport

Given the explosive growth in road traffic between 1990 and 1995, capacity problems on the Czech road and expressway network were inevitable. Traffic on the network increased to record levels:

- expressways, up 33 per cent;
- category I roads, up 28 per cent;
- category II roads, up 16 per cent;
- category III roads, up 10 per cent;
- road network overall, up 20 per cent.

The rebuilding of the road network could not keep pace with the fast growth in road traffic (private cars and HGVs), particularly for expressways. Currently, 415 km of expressway and 315 km of other high-speed roads are in service. Only 35 per cent of the total length of category I roads have been improved, and the situation is worse for category II roads, where only 11 per cent have been rebuilt to international standards. The most urgent problems currently are as follows:

- providing a high-standard expressway network and sufficient road links with European Union countries;
- increasing current capacity at border crossing points and improving access to them (and to new crossing points);
- building expressways and other high-speed roads on the most heavily travelled routes;
- building urban bypasses in towns where there is heavy freight traffic, in order to eliminate nuisances and improve the environment;
- rebuilding bridges (and building more bridges), since, of the 15 562 existing structures, 8.8 per cent are currently in very bad condition, 20.2 per cent are in satisfactory condition, and 36 per cent do not meet weight capacity standards. It should be pointed out that 52 per cent of the country's bridges were built over 50 years ago.

Rail transport

As rail traffic was reduced by 43 per cent between 1989 and 1995, capacity problems cannot simply be attributed to quantities carried. There are two explanations for bottlenecks on the Czech rail network:

- major alterations and upgrades on the main international transit corridors will continue until 2007;
- inadequate track and bridge maintenance reduces train speeds.

As a general rule, delays are due less to the size of the network than to poor standards of service, slowness and technologically outdated equipment that is not up to European standards.

Air transport

Air mode is likely to be the first to experience major capacity problems for several reasons:

- air traffic has experienced the strongest growth;
- the "monopoly" of the Prague-Ruzyne airport.

In fact, Prague-Ruzyne handles 95.2 per cent of all traffic. It was designed to handle 2.5 million passengers per year, but it is now handling 3.4 million. Rebuilding work started in June 1995 and is to continue in three phases until completion in 1997. Capacity should be increased to 4.8 million passengers per year. However, it is expected that this will not be sufficient since, according to the forecasts, 6.1 million passengers per year will be using the airport by 2000. Consequently, a fourth, fifth and sixth phase are already under study.

Waterway transport

The Utsi-Labem section of the Elbe-Vltava waterway to Magdeburg (Germany) is posing major draught problems. In fact, vessel laden capacity is dependent on the level of the river at any given time, which cannot be predicted much in advance. If the level falls too low, shipping can be interrupted for weeks. The record was 100 days in 1992. This has a major impact on operator's business as they are not always able to give a precise delivery time and in some periods are unable to honour their contracts.

Question 4: Measures

A number of changes are needed to enable the gradual integration of the Czech Republic into the European Union's economic and transport systems. To this end, special measures have already been taken, both for infrastructure development and for the integration of transport firms into a competitive market.

Rail transport

A restructuring plan for Czech railways is currently being drafted. It will establish:

- a strategy for Czech railways to 2005;
- an economic model;
- a framework for the liberalisation of freight transport and the regulation of passenger transport;
- joint finance programmes with the State;
- the role of foreign operators;
- a fares policy;
- a human resources programme.

Road transport

The Czech authorities are in the process of examining a programme for the development of expressways and dual-carriageways. This should serve as the master plan for the Czech road network from now to 2005.

Air transport

A construction project for Prague-Ruzyne airport is currently being developed. It also provides for the privatisation of three airports: Ostrava-Mosnov, Brno-Turany and Karlovy-Vary.

Freight transport

The Czech government is extremely concerned about the environment. It wants the railways to retain a major role in freight traffic. Well aware of the changes that will be needed, the government is awaiting a broad-based European policy for the development of combined transport. In its view, a national initiative to implement the measures needed to ensure a more balanced modal split is insufficient at a time when traffic is increasingly international.

The introduction of tolls has not yet been considered, but pre-paid annual registration fees for access to at least part of the network will be introduced as from 1995 in order to make a return on motorway investments.

Passenger transport

The measures taken relate first to subsidies and special fares, which were introduced to allow network operators to set or revise their fares in line with costs and increase their income from ticket sales.

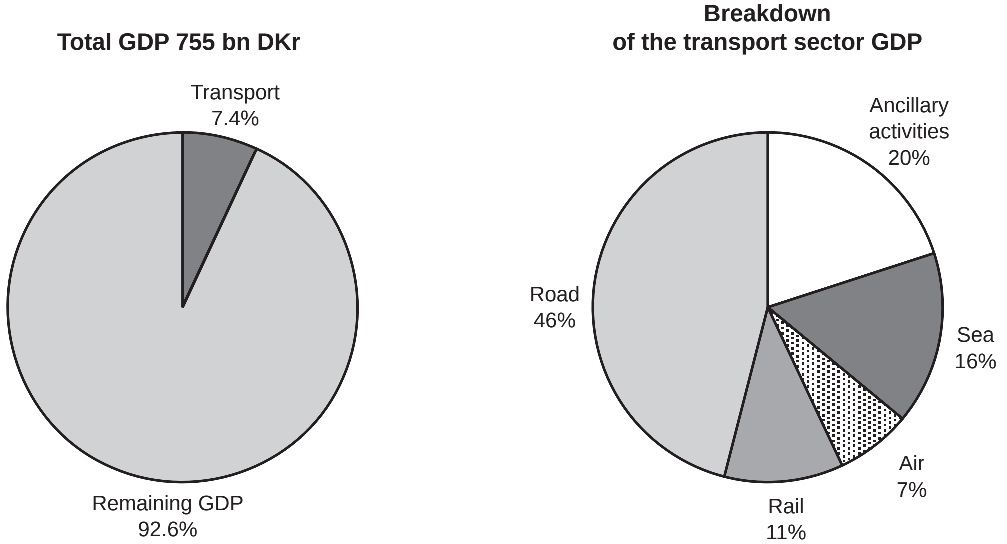
Passengers whose discount fares have been withdrawn (students, workers) will be compensated directly by the government.

DENMARK

Area: 43 093 km²
Population: 5 197 000

In 1993 the transport sector accounted for 7.4 per cent of Danish GDP, against 6.6 per cent in 1984. The road haulage sector alone accounted for half of the "transport GDP" in 1993.

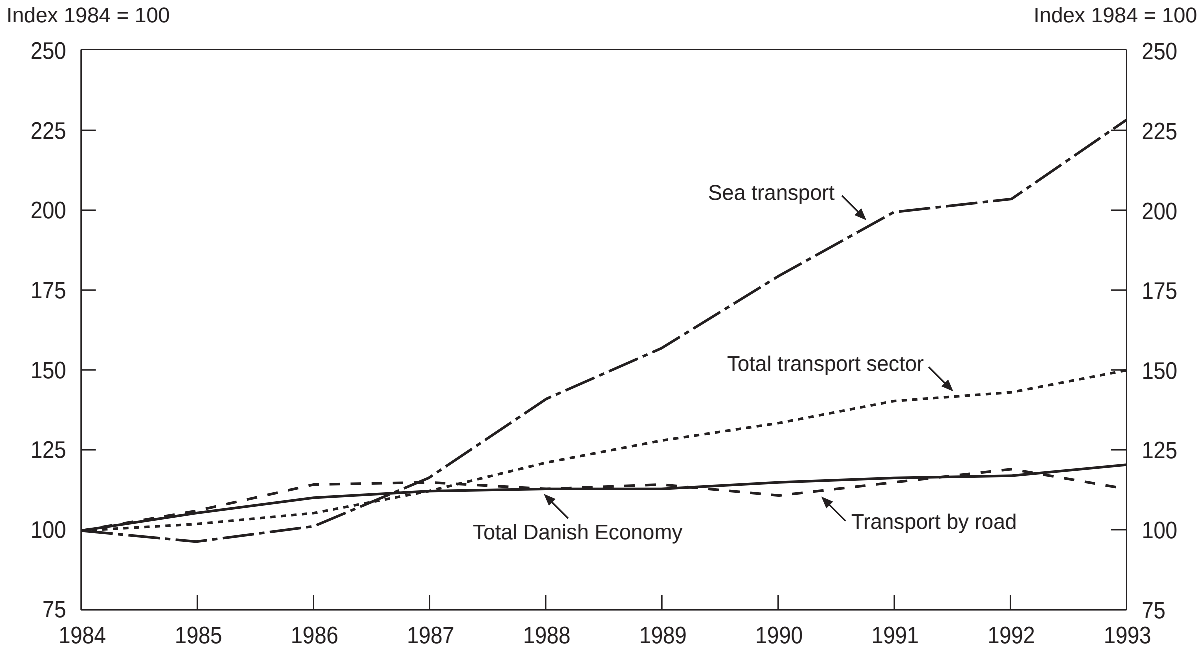
Figure 1. **Transport share in country economy in 1993**



Source: Statistics Denmark.

Gross output of the transport sector (at constant prices) increased by 60 per cent over the period. Intermediate consumption (at current prices) increased by 36 per cent. At constant prices, the transport sector has been growing regularly for ten years. In 1991 it was already 61 per cent higher than in 1984. It is growing faster than the Danish economy, which grew by only 18 per cent (at constant prices) over the same period.

Figure 2. **Development of gross product at constant prices**
Million DKr in 1980



Source: Statistics Denmark.

Over the past ten years, maritime transport activities have increased the most. Road transport, after increasing in 1986, has remained fairly stable, with even a slight decline between 1992 and 1993. However, of the 16 000 transport enterprises in the VAT register,[1] 71 per cent are road operators. Road and maritime transport enterprises and those in ancillary activities have the same turnover. As a general rule for all modes, just 3 per cent of them account for 73 per cent of the mode turnover.

Question 1: Future trends in passenger and freight traffic

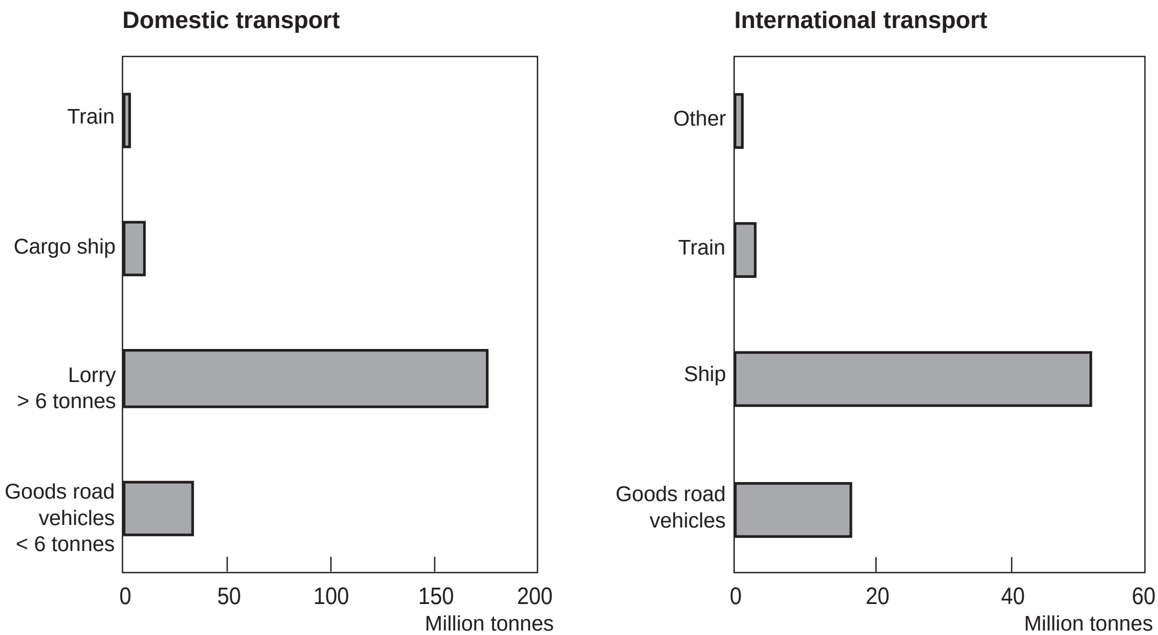
Traffic should continue to increase. Passenger transport should grow by about 25 per cent by 2005 and freight transport by about 40 per cent. These forecasts are based on government estimates of economic growth. Since the rate of growth has been lower than expected, the same will no doubt be true of traffic growth in the next few years.

Freight traffic

Of the 180 million tonnes of domestic freight, 94 per cent goes by road, of which 84 per cent in trucks of over 6 tonnes. The volume of freight carried by coastal navigation amounted to less than 50 million tonnes in 1992. The share of rail is negligible.

In international freight transport, 71 per cent of the tonnage transported in 1992 went by sea and 23 per cent by road, with the rest going by rail.

Figure 3. **Modal split of domestic and international traffic**



Source: Statistics Denmark.

Road transport

This sector is characterised by a very large number of very small operators. Only 1 per cent of the enterprises have a turnover of DKr 25 million or more. In addition, 8 per cent of those working in the sector have a second job in another branch. This sector employs a high proportion of unskilled workers.

Until 1988, domestic road haulage was expanding rapidly. From 1989, the trend was reversed, with the slowing down of the national economy and, in particular, reduced activity in the construction sector. While the transport of construction materials fell, that of finished products (manufactured products, food products, machinery, small parcels, etc.) increased. This increase concerned only the public carriers and vehicle hire services, at the expense of own-account operators.

Operating conditions of firms in this branch have improved, especially in own account and vehicle hire. Productivity per truck has increased in the past ten years. The number of empty returns has fallen, with more vehicles being loaded on wagons. The trip length per tonne of freight has increased, but with the use of combined transport techniques, the annual vehicle kilometrage has increased only a little.

There has been a decline in freight flows in the Copenhagen area and to the east of the Little Belt. An increasing proportion of freight is loaded in the counties of Ribe, Vejle, Aarhus and Viborg. The majority of the traffic is local, with freight being transported within a single county. Little freight traverses the country, and only 3 per cent of total freight is transported between Jutland and Funen and between Zealand and the islands.

International road haulage increased between 1984 and 1993 in line with the growth of imports and exports. The export traffic share of the total is somewhat higher than that of imports, 82 per cent as against 67 per cent. In 1992, Danish operators carried 74 per cent of the international freight traffic. Over this period, national operators increased their market share.

Maritime transport

Over the past ten years, freight traffic in Danish ports has increased. Between 1984 and 1993, maritime transport increased by 24 per cent. This increase is due, on the one hand, to the development of ferry traffic and, on the other, to the ever-growing activity of foreign ship owners in Danish ports.

In 1993, domestic sea transport accounted for 11 per cent of total sea transport in Danish ports. After a decline in traffic at the beginning of the 1980s, Danish coastal shipping grew between 1984 and 1991 (when there was a slight decline). In 1993, the volume of traffic was 21 per cent higher than in 1984. The cargoes carried are 63 per cent solid and liquid fuels and 26 per cent stone, cement, gravel, sand and lime.

Over the past decade, domestic ferry transport carried an annual volume of some 9 million tonnes, and accounted for 10 per cent of sea-borne freight traffic in 1993. One quarter of this tonnage is aboard trains carried by ferries across the Great Belt, the rest being loaded virtually exclusively on trucks; 48 per cent of these vehicles cross the Great Belt, 36 per cent take other east-west roads, and 16 per cent take some other route. It is the Great Belt traffic which has increased most (up by 1.4 million tonnes between 1983 and 1993). The other east-west routes have seen traffic fall by 0.7 million tonnes over the same period.

Between 1984 and 1993, sea-borne traffic from other countries increased very slightly. In 1993, 33 million tonnes of freight were imported by ship, or one-third of the total traffic handled by Danish ports. Over 30 per cent of these imports are solid and liquid fuels. Agro-food products and construction materials accounted for only 11 per cent of imports. Still in 1993, 19 million tonnes of cargo were exported to foreign ports, or an increase of 100 per cent in the volume of traffic since 1984. The quantities of liquid fuels and cereals, 49 per cent and 14 per cent, respectively, of the freight exported, increased considerably.

Danish flag vessels accounted for only 15 per cent of exports and 12 per cent of imports by sea. The use of foreign flag crude oil tankers is increasingly frequent, reducing the market share of Danish ship owners in export traffic.

Ferry traffic increased by 5.4 million tonnes between 1984 and 1993.

Rail transport

Since 1986, overall domestic rail freight traffic has declined. In 1992, 2.1 million tonnes of freight were carried by rail in Denmark, or 25 per cent less than in 1986. Only parcel traffic (25 per cent of the total domestic traffic) has increased, especially since 1991, whereas complete loads (block trains and wagon loads) have declined considerably since 1988. In addition, the distances covered by freight trains have declined. Combined transport accounts for 20 per cent of total national traffic.

In international traffic, the flows are virtually entirely made up of block trains or wagon loads, while parcel traffic accounts for only 0.2 per cent of the total. Between 1986 and 1993, rail freight to foreign destinations increased very significantly, up 60 per cent in volume and 48 per cent in transport output. The most important export freight categories are tobacco, agro-food products, iron and steel, beverages and miscellaneous articles.

Rail freight imports are declining, and the volume of traffic fell by 9 per cent between 1986 and 1993. Rail transport output for this type of traffic fell by 12 per cent.

In 1993, transit freight traffic carried by rail amounted to 2.8 million tonnes and 653 million tonne-km, or one-third of the total traffic on the Danish rail network. Rail transit has increased by 49 per cent since 1986, in particular due to the growth of traffic from Sweden.

Air transport

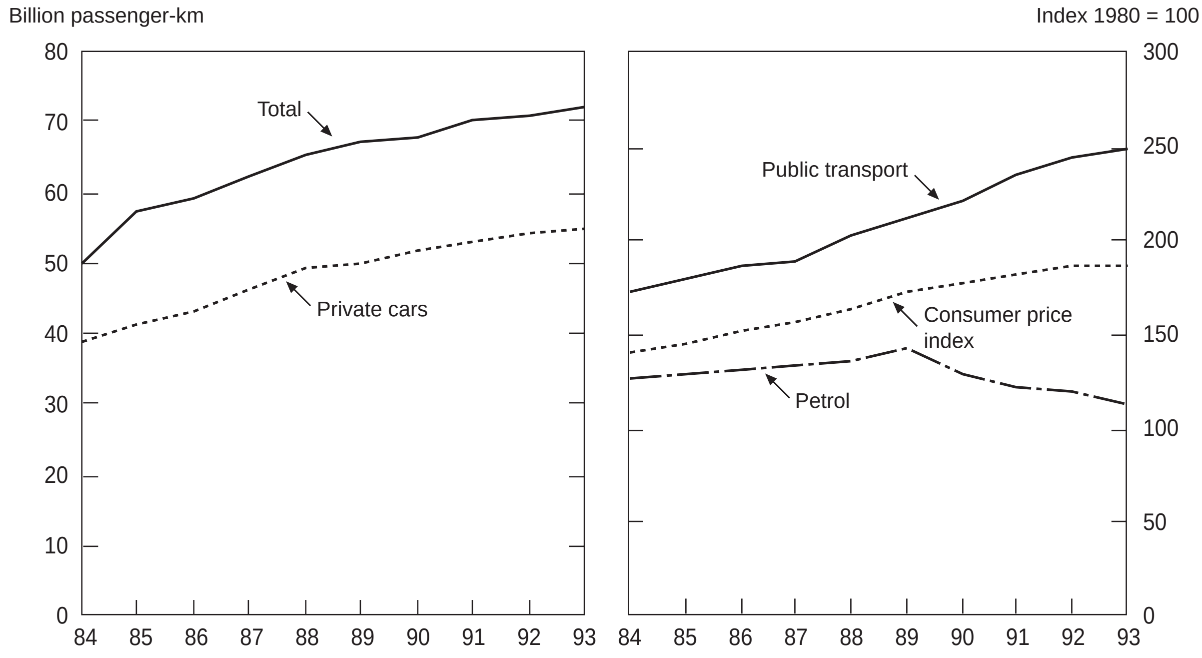
Denmark has 26 airports, but freight traffic of over 350 tonnes can only be handled at Copenhagen and Billund airports. Copenhagen airport accounts for 96 per cent of freight traffic between Denmark and other countries.

Passenger traffic

In terms of passenger-km, total passenger traffic increased by over one-third over the period 1984-93, solely as a result of growing car use. There are a number of reasons for the development of private transport:

- the vehicle stock is growing;
- the road network is well-developed;
- the price of public transport increased considerably over the period;
- taxes on oil products have been reduced.

Figure 4. **Trends in passenger transport and prices**



Source: Statistics Denmark.

Public transport users are primarily those who are too young to drive or who do not have the financial resources to afford a car (students, etc.).

Road transport

-- Bus transport accounts for 7 per cent of total passenger traffic, scarcely more than the bicycle (6 per cent).

-- Private cars account for three-quarters of total passenger traffic. The majority of people aged 16 to 74 use a car for both home-work commuting during the week and for leisure activities at the weekend.

Rail transport

The railways account for 9 per cent of total passenger traffic. One-quarter of the passengers using this mode use the tramway (S-train).

Air transport

Passenger transport by air is fairly substantial, as Copenhagen airport (tenth biggest in Europe) had roughly the same number of passenger departures and arrivals (a little under 10 million) in 1992 as Orly, Rome and Brussels.

Question 2: Present situation as regards infrastructures and investment projects

At constant 1980 prices, DKr 4.2 billion a year were allocated between 1984 and 1993 for road construction and maintenance and DKr 1.1 billion for the construction of railways and the acquisition of rolling stock. Over the period 1989-93, DKr 0.4 billion a year was allocated to new construction and the fixed costs of the ports. DKr 2 billion have been invested since 1989 in the Great Belt fixed link project.

Road infrastructures

Present situation

In terms of network density network, in km of road per km² of area, Denmark is in fifth place among the countries of western Europe, after Belgium (first), the Netherlands, Germany and Switzerland. Danish road capacity, in km of road per 1 000 vehicles, is in second place in Europe, after Norway.

While the Danish road network was one of the most developed in Europe until recently, the rate of construction has slowed considerably over the past decade. There was an increase of only 1.5 per cent in the length of the network over this period, whereas the vehicle stock (commercial and private) increased by 15 per cent.

The network is made up of county roads, main roads and municipal roads. In 1991 the main roads became an infrastructure policy priority. The length of roads with four or five lanes rose again, because budgets for the construction and maintenance of public roads, which had been falling, were increased. In 1993, the amount allocated for the road network amounted to 40 per cent of the public sector budget and 6 per cent of the national budget.

The vehicle stock

After falling at the beginning of the 1980s, the vehicle stock began to increase again fairly steadily. As of 1 January 1994, there were 370 vehicles (private and commercial) per 1 000 population, as against 301 in 1976. The number of private cars, 83 per cent of the total stock, increased by 25 per cent between 1976 and 1994. The number of buses also increased over this same period for two reasons:

- the expansion of public transport services in the early 1980s, with the creation of public passenger transport enterprises;
- the 1991 fiscal changes for minibuses.

Compared with the rest of western Europe however, the vehicle ownership rate remains fairly low, since Denmark is in second to last place (ahead of Spain).

Since 1976, total capacity of the stock of trucks, semi-trailers, etc., has doubled. In 1994, trucks were bigger and more numerous than in 1976.

Investment projects

The priority projects for the construction of new infrastructures, apart from the corridor defined in the TEN ("the fixed link across Øresund") are:

-- the construction of motorways north of Aalborg: expected cost, ECU 263 million and opening scheduled for 2001;
-- the construction motorway between Kolding and Esbjerg: expected cost, ECU 171 million and opening scheduled for 1998.

In the context of the TEN (Trans-European Network), ECU 28.5 million are earmarked for road construction.

Rail infrastructures

Present situation

In 1993, the total length of the rail network was 2 881 km, or a network density of 67 km per 1 000 km². The Danish network is twice as dense as that of the other Nordic countries, but it is very modest when compared with that of other European countries. Seventy per cent of the network is single-track and only 11 per cent of the lines are electrified, even though the electrified share has doubled in the past ten years. Between 1990 and 1993, the sums allocated (2 per cent of gross fixed capital formation in Denmark) for railway construction and the renewal of rolling stock increased.

One-fifth of the rail network is operated by local private companies (belonging to local authorities or the central government). The remaining lines are operated by the national railway company, DSB.

Rolling stock

In recent years, 100 locomotives have been replaced by modern trains. The number of freight wagons has been sharply reduced, and although the new wagons are bigger than the old, the total carrying capacity of the rolling stock fell by 18 per cent between 1984 and 1993.

At the beginning of the 1980s, the number of passengers fell steadily. The introduction of the IC3 express trains made it possible to return to a volume of traffic more or less the same as in the years preceding the decline, but the overall number of seats available has nevertheless fallen by 8 per cent since the 1980s.

Investment projects

The rail infrastructure projects concern Denmark's mainline network as projected in the TEN programme. The work envisaged includes upgrading, electrification and laying of a second track on the Odense-Padborg line. This project has been approved by the European Union. Since the studies are not yet completed, the Danish authorities cannot at present give a figure for the total cost of the work or a date for the entry into service of the new line.

Preliminary studies for the creation of a high-speed train network have just begun. No date for the implementation of this project has yet been set.

In the context of the TEN, ECU 45.6 million will be earmarked for rail infrastructures.

Marine infrastructures

Present situation

In 1993, Denmark had 89 ports handling cargo, vehicles and passengers and 55 ferry ports. The total traffic of these sites amounted to only 4 per cent of total European port traffic.

The merchant fleet

In 1994 the Danish merchant fleet amounted to 1.2 per cent of the world fleet and 7.7 per cent of the European fleet. While total tanker tonnage has fallen by 35 per cent since 1985, the total tonnage of dry cargo vessels has increased by 42 per cent. This is explained by the substantial increase in the number of container and Ro-Ro ships in the total Danish fleet.

Investment projects

The Danish documents mention no new investments.

Question 3: Capacity problems

The problem of road accidents

The number of accidents causing death or injury fell by 26 per cent between 1984 and 1993. In 1993, there were 8 500 accidents, two-thirds of them in urban areas. Trucks represent a particular danger to other vehicles and pedestrians. In 1993, trucks were involved in only 7 per cent of accidents, but 21 per cent of those killed were involved in collisions with trucks. Pedestrians make up 92 per cent of those killed or injured.

Energy consumption in the transport sector

Denmark's total energy consumption has not changed since 1972 (before the first oil shock), but the energy consumed by the transport sector increased by 24 per cent between 1972 and 1992. Road transport is the biggest consumer, with 58 per cent of the total consumption for the sector, or an increase of 16 per cent over the past ten years; this increase is in fact comparable with that of the vehicle stock. Diesel fuel consumption has increased particularly, as a growing number of households buy diesel cars.

In 1993, maritime transport accounted for 28 per cent of the sector's total consumption. Vessels trading with other countries use 88 per cent of the Danish crude oil stocks, a trend that has increased since 1984.

Rail transport energy needs account for 2 per cent of total transport consumption.

It is likely to be difficult to reduce the amount of energy consumed by the transport sector, because the most fuel-efficient modes (such as rail) are increasingly being abandoned for the car. The latest estimates forecast an increase in energy consumption of at least 15 per cent over the next few years.

Environmental impact

A major study was carried out in 1990 on the pollutants emitted by the different transport modes. The transport sector is responsible for over 50 per cent of total toxic gas emissions. Road transport is by far the most polluting mode. The authorities are counting in the first instance on catalytic converters to reduce the toxic emissions released into the atmosphere by motor vehicles.

The present geographical distribution of the infrastructures for all modes in urban and residential areas causes problems of noise emissions that exceed the norms in force in Denmark.

Question 4: Measures

“Traffic 2005”, a programme of measures to improve transport efficiency and facilitate trade, compatible with the needs of the population and respect of the environment, has been drawn up by the Danish government. It defines the following major strategies for the future:

- influence the volume of traffic and of demand, in order to modify the modal split;
- reduce environmental problems;
- set new priorities for investments in transport infrastructures;
- improve traffic research and statistics.

The main idea behind this programme is that the construction of new infrastructures will not improve the present situation, as regards either traffic flows or regional economic development. On the contrary, an increase in the capacity of infrastructures would induce additional traffic, notably on roads. Priority must be given to technological solutions and the use of fiscal measures to regulate demand and achieve a better modal split. High taxes are already levied on private car users and will continue to be in the years to come.

In the fiscal reform introduced in 1994, it was planned that the government would regularly increase the taxes on diesel fuel until 1998 and perhaps even until 2005.

Denmark intends to sign an agreement with Germany, the Netherlands, Belgium and Luxembourg obliging road users to pay charges in all five signatory countries.

Less polluting modes, such as water-borne transport, railways and combined transport techniques, should be developed. However, the potential for developing combined transport in Denmark appears very limited, according to a recent study, because 60 per cent of loaded trucks travel less than 50 km and only 20 per cent more than 100 km. To develop this technique (in order at least to reduce international road traffic), the government has undertaken to support efforts to construct a European rail-road combined transport network. It is prepared to draw up a multimodal infrastructures programme.

The development of fixed links between the Danish islands and the neighbouring countries should also make it possible to increase transfers of traffic from road to rail.

In road transport, the number one priority is considered to be the improvement of road safety. The "Traffic 2005" plan proposes to adopt the solutions worked out by the Danish Road Safety Commission, despite their high cost. The improvement of road signs and signals and road equipment in urban areas and the maintenance of the municipal network will be the priority tasks of the municipalities and counties.

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Summary of the Danish government's White Paper on transport and the Traffic Plan "Traffic 2005", submitted in December 1993.

Statistik Danmarks, *Transport Statistik 95*.

Danish Ministry of Transport, "Priority projects in terms of infrastructures".

Note

1. This is the national register in which transport enterprises must be recorded in order to pursue their activities legally. They are mainly freight transport enterprises because passenger transport operators are not obliged to register.

ESTONIA

Area: 45 227 km²
Population: 1 491 583

The transition to a market economy has been marked by far-reaching changes to Estonia's economic structures. Firms (particularly in the commercial sector) have had to find new partners outside the countries of the CIS, partly as a result of currency conversion problems and partly as a result of political upheaval in the countries of the former Soviet Union.

Economic development over the next few years has been estimated on the basis of GNP, which is expected to rise by 2 per cent by 1998 and by a further 42 per cent between 1998 and 2015. The expansion of the services sector, while rapid, has not been sufficient to compensate for the decline in industrial output (down 39 per cent between 1991 and 1992). According to the national statistics office, GDP has been falling steadily since the beginning of the 1990s.

	Decline in GDP (% per year)
1990	6.5
1991	13.6
1992	14.2
1993	8.6
1994	3.2

In 1996, this negative trend should slow and become slightly positive by the end of the year. At the start of 1995, GDP (in 1993 constant prices) had risen by 1.7 per cent on the previous year. The price index rose by 1 308 per cent over the same period and unemployment by over 16 per cent. The monetary reform which took place on 20 June 1992 has enabled Estonia to control its own monetary policy. The Estonian kroon re-entered the international financial market pegged to the deutschemark.

In 1993, central government funds were expected to be 80 per cent higher than in 1992, with half of the increase coming from VAT.

The increase in the volume of exports failed to overtake the rise in the import volume, leading to a worrying balance of payments deficit. In 1994, the share of exports in GDP was 78.7 per cent. The share of imports was 89.7 per cent.

The exit from the rouble area in June 1992 brought an end to transactions with the other republics of the former USSR. However, this drop in trade was offset in a spectacular manner in 1993 by the growth of exports to western countries. Exports are divided equally between the EFTA countries and members of the CIS. Currently, 80 per cent of exports go to the CIS and the European Union (particularly Germany, Denmark and the Netherlands). Since the accession of Finland and Sweden to the EU, the share of trade with the EU has risen by 32.34 per cent (causing the share of trade with the EFTA countries to fall). However, both for imports and exports, Finland and Russia remain Estonia’s principal trading partners.

Question 1: Future trends in passenger and freight traffic

Both passenger and freight traffic have followed the trend set by the Estonian economy. Consequently, the volume of traffic fell in 1994.

Passenger traffic

The volume of public transport has not fallen evenly across all modes. In the maritime and air transport sectors, for example, the volume of passenger traffic has been growing since the beginning of the decade. The overall trend, however, is negative. Since 1992, the total volume of traffic (measured by number of passengers) has fallen by approximately 40 per cent. The number of passengers transported via the inland waterways has dropped below the 1 million mark. However, the reduction in the number of passengers using this mode is not necessarily the result of the poor economic situation, since the inland waterways have never occupied more than a negligible share of the Estonian transport market.

Passengers transported by Estonian companies, 1992-95
Millions

	1992	1993	1994	1995*
Total **	557.7	439.6	307.2	284.1
Passenger-kilometres	5 148.0	4 275.0	3 664.0	3 251.0
Of which international	5.1	3.5	3.3	3.2
“ “ (passenger-km)	1 087.0	931.0	866.0	790.0

* Estimated.
** Includes inland waterways traffic.

The volume of passenger traffic has suffered as a result of higher fares in the public transport sector and the growing number of private cars.

Road transport

Public road transport
Millions

	1992	1993	1994	1995
Public road transport	348.3	284.6	216.0	227.0
Passenger-km	3 078.0	2 570.0	2 348.0	2 468.0
Of which international	0.9	0.4	0.3	0.4
“ “ (passenger-km)	253.0	246.0	286.0	340.0
Of which local	347.4	284.2	176.9 *	175.0
“ “ (passenger-km)	2 825.0	2 324.0	947.0 *	937.0
Of which tramway/trolley	191.3	135.5	69.8 *	67.0
“ “ (passenger-km)	717	508.0	201.0 *	261.0

* As of 1 January 1994, a different method has been used to calculate volume of municipal public transport in Tallinn; the monthly ticket now represents 75 journeys on average, rather than 120 as before.

Average daily traffic on the Tallinn-Pärnu-Ikla route has fallen from 8 900 vehicles per day around Tallinn and 1 500 around the Estonian border in 1992 to 7 500 and 800 vehicles per day, respectively, in 1993.

Between 1990 and 1993, the level of domestic traffic (passenger and freight) in the Baltic states experienced a significant drop, despite the rise in car ownership. The drop was the result of higher oil prices, which rose by a factor of seven, whereas prices generally rose by a factor of three or four.

According to forecasts produced for the “Via Baltica” study, urban traffic on the main thoroughfares in Tallinn is expected to grow by 41 per cent between 1990 and 2000, and by a further 99 per cent between 2000 and 2015. The number of private cars has more than doubled during the last decade:

Private cars per 1 000 inhabitants

1980	86
1985	115
1990	154
1992	186
1994	226

On 1 January 1994, the motorised vehicle fleet was broken down as follows:

	1991	1992	1993	1994
Private cars	261 086	283 469	317 425	337 812
Buses and coaches	8 628	8 400	8 663	6 340

The motorised vehicle fleet is therefore growing by between 8 and 10 per cent each year.

In 1992, the average distance covered by private cars was 7 000 km per year. Taken together, private cars, buses and coaches account for 20 billion passenger-kilometres a year. In 1992, international coach lines transported 900 000 passengers.

Improvements in domestic and international bus (and coach) lines should lead to a slight increase in the number of passengers. However, growth is expected to be slow, owing to the closure of unprofitable lines and the introduction of higher fares.

Rail transport

Rail transport
Millions

	1992	1993	1994	1995
Rail passengers	15.8	16.7	11.6	8.8
Passenger-km	950.0	722.0	537.0	421.0
Of which international	2.8	1.3	0.9	0.8
“ “ (in passenger-km)	449.0	228.0	147.0	102.0

Among the reasons for the decline in rail traffic are improvements in the system for obtaining visas, the weakening of economic ties with the CIS, and the increase in the car ownership rate.

Maritime transport

Maritime transport
Millions

	1992	1993	1994	1995
Passengers - maritime transport	2.1	2.6	2.8	3.1
Passenger-km	211.0	247.0	286.0	244.0
Of which international	1.3	1.7	1.9	2.0
“ “ (passenger-km)	201.0	233.0	275.0	232.0

More than 500 vessels are registered in Estonia. The growth in the number of passengers is largely due to the very rapid development of economic relations with Sweden, Finland and Germany, in particular, and with European countries in general.

The Tallinn-Helsinki route, the most popular crossing, transported 1.5 million passengers in 1992 and 2.2 million in 1994. Next, in terms of the volume of traffic, is the Tallinn-Stockholm crossing with 286 000 passengers in 1993 and 306 000 in 1994. On both these crossings, the number of passengers rose by 36 per cent between 1991 and 1992 and the number of vehicles transported by a factor of 3.5.

In spite of a slight drop in the number of passengers as a result of the “Estonia” ferry disaster, traffic seems to have picked up in 1995.

Air transport

Air transport by Estonian airlines
Millions

	1992	1993	1994	1995
Air passengers (thousands)	174.5	150.0	175.5	184.0
Passenger-km	191.0	228.0	159.0	138.0
Of which international	123.2	122.0	170.5	180.0
“ “ (passenger-km)	184.0	224.0	158.0	137.0

Estonia has 94 aeroplanes registered. Forecasts for 1994 show 330 000 passengers passing through Tallinn airport (compared with 77 000 in 1993). Air transport generally, all types of traffic taken together, is expected to continue growing in 1995. It seems that flight destinations have changed, since international traffic in passenger-km is decreasing while the total number of passengers is increasing.

Freight traffic

The downward trend in freight traffic mirrors the decline in the national economy but is even more acute. Over the past few years, the volume of freight traffic has fallen very sharply (down 36.5 per cent between 1992 and 1993), although the drop applies only to freight carried by national operators. In 1995, the total volume of goods transported in tonne-km is lower than in 1992. Figures are however given for national companies only. It would appear that following the Soviet Union’s loss of influence, foreign operators, based in Finland for example, have been able to develop traffic in certain goods for import or export.

Freight transported by Estonian transport companies, 1992-95
Million tonnes

	1992	1993	1994	1995*
Total volume of goods transported**	66.9	42.5	40.6	37.2
t-km	26 492.0	30 891.0	31 948.0	21 476.0
Of which international	19.2	22.2	20.0	19
“ “ (t-km)	24 301.0	29 829.0	30 893.0	20 497.0

* Estimated.
** Including traffic by air and inland waterways.

Road traffic
Million tonnes

	1992	1993	1994	1995
Volume of goods transported	33.9	11.4	12.1	9.0
In t-km	1 457.0	1 056.0	1 415.0	1 549.0
Of which international	0.5	0.8	1.2	1.2
“ “ (t-km)	307.0	554.0	897.0	1 100.0

Fleet of motorised vehicles, 1 January 1994

Type of vehicle	1991	1992	1993	1994
Lorries	64 937	62 728	62 971	53 733
Special vehicles and vans	12 120	11 830	11 118	n.a.
Trailers, semi-trailers		36 142	37 405	n.a.

According to vehicle counts carried out in 1992 on the Estonian section of the Via Baltica, heavy goods vehicles accounted for 22 per cent of all vehicles. Half the lorries weighed less than 4 tonnes, and only 8 per cent weighed more than 12. Efficiency is poor, given that nearly 20 per cent of the lorries included in the survey were empty. Moreover, the total volume of goods transported decreased in 1995 whereas traffic in t-km increased.

Share of heavy goods vehicles in the fleet of motorised vehicles
Percentage

Type of vehicle	1995	2000	2015
Lorries	14	12	13
Semi-trailers	5	5	5
Buses and coaches	8	4	2

As a result of the increase in the price of petroleum products, traffic growth is relatively limited, except on the Via Baltica, where transit traffic rose by more than 500 per cent between 1988 and 1992. In 1992, 0.9 million tonnes of goods were transported internationally by road. In 1990, road freight transport in the Baltic states accounted for less than 20 per cent of total tonne-kilometres.

Freight traffic by road can be expected to quadruple over the next 20 years, as 50 per cent of rail traffic is transferred to the road sector and as a result of the demand for freight traffic between the Nordic countries and central and southern Europe.

Rail transport

Rail traffic trends

Million tonnes

	1992	1993	1994	1995
Volume of goods transported	27.2	24.2	22.6	21.6
t-km	3 646.0	38.22	3 377.0	3 235.0
Of which international traffic	13.5	15.6	13.8	13.5
“ “ (t-km)	2 919.0	3 274.0	2 850.0	2 800.0
Of which transit traffic	6.3	9.8	8.9	8.8
“ “ (t-km)	1 174.0	2 430.0	2 133.0	2 200.0

The drop in freight traffic by rail is largely due to the discontinuation or reduction in bulk transit traffic to and from the CIS since 1993 (down 10 per cent). Most rail traffic is transit traffic generated by the ports. The port of Tallinn accounts for 83 per cent of all traffic through Estonian ports.

Maritime transport

Maritime transport by Estonian shipping companies

Million tonnes

	1992	1993	1994	1995
Volume of goods transported	5.7	6.8	5.7	4.0
t-km	21 388.0	26 012.0	27 154.0	16 316.0
Of which international	4.8	5.9	5.0	3.1
“ “ (t-km)	21 375.0	26 001.0	27 145.0	16 305.0

In 1992 the Estonian merchant navy transported 4.8 million tonnes in international traffic. This figure also represents average traffic for the period 1992-95 after a year of heavy traffic in 1993. In 1994, Estonian ports handled approximately 12 million tonnes of freight, which represented a slight drop from the previous year (once again due to the reduction in transit traffic from the CIS, particularly Russia).

Estonian ports hope that in 1995 and the years ahead they will be required to handle new flows of transit goods from Kazakhstan, Ukraine and Belarus.

Air transport and inland waterways

The volume of goods transported by air and the inland waterways is under 1 million tonne-km per year, despite a slight increase in the volume of inland waterways traffic in 1994.

Question 2: Present situation as regards infrastructure and projects for investment

Thanks to international funds granted to Estonia since 1992, the first calls for bids will be launched for infrastructure projects selected mainly by the EBRD and the World Bank. The projects largely involve the modernisation (or replacement) of transport infrastructure, in particular ports and roads. Foreign aid has mainly taken the form of training, technical support and research activities.

There will be no significant change in the length of the transport network in the period up to 2015. However, the quality of the network will be improved. Roads will be upgraded to a minimum of two lanes with a width of 9 m.

Air transport infrastructure

Estonian Airport carried out modernisation work on Tallinn airport in 1995. A loan from the EBRD was used to extend and renew the runway. A loan of ECU 20 million from the European Investment Bank is being used for a project currently under way (1994-97) to update the air traffic control system.

Road infrastructure

The road network is 14 811 km long (6 453 km of primary roads), with a density of 0.33 km/km². There are a number of missing links, for example:

- Tallinn-Novgorod ;
- Tallinn-Ostrov (towards Moscow).

A road renewal project is currently underway (1995-96), funded through a $12 million loan from the World Bank. New sections of motorway will be built on the main routes (Tallinn-Tartu, Tallinn-Pärnu) and the rest of the network will be upgraded. The World Bank has also issued $3 million for the purchase of tyres and spare parts for vehicles used for public transport.

Infrastructure projects not on the main corridors

Two key projects launched at national level have been temporarily halted:

- The first project concerns the Ruu-Aaspere section of the route between Tallinn and Narva. The plan is to upgrade a 50 km stretch of a two-lane road to a motorway, at a total cost of $21 million. Upgrading work began in 1985. The project then came to a halt, but work was resumed on 1 January 1996. So far, the project has cost $2 million.
- The second concerns the Yuri-Aruvalla section of the Tallinn-Tartu-Voru-Luhamaa route. The plan is to upgrade a 5 km stretch of a two-lane road to a motorway, at a total cost of $6 million. By 1 January 1996, $0.8 million had been spent on the project since its launch in 1990.

Railway infrastructure

The rail network totals 1 026 km of line, representing a density of 0.023 km/km^2. A new railway line for passengers travelling between Tallinn and Berlin, via Riga, Vilnius and Warsaw, was scheduled to be opened in May 1993.

Diesel locomotives are currently being modernised thanks to a $7.5 million loan from the World Bank and the Japanese Import-Export Bank.

Infrastructure projects not on the main corridors

Two key infrastructure projects have been launched at national level outside the main corridors:

- The first project concerns the Tallinn-Tapa-Narva-St Petersburg line. The plan is to upgrade 210 km of track along the Estonian section of this line, at an estimated cost of $11 million. The aim of the project is to facilitate transit services of goods to Russia (70 per cent of such traffic travels on this line).
- The second concerns the Tallinn-Tapa-Tartu-Kiliima-Petseri-Moscow line. No further information is available on this project, which also aims to facilitate transit services of goods to Russia. This line accounts for the remaining 30 per cent of transit traffic to Russia.

Maritime infrastructure

Tallinn has three deep-water, ice-free ports, with a total annual capacity of 14 million tonnes of freight and 2 million passengers. The site of the new ferry terminal has yet to be decided. The choice is between the existing port in Tallinn or the new port of Maardu, 15 km east of Tallinn.

In April 1993, the European Community and the G 24 “Transport” group approved inclusion of the Via Baltica route (193 km in Estonia and an 80 km ferry crossing between Tallinn et Helsinki) in the list of top priority transport corridors in the former Eastern Europe.

A dry bulk terminal is currently being built in the port of Muuga. The work (1994-97) is funded by a loan of ECU 15 million from the European Investment Bank.

Question 3: Capacity problems

In 1993, the journey between Tallinn and Helsinki took between four and a half hours for private cars and seven hours for heavy goods vehicles, excluding the time spent waiting for the ferry. Although the level of induced traffic would be very high if the journey time between the two cities could be cut to under three hours, there has been no significant improvement in the duration of the crossing since 1993.

It can take up to two hours for heavy goods vehicles on the Via Baltica to cross the Latvian border, and the situation is getting worse as the volume of traffic increases. It now takes longer to cross Tallinn and Pärnu. Road maintenance needs to be improved, particularly in winter, in order to maintain road capacity.

The inexperience of new drivers has led to an increase in the number of people killed in road accidents (up 40 per cent between 1985 et 1991). The number of fatalities has gone up more quickly than the number of accidents.

Traffic accidents, 1990-94

	Accidents	Fatalities	Casualties
1990	2 099	436	2 379
1991	1 965	491	2 175
1992	1 167	287	1 289
1993	1 317	321	1 502
1994	1 584	364	1 832

Question 4: Measures

Estonian transport policy is based on a number of socio-economic objectives:

- to enable all physical and legal persons to use the public road network, in accordance with national law;
- to develop transport services throughout Estonia in response to public needs in terms of capacity, quality and respect for the environment;
- to increase the share of transport GDP in national GDP by developing transport services to include transit traffic, and by making greater use of the existing road network for international traffic;
- to enhance the capacity of Estonia to compete on the world market.

Priority must be given to meeting the needs of (national) transport users. The aims of the present transition phase are:

- to restructure the transport sector;
- to prevent capacity losses in the case of strategic transport modes (public road and rail transport and maritime transport);
- to bring the overall quality of the transport system and infrastructure up to the same standard as that of EU member states.

A number of measures will have to be taken in order to achieve these aims. The Estonian government has decided to prioritise:

- improving the capacity and safety of traffic on the east-west corridor;
- developing the port of Tallinn;
- modernising Tallinn airport in accordance with the rules laid down by the ICAO;
- rebuilding the main north-south and east-west roads.

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FINLAND

Area: 338 100 km^2
Population: 5 117 000

From 1991 to 1995, a deep economic recession resulted in an overall reduction of about 15 per cent in GNP and in consumption. A bank crisis and rising unemployment obliged the government to reduce expenditures and increase borrowing to finance the budget deficit. Also during this period, profound social changes shook the foundations of the "welfare state".

The socio-economic changes have been so far-reaching that it is difficult to determine trends that would make it possible to calculate traffic forecasts. Those made in the late 1980s (a stable decade with economic growth) were overly optimistic. More recent forecasts include alternative scenarios. Different factors affecting the development of society are taken into account, such as environmental and demographic parameters.

The forecasting methods, in particular those of the Finish National Road Administration, make the following assumptions:

- annual GDP growth of 2.7 per cent until 2005 for the industrialised countries;
- annual growth of Finnish GDP of 3.5 per cent between 1995 and 1999; 3 per cent between 2000 and 2005; 2 per cent between 2006 and 2020;
- annual growth of household income, 0.5 per cent less than that of GDP;
- a population increase of 2 per cent over the period, accompanied by growth in the active population until 2010, followed by a fairly rapid decline between 2010 and 2020;
- ageing of the population and an increase of 0.5 per cent a year in the number of households, or 14 per cent by 2005.

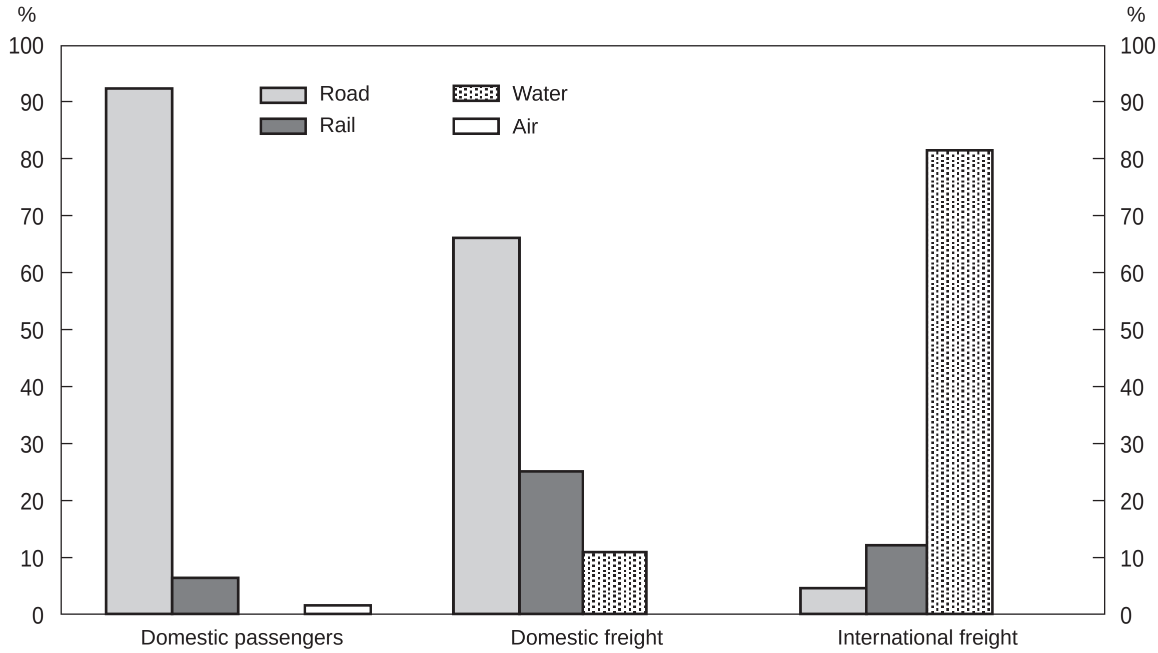
Question 1: Future trends in passenger and freight traffic

Studies carried out in Finland forecast an annual increase in transport expenditure of 5 per cent between 1995 and 2000, or a higher growth rate than that of national GDP. As of the year 2000, transport should grow at the same rate as GDP.

Total passenger traffic, all modes taken together, should increase by 30 per cent by the year 2000. In 1994, Finns spent on average 76 minutes a day travelling and covered 50 km. Public transport accounted for 21 per cent of total passenger kilometrage.

Total domestic freight traffic, all modes taken together, is expected to grow by 42 per cent in volume terms between 1994 and the year 2000 and international and transit traffic by 30 per cent. The modal breakdown should remain much the same.

Figure 1. **Traffic in Finland by transport modes in 1995**



Source: ECMT.

There is little information about future trends by mode and type of traffic.

Transport costs in 1993 were about FIM 87 billion and almost 12 per cent of the turnover of firms. This amount is two to three times greater than that of Finland's principal EU competitors. If Finland is to be competitive, its transport sector will have to be more efficient than that of other European countries.

Road transport

Between 1980 and 1990, in terms of kilometres covered on the main roads, traffic increased by 55 per cent. The economic crisis of the early 1990s reduced this traffic by 3 per cent a year. Between 1994 and 2000, the annual kilometrage is expected to grow by 19 per cent and thus reach 19 billion km on the main roads of the public network, instead of the 21 billion forecast before the crisis. The 20 billion km threshold is now expected to be crossed in 2010. By that date, mobility growth should be 38 per cent, thereby raising annual kilometrage to 22 billion. The big towns of the south of the country will be affected first.

Passenger traffic

Road traffic accounts for 93 per cent of total domestic passenger kilometrage. In terms of passenger-km, rural roads account for 65 per cent and urban roads (streets) for 28 per cent. Forecast studies indicate that this traffic will grow by 2.5 per cent a year over the period 1996-2000.

For international traffic, roads account for 12.8 million passengers out of a total of 30.3 million, or a market share of 40.2 per cent.

Freight traffic

The share of road freight transport is large when compared to figures for many other European countries. In 1994, in terms of tonne-km, road transport accounted for 65 per cent of domestic traffic and only 4 per cent of international tonnage (i.e. 2.9 million tonnes out of a total of 78.5 million tonnes). This figure does not take account of the volume of transit traffic (1 million tonnes for road traffic).

Rail transport

Passenger traffic

Rail transport is most important for long-distance passenger travel between the outlying regions. Its share of long-distance public transport is 64 per cent. However, in volume terms, the urban and suburban services in the Helsinki area account for the greater part of rail traffic.

In 1995, total traffic volume was 11 million passengers. In 2010, according to the forecasts, the traffic volume should reach 15-18 million passengers, notably thanks to the introduction of high-speed trains. At present, VR (Finnish Railways) accounts for 4.7 per cent of total domestic passenger-km (private and public transport) and 0.3 per cent of total international passengers (i.e. 0.1 million passengers out of 30.3 million). Finland and Russia have developed a joint programme for a high-speed line. Substantial growth in the number of passengers travelling by rail between Helsinki and Saint Petersburg is thus expected (growth was already 15 per cent between 1992 and 1994).

Freight traffic

The railways account for 26.2 per cent of tonne-km in domestic traffic and 11.5 per cent of total international freight tonnage, or 9.1 million tonnes out of 78.5 million (all modes together). This figure does not take account of the volume of freight in transit, which is in fact large. In 1994, rail and water-borne transport handled 6 million tonnes of transit freight.

Rail remains the main transport mode for raw materials and the output of heavy industry. The share of the domestic freight market travelling by rail has increased.

Entry in the European Union and changes in Russia and the Baltic countries have permitted the VR to increase its share of international east-west rail traffic. Traffic with Russia grew 15 per cent between 1992 and 1994, and should continue to grow until 2010.

Inland waterway and maritime transport

Passenger traffic

For domestic passenger transport, the share of the water-borne traffic is negligible, with only 0.2 per cent of total passenger-km. For international traffic, instead, it accounts for 41.3 per cent of total passengers carried (or 12.5 million out of 30.3 million). In 1995, 8.9 million passengers travelled between Finland and Sweden and 4 million between Finland and Estonia. Passenger traffic to Estonia increased by 80 per cent in 1995.

Freight traffic

For international traffic, 85 per cent of freight goes by sea: 66.5 million tonnes, excluding transit cargoes, out of a total of 78.5 million. This is possible owing to the existence of 23 ports equipped with icebreakers. The share of domestic traffic is much lower, at 8.7 per cent of total tonne-km. It is mainly coastal navigation (92 per cent of sea-borne tonne-km). The main export ports are: Hamina, Kotka, Sköldvik, Helsinki and Rayma, and the main import ports are Sköldvik, Helsinki, Nantali, Raahe and Pori.

In 1994, the ferries, which carry trains and road vehicles, transported 6.6 million tonnes, or 8.4 per cent of the total 78.5 million tonnes (all modes together).

Air transport

Passenger traffic

A high proportion of total passengers in transit via Finland are air passengers. Air traffic accounts for 16.2 per cent of total international traffic, with 4.9 million passengers. In domestic transport its share of total traffic is only 1.4 per cent of total passenger-km.

Freight traffic

The share of domestic freight traffic by air is only 0.01 per cent of domestic traffic in tonne-km.

Question 2: Present situation as regards infrastructures and investment projects

Road infrastructures

The Finnish Road Administration is responsible for the maintenance and development of the country's public road network. The municipalities are responsible for the construction of urban and interurban roads. Maintenance co-operatives are responsible for maintaining private roads (approximately 280 000 km).

As of 1 January 1995, there were about 78 300 km of public roads, of which 12 800 km of main roads (or 16 per cent of the network). In six years, 2 100 km of roads have been built, of which 1 400 km of additional main roads; 200 km of motorway (and semi-motorway[1]) were opened in recent years, bringing the total motorway network to 600 km.

Public roads are classified as:

- class I main roads;
- class II main roads;
- regional roads;
- connecting roads.

Some 35 per cent of road transport takes place in winter. Studded tyres are permitted despite their abrasive effects on road surfaces. Driving conditions and road safety have improved with the use of better meteorological information systems. The costs of keeping roads open in winter amounts to 66 per cent of total road maintenance costs.

By 2010, Finland should have 1 250 km of motorways, according to the studies carried out by the Road Administration on Finland's national objectives (the first of which is to ensure smooth traffic flow even under very difficult weather conditions, in particular thanks to the modernisation of road surfaces). Finland gave as priority projects (included in the TEN), the work under way on the following routes (see the map on Finland's main road projects 1997):

- E18, main road 1, construction of a new motorway, to be ready in 1998, on the section Turku-Paimio: FIM 980 million;
- E12, main road 3, construction of a new motorway between 1994 and 2002 on the Hämeenlinna-Kulju section: FIM 1 200 million;
- Main road 4, construction of a semi-motorway, between 1993 and 1997, on the section Oulu-Ii: FIM 420 million;
- Main road 6, construction, between 1994 and 1998, of a new motorway bypass in Imatra: FIM 280 million;
- E18, main road 7, construction of a semi-motorway, between 1996 and 1998 on the section Koskenkylä-Loviisa: FIM 120 million;
- Main road 17, construction of a four lane road, between 1996 and 1998, on the Joensuu-Ylämylly section: FIM 105 million;
- E18, main road 45, construction of an intersection, between 1996 and 1998 in Pakinkylä, Helsinki: FIM 150 million;
- E18, main road 1, construction of a new motorway, between 1997 and 2003, on the section Paimio-Muurla: FIM 890 million;
- Main road 4, addition of a semi-motorway to a motorway, to start in 1997 on the section Järvenpää-Lahti: FIM 600 million, to be done with private money (a shadow toll project, DBFO).

Rail infrastructures

The Finnish Rail Administration, under the supervision of the Finnish Ministry of Transport, is responsible for managing the infrastructures. Certain lines are completely private, however, and belong to ports or industrial enterprises.

At present, 80 per cent of the Finnish population live in towns connected to the rail network. The VR network has been able to adapt to the rather particular regional structure of the country. The Finnish mainline network (freight and passenger) totals 5 660 km, of which over

90 per cent is single track. Only 37 per cent of the rail network, or 2 073 km, are electrified, but electric trains carry 65 per cent of the total traffic.

The introduction of fast trains has made it possible to reduce average rail trip times by 30 to 40 per cent.

As of autumn 1995, the line between Helsinki and Turku was upgraded to take Pendolino S220 high-speed trains. This work does not come under the Nordic Triangle project. The upgrading of the Helsinki-Tampere line will permit high-speed train services (220 km/h).

The railway projects under way (see the map on Finland's main railway projects in 1997) are on the following routes :

- Vainikkala-Kouvola-Kotka-Hamina, elimination of the level crossings;
- upgrading of the Helsinki-Tampere rail link to high-speed standard, to be ready in 2004: FIM 850 million;
- electrification of the line linking Tampere to Pori and Rauma (1995-1999): FIM 292 million;
- upgrading of the Helsinki-Turku line to be ready in 1998: FIM 644 million;
- electrification of the line linking Toijala to Turku between 1997 and 2000: FIM 183 million.

These projects will improve the capacity of the rail network as a whole as well as its integration into the environment. These projects should also make it possible to increase the axle load to 25 tonnes. The planned dates for the opening of all these infrastructures are likely to change owing to financing problems.

Question 3: Capacity problems

Road

The volume of road traffic in Finland remains fairly modest as compared with the average traffic in other European Union countries. Peak-hour traffic jams are rare and occur mainly in the capital and on the main roads of the other big towns. Every year 27 million km are covered on the main road network, or 60 per cent of total road traffic. In 1994, there were 3 444 accidents (46 per cent of total accidents), with 337 deaths. In 2010, traffic on the main roads is expected to be 63 per cent of the total road traffic.

Traffic jams and queues at the weekend have increased. In 1993, weekend congestion was estimated at 880 km on the main roads, or an increase of 22 per cent as compared with 1988, and queues at 1 900 km, or 3 per cent more than in 1988. The forecasts (made on the basis of present capacity) for 2010 are worrying: 1 900 km of congestion and 2 400 km of queues on the main road network (see the map on roads with high traffic flows in relation to capacity 1997-2010).

Question 4: Measures

The Ministry of Transport has adopted a 14-point programme aimed at reducing the negative effects of transport on the environment.

Road transport

Road maintenance gives priority to ensuring that road remain practicable. Special attention is given to traffic safety as well as to safety related to winter maintenance and to road surface conditions. The importance of environmental aspects is increasing.

According to an evaluation issued by the Road Administration, Finland will have some 1 250 km of motorway by the year 2010. About half already exists.

Rail transport

The most important objective of railway construction and maintenance for the next few years is to make the existing railway network correspond to current transport needs and to keep investments for development arising from increased transport demand under control.

It is also necessary to increase capacity on the main railway routes in southern Finland and on local lines in the Helsinki area.

Traffic safety will be improved by safety equipment and by increasing the amount of remote control systems. The most important railway stretches will be equipped with automatic protection systems. Level crossings are to be eliminated from railways used to transport dangerous substances or earmarked for fast passenger traffic.

Adverse environmental effects will be alleviated by continuing electrification, which also has rationalisation benefits. The introduction of new fast rail traffic also calls for electrification. Fast passenger traffic in southern Finland is being developed in line with the improvements in the fundamental railway network (see the map on Service levels of Finland's railway network in 2010).

Inland waterway and maritime transport

The technical quality and the safety of the waterways will be improved by developing safety equipment and by constructing a DGPS satellite positioning system which covers the entire waterway system.

Icebreaker operations assist traffic to ports in winter so that industrial transport needs can be handled regularly and without unreasonable delays.

The competitiveness and the efficiency of the ports and the port operations are being promoted. The cargo port in the capital area is the largest development project and will eventually replace Helsinki's present cargo ports.

Air transport

Finland's airports have a uniform infrastructure that supports its regional policies. This infrastructure is to be further developed to meet future demand. Air traffic growth calls for enhanced air navigation services. The replacement of the country's entire air navigation system is under way.

An important new air route is the so-called Transpolar Route, which will shorten the flight time from western Europe to the Far East.

Airport development is focused on Helsinki-Vantaa Airport, where terminal capacity is being increased by the construction of a “middle” terminal.

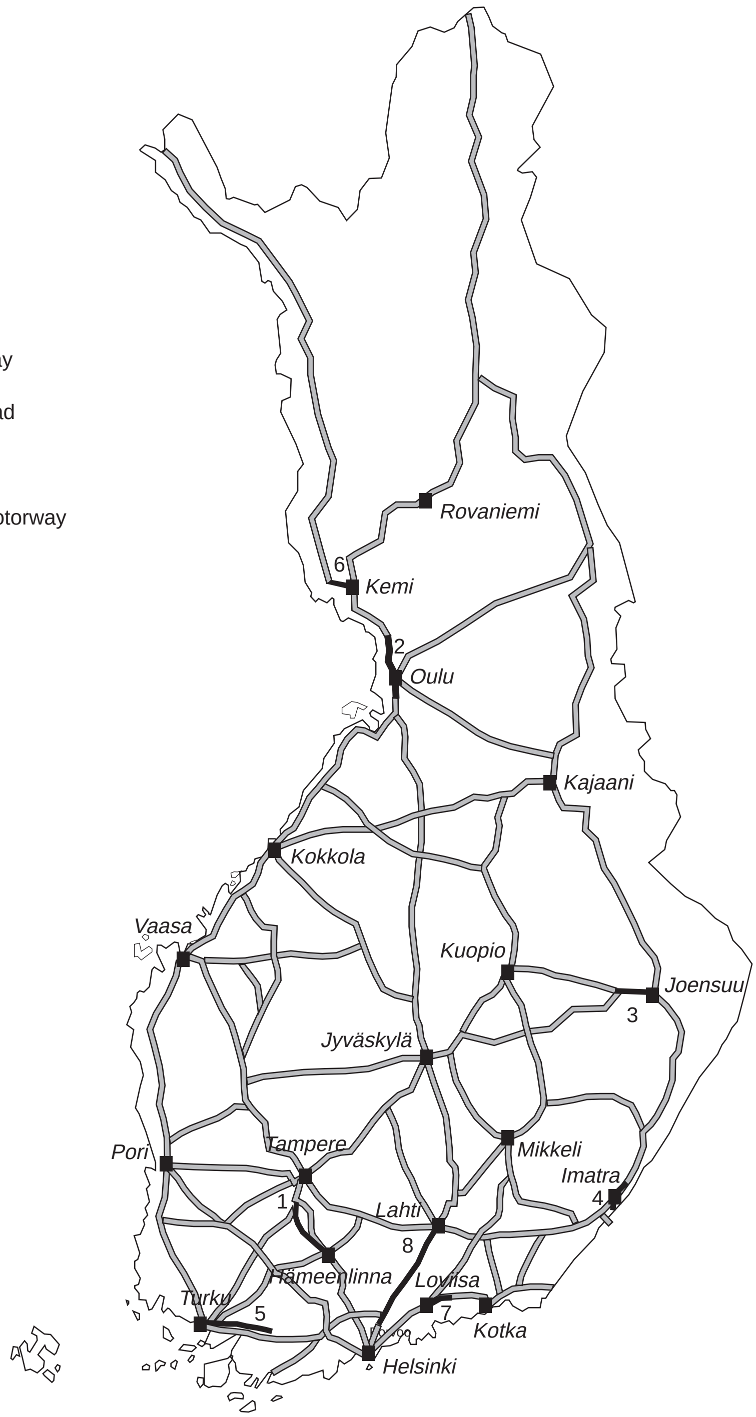
Note

1. A semi-motorway is a road which in a first phase has two single carriageways with grade separations at intersections, as with a motorway. If traffic increases, these roads can easily be made into full motorways because the necessary width is already allowed for.

Map 1. **Finland's main road projects 1997**

1. Hämeenlinna-Kulju motorway
2. Oulu-Li semi-motorway
3. Joensuu-Ylämylly 4-lane road
4. Imatra bypass
5. Turku-Muurla motorway
6. Kemi-Tornio motorway
7. Koskenkylä-Loviisa semi-motorway
8. Järvenpää-Lahti motorway

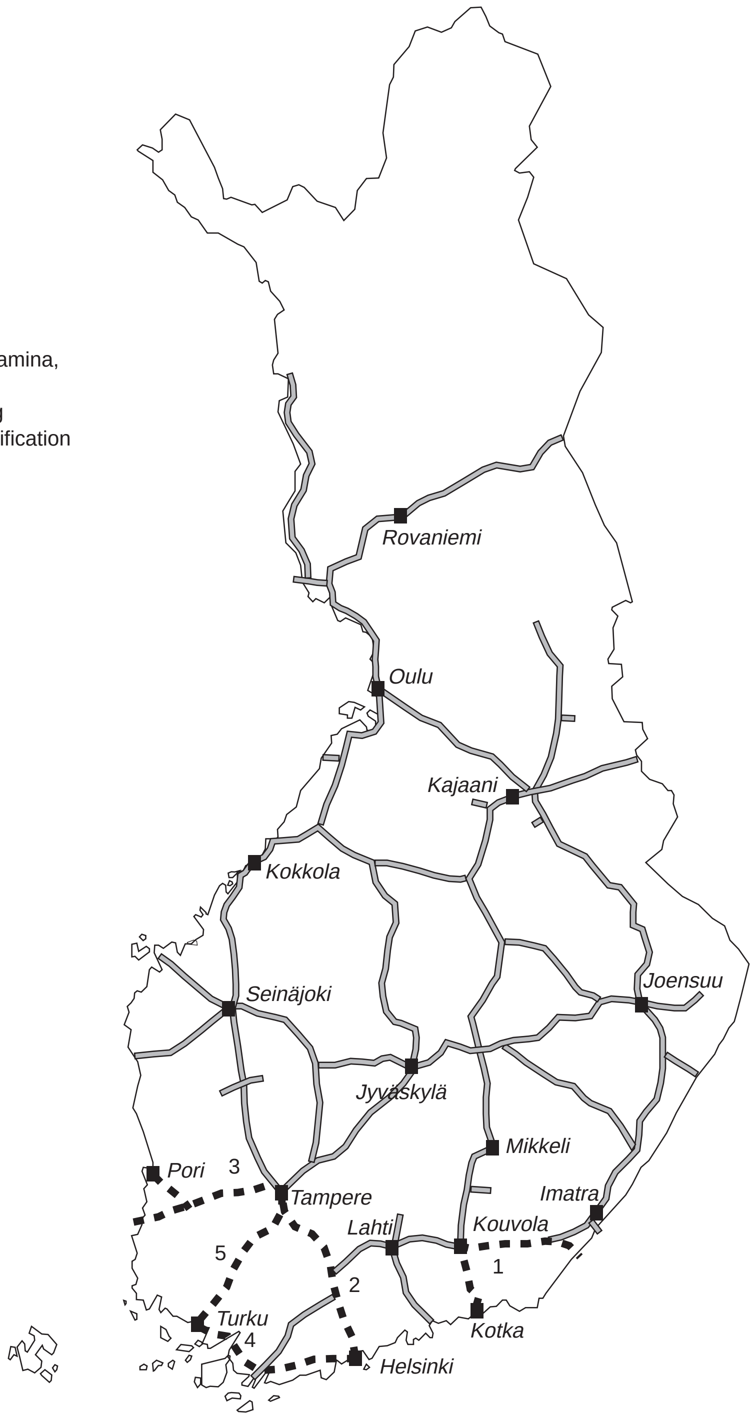
Main roads
Road project



Source: ECMT.

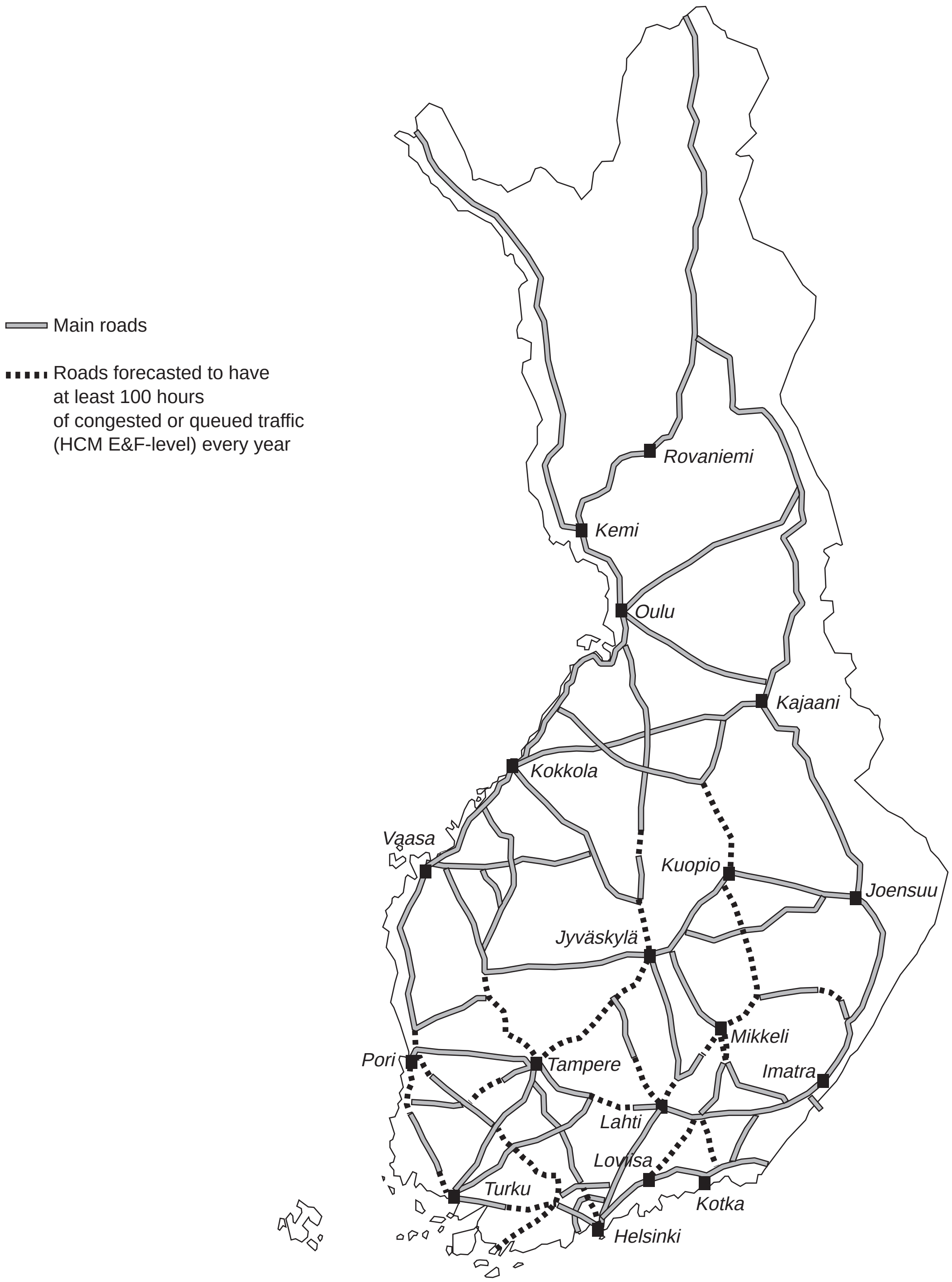
Map 2. **Finland's main railway projects 1997**

1. Vainikkala-Kouvola-Kotka-Hamina, elimination of crossings
2. Helsinki-Tampere, upgrading
3. Tampere-Pori-Rauma, electrification
4. Helsinki-Turku, upgrading
5. Toijala-Turku, electrification



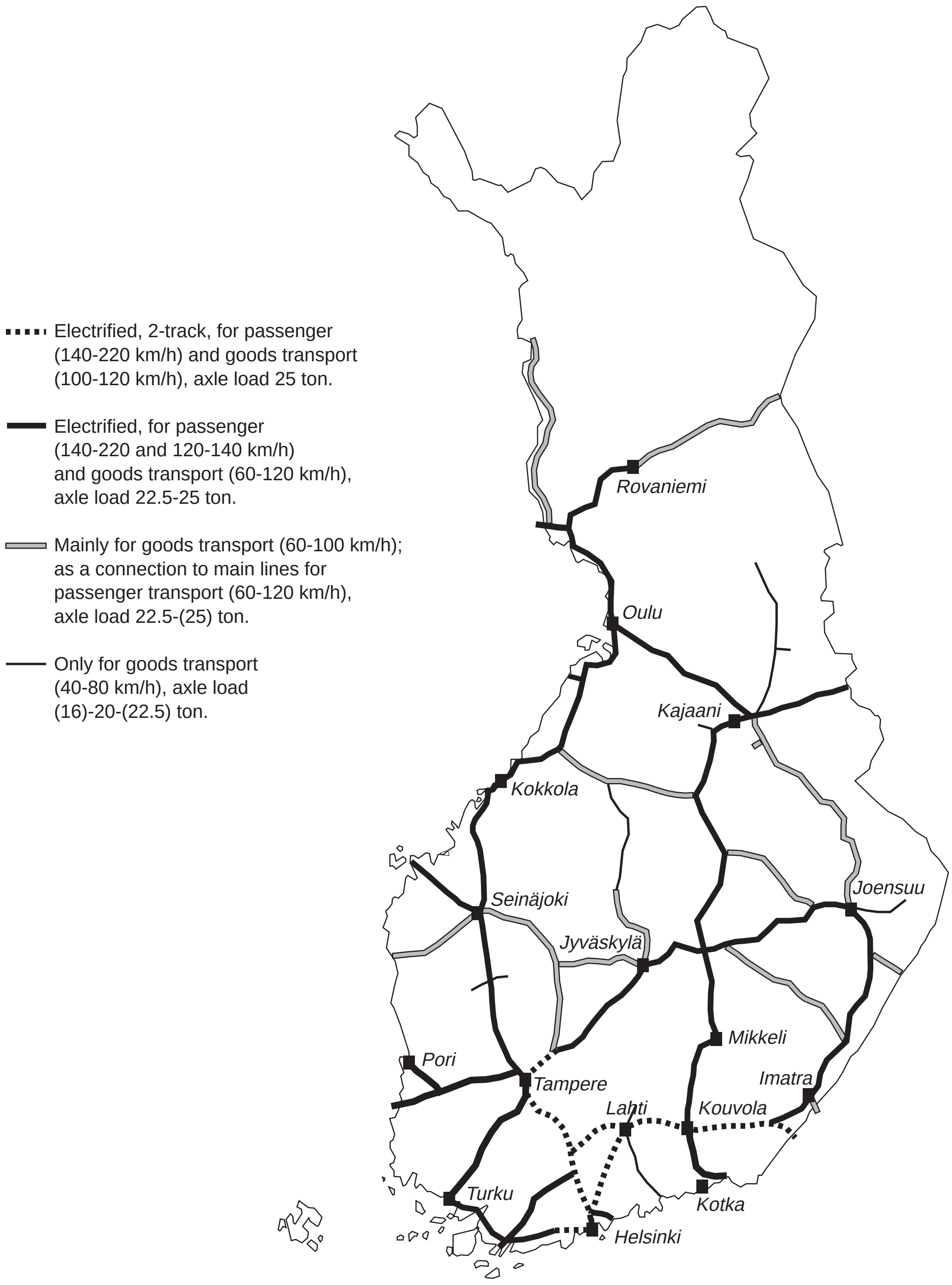
Source: ECMT.

Map 3. **Roads with high traffic flows in relation to capacity 1997-2010**



Source: ECMT.

Map 4. **Service levels of Finland’s railway network in 2010**



Source: ECMT.

FRANCE

Area: 551 000 km²
Population: 58 300 000

Statistics for the period 1986-95 are taken from the 33rd Report of the National Accounts Committee for Transport or from earlier reports. Figures for the past three years are provisional. The forecasts are generally taken from the central (medium growth) scenario on which the macroeconomic framework for forecasts to the year 2015 was based.

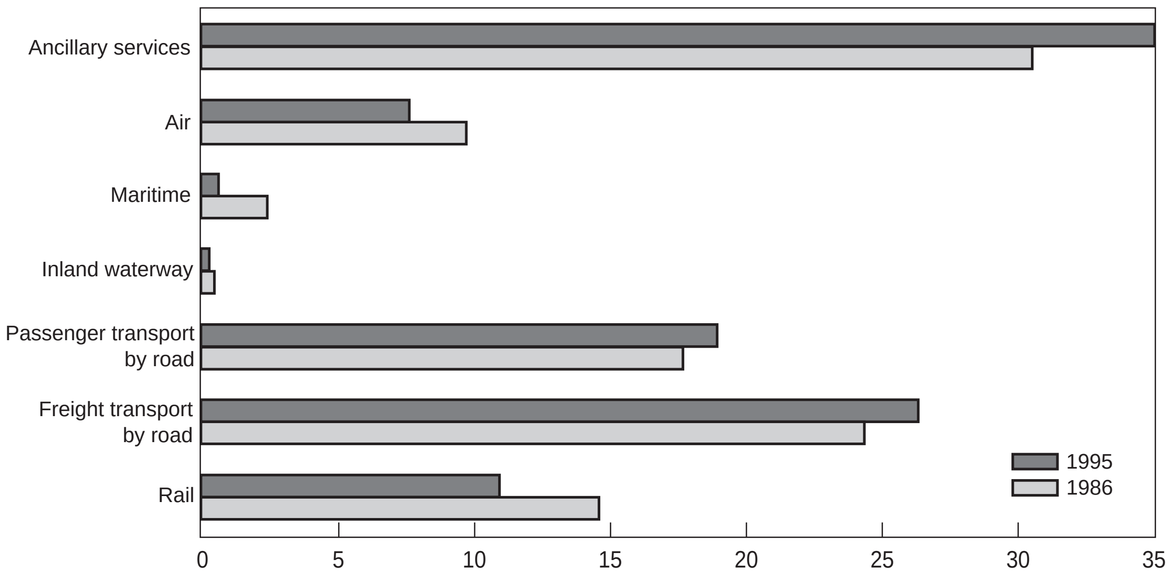
Between 1986 and 1995, market GDP in current francs rose from FF 4 224 billion to FF 6 260 billion. This 48 per cent increase represents annual growth of 4 per cent. Over the same period, transport sector value added in current francs increased by 34 per cent from FF 195 billion to FF 262 billion, for an annual growth rate of 3 per cent, i.e. one point less than market GDP.

In 1995, GDP was 2.5 per cent higher than in the previous year. At the same time, motorway traffic was 2 per cent higher than 1994, with HGV traffic up 3.6 per cent and light vehicle traffic up 1.6 per cent.

The overall growth in the transport sector masks enormous disparities. In the maritime transport sector, value added plummeted and has actually declined by more than 60 per cent over the past ten years. In contrast, growth in ancillary transport services outstripped that of traded GDP, increasing by more than 50 per cent over the past ten years.

Ancillary services increased their share by more than four percentage points, while rail's share declined by almost four points. However, the results for rail reflect the adverse impact of the month-long strike in 1995.

Figure 1. **Trends in share of transport industry value-added by sector in 1986 and 1995**
In percentage



Source: ECMT.

Question 1: Future trends in passenger and freight traffic

Methods

For the purposes of establishing infrastructure investment programmes, the central departments of the Ministry for Transport were asked to produce joint projections to the year 2015. These are now being used as the basis for the five transport infrastructure master plans provided for under the Regional Planning and Development Policy Guidelines Act of 4 February 1995.

France's economic trend forecasts are based on the DIVA model developed by BIPE Conseil, a private consultancy firm. The model considers three potential development scenarios for France in the context of the world economy. The main assumptions and findings of the studies (first conducted in 1994, then updated to the year 2015 in 1996) are as follows:

- globalised economy (the "world" scenario);
- triad economy (economy centred around three large economic areas: Europe, United States and Japan and their satellite countries (the "Europe" scenario);
- isolationist economy (the "France" scenario).

The "world" scenario

- Competitive environment: monopolistic (product differentiation, multinationals, flexible organisation).
- Growth: maximum at world level, highly cyclical. France gets off to a slow start with heavy restructuring.
- Job sharing: flexibility, low costs, high productivity gains, highly divisive (unemployed/employed).
- Income/spending: wide gap between the unemployed and the employed. Wages low, income from property high.
- Central government: company taxes lower, household taxes higher, capital highly mobile, interest rates high. Minimum income assistance for the unemployed.

Foreign trade growth rates in France are extremely high. Very high productivity gains are required. Sectoral growth rates are generally in line with global economic growth rates.

The "Europe" scenario

This is the main development scenario in France.

- Competitive environment: large European oligopolies, regulated by the Community. The distribution sector is dominant, although growth rates start to slow after 2000 (compared with the "world" scenario).
- Growth: lower than in the "world" scenario, but less cyclical. Growth initiatives at European level. Risk of France being ousted from the major Asian markets.
- Job sharing: in a European framework. Job market picks up after economic recovery. Shorter working hours, development of locally based services, taxation of social security benefits. Unemployment figures down, number of households continues to increase.
- Income/spending: gap narrows. "Prudent", cost-conscious spending.
- Central government: single European currency, long-term savings.

Spatial organisation is based on the "urban network" pattern. The role of the Ile-de-France area is more balanced. Centralisation of companies' European operations (multinational holding companies) and decentralisation of French management.

Growth is concentrated primarily in the services sector (particularly on the domestic market). Some industries (the electrical, electronics, chemical and parachemical industries) are expanding at home and abroad, exports by French specialist industries (agro-food and aero-engineering) are higher, and there are some zero growth sectors (textile, timber, leather). Intermediate sectors (iron and steel, aluminium, foundries) are stable.

The "France" scenario (isolationist scenario)

- Competitive environment: public monopolies, quotas and protectionist tariffs. Downturn in export businesses.
- Growth: low, productivity low. Risk of EU regulations and legislation being flouted.
- Job sharing: job protection. Working hours reduced by the administration, not a great deal of growth in services, full employment but low income and hours.

- Income/spending: purchasing power slightly up. Spending on luxury items low, no great incentive for long-term savings. Number of households stable (trend towards less cohabitation stopped).
- Central government: more government intervention. Regular depreciation of the French franc.

Two trends dominate spatial organisation: increasing concentration around Paris and Lyons (natural economic trend), and at the same time mandatory decentralisation to ensure an even spread of jobs throughout the country.

The method is based on two econometric projections. The models used by the SES (formerly OEST) attempt to correlate traffic trends with a number of explanatory variables:

- macroeconomic variables;
- the transport regulatory policy variables;
- the infrastructure supply variables.

As it had been observed that the macro economy, regulatory policy and infrastructure supply may not move together, even if they are not interdependent, it was decided to opt for a medium growth scenario and then to examine variants of that scenario when projections called for some adjustment to one set of assumptions or another.

The medium scenario was the DIVA “Europe” scenario (global triad: United States, Europe, Japan).

Among the macroeconomic assumptions, the two possible variants were the “low growth” scenario (the DIVA “France” scenario) and the “high growth” scenario (the DIVA “world” scenario).

The assumptions made with regard to “transport regulatory policy” were: gradual market liberalisation within the EU, a continuing public service obligation and land-use planning. It also provides for the regulation of competition (both within and between modes) and the gradual internalisation of external costs.

- In terms of regulations, the consequences would be:
  - a 24 per cent increase in taxes on diesel fuel;
  - a 6 per cent increase in road freight transport prices (implementation of the Progress Contract);
  - changes to technical standards: increasing the maximum permissible gross laden weight (PGLW) to 44 tonnes (5 per cent reduction in price).

- In terms of transport prices, the consequences would be:
  - productivity gains in road transport would offset higher payroll costs and petrol prices;
  - higher taxes reflecting environmental costs would push road transport costs up by 15 per cent;
  - the real costs of rail transport would be unchanged, while the costs of inland waterway transport would be 10 per cent higher;
  - higher costs would have a knock-on effect, pushing rail prices up a further 8 per cent.

Variation in transport prices, "Europe" scenario

	Increase 1993-2015	Average annual increase
Road	15 %	0.6 %
Rail	8 %	0.3 %
Inland waterway	10 %	0.4 %

– In terms of infrastructure, the consequences were predicated upon the construction of the following infrastructure:
  - the East and Mediterranean High Speed Train lines;
  - a Barcelona-Perpignan link;
  - the Seine-Nord and Rhine-Rhône inland waterway links;
  - the Channel Tunnel, for freight.

Three scenarios were developed for the period 1993-2015 based on the above assumptions: medium, liberal and interventionist.

	Medium	Liberal	Interventionist
Increase in petrol prices in real terms	1.5%		
Increase in diesel taxes	24 %	0 %	58 %
Axle tax			+ FF 13 000
Maximum PGLW	44 t	44 t	40 t
Progress Contract: price increase	6 %	6 %	9 %

Impact on freight prices

Percentage change

	Medium	Liberal	Interventionist
Road freight	15 %	- 3 %	36 %
Rail freight	8 %	0 %	15 %
Inland waterway freight	10 %	10 %	10 %

The "infrastructure" assumptions are in fact an additional set of assumptions which predict a more sustained effort on land transport infrastructure. These "high capacity" assumptions, as they are referred to, forecast that the rate of motorway construction over the period 1995-2015 will be maintained after that date (i.e. an additional 765 km of motorway over the whole period) and the construction of 120 km of high speed rail track per year (instead of 80 km/year).

When all of these variables are factored in, the results are as follows.

Average annual growth in freight transport in France

Percentage variation on medium scenario (t-km)

	Medium scenario	Growth		Regulation		Infra.
	1992-2015	Low	High	Liberal	Interventionist	High
Road freight	2.4 %	- 0.7 %	0.9 %	0.3 %	- 0.4 %	0.1 %
Rail freight	0.8 %	- 0.6 %	0.6 %	- 0.4 %	0.4 %	- 0.3 %
Inland waterway freight	0.8 %	- 1.0 %	0.9 %	- 0.5 %	0.6 %	0 %
Total freight	2.1 %	- 0.7 %	0.9 %	0.2 %	- 0.2 %	0 %

Overall, analysis of the different scenarios shows a higher average growth rate in passenger traffic flows than in freight flows: 2.4 per cent and 2.1 per cent, respectively.

Passenger traffic

Billions of passenger-kilometres

	Medium scenario	Alternative assumptions (difference compared with medium scenario in billion passenger-km)				
		Growth		Regulation		Infra.
	Low capacity	Low	High	Liberal	Interventionist	High
Roads : - motorway franchises	 407 169	 - 35 - 10	 39 11	 3 6	 - 4 - 5	 14 7
Rail	80	- 3	2	3	- 3	6
Air	19	- 2	2	1	0	- 2
Total	507	- 40	43	7	- 7	19

Freight traffic

Billion tonne-km

	Medium scenario	Alternative assumptions (difference compared with medium scenario in billion t-km)				
		Growth		Regulation		Infra
	Low capacity	Low	High	Liberal	Interventionist	High
Road	280	- 4.1	63	6	- 8	7
Rail	57.5	- 7.9	9.1	- 3	4	- 4
Inland waterway	8.3	- 1.7	1.8	- 1	1	0
Total	346	- 50	74	2	- 3	2

Freight traffic

Domestic traffic

Trends in freight traffic in metropolitan France
Million tonne-km

	1985	1990	1992	1993	1994	1995*
SNCF	50.1	45.8	44.1	39.9	42.4	41.2
Road	84.5	114.8	120.0	115.3	122.1	131.6
- of which for hire	57.7	86.1	90.4	87.5	93.2	101.2
Inland waterway	7.6	7.2	6.9	6.0	5.6	5.9
Pipeline	24.1	20.5	23.4	23.3	22.8	22.1

* Estimated.
Source: SNCF, DAEI/SES, VNF and DHYCA.

Breakdown by type of traffic in 1994
Percentage

	Domestic traffic	Inbound	Outbound
Rail	67	13	20
Road	85	8	7
Inland waterway	55	20	25

In 1994, raw materials or semi-finished products accounted for almost 60 per cent of the volume (in tonne-km) carried by inland waterway transport, while rail and road transport carried a much more balanced mix of goods:

- raw materials and semi-finished products accounted for 41 per cent of the total freight (in tonne-km) carried by rail and for 33 per cent of the volume carried by HGVs;
- manufactured goods accounted for 29 per cent of the total carried by rail and 28 per cent of the total carried by road;
- energy products accounted for 10 per cent and 15 per cent of the total carried by rail and road, respectively.

International traffic

France's foreign trade by mode of transport in 1994[1]
Million tonnes

	European Union		Other countries	
	Incoming	Outgoing	Imports	Exports
SNCF	7.3	14.2	2.5	3.1
Road	60.7	59.4	14.0	11.2
Inland waterway	4.0	11.4	4.9	1.7
Sea	32.7	26.7	135.6	29.3
Air	0.0	0.0	0.2	0.3
Other (fixed installations)	4.4	3.3	19.6	3.7
Total	109.2	115.0	176.8	49.4

In 1994, French incoming flows were mainly from the "Blue Banana" countries, i.e. the northern European Union: 26 per cent of flows between France and: Belgium/Luxembourg; 21.5 per cent with Germany; 18 per cent with the United Kingdom; 12.5 per cent with the Netherlands. Outgoing flows did not follow quite the same pattern, as 16 per cent went to Italy and 11 per cent to Spain. Germany is still the main destination, accounting for 26.5 per cent of flows by tonnage. Belgium (and Luxembourg) also account for 22 per cent of the tonnage shipped from France.

Over the period 1993-2015, whatever the scenario, trade with foreign countries is expected to continue to fuel strong growth in freight flows: the forecasts are for a 4 per cent increase in foreign trade flows and a 5 per cent increase in transit flows.

Road traffic

Over the period 1986-95, road traffic other than transit traffic increased by 56 per cent. In 1992, its share of the market was 74.4 per cent and is expected to rise to 81 per cent by 2015. This assumption takes into account the impact of the Channel Tunnel and the widening of canals.

Rail traffic

Over the period 1986-95, rail transport other than transit traffic declined from 50.1 billion tonne km to 41.2 billion, a reduction of 17 per cent.

Over the period 1992-2015, an average annual growth rate of 0.8 per cent is forecast, relatively low when compared to the total growth in traffic forecast to 2015. In other words, the railways' share of the market is expected to decrease from 22.36 per cent in 1992 to 16.63 per cent by 2015. Moreover, average prices are expected to increase by around 8 per cent over the same period.

Inland waterway traffic

Over the period 1986-95, inland waterway traffic declined by 26 per cent, from 8 billion tonne-km to 5.9 billion.

Forecasts for the period 1992-2015 estimate an annual growth rate of 0.8 per cent. As with rail, the waterways' share of the market is expected to decline over the same period, from 3.2 per cent in 1992 to 2.4 per cent in 2015. Prices are expected to rise by an average 10 per cent over the same period.

Combined transport

From 1986 to 1995, the volume of combined traffic increased from 6.8 billion to 11 billion tonne-km, i.e. an increase of 62 per cent.

By extrapolation, annual growth of 5 per cent for is forecast for the period 1992-2015.

Maritime traffic

From 1985 to 1994, maritime transport in the main ports of metropolitan France increased by approximately 11 per cent, from 274 million to 303 million tonnes. Tonnage unloaded increased by 9 per cent, and tonnage loaded by 15 per cent.

Forecasts for the period 1994 to 2015 put the annual growth rate at 0.6 per cent.

Air traffic

From 1985 to 1994 air freight at the main airports in metropolitan France increased from 0.817 million tonnes to 1.247 million, a rise of 53 per cent.

The forecast annual growth rate for the period 1993-2015 is 4.9 per cent, according to the most likely scenario produced by the General Directorate for Civil Aviation (DGAC).

Oil pipeline transport

From 1986 to 1995, the tonnage carried by oil pipeline fell from 25.7 to 22.2 million tonnes, i.e. by 14 per cent.

Currently, there are no forecasts available for the period under consideration. However, the French authorities believe that the tonnage carried by this type of transport will remain fairly constant from now to 2015.

Passenger traffic

Mobility has increased by approximately 25 per cent over the last ten years. Air transport achieved the largest increase (48 per cent), followed by road transport (35 per cent). The sharp decline observed in 1995 is perhaps simply a temporary setback due to the strike at the end of 1995, particularly since rail traffic seems to have held steady at around 58 billion passenger-kilometres since 1993.

Trends in passenger traffic, 1985-95

Million passenger-kilometres

	1985	1990	1992	1993	1994	1995[2]
Private cars	489.6	585.6	617.0	629.8	651.2	664.3
Buses and coaches	37.0	41.3	41.8	42.0	42.6	40.5
SNCF	61.9	63.7	63.0	58.4	58.9	55.6
- TGV	8.7	14.9	19.0	18.9	20.5	21.4
RATP	11.0	11.9	11.7	11.6	11.6	10.3
- rail	8.9	9.7	9.5	9.3	9.3	8.3
- road	2.1	2.2	2.2	2.2	2.3	2.0
Air (domestic airlines)	39.7	51.9	52.4	53.1	60.0	58.8

Source: SNCF, RATP, DAEI/SES and DGAC.

Road traffic

Between 1986 and 1995, private vehicle traffic increased by 29 per cent, from 515 to 664.3 billion passenger-kilometres, gaining more than 3 percentage points in modal share.

For the period 1992-2015, the forecast annual growth rate for road traffic overall is 2.5 per cent. This is higher than the observed rate for the period 1986-95 (2.42 per cent).

Trends in private and public transport vehicle stocks
Thousands

	Private vehicles	Buses and coaches
1985	21 090	71
1990	23 550	75
1991	23 810	77
1992	24 020	76
1993	24 385	76
1994	24 900	78

Source: OEST and CCFA.

The stock of vehicles under 15 years old increased by almost 11 per cent over the period 1986-95. For public transport by road, the situation was more varied as trends differed with each type of service.

Trends in public transport by road
Billion passenger-kilometres

	1986	1995	% change
Urban including RATP buses	6.6	7.2	9.1
Intercity including the Ile-de-France	6.7	7.0	4.5
School buses	5.7	5.6	-1.8
Works buses	4.6	2.3	-50.0
Occasional	15.8	18.4	16.5
Total	39.4	40.5	2.8

The transport strike in France in December 1995 affected all types of public transport by road. However, in the case of company bussing, the decline is mainly attributable to structural changes (rising household car ownership, company downsizing, etc.).

Rail traffic

Over the period 1986-95, total passenger-kilometres by rail declined by 7 per cent, from 68.7 to 64.6 billion. SNCF attributes the decline to the strike, with an estimated impact of around 7 percentage points. This would bring corrected figures for 1995 to 69 billion passenger-kilometres. Based on this assumption, rail traffic would actually have remained constant. However, this is an assumption that should not be allowed to divert attention from the fact of a decline in rail's market share.

Trends in rail traffic by type of service
Billion passenger-kilometres

	1986	1995	% change
SNCF	59.6	55.6	- 6.7
of which :			
- TGV	8.9	21.4	140.4
- Main network other than TGV	41.5	25.7	- 15.8
- Paris suburban lines	9.2	8.5	- 7.6
Regional express trains	5.6	6.7	19.6
RATP (metro + regional express network, RER)	8.7	8.3	- 4.6
Provincial metro	0.4	0.7	75.0
Total	68.7	64.6	- 6.0

TGVs are gradually replacing some main-line services. However rail traffic overall (both SNCF and metro services, including the RER) has declined. The growth in traffic on provincial metro lines can be attributed to new lines brought into service during the period under consideration.

The average annual growth rate forecast for the period 1992-2015 is 1.7 per cent. No change in average price is expected.

Air traffic

Air traffic increased by 48 per cent overall during the period under consideration. Domestic traffic rose by the same percentage, from 8.3 billion passenger-kilometres in 1986 to 12.3 billion in 1995. However, compared with the volume of road traffic, domestic air traffic gained only a quarter of a percentage point in market share over the same period.

Over the period 1993-2015, the average annual growth rate forecast is 3.5 per cent, according to the most likely scenario produced by the DGAC. Average prices should fall by 11 per cent over the same period.

Question 2: Present situation as regards infrastructure and investment projects

Existing infrastructure

Road network

As of 1 January 1995, the national road network was 34 640 km in length, including 7 956 km of motorway. Almost three-quarters of national roads are two-lane roads and 15 per cent are dual carriageways. The French road network also comprises 365 600 km of departmental roads, 562 960 km of local authority roads and 1 733 km of urban expressways.

Rail network

As of 1 January 1995, the total length of the rail network amounted to 32 275 km, 5 740 km of which served by the TGV. The passenger network is 24 148 km in length and 54 per cent of its lines are electrified.

Inland waterway network

France has a total of 8 500 km of navigable inland waterways, of which only 9 per cent are wide waterways. Of this network, 5 650 km are in regular use. The fleet consists of 2 368 boats, of which 178 are purpose-built for cargoes in liquid or powder form. The waterway network's total capacity is 1 365 million tonnes, including 149 000 tonnes of special freight.

Investment projects

From 1986 to 1995, the sums allocated to transport infrastructure rose from FF 53.2 billion to FF 86.4 billion. Although this amounts to an increase of over 60 per cent, the figure is deceptive in that it was not evenly distributed among modes: investment in the main SNCF network was cut by almost 2 per cent whereas allocations for airports increased by more than 236 per cent.

Trends in infrastructure spending

Billion francs

	1986	1995	% change
Road network	33.9	59.3	74.93
Main SNCF network	10.1	9.9	- 1.98
UPT	6.1	10.5	72.13
Ports	1.4	2.2	57.14
Airports	1.1	3.7	236.36
Inland waterway	0.6	0.8	33.33
Total	53.2	86.4	62.41

The previous report mentioned the development of two infrastructure master plans, one for rail and the other for roads. Both were drawn up without reference to other modes (although the assumption was that there would inevitably be competition, no attempt was made to assess the impact of potential complementarity) and with relatively scant attention to environmental problems.

1992 data have not undergone substantial modifications, particularly as regards rail infrastructure projects. The pace, or rather the programming, of road and motorway construction work seems however to have changed, although the extent of these changes is not known.

However, new plans are now being developed as provided under the Land Use Planning and Development Act. No precise date has been given for their publication.

At this stage, it is too early to give detailed projections on spending plans, which will be subject to the convergence criteria of the Maastricht Treaty.

Road infrastructure

The roads master plan given in the previous report remains valid. Although it is currently being revised, spending by the government and the regions on the road network will total FF 74.1 billion (in 1994 francs) by the end of the 11th plan (1994-98), and most will be allocated to the A20 and A75 motorways and to the RN7.

Rail infrastructure

France has launched an ambitious railway restructuring programme whose two main aims are:

– clarification of the respective responsibilities of government and the SNCF;
– regionalisation.

In order to clarify the respective responsibilities of government and the SNCF, the government is considering setting up a new public body in 1997. Reforms can only be introduced gradually. The ultimate aims are that:

– the government will continue to be responsible for specifying network requirements and density;
– the public body, on behalf of the government, will take over ownership and financial responsibility for rail infrastructure;
– the SNCF, which would continue as a single company, would be responsible for infrastructure management and rail transport.

A full-scale pilot decentralisation scheme is planned, under which the network will be divided into six regions. The government will give the regions responsibility for organising regional passenger services and will provide the necessary funding. It will then be up to the regions and the SNCF to agree on the passenger services to be provided. The aim of regionalisation is to give regional executives full responsibility for deciding which regional passenger services should be provided, just as they now do for public road transport services. The regions would then be responsible for developing services to best meet public demand.

As regards the future development of the network, the national master plan for high-speed rail links (approved 14 May 1991) applies until it has been completed. Work in progress on the Mediterranean high-speed line should be completed by the year 2000; work has begun on the detailed outline design of the eastern high-speed line.

Inland waterway infrastructure

The inland waterway infrastructure master plan is also being revised. The Land Use Planning and Development Guidelines Act sets out the schedule for completion and methods of financing for the Saône-Rhine wide inland waterway link. Large-scale public consultations took place in the summer of 1996. Impact studies to be undertaken in the next few months should arrive at satisfactory solutions to problems (mainly environmental ones) identified in the course of public consultation rounds. These studies will then be discussed at public hearings.

Question 3. Capacity problems

Road transport

Safety

Trends in road accidents in France, 1985-95
Thousands

	1985	1990	1992	1994	1995
Accidents	191.1	162.6	143.4	132.7	132.9
Fatalities	10.4	10.3	9.1	8.5	8.4
Injuries	270.8	225.9	198.1	180.8	181.4

Source: Secretariat of State for Road Transport.

The figures for 1995 seem to confirm the downward trend in the number of motorway accidents, with accident and injury figures down by 4 to 5 per cent from the previous year.

Congestion

With the general increase in mobility, higher car ownership levels and a substantial increase in road freight traffic, congestion problems could have been considerably worse. In fact, congestion has not proved as bad as expected. Over a 15-year period for total travel:

– the average number of daily trips per person was slightly down;
– the time allowed for trips was virtually the same;
– the average distance travelled had increased sharply (by over 40 per cent).

Therefore the average trip took less time.

Some observers are quick to assert that congestion is self-regulating, as users weigh up all the external factors when they make their choice of mode. The development of infrastructure networks, more effective traffic control methods, higher performance transport services and lower transport costs in real terms are factors that rational actors take into consideration.

Road traffic indices, 1985-95
Index 1970 = 100

	National roads*	Motorways**	National network overall
1985	140	215	162
1990	166	302	207
1991	169	316	213
1992	169	323	215
1993	172	333	220
1994	176	345	227
1995	179	360	234

* National roads in the open countryside and in built-up areas with a population of over 5 000.
** Traffic index for comparable networks, a new set of count-sites was introduced in 1992.
Source: Secretary of State for Road Transport.

Rail transport

Congestion

Projected congestion in France's conventional rail network by the year 2015 assumes high rail traffic growth and construction of the planned high-speed lines. Without investment in the conventional network, congestion could be a problem on the following lines.

- Dijon-Gevrey-Chagny (south of Dijon);
- Bobigny-Noisy and Sucy Valenton (Paris outer ring);
- Miramas-Berre;
- Sotteville-Rouen;
- Aisy-les-Laumes and Blaisy Bas-Dijon;
- Chagny-Chalon sur Saône-Villefranche (approach to Lyon);
- Lyon-Sibelin-Chasse (south of Lyon);
- Nîmes-Montpellier-Narbonne;
- Cannes-Nice;
- Bordeaux-Libourne (Saint-Jean bridge approach to Bordeaux);
- St Jory-Toulouse;
- Strasbourg-Mulhouse;
- Noisy-Sucy;
- Etampes-Orléans;
- Mulhouse-Basle.

Question 4. Measures

France is focusing on ensuring sustainable development. It has three priority areas:

- ensuring that its policy decisions are people-centred, the priority being to preserve the public's health, as can be seen from the Clean Air Act recently passed in France.
- achieving synergies between the economy and the environment: since the choice of energy will be crucial in the future, policies promoting vehicles using the least-polluting energy sources will be pursued;
- making the best use of available space: to adapt urban and intercity transport and to control freight transport in line with land use and development plans.

In the field of passenger transport, efforts to promote public transport will be pursued, particularly by developing closer relations between decision makers and users and by securing greater interoperability between infrastructure networks.

In the field of freight transport, France is attempting to formulate a balanced policy that will meet two needs:

- the need for solidarity between wealthy and poorer regions;
- the need to internalise the external costs of transport to ensure that they are distributed fairly among modes. A first approach will be to give priority to combined transport where relevant.

Lastly, trials have been conducted using new traffic management tools (such as differentiated tolls). Once they have been evaluated, it will be possible to decide whether to bring them into general use.

SOURCES

SES, "*Note de Synthèse*", March 1996.

"Autoroutes 2020", No. 40, July/August 1996.

Ministry of Civil Engineering, Housing, Transport and Tourism, "Transport in figures 1995".

INRETS, "Development scenario studies", 1996.

NOTES

1. From 1993, the mode at Community/other country borders.

2. For 1995, the figures are provisional estimates. For road transport, they come from diverse sources. Estimates are those of the Commission des comptes transports de la Nation.

GERMANY

Area: 349 000 km²
Population 81.7 million

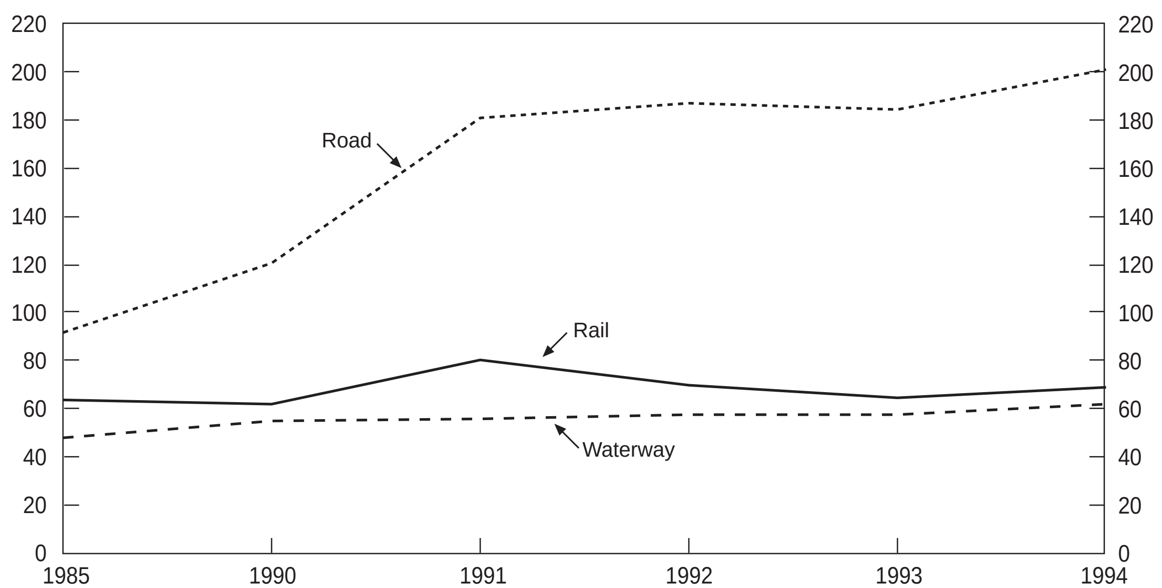
Question 1: Future trends in passenger and freight traffic

The forecasts contained in Germany's Federal Transport Infrastructure Plan (BVWP) remain valid. However, the figures given below for both freight and passenger traffic are taken from IFO's September 1995 analysis of trends as of February 1995.

An appended table summarises Germany's economic situation in 1995 and gives baseline economic data for the forecasts.

Freight traffic

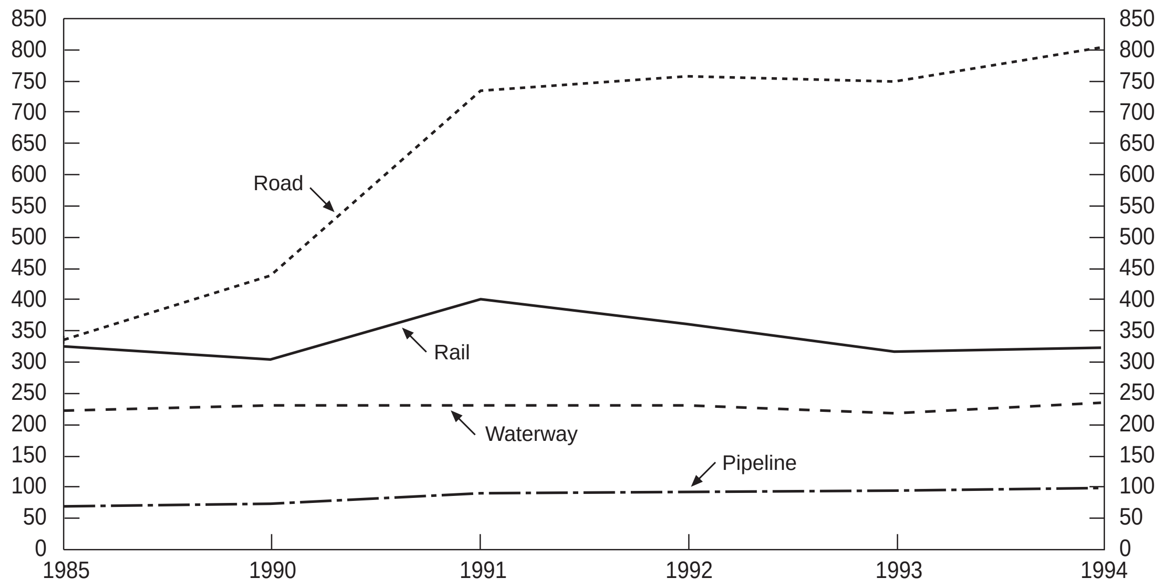
Figure 1. **Trends in freight traffic by inland transport**
In billion tonnes-km



Source: ECMT.

Despite an active national policy of promoting the development of inland modes other than road, road freight transport remains the predominant mode by far. Nevertheless, the tonnage transported by rail and waterway increased slightly from 1993 onwards.

Figure 2. **Trends in freight traffic by mode**
In million tonnes



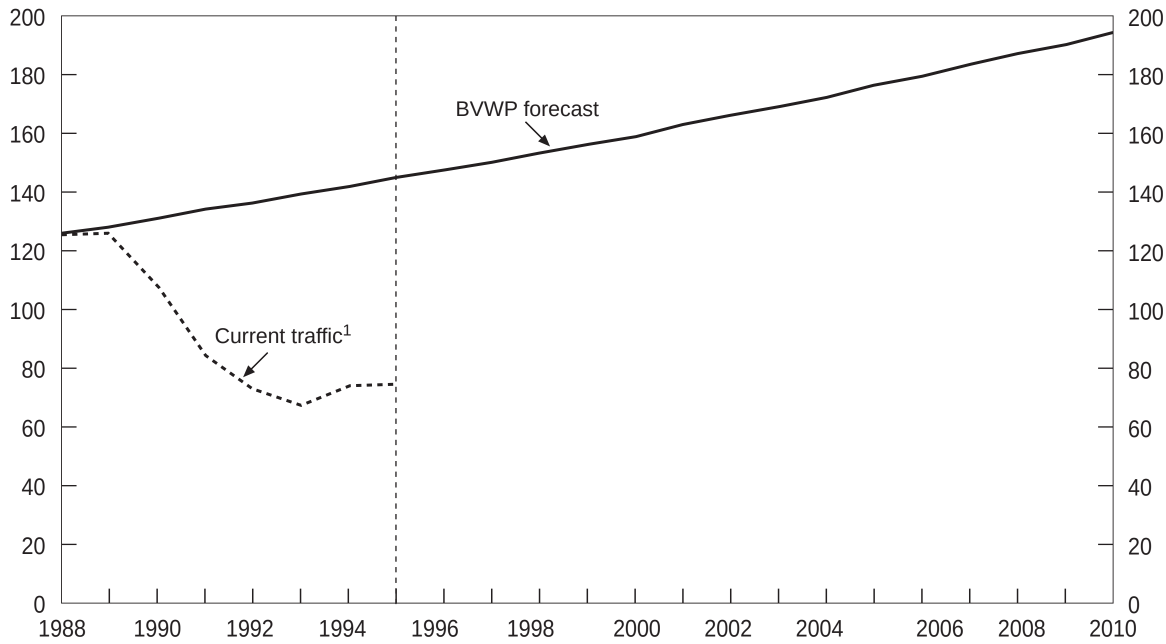
Source: ECMT.

The BVWP had forecast growth of 77 per cent for the period 1988 to 2010. However, the latest estimates, compiled in the current economic context, forecast growth of no more than 45 per cent by the year 2010.

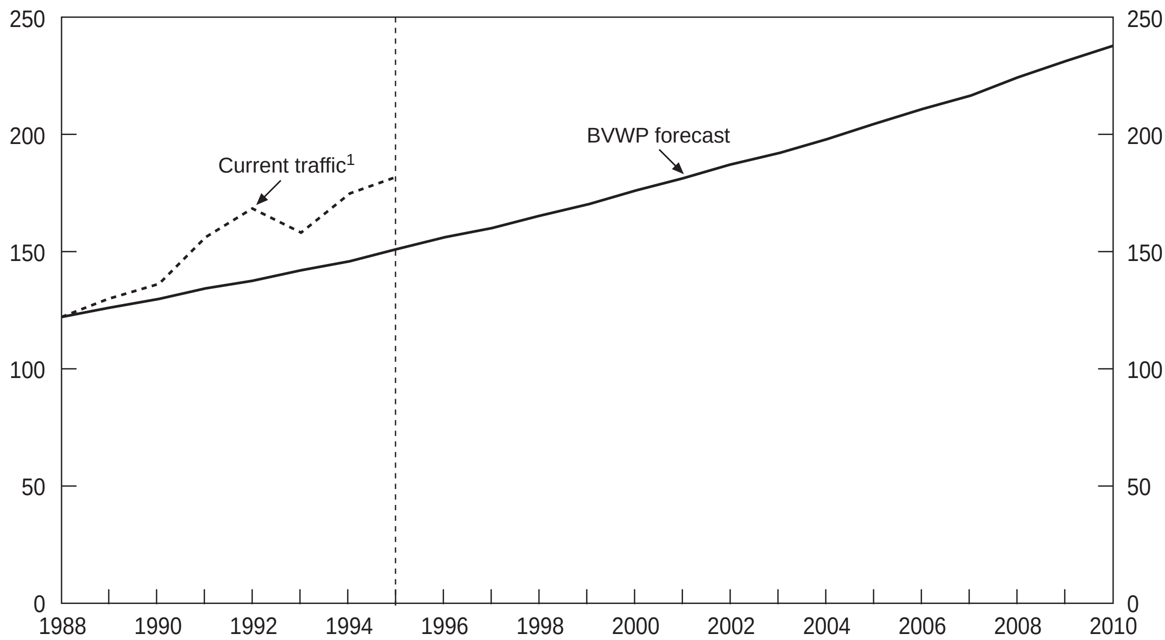
Available data indicate that the BVWP forecasts overestimated the growth of traffic in tonnes-km and underestimated future road growth.

Figure 3. **Future traffic trends**
Comparison of BVWP forecast and present data

A. Transport by rail in billion tonnes-km



B. Transport by road in billion tonnes-km



1. Figures to 1994 are traffic survey data, compared here with BVWP's estimates. From 1995 the IFO's short-term forecasts are used.

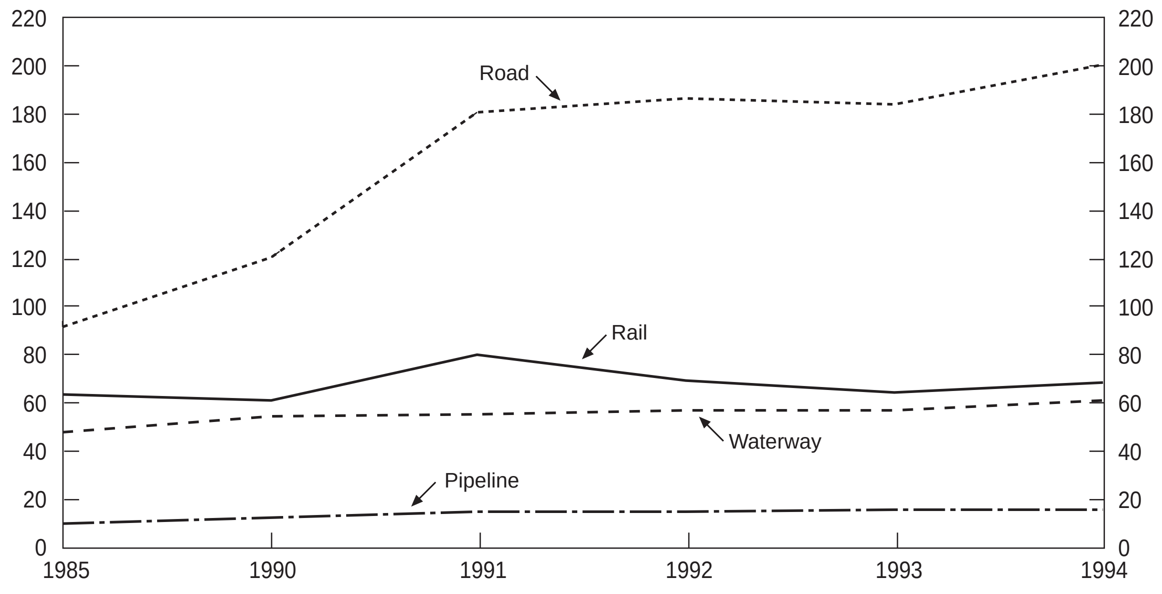
Source : ECMT.

Figures to 1994 are traffic survey data, compared here with BVWP's estimates. From 1995 the IFO's short-term forecasts are used.

The forecasts were based on assumptions of regulatory policy conditions, such as:

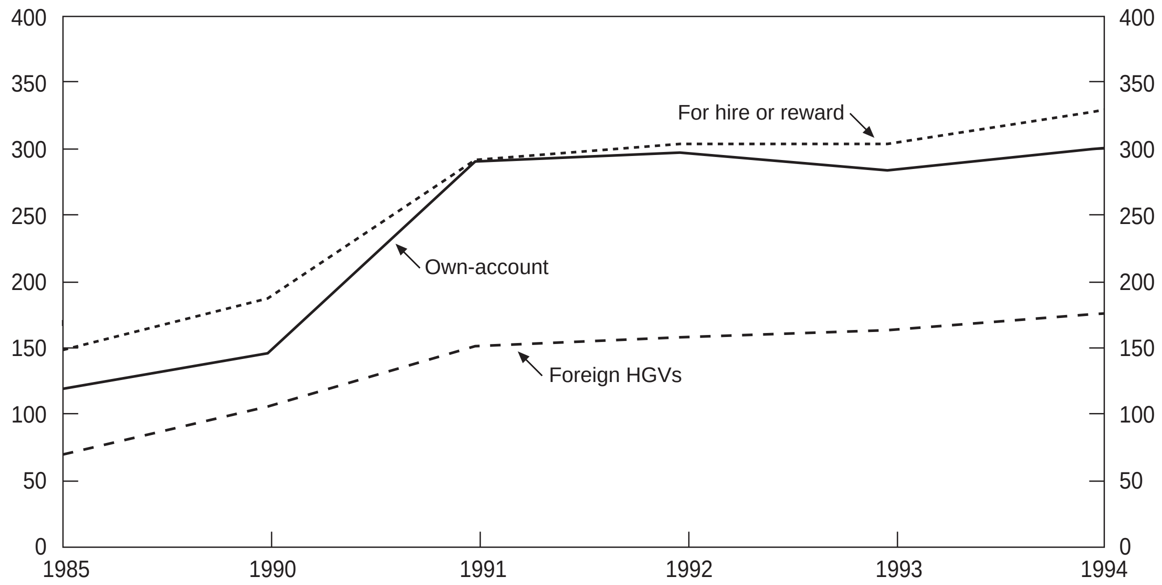
- User costs in the individual modes of transport will probably increase
- Local transport policy aiming at the restriction of parking space
- Effects of rising demand in road transport, which will noticeably exceed the supply of infrastructure, with simultaneous improvement of the services offered by rail transport

Figure 4. **Trends in freight traffic by mode**
In billion tonnes-km



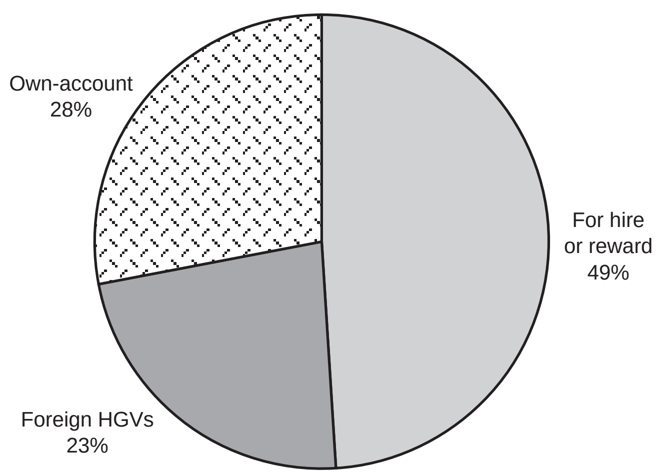
Source: ECMT.

Figure 4. **Trends in types of road traffic** *(continued)*
In million tonnes



Source: ECMT.

Figure 5. **Breakdown of road traffic by type in 1993**
In billion tonnes-km



Source: ECMT.

The BVWP projected a 95 per cent increase in HGV traffic over the period 1988-2010. Revised estimates broadly confirm this trend, even forecasting growth of over 100 per cent.

Rail transport

Breakdown of rail traffic
Billion tonnes-km

	1985	1990	1991	1992	1993	1994
Complete train loads	63.0	60.8	79.2	69.0	64.1	68.3
Part loads and express parcels	1.0	1.1	1.1	0.8	0.8	0.8
Total	64.0	61.9	80.3	69.8	64.9	69.1

Breakdown of rail traffic
Million tonnes

	1985	1990	1991	1992	1993	1994
Complete train loads	321.3	300.6	398.3	358.7	314.0	321.8
Part loads and express parcels	3.1	3.1	2.9	2.5	2.2	2.2
Total	324.4	303.7	401.2	361.2	316.3	324.0

Over the past decades, the trend throughout the European Union has been towards a sharp decline in rail freight transport. Nevertheless, recent IFO studies rate the prospects for growth in this type of traffic very high, estimating growth of 66 per cent over the period 1993-2010. However, this rate of growth could be attained only if a rail-oriented policy were implemented and sustained efforts were made in terms of management.

Combined transport

The total traffic carried by combined transport, which showed no change for over ten years, increased by 19 per cent from 1993 to 1994. Over the same period, two million vehicles switched from road to rail mode.

Trends in combined traffic
Million tonnes

	1980	1990	1991	1992	1993	1994
Containers	6.93	13.00	13.50	13.20	12.40	14.70
Semi-trailers carried by trains	4.59	13.30	13.60	13.40	14.40	17.20
Total	11.52	26.30	27.10	26.60	26.80	31.90

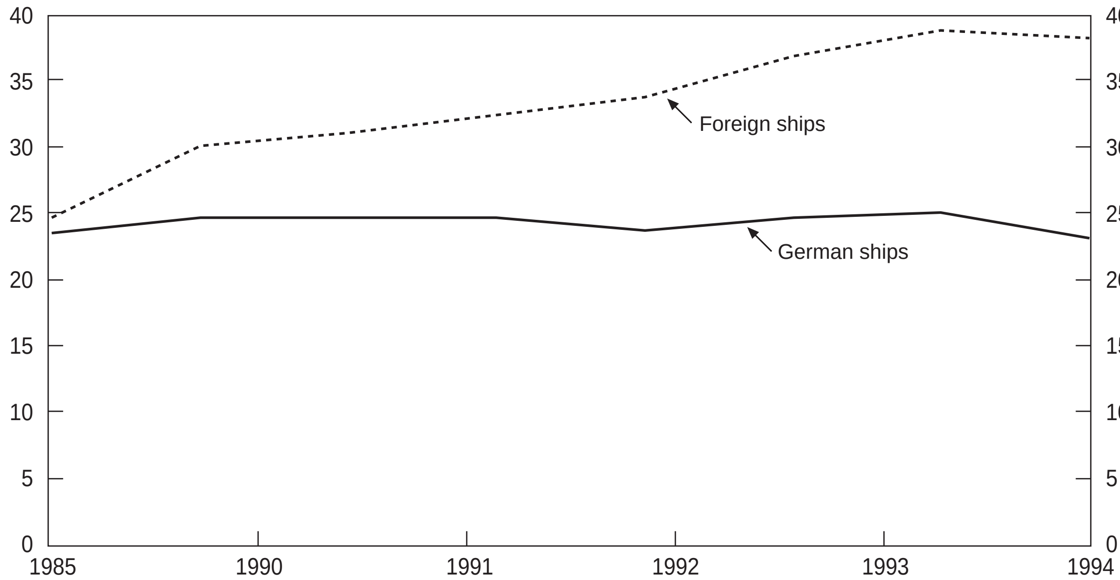
The German authorities want to give strong incentives to develop this mode, particularly for transit traffic, and are keen to see the volume carried by combined transport double by the year 2010.

Inland waterway transport

Trends in waterway traffic
Million tonnes

	1985	1990	1991	1992	1993	1994
German ships	105.3	102.7	104.5	102.9	96.3	101.6
Foreign ships	117.1	128.9	125.5	127.0	122.2	133.4
Total	222.4	231.6	230.0	229.9	218.5	235.0

Figure 6. **Breakdown of traffic volume by type of ship**
In billion tonnes-km



Source: ECMT.

The BVWP projected that inland waterway traffic would increase by 84 per cent from 1988 to 2010. Now that the environment is a major issue, this mode shows considerable growth potential, despite the slight downturn in total tonnage carried between 1990 and 1993. The IFO forecasts growth of 60 per cent between 1993 and 2010.

Air transport

	1985	1990	1991	1992	1993	1994
Million tonnes-km	314.3	439.5	428.8	428.8	435.9	459.2
Thousand tonnes	1 069.2	1 578.5	1 560.8	1 599.8	1 680.6	1 878.4

The BVWP forecast that air traffic would grow by 151 per cent from 1988 to 2010. Judging by the large increase in traffic over the period 1988-93, these projections seem likely to be borne out. In fact, there was an increase of 45 per cent in tonne-km and 58 per cent in tonnage carried for freight alone from 1985 to 1993.

Transit traffic

A study of certain international links has identified one trend in freight traffic passing through Germany. Flows of freight from the United Kingdom, France and the Benelux countries en route to northern, central and eastern Europe (Poland, the Baltic states, Russia, the Czech and Slovak Republics and Hungary) totalled 2.2 million tonnes in 1988 and 4.2 million tonnes in 1993. The BVWP forecast flows of 8.9 million tonnes by 2010.

Flows from northern Europe (Norway, Sweden, Finland and Denmark) totalled 2.7 million tonnes in 1988 and 3.8 million in 1993. Forecasts are for 6.7 million tonnes by 2010.

These figures may foreshadow a substantial increase in transit traffic via Germany, which already has the highest through-traffic figures in Europe. At peak hours on some roads up to 27 000 HGVs per day have been recorded, of which at least 30 per cent were foreign HGVs in transit.

Freight transit traffic through Germany totalled approximately 27 billion tonnes-km in 1993:

– 4.2 billion tonnes-km by rail;
– 8.2 billion tonnes-km by waterway.

The tonnage carried by these two modes had remained static from 1980 to 1993, while road tonnage more than doubled from 6 billion tonnes in 1980 to 14.1 billion tonnes in 1993. The indications are that this trend will continue. Experts expect transit traffic by road to double in volume from now to 2010, unless the government rapidly introduces policies to prevent it.

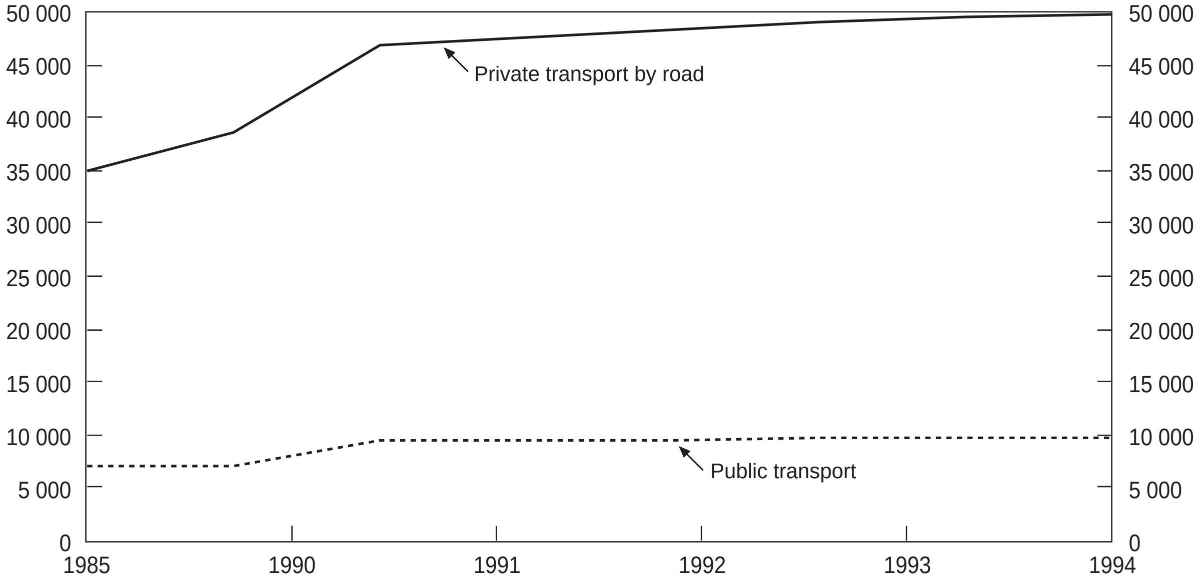
Passenger traffic

In Thousand of passengers

	1985	1990	1991	1992	1993	1994
Public transport	6 984	7 131	9 442	9 469	9 574	9 593
Private transport by road	35 024	38 600	46 774	47 572	48 338	49 090
Total	42 008	45 730	56 216	57 042	57 912	58 683

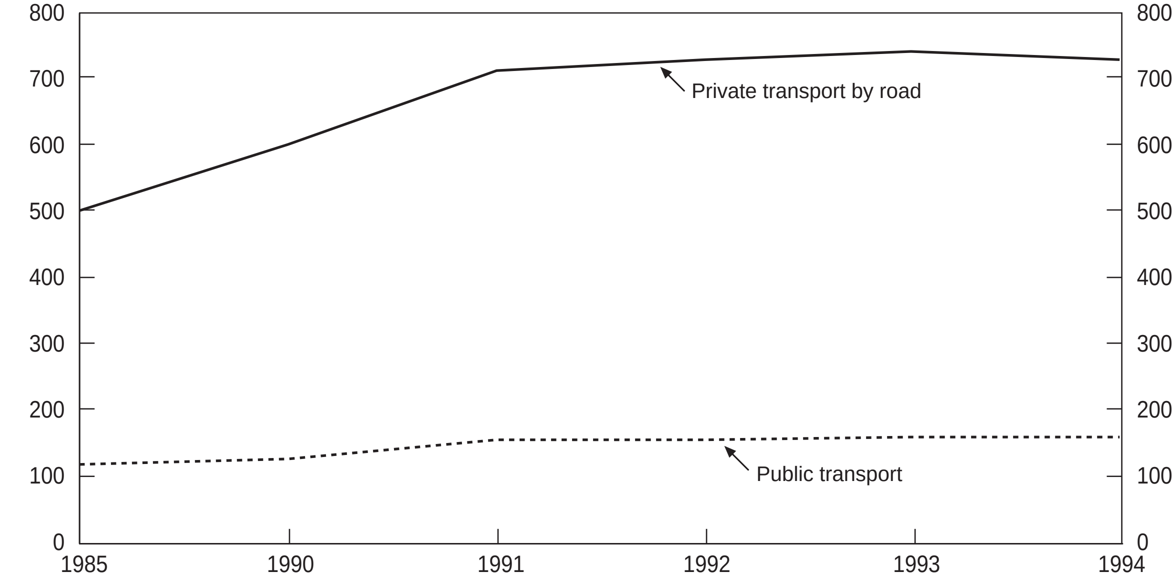
The modal split in passenger traffic has been relatively stable since 1991. Despite incentives to use public transport, the private car accounted for 81 per cent of all passenger traffic and 82 per cent of passenger-km in 1994.

Figure 7. **Trends in the number of passengers by type of transport**
In thousand passengers



Source: ECMT.

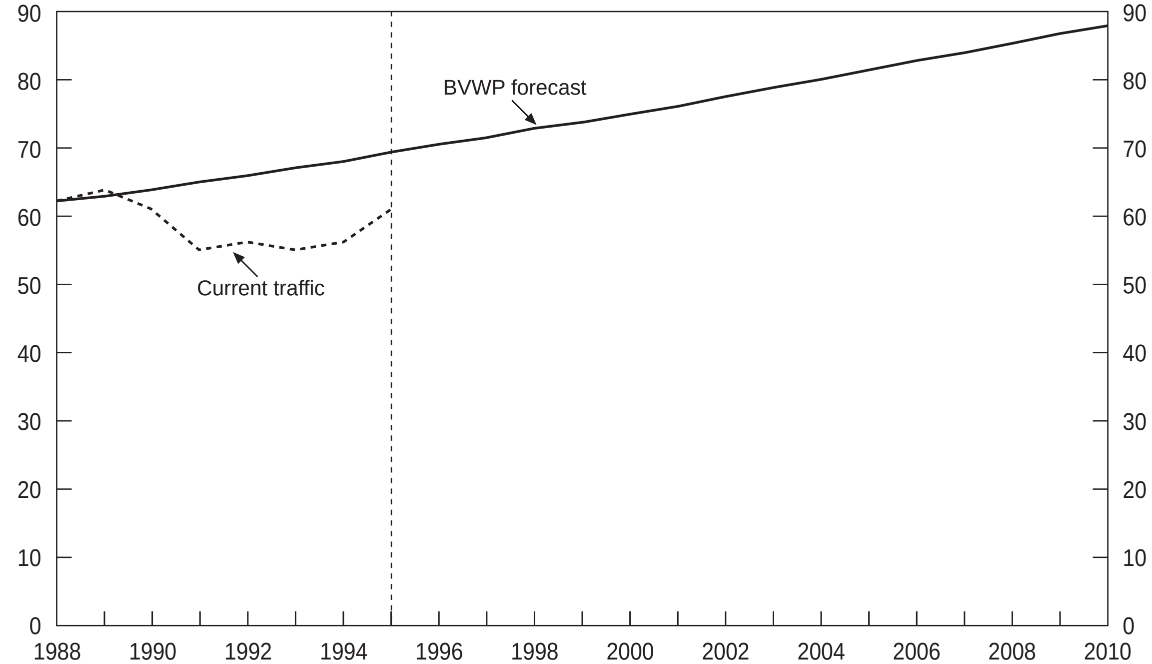
Figure 7. **Trends in passengers-km by type of transport** *(continued)*
In million passengers-km



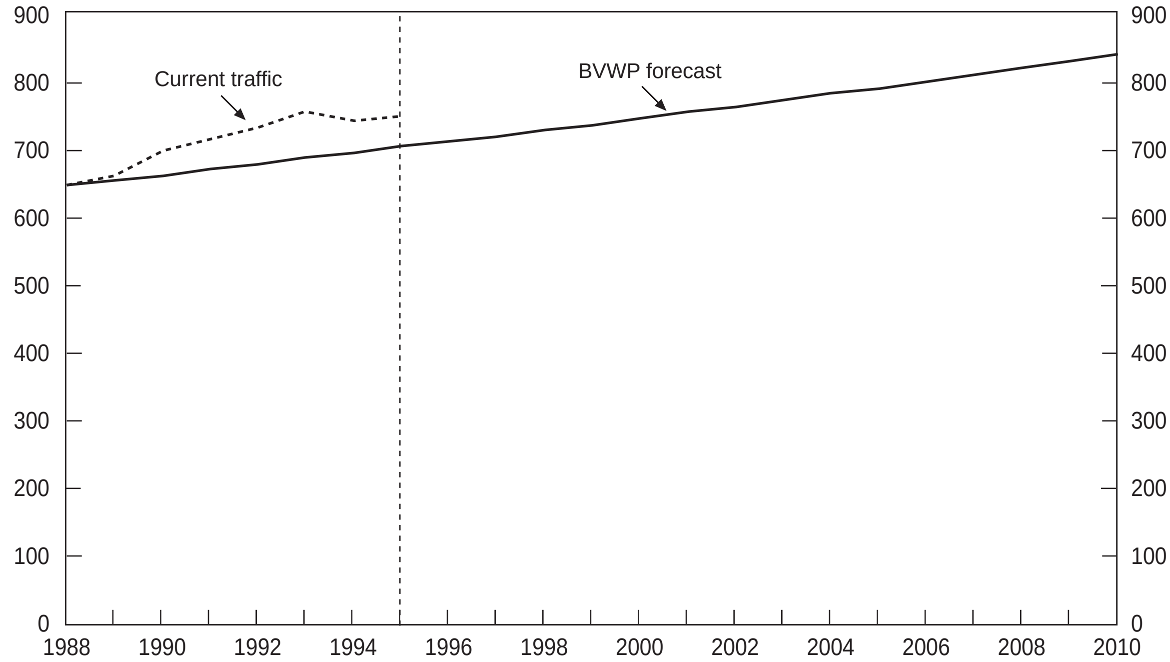
Source: ECMT.

Figure 8. **Future traffic trends**
Comparison of BVWP forecast and present data

A. Traffic by rail in billion passengers-km



B. Traffic by road in billion passengers-km



Source : ECMT.

Explanations about BVWP forecasts: see page 146

Trends in billion passengers-km since 1985

	1985	1990	1991	1992	1993	1994
Public transport	118.5	128.2	158.5	158.0	160.2	162.4
Private transport by road	495.1	601.8	713.5	731.5	740.8	731.2
Total	613.6	730.0	871.0	889.5	901.0	893.6

The BVWP estimated growth in passenger traffic over the period 1988-2010 at 32 per cent. Recent estimates put growth higher still, at 42 per cent.

The trend is the same for private road transport, with forecasts of 32 to 43 per cent growth over the same period.

Public transport by road

Breakdown of road traffic
Million passengers

	1985	1990	1991	1992	1993	1994
Scheduled services	5 731.0	5 815.0	7 775.0	7 761.3	7 835.2	7 846.3
Non-scheduled services	76.0	81.0	85.8	85.7	83.6	81.2
Total	5 808.0	5 896.0	7 860.8	7 847.0	7 918.7	7 927.5
non-scheduled services	1.31%	1.37%	1.09%	1.09%	1.06%	1.02%

Breakdown of road traffic
Billion passenger-km

	1985	1990	1991	1992	1993	1994
Bus	54.0	56.6	70.3	69.9	70.2	68.6
Of which scheduled services	33.8	32.6	42.6	42.7	43.6	43.4
Of which non-scheduled services	20.3	24.0	27.6	27.2	26.6	25.2
Tram, S-Bahn	8.3	8.6	13.2	10.5	9.4	8.9
Total	62.3	65.2	83.5	80.4	79.6	77.5

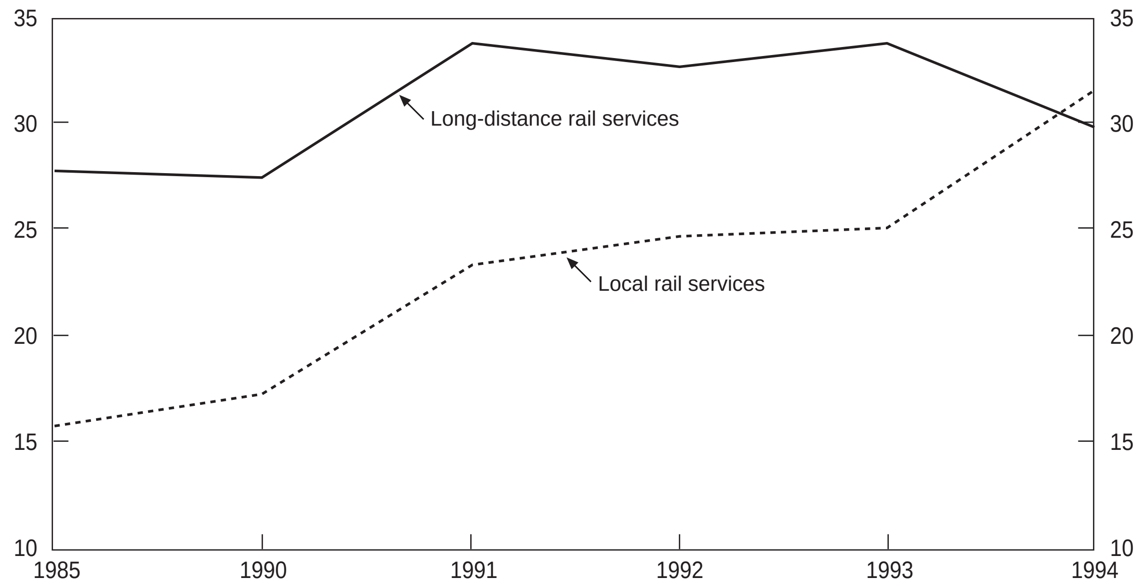
The number of passengers carried by bus and coach has risen sharply and is up 40 per cent in less than ten years. The share of traffic (by number of passengers) carried by non-scheduled transport is declining, despite a slight increase in the overall number of passengers carried.

Rail transport

Trends in rail transport
Million passengers

	1985	1990	1991	1992	1993	1994
Local rail services	994	1 058	1 381	1 421	1 441	1 457
Of which home-to-work travel	344	344	427	431	480	n.a.
Of which home-to-school travel	231	205	232	261	266	n.a.
Long-distance rail services	140	114	137	130	138	126
Total	1 134	1 172	1 518	1 551	1 579	1 582

Figure 9. **Trends in rail traffic since 1985 by type of service**
In billion passengers-km



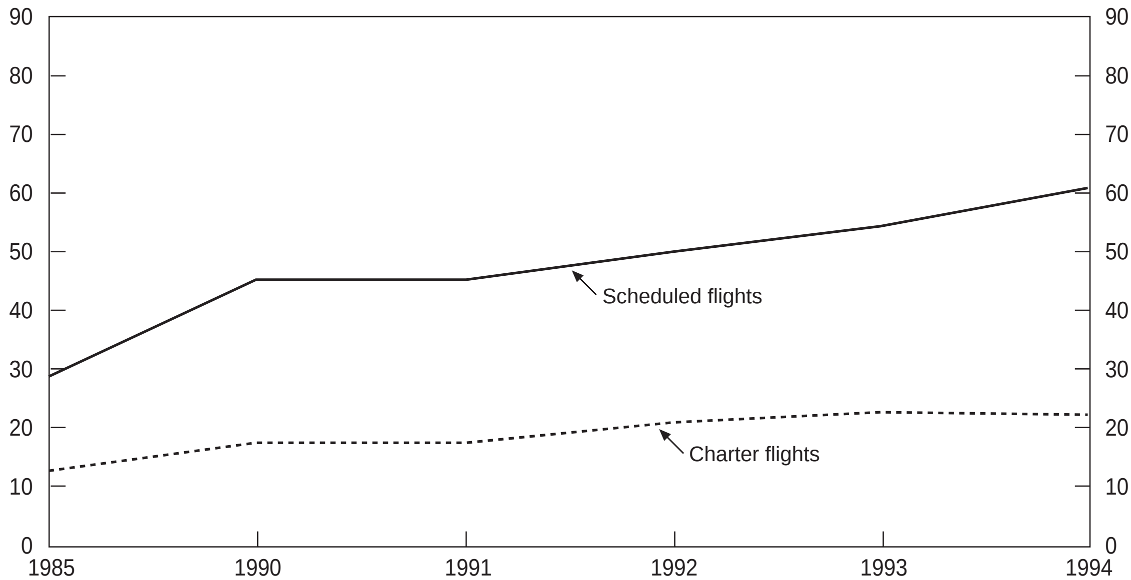
Source: ECMT.

The IFO's figures on rail traffic trends are less optimistic than those contained in the BVWP, at growth of 30 per cent rather than 40 per cent over the reference period. Moreover, this rate is based on the assumption that a strong rail transport development policy will be put in place.

Trends in air traffic
Million passengers

	1985	1990	1991	1992	1993	1994
Scheduled flights	28.9	45.4	45.3	50.1	54.3	60.7
Charter flights	12.8	17.2	17.2	20.9	22.5	22.3
Of which tour operator charter flights	10.3	15.5	15.6	19.3	20.7	20.7
Total	41.7	62.6	62.5	71.0	76.8	83.0
Of which domestic flights	9.4	13.0	13.2	13.8	14.6	14.8

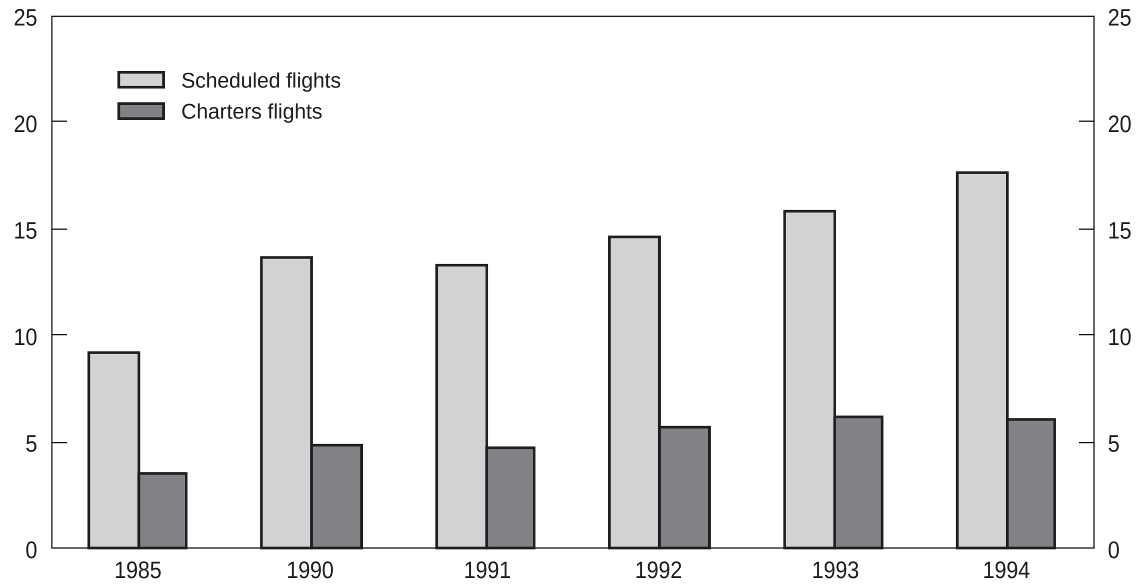
Figure 10. **Trends in air traffic since 1985**
In million passengers



Source: ECMT.

Germany's international air traffic has increased strongly for both scheduled and charter flights. Since 1993, however, the number of charter flight passengers has flattened out somewhat, an apparent sign of a slight downturn in tour operator business.

Figure 11. **Breakdown of traffic by type of flight**
In million passenger-km



Source: ECMT.

Recent estimates, together with particularly strong growth in the period 1988-93, appear to bear out the high growth rate projected in the BVWP for the period 1988-2010 (up 151 per cent).

Question 2: Present situation as regards infrastructure and investment projects

In 1995, Germany's transport investment policy focused on the development of environmentally friendly infrastructure. Rail and waterway modes therefore received particular attention. The sums allocated by the federal government to transport in 1995 are broken down as follows:

- DM 10 billion to rail;
- DM 8.6 billion to the core federal road network;
- DM 1.1 billion to inland waterways.

An additional DM 6.28 billion were allocated to the *Länder* for the purposes of improving local transport conditions.

The development of transport infrastructure in the new *Länder*, especially the 17 infrastructure projects provided for in the framework of the German Unity Plan (the VDE), continues to be a priority. Other programmes are aimed at improving transport conditions in general or in specific modes: these include the 1993-97 five-year plan, the Federal Road Network Development Plan, the Structural Reform of the Railways and the transit traffic policy programme.

In the period from the latter half of the 1980s to 1994, the Ministry of Transport invested a total of some DM 48 billion in major federal transport corridors and local infrastructure in the new *Länder*. DM 17 billion have been earmarked for renovating, upgrading and building rail infrastructure. In addition, the federal government attaches the utmost importance to the use by transport operators of new communications and traffic control technologies which should also facilitate balanced and environmentally sustainable traffic growth.

Currently the *Länder* and industry have drafted framework agreements to introduce integrated traffic information systems and the new technologies required to modernise the management of all transport modes in Germany as quickly as possible. According to the Ministry of Transport, it is essential for Germany to maintain a strong position in advanced technology, including in the area of transport.

Existing infrastructure

Road infrastructure

Length of the federal road network (major roads)
Thousand kilometres

	1985	1990	1991	1992	1993	1994
Federal motorways	8 350	8 959	10 955	11 013	11 080	11 143
Federal roads	31 400	30 900	42 100	42 200	42 000	41 800
Total	39 750	39 859	53 055	53 213	53 080	52 913

The Ministry of Transport bases its infrastructure investment programmes on mobility trends, the average daily traffic on major federal roads, and car ownership figures. In some cases, traffic trend data relate only to the former *Länder*, as the survey system in the new *Länder* is still under development.

On this basis, the number of cars in federal Germany totalled 46.6 million in 1994, representing an annual increase of 2.2 per cent. HGVs account for 13.1 per cent of the traffic on federal motorways and 7.7 per cent of the traffic on federal roads.

Average daily traffic has increased by:

- 1.1 per cent on federal motorways, to 45 900 vehicles/day;
- 0.2 per cent on federal roads, to 9 390 vehicles/day.

In 1994, total distance travelled on the road network was an estimated 496.8 billion kilometres. The table below shows that there was more traffic (all categories of vehicles) on the motorways than on federal roads. However, the total distance travelled on major federal roads was substantially higher than the total annual distance travelled by German vehicles, due to the increasing flows of international through-traffic.

Annual distance travelled on the road network
Billion kilometres

	1985	1990	1991	1992	1993	1994
Federal motorways	94.5	135.6	140.8	146.6	151.5	154.8
Federal roads	84.3	103.3	104.8	105.4	105.0	103.4
Länder roads	66.2	80.7	82.0	82.6	81.8	80.8
Local roads	37.6	44.4	45.7	45.7	45.4	44.6
Municipal roads	101.9	124.5	129.2	126.9	122.0	113.2
Total	384.5	488.5	502.5	507.2	505.7	496.8

According to estimates by the German Economic Research Institute (DIW), the total distance travelled in the new *Länder* in 1994 was approximately 85 billion vehicle-km, i.e. an increase of 10 per cent over 1993 figures.

Progress on recent projects

Progress on road and rail construction and development projects implemented under the VDE is reviewed below. According to the Ministry of Transport's first progress report on VDE projects in September 1995, good progress has been made in the four years since the start of the plan. The Ministry intends to continue to focus on "integrated transport", in order to achieve a more balanced distribution among inland transport modes and protect the environment.

Over the past four years, total investments amounted to DM 12 billion, 80 per cent of which was allocated to rail transport.

Road transport

The DEGES and the relevant authorities in the former and new *Länder* have made good progress on planned construction work under the VDE projects, and some sections have been opened to traffic. The following projects have been completed:

- widening of the Berlin South ring-road to six lanes (A10);
- the bridge over the Neisse on the border near Görlitz (A4);
- the A4 motorway between Eichelborn and Weimar;
- the Hermsdorfer Kreuz motorway interchange (A4/A9);
- the A9 motorway between Großkugel and Droyßig and between the Thuringian/Bavarian border and Berg/Bad Steben.

From the end of 1994, some DM 2.2 billion were invested in seven VDE road projects and a further DM 1.5 billion were allocated for 1995.

Rail transport

In line with the Ministry of Transport's priorities, rail projects (2 000 km of track in all) made good progress over the four-year period. Construction work was under way or had been completed on almost all of the lines. Two projects, representing a total of 273 km of track, are already open to traffic:

- VDE No. 6: the Eichenberg-Halle line, opened in May 1994;
- VDE No. 7: the Bebra-Erfurt line, opened in May 1995;
- VDE No. 5: the Helmstedt-Magdeburg-Berlin line, via Potsdam, was scheduled to open in late 1995.

Waterway transport

Waterway transport strikes a good balance between economic growth imperatives and environmental concerns. Construction projects take the surrounding landscape into account. Some work planned under the VDE, such as the construction of additional road bridges, has been completed. Investment to the end of 1994 totalled DM 110 million.

The largest VDE project is the renovation of the Magdeburg river crossing, planned to commence in 1996. The aim is to provide a link to Magdeburg's ports over a canal bridge on the Elbe with locks at Rothensee and Hohenwarthe.

Current projects

Road infrastructure

The construction of by-passes for major federal roads is a key element in the federal road network development programme. The 1993-97 five-year plan, with its extension to the year 2000, involves the construction of a total of 428 by-passes. In 1994, 49 sections (total length 147.9 km) entered service at the federal level. The total investment for these projects was DM 1 076.6 million.

Following agreements with neighbouring countries, a start was made on the construction of frontier bridges on international routes. Two such agreements are particularly significant. The first, with Poland, entered into force in 1994 and will enable the construction of bridges over the Oder (A4 and A12 motorways). The second, with Luxembourg, will enable the construction of a bridge over the Mosel (A8 motorway).

Rail infrastructure

Some VDE projects are already under way or will be shortly. They include:

-- VDE No. 1: Upgrading of the Lübeck-Hagenow Land-Rostock-Stralsund line

  The electrification of the north-east/west line (over 242 km) and the laying of a second track will improve the network in the former *Länder* and will link Schwerin, the principal town of the *Land*, and the ports of Wismar, Rostock and Stralsund to the network. In addition, it will speed up international traffic to Scandinavia and Eastern Europe (particularly to the Baltic ports mentioned above). It should also facilitate the development of a coastal tourist region: Mecklenburg-West Pomerania. The aim is to reduce the journey time from Lübeck to Stralsund to two hours. With the work now under way, it should be possible to bring the Hagenow-Schwerin section into service in 1996 at speeds of 160 km/h.

Along with the decision to electrify the line between Hamburg and Nauen (west of Berlin) by the end of 1996, it was decided to build a double track link between Hamburg and Rostock via Schwerin with a spur to Stralsund and Rügen island.

-- VDE No. 2: Upgrading of the Hamburg-Büchen-Berlin line

The laying of a second track and electrification of the line over 270 km will enable trains to travel at an average speed of 160 km/h and up to 200 km/h on some sections, considerably cutting journey time. It will also greatly improve links between the centre of Germany and the North Sea ports and the link between these ports and the *Länder* in the east and south-east. The entire Hamburg-Berlin line could enter service in 1997, reducing the journey time by 2 h15. The connection to Berlin will be via the old Berlin-Spandau rail link via Falkensee (which was cut when the Berlin wall was built in 1961); it will be renovated and converted to double track.

-- VDE No. 3: Upgrading and construction work on the Uelzen-Salzwedel-Stendal line:

It is planned to upgrade and build new sections on the Uelzen-Stendal line (over 113 km) to connect it to the Hanover-Stendal-Berlin high-speed line. In the first instance, the gap in the line (dating from the division of Germany) between Salzwedel and Nienbergen to the east of Uelzen is to be rebuilt and to be in operation by 1997 (single track, diesel traction). At a later date, the track is to be electrified (1999) and a second track laid along its full length. This will improve the link between the eastern *Länder* and the *Länder* containing Bremen and other North Sea ports. There are also plans to eliminate low-capacity sections on the network and to improve regional and commuter services.

-- VDE No. 4: Construction of the Hanover-Stendal-Berlin high-speed line

This line, 265 km long, is to be built as part of the European high-speed network. Paris/London-Brussels-Aix-la-Chapelle-Cologne-Hanover-Berlin-Warsaw-Moscow. The Lehrte-Oebisfelde line is to be electrified and converted to double track for speeds of 200 km/h; track for speeds of 250 km/h is to be laid from Oebisfelde to Staaken.

Later, the line from Staaken to Berlin’s mainline railway station (Berlin Hauptbahnhof) is to be upgraded and electrified. A start has already been made, such as the construction of bridges: six, including those over the Elbe and the Mittelandkanal, have been completed and 20 others are under construction.

In the Berlin rail network, between Staaken and the Berlin Friedrichstraße and Hauptbahnhof stations, major work is under way, chiefly to restructure the Berlin underground lines between the Zoo and Hauptbahnhof stations. Because of this work, there will be no mainline link between the two stations until 1997. The high-speed line should be open to traffic by the end of 1997. The journey time from Hanover to Berlin should be two hours, instead of three.

-- VDE No. 8: Upgrading and construction work on the Nuremberg-Erfurt-Berlin link

Upgrading and construction work along a 521 km stretch of this key north-south link is being undertaken as part of the TEN scheme. The work will substantially improve

Germany's south/south-west rail link as well as the rail link between the industrial heartland and Berlin. There are also plans to convert the line between Nuremberg-Ebensfeld to four tracks (200 km/h), to construct a new Ebensfeld-Erfurt-Halle/Leipzig line, and to upgrade the track between Halle/Leipzig and Berlin. Work has already begun on this section. The Halle-Bitterfeld section had been shut down completely but has now been completed and is back in service.

Work to link the Intercity Express (ICE) line with the A71/A73 motorway south of Erfurt is scheduled for spring 1996.

When all the necessary work has been completed, the journey time from Berlin to Nuremburg will be approximately three and a half hours.

-- VDE No. 9: Upgrading of the Leipzig-Dresden line

The gradual upgrading of the track along a length of 115 km to cater for speeds of up to 200 km/h will reduce the journey time from one and a half hours to one hour by the year 2000. Initially, work will concentrate on existing track, stations and bridges between Wurzen and Oschatz. The construction of the connection to the Berlin-Dresden line and to the Dresden railway junction is at the planning stage. After the upgrade, Saxony will have better links with the Ruhr, Rhine and Main basins and Bavaria. At the same time, the new lines being built from the Dresden junction will bring substantial improvements to regional and commuter train traffic.

Waterway infrastructure

Under VDE No. 17, 253 km of waterway are to be developed in order to enable the passage of large carriers (up to 2 000 tonnes), and loading docks are to be modernised (through the provision of gantry cranes with a capacity of 3 500 tonnes). Specifically, this will require:

- improvements to the Mittellandkanal along a 60 km stretch in Saxony-Anhalt: the canal will be widened and clearances under bridges increased;
- improvements to a 106 km stretch of the Elbe-Havel canal and the Untere-Havel waterway between Niegripp and Potsdam: the canal will be widened and clearances under bridges and the capacity of the Zerben, Wusterwitz and Brandenburg locks will be increased;
- improvements to the Havel-Kanal along a 14 km stretch from the Untere-Havel waterway to the Wustermark freight terminal: the canal will be widened and clearances under bridges increased;
- improvements to the Berlin navigable waterway along a 67 km stretch between two sections (Potsdam-Westhafen and Potsdam-Osthafen): the canal will be widened and clearances under bridges and the capacity of the Charlottenberg and Kleinmachnow locks will be increased.

Question 3: Capacity problems

Road transport

The funds provided for some road infrastructure projects were revised downwards following cuts in the federal budget. In its funding plan of 13 July 1993 and its decisions on the infrastructure investment budget, the federal government had earmarked DM 10.76 billion for spending on major federal roads in 1993 and 1994 and DM 10.6 billion in subsequent years. However, the budget passed by the Bundestag in 1995 provided only DM 10.65 billion for major federal roads in 1995 and DM 9.9 billion per year from 1996 to 1998.

The budget also affected roadwork. For instance, construction standards on the width of six-lane motorways were revised downwards. The full cross-section of this type of motorway will now be limited to 35.5 m instead of 37.5 m. However, these dimensions should still ensure that vehicles can travel safely without the need for speed limits. The motorways will be able to remain open to traffic while work is in progress.

Freight transit traffic

The number of heavy lorries travelling through Germany has risen steeply since 1990. However, most of these vehicles do not comply with European Union safety or environmental standards. They are the source of some of the transport taxes (Germany's "polluter pays" principle) and put those who do comply with the standards and other cleaner modes of transport at a disadvantage.

The costs of the damage to the environment caused by road freight transit traffic are higher than the value added it generates.

Question 4: Measures

Road transport

Legislative measures

There have been a number of amendments to legislation on road construction -- mainly relating to the specifications for the construction of major federal roads -- with the entry into force of the following acts:

- the Third Law of 25 March 1994 amending the Law on Major Federal Roads (OJ 1994, vol. 1) with effect from 8 April 1994;
- the Law on private financing of the construction of major federal roads of 30 August 1994, with effect from 2 September 1994;
- the Law on motorway user charges of 31 August 1994, with effect from 9 September 1994.

Environmental protection

In 1994, DM 851 million were spent on environmental protection, including DM 561 million for new construction or development projects.

DM 402 million were also invested in noise abatement: construction of approximately 48 km of embankments, 88 km of noise barriers and 42 000 m² of double glazing. Some DM 449 million were spent on the conservation of nature and the countryside, including the maintenance of green areas and biotopes.

The reduction of exhaust gases from vehicles is one of the main planks of current transport policy. To this end, the Transport Ministry is planning:

- as a first step, to introduce a tax on private motor vehicles;
- to follow this up with an initiative at European level to reduce the acceptable concentration of gases in vehicle exhausts emissions by the year 2000.

The German automobile industry has also voluntarily undertaken to reduce the petrol consumption of private vehicles and the growth in the number of privately owned vehicles by 25 per cent by the year 2005 (relative to 1990 figures).

In order to promote the use of LPG vehicles, the authorities are planning to reduce taxes for this type of vehicle by around 60 per cent.

Road safety

The first step was to remove level crossings on major federal roads in order to improve safety and traffic flow. Spending on the removal of these crossings and the installation of safety equipment under the roads plan totalled DM 53.7 million in 1994. The closure of railway intersections on local authority roads cost DM 192.7 million.

Transit traffic

The exponential growth in freight traffic through Germany, principally via roads, prompted the federal government to frame, with the advice of industrial transport specialists, a national concept of what constitutes environmentally friendly through traffic. The "Freight transit through Germany" plan specifies a number of measures designed to strike a better balance among the different transport modes. In order to avoid "road only" transport, infrastructure costs are to be allocated fairly among modes so that road users contribute to the costs of the infrastructure they use. With this in mind, a time-based toll system for HGVs on motorways is to be introduced in 1997 and will mark a turning point in Germany's road transport policy.

Rail transport

Measures taken in the rail transport sector are a result of regulatory policy, on the one hand, and the restructuring of the railways, on the other. The next steps should be to separate infrastructure management from operations by Deutsche Bahn Company (DB) and to open the network to third parties. The order governing infrastructure use (*InfrastrukturNutzungsverordnung*), at the draft stage at the end of 1995, should ensure open competition in the railways by regulating the allocation of infrastructure capacity and allowing the introduction of user charges by DB.

As part of the restructuring process, the responsibility for local passenger service was to be devolved to the *Länder* on 1 January 1996, thereby enabling local public transport to provide "customised" services.

Combined transport

To encourage the wider use of combined transport technologies, particularly for EEC freight traffic travelling through Germany to the countries of eastern Europe, the federal government is considering the introduction of a number of measures, such as:

- abolishing taxes;
- allowing freight traffic on Sundays and public holidays.

A review of infrastructure investment programmes is also planned with a view to developing road/rail transfer terminals, creating a user network, meeting operators' needs, etc. This last initiative will bring private operators and the railway companies together to draft a programme of action (*KV-Standortkonzeption 2010*) aimed at making combined transport technologies more attractive. Among the initiatives mentioned are the development and construction of 44 combined transport terminals in Germany.

Under the 1992 transport infrastructure master plan, DM 4.1 million[1] were allocated to improving rail-waterway connections to the year 2012; interest-free loans and subsidies to finance DB's transfer terminals were also provided. The development of combined transport is extremely important for the future of DB, which is relying heavily on growth in this type of traffic to increase its share of the freight transport market.

Note

1. This figure should be treated with caution. Although the source is the Federal Ministry of Transport's *Strassenbaubericht 1995*, it seems a little low compared with other investment and is all the more surprising given the obvious determination to develop this mode.

Appendix

Current economic data, 10 August 1995

	Economic data	Effective date	Source
Expected growth 1995			Federal Ministry of Economics, Annual economic report
Old *Länder*	+2.50%	year	
New *Länder*	+8-10%		
Germany	3.00%		
Consumer prices			
Expectation 1995	+2.00%		
Employment			Federal Labour Office
Unemployment rate			
Old *Länder*	9.2%	1-8-1995	
New *Länder*	14.8%	1-8-1995	
Germany	10.4%	1-8-1995	
Number of unemployed			
Old *Länder*	2 549 063	1-8-1995	
New *Länder*	1 041 437	1-8-1995	
Germany	3 590 500	1-8-1995	
Part-time workers			
Old *Länder*	86,212	1-8-1995	
New *Länder*	55,014	1-8-1995	
Germany	141,226	1-8-1995	
New orders			Federal Ministry of Economics, News of the day
(Changes from preceding year)			
Old *Länder*			
Manufacturing sector	+9.5%	May 95	
Manufacturers of int. products	+10.0%	May 95	
Manufacturers of capital goods	+9.0%	May 95	
Manufacturers of consumer goods	+7.4%	May 95	
New *Länder*			
Manufacturing sector	+54.7%	May 95	
Manufacturers of int. products	+28.3%	May 95	
Manufacturers of capital goods	+8,7%	May 95	
Manufacturers of consumer goods	+14.9%	May 95	
Production in the producing sector			Federal Ministry of Economics, News of the day
(Changes from preceding year)			
Old *Länder*			
Manufacturing sector	+4.0%	May 95	
Manufacturers of int. products	+2.3%	May 95	
Manufacturers of capital goods	+6.7%	May 95	
Manufacturers of consumer goods	+3.9%	May 95	
Construction industry	+0.3%	May 95	

New orders (Changes from preceding year) New *Länder* Manufacturing sector Manufacturers of int. products Manufacturers of capital goods Manufacturers of consumer goods Construction industry	 +18,0% +29,4% +4,6% +18,7% +14,0%	 May 95 May 95 May 95 May 95 May 95	
Motor industry (motor vehicles) Production Number of new registrations Export (Changes from preceding year) Production Number of new registrations Export	 2 590 400 1 931 400 1 423 700 +14,0% +2,0% +18,0%	 Jan-Jun 95 Jan-Jun 95 Jan-Jun 95 Jan-Jun 95 Jan-Jun 95 Jan-Jun 95	VDA (Association of German motor vehicle manufacturers)
Trade surplus Last month January to... Current account deficit Last month January to...	million DM +6 300 +27 157 -3 926 -16 490	 April 95 April 95 April 95 April 95	Deutsche Bundesbank

GREECE

Area: 131 000 km²
Population: 10 500 000

Question 1: Future trends in passenger and freight traffic

Compared with other EU countries, Greece has one of the lowest levels of development, as shown by its per capita GDP ($7 300) and car ownership rate (172 vehicles per 1 000 inhabitants in 1993).

Freight traffic forecasts drawn up within the framework of the Blue Plan were based on a number of different scenarios, taking into account GDP growth trends in Mediterranean countries and freight traffic trends (measured in tonne-km) between 1972 and 1992. Evaluation of the traffic flows in tonne-km takes into account the size of the countries considered.

Freight traffic forecasts
Billion tonne-km

	High estimate		Low estimate	
	2000	2025	2000	2025
Scenario T2	20.0	29.7	17.4	21.0
Scenario A2	20.5	31.5	17.8	22.9

Source: Blue Plan.

Rail traffic

The volume of rail traffic seems to have been estimated using the four methods described in the previous report (generation, attraction, modal distribution, assigning of traffic) and based on the administrative divisions of the rail network. Growth of rail mobility was not predicted. Furthermore, no global figures for domestic traffic have been forwarded; a set of maps shows traffic volumes only on the different lines making up the network, for the years 1992, 1993, and 1994.

A study of these maps reveals that passenger traffic overall has fared better, in terms of volume, than freight traffic. Nonetheless, the volume of passenger traffic on certain lines, for example between Salonika and Idoméni, fell by 45 per cent between 1991 and 1994.

Average annual traffic growth on line sections shown on the maps
Percentage

	1994/91	1994/93	1993/92	1992/91
Passenger traffic	-12	-11	-1	7
Freight traffic in tonnes	-42	-24	-18	-14

According to figures published by the ECMT, it would seem that although load factors (in terms of number of passengers per train) are declining, mobility appears to be increasing. Performance is better when expressed in passenger-kilometres than in number of passengers.

Rail traffic, 1985-94
Billions (ECMT data)

	1985	1993	1994	94/93
Freight (t-km)	0.73	0.52	0.32	- 38
Passenger (p-km)	1.73	1.73	1.75	+ 1

Road traffic

For the past few years, the National Roads Department has carried out an annual study of road traffic by origin/destination. On the basis of the maps resulting from this study, together with origin/destination traffic forecasts for the years 2000 and 2010, vehicle flow forecasts can be made on the basis of the following assumptions:

	2000	2010
Entry into service of new road sections	1. Road from Egnatia 2. Sections between Aktio and Preveza (Rio-Antirrio) 3. Road between Kozáni and Ptolémaida	1. Road from Egnatia 2. Sections between Aktio and Preveza (Rio-Antirrio) 3. Road between Kozáni and Ptolémaida 4. Pamagia-Vols section 5. Lamia-Trikkala section 6. Western route 7. Siátista-Krystallopigi
Existing section upgrades	1. Road linking Corinth, Athens and Salonika 2. Road between Salonika and Promahónas	1. Road linking Corinth, Athens and Salonika 2. Road between Salonika and Promahónas 3. Road between Trípolis and Kalamata
Socio-economic forecasts	1. Same population as in 1993 2. 1993 GDP trends	1. Average annual population growth rate: 0.4 % 2. Average annual GDP growth rate: 3.8 % 3. 30 % improvement in regional indexes

The 1993 map shows two main areas of traffic, totalling, on average, 25 000 vehicles per day:

- the first follows the route between Thivai and Athens, as far as Corinth;
- the second concerns the roads around Salonika, in the north towards Idoméni and in the west towards Gianitsà.

Traffic levels of approximately 10 000 vehicles per day are generally found on roads leading to or extending beyond the aforementioned high traffic routes, i.e. Corinth-Patras, Lianokládi-Thiva, Lárisa-Vólos.

Traffic in northern Greece is much less dense, with between 2 000 and 4 000 vehicles per day. The western part of the country is served by an inland route which, on average, totals between 5 000 and 7 000 vehicles per day.

The volume of traffic in central Greece is low, to the point of non-existence on some routes (0 to 900 vehicles per day).

The map of traffic forecasts for the year 2000 shows that:

- in the north, average daily traffic is increasing significantly, in particular east-bound traffic which is expected to total between 3 500 and 8 000 vehicles per day;
- in the east, average traffic on coastal roads is expected to double (from 5 000 vehicles per day on some routes in 1993 to 10 000 in 2000);
- in the north-west, the route between Salonika and the province of Ioannina will total between 6 000 and 8 000 vehicles per day;
- in the south, coastal traffic is increasing.

According to forecasts for 2010, traffic on the coastal roads will continue to increase, and, at the same time, the distribution of traffic throughout the network will become more even as traffic on transverse routes reaches significant levels:

- traffic between Patras and Corinth is expected to increase from approximately 10 000 vehicles per day between 1993 and 2000 to 18 000 in 2010;
- traffic between Monastiri and the province of Trikkala (towards Kalabáka) is expected to total between 4 000 and 10 000 vehicles per day (depending on the direction of the traffic);
- 15 000 vehicles per day are forecast between Salonika and Ioannina.

Road traffic trends

Billions (ECMT data)

	1985	1993
Freight traffic (t-km)	10.35	13.95
Private car traffic (p-km)	13.33	-
Bus traffic (p-km)	5.79	5.16

Question 2: Present situation as regards infrastructure and investment projects

Description of existing and future infrastructure

Road infrastructure

Present situation on existing road corridors
Kilometres

	Corridors	National roads	Express roads	Total
1	Patras-Athens-Salonika-Evzoni	206	453	659
2	Egnatia (Igoumenitsa-Salonika-Alexandroupolis-Greek/Bulgarian border)	70	285	355
3	Salonika-Greek/Bulgarian border		80	80
4	Siatista-Greek/Bulgarian border		28	28
5	Corinth-Tripolis-Kalamata	70	12	82
6	Salonika-Florina		23	23
7	Patras-Pirgos		100	100
8	Salonika-Nea Moudania	15	50	65
		361	1 031	1 392

Situation of road corridors in 2010
Kilometres

	Corridors	National roads	Express roads	Total
1	Patras-Athens-Salonika-Evzoni	206	453	659
2	Egnatia (Igoumenitsa-Salonika-Alexandroupolis-Greek/Bulgarian border	70	285	355
3	Salonika-Greek/Bulgarian border		80	80
4	Siatista-Greek/Albanian border		28	28
5	Corinth-Tripolis-Kalamata	70	12	82
6	Patras-Pirgos		100	100
7	Salonika-Nea Moudhania	15	50	65
8	Eastern corridor (Igoumenista-Patras)	50		50
9	North Crete corridor		20	20
10	Elefsina-Stavros-Spata-New airport (Athens bypass)	70		70
		481	1 028	1 509

Railway infrastructure

A map of the future rail network indicates ambitious plans, aimed at improving the density of the network throughout Greece and developing seven connections with the rail networks in neighbouring countries: F.Y.R.O.M., Albania, Bulgaria and Turkey.

Key projects outside the TEN

Five road and four rail infrastructure investment projects that were not selected at the Essen Summit have been identified as key projects.

Road projects and their cost
MECU

	Nature of work	Funding source	EU contribution	National contribution	Private funding	Total cost
1	Improvements along the Salonika-Serres-Promahónas corridor	Cohesion Fund	16 575	2 925	19 500	49 505
2	Completion of work on the Salonika-Mouciania corridor	Cohesion Fund	18 530	3 270	21 800	33 003
3	Corinth-Tripolis-Kalamata	Cohesion Fund	3 194	565	3 758	33 003
4	Ring-road around Piraeus	Cohesion Fund	27 209	480	32 011	
5	Northern Crete corridor bypass around Agrinion and Arta Bridge between Rio and Andirio	Structural funds	226 780	151 162	320 000	897 892

Rail projects

Rail projects and their cost
MECU

	Nature of the work	Funding source	EU contribution	National contribution	Total cost
1	Athens-Salonika-Idoméni Evangelismós-Leptokariá Electrification of the Athens-Salinika line	Structural funds	338 316	145 938	484 264
2	Upgrading work on rest of network: Peloponnese network Lárisa-Vólos line	Structural funds	5 950	7 650	13 600
3	Widening of the Paleofársala-Kalabáka line	Cohesion Fund	28 815	5 095	33 900
4	Upgrading work on the Salonika-Alexandroúpolis line	Cohesion Fund	26 520	4 080	31 200

Question 3: Capacity problems

In spite of the relatively low car ownership rate in Greece, congestion and pollution attain high levels in urban areas, particularly in the Athens area.

Question 4: Measures

Greece makes no mention of special measures taken recently. It would seem that, for all modes, the government's main response to capacity problems consists in developing infrastructure within the framework of the various projects.

HUNGARY

Area: 93 000 km²
Population: 10 200 000

Hungary mentions the difficulty of producing reliable statistics in a still unstable economic and political context. As a result, it is difficult to evaluate the cost and return to capital of a motorway project, for example. In addition, the war in the former Yugoslavia complicates the Hungarian situation, since Hungary's geographical situation makes it a natural transit route between western and south-eastern Europe.

The positive aspect of the political and economic changes is the multiplication of the financing possibilities for infrastructure maintenance and development: in addition to the state budget, it is possible to obtain private capital, funds allocated by the international organisations and Community funds (via the PHARE plan). The advice and assistance provided in the PHARE framework permits more rapid progress on the path of European integration.

The Hungarian government has just adopted a new transport plan, which has four objectives:

– promote European integration;
– co-operate with neighbouring states to achieve balanced development;
– protect human life and the environment;
– ensure the proper regulation and efficiency of the transport market.

Question 1: Future trends in passenger and freight traffic

In view of these very particular circumstances, many studies concerning both passengers and freight have been carried out in recent years in Hungary. The methodologies used include scenarios, expert forecasts, extrapolations and the separate or combined application of transport models. The results presented here cover the period to the end of this century, and deal separately with passengers and freight.

Passenger transport

Private transport

Private transport is expected to increase from some 51 billion passenger-km in 1994 to 54-55 billion in 2000 and 67-81 billion in 2010. By convention, the trend in the car stock is used to make traffic forecasts. From the beginning of the 1960s, the number of private cars suddenly began to increase, rising from 30 000 in 1960 to 2.1 million in 1993. The forecasts are for 2.2 million cars in 1995 and 2.5 million in the year 2000, or even 3 million, depending on the rate of economic growth.

Public transport

Public transport is expected to remain the main mode until the year 2000, but its market share is likely to fall. In 1994, it accounted for 30 billion passenger-km for total national traffic, and a market share of 60 per cent for Budapest alone. The forecasts are for 32-33 billion passenger-km for the year 2000, and 30-34 billion pour 2010.

In this sector, the modal split is not expected to change, at least over the period studied:

- Road and rail public transport should retain their present market share of 57 per cent.
- Waterway transport (mentioned here because of its first place for leisure trips) should continue to carry about 65 million passengers.
- Air transport should see its traffic increase by 60-80 per cent by 2000 because of changes in air routes in the region. Domestic air transport activities have increased, but this is charter traffic and this mode is not of great significance (because of the size of the country).

International passenger traffic should grow strongly to the year 2000. No figures can be given, however, as growth will depend very much on uncertain factors, such as liberalisation of tourism. However, international (diplomatic and economic) relations remain sensitive issues of importance for the evolution of this sector. The war in the Balkans is also a far from negligible factor, as is the enlargement of the European Union. The question of visa applications has a considerable impact on passenger traffic in eastern Europe.

For road transport, the number of vehicles entering Hungary in the mid-1990s is 10 million a year.

Freight transport

According to the forecasts presented in the following table, there will be moderate growth of freight transport to the year 2000. Over this period, international and transit traffic will grow at an above average rate.

Forecast freight transport, 1985-2000
Billion tonne-km

		1985	2000		2000/1985 (%)	
			Low hypothesis	High hypothesis	Low hypothesis	High hypothesis
Own account		5.48	6.0	7.1	109	130
Transport enterprises		42.64	47.3	55.8	111	131
Total		48.12	55.3	62.9	111	131
Of which:	domestic	21.65	22.9	26.3	106	121
	imports	9.54	10.5	12.5	110	131
	exports	5.27	6.2	8.5	118	161
	transit	11.66	13.7	15.6	117	134

The following table shows trends in the transport market structure by mode. The railways are expected to lose traffic to road haulage. Road traffic is expected to cease growing by 2000 as a result of the increasing use of multimodal transport techniques. However, road haulage will remain in first place.

Trend in the freight market structure by mode, 1970-2000
Percentage

					2000	
	1970	1975	1980	1985	High hypothesis	Low hypothesis
Rail	67.1	59.4	50.8	46.4	30.1	29.9
Road	19.7	22.0	23.7	24.8	51.1	50.9
Waterway	5.9	4.3	4.5	3.9	5.9	6.0
Sea	3.8	6.5	11.9	14.8	-	-
Pipeline	3.5	7.8	9.1	10.1	12.9	13.2
Total	100	100	100	100	100	100

Question 2: Present situation as regards infrastructures and investment projects

The degradation of the transport infrastructures is due to the present economic crisis but also to the fact that the development of infrastructures was relegated to a low priority in communist economic policy. Furthermore, over the past decades the improvement of networks and services was not based on the needs of domestic economic development.

At the beginning of the 1990s, the situation improved owing to privatisations, the investment of private capital, the reform of institutional structures and the creation of a budget independent of the central government budget. Regulations were amended or developed, so that there is no longer any obstacle to the creation of a development model compatible with the environment.

The shortage of capital remains a serious problem. It is at present impossible to solve the problem created by insufficient capacity and even the total lack of certain elements in the networks. This problem is a heavy burden for the Hungarian economy. Some regions are poorly connected to the country's main transport axes, investment is insufficient, and the levels of service required for integration in the European Union cannot be achieved. Because of balance of payment difficulties, sufficient resources cannot be allocated from the central budget.

To accelerate development, the Hungarian Ministry of Transport has launched a programme of development of infrastructures for rolling stock, which authorises the state to initiate the development of those projects for which the need and the probability of a good return on capital are the greatest.

An investment plan to replace previous ones is now being drawn up. Changes are expected mainly in the rail transit network and in motorways. These changes are urgent and necessary in order for the country to open up to the European Community and be integrated into the European Union.

Comparison of transport sector characteristics, Hungary-Austria, 1994

	Hungary	Austria
Per capita GDP in thousand US$	4.1-6.0*	25.0
Population density (inhabitants/km²)	114.0	90.0
Cars/1 000 population	210.0	345.0
Motorways: km	311.0	1 335.0
Motorways: km/1000 km²	0.3	1.76
Rail: km²	7 405.0	5 745.0
Rail: km/1 000 km²	79.6	68.5
of which electrified (%)	30.1	54.3

* Figures corrected using the World Bank conversion method.

These figures must not obscure the present and expected future dynamism of road traffic, however, for both passengers and freight. In this sector, the Hungarian authorities consider that, without the significant development of infrastructures, chaos is inevitable.

From the outset, investment projects are evaluated from the standpoint of their international importance. They must conform to European plans (and standards) and obtain outside support in this respect from competent international bodies and regional programmes.

Rail infrastructures

In the case of international rail transport, the aim is to achieve speeds of 140-160 km/h. For intercity links, speeds should be over 100 km/h.

There are two major rail projects:

- One is the Budapest-Hegyeshalom (Austrian border) line, which should permit trains to operate at 160 km/h. The construction of this line in Hungary (178 km) will also make it possible to travel from one capital to the other in two hours. The work, which began in 1993 and should be completed in 1998, also includes track safety equipment, modernisation and electrification and the reconstruction of a maintenance and repair facility.

  From the European standpoint, this project is a priority of the Hungarian Railways (MAV) programme. In fact, most Hungarian tourists travel to Vienna. In addition, completion of this project will permit a connection with Greece.

- The second major rail project concerns the Budapest-Kelebia (border with Serbia) line, which is to be upgraded to permit speeds of 160-200 km/h. The work was started in 1993 and should be completed in 1997. It comprises the construction of a second track, upgrading to permit higher train speeds, the construction of station buildings, the replacement of the old safety system and the installation of a new electrification system. It involves laying 140 km of track for the line and 40 km for the stations, installing safety equipment at 19 stations, building subways for passengers and modifying the level crossings.

This project is part of the north-south Trans-European (TER) route, and this favours its realisation (the project headquarters are in Budapest). This project to upgrade for high-speed operation has the benefit of favourable terrain which makes it relatively inexpensive.

As regards the other investment projects of the MAV, modernisation of the network is to continue, with the construction of second tracks where necessary, electrification, and the promotion of combined transport with the construction of terminals. Rolling stock and automatic traffic control are not forgotten in this general reconstruction plan.

Road infrastructures

The first priority is the motorway network, which does not yet exist. Another major objective is to relieve transit traffic through big towns by constructing bypasses. In the case of the capital, this also involves the construction of two bridges over the Danube, destined to be used by motorways. One, as a completed section of the M0 bypass, is already in service. The other will not be built before the end of the 1990s.

The projects involve five motorways. The first project is the extension of the M3 motorway from Gyengyes (70 km east of Budapest) to Polgar in the direction of the border with Ukraine, or 110 km of two two-lane roads. This extension will not only permit connection with the CIS countries, but will also serve the industrial region of northern and eastern Hungary. According to the governmental decision of October 1995, this motorway will be financed out of public funds. Work will begin in 1996 and should be completed as far as Fezesabony (44 km) in 1998 and Polgar (69 km) in 2003.

The extension of the M5 motorway (from south-east of Budapest to the border with Vojvodina) has been split into separate sub-projects which could perhaps be implemented simultaneously. This motorway carries traffic in the direction of Belgrade-Sofia-Istanbul. It is part of the European north-south project (TEM) (see the annex map). From the standpoint of the domestic network, it permits connection between the motorways of the southern and eastern parts of the country. The first section, between Ujhartyan and Lajosmizse (km 44 - km 74), will obtain a second lane. The bypass around Kecskemet and an extension of 72 km of 2 x 2 lanes in the direction of the southern border is to be built in at least two stages. A concession contract has been concluded for this project and construction should begin in 1996.

The other sub-projects provide for extending this motorway to the border (some 130 km in all).

The extension of the M7 motorway (from Balatonaliga, 90 km south-west of Budapest) to the border with Croatia and Slovenia, has been split into three sub-projects of a total length of 141 km. Depending on the sub-project, the work will involve adding a second lane, constructing 2 x 2 sections, or modifying intersections (eliminating level crossings in the case of the railways). This motorway is a major road for the Hungarian tourism region of Lake Belaton and also takes traffic heading for Zagreb and Ljubljana. The new sections of this motorway are not to be placed in service before the end of the decade. The work should start in 1998 and be completed in 2003, because it comes under the plan for Corridor IV.

The M1 motorway is to be extended to the Austrian border, from Gyer to Hegyeshalom. This road is part of the international TEM project. From the domestic standpoint, it is an important part of the road system linking the developed industrial, agricultural and tourist regions and the capital. The last missing section was opened in 1995. A link motorway (M15) will be constructed to join and extend a motorway planned by Slovakia to Rajka, a new border crossing. This last road is also part of the TEM network and is included in the 1997 M1 concession contract.

The M0 motorway serves as a by-pass for Budapest. The aim is to link the different radial motorways serving the capital. At present, a 30 km section is operational and links M1, M7 and M5. The cost of construction was financed by the World Bank and an EBRD loan. The northern part of this project, with a bridge over the Danube, was to be built in 1996.

In addition to the infrastructure, the vehicle stock needs renewing; this is partly the responsibility of the central and local governments.

Question 3: Capacity problems

Rail transport

The Hungarian administration has indicated which sections of the domestic rail network carry heavy traffic. All are localised around Budapest, to the north-west and the south-east (see the annex map). In 1990, the average volume of traffic over these sections was between 110 and 175 trains a day, corresponding to coefficients of utilisation of close to 90 per cent. Special mention must be made of the section between Mezetur and Bekescsaba; with 65 trains a day, it has a coefficient of utilisation of 93 per cent. This section of track is on the line from Budapest to the near-by Romanian border.

According to the authorities, the capacity problems seem to be directly related to the technical characteristics of the infrastructure, among which are: differences in track gauge and the low share of electrified lines (as compared with the international average). Another is the geographical configuration of the network, which appears to be excessively centred on Budapest (star network). However, the network density is close to the European average.

One consequence of the advanced age of the tracks is the reduced operating speeds (40 to 60 km/h) over some 20 per cent of the mainline network.

As a specific problem, the Hungarian rail network includes five bridges over the Danube. Two allow passage to other vehicles, while a third, in the north, is only semi-permanent. Four of the five are single-track; only the bridge to the south of Budapest is double-track. The total length of these bridges is 2 442 m. Six other bridges cross different arms of the Danube; one is used only by the Csepel express line and is the only double-track bridge; three others are also road bridges (the total length of these bridges is 628 m).

Of the seven railway bridges over the Tisza, only one (at Szolnok) is double-track and two others are also road bridges. The total length of these bridges is 1 243 m.

On all the bridges used by both road and rail traffic over the Danube and the Tisza, and on the northern rail bridge in Budapest, trains are limited to 10 km/h. On most of these bridges, maintenance, and in particular protection against corrosion, is not properly carried out. Moreover, in most cases the arches are too narrow and too low for navigation by sea-going craft.

The major investment projects to be implemented in the rail sector in the near future are as follows:

- construction of the connection (22 km of new track in Hungary) between Hungary and Slovenia as part of Transport Corridor V;
- increase in the length of electrified track (some 245 km);
- development of communications centres (Hungary is to gradually develop nine centres).

The second project is in preparation; the aim is to relocate the combined transport terminals in the centre of Budapest to the outskirts.

Technical obsolescence and the poor state of installations also concern the sidings and marshalling yards. The situation seems quite serious throughout the network: inadequate rail loading capacity, too short tracks, unsuitable safety equipment, few lines permitting simultaneous movements, little or no mechanisation, old and damaged tracks. The rolling stock maintenance sheds are also in a dilapidated state. Station facilities have remained at the standard of 50 years ago. Lastly, the telecommunications system also needs upgrading.

Road transport

The heavily travelled sections of international routes had average traffic volumes in 1990 of just over 10 000 to just under 19 000 vehicle-equivalent units a day, corresponding to an average capacity utilisation rate of 85 per cent (see the annex map). In 1990, the most heavily travelled section (18 900 vehicle-equivalent units, 114 per cent capacity utilisation) was a relatively short stretch to the north of Budapest, between the capital and Vac, close to the border with Slovakia. Another section parallels the M3 extension project, as does the route, further south, heading to Ukraine, which is also partly overloaded. In the tourist region of Lake Belaton, the route of another motorway project (M7), is also cited among the saturated sections. To the north and parallel with this route, difficulties are reported in the direction of the Austrian border.

Despite significant, and at the time adequate, development between 1970 and 1980, the quality of the roads is not up to the standards required by the increasing traffic. Road surfacing was the first to suffer from cuts in the resources allocated to road maintenance and development in the 1990s. The deterioration of the roads is leading, as with the railways, to various problems: more congestion, increasing fuel consumption, wasted time, pollution, accidents, rising maintenance costs.

The shortcomings of the trunk road network, already reported as the most worrying in the mid-1980s, range from capacity problems on two-lane roads (saturated over 440 km) and the many level crossings, to the need to build cycle paths or to upgrade almost 4 000 bridges because of their inadequate carrying capacity. Over a length of 12 000 km, the trunk road network seems to have an inadequate capacity and surfaces that are incompatible with road safety. Lastly, on the international routes classified E in Hungary, 1 400 km do not meet the standards required by the agreements.

The overall structure of the Hungarian road network suffers from the small number of bridges over the Danube and the Tisza and by the lack of quality roads linking the major towns and regions. Like the rail network, the road network is considered to be too much centred on Budapest.

There are few places where the roads are configured to separate traffic according to vehicle speed or category or according to whether it is local or transit traffic. Few towns have bypasses.

The density of the national road network is 320 km/1 000 km², which is low compared with the average for European countries (557 km/1 000 km²).

The Hungarian road network has over 11 000 bridges, but half have neither adequate loading capacity nor sufficient width, so that certain vehicles must often make long detours. A large proportion of these bridges are old, in poor repair and inadequately protected against corrosion.

Question 4: Measures

The primary aim of the transport sector investment projects in Hungary is the upgrading and reconstruction of infrastructure and equipment. However, Hungary's transport policy is also aimed at ensuring that the transport system develops favourably with respect to criteria such as network capacities, environmental protection and energy consumption.

In Hungary's present situation, this means maintaining or even developing public transport (rail, bus, urban transport), despite the growing number of private cars. The general transport policy thus conceived takes account of the consequences of this growth.

No measures to limit passenger transport demand are envisaged at present:

- in domestic traffic, because no growth is expected for the moment;
- in international traffic, because it corresponds to the political and economic objectives of opening up the country and is an important source of revenue.

However, certain restrictions on car traffic are envisaged for town centres that are already saturated.

In the freight sector, the planned modernisation of the structure of production in Hungary will probably affect growth of the volume of transport services supplying local demand, which will increase significantly. Transit traffic will no doubt increase significantly and will then receive particular attention.

Among the other actions concerning this sector, institutional and regulatory changes permit the introduction of market mechanisms: change of status of certain transport enterprises, recourse to the concession system. Regulations having any kind of impact on the investment of private capital have been prepared and the most important have taken the form of laws. These changes will also lead to changes in demand.

IRELAND

Area: 69 000 km^2
Population: 3 600 000

Question 1: Future trends in passenger and freight traffic

Ireland is an island among islands, as the Irish say, and for this reason, is increasingly dependent on its ports and airports for trade. Inland freight and passenger transport uses the road system. However, Ireland has not provided much data on modal split, and the forecasts in documents on transport policy only cover air and sea traffic, apparently the only kinds to be taken into account for planning investment in infrastructure.

Road traffic

Road transport is the dominant mode for domestic passenger and freight traffic, except in certain corridors or for certain freight flows.

Freight traffic

Road freight traffic represents 89 per cent of total freight traffic in Ireland.

Trends in road freight traffic, 1989-92

	Million tonnes	Annual change (%)	Million t-km	Annual change (%)
1989	83.50	+1.3	5 478.7	+9.5
1990	81.10	-2.9	5 776.0	+5.4
1991	80.10	-1.2	5 138.0	-11.0
1992	83.85	+4.7	5 150.0	+0.2

Numbers of commercial vehicles (over 8 tonnes), 1989-93

	Thousand vehicles	Annual change (%)
1989	130 020	+9.5
1990	143 166	+10.1
1991	148 331	+3.6
1992	144 798	-2.4
1993	135 225	-6.6
% 93/89		+15.2

Passenger transport

Public and private road transport covers 96 per cent of domestic passenger flows.

Mobility of commercial and private vehicles and numbers of private vehicles, 1989-93
Million vehicle-km and numbers

	Vehicles-km (millions)	Annual change (%)	Private vehicles (thousands)	Annual change (%)
1989	23 684	+8.4	773 396	+3.2
1990	24 896	+5.1	796 408	+3.0
1991	25 255	+1.4	836 583	+5.0
1992	26 270	+4.0	858 498	+2.6
1993	27 350	+4.1	891 027	+3.8
% 93/89		+15.5	% 93/89	+15.2

Road transport by bus, 1989-93

	1989	1990	1991	1992	1993	% 93/89
Thousands of trips	224 525	231 280	237 318	240 896	231 773	
Annual change (%)	-0.7	+3.0	+2.6	+1.5	-3.8	+4

Rail traffic

Freight transport

Freight traffic stood at 570 million tonne-km in 1994, 1 per cent down on the previous year (ECMT figures).

Trends in rail freight traffic, 1989-93

	1989	1990	1991	1992	1993	% 93/89
Million tonnes	3 067	3 278	3 312	3 333	3 061	
Annual change (%)	-	+6.9	+1.0	+0.6	-8.16	-0.2
Million tonne-km	555.94	588.55	602.58	633.26	574.56	+3.35

Passenger transport

Passenger traffic stood at 1.26 billion passenger-km in 1994, 1 per cent down on the previous year (ECMT figures).

Trends in passenger rail traffic, 1989-93

	1989	1990	1991	1992	1993	% 93/89
Thousand trips	26 309	26 767	26 837	25 837	26 143	
Annual change (%)	+3.2	+1.7	+0.3	-3.7	+1.18	-0.6

However, the planned investment in this mode should result in a significant rise in passenger traffic, from 7.9 million passengers in 1993 to 8.7 million in 1999.

Air traffic

Air transport accounts for 75 per cent of the total traffic in and out of Ireland.

Trends in air traffic in international and domestic airports, 1989-93

	International traffic		Domestic traffic	
	Million passengers	Annual change (%)	Thousand passengers	Annual change (%)
1989	7.20	+13.0	413	+49.0
1990	7.85	+9.0	484	+17.2
1991	7.47	-5.0	371	-23.3
1992	8.16	+9.2	273	-25.0
1993	8.37	+2.6	236	-13.6
% variation 1993/89		+16.3		-42.9

The benefits of the infrastructure development work planned in the Operational Programme for Transport (OPT) are expected to include a considerable rise in traffic in the period 1994-99. Passenger traffic at Dublin airport is expected to increase by 6 per cent a year and at Cork and Shannon airports by 4 per cent. Freight traffic should rise by 6 per cent a year over the same period at these three airports.

Freight and passenger traffic forecasts at the international airports

	Passenger traffic (millions)			Freight traffic (tonnes)		
Airport	1993 (actual traffic)	1996 (forecasts)	1999 (forecasts)	1993 (actual traffic)	1996 (forecasts)	1999 (forecasts)
Dublin	5.94	7.19	8.16	65 290	77 050	91 750
Shannon	1.71	1.70	1.89	26 310	26 050	31 100
Cork	0.72	0.79	0.88	2 500	2 550	3 000
Total	8.37	9.68	10.93	94 100	105 650	125 850

Maritime traffic

Maritime transport is still the main mode of transport for freight traffic in and out of Ireland, except in the case of light freight or goods with high added value.

Irish ports handle 76 per cent of Ireland’s total volume of commercial trade, but only 60 per cent of exports by value.

Freight traffic in international commercial ports and in local ports, 1989-93

	Commercial ports		Local ports	
	Million tonnes	Annual change (%)	Million tonnes	Annual change (%)
1989	13.50	+6.0	11.40	-
1990	14.37	+6.4	11.70	+2.6
1991	14.29	-0.6	11.95	+2.1
1992	14.57	+2.0	12.51	+4.7
1993	15.80	+8.4	12.56	+0.4
% variation 1993/89		+17.03		+10.2

The port development measures planned in the OPT should enable the commercial ports to increase their volume of activity. The total freight tonnage handled in the ports should increase by 11.3 million tonnes by the end of the year 2000. The increase in traffic will be split as follows:

Mode	1993 forecasts (million tonnes)	Increase forecast by 2000
Ro/Ro	2.91	+1.48
Lo/Lo	3.43	+1.41
Bulk	20.87	+8.30
Total	27.21	+11.19

According to these forecasts, traffic is set to rise by 75 000 Ro/Ro units and 94 000 Lo/Lo units. The Irish authorities also predict 5 per cent annual growth in passenger traffic. Some of these measures will also reduce maritime and port costs by at least 15 per cent (in real terms).

Question 2: Present situation as regards infrastructure and projects for investment

Following the 1989-93 Operational Programme on Peripherality (OPP), Ireland’s new development plan for the period 1994-99 is the OPT.

Review of OPP

The impact of the OPP on the economy and on transport has been very positive. For a total investment of £990 million, 9 000 stable jobs are expected to be created and GDP to rise by 0.4 per cent.

Through these investments, 450 km of primary roads have also been upgraded, as well as 1 700 km of roads on routes along which there has been high growth in industry and tourism. There has also been heavy investment in the international and domestic airports and this could increase traffic. Likewise, the new facilities at the ports of Dublin, Cork, Waterford and Rosslare (and also in some local ports) should lead to a sharp rise in passenger and freight transport.

With regard to rail transport, there has been an improvement in traffic conditions, notably with the start of the Dublin-Belfast project, the resumption of work on Dublin’s suburban west lines and the granting of subsidies for freight services.

The new OPT investment programme

The programme has four main aims:

- to increase the emphasis on public transport;
- to pursue the development of primary national network roads, but as a lower priority;
- to pay greater attention to “non-national” (local network) roads;
- to continue investing in the international ports and airports.

The planned initiatives are split into two sub-programmes, National Economic Development and Sub-regional Economic Development.

- The first covers investment plans for infrastructure and facilities in the transport sectors that the Irish authorities consider to be strategic, i.e. mainly the national road network, main railway lines, commercial ports and international airports.

- The second concerns the investment required in transport infrastructure and equipment at sub-regional level and in the priority municipalities. This mainly involves the "non-national" road network, regional ports and the Dublin Transport Initiative.

Descriptions of existing infrastructures

Road network

The infrastructure investment programmes examine road infrastructures from three angles: type of road, population served and commercial and industrial activities in the region.

- First are the primary national roads, linking ports, airports, main towns and highly populated regions. They only represent 3 per cent of the total network in length, but they carry 26 per cent of total traffic.
- The secondary national roads link medium-sized towns and less densely populated regions to the primary network, thus providing a network spread more evenly across the country. Their total length is exactly the same as the primary network (3 per cent of the total length of the network), but they carry only 12 per cent of total traffic.
- The other roads form the "non-national" network. These are the regional roads, county roads and urban roads, which form an extensive network that is 94 per cent of the total length of the network (county roads account for 80 per cent). The areas served are sparsely populated, and total traffic on these roads hardly exceeds 60 per cent.

Rail network

There are 2 000 km of lines, only 520 km of which are double track. Only 40 km of suburban lines are presently electrified. Despite this, the Irish authorities consider that rail transport has an important public service role to play in linking populations. There are direct train services to the four main towns (Dublin, Cork, Limerick, Galway) from 38 of the 53 towns with 5 000 or more inhabitants and 49 of the 99 towns with 2 000 or more inhabitants.

The rail freight terminals are located in strategic areas (heavily industrialised or close to commercial ports and international airports). There are also 14 combined transport terminals, including one in Belfast.

The Irish rail network is highly standardised in terms of rail gauge throughout the Republic of Ireland and Northern Ireland.

OPT investment plans

Total planned investment represents ECU 1.406 billion, of which 0.827 billion for the National Economic Development sub-programme and 0.578 billion for the Sub-regional Economic

Development sub-programme. The distribution of funds within each of these sub-programmes is shown on the table below in MECU.

Measures	National economic development	Measures	Sub-regional development
Primary national roads	496.510	Non-national roads	278.100
Secondary national roads	131.990	Dublin Transport Initiative	279.160
Main railway lines	72.450	Regional ports	21.020
International airports	47.780	Total	578.280
Commercial ports	72.190		
Technical assistance	7.030		
Total	827.950		

Road infrastructure

The new investment programme for the primary network focuses on four corridors:

- the north/south corridor, including Euroroutes E01 and E30 and national roads N1, N11, and N25;
- the south/west corridor, including Euroroutes E20 and E201 and national roads N7, N8, N18 and N19;
- the east/west corridor, corresponding to national roads N4, N6 and N16;
- the west corridor, corresponding to national roads N17, N18, N24 and N25.

The Annex at the end of the report gives a breakdown of the planned investment in primary national roads.

The work planned on the secondary network concerns a small number of roads considered to be the most important for the country’s economic development.

Firstly, it concerns sections of roads connected to the four corridors or to primary national roads and therefore two sections of the national roads N52 and N80.

It is also planned to upgrade:

- the N56 which serves the major fisheries of the port of Killybegs;
- the section of the N59 between Galway and Clifden which serves an important tourist area;
- the N61 between Athlone and Boyle;
- the N69 between Limerick and Foynes, which offers access to strategic ports on the estuary of the Shannon river;
- the N70, Ireland’s main tourist route;
- the N71 between Cork and Killarney, a major route for tourism and for the economic development of the western suburbs of Cork;
- the N76 between Kilkenny and Clonmel.

The same type of improvements are planned on both the primary and secondary national roads: widening, realignment and reconstruction of sections in poor repair. It is also planned to upgrade the drainage and surfacing on some roads, provide bypasses and improve safety by installing certain equipment, etc.

Rail infrastructure

The four types of work that are planned should significantly improve the efficiency of the lines and the quality of the service offered to passengers:

- Repairing the track: timber sleepers will be replaced by the more modern and cost-effective concrete sleepers on more than 650 km of track.
- Renovating the infrastructure: the focus will be on raising a number of bridges, including those on the Dublin-Belfast line, to allow containers to be carried on the entire railway network.
- Modernising the signalling system: the present signalling system will be replaced by a more modern system with electronic and radio centralised traffic control. The new system will be installed on more than 500 km of track and will greatly improve safety and profitability.
- Replacing rolling stock: the introduction of modern electric and diesel rolling stock will provide a greater traction capacity with lower operating costs and greater reliability with less energy consumption: 30 of the 126 locomotive in the fleet will be replaced.

All these measures will improve rail services overall, particularly by cutting running times, as shown by the forecasts below.

Improvement in rail services to and from Dublin

Station (km from Dublin)	Time saved in minutes (year)	Estimated journey time
Belfast (183)	20 (1996)	01:35
Sligo (218)	30 (1999)	02:45
Waterford (180)	25 (1998)	01:50
Cork (266)	15 (1996)	02:15
Tralee (333)	20 (1999)	03:15
Limerick (208)	10 (1996)	01:50
Galway (209)	15 (1998)	02:15
Rosslare (167)	10 (1999)	02:35
Westport (264)	10 (1999)	03:10

Question 3: Capacity problems
and
Question 4: Measures

The operational programmes OPP and OPT aim to eliminate road and rail congestion problems, facilitate interconnection between modes, try to ensure a regional balance, improve road safety and encourage a modal split in favour of public transport (thereby reducing the problems of pollution).

Consequently, the authorities are exploring various scenarios in order to identify the most appropriate ways of improving the national situation. Hence the adoption of the Dublin Transport Initiative (DTI), as the figures showed that it would ultimately generate more benefits than another plan.

Expected benefits from applying the DTI

Percentage change

	Peak hours in 2001	Off-peak hours in 2001	Peak hours in 2011	Off-peak hours in 2011
Trips in area studied:				
- car trips	-8	-4	-8	-4
- public transport trips	+17	+9	+20	+13
Trips in central Dublin:				
- car trips	-23	-8	-23	-8
- public transport trips	+30	+20	+34	+27
Public transport modal split:				
- in areas studied	33/39	28/31	29/35	23/26
- in central Dublin	44/57	29/34	41/55	24/30
Congestion	-9	+10	-18	+8
Accessibility:				
- central Dublin	+18	+33	+21	+17
- area studied	+14	+10	+15	+9
Accidents	-10	-5	-11	-6
Pollution:				
- HC	-37	-17	-37	-20
- NO_x	-1	+4	-2	+3
- CO	-6	+2	-10	+4
- $C0_2$	-5	+6	-11	+4
Energy consumption	-4	-1	-4	-1

Annex

Indicative Projects: National Primary Roads

Selection of major improvement projects planned to begin and/or be completed in the period 1994-99

	Actual position	Length	Estimated date of construction	Estimated cost
N 1 DUBLIN/DUNDALK/BORDER				
Dunleer-Dundalk (Louth) Provision of a new motorway, together with a link road to the N2 south of Ardee	Motorway scheme	16 km	1996 - 2001	£64 m
Balbriggan Bypass (Dublin) New motorway by pass of Balbriggan from the Five Roads to Gormanstown	Motorway scheme approved	11.5 km	1995 - 1998	£36 m
N 1 /N 11 /M50 DUBLIN RING ROAD				
Southern Cross Route (Dun Laoghaire Rathdown) Mainly new motorway from the N11 to the N81 (Western Parkway)	Motorway scheme approved. Start delayed pending outcome of High Court action on motorways theme.	12.5 km	1995 - 1999	£61 m
South Eastern Motorway **(Dun Laoghaire Rathdown)** Final link in the Dublin Ring Road. New dual carriageway motorway from Sandyford to the N ll at Shankill	Preliminary design	9 km	1998 - 2000	£44 m
Northern Cross Route (Fingal) New dual carriageway motorway from the N3 to the Nl	Under construction	9.8 km	- 1996	£58 m
Northern Cross Route Extension (Fingal) New single carriageway from the Nl to the Malahide Road	In planning	3.4 km	1995-1997	£7 m
N2 DUBLIN/MONAGHAN/BORDER				
North Road, Finglas (Dublin) Extension of the existing dual carriageway from Mellowes Road to the Dublin Ring Road	Under construction	1.8 km	1994 - 1995	£10 m
Broomfield/Castleblayney Single carriageway realignment of the existing road from Broomfield to Castleblayney	Under construction	6.2 km	- 1995	£7 m
N3 DUBLIN/CAVAN				
Cavan Bypass Bypass of Cavan town from Tullytoe to north of Butlers Bridge	Preliminary design	9.5 km	1997-1999	£7.5 m

N4 DUBLIN/SLIGO				
Lucan/Kilcock (Kildare) Provision of new dual carriageway motorway from the Lucan Bypass to west of Kilcock	Under construction	17.6 km	- 1995	£61 m
Curlews (Roscommon and Sligo) Single carriageway from east of Boyle to south of Castelbaldwin	CPO made	16.5 km	1996- 1999	£16.6 m
Colleoney/Sligo Stage 2 (Sligo) New dual carriageway from the N17/N4 Collooney Bypass to Carraroe	CPO approved	8.8 km	1994 - 1997	£23 m
Drumsna/Jamestown (Leitrim) Single carriageway bypass of Drumsna and Jamestown	Under construction	7.2 km	1994- 1996	£8 m
Longford Bypass (Longford) New single carriageway from the Dublin Road to the Sligo Road	Under construction	5.4 km	- 1994	£7.4 m
N5 LONGFORD/CASTLEBAR				
Swinford Bypass (Mayo) Single carriageway bypass of Swinford from Lisackagh to Cloonlara	Under construction	6.6 km	- 1994	£8.7 m
N6 KINNEGAD/GALWAY				
Eastern Approach Road Stage 3 (Galway) Merlin Park - Ballybane dual carriageway, remaining link of the Oranmore - Galway Eastern Approach Road	CPO approved	2.3 km	1995 - 1996	£6 m
Loughrea Bypass (Galway) Bypass to the north of the town of Loughrea	Preliminary design	3.7 km	1996 - 1998	£6 m
N7 DUBLIN/LIMERICK				
Nenagh Bypass (Tipperary NR) New single carriageway from Five Alley on the Limerick side of Nenagh to west of Lissanisky Cross on the Dublin side and a link road from the NS2 at Carty's Cross to the existing N7 on the Limerick side of Nenagh	Preliminary design	16 km	1995 - 1998	£18 m
Newbridge Bypass/Kilcullen Link (Kildare) Motorway bypass of Newbridge joining the Naas Bypass to the Curragh dual carriageway and motorway bypass of Kilcullen from Newbridge Bypass to the N9 south of Kilcullen	Under construction*	18.5 km	- 1994	£63 m
Roscrea Bypass Stage 2 (Tipperary NR) Construction of new single carriageway bypass of Roscrea from the completed Stage I (at the roundabout on the Templemore Road - N62) to the N7 at Racket Hall	Under construction	2.4 km	- 1995	£6.5 m

* Newbridge By Pass has been officially opened (1993) and the Kilcullen Link is due for completion in 1994.

Naas Road Interchanges (Kildare and Dublin) **(a)** Provision of an underpass at Johnstown junction and an overpass it Kill junction to cater for traffic movements at these locations **(b)** Provision of an overpass at Rathcoole/ Saggart to cater for traffic movements off N7	CPO made CPO approved		1995 - 1996	£13 m
Kildare Bypass (Kildare) Motorway bypass of Kildare Town	Motorway scheme made	12 km	1995 - 1999	£45 m
Portlaoise Bypass (Laois) New motorway from the Dublin Road (N7) at the Heath to the Limerick Road (N7) at Clonboyne and intersecting the Cork Road (N8) at Togher	Under construction	14 km	- 1997	£44 m
N8 PORTLOISE/CORK				
Southern Ring Road (Cork) New dual carriageway from Rochestown Road via Douglas to the Kinsale Road and extending to the N71 at Bishopstown	Under construction/ partly completed	8 km	-1995	£41 m
Downstream Crossing (Cork) New tunnel beneath the River Lee connecting the existing road network on the north side of the river via the Dunkettle Roundabout to the road network on the south via the Southern Ring Road	At tender stage	-	1995-1999	£86 m
N9 NAAS/WATERFORD				
Bolton Hill (Kildare) Improvement between Kilcullen and Carlow at Bolton Hill	Under construction	4.1 km	- 1995	£4.5 m
N 11 DUBLIN/WEXFORD				
Arklow Bypass (Wicklow) New dual carriageway bypass of Arklow	CPO approved	12 km	1995 - 1998	£39 m
Enniscorthy/Wexford (Wexford) Single carriageway realignment between Enniscorthy and Wexford	Under construction	8.3 km	- 1994	£7.3 m
Kilmacanogue - Glen of the Dowas (Wicklow) New dual carriageway and associated interchange roads connecting existing dual carriageways at Glen of the Downs and Glencormac	Preliminary design	6 km	1996 -1999	£17.5 m
N15 SLIGO/DONEGAL				
Donagal Bypass (Donegal) Single carriageway bypass of Donegal Town	CPO made	8.3 km	1996 - 1999	£12 m
N18 LIMERICK/GALWAY				
Setright's Cross (Clare) Provision of a grade-separated interchange comprising a bridge over the existing dual carriageway and 1 km of ancillary roads	Under construction	-	- 1994	£5.4 m

N20 CORK/LIMERICK				
Patrickswell/Limerick (Limerick) 10.9 km of new dual carriageway and 3 km of single carriageway from Childers Road to the Lantern Lodge plus 3.2 km of associated single carriageway ancillary roads	Preliminary design	13.9 km	1996 -1999	£34.2 m
CorklMallow Stage 2 (Cork) l0 km of single and 5 km of dual carriageway linking Commons Road in Cork City and Rathduff via Blarney	Under construction	I5 km	- 1995	£510 m
Blackpool Bypass Stage 2 (Cork) New four lane link between the improved Leitrim Street, via the Northern Ring Road and the Pole Field, to the Mallow Road	CPO approved	2 km	1997 - 2000	£15 m
N2 I LIMERICK/TRALEE				
Castleisland/Ballycarthy/Tralee (Kerry) Improvements between Castlelsland and Tralee, including a new dual carriageway between Ballycarthy and Tralee	Preliminary design	ll.5 km	1996 -1999	£21.3 m
N22 CORK/KILLARNEY/TRALEE				
Minish/Clonkeen(Kerry) New single carriageway on a new alignment from the junction with the N72 at Lissyvigeen to connect with the completed road at Curraglass	Under construction	10 km	- 1997	£15.5 m
Sliabh Riach (Cork) Realignment of roadway from Ballyvourney to the Kerry County boundary	Under construction	6 km	- 1996	£8.4 m
N24 LIMERICK/CAHIR/WATERFORD				
Clonmel Relief Road Stage 2 (Tipperary SR) Single carriageway completion of an inner bypass of Clonmel linking the completed Stage I to the N24 east and west of the town	Under construction	8.5 km	- 1996	£9 m
Piltown/Fiddown (Kilkenny) Road realignment bypassing Piltown and Fiddown	Preliminary design	7.5 km	1996 - 1998	£8 m
New Ross/Wexford (Barntown) (Wexford) Realignment of 6.7 km of single carriageway between Harristown Little and Barntown and improvement of 1.5 km of single carriageway between Barntown and Ballindinas roundabout	CPO approved	8.2 km	1994 - 1996	£7.5 m
Dunkettle/Carrigtwohill (Cork) New dual carriageway from Dunkettle to the existing dual carriageway east of Carrigtwohill linking with the N8 Glanmire Bypass	Under construction	10.6 km	- 1997	£48.5 m

OTHER ROUTES				
Mulcon Valley (Cork) New single carriageway link road to Ringaskiddy Port from the Southern Ring Road	Under construction	3 km	- 1995	£8.3 m
Dublin Port Access Route (Dublin) Improved access to Dublin Port	Assessment of route options	n/a	1998- 2000	n/a

ITALY

Surface area: 294 000 km²
Population: 57 700 000

Italy's General Transport Plan (GTP), established in 1986, was updated in 1991 and approved in August 1992.

GDP rose by 3.2 per cent in 1995, following the general recovery in the Italian economy since 1994, with a positive GDP balance of 2.2 per cent overcompared with the previous year. The recovery began to be felt from the second half of 1993, owing to positive trends in international trade, the depreciation of the lira and the modernisation of the productive system.

The economic outlook for 1995 is generally positive, although international forecasts for 1996 predicted a Europe-wide cyclical downturn which would affect industrial production and exports and would therefore lead to slower growth. The latest OECD data indicate GDP growth of 2.8 per cent for Europe and 2.6 per cent for Italy.

For Italy, the main developments in 1995 were:

- strong growth in industrial output, up 5 per cent on 1994;
- a decline in domestic consumption from 1.7 to 0.5 per cent, despite a substantial increase in exports (up 10.5 % on 1994);
- a 10.8 per cent upswing in investment (double the 1994 figures);
- export-led growth (exports totalled 30 % of total industrial output).

To sum up, the Italian economy overall showed major disparities, with strong growth in the north and stagnation in the south.

Statistics supplied by ISTAT, the National Statistics Institute, show the importance of the transport sector to the Italian economy in terms of value added, investment and jobs.

- *In terms of value added:*
  Transport sector value added totalled Lit 96.17 billion in 1994, or 6.17 per cent in terms of GDP. It has increased steadily as a share of GDP over the past ten years, as it has in other countries of Europe where value added amounts on average to 6 per cent.
- *In terms of investment:*
  New trends have emerged in manufacturing industry capital expenditure, with investment rising in the transport sector from - 1.3 to + 8.1 per cent, and in the industrial machinery and industrial engineering sector from 6.79 to 12.7 per cent in response to renewed growth in demand for rolling stock (trains) and HGVs.

– *In terms of jobs:*
The number of jobs in the sector fell by 2.4 per cent, owing to rationalisation in the public transport sector.

Question 1: Future trends in passenger and freight traffic

The latest data on medium- and long-haul domestic traffic in the 1995 Transport Accounts confirm the growth trend in both freight and passenger traffic. The statistics also show the predominance of road transport, despite a slight decline in this mode's share of total freight traffic compared with rail. Road transport's share of freight traffic actually fell to 61.4 per cent, compared with 61.8 per cent in 1993. However, in absolute terms, the volume of freight carried by road is increasing steadily.

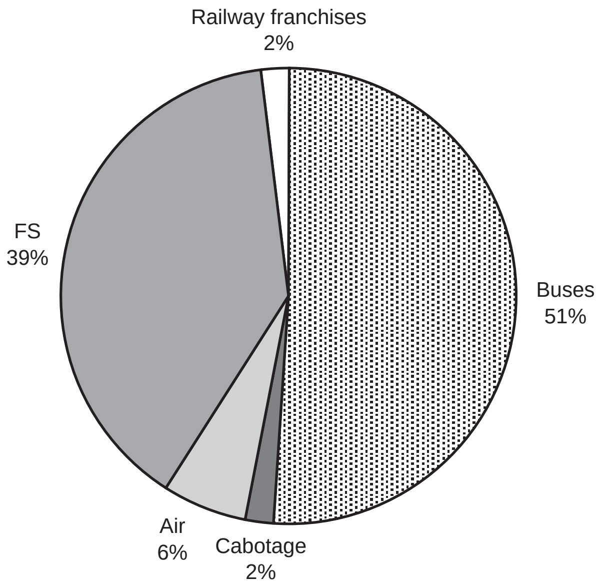
Passenger transport

The statistics for 1994 differentiate public and private passenger transport.

For intercity traffic, rail (intercity service) carries the largest share of public transport traffic. However, for intercity transport overall, the private car is still the main mode of transport and accounted for 70.5 per cent of traffic in passenger-kilometres in 1994.

Passenger transport has increased by 1.9 per cent between 1993 and 1994, all modes combined.

Figure 1. **Modal split in public passenger transport in 1994**



Source: ECMT.

Road traffic

Some 1 100 public passenger transport firms provide local service in Italy. In terms of numbers of passengers carried, their share of traffic declined by 7.2 per cent over the period 1990-93.

Between 1994 and 1995, overall road traffic increased by 3.5 per cent in terms of vehicle numbers. Light vehicle[1] traffic, on the other hand, increased by 39 per cent over the same period and is expected to increase by 10.1 per cent from the year 2000 to 2005, at an annual growth rate of 1.9 per cent.

Trends in medium- and long-haul domestic road transport
Million passenger-kilometres

	Buses	Private cars
1970	22 748	130 174
1980	37 436	202 530
1985	43 948	233 738
1990	56 111	275 869
1991	58 839	282 207
1992	61 227	289 687
1993	61 698	294 542
1994	64 122	300 140

Rail traffic

The share of traffic carried by rail franchises is negligible and concerns only inter-regional transport over distances of less than 50 km.

In 1994, express rail services increased their share, in terms of passenger-kilometres, by 3.8 per cent over 1993 figures. However, their share of passenger traffic had declined by 2.6 per cent between 1992 and 1993.

Rail mobility in 1994 has been calculated at 107.5 km/passenger.

Trends in domestic medium- and long haul rail traffic
Million passenger-kilometres

	FS	Rail franchises
1970	32 457	2 406
1980	39 587	3 356
1985	37 401	2 908
1990	45 513	2 780
1991	46 427	2 769
1992	48 361	2 786
1993	47 101	2 817
1994	48 900	2 880

The volume of traffic carried by the Italian national railways (FS) rose by 1.9 per cent over the period 1994-95. This increase in mobility appeared when FS became a joint-stock company pursuant to Law No. 42 of 1990.

Forecasts for FS traffic to the year 2000 were based on two “infrastructure-related” assumptions. The “high” capacity scenario assumes that new high-speed lines will be operational by the year 2004, the “low” capacity scenario assumes that they will not be.

Average annual growth in FS passenger services

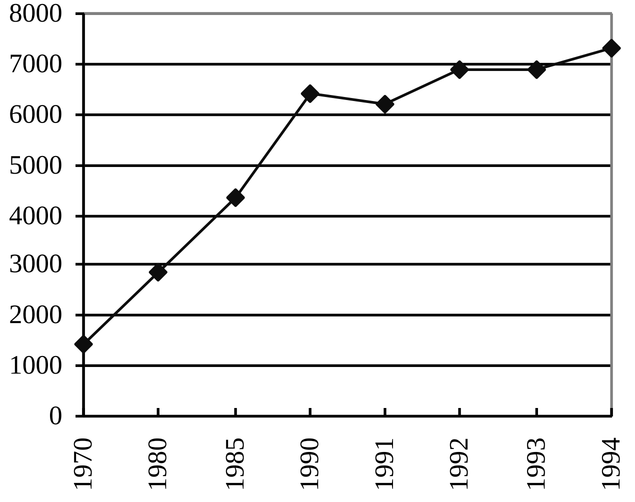
1990-1995	1.6 %
1996-2000	1 % (low capacity assumption)
2000-2004	4 % (high capacity assumption)

Air traffic

While domestic air traffic saw a slight downturn in 1994 (of 0.2 per cent compared with 1993), international air traffic increased by 5.5 per cent between 1994 and 1995. Overall, however, air transport is the mode that shows the highest growth: 67 per cent since 1985.

The trend is the same for air freight traffic.

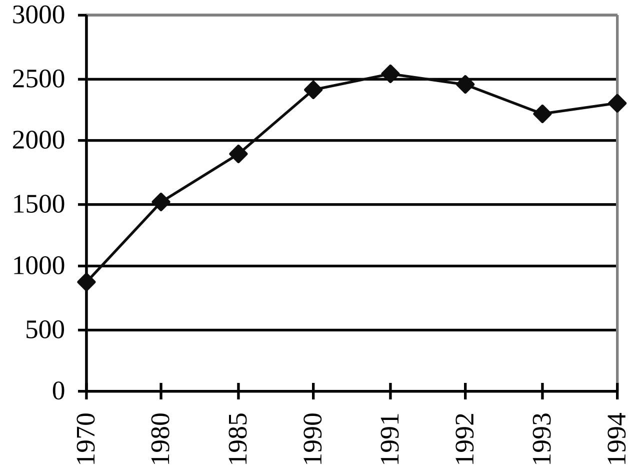
Figure 2. **Trends in domestic medium- and long-haul air traffic**
Millions of passenger-kilometres



Maritime traffic

Passenger transport by ferry is only significant locally. Ferries provide regular services to the Italian islands, particularly Sardinia. While the volume of traffic carried by national shipping lines fell by 10 per cent between 1994 and 1995, it increased by 20 per cent on international lines.

Figure 3. **Medium- and long-haul ferry traffic, 1970-94**
Millions of passenger-kilometres



Freight traffic

In 1994, freight traffic was 4.4 per cent higher than in the previous year. In volume terms, all modes saw an increase in traffic over the past few years, but only rail increased its market share.

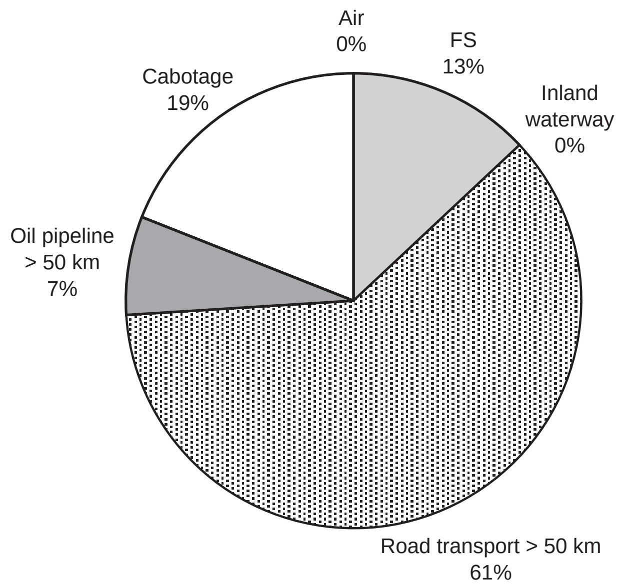
Although internal waterway traffic declined by half over the period 1970-90, a 50 per cent increase between 1992 (the worst year) and 1994 seems to indicate the beginnings of a recovery. With traffic totalling 98 million tonne-km, this mode's share of domestic transport overall (medium- and long-haul) is negligible (0.06 per cent).

The same can be said of air transport, which carried 24 million tonnes in 1994, or the equivalent of a market share of 0.01 per cent.

In terms of international traffic, the predominant flows in volume terms were import flows, at 270 million tonnes, compared with 90 million tonnes of exports in 1994. In terms of value, the reverse is true since, for all modes together, export flows were valued at Lit 305 million compared with Lit 270 million for import flows.

A quarter of the total volume of imports (56 per cent by value) comes from European Union member states. For intra-Community imports, Italy's main trading partners in 1993 were Germany, France, the United Kingdom and the Netherlands.

Figure 4. **Modal split in freight traffic in 1994**



Source: ECMT.

Modal split in import and export flows in 1993

Position	Value	Quantity
1st	road	sea
2nd	sea	road
3rd	rail	rail

The imbalance between the volume and value of imports from other European countries is attributable to the weak lira. For imports from the rest of the world, the situation is reversed: 75 per cent by volume and 44 per cent by value.

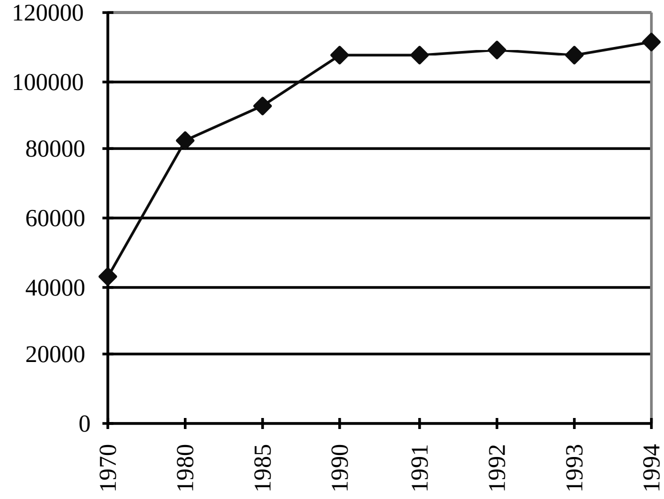
The main trading partners for exports were as above, with Spain replacing the Netherlands.

Road traffic

Domestic traffic is mainly composed of medium- and short-haul flows, according to a road freight traffic survey which demonstrated that the points of origin and destination of 71.8 per cent of flows were located in the same region.

Road's modal share in freight transport is virtually the same regardless of the region. As a result, unlike rail, road is used for freight movements equally frequently in all of Italy's regions.

Figure 5. **Road freight traffic trends since 1970**
Million tonne-km



International road traffic is more or less equally divided between imports (38.9 million tonnes) and exports (38.4 million tonnes). Road transport, which accounted for 43.57 per cent of the total volume of exports in 1993, is its only serious competitor (maritime transport accounts for 50.06 per cent of this traffic). Road's share in the total volume of imports is much smaller, at only 15.16 per cent.

From 1994 to 1995, HGV traffic on the national road network increased by 5.79 per cent. Forecasts for the period 1995-2000 estimate an increase in HGV traffic of 14.7 per cent, i.e. an annual growth rate of 2.8 per cent. These figures confirm the growth trend in this mode, although at a slower pace than in previous years.

Rail traffic

Forward studies have shown a strong correlation between freight mobility and GDP growth. An analysis of the data for the period 1994-95 confirms this. FS traffic increased by 11.6 per cent in terms of train-kilometres, 11.8 per cent in terms of tonne-km and 13.6 per cent in terms of tonnage carried. With a modal share of 12.57 per cent of traffic, FS strengthened its position on the freight transport market in 1994 compared with road transport.

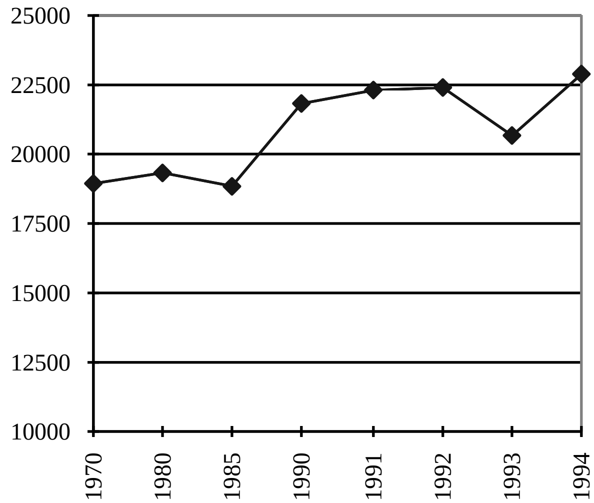
Overall, rail freight flows on the public rail network have increased steadily since 1980. Traffic grew by 30.7 per cent between 1980 and 1994, peaking at 39.3 per cent in the period 1985-94. In 1995, rail flows were again up a very substantial 12.3 per cent on 1994.

Domestic rail freight traffic in 1993 amounted to 21.9 million tonnes (statistics in accordance with European Directive EEC 1177/80), i.e. 31.9 per cent of the total volume of freight traffic. This represents a rise of 27.1 per cent since 1985.

Average annual growth in FS freight services

1990-1995	2.65 %
1996-2000	4.3 % (low capacity assumption)
2000-2004	9 % (high capacity assumption)

Figure 6. **Trends in freight traffic since 1970**
Million tonne-km



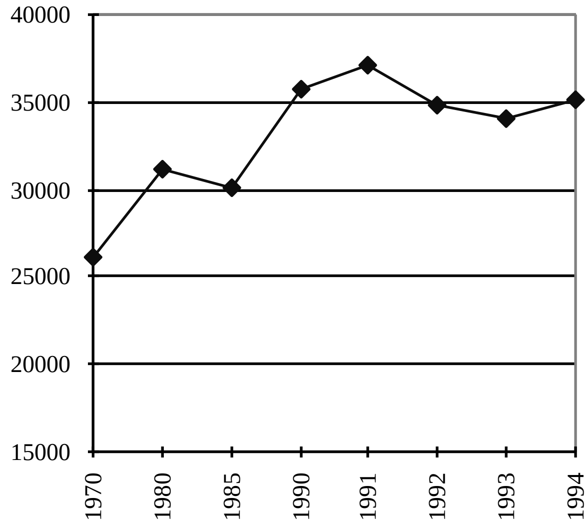
The bulk of rail freight traffic consists of import flows: 19 million tonnes, compared with 3.7 million tonnes of export products in 1993. Despite this, rail's share in the overall volume of import products was only 7.74 per cent in 1993 (4.25 per cent of total export flows).

Maritime transport

Maritime transport is the main mode for international freight traffic, whether import or export traffic. By volume, 67 per cent of international freight traffic flows are carried by maritime transport. Maritime transport's modal share has been increasing steadily for some time now despite 1993's slight decline in tonnage carried.

Domestic coastal navigation traffic rose by 5.7 per cent from 1994 to 1995, whereas international maritime freight traffic rose by only 1.7 per cent over the same period.

Figure 7. **Trends in freight traffic since 1970**
Million tonne-km



Imports		**Exports**	
- by volume, in millions of tonnes	174.20	- by volume, in millions of tonnes	44.10
- share of total volume (%)	67.75	- share of total volume (%)	50.06
- by value, in millions of lire	57.40	- by value, in millions of lire	58.60
- share in total value (%)	24.73	- share in total value (%)	22.15

Question 2: Present situation as regards infrastructure and investment projects

The broad outlines of the GTP suggest that maritime, rail and combined transport infrastructure projects would be priorities in any future plans.

The GTP, drawn up over the period 1984-86 and updated in 1991, provides strategic guidelines for national transport policy. Its main objective is to build an integrated intermodal transport system. In order to do so, it concentrates on two main areas:

– achieving a better balance between demand for rail and road transport;
– reorganising management and services in intermodal transport.

From an institutional standpoint, the aim is to set up a single supervisory framework to facilitate co-ordination of local authority investment programmes. From an operational standpoint, the plan proposes a fully integrated approach to intermodal transport, which is to be at the centre of economic development.

The plan was updated after a few years' experience with the basic programme. It is based on seven key points in the areas of land and sea transport.

– The development of multimodal corridors. The plan points out that more thorough planning of connections between corridors and networks and corridor links is necessary.

- Using port systems. Law No. 26/87 recognised the legal status of the port systems identified in the GTP, which have never been put into operation. It is therefore imperative to implement the project as provided in the GTP, especially since Italy has a long coastline and many problems with its ports.

- Priority for Alpine crossings. The updated GTP provides for setting national priorities. With this aim in view, current projects (the Brenner, Saint Gotthard, Simplon and Splügen projects) will be subject to an economic evaluation.

- Policy choices for rail transport. All aspects of rail transport must be developed:
  - its basic role as a public service provider, particularly urban and commuter services;
  - FS's basic role in intermodal transport must be further developed by ensuring a fairer modal split;
  - high-speed line development must proceed with particular attention to connections with the rest of the rail network.

- Continuance of the freight terminal ("*interporti*") policy. The revised plan confirms the earlier policy choices made as regards the siting of freight terminals and highlights the need to set up networks of such terminals.

- Implementation of the programme at urban level. Urban transport policy is based, according to the GTP, on the "integrated project" principle and on updating national financial structures for locally based enterprises.

- Full integration of southern Italy into the national transport system. Conventional and special initiatives (for southern Italy) should be integrated and complementary so that the south of Italy can be incorporated into the national transport system.

Two fundamental acts were passed to enable the implementation of the GTP:

1. Law 385/90 (transport provisions);
2. Law 186/91.

The new GTP transport programme

Italy's transport sector has recently undergone extensive restructuring in order to facilitate separate accounting for management and infrastructure services. This is a direct result of the Common Transport Policy defined in the European Commission White Paper.

The strategic aims of Italy's national transport policy are to:

- improve the quality and performance of the national transport system;
- integrate national markets with the TEN networks;
- create the necessary conditions for a free market based on the strict enforcement of framework legislation on competition as prescribed in European Union directives.

As regards transport system plans, Italy's programme is entirely consistent with European Community policy as defined in:

– Community guidelines for the development of trans-European transport networks (Community decisions concerning the master plan for the high speed, combined road/rail and multimodal transport networks);
– the new Council Regulation No. 2236 of 1995, which sets out general regulations for Community funding of trans-European networks.

As regards services management, Italy began a privatisation process in line with Community principles of free competition:

– Road and airport systems: ANAS and AAAVTAG have become public companies.
– Airports: companies have been set up with capital for services management and for infrastructure investment.
– Maritime sector: the sector has been reorganised and ports have been restructured by setting up ports authorities to organise and manage services.
– Rail transport: FS became a joint-stock company, links with government were severed and an injection of private capital was made to finance the infrastructure necessary for the construction of a high-speed network.

Details of the measures taken in sectors that are the Ministry's responsibility are discussed below.

Road infrastructure

Length of toll motorway network (Kilometres)

	2 lane	3 lane	Total
As at 31/12/1990	5 105.3	1 106.0	6 211.3
As at 31/10/1995	5 052.0	1 410.0	6 462.0
Annual variation	- 0.2 %	5.0 %	0.8 %

Source: Autostrade SpA.

Rail infrastructure

Rail transport investment programme

FS investment programme under the 1994-2000 Programme Contract (CdP)
Billion lire

Field	Tab. A	Tab. A1	Total A + A1
1995 interim project for high speed system 1bis	8 331	1 260 150	9 591 150
Maintenance fund for the railway system in general	2 388	2 650	5 038
International line	29	100	129
Technology and performance of railway system in general (urban, inter-city and international lines)	1 396	800	2 196
Unscheduled maintenance	1 891	974	2 865
Railway junctions	6 876	1 527	8 403
Track, doubling and renewal	9 439	4 989	14 428
Rolling stock (and ferries)	4 900	3 150	8 050
Previous year's balance and adjustments for previous contracts	3 500	0	3 500
Joint funding outstanding		750	750
Total	38 750	16 350	55 100

The sums in the column headed Tab. A are the amounts allocated to FS under the CdP of 29 December 1992. The sums in the column headed Tab. A1 are the additional sums allocated to the FS under budget legislation, Acts Nos. 538 of 24 December 1993 and 725 of 23 December 1994.

Question 3: Capacity problems

There appear to be congestion problems on the motorway network due to heavy HGV traffic on the north-south corridor through Italy. The problem could be alleviated, according to the Italian authorities, by transferring a large proportion of road freight traffic to coastal navigation services.

Road transport capacity problems

Peak traffic flows (weekend departures and return journeys) on some sections of motorway, 1995

Motorway	Section	No. of lanes	Direction	No. of vehicles
A1	Modena south-Allacc.A14	3	North	4 823
A1	Firenze north-Firenze Signa	2	South	3 285
A1	Asse Mediano (NA)-Allacc.A16	3	North	4 927
A4	Allacc.A8-Milano Cormano	3	East	6 106
A4	Capriate-Dalmine	3	East	5037
A8	Busto Arsizio-Castellanza	3	South	3688
A10	Genova Aeroporto-Geneva Pegli	2	West	3 021
A11	Pistoia-Montecatini	2	East	3 181
A12	Allac. A7-Genova east	2	East	2 913
A14	Interc. Casalecchio (BO)-Allacc.A13	2	North	3 539
A14	Imola-Interc.raccordo Ravenna	3	North	4 902
A14	Cattolica-Pesaro	2	South	2 601

Source: Autostrade SpA.

Question 4: Measures

Maritime transport

In the maritime transport sector, Law No. 84 of 1994 on the reform of port legislation introduced a number of important innovations. It redefines port categories, organisational levels, the division of responsibilities and management structures for private port services. Article 6 of the Law also lists the 18 ports in which port authorities have been set up with responsibility for:

- scheduling, co-ordinating, developing and inspecting port operations and other activities conducted under licence in port areas;
- handling operations in the public areas of the port;
- overseeing activities carried out in the public interest and paid for by port users.

Rail transport

In the rail sector, the most significant innovation was the transformation of FS into a joint-stock company under 1992 CIPE legislation and the Law of 12/8/1992 which authorised the Ministry to define the scope and procedures for letting franchises to the new company.

The new legal basis amended both substantive laws and the legal instruments governing relations between the State (which remains the majority owner of the rail company) and the company itself. In addition the new relations are governed by:

- a franchise instrument;
- a public service contract;
- a programme contract;
- EEC Directive No. 91/440 (on rail network interoperability);
- EEC Regulation No. 1107/69 et seq. concerning the public service obligation.

The franchise instrument, approved by a Ministry of Transport Decree (225T of 26/11/1993), sets out a new model for contractual relations between the State and FS in accordance with the Community Directive on the organisation, performance and liberalisation of the European railway system.

The public service contract establishes the State as the "purchaser" of services provided at its request by the rail company.

The programme contract sets out investment programmes for the development and restructuring of FS SpA and sets the amounts payable for operating infrastructure for which the State is responsible, in accordance with the provisions of the Directive.

To date, three programme contracts have been signed, the last voted by the CIPE on 23/6/1995. It sets out investment programmes and funding for the period 1994-2000.

The originality of this instrument lies in the relations it establishes between the State and the rail company, preserving both the public service element and the company's independence while allowing it to earn a commercial rate of return.

In the latest programme contract, the State increased its previous funding commitments. Moreover, it increased capital funding for the new company through the annual allocations provided for in budget legislation. This legislation is also necessary for updating the investment programme and identifying new sources of Community funding, such as the fund for Mezzogiorno and the Community Regional Development Fund.

Another innovation from a financial standpoint was funding for the development of a high-speed rail project.

In order to implement this project, FS SpA granted a franchise to TAV (*Treno Alta Velocità*), a company jointly owned by the Italian railways and major financial institutions in Italy and abroad for the design, construction and commercial operation of the new high-speed lines and infrastructure.

The 1993-95 programme contract provided for 60 per cent private funding for high-speed line projects, connections to the national railway network and rolling stock, the remaining 40 per cent plus interest on private capital to be financed by the State.

The latest programme contract, for the period 1994-2000, will confirm the methods of finance and will open the door to private capital in the form of partnerships compatible with the Community directive.

Short sea shipping in Italy

Maritime transport plays an extremely important role in the country's transport system. Over 60 per cent of Italy's import and export flows are carried by maritime transport and approximately 19.3 per cent of domestic freight is carried by maritime short sea shipping services. Short sea shipping is a fundamental part of the national transport system, which is structurally dependent on the organisation of international transport, the supply of port services and the type of goods traded.

The GTP and its 1991 revision points out that Italy's port system and those of other EU countries bordering the Mediterranean, play hardly any part in major traffic flows, which are now concentrated on the Atlantic sea routes of northern Europe and on developing countries in the East or on the Pacific Rim.

The GTP proposed to promote a general policy to reintegrate the Mediterranean ports into mainstream traffic flows through the Mediterranean.

This requires a dual development strategy: on the one hand, the modernisation of port services for ocean-going traffic and traffic handled by northern Europe's Atlantic ports and, on the other, the reorganisation of the port system through the implementation of operational plans and the reorganisation of domestic demand along a north-south route. The aim is to transfer some of Italy's overland traffic to short sea shipping services.

The plan identifies two traffic corridors, the Adriatic and the Tyrrhenian Sea (towards Corsica) corridors for north-south short sea shipping services. Together, these sea routes cover an area of approximately 1 000 km within which intermodal rail/sea services should be developed in order to readjust freight traffic demand and alleviate congestion on motorways.

Problems for implementing this policy

The problem that arises in developing short sea shipping services is how to make them competitive, in terms of efficiency and overhead costs, with freight services offered by rail and road hauliers. For this reason, new solutions that can contain the current crisis in the sector and promote the economic and commercial recovery of sea transport firms are necessary.

Over the past five years (1990-95) short sea shipping's share of traffic has remained relatively steady at around 35 billion tonne-km. However rail services have also picked up -- they now account for some 24 billion tonne-km -- while road transport has also increased its volume, to around 110 billion tonne-km. Overall, short sea shipping is now stable, with a market share of around 19 per cent compared with 12-13 per cent for rail and over 66 per cent for road transport.

Priority should be given to initiatives that will make short sea shipping better able to compete with domestic rail and road transport, but primarily to compete in the European Union's liberalised transport sector, as this will determine the terms of competition for Italy's maritime transport industry.

Among such initiatives the first priority should be buy-back policies, which tend to encourage capital investment in fleet modernisation. The aim is to optimise operating costs and reduce external costs, which are a burden on the management of the Italian fleet, and to improve the efficiency and productivity of this employment sector.

Lastly, with a view to maintaining maritime transport's market share, a co-ordinated policy should be developed at Community and international level to ensure that the liberalisation policy implemented for trans-European port networks and short sea shipping services does not work to the disadvantage of the Italian fleet. Maritime transport's share of the transport market in terms of freight import/export flows was formerly 24 per cent, the figure on which the GTP was based, but it is lower now.

For the major ports in the CIPE proposals, which are considered to be in the common interest of the Community, there are problems with accessibility, siting and inter-modal (rail, road and port) connections as well as the computerisation of services.

In accordance with European Union directives, short sea shipping services were liberalised in 1993, and, from 1999, ferry services operating between the Italian islands and mainland Europe will also be liberalised. For port systems, this will be a determining factor in the development of short sea shipping. With regard to infrastructure and the geographical distribution of ports, the system's potential capacity exceeds demand. It may also be reasonable to assume that maritime transport will increase in the future.

Measures being taken

The restructuring of the maritime sector began a few years ago, with the introduction of the new law (Law No. 84 of 1994) concerning the reform of legislation on ports. This new law organises all port activities in line with the objectives of the GTP and its 1991 update, with the current instruments of the GTP itself and the amendment to the regional transport plan. It is also a statutory instrument that enables the classification of ports both at an organisational level and as regards the division of responsibilities and management structures for port services.

The latest statutory instrument is Legislative Order No. 65 of 16/2/1996 on urgent measures in the ports and maritime sector, which contains provisions relating to staff management in the sector (including provisions on early retirement) and provides for the privatisation of groups operating in the sector. The legislative order also provides for port authorities constituted on 1/1/1995 to assume all the responsibilities attributed to them under Law No. 84 of 1994.

Still on the issue of maritime transport, and more particularly the issue of companies belonging to the FINMARE group operating in the international maritime transport sector, Legislative Order No. 98 of 1/4/1995 on urgent measures in the transport sector, as amended by Law No. 204 of 30/5/1995, provides in Article 3 for a special procedure for the privatisation of such companies and confirms that the State must provide the funds necessary for the recapitalisation of these undertakings.

In addition, as previously pointed out, Law No. 84 of 1994 instituted port authorities in 18 ports in order to make port services more efficient and more competitive in the context of the ongoing liberalisation of port services within the European Union.

Integrating Italy's ports with European infrastructure networks

Recent surveys by the European Commission (DG VII) estimate surplus capacity in western Mediterranean ports, the gateways to trans-European road and rail networks, at 30 to 40 per cent at present.

With the recent construction projects in the south of the country (Gioia Tauro and Cagliari) Italy's port system is contributing to this capacity surplus. This warrants the finalisation of a Community action plan to attract new traffic and strike a better balance with traffic through the Atlantic ports (Rotterdam, Antwerp and Hamburg).

At European level, this plan would seem to be vital to enable optimum use of the overall capacity of Community ports, with advantages in terms of general costs and the environment.

At national level, Italy is the origin or destination point of 80 per cent of the Community's transalpine rail and road traffic. In the Mediterranean Basin, maritime transport handles 69 per cent of trade flows. In Italy, much of the traffic goes through the Tyrrhenian ports, principally Genoa, which is a major terminal for freight from and to the whole of the Mediterranean (Gibraltar, Suez) and for freight from the Adriatic ports and the entire Mediterranean basin (Cagliari, Palermo, Syracuse, Catania, etc.). Further south, Gioia Tauro, which was recently opened to shipping, is a very important terminal for containerised traffic.

Italy's policy is aimed at providing links between its ports system and the trans-European networks:

- to the east, with the port of Trieste, the terminal for eastern European countries;
- to the south, with the port of Genoa, the Mediterranean terminal of the Tyrrhenian corridor to France and Spain;
- to the north, with the ports of the upper Adriatic and the Tyrrhenian Sea.

Given the foregoing, the national ports system, which is properly structured in terms of infrastructure capacity and transhipment facilities, could become a key factor in the development of trade.

The Mediterranean co-operation project

Transport Ministers met in Paris, Cannes, and Rabat (on 22 September 1995) to sign a milestone agreement on future Community funding for the extension of the trans-European networks to the Mediterranean. This agreement provides for the development of port systems and the integration of intermodal transport services. The objective is to facilitate trade by improving port infrastructure and services from an intermodal standpoint, by linking ports to land transport corridors, installing IT systems for traffic management (VTS) and for port information networks. The protocol to the agreement also provides for major legal and administrative measures for port management and for environmental protection.

The Italian authorities view this agreement as a means of developing their maritime coastal navigation services on a larger scale.

Note

1. Light vehicles include mopeds and two-axle vehicles with a ground-to-axle-clearance of 1.30 m or less. They are category “A” vehicles for toll purposes. Exempt and non-classified vehicles are also included in this category. Heavy vehicles include all two-axle vehicles with a ground-to-axle clearance of over 1.30 m (toll category “B” and all vehicles with three or more axles (toll categories “3”, “4” and “5”).

LATVIA

Area: 64 500 km²
Population: 2 513 469

Economic development in Latvia over the next few years has been estimated on the basis of GNP which, according to previous forecasts, was expected to drop by 10 per cent in the period leading up to 1998 and then increase by 33 per cent between 1998 and 2015. However, GNP stopped falling in 1994 and began to rise. Latvia encountered a number of difficulties in effecting its transition to a market economy, but now can point to some positive achievements:

- the remarkable stability of the lat (national currency) (1 US$ = 0.54 lat, September 1996);
- the reduction of inflation to an estimated 20 per cent in 1995;
- a balanced budget, which should be maintained in 1996 and 1997 (draft budget);
- a reduced level of imports;
- a quite moderate level of foreign debt, which is within the country's debt service capacity;
- unemployment, now stable at between 6 and 6.5 per cent.

Question 1: Future trends in passenger and freight traffic

The transport and communications sector's share in GDP has continuously increased and more than doubled between 1991 and 1994. This positive trend is also the result of a decline in the industrial and farming sectors. The volume of traffic, which has actually dropped considerably since independence, rose again, at least for freight traffic.

Latvia is a major transit zone (especially east-west). As the following table shows, transit traffic represents more than 75 per cent of total traffic, a share that is rising constantly. It represents more than 90 per cent of rail traffic.

Freight traffic in 1994
Thousand tonnes

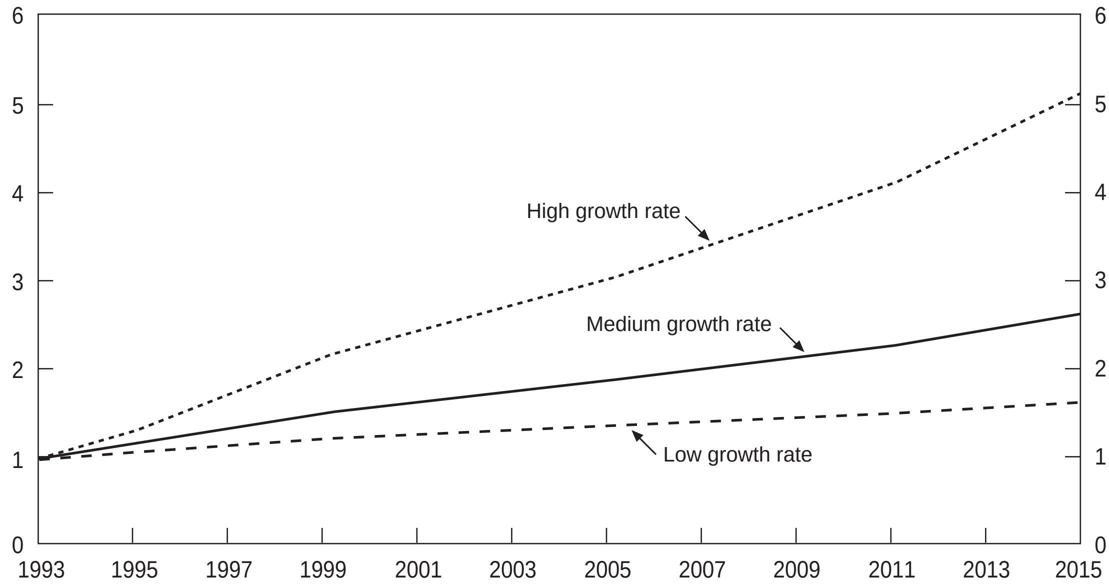
National traffic	7 989
Import traffic	4 498
Export traffic	5 158
Transit traffic	54 942
Total	72 587

Road transport

There was a significant drop in local traffic (passenger and freight) in the Baltic states between 1990 and 1994, in spite of the strong increase in car ownership.

The traffic forecasts are based on three growth scenarios for the national economy: low, high, and medium. The medium growth scenario is considered to be the most realistic.

Figure 1. **Projected traffic growth based on economic growth forecasts**
In percentage



Source: ECMT.

Passenger transport

The number of cars per thousand inhabitants is increasing rapidly, with between 4 000 and 5 000 new registrations per month in 1995. European cars make up more than half the number of cars in the fleet.

Development of car ownership, 1980-94
Per thousand inhabitants

	Car ownership
1980	65
1985	78
1990	97
1992	122
1994	152

According to car ownership forecasts drawn up before the system for registering vehicles changed, the number of cars per 1 000 inhabitants will be 285 by the year 2015 in the case of the minimum scenario and 395 in the case of the maximum scenario.

According to the medium scenario, by 2015 the number of cars per 1 000 inhabitants will have risen by 115 per cent to 326.

Motorised vehicle fleet, 1980-94

	1980	1985	1990	1992	1993	1994
Private cars	165 499	214 514	282 688	350 000	367 500	n.a.
Buses and coaches	9 380	10 587	12 138	12 700	11 600	14 160

The drop in the number of private cars may be explained by the changes made to the vehicle registration system and the fact that many old vehicles (including motorcycles) were scrapped. On average, private cars covered 7 000 km in 1992. Transport by private car, bus or coach totals 18 billion passenger-km per year.

As far as urban transport is concerned, bus and trolley traffic decreased sharply over the past few years. The number of public passengers decreased and car ownership increased (in particular in the region of Riga). The use of taxis is also less frequent, not because they are fewer but because they are now more expensive.

Many minibuses have been introduced and have a significant share in public transport. The number of passengers nevertheless decreased due to less frequent services. Buses are still as crowded but run less frequently. Transport by coaches is used less than in the past. To improve turnover, companies have reduced their services and some lines have been closed.

Public road transport trends, 1990-95
Millions

	1990	1991	1992	1993	1994	1995
Bus passengers	573.3	570.8	287.5	186.0	188.1	184.5
Trolley passengers	219.7	224.2	188.0	112.4	110.7	98.7
Total including taxis	881.3	808.2	479.3	301.0	300.9	n.a.

Freight traffic

According to vehicle counts carried out in 1992 on the Estonian section of the Via Baltica, heavy goods vehicles accounted for 55 per cent of all vehicles. Some 50 per cent of lorries weighed less than 4 tonnes, and only 8 per cent weighed more than 12 tonnes. Efficiency was poor, given that nearly 20 per cent of the lorries surveyed were empty.

Forecasts of the share of HGVs in the total vehicle fleet, 1995-2015

	1995	2000	2015
Lorries	11%	11%	12%
Semi-trailers	5%	5%	5%
Buses and coaches	6%	5%	3%

In 1990, road freight traffic in the Baltic states accounted for less than 20 per cent of the total number of tonne-km. Over the next 20 years, road freight is expected to quadruple, with 50 per cent of the present volume of rail traffic being transferred to the road and because the service provided by road vehicles is more suited to freight traffic between the Nordic countries and central and southern Europe.

Between 1990 and 1994, the volume of traffic in tonnes fell by a factor of ten and was accompanied by a decline of 76 per cent in the number of tonne-km. Average mileage per vehicle rose in 1994. On the basis of the available data, it is not possible to distinguish between road transport for hire and own-account road transport.

Freight traffic trends, 1990-1995

	1990	1991	1992	1993	1994	1995
Tonnes (thousands)	206 210	161 808	85 000	28 985	19 801	20 600
T-km (millions)	5 853	4 866	2 500	1 253	1 400	n.a.

In 1992, average daily traffic on the Tallinn-Vilnius route totalled 12 100 vehicles south of Riga and 1 800 near the Lithuanian border. Average daily traffic on the Riga-Kaliningrad route in 1992 totalled 6 600 vehicles South of Riga and 3 400 near the border with Lithuania.

According to forecasts prepared within the framework of the “Via Baltica” study, traffic on the main thoroughfares in Riga is expected to rise by 18 per cent between 1990 and 2000 and then by 86 per cent between 2000 and 2015. However, transit traffic on the “Via Baltica” rose by over 500 per cent between 1988 and 1992.

Air transport

Passenger traffic

The number of passengers travelling by air was quite high in the past (more than 2 million in 1990, due to Soviet tourism in Jurmala, on the Baltic coast); it fell to 211 000 in 1993 but increased to 490 000 in 1995. The main difference compared with the past is that nowadays passengers pay their tickets on the basis of international tariffs.

Passenger air traffic trends (Riga airport), 1990-95
Millions

	1990	1991	1992	1993	1994	1995
Passenger-km	3 357.0	2 999.0	450.0	211.0	271.0	n.a.
Passengers	2.2	1.9	0.4	0.2	0.2	0.5

Freight traffic

At present, the volume of goods transported is quite low, at around 4 000 tonnes, but could develop if Riga airport becomes a platform for distribution of air freight to the CIS (Kazakhstan, Armenia, Turkmenistan, etc.).

Freight air traffic trends, 1990-95

	1990	1991	1992	1993	1994	1995
T-km (millions)	22	18	3	7	9	n.a.
Tonnes (thousands)	15	11	3	3	3	4

Passenger and freight air traffic is expected to grow by approximately 13 per cent a year.

Rail transport

Passenger traffic

Passenger traffic has fallen sharply over the past few years, as much for urban and suburban traffic as for international traffic. There has, however, been no change in the average distance covered.

Examples of distance covered
Kilometres

Moscow - Riga	973
Moscow - Ventspils	1 144
Moscow - Liepaja	1 157
St Petersburg - Riga	687
St Petersburg - Ventspils	858
St Petersburg - Liepaja	871

Passenger rail traffic trends, 1990-95
Millions

	1990	1991	1992	1993	1994	1995
Passengers	144.5	90.7	83.1	59.6	55.6	44.5*
Passenger-km	5 366	3 930	3 656	2 359	1 794	1 373**

* Lithuania 15.2 and Estonia 8.8
** Lithuania 1 130 and Estonia 421

The volume of tramway traffic has not fallen as sharply as the volume of traffic by train:

	1990	1991	1992	1993	1994
Passengers	243.1	251.6	193.7	114.9	112.8

Freight traffic

The downturn which occurred in the years following independence has been stopped. There is renewed freight traffic by rail, mainly due to transit traffic on the east-west corridor.

Breakdown of freight traffic, 1994-95

	1994	1995
Domestic	3 389	3 545
Export	924	984
Import	3 206	2 854
Transit	20 277*	21 457**
Total	27 796	28 840

* *Of which 16 931 (83.5 %) towards ports.*
** *Of which 17 925 (83.5 %) towards ports.*

Freight rail traffic trends, 1990-96

	1990	1991	1992	1993	1994	1995	1996
Tonnes (thousands)	84 111	75 265	31 807	30 574	27 796	28 840	+19%
T-km (millions)	18 538	16 739	10 115	9 852	9 520	9 757*	+25%

* *Lithuania 7 686 and Estonia 3 610.*

For the first half of 1995, Latvian railways (LDZ) carried 14.02 million tonnes, or 4 846.8 million tonne-km, and 16.67 million tonnes, or 6 402.9 million tonne-km, for the first half of 1996.

Two shuttle trains have been in service since the beginning of 1996 between Riga and Moscow.

Maritime transport

Latvian ports mainly handle goods in transit to and from the CIS: 90 per cent of the goods that pass through the ports are transit goods. The three main ports are: Riga, which specialises in handling general commodities, containers, grain, and fish; Ventspils, which specialises in petroleum products; and Liepaja, which handles mainly timber and metals. Efficient links connect all three ports to the rail network.

Ventspils is the largest Latvian port and the largest oil-exporting port in the Baltic, with a total annual capacity of 42 million tonnes. Two pipelines link Ventspils to Russia, one for crude oil, the other for petroleum products.

In 1995, the volume of goods handled in the Latvian ports increased to 39 million tonnes. Forecasts are summarised in the following table:

Traffic forecasts, 1995-2010
Million tonnes

	1995 (actual)	2000	2005	2010
Ventspils	29.63	56	68.0	83.0
Total Latvia	38.92	71	87.5	106.4

Container traffic has developed considerably these last years, with 120 000 TEU in Riga in 1995.

Breakdown of traffic volume by port
Million tonnes

	Ventspils	Riga	Liepaja	Other ports	Total
1993	22.39	4.70	0.43	0.10	27.62
1994	27.72	5.95	1.10	0.20	34.97
1995	29.63	7.42	1.44	0.43	38.92
1996 (forecasts)	35.0	8.80	1.70	0.50	46.00

Maritime traffic trends
Million t-km

	1990	1991	1992	1993	1994
Total	61 620	47 335	30 560	36 577	42 198

Inland waterways

This mode of transport is little used at present. It may become more popular, however, if tourism expands as the government expects.

Inland waterways passenger trends
Million passenger-km

	1990	1991	1992	1993	1994
Passenger-km	12	5	1	0.4	

Question 2: Present situation as regards infrastructure and projects for investment

The main modes of domestic transport in Latvia are rail and road. However, it is important not to overlook maritime transport, which has a very large share in GDP. Air transport is mainly concerned with international passenger services.

There will be little change in the network of transport infrastructure in the period leading up to 2015. The only new routes will be ferry services from Riga to Karlskrona and Stockholm. However, the network will be improved, with roads upgraded to at least two lanes 9 m in width. In particular, the Riga-Jelgava section on the road linking Riga and Kaliningrad will be upgraded to four lanes, and work on the Jelgava bypass will be completed.

In April 1993, the European Community and the G24 Transport Group approved inclusion of the Via Baltica in the list of top priority transport corridors in the former Eastern Europe. The Via Baltica goes from Helsinki to Warsaw, via Tallinn, Riga and Kaunas. The project to improve the Via Baltica is scheduled to run until the year 2000. The cost of the present phase is $70 million. The project includes the construction of bypasses, the rehabilitation of bridges and surfacing, and the development of information systems for road users. Financial solutions involving toll sections or a concession are being considered.

Another project, already well along, is the construction of the Via Latgale from Riga to the Russian border (Teherova border crossing).

A request for a new pan-European corridor (rail and road) has been made (Helsinki Conference of Ministers in June 1997). It is an east-west corridor, from the Russian border (coming from Moscow) to Ventspils. This corridor is 460 km long and there is a branch from Belarus and two supplementary maritime terminals in Riga and Liepaja.

Present infrastructure situation

Road network

The road network comprises 20 688 km of national roads, including 8 368 km of primary roadways. The density of the network is 0.32 km/km^2; in addition, there are a great many country roads, totalling 39 000 km. The network has changed very little since the beginning of the decade. However, since the volume of passenger and freight traffic by road has fallen sharply since 1990, the construction of new roads has not been a priority.

Development of the road network, 1980-94

Thousand kilometres

Type of road	1980	1990	1991	1992	1993	1994
National roads	20.1	20.6	20.6	20.6	20.6	20.6
of which paved roads	*15.7*	*18.8*	*18.8*	*18.8*	*18.8*	*18.8*
Country roads	30.7	38.9	39.6	39.6	39.6	39.6

However, the roads are in urgent need of repair, particularly in view of the number of accidents caused (to a greater or lesser extent) by the state of the carriageway. Adequate resources for maintaining the road network are not available. Only one-tenth of the $80 million needed for maintenance was granted under the 1994 budget. A loan of $10.4 million from the EBRD will be used for a rehabilitation project worth a total of $26 million.

There are 57 bus and coach terminals in Latvia, operating efficient services throughout the country. However, the state of the vehicles is a major problem, and it will require $60 million a year over a period of five years to renew the bus and coach fleet.

Rail network

The rail network comprises 2 413 km of line, representing a density of 0.037 km/km². The length of the network has increased by only 13 km in ten years (1980-90). There has been no change in the very low percentage (10%) of electrified railway lines since 1990.

Development of the rail network, 1980-95

Kilometres

Type of track	1980	1990	1991	1992	1993	1994	1995
Main lines	2 384	2 397	2 397	2 406	2 413	2 413	2 413*
Broad gauge	2 350	2 364	2 364	2 373	2 380	2 380	2 380
Narrow gauge	248	271	271	271	271	271	33

* Lithuania 2 002 km, 1 021 km Estonia.

In 1996, traffic was interrupted on some unprofitable lines. The Latvian railway company is trying to develop the east-west corridor, between Moscow (and Belarus) and Ventspils, Riga or Liepaja. Another important corridor should also be developed between St. Petersburg and Warsaw, via Rezekne.

The Latvian railways are undergoing a profound restructuring, following the principles set out in EU Directive 91/440. This led to a decrease in staff and a recent increase in productivity.

LDZ staff, 1985-96

1985	1990	1991	1992	1993	1994	1995	1996 (forecasts)
28 951	23 737	23 128	21 736	20 894	21 398	20 254	19 000*

* 17 500 in Lithuania, 8 300 in Estonia.

The number of stations has decreased to 175 (down from 205 in 1985). Due to restructuring, the number of railway stations in operation may decrease further. Approximately 70 per cent of the 9 980 freight wagons will have to be replaced, or at least taken out of service, by 2010. The same percentage also applies to the 609 passenger coaches.

The east-west corridor project can be broken down as follows:

	Length in km
Main corridor	
- Ventspils Jelgava	164
- Jelgava Krustpils	138
- Krustpils Zilupe (Russian border)	158
Branches	
- Indra (Belarus border) Krustpils	158
- Lepaja Jelgava	180
- Riga Krustpils	121

Air transport infrastructure

A new airline set up as a result of a participation offer made to the Latvian government by Scandinavian airlines SAS and the US Braniff International (BI) flew for the first time in November 1994 and entered into service in April 1995. This new air company is called Air Baltic.

Capital of Air Baltic
Percentage

Latvian government	51
SAS	29
BI	8
Two finance partners	12
Total	100

Air transport infrastructure is well developed in Latvia: Riga international airport, Spilve and Liepaja airports, 12 military and 90 civilian landing fields are distributed throughout the country. Three other airports have been closed: Ventspils, Rezekne and Daugavpils. Infrastructure capacity is therefore considerable but needs to be modernised.

The runway and lighting system at Riga airport has been rehabilitated and the air traffic control system has been modernised. A master plan for the airport includes the construction of a business centre, a number of hotels, and a freight distribution centre.

Key projects not on the main transport corridors

Nine projects are currently being studied or are already under construction in Latvia.

Nature of the project	Geographical location	Time scale	Estimated cost (million $)
Construction of a road	Between Riga and Moscow	1994-2005	100
Rehabilitation of major roads	Whole of Latvia	1995-2000	40
Reconstruction of a bridge	River Venta on the Riga-Liepaja route	1997-1999	6
Reconstruction of a viaduct	Riga-Liepaja route	1996-1997	1.5
Construction of a fixed link (bridge or tunnel)	River Daugava in Riga	1998-?	
Reconstruction of access routes	Ports of Riga and Liepaja	1997-2000	5
Reconstruction of rail access	Port of Ventspils	1997-1999	25
Rehabilitation of the main railway lines linking the ports to their hinterland		1995-2000	15
Rehabilitation of port installations		1995-2000	90

Question 3: Capacity problems

The most congested areas are located at the borders with Estonia and Lithuania and on roads through the centres of Riga, Bauska and Jelgava (the Jelgava bypass is still under construction).

Capacity on the new Riga bypass is insufficient where the road crosses the River Daugava.

Lack of road maintenance is likely to generate further areas of congestion.

Poor safety levels are the main problem facing passenger and freight traffic in the road sector. The number of fatal road accidents is four to eight times higher than in western European countries. It is significant that 49.7 per cent of private and commercial vehicles are more than ten years old.

The lack of experience of new drivers has caused the number of road accident fatalities to rise by 40 per cent between 1985 and 1991, more quickly than the number of accidents. Recently, however, there has been a reduction in the number of fatalities, which is all the more noteworthy in that, at the same time, the rate of motorisation has increased steadily. The number of road accidents remains worrying, but the situation improved markedly between 1995 and 1996. In January 1996, there were 164 accidents, as against 262 in January 1995 and 148 in February 1996, as against 224 in February of the preceding year.

Traffic accidents, 1990-95

	Accidents	Fatalities	Casualties
1990	4 325	877	4 716
1991	4 271	923	4 543
1992	3 474	729	3 766
1993	3 389	670	3 721
1994	3 814	717	4 380
1995	4 056	611	4 903

The results of a survey conducted by the Latvian Transport Ministry show that the increase in the number of accidents is in proportion to the worsening state of the roads, with 10 per cent of accidents due solely to the poor state of the road. The cost of road accidents to the state budget is very high: 58 million lats (3.8 per cent of GNP) in 1994.

Freight transport techniques are outdated and the goods transported are often lost or damaged.

Problems with certification, the issuing of licences, vehicle checking, and legal checking procedures are increasingly common. Safety is not guaranteed, goods and vehicles are not insured, and there is a lack of effective co-operation between transport professionals and government authorities.

Question 4: Measures

A national transport development plan scheduled for the period 1996-2010 was approved by the Government in November 1995.

The 1993-94 indicative PHARE programme mainly focused on:

– a seaport master plan for the three main Latvian ports (ECU 0.7 million);
– an institutional support programme at the Ministry of Transport (ECU 0.55 million);
– a training programme for managers at the Ministry of Transport (ECU 0.36 million);
– PHARE technical assistance through creation of a PIU (project management unit).

In 1995, the programme was strengthened by:

– a study on restructuring the railway (ECU 0.54 million);
– a master plan for interurban transport by buses (ECU 0.24 million);
– a road safety and maintenance master plan (ECU 0.24 million);
– a study on harmonisation between EU transport legislation and Latvian legislation (ECU 0.30 million).

The studies scheduled for 1996 include:

– upgrading of the east-west railway corridor and railways infrastructure in Ventspils (ECU 0.40 million);

- a feasibility study for a new bridge (or tunnel) to cross the Daugava river in Riga;
- a transport master plan for Riga city;
- a study on tariffs and income of transit activities in Latvia.

Other PHARE projects are being carried out or scheduled, such as the Multi-country Programme and Cross Border Co-operation Programme:

- the building of a control tower in Riga harbour (Vessel Traffic Services Tower Building);
- Via Baltica support (World Bank Highway Project);
- Maritime safety in the Baltic Sea (safety at sea) radio system;
- upgrading of border crossings facilities (in particular with Russia and Belarus) (Border Crossing Programme).

Very active bilateral co-operation, especially with Sweden, Finland, Denmark and the Netherlands, should also be mentioned:

- the master plan of the port of Liepaja;
- upgrading of the railway line Liepaja-Jelgava and Liepaja station (East-West corridor);
- upgrading of logistic chain on the East-West corridor;
- setting up of a Distripark in the port of Riga.

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3. Finnish Ministry of Transport & Communications, Via Baltica - Feasibility Study, Nordic Project Fund/Nordic Investment Bank, EBRD, Viatek, SweRoad, August 1993.

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LITHUANIA

Area: 65 300 km²
Population: 3 709 300

Lithuania is the most southern of the Baltic states. A characteristic feature of the country is that two transit corridors cross on its territory:

- a north-south corridor stretching from the northern tip of Europe to the countries in central Europe;

- an east-west corridor linking the Baltic ports of Kaliningrad and Klaipeda to Belarus (and Russia).

Lithuania’s GNP is expected to remain stable until 1998 and then increase by 28 per cent between 1998 and 2015. GDP is expected to increase by 26.8 per cent between 1995 and 2000.

The outlook for economic development and the possibility of new relations abroad have led to a major restructuring of Lithuania’s transport sector. At the beginning of 1994, the government approved the Transport Development Programme, which contains basic principles and strategic objectives for a national transport policy:

-- to integrate the transport network in eastern Europe via international corridors, while maintaining the transport sector’s traditional trade relations with eastern European countries and the CIS;

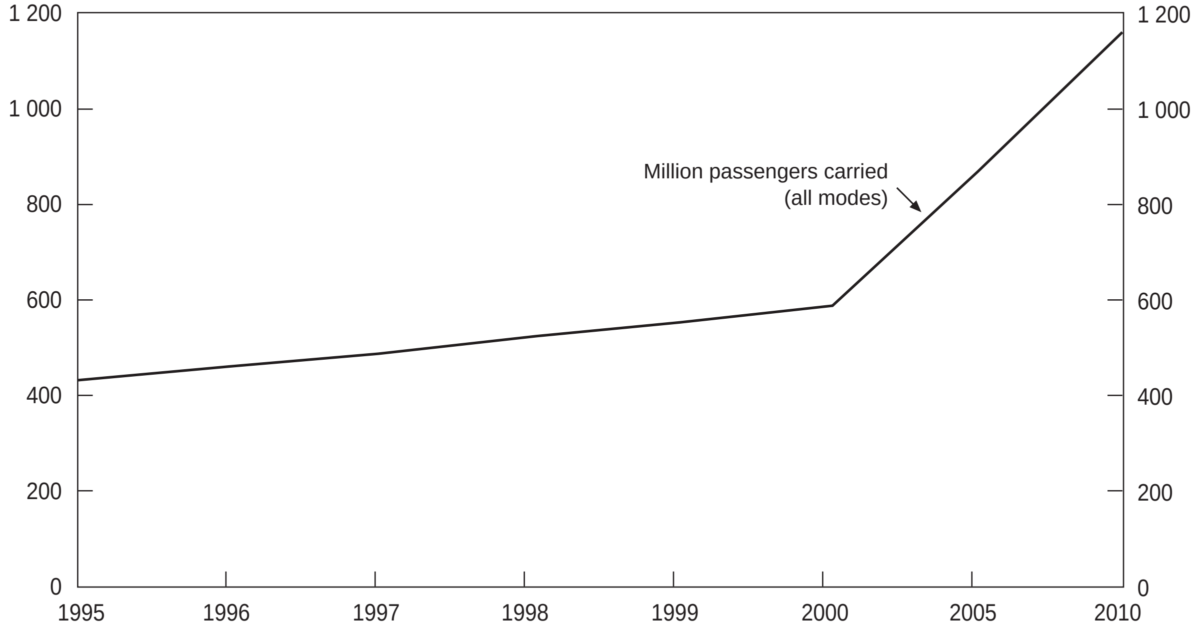
-- to set up a regulatory frame corresponding to that of the European Union;

-- to put an end to state monopolies and privatise national trade companies in order to create an open market and encourage private investments in this sector.

Question 1: Future trends in passenger and freight traffic

Passenger traffic

Figure 1. **Future trends in traffic volume performed by national operators**
In million passengers



Source: ECMT.

Road transport

Car ownership per 1 000 inhabitants, 1980-95

	Car ownership
1980	60
1985	91
1990	121
1994	169
1995	185

The number of private cars doubled over the last decade. On average, private cars travelled 7 000 km in 1992.

Car park, 1991-95

	1991	1992	1993	1994	1995
Cars	530 824	565 320	597 735	652 810	718 469
of which private	*510 562*	*542 516*	*575 980*	*627 105*	*685 552*
Bus	15 627	16 284	16 339	17 103	17 052
of which private	*563*	*930*	*1 699*	*2 967*	*5 824*

Traffic forecasts and modal split (national operators), 1995-2010

	1995	1996	1997	1998	1999	2000	2005	2010
Millions of passengers transported	405.7	439.3	472.9	506.5	540.1	573.7	860.6	1 144.5
% road	96.10	96.40	96.63	96.78	96.90	97.02	97.87	98.24

Traffic forecasts up to 2010 show an increasing monopoly for road. Traffic volume should triple between 1995 and 2010.

According to forecasts prepared as part of the 1992 “Via Baltica” study, the volume of traffic on the main thoroughfares in the city of Kaunas will increase by 30 per cent between 1990 and 2000 and by a further 92 per cent between 2000 and 2015.

Air transport

The two Lithuanian airlines account for only a quarter of passenger traffic. In 1995 they transported more than 241 900 passengers and forecasts are for 295 000 in 2000, 335 000 in 2005 and 392 000 passengers in 2010. Lithuanian international airports should have traffic of 640 000 passengers in 2000, 850 000 in 2005 and 1.25 million in 2010, as against traffic of 418 000 passengers in 1995.

Despite a high growth rate, the share of air transport performed by national operators in the modal split(all modes) should decrease. In 2010, air passenger traffic should represent 0.03 per cent instead of 0.6 per cent in 1995. Traffic volume of foreign airlines should also increase, according to the forecasts.

Rail transport

Traffic forecasts and modal split (national operator), 1995-2010

	1995	1996	1997	1998	1999	2000	2005	2010
Millions of passengers transported	15.2	14.5	14.6	14.8	15.2	15.5	16.5	18.0
Percentage rail	3.60	3.18	2.98	2.83	2.73	2.62	1.88	1.54

Whereas other modes seem to have important growth rates, traffic volume of railways should only increase by 20 per cent. According to the forecasts, railways should have some difficulty remaining the second most frequently used mode, and there will be an ever greater gap with road.

Waterways and maritime transport

Traffic volume, 1995-2010

	1995	1996	1997	1998	1999	2000	2005	2010
Millions of passengers transported								
- by inland waterways	1.00	1.60	1.60	1.70	1.70	1.74	1.80	2.00
- by sea	0.038	0.059	0.065	0.068	0.075	0.082	0.118	0.155

Although, according to forecasts, traffic should be multiplied by four between 1995 and 2010, the share of maritime transport in global traffic should stay at a very low level, with 0.01 of the modal split. Inland waterways are in the same position since, even if traffic volume is multiplied by two over the period, their share in modal split should decrease from 0.24 per cent in 1995 to 0.17 per cent in 2010.

Freight transport

In 1990, road freight traffic accounted for less than 20 per cent of total tonne-km in the Baltic states. Over the next 20 years, the volume of freight traffic by road is expected to quadruple, as 50 per cent of rail freight shifts to the roads and in response to the demand for freight traffic between the Nordic countries and central and southern Europe.

Industrial vehicles, 1991-95

	1991	1992	1993	1994	1995
Lorries	84 341	87 321	89 530	93 593	101 422
of which private	*3 105*	*6 537*	*14 786*	*24 105*	*37 873*
Road tractors	7 728	8 911	9 241	7 467	7 469
Trailers	12 311	11 469	11 813	10 696	9 119
Semi-trailers	11 969	11 794	10 952	10 696	9 119

Share of HGVs in total number of vehicles, 1995-2015

	1995	2000	2015
Lorries	9 %	9 %	9 %
Semi-trailers	5 %	5 %	5 %
Buses and coaches	6 %	5 %	3 %

Traffic on the east-west corridor

Approximately 15.1 million tonnes of goods were transported westwards in rail transit traffic in 1992, and 7.6 million tonnes eastwards.

Maritime transport

Number and nationality of ships stopping in Klaipeda, 1995

Arrivals			Departures		
Total ships	Lithuanian flag	Foreign flags	Total ships	Lithuanian flag	Foreign flags
6 931	3 702	3 229	6 725	3 497	3 228

The port of Klaipeda has links with ports in more than 53 countries in Europe, Asia, Africa and North America. In 1994, 77 per cent of exports and 75 per cent of imports passing through the port were in transit, mainly to and from countries in the European Union and the CIS.

Traffic in Klaipeda
Tonnes

	1994	1995	First half 1996
Export	11 727 750	10 098 970	4 896 560
of which transit	9 039 650	6 913 500	3 493 150
Import	2 796 520	2 622 160	1 611 140
of which transit	2 080 890	1 372 120	995 970
Total	14 524 270	12 721 130	6 507 700
% export in total	80.75	79.39	75.24
% import in total	19.25	20.61	24.76

In 1992, the port of Klaipeda loaded 13 million tonnes of cargo. More than 90 per cent was transit traffic between eastern and western Europe, and 40 000 vehicles were expected in Ro-Ro traffic in 1993. In 1991, the port handled approximately 3.8 million tonnes of cargo, including 40 200 tonnes of container traffic.

Container traffic in Klaipeda

	1994	1995	Sept 1996
TEU Units	6 572	30 008	29 745

The volume of container traffic passing through the port has considerably increased; the number of units carried was multiplied by 4.5 between 1994 and 1995. With 135 000 TEU expected by the year 2000, this trend should be maintained. More than 60 000 TEU were transported in semi-trailers in 1994. Between 1992 and 1994 the number of semi-trailers, lorries and cars loaded onto ferries in Ro-Ro traffic rose by a factor of five to total 76 900 vehicles.

The number of passengers using the port of Klaipeda has risen considerably since the 1993 survey, which identified 18 500 passengers. By 1994, the number of passengers had risen to 55 000 and between 250 000 and 300 000 passengers are expected by the year 2000 (all flags).

Road transport

Ro-Ro traffic in the port of Klaipeda grew by more than 90 per cent between 1992 and 1994 (gross weight of 3.3 million tonnes in 1994), causing the volume of road traffic on the B branch of the IX corridor to rise by 25 per cent between 1993 and 1994 to a total of 11 500 vehicles per day on certain sections of road. Mean traffic on the D branch rose by 20 per cent. Between 1 800 and 9 000 vehicles use certain sections of this branch every day.

In 1992, more than 70 000 lorries travelled across Lithuania on the east-west route, carrying approximately 750 000 tonnes of goods, mainly in traffic between the countries of the CIS and the district of Kaliningrad. Up to 9 500 vehicles per day use the Klaipeda-Vilnius route (see the map at the end of this report: "The quantity of goods in transit carried by road through Lithuania in 1995") .

Rail transport

The volume of rail freight on the IXB corridor (Minsk-Kaunas-Klaipeda) depends on the level of traffic passing through the port of Klaipeda. In 1994, the different rail sections of this corridor transported between 11.6 and 18.7 million tonnes of freight. Rail transport accounts for:

- between 7.3 and 7.9 million tonnes per year on the IXD branch linking Kaunas and Kaliningrad (Russian goods heading for the region and port of Kaliningrad);
- between 9 and 20 million tonnes and between 3.5 and 9.5 million passengers per year between Klaipeda and Kaisiadorys, depending on the particular section of the line;
- 22 million tonnes and 13 million passengers per year between Vilnius and Kaisiadorys;
- 12 million tonnes and 8.5 million passengers per year between Kaunas and Kaliningrad.

International traffic accounts for 85 per cent of total rail traffic on branches IXB and IXD.

Forecasts of railway freight traffic flows, 1995-2010

Million tonnes

	1995	2000	2005	2010
Branch IXD	6.0	6.5	7.2	8.3
Branch IXB	12.5	15.0	17.5	20.0

Traffic on the north-south corridor

Road transport

Road traffic rose strongly up to 1994 and reached, depending on the section, average daily traffic of 1 800-9 000 vehicles in 1994. In the following two years, traffic intensity increased by more than 20 per cent, to 2 700-10 000 vehicles a day, of which 1 600 cross the border.

Transit road traffic on the Via Baltica grew by more than 500 per cent between 1988 and 1992. In 1994, transit traffic totalled 3.1 million tonnes and import-export traffic amounted to 4.3 million tonnes in 1995.

Forecasts of vehicle flows, 2000-2010

	2000	2005	2010
Daily traffic	4 000 - 18000	6 000 - 28 000	9 500 - 42 000

On the Lithuanian section of the Via Baltica (branch IA) traffic density is less heavy at 1 500-5 000 vehicles per day. Most of the traffic is local or bilateral traffic between the region of Kaliningrad and Lithuania. However, the volume of traffic is expected to double by the year 2000.

According to vehicle counts on the Via Baltica in 1992, heavy goods vehicles accounted for 42 per cent of traffic at the Polish border and 23 per cent at the Russian border in the direction of Kaliningrad. Efficiency is poor:

-- nearly 20 per cent of the lorries included in the survey were empty;
-- 50 per cent of lorries had a total weight of less than 4 tonnes;
-- only 8 per cent weighed more than 12 tonnes.

In 1992, more than 90 000 lorries travelled across Lithuania on the north-south corridor, carrying approximately 1 million tonnes of freight from or to countries of the CIS, Poland, Germany, France, Finland and other European countries.

Average daily traffic on the Riga-Kaunas-Suwalki-Warsaw route in 1992 totalled 13 200 vehicles around Kaunas and 1 000 vehicles around the Polish border.

The average number of vehicles taking the Riga-Kaliningrad route to cross Lithuania ranged from 3 200 vehicles per day at the Latvian border to 2 600 per day at the Russian border (see the map at the end of this report: "The quantity of goods in transit carried by road through Lithuania in 1995").

Rail transport

In 1994, 185 000 people took advantage of the "Baltic Express" international passenger service between Tallinn and Warsaw via Riga and Kaunas, one year after the line was opened for service. It is predicted that the service could attract 1 million passengers by the year 2000.

Freight traffic on the north-south corridor totals 70 000 tonnes.

Traffic forecasts, 2000-2010
Million tonnes

	2000	2005	2010
Expected traffic volume	1.4 - 1.6	2.0 - 2.4	3.5 - 4.0

Question 2: Present situation as regards infrastructure and projects for investment

Infrastructure description

Road infrastructure

The total length of the road network is 61 442 km, of which 85 per cent only is paved.

Network length in 1995

	km
Roads	61 442
of which public lanes	*21 121*
- local	35 595
- urban	4 726
Total lanes surfaced	53 081
of which public	*21 121*
- local	27 513
- urban	4 447

Network density is 622 km of road and 321 km of primary road per 1000 km² or 11 km of road and 5.6 km of primary road per 1 000 inhabitants. The road network has a missing link between Vilnius and Brest (Belarus).

There are more than 4 000 bridges and viaducts in Lithuania, of which approximately 600 are part of the rail network, 1 400 are on national roads and 2 300 come under the control of the local authorities. Their state of repair gives cause for concern.

Railway infrastructure

The rail network is 2 665.4 km long, with a density of 0.041 km/km²; 559.8 km of line is double track. The only electrified part of the network is a 122 km section between Vilnius and Kaunas.

Public railways network length, 1995

	km
Length of commercialised railway lines	2 665.4
Commercialised lines	2 001.8
Single track	1 442.0
Double track or more	559.8
Electrified lines	122.0
- of which double track or more	117.0
- of which single track	5.0

Air transport infrastructure

The following investment measures are planned in the air transport sector:

-- development of an international airport for freight traffic (regional hub) on the site of the former military airport and an aircraft maintenance depot in Siauliai;
-- modernisation of air traffic control equipment;
-- modernisation and development of Vilnius international airport at an estimated cost of $16.8 million (1991-98);
-- continuation of work to rebuild Kaunas and Palanga airports.

Projects in the corridors

Until 2015, the transport infrastructure network will remain as it is on the north-south corridor (the only new links are the ferries Klaipeda to Karlskrona and Stockholm). Work on the Via Baltica will be under way between 1990 and 1999, but will only be the first stage (motorway rebuilding). The roads concerned will be widened to two lanes, with a minimum width of 9 m. This should upgrade significantly the quality of the Lithuanian road network.

Infrastructure on the east-west corridor

In 1995, a transport plan was drawn up with the general aim of improving infrastructure on the Lithuanian section of this corridor. The total cost of the projects involved will be $46.5 million (37.8 million of which will be funded through loans from the EBRD and the Japanese Eximbank). The aims of the programme are to modernise the rail network, the road network, and port infrastructure (notably by improving the connection with the rail network).

1. In the rail sector, the following investment measures, totalling $241 million, are planned for the next five years (1995-2000):
   -- repair work on 390 km of track and trackside equipment;
   -- laying a second track on 63 km of line;
   -- modernisation of the signalling and telecommunications system ;
   -- gradual electrification of the Klaipeda-Vilnius-Kena section of line.

2. $45 million are needed to improve the road network, of which $34.5 million will be funded through loans from the EBRD and World Bank. Work is scheduled up to 2000:
   - 170 km of road surface repairs
   - the construction of town bypasses (totalling 44 km);
   - upgrading of bridges and viaducts;
   - setting up safety equipment.

3. The main investment projects for the port of Klaipeda are the extension of the terminal for ferries and Ro-Ro traffic (with funding worth ECU 5 million from the PHARE programme), the construction of a new container terminal and a terminal for bulk cargo, the reconstruction of the port entrance, and repairs on the railway line through the port. Total costs for these projects (excluding the reconstruction of the oil terminal in Klaipeda) are $200 million. Investments in this port are considered as top priority for the transport sector in Lithuania. These projects will cost a total of $87 million with a 15-year payback period.

   The PHARE programme will contribute ECU 5 million to the cost of improving the Ro-Ro and ferry terminal.

Infrastructure on the north-south corridor

Since 1988, studies for Via Baltica have led to a number of resolutions and declarations by the various countries concerned by the development of this axis. However, action to develop this axis has been slow and has encountered several difficulties. On an initiative of the Nordic Investment Bank and the G-24 Working Party, a commission has been set up to co-ordinate and stimulate efforts by the countries and the financial institutions concerned. This commission is composed of delegates from the Estonian, Finnish, Latvian, Lithuanian and Polish governments but also the European Commission, EBRD, IBRD, EIB and the Nordic Investment Bank. A precise programme of investments has been set up to finance projects to alleviate technical and institutional problems. This programme covers the period 1996-2000. By 2000, Via Baltica should be able to handle significant international traffic flows and constitute a real international corridor.

The total cost for this programme is $178.4 million, to which national contributions must be added, as well as special funds and loans granted by international financial institutions. The total length of the road on Lithuanian territory is 274 km. Due to predicted traffic increases, 206 km should be equipped with four lanes and 68 km with two lanes. The first phase of the project involves the following work:

- upgrading the road with a new surface and separated lanes over 177 km;
- construction of bypasses (31 km).

The first phase of the project should last from 1997 to 2000. The total amount for this phase is $70.4 million for Lithuania alone, of which $17.6 million in local funds. The remainder will come from loans granted by various international financial institutions:

- $25 million from the EIB;
- $21.1 million from the EBRD and the Japanese Eximbank;
- $6.7 million from the Nordic Investment Bank.

This commission also set out a Memorandum of Understanding for the development of Via Baltica.

For the Lithuanian authorities, it is also very important to develop railway infrastructure on corridor I linking Tallinn-Riga-Kaunas-Warsaw. A programme was launched in 1993 to set up direct railway links between the Baltic states and western European countries. Also in 1993, an international railway passenger line was opened and in 1994 a freight line. Work has begun on a project to build a freight terminal for transferring freight from wagons using 1 435 mm gauge track to wagons using 1 520 mm gauge track. The terminal will have a handling capacity of 2.5 million tonnes per year. Some sections of the superstructure of the terminal will be financed by private funds.

Question 3: Capacity problems

For all transport modes, the main problem is lack of funding, notably for infrastructure improvements.

The second problem, which concerns all of Lithuania, is border crossings. There are too few crossing points, and, in addition, customs procedures have not been adapted to the market economy and the internationalisation of trade. As a result, waiting times at borders are a major problem for road haulage services and particularly for foreign vehicles in transit. In January 1996, the Baltic states, in the Council of Ministers of the Baltic area, agreed on plans for common procedures for transit traffic and for increasing the capacity of border crossings. All the measures require total co-operation among the countries concerned, which include Lithuania and Poland. Moreover, the European Commission granted ECU 2 million via the programme PHARE for the upgrading of border crossings, in particular at Kalvarija.

Road transport

Road infrastructure

In 1992, the worst congestion on the whole of the Via Baltica was on the border between Lithuania and Poland, where delays of several days were common. There is a danger that capacity will remain insufficient even after the Kavarija-Szypliszki border crossing is opened. The border crossing point between Ladzdijai in Lithuania and Ogrodniki in Poland, which is now used for international traffic, was originally opened in 1986 for local traffic. It was therefore equipped with temporary facilities designed to cope with a low level of traffic. In 1989, as a result of the opening of the former Soviet Union, traffic increased four-fold. After the Baltic states became independent in 1991, the border was opened to foreign vehicles and traffic continued to grow, doubling to 400 000 vehicles, despite the lack of sufficient capacity.

In 1992, the Lithuanian and Polish governments signed an agreement establishing Ladzdijai-Ogrodniki as an international crossing point and Kalvarija-Szypliszki as the main crossing point between the two countries on the Via Baltica.

Traffic is congested in many places along the Lithuanian section of the Via Baltica as a result of breaks in the route, and signposting needs to be improved. The main bottlenecks are the road through Panevezys, the section between Kedainiai and the A1 motorway, and the 82 km section of road between Kaunas and the Polish border. Road maintenance is becoming increasingly difficult as budgets are reduced.

On the Riga-Kaliningrad route, traffic is slowed by the border crossing points and the road through the town of Siauliai.

Vehicles

The fleet of coaches used for domestic services is in poor condition, with average depreciation currently standing at 80 per cent. Between 1990 and 1993, most of the coach lines were closed. Inexperienced new car drivers have caused the number of road accident fatalities to rise more quickly (up 40 per cent between 1985 and 1991 in Lithuania) than the number of accidents.

Rail transport

Railway lines are in increasingly poor condition and 342 km of track used for heavy traffic are in urgent need of repair. On average, locomotives are ten to 15 years old. The coach fleet comprises 341 vehicles, half of which have been in service for more than 20 years, while 27 per cent of all wagons are less than five years old. However, none could be used in international traffic to western European countries.

Question 4: Measures

In April 1992, the Lithuanian government approved a strategic programme for the reconstruction and development of the transport system. The programme will be implemented in three parts:

-- In the short term, the Ministry of Transport will be reformed by introducing new budgetary procedures and defining a new regulatory framework.

-- In the medium term, the aim will be to promote:
  - the development of a transport system based on free market principles, notably through the privatisation of transport undertakings;
  - better transport conditions for passengers and freight, as well as the integration of Lithuania in the European transport network.

  The government's priorities are the rehabilitation and maintenance of existing infrastructure and the elimination of bottlenecks at the borders with Poland and Latvia.

-- In the long term, the aim is to identify major investment projects (all modes, domestic and international traffic), rank them by order of importance, and ensure they are carried out.

The aims of the national transport development programme adopted in 1994 are:

-- alongside countries in central and eastern Europe, to integrate the Lithuanian transport system into European transport networks and services on multimodal corridors in Europe;
-- to promote private investment;
-- to bring legislation governing transport activities into line with EU directives.

Moreover, since June 1995, when Lithuania became an "associate member" of the EU, efforts have been under way to establish a new regulatory framework for all transport activities. At the end of the year, a technical assistance plan entitled "Harmonisation of Transport Legislation with that of the European Union" will be implemented with a view to speeding up the harmonisation process.

The main legislation enacted to date involves:

-- the Law on Civil Aviation, which came into force on 22 May 1996, as well as the Law on the Use of Air Space;
-- the Law on the Port Authority of the Port of the State of Klaipeda, in effect since 5 June 1996;
-- the Railway Law, in effect since 22 June 1996;
-- the Inland Waterways Law, in effect since 17 September 1996.

SOURCES

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3. Republic of Lithuania, Ministry of Transport, *Report on the meeting of the Ministers of Transport of the three Baltic states*, held in Vilnius on 29 and 30 July 1993, with the participation of representatives from EC DG VII, EBRD, World Bank and G-24, Vilnius, August 1993.

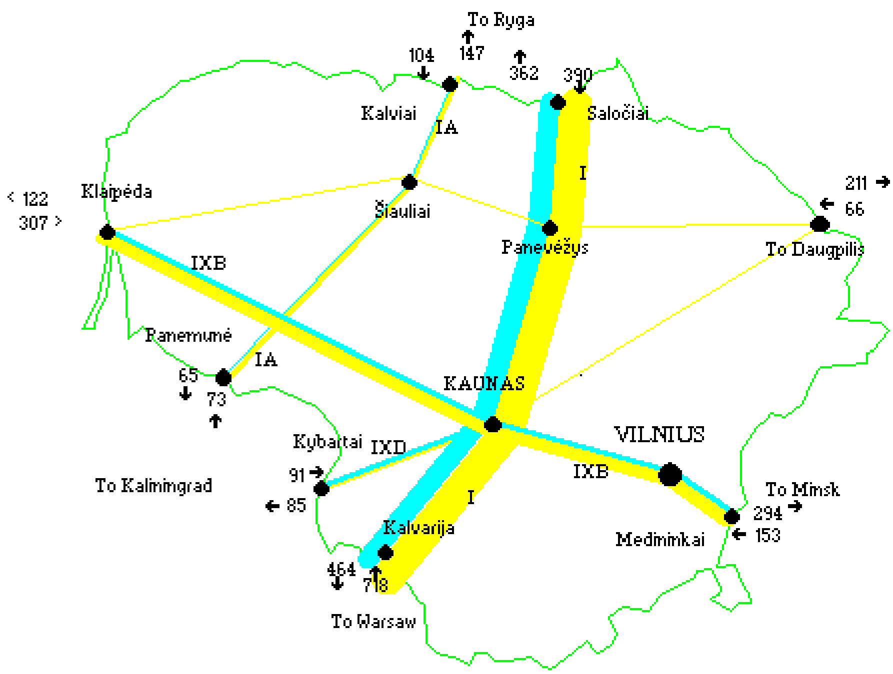
4. Algirdas Sakalys, 1st Vice Minister, Ministry of Transport, “Policy to develop Lithuanian Transport Infrastructure”.

5. MICECO, Information Note 12 : Transport (PHARE, Lithuania), fax dated 16 July 1993.

6. Commission of the European Communities, DG I, PHARE Programme (Lithuania): Draft Commission Decision of 1993; Financing Proposal, 10 June 1993; Information Note 1 : Logical Framework Matrix; Information Note 2 : Policy Assessment; Information Note 3 : Institutional Assessment; Information Note 4 : Commitments and Contracts, 1991-1992; Information Note 5 : Indicative Commitment to Other Sectors.

MAP

Quantity of goods in transit carried by road through Lithuania, 1995
Thousand tonnes



Source: Customs Department, Ministry of Finance, Lithuania.

MOLDOVA

Area: 37 000 km²
Population: 4 300 000

Moldova has signed a number of European transport conventions and agreements, among them:

- Convention on road traffic (19/9/1949), European agreement supplementing the convention on road traffic ((1/5/1971);
- Convention on the contract for the international carriage of goods by road (19/5/1956);
- European Agreement concerning the work of crews of vehicles engaged in international road transport (1/7/1970);
- Customs convention on the international transport of goods under cover of TIR carnets (14/11/1975);
- Customs convention on the temporary importation of private road vehicles (4/7/1954).

During the last two years, Moldova became full member of:

- the Memorandum of Understanding concerning corridor N° 9;
- the European agreement on main international railway lines;
- the European Conference of Ministers of Transport.

With GDP totalling $1 110 million, "net industrial output" standing at $628 million, and 4 per cent monthly inflation, Moldova is pursuing its reform process, with priority being given to the privatisation of state enterprises and of public limited companies.

In the transport sector, the privatisation of state-owned enterprises and the restructuring of the institutions responsible for this sector are under way, particularly the Ministry of Transport and Roads, which has responsibility for state enterprises and semi-public enterprises, a total of 115 enterprises, of which:

- 51 road transport undertakings, or 5 000 lorries (7 per cent of the total lorry fleet), 500 taxis and 1 900 buses and coaches (20 per cent of the total fleet);
- 31 railway stations and road terminals;
- 2 enterprises specialising in inland waterways transport;
- 1 railway undertaking;
- 3 road management enterprises;
- 6 industrial enterprises;
- 10 enterprises specialising in ancillary transport services;
- 11 miscellaneous enterprises.

Most of these state-owned enterprises are solvent and operate at a profit. However, the economic and financial situation of the sector is still poor.

Question 1: Future trends in passenger and freight traffic

Road transport

Freight traffic

The demand for road haulage services has declined over the past few years. In 1995, the total volume of goods transported by firms operating road haulage services for hire was 3.93 million tonnes, down 27 per cent from the previous year. However, this result is better than the 1994 figures, which were down 68 per cent from 1993.

Despite a regular increase in international road traffic, which more than doubled between 1994 and 1995, scarcely more than 20 per cent is handled by Moldovan road transport enterprises.

Road haulage firms, especially nationalised firms, are in difficulty. Out of the ministry's total fleet of 5 000 lorries, 3 500 remained parked at the ministry throughout the whole of 1995 owing to lack of freight and financial resources. The ministry is doing its best to protect Moldovan international road hauliers at all levels (legal and practical).

Passenger traffic

In 1995, 43 million passengers travelled by road, an increase of 14 per cent from the previous year. Passenger-kilometres rose by 22 per cent over 1994.

Faced with this increase in the number of passengers travelling by road, the Moldovan government is re-opening a number of suburban and interurban lines. As a result of the growing demand for international passenger transport, new services to Bulgaria, Turkey, Romania, Austria, Ukraine, Belarus and Russia are being developed. The Ministry of Transport and Roads is presently looking at possibilities for replacing both passenger and freight vehicles through state-guaranteed foreign loans.

Rail transport

Freight traffic

The Moldovan railways play a very important role, particularly in national transport policy.

In 1995, freight traffic totalled 4.39 million tonnes, down 1.6 per cent from 1994. Since 1993, the demand for freight transport by rail has fallen by an estimated 27 per cent.

However, although the volume of goods transported has fallen, the situation is less critical than that of the road sector, as the Moldovan government has been promoting the transfer of traffic to the railways for the past few years.

Furthermore, the drop in traffic is offset to a large extent by productivity improvements (+ 28.6 per cent) and shorter wagon standing times (- 24 per cent) during load transfer operations.

Passenger traffic

In 1995, the Moldovan Railways transported 11 million passengers (949.3 passengers per km of line).

These figures show a 20.2 per cent drop in traffic compared with 1994. However, the drop is offset to a large extent by a 38.4 per cent reduction in minimum standing time and a 35 per cent rise in passenger coach productivity.

Inland waterways transport

This mode performed better than the others in 1995, transporting 3.66 million tonnes of cargo and 570 000 passengers, an increase of 15.2 per cent in volume and of 3.6 per cent over the previous year.

Summary of traffic levels, 1995

		1995	Change from 1994
Road transport	Million tonnes	3.93	- 27.0 %
	Million passengers	43.0	+ 14.0 %
Rail transport	Million tonnes	4.39	- 1.6 %
	Million passengers	11.0	- 20.2 %
Inland waterways transport	Million tonnes	3.66	+ 15.2 %
	Million passengers	0.57	+ 3.6 %

Question 2: Present situation as regards infrastructure and projects for investments

The transport infrastructure in the Republic of Moldova consists of:

- a road network totalling 10 351 km (excluding municipal, farm, and country roads) and a total vehicle fleet of 169 100 cars, 69 600 lorries and 10 000 buses and coaches;
- 1 318 km of railway line;
- four airfields.

Road infrastructure

Roads are a fundamental part of the social and industrial fabric of Moldova. They need to ensure that the road transport sector, which is very important in a country where road traffic accounts for 90 per cent of total passenger traffic, functions smoothly.

The road network in Moldova
Kilometres

Road surface	Total network	National roads	Local roads
Concrete	487	426	61
Asphalt	5 225	2 327	2 898
Pre-treated macadam	758	229	529
Macadam and gravel	3 591	188	3 403
Earth	470	-	470
Total	10 351	3 170	7 361

In 1995, 1 455 million lei were spent on new infrastructure construction projects:

- A bridge on the Pojareni-Tipala-Chetros motorway. Work on the bridge cost 281.19 million lei for 11 km of new road.
- A bridge on the Lapusna-Carpineni-Sarata-Rezesti motorway. The 7 km of new road leading to the village of Negra cost 314.112 million lei.
- A motorway section on the Fetita-Lipoveni-Munteni-Porumbrei route. The 1.4 km of new road joining the village of Lipoveni to the motorway cost 860.17 million lei.

For 1995, 62 million lei were set aside for the Road Administration in the central government budget, but this represents only 11 per cent of the cost of normal road maintenance. In fact, the Road Administration received only 57.5 million lei (36.5 million for national roads and 21 million for local roads).

A comparison of the 1995 budget allocations and the total funding requirement reveals that the allocations covered only:

- 16.7 per cent of the cost of carrying out normal maintenance on national roads (13 200 lei per km instead of 78 900 lei);
- 5.5 per cent of the cost of carrying out normal maintenance on local roads (2 800 lei per km instead of 51 000 lei).

Consequently, road maintenance was carried out with an eye constantly on savings. Work was therefore limited to the strict minimum necessary to maintain the existing state of the roads. In all, 54 million lei were spent to repair 247 km of road (149.1 km of national roads and 97.9 km of local roads).

Most of the Road Administration’s budget comes from taxes collected by the State. The difficulties arise because:

- the State no longer receives the full amount in taxes because the districts increasingly pay back to the State only a half or third of the taxes they collect, at most;
- the State is not always in a position to redistribute the money received to the Road Administration.

The situation of the road infrastructure is therefore very alarming. Not surprisingly, most public roads are in a very poor state. Out of the total road network (10 531 km), 390 km are in good condition, 4 530 km are considered satisfactory and 5 611 km are in poor condition.

Railway infrastructure

In 1995, the state-owned railway operated services over 1 320 km of line, of which 1 150 km were in Moldova.

Virtually all railway track in Moldova (1 120 km) is built to the 1 520 mm broad gauge. Only 30 km of track is narrow gauge (1 435 mm). The network has a density of 34 km of line per 10 000 inhabitants.

The main railway lines serve principally the towns of Razdelinaya, Bender, Chisinãu, Ungheni and Bãlti for passenger traffic, and Razdelinaya, Bender et Reni for freight traffic.

All these lines are electrified and equipped with an automatic block system. Combined transport is possible.

There are six interconnections with railways in CIS countries, at Kelmentsy, Mãmãliga, Moghilev-Podolsky, Slobodca and Basarabeasca. There are also three interconnections with south-eastern and western European countries, at Ungheni, Prut and Reni.

Question 3: Capacity problems

Insufficient funding is the main problem facing the Republic of Moldova. Resources allocated for transport infrastructure investments have been decreasing since 1991.

Road transport

The age of the vehicle fleet considerably hampers traffic growth and generates extra cost.

Passenger traffic

Growth of international passenger traffic is being held up by the need to modernise the vehicle fleet, as more than 55 per cent of the 2 000 buses belonging to the Ministry have surpassed the end of their depreciation period and must be withdrawn from service.

The situation for urban passenger services is even worse. The cost of running the buses is so high that the Ministry is having to close lines and stop services in a growing number of urban centres: Ceadit-Lunga, Briceni, Riscani, Donduseni, Vulcanesti, etc.

The authorities are currently studying various external funding options that would make it possible to renew the fleet (foreign loans, leasing arrangements, etc.).

Freight traffic

The situation is similar for freight traffic in the road sector. Available funding is insufficient to enable Moldova to purchase western European vehicles that meet international road transport standards (notably for traffic with the European Union).

In order to compensate for the lack of funding, transport undertakings are adapting their working methods and developing additional services, such as:

- private car repairs;
- storage facilities;
- organisation of secondary production activities.

In order to alleviate day-to-day problems connected with loss of revenue, state-owned companies are reviewing the way they manage both their property and their staff. Most of them are obliged to:

- sell vehicles (e.g. give drivers the opportunity to buy their lorries);
- lease vehicles (150 leased lorries transport goods on national and international roads to Russia and Romania);
- review their administrative structure (which often means staff cuts).

Infrastructure

A complete rethinking of pricing policy and taxation will be necessary to finance transport infrastructures.

Rail transport

Once again, lack of funding is a problem. Given the poor condition of rolling stock, new equipment is needed in order to carry out repairs and overhauls. Vehicle use is increasingly limited. The difficulties are due to a number of as yet unresolved problems:

- the need to modernise rolling stock and equipment;
- insufficient depreciation funds;
- rates that are too low;
- lack of funds to replace railway track;
- the need to review the rail sector’s tax system (which is different from that of all other branches of the Moldovan economy).

It is estimated that $200 million are needed to improve the situation.

Question 4: Measures

Transport in Moldova is still in a state of upheaval. The Ministry is in the process of privatising the various services it has administered to date on the basis of economic incentives, current laws, the tax and licensing systems, and customs duties.

Furthermore, many standards are currently being drawn up for the different branches of the transport sector. For example, a new transport law will establish new rules for individual types of transport.

In this context, the Ministry needs to carry out a detailed analysis of the entire transport market. At present, priority has been given to collecting information on transport firms and their sector of activity. By analysing a maximum amount of data, the Ministry should be able to produce a transport bill that is well adapted to the situation in Moldova.

Legal constraints are a way of improving the situation in the transport profession and of barring firms with dubious practices that hamper the smooth functioning of the market economy and distort competition.

In addition, current bankruptcy laws make it possible to verify a firm’s solvency and determine whether decisions taken are reasonable. In this way, it should be possible to replace incompetent managers and improve productivity.

The authorities also intend to review their vehicle procurement policy. Whereas the fleet is sufficient in terms of number of vehicles, it is very out of date from a technological point of view and does not meet European technical standards. As a result, Moldovan vehicles are not authorised to operate in western European countries (except for a few vehicles still in a satisfactory state).

Lastly, there are not enough specialised vehicles (e.g. temperature-controlled, refrigerated), despite the fact that such vehicles are essential for transporting fragile goods such as foodstuffs over long distances, and that traffic of this kind accounts for 40 per cent of exports.

Solutions are urgently needed to all these problems, as they seriously affect Moldova’s capacity to trade with other countries.

The situation in the rail sector also urgently needs study, with a view to allocating additional funds so that rolling stock can be renewed and the infrastructure modernised.

NETHERLANDS

Area: 34 000 km²
Population: 15 500 000

In 1990, the Netherlands published its Second Transport Structure Plan (SVV-2). Its main objective was to make every effort to secure a "sustainable society" for future generations. With this aim in view, SVV-2 proposed a number of measures intended to facilitate accessibility, improve safety and safeguard the environment over the period extending to 2010. Four years later, it was possible to review the first results and to compare the forecasts on which it was based with actual traffic figures. The new SVV-3 will probably be published in 1999.

Question 1. Future trends in passenger and freight traffic

In drafting the SVV-2, the authors used a "medium growth" scenario based on the economic forecasts of the Central Planning Bureau (CPB). This scenario predicted:

- an increase in the population of the Netherlands from 14.5 million in 1986 to more than 15 million by 2010;
- smaller families, leading to a sharp increase in the number of households;
- ageing of the population;
- 29 per cent increase in the working population, mainly through rising numbers of working women;
- more jobs generated in the services sector than in other sectors;
- 65 per cent increase in the real income of the employed and an increase of over 85 per cent in real household income.

Before long it became apparent to the Dutch authorities that the economic and demographic assumptions on which the scenario was based were no longer valid, in that the rate of population growth, particularly for birth and immigration rates, had been underestimated. By 1991, the level that the population had been expected to reach by 2010 had already been attained, and the economy had not grown at the rate predicted.

Consequently, in 1992, the CPB published a new set of socio-economic scenarios based on assumptions about world-wide developments (CPB, 1992). The two world-wide scenarios developed for the Netherlands and used in transport planning are.

- Global Shift (GS). As its name suggests, this scenario is based on a shift in economic activities from countries surrounding the Atlantic to Pacific Rim countries. Consequently, it predicts a rather low growth rate. International co-operation and the integration of European economies would slow down. Adverse economic conditions in Africa and eastern Europe would produce a stream of immigrants into the Netherlands. Rather extensive use of regulatory measures would have relatively little effect.

– European Renaissance (ER). This scenario predicts economic recovery in Europe, accompanied by successful European integration. The Netherlands would have slightly higher average annual economic growth than in the 1985 "medium growth" scenario. Transport policy would be influenced by market conditions and by regulatory measures.

These new scenarios predict an increase in freight traffic, particularly road freight traffic, with a different modal split and different trends for population mobility. Therefore, new road transport policy measures have been developed for the period to 2010. They fall into two categories; "Package 1" measures relate to passenger transport and freight flows, while "Package 2" contains additional measures primarily consisting of higher taxes on fuels and pollutant emissions from utility vehicles from the year 2000 onwards.

Package 1

Passenger transport measures	Freight transport measures
Introduction of speed governors on buses	Introduction of speed governors on HGVs
Stricter implementation of ABC policy*	Development of measures to increase the productivity of road freight vehicles
Parking charges to double	Development of measures to promote the use of rail and waterway modes
Stricter standards for passenger car emissions	Stricter standards for HGV emissions
Improvements in local and regional public transport service	Improvements to the national rail network and the services it provides
Extension and widening of the trunk road network	
60 per cent increase over 1986 rates in fuel taxes in real terms	
30 to 40 per cent increase in public transport fares (depending on the scenario) to reduce operating deficits	

* ABC policy aims to improve coherence between access constraints of companies (as working places) and those on people's mobility. Companies should take these constraints and the possibilities offered by public transport services into account when deciding on their location. The policy seeks to optimise the use of public transport services and ensure access for all. Its enforcement could be strengthened by complementary measures such as stricter parking rules, depending on the urban area and the type of vehicle.

Vehicle-km trends by vehicle type for each scenario following the introduction of the measures outlined above

		2000		2010 *Package* 1		2010 *Package* 2	
1986 base-year index=100	1993	ER	GS	ER	GS	ER	GS
Private cars (based on working days)	119	125	120	137	130	129	109
Vans		179	159	240	219	240	219
HGVs and semi-trailers	132	151	132	216	189	216	189

Freight tonnage trends by mode for each scenario

Million tonnes

		2000		2010	
	1986	ER	GS	ER	GS
Road transport (1986 base-year index)	456 (100)	663 (145)	639 (140)	810 (178)	769 (169)
Rail transport (1986 base-year index)	18,3 (100)	32 (175)	22 (120)	55 (301)	25 (137)
Waterway transport (1986 base-year index)	238 (100)	309 (130)	268 (113)	364 (153)	281 (118)
Total (1986 base-year index)	712 (100)	1014 (142)	924 (130)	1229 (173)	1075 (151)

Passenger traffic

Mobility trends

The most recent data on private and freight mobility in the Netherlands are for 1995. The figures on private mobility show that as of 1994 Dutch drivers travel much more than what was forecast for 2000 in the ER scenario. Over the period 1990-95, the total number of kilometres travelled by private car (driver and passengers) increased by 10 per cent. Growth was mainly concentrated in the trunk road network, where traffic has risen by 40 per cent since 1986.

Such growth is in fact observed for all surface transport modes. Public transport, i.e. train, buses, underground and coaches, even increased by 17 per cent between 1990 and 1995.

Trends in mobility

Billion kilometres travelled, by mode

	1986	1990	1992	1993	1994	1995	2000*
Car (driver)	69.6	78.2	81.4	82.8	85.9	86.5	83.5
Car (passenger)	46.5	48.4	49.5	49.0	51.6	51.6	51.2
Train	8.9	11.1	15.0	14.8	14.4	14.0	±15
Tram/bus/metro	6.4	6.0	6.7	6.5	6.2	6.3	7.4
Private bus	5.9	5.2	5.2	5.7	5.4	5.8	
Taxi and others	6.3	7.7	4.6	5.2	8.8	8.2	
Bicycle	11.9	13.0	13.0	13.1	13.1	13.2	13.9
Total	155.5	169.6	175.4	177.1	185.4	185.6	

* European Renaissance scenario (ER).

Source: MIT, 1997-2001.

Whereas in 1992-93 the average daily distance travelled per person, principally on regular journeys and business trips by car, fell by 2.1 per cent, the situation in 1994 was about the same as in 1992. Nevertheless, between 1992 and 1994, the daily distance travelled for business trips was down by 18 per cent, to the benefit of leisure trips (up 38 per cent).

Trends in people's daily mobility, in km per day by purpose of trip and mode of transport

	Regular journeys		Business		Leisure		Other		Total	
	1992	1994	1992	1994	1992	1994	1992	1994	1992	1994
Private car	6.5	6.4	3.7	3.0	10.2	10.5	6.5	6.8	26.9	26.8
Public transport	1.3	1.2	0.2	0.2	2.0	1.8	2.1	2.0	5.6	5.3
Bicycle/moped	0.7	0.7	0.1	0.1	1.4	1.3	1.4	1.5	3.5	3.6
Other *	0.3	0.2	0.0	0.0	0.4	0.4	0.4	0.7	1.5	1.3
Total	8.7	8.5	4.0	3.3	10.4	14.4	10.4	10.1	37.4	37.2

* This category also includes journeys on foot.

Source: CBS.

Domestic traffic

Domestic traffic by mode, 1986-94

Billion passenger-km

	1986	1993	1994
Private car	123.3	140.5	146.9
Public transport	15.1	21.8	21.0
Motorcycle	1.9	1.4	1.4
Bicycle	11.9	12.4	13.0
Other	12.7	14.3	15.1
Total	164.9	190.4	197.4

Source: CBS.

Passenger transport by bus accounts for 90 per cent of domestic travel, with 67 million passengers per year over the period 1986-94. In 1994, domestic rail transport carried 306 million passengers, i.e. 100 million more than in 1993.

Freight traffic

Domestic traffic

Domestic traffic trends by mode, 1986-99
Million tonnes

	1986	1990	1992	1993	1994	1995	1999*
Road	364	393	407	392	391	398	455
Rail	5	5	5	5	4	5	8
Inland waterways	84	85	67	68	69	68	76

* These forecasts do not include traffic on the Betuwe Line.
Source: NEA/CBS.

International traffic

Although the overall volume of freight traffic is increasing steadily, the modal split has remained constant and should remain so from now to the year 2000. Air freight traffic accounted for barely 1 million tonnes in 1994 and is not expected to show much increase between now and 1999.

Trends in international traffic by mode
Million tonnes

	1986	1990	1991	1992	1993	1994	1999*
Road	92	120	126	132	131	134	164
Rail	13	13	13	12	12	13	22
Inland waterways	154	165	158	154	146	148	170
Pipeline	39	45	50	53	51	53	57
Maritime	321	348	367	355	343	349	400

* These forecasts do not include traffic on the Betuwe Line.
Source: NEA/CBS.

Trends in freight transit traffic, 1983-93
Thousand tonnes

	1983	1988	1992	1993
Inward + outward	84 366	104 629	103 929	80 831

Trends in import and export freight traffic, 1983-93
Thousand tonnes

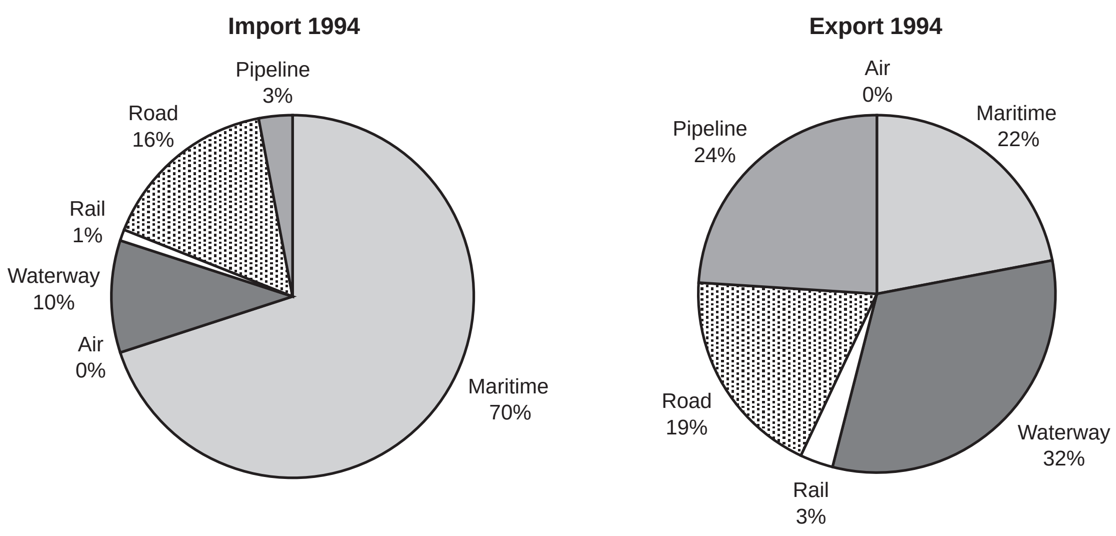
	1983	1988	1992	1993
Import	303 951	361 384	402 698	367 383
Export	235 721	282 503	342 663	334 575

The modal split for imports differs substantially from that for exports.

Maritime transport is still the main mode for imports, accounting for 70 per cent of traffic in 1993 as in 1983. The share of inland waterways declined by more than a third over the period 1983-93, no doubt losing out to road (whose share increased from 12 per cent in 1983 to 17 per cent in 1993).

On the export side, inland waterways are still the main transport mode despite a net decline in the overall volume of traffic carried, down from 39 per cent in 1983 to 29 per cent in 1993. However, the modal split of export traffic is much more evenly balanced than that of import flows.

Figure 1. **Modal split of import and export traffic flows in 1994**



Source: CBS.

International traffic is expected to increase from 246 million tonnes in 1987 to 393 million tonnes by 2010. The modal split is expected to be as follows:

– 196 million tonnes by barge;
– 145 million tonnes by road;
– 52 million tonnes by train.

International freight traffic follows two main routes: east-west flows are expected to total 242 million tonnes and north-south flows 151 million tonnes.

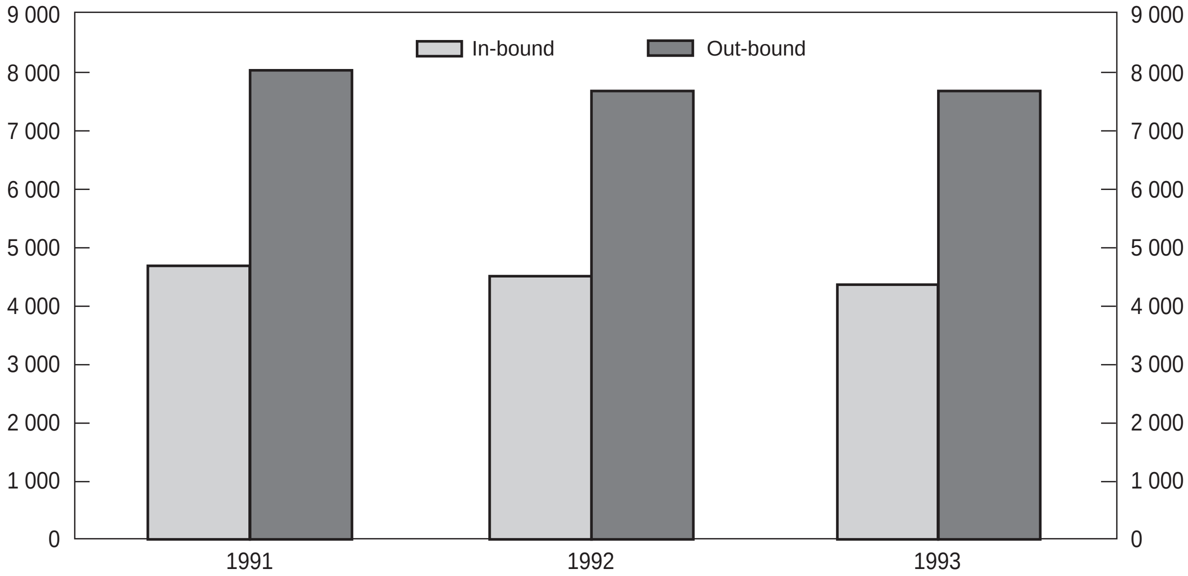
Road transport

Total freight carried by road in the Netherlands increased by 7 per cent between 1986 and 1994, to reach a total of 391.04 million tonnes in 1994, with 104 million tonnes for international traffic.

Rail transport

International rail traffic is broken down as indicated in the figure below.

Figure 2. **International rail traffic**
In thousand tonnes



Source: Dutch Ministry of Transport, The Hague.

Combined transport

According to forecasts, container traffic in the Netherlands should increase by a factor of four over the period 1990-2015. The "Plan for the Promotion of Intermodal Transport" forecasts that the freight carried in the Netherlands should increase from 40 million tonnes to 100 million tonnes between now and 2015 and that the market share of combined transport should rise from 30 per cent, the current figure, to 60 per cent.

Trends in container traffic

Thousand tonnes

	1986	1992	1999
Road	12 549	18 946	24 170
Rail	1 781	2 423	3 422
Inland waterways	1 934	4 755	6 186
Maritime	23 227	30 930	40 066
Total	39 491	57 055	73 844

Source : CBS.

Traffic by type of units, 1986-94

	1986	1990	1993	1994
Million wagon-km (rail)	210	-	167	160
Thousand sea containers	-	270	247	286
Thousand inland containers	-	29	28	34

Inland waterways traffic

Freight inland waterways traffic by containers, 1991-94

	1991	1992	1993	1994
Million t-km, domestic traffic	6 476	5 886	6 865	n.a.
Thousand containers, international traffic	464	500	633	683

Trends in the number of kilometres travelled in the Netherlands by all types of freight transport vehicles, 1986-95

Millions

	1986	1990	1991	1992	1993	1994	1995*
HGVs	3 365	3 782	3 973	4 094	3 943	3 710	3 530
Semi-trailers	1 719	2 362	2 511	2 671	2 741	2 770	2 820

* AVV forecasts.

Source: CBS.

Trends in international road traffic, 1986-94

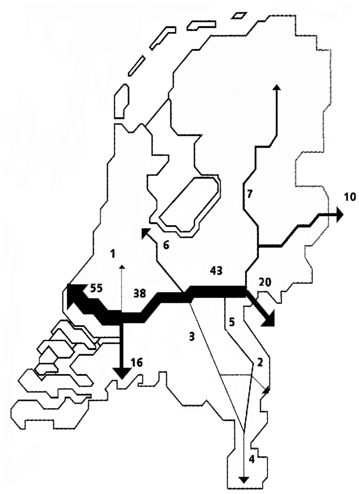
Thousand tonnes

	1986	1993	1994
Total	55 662	98 067	104 920
For hire	48 447	90 282	97 836
Own account	7 215	7 885	7 084

Rail transport

By 2010 overall rail freight traffic tonnage (i.e. both domestic and international) is expected to rise to 65 million tonnes, more than half of it on the Betuwe line.

Forecast traffic density on the Betuwe line by the year 2010
Million tonnes



Source: Dutch Ministry of Transport, The Hague.

The map shows international and domestic traffic flows on the new lines as well as other main rail connections.

Although forecasts are quite optimistic, domestic traffic has decreased by 20 per cent. After a sharp fall in 1992 and 1993, international traffic increased by 16 per cent in 1994.

Trends in railways traffic performed by the Dutch railways, 1986-94
Million tonne-km

	1986	1989	1990	1991	1992	1993	1994
Domestic	1 060	1 017	1 017	998	966	965	857
International*	2 209	-	-	2 031	1 786	1 675	1 949

* Tonne-km carried on the Dutch territory are included.
Source: CBS.

Air traffic

Although air transport has a small market share, the volume of freight handled at Schiphol airport increased by 42 per cent between 1992 and 1995.

Trends in air freight traffic
Thousand tonnes

	1992	1993	1994	1995
Total freight	695	775	834	988
Freight with Europe	106	115	121	126

Source : Luchthavenstatiseken.

Question 2. Present situation as regards infrastructure and investment projects

Investment by the central government in all types of infrastructure has risen steadily since 1986. Public transport has seen the largest increases, with the amount spent on infrastructure in 1996 4.4 times greater than the amount spent in 1986. The budget for infrastructure construction on the main roads network increased 2.2 times over the same period. However, the amount devoted to road construction increased by only 33 per cent over the same period.

SVV-2 includes an extensive investment programme for navigable waterways, again funded by the government. The 1995 construction budget was 44 per cent higher than in 1993. However as of 1996, funds were to be allocated only for maintenance, and the budget was lower than that of 1992.

Trends in investment by government in major transport infrastructure
Million guilders

	1986	1990	1993	1994	1993	1996	2000
Trunk roads:							
- maintenance	364	738	762	741	820	802	888
- construction and extension	643	876	769	1 013	704	852	1 025
- better use of capacity			131	-	111	251	282
Domestic inland waterways:							
- maintenance	274	309	319	331	316	372	396
- construction and extension	129	149	221	216	223	323	193
Dutch Railways (public tr.)							
- construction	282	479	698	873	698		
- maintenance			1 024	1 138	1 024	1 248	1 151
Urban and regional transport:							
- construction	-	-	-	361	462	-	-
- regional construction*	-	-	556	-	-	454	632

* In this field, it is not possible to estimate costs for before 1992, owing to a change in the accounting system.
Source: DG VI/FPI.

For the Ministry of Transport, building and maintaining new infrastructure are as important as their optimal use. In this context, traffic control technology plays an important role. Substantial sums are being invested in new traffic signal and flow management technologies (control of slip-road accesses, automatic signals) on the trunk road and secondary road networks (even outside urban areas). Traffic control also helps to alleviate road traffic congestion problems in the short term. For these reasons, investment is to be stepped up over the period 1996-2000, with spending on new technologies totalling Gld 1.6 billion.

Investment programmes

For several years, the two largest infrastructure investment projects have been the rail investment programmes.

A rail link for rail freight traffic, the Betuwe Line

This line will form the backbone of the Dutch rail network for freight and will also link it to the European network. The line, 160 km long, will serve the ports of Rotterdam and Amsterdam as well as Schiphol airport and will provide direct connections with the rest of Europe.

The construction costs for the project are expected to total ECU 4 billion. Financing is provided by:

- the national budget, through infrastructure funds and economic structure improvement funds;
- the Gelderland province;
- the European Union, through the TEN budget.

Private funding totalling ECU 750 million is also expected.

In policy terms, the project is intended to serve a number of purposes:

- to reduce road traffic growth;
- to offer attractive services in port areas to Dutch and foreign companies and to strengthen the country’s image as a multimodal base as well as making its port areas more competitive.
- to provide an alternative to congestion and pollution in the long term.

The Rail 21 programme.

This programme mainly concerns passenger rail transport. The aim is to increase infrastructure capacity by 60 per cent over the period 1990-2010. The Netherlands is also taking this opportunity to install a new signalling system that will enable high-speed trains to run independently of conventional trains on local networks.

Work has already started on many of the sections scheduled for construction or widening. The final decision on the route of the European Paris-Cologne-Brussels-Amsterdam (PCBA) high-speed line was taken in 1996, and the rolling stock was ordered. Total costs for this line should amount to ECU 4 billion and the line should be in operation in 2005.

Projects not included in the TEN scheme at the Essen Summit

In addition to the two Dutch projects identified at the Essen Summit (i.e. the European PCBA high-speed line and the Betuwe line), ten large financial projects have already been started (see the annex map).

Inland waterways projects

- Project No. 1. The Waal river project, total cost ECU 240 million, to improve waterway transport infrastructure and traffic control measures. Work has already begun and should be completed by 2002. Costs for the first phase (completed in 1995) already total ECU 65 million.

- Project No. 2. The Maas (Meuse) river project, total cost ECU 500 million, to upgrade infrastructure and widen bridges. Work has already started and is scheduled for completion in the beginning of the next century. Costs for the first phase (i.e. to 1996) totalled ECU 35 million.

Rail projects

- Project No. 3. To upgrade the Amsterdam-Utrecht-Maastricht line and widen it to four tracks. This project will considerably improve the TEN Amsterdam-Utrecht-Maastricht link. The work will be carried out in the Amsterdam, Loenen and Liempde areas. It should be possible to bring the line into service in 2005. The foreseen total cost is ECU 1 500 million.

- Project No. 4. The Amsterdam-The Hague-Rotterdam/Dordrecht. As of 1996, this project, scheduled for completion by the end of the century, should require only a further ECU 351 million to complete, for a total cost of ECU 2 billion. It consists of a number of sub-projects in the vicinity of Amsterdam, Leiden, the Hague and Rotterdam. Most of the line will be four-track, with some six-track sections.

- Project No. 5. The Rotterdam-The Hague-Utrecht line project, at a total cost of ECU 690 million, to double the track and build new structures in the Gouda, Woerden and Utrecht areas. Work is scheduled to be completed by 1998 with some parts being completed by 2004. Costs up to 1997 were ECU 400 million.

- Project No. 6. The high-speed line to the east (Amsterdam-Arnhem-German border). The overall costs of the first phase (Arnhem station) is scheduled to be competed in 1998 at a cost of ECU 50 million. Parliament has just given the go-ahead for work to begin on the entire length of the line, but the project will not be completed until before the next century. Total cost for this project should amount to ECU 3.8 billion.

Road projects

- Project No. 7. The A4 (Amsterdam-The Hague-Rotterdam) motorway project. At a total cost of ECU 800 million, this project involves the construction of new lanes and links, a second

Benelux tunnel and a second Schiphol tunnel. Work has already begun and totalled ECU 300 million to 1996. It will be completed when construction in the Schiphol area has been finished, i.e. in 1999. The second Benelux tunnel should be operational by 2002.

- Project No. 8. "Rotterdam Square", as it is known, involves work on the A15, A29 and A20 motorways: rebuilding the Giessenplein junction, adding another lane (from 2 x 2 to 2 x 3 lanes), improvements to the Caland Tunnel and new interchanges at a total cost of ECU 930 million. Costs for initial work, to 1996, have already totalled ECU 320 million. The construction work should be completed by 2000 except for the work on the Euroweg (2004).

- Project No. 9. Construction of a 2 x 2 express motorway on the A50 (Eindhoven-Oss) motorway at a total cost of ECU 583 million (500 in 1997 and later). Work has already begun and should be completed by 2003.

- Project No. 10. The A2 (Amsterdam-Maastricht) motorway. Rebuilding the junction with the A12 at Oudenrijn, building a second bridge over the Waal river near Zaltbommel and widening the A2 (from 2 x 2/3 to 2 x 3 or 2 x 4 lanes, depending on the section) for a projected cost of ECU 260 million. Work has already started. Costs to 1997 totalled ECU 113 million.

Question 3. Capacity problems

Ease of access and congestion

In view of the Netherlands' ambition to be a genuinely multimodal country, the Dutch authorities are very keen on accessibility. One of the main indicators for accessibility is the "probability of congestion", and it increased over the period 1987-92.

One objective of SVV-2 was therefore to reduce the risk of reaching a maximum congestion probability of 5 per cent on the national road network. For roads to the interior,[1] a limit of 2 per cent was set in SVV-2. However, in six years the percentage of the overall network where these limits are exceeded has more than doubled.

Parts of the road network where the probability of congestion is higher than 2 per cent on regional and local roads or 5 per cent on national roads and main corridors, 1987-93

	1987	1990	1991	1992	1993
Roads to the interior	13.9	25.7	33.3	33.8	33.6
Main roads	4.2	6.7	9.5	9.3	7.3
Other motorways	4.4	7.3	8.0	8.0	10.5
Total	7.5	13.8	15.1	15.9	16.2

Source: MIT, 1995-1999.

1. Motorways or highways linking the main Dutch harbours.

The situation is scarcely better for public transport. The number of trains running late has increased since 1990. While the situation seemed to have improved in 1993, 1994 figures show that 5.1 per cent of local trains ran more than five minutes late, as opposed to 2.9 per cent in 1993 and 3.4 per cent in 1992. However, according to the forecasts, these percentages should fall in 1996, particularly in the Randstad area where infrastructure capacity has been increased. Intercity trains are the ones most likely to run late: 9.6 per cent were more than five minutes late in 1994, compared with only 5.3 per cent in 1990.

According to SVV-2, efforts must be maintained to meet both quantitative and qualitative targets for improving public transport; in order to avoid traffic congestion problems on the trunk road network it is vital for public transport to be in a position to offer a quality alternative to driving.

It is also the responsibility of the authorities to ensure that optimum use is made of all existing infrastructure. Fares policy is an effective instrument for regulating the use of the different modes and for preventing road congestion. Therefore, groups to study the question should be organised very soon.

Safety

Despite continued growth in car ownership, there has been a slow but steady decline in the total number of road accidents (except in 1994). However, the fall is less marked than had been forecast in the mid-1980s. The target set for 2000 -- a 25 per cent reduction of the number of road accident casualties in 1985 -- will probably be met (for deaths and injuries requiring hospital treatment) but is unlikely to be met for all casualties. There was even an overall increase in the number of accidents in 1995.

It does not seem possible to meet the SVV-2's targets for the year 2010 -- a 50 per cent reduction in fatalities and a 40 per cent reduction in casualties as compared to the 1986 figures -- without a change in policy. Although it is becoming increasingly difficult to find measures that will reduce the risk of accidents, road safety remains at the heart of Dutch transport policy. If it were not, road accidents would probably increase by 25 per cent from now to 2010.

Road accident trends, 1986-95 and target for 2010

	1986	1990	1992	1993	1994	1995	2010 (SVV-2 objective)
Fatalities	1 529	1 376	1 285	1 252	1 298	1 334	763
Injuries	50 202	52 032	48 328	47 577	49 146	50 970	21 298
Requiring hospital treatment	14 704	13 652	11 654	11 562	11 735	11 688	8 823

Source: AVV.

Improved road safety levels were first noted in urban areas. The number of accidents on the roads outside urban areas also fell, but to a lesser extent.

Question 4. Measures

SVV-2 has set a number of minimum and maximum targets to be met in the period 1995-2010 in the areas of the environment, safety and accessibility.

The targets for accessibility and safety are those described above.

The environmental targets include:

- reduction in NO_x emissions from passenger cars to 40 thousand tonnes in 2010 (a 75 per cent reduction from the 1986 base-year index);
- reduction in NO_x emissions from commercial vehicles to 25 thousand tonnes in 2010 (a 75 per cent reduction from the 1986 base-year index);
- reduction in CO_2 emissions from all road vehicles to 20.7 million tonnes in 2010 (i.e. 10 per cent reduction from the 1986 base year index).

These targets are in line with those set in NEPP-Plus, the 1990 revision of the 1989 Dutch National Environment Plan. Measures to reduce NO_x and C_xH_y emissions have been maintained. Between 1986 and 1995, admissible rates for private car NO_x emissions were reduced by 30 per cent and for C_xH_y emissions by 33 per cent. For HGVs, there has been an increase of 20 per cent over the same period. Overall, NO_x emissions have decreased by 10 per cent over the period and CO_2 emissions have increased by 20 per cent. Therefore, the SVV-II target of not exceeding 1986 levels has yet to be reached.

Intermediate targets have also been set. Aimed at reducing mobility growth rates, they serve as guidelines for introducing certain measures:

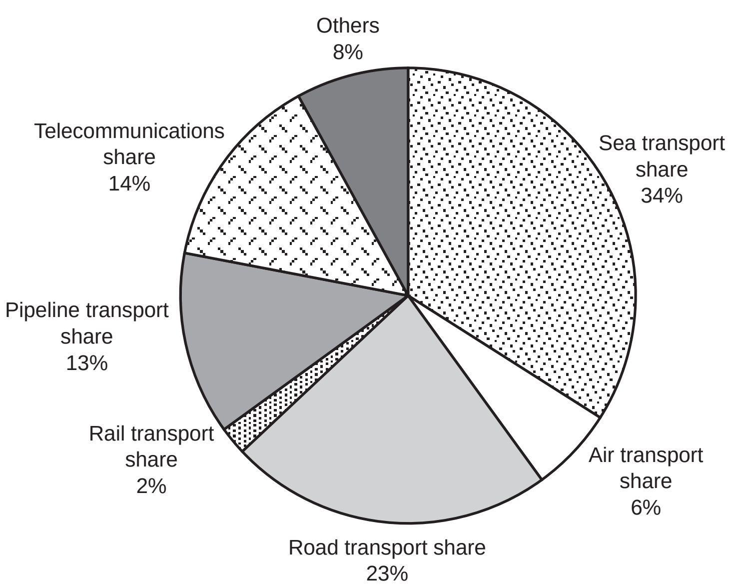
- Reducing the growth in passenger car use from 70 to 35 per cent over the period 1986-2010 through the introduction of a pricing policy (fuel price increases and electronic road pricing). For commercial vehicles, the target for growth of the utilisation rate is set at 40 per cent.
- Improving public transport by offering better services and building new infrastructure (Dutch Railways' Rail 21 programme).
- Implementing the Target Group policy, which includes special provisions for freight transport, commercial traffic and car pooling.
- Implementing the ABC policy (Country Planning) on parking problems, particularly for the workplace.
- Developing a company transport policy concept, to encourage firms with 50 employees and more to promote alternatives to private car use.
- Reducing traffic in urban areas.
- Selectively extending the road network and improving capacity.
- Implementing a land use policy aimed at grouping new housing, commercial and industrial developments in order to reduce the need for car travel -- the "compact city" concept.
- Decreasing by 2010 the rate of C_xH_y emissions to 40 k-tonnes for all vehicles.

NORWAY

Population: 4.3 million
Area: 324 000 km²

The share of transport activities in Norwegian GDP has grown steadily since the low of 1987.

Figure 1. **Modal shares of the gross product of the sector in 1991 (%)**



Source: Statistics Norway.

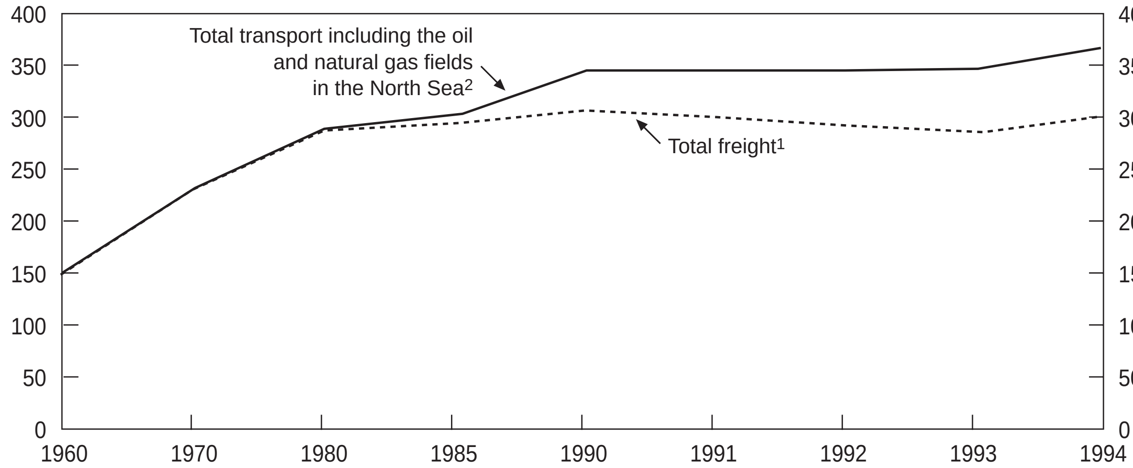
Question 1: Future trends in passenger and freight traffic

There have not been any very important changes in traffic trends since the 1991-92 study. The statistics supplied are not very recent, as Norway has not recently carried out a specific study of traffic trends.

Freight traffic

Domestic traffic

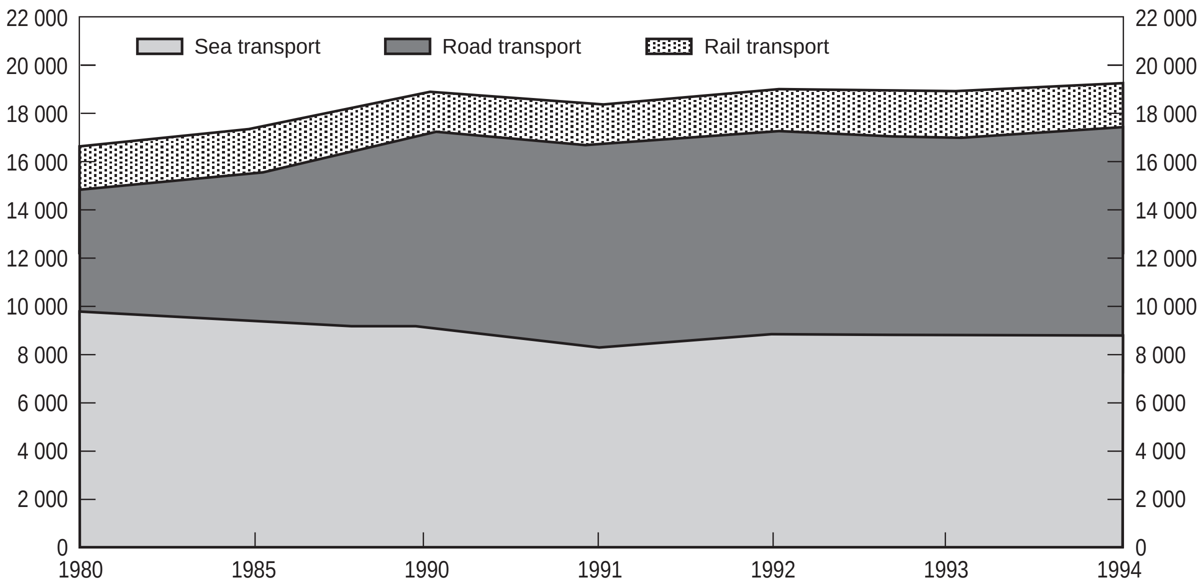
Figure 2. **Trend in domestic freight transport**
Million tonnes



1. Domestic surface traffic (sea, rail, road) and floating of logs, although this last river-sea "mode" has tended to disappear since 1985.
2. North Sea traffic is oil and natural gas by ship and pipelines from the oil and gas installations.

Source: Institute of Transport Economics, Norway.

Figure 3. **Trend in domestic freight traffic**
Tonnes-km



Source: Institute of Transport Economics, Norway.

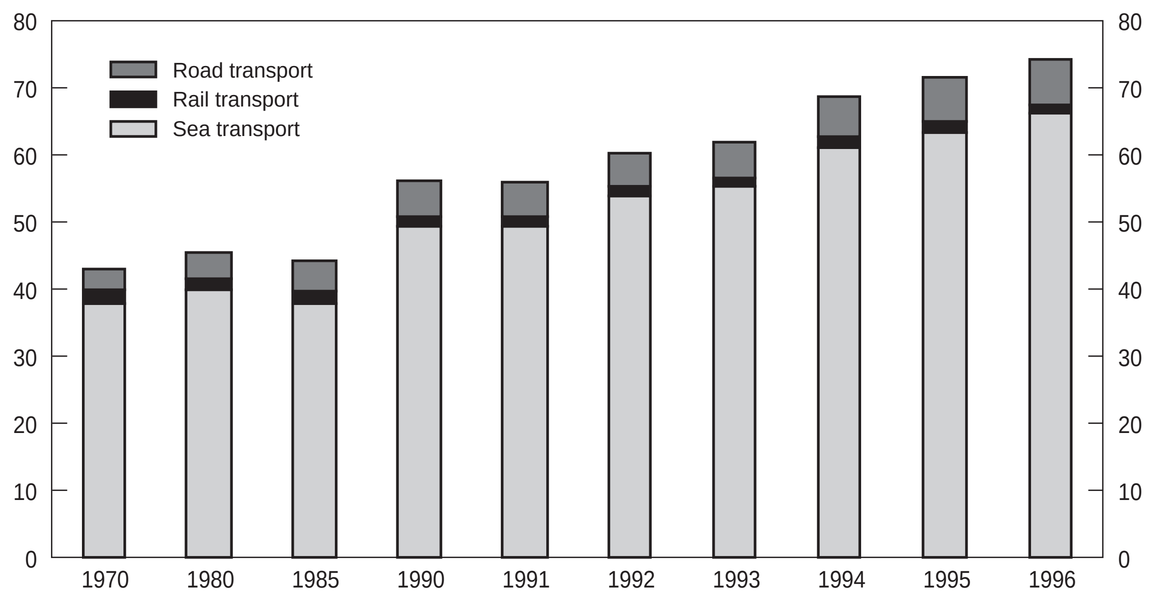
For some ten years, freight traffic for the three main modes has remained fairly stable at around 300 million tonnes. Nonetheless, the effects of the economic recession were felt in 1993 when total traffic fell to 280 million tonnes, the level of 1980. In 1994, however, the freight level returned to that of 1991-92.

Domestic freight traffic trends in the main transport modes, 1980-1994

Total	1980	1985	1990	1991	1992	1993	1994
Million tonnes	281.5	287.3	300.9	292.2	286.4	280.4	293.7
Million tonne-km	16 703.0	17 489.0	18 936.0	18 378.0	18 977.0	18 933.0	19 221.0

International traffic

Figure 4. **Trend in international traffic**
Million tonnes



Source: Institute of Transport Economics, Norway.

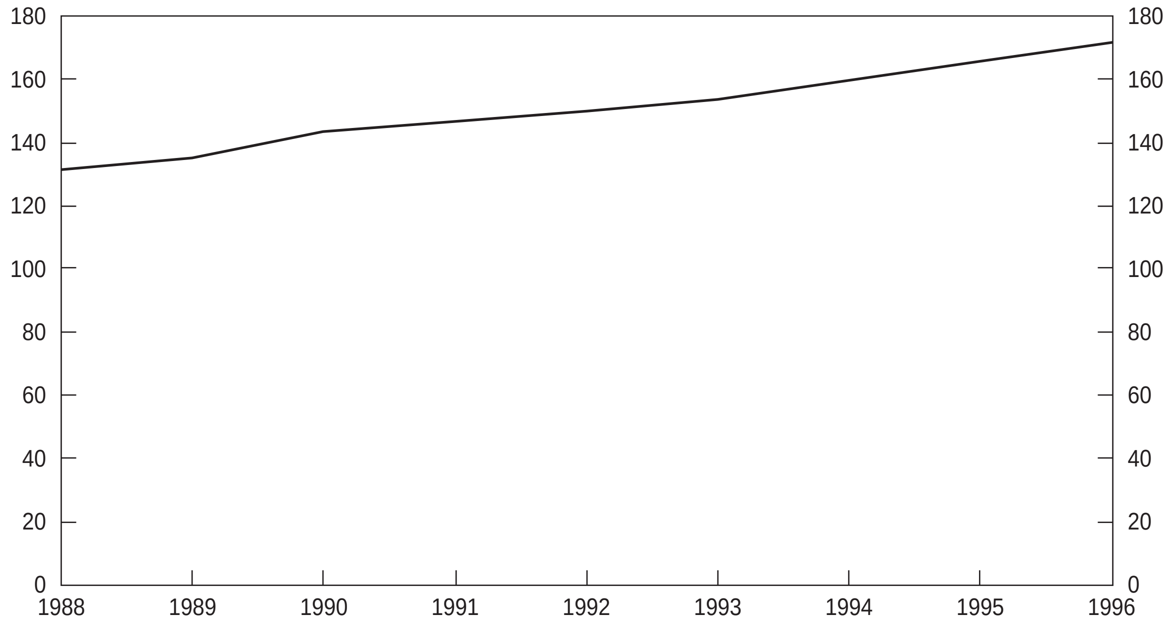
Road transport

Road transport	1980	1985	1990	1991	1992	1993	1994
Million tonnes	210.1	216.3	231	226	222	218	232
Million tonne-km	5 252.0	6 418.0	8 231	8 286	8 348	8 413	8 876

Despite the large volume of traffic on the North Sea, road haulage remains the dominant mode, with 79 per cent of the tonnage transported in 1994. The volume of freight has increased very little since the beginning of the decade: the 1994 tonnage is the same as that of 1990, after increasing by 7 per cent between 1985 and 1990.

Figure 5. **Total goods vehicles**

In thousands



Source: Statistics Norway.

The commercial vehicle stock has grown less rapidly since the beginning of the 1990s, and the growth rate has been below that of the 1980s.

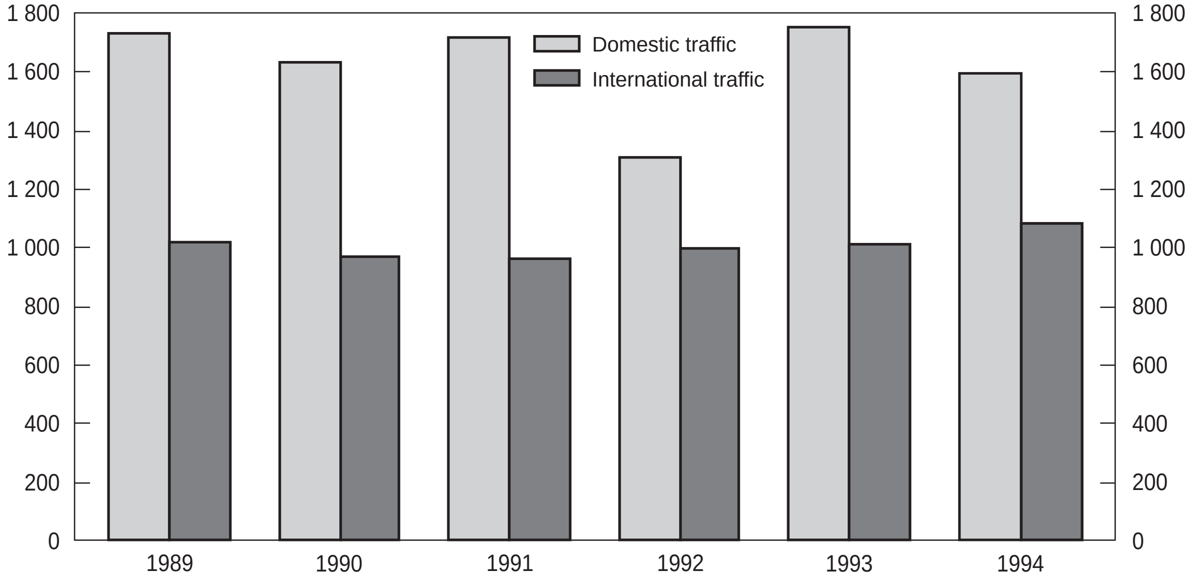
Rail transport

Trend in domestic rail traffic, 1980-1994

	1980	1985	1990	1991	1992	1993	1994
Million tonnes	9.4	9.1	6.8	6.8	6.0	5.6	4.9
Million tonne-km	1 657.0	1 771.0	1 630.0	1 717.0	1 305.0	1 754.0	1 599.0

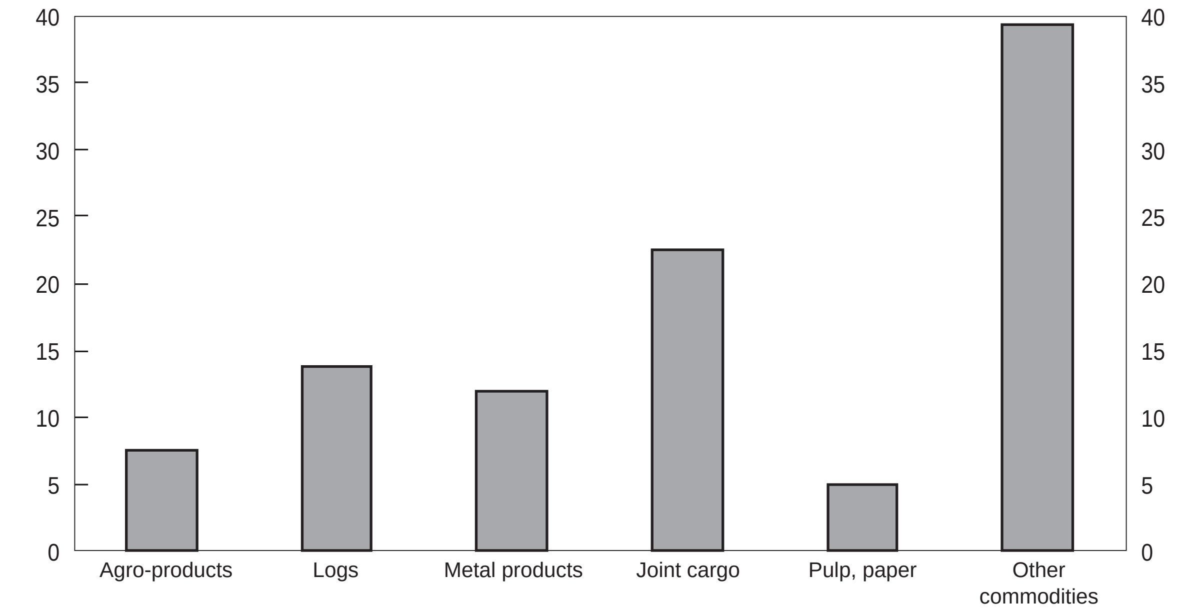
Domestic rail transport is being increasingly used for long distances, but in volume terms (tonnage) traffic has halved in the past 15 years. International rail traffic (imports and exports) has held up better.

Figure 6. **Trend in NSB domestic traffic**
Million net tonnes-km



Source: Statistics Norway.

Figure 7. **Domestic and international traffic, by product**
Percentage



Source: Statistics Norway.

Maritime transport

Trend in maritime transport, 1980-94

	1980	1985	1990	1991	1992	1993	1994
Million tonnes	62	61.9	63.1	59.4	58.4	56.8	56.8
Million tonne-km	9 794	9 300.0	9 073.0	8 374.0	8 883.0	8 746.0	8 746.0

Domestic maritime freight traffic fell in favour of road transport, but this mode is still used for long-distance transport. In tonne-km, its share of total traffic is the same as that of road haulage, 45 per cent.

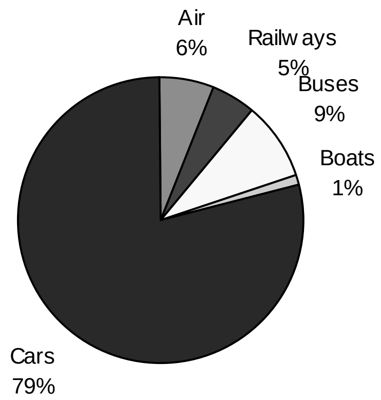
Air transport

Total traffic volume, domestic and international, amounted to 76 964 tonnes in 1993, of which 46 077 tonnes were domestic. Domestic air freight transport does not appear in tonnes, but only in tonne-km, because air is used above all for the rapid transport of high value-added light freight. In 1994, it amounted to only 20 million tonne-km.

Passenger traffic

Public transport by road still plays an important role in passenger transport, despite the rise in car use. As for rail transport, it would appear that rail services are better adapted to demand for passenger transport than for freight transport.

Figure 8 - **Passenger transport modal split in 1994**



Source: Institute of Transport Economics, Norway.

Road transport

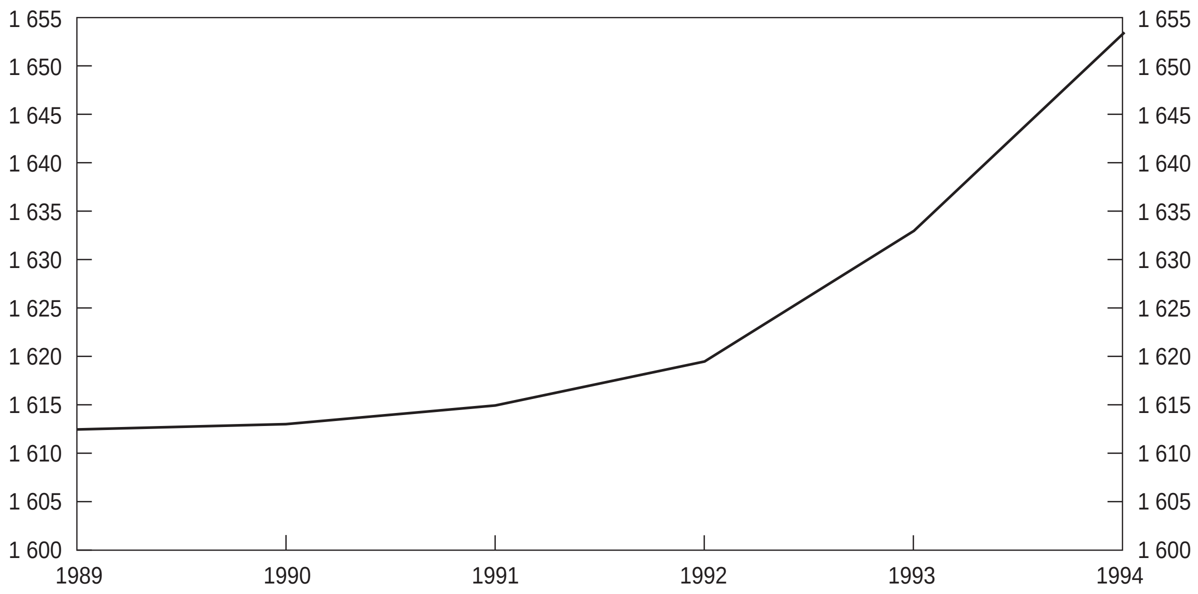
Road is clearly the dominant mode for both public and private transport, with over three-quarters of total traffic. However, cars and buses are mainly used for daily home-work travel. The average length of a trip by car is 14 km, far behind air travel, at 425 km.

Bus transport has represented 280 million passengers a year over the past ten years, or a slight fall as against the period 1960-80: -7 per cent.

Trend in regular bus traffic, 1987-91

	1987	1988	1989	1990	1991
Million passenger-km	3 742.8	3 900.	3 955.6	3 890.3	3 935.1
Thousand passengers	284 044.0	276 500.0	285 400.0	277 500.0	287 100.0
Capacity utilisation (%)	23.0	23.8	24.9	23.3	22.7

Figure 9. **Number of private cars**
In thousands



Source: Statistics Norway.

Car ownership has increased at a particularly rapid rate since 1991.

Rail transport

Trend in rail traffic, 1970-94
Million passengers

	1970	1980	1985	1990	1991	1992	1993	1994
NSB (state railways)	29	37	34	34	33	36	37	38
Suburban traffic	91	95	85	81	82	81	86	87
Total traffic	120	132	119	115	115	117	123	125

Rail traffic has remained fairly stable since 1970 and, in 1994 was broken down as follows: 70 per cent of the passengers used suburban trains and 30 per cent mainline services.

NSB, Norwegian Railways, increased its share of total rail traffic by 5 per cent between 1970 and 1980 and since then this total has remained fairly steady at some 38 million passengers a year. In international transport, the volume of rail traffic is less than 1 million passengers, despite a revival of international passenger traffic since 1992. This type of traffic is a declining share of the total volume of activity of the NSB : 0.6 per cent in 1995.

Air transport

Norwegian air traffic amounts to 18 million passengers a year, of whom 55 per cent on domestic flights. Traffic has been growing since 1980, but as a public transport mode its share of the total number of passengers remains negligible at less than 1 per cent.

In terms of passenger-km, total air traffic is growing strongly, up 27 per cent since 1990. This growth is explained by the great increase in traffic for destinations in Greece, Spain and Turkey.

Trend in domestic air transport, 1980-94
Millions passengers

	1980	1985	1990	1991	1992	1993	1994
Passengers	3	5	7	7	7	8	10

Domestic air traffic, which more than doubled in volume between 1980 and 1990, seems to have stabilised in recent years at some 8 million passengers a year.

Question 2: **Present situation as regards infrastructures and investment projects**

Road infrastructures

Length and composition of the Norwegian road network. 1988-93

Kilometres

	1988	1989	1990	1991	1992	1993
Total road network, of which:	87 578	88 174	88 922	89 135	89 737	90 502
National roads	26 030	26 147	26 221	26 265	26 386	26 406
Provincial roads	26 845	26 849	26 974	27 004	26 978	27 050
Local roads	34 703	35 177	35 727	35 866	36 373	37 046

The trunk road network is the backbone of the Norwegian road system. It connects different parts of Norway together and connects Norway to the rest of Europe. It represents about 25 per cent of the national road network, and about 40 per cent of the total transport on roads is on trunk roads.

Road surfaces in 1990

	% of paved roads*	% of unpaved roads
Total road network, of which:	70%	30%
National roads	98%	2%
Provincial roads	66%	34%
Local roads (in 1993)	55%	45%

* Including roads in towns.

Rail infrastructures

Composition of the Norwegian rail network, 1993

	Length (km)	of which electrified
NSB Lines	4 023	2 422
Private railway lines*	16	16
Tramways and rapid transit systems	217	

* Length as of 1 July 1991.

Major infrastructure projects

The Nordic Triangle is a joint project involving Finland, Sweden and Norway. It defines a network of rail and road infrastructures linking the towns of Oslo, Göteborg, Copenhagen, Stockholm and Helsinki. At the Essen conference in December 1994, this project was recognised as a priority, despite Norway’s refusal to join the European Union.

Road infrastructures in the Nordic Triangle

Route E6 running from Oslo to the Swedish border in the direction of Göteborg measures 120 km. This is the main route in the direction of Sweden and the continent. At present, about 50 per cent of all freight transported to and from Norway takes this road. Its modernisation is estimated to cost some ECU 240 million initially and a further 120 million later. The cost of the connection at Oslofjord is estimated at ECU 150 million. It would be the key element in the transport system between the Oslofjord region and Europe because it provides a link between the E18 to the west of Oslofjord and the E6 to the east.

Parliament has given its approval for the construction of the E6 as a motorway between Oslo and Svinesund at the Swedish border before the year 2000.

Route E18, running from Oslo to the Swedish border in the direction of Stockholm, measures 100 km in all. This is the second major route (for freight traffic) between Norway and Sweden, after the E6. Its modernisation will cost some ECU 415 million. Parliament has approved the upgrading of the E18 to motorway standard between Oslo and the county of Akershus as a long-term project.

The Oslo main roads plan (already approved by Parliament) includes sections of roads belonging to the E6 and E18 routes. The work is being financed partly out of the receipts of the Oslo Toll Ring and partly out of public funds.

Rail infrastructures in the Nordic Triangle

The Østfold line crosses this county and is at present 170 km long. It is the main rail link between Oslo and the south-eastern border with Sweden. The long-term investment programme drawn up by the NSB provides for:

- the construction of double-track line between Oslo and Halden (already started);
- the modernisation of the single-track line between Halden and the border;
- the construction of a new double-track link between Oslo and Ski, in addition to the existing line.

The cost of this work is estimated at ECU 1 200/1 300 million.

The Kongsvinger line running from Lillestrøm (6 km east of Oslo) to the Swedish border, between Magnor (Norway) and Charlottenberg (Sweden), is part of the Oslo-Stockholm rail link and measures 115 km. The rail section between Oslo and Lillestrøm will be upgraded as part of a programme for high-speed operation of a new line linking the capital to Gardermoen international airport. The work will be completed in 1998. Apart from the Oslo-Lillestrom section, this line will be single-track with overtaking sidings.

This Kongsvinger line is already of a fairly high technical standard as compared with the rest of the single-track network, and it should be possible to increase average speeds at fairly moderate cost.

Priority projects at national level

Norway gives six road projects as among the most important. They generally concern the primary road network, but three are located on roads of international interest.

County	Road	Nature of the work	Date	Cost (Million NKr)
Buskerud	National road n°11 Drammen-Mjøndalen section	Construction of a new section (initially 2 lanes) over 12 km	1995-1999	738
Vestfold	E18, Gutu-Helland section	Construction of a new section (initially 2 lanes) over 30 km	1995-2000	1 100
Hordaland	Road n°555 Nygårdstangen-Gyldenpris section	Construction of a 1.6 km section in the west corridor of Bergen	1995-1998	520
Sogn og Fjordane	E16, Aurland-Laerdal section	Construction of a tunnel of 24 km, replacing the present ferry line	1994-2000	825
Sør Trøndelag	National road n°714 Connection between the islands of Hitra and Frøya and the mainland	Construction of submarine tunnels: one of 5,8 km between Hitra and Frøya one of 4,9 km between Hitra and the mainland Construction of a bridge connecting Hitra to Fjellværøy	Planning under way	Not estimated
Finnmark	E69, connection of the island of Magerøya with the mainland	Construction of a new E road, with a submarine tunnel of 6.8 km, an overhead tunnel of 4 km and 640 m of bridges	1993-1998	770

In rail infrastructures, there are priority projects on four lines, as shown on the annex map.

Project N°	Line	Nature of the work	Date	Cost (Million NKr)
1	Gardermoen	Construction of a high-speed line between Oslo and the airport, then north as far as Eidsvoll	1995-1998	5 645
2	Oslo-Eidsvoll	Construction of a link and crossing between the existing Oslo-Eidsvoll line and the new Gardermoen line	1995-1998	640
3	Vestfold	Construction of a double-track section on the existing line (at present single-track) : 3.1 Between Åshaugen, Sande and Holm 3.2 Between Skoger and Åshaugen	 1996-1998 1996-2000	 400 400
4	Oslo-Bergen	Upgrading of the existing line through reducing the number of curves and making certain sections double-track (Tunga-Finse and Gråskallen)	1993-1999	425

Question 3: Capacity problems

For road transport, traffic loads vary greatly from one county to another and also from one section of road to another. Average daily traffic is among the highest in the county of Akershus over a section of the E18, at 90 000 vehicles in 24 hours. On another section of the road, on the border between the counties of Telemark and Aust-Agder, average daily traffic is about 4 000 vehicles in

24 hours. Certain counties, such as Sogn og Fjordane, have average daily traffic volumes of between 1 051 and 1 985 vehicles in 24 hours, depending on the road sections surveyed.

The number of road accidents has remained stable for over ten years, with an average of 8 500 accidents a year. This figure is the second best in Europe, after Iceland.

Question 4: Measures

A major challenge in the years ahead will be to improve mobility, both for the population and for commerce and industry, within the limits imposed by environmental concerns and traffic safety, especially in urban areas. In particular, environmental considerations will place constraints on transport policy. One of the government's challenges is to promote greater co-ordination and balance between different zoning and transport solutions, on the one hand, and regard for natural and cultural environmental issues, on the other, so as to diminish controversial encroachments. The Government also attaches importance to the initiation for measures which abate environmental and traffic accident problems, especially in urban areas, and which contribute to reducing or stabilising emission levels.

The government plans to develop administrative management schemes and planning systems and processes that facilitate global solutions for the use of existing transport systems and co-ordinated investment projects. The government plans to emphasise the development and use of information technology with a view to improving transport efficiency.

Improved co-ordination among sectors is a way to meet transport policy goals at the lowest possible cost. One important challenge is achieving efficient co-ordination through close contact between land and sea transport in ports and combined transport arrangements. The government also attaches importance to greater co-operation on measures to establish joint public transport terminals, provide better facilities for transferring from one means of transport to another, and improve fare and ticketing systems, etc.

POLAND

Area: 312 685 km²
Population: 38 600 000

The years 1990-93 saw a substantial fall in the output of basic industry and therefore in rail transport of steel products, fertilisers, coal and construction materials. At the same time, (smaller) enterprises in wholesale and retail trade, services and production of consumer goods, which generally use road transport, developed considerably.

The pattern of foreign trade also changed, with trade with eastern Europe declining, while that with the west increased.

Also during this period household incomes fell and unemployment rose, with 3 million people (or 15 per cent of the active population) out of work. Despite this, car ownership rates increased rapidly.

Between 1990 and 1992, GDP fell by 20 per cent, from 649 525 billion to 538 609.1 billion old zlotys, but in 1993 there was an increase of 4 per cent. Freight transport increased by 6 per cent. Both Polish and foreign experts predict GDP growth of 5 to 6 per cent a year for the next few years.

Question 1: Future trends in passenger and freight traffic

Particularly strong traffic growth is expected in the Baltic region in the period to 2010. Studies show considerable development of both freight and passenger flows (notably tourists) between Poland and Sweden, Denmark and Norway. Traffic from the Baltic to Europe is expected to increase by 80 per cent, traffic from Sweden and Denmark by 60 per cent and from Finland by 64 per cent. Poland should have the highest growth, with a 170 per cent increase in total volume of traffic in the Baltic region.

Passenger traffic

The studies of modal split for 2005 predict an increase in the market share of air transport and in car ownership rates. The number of rail and bus passengers is expected to decline, whereas in 1992, development scenarios to 2000 predicted an increase in public transport by both rail and road.

Passenger transport modal split in Poland
Percentage of passenger-km

Mode	1990	1995	2000	2005
Car	39.1	66.1	69.3	73.2
Rail	30.9	13.9	12.1	10.1
Bus	27.4	17.6	15.2	12.7
Air	2.6	2.4	3.4	4

Forecasts for traffic volume indicate a somewhat different modal split for 2005 and an even greater increase in car use, with the number of those using cars multiplied by three. An increase in the number of users of road and rail public transport is however expected as of 1995. It seems that there is a change in patterns, rather than usage, with greater numbers adopting public transport for shorter trips.

Passenger traffic trends, 1990-2010
Million passengers

	1990	1993	1995	2000	2005	2010
Rail	789.9	541.1	465.9	638.2	750.7	888.4
%	*15.9*	*10.3*	*8.6*	*9.7*	*9.5*	*9.7*
Bus	2 084.7	1 380.8	1 423.1	1 618.4	1 800.6	1 850.1
%	*41.8*	*26.4*	*26.3*	*24.6*	*22.8*	*20.3*
Air	1.7	1.4	1.8	3.5	5.9	9.2
%	*0.02*	*0.03*	*0.03*	*0.05*	*0.06*	*0.1*
Waterway	3.8	0.6	0.6	0.7	0.7	0.8
%	*0.07*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*
Sea	0.6	0.7	0.7	0.9	1.2	1.9
%	*0.01*	*0.01*	*0.0*	*0.01*	*0.02*	*0.02*
Car	2 099.0	3 310.5	3 512.3	4 309.5	5 351.9	6 352.6
%	*42.2*	*63.2*	*65*	*65.6*	*67.7*	*69.8*
Total	4 979.7	5 235	5 404.2	6 571.2	7 911	9 103

Air transport

For air transport, the number of passengers is increasing more rapidly than the distances covered. The domestic market still seems to account for a substantial proportion of total traffic.

Maritime transport

Passenger transport by sea in the Baltic is growing very strongly and the forecasts for this area confirm this trend.

Ferry traffic in Polish ports to 2010

	1993	2010
Passengers	690 000	1 900 000
Cars	130 000	450 000

Freight transport

Road transport is expected to increase by 30 per cent between 1995 and 2005. Rail transport and pipelines will see traffic decline. However, in tonne-km, rail transport should keep a large share of the traffic.

Freight transport modal split

Percentage of t-km

	1990	1995	2000	2005
Road	29.1	38.1	45.2	49.5
Rail	60.1	51.3	46.8	44.1
Waterway	0.7	0.6	0.5	0.4
Pipeline	10.1	10.0	7.5	6.0

For volume of freight transported, the declining trend of the early 1990s ceased in 1993, and there has even been an increase of about 1.5 per cent.

Freight volume on the domestic Polish market, 1990-2010

Million tonnes transported and percentage of total domestic freight

	1990	1993	1995	2000	2005	2010
Rail	281.7	214.2	225.3	289.7	336.3	367.9
%	*17.1*	*15.9*	*16.3*	*15.8*	*15.2*	*15.2*
Road	1 292.3	1 071.2	1 086.7	1 459.8	1 769.8	1 935.9
%	*78.6*	*79.4*	*78.8*	*79.6*	*80.2*	*80.2*
Pipeline	33.0	31.2	33.3	44.3	53.3	57.8
%	*2.0*	*2.3*	*2.4*	*2.4*	*2.4*	*2.4*
Waterway	9.8	8.7	9.3	11.1	12.4	14.1
%	*0.6*	*0.7*	*0.7*	*0.6*	*0.6*	*0.6*
Sea	28.0	23.9	24.9	29	35.4	38.4
%	*1.7*	*1.8*	*1.8*	*1.6*	*1.6*	*1.6*
Total	1 644.8	1 349.2	1 379.5	1 833.9	2 207.2	2 414.1

Road transport

Private road haulage has developed enormously and taken freight away from the railways.

Waterway transport

Waterway transport is the least important mode, because of inadequate infrastructures and the shallow draught of the rivers. However, it is stable, whatever the economic trend.

Rail transport

For many years the railways dominated freight transport, but their market share is falling drastically and a dynamic recovery is unlikely owing to the economic recession in Europe. The slight increase in volume transported between 1993 and 1994 was due both to the generally improved economic situation in Poland (and a revival of demand) and to increased efforts by the railways, notably for rates.

Combined transport

Combined transport is a fairly new concept in Poland and has enormous potential. Initial traffic estimates for combined transport in 2010 predict volume of 6 to 8 million tonnes. Increases in the volume of intermodal consignments are expected to concern particularly the seaports and the east-west corridor through the central regions of the country.

Question 2: Present situation as regards infrastructures and investment projects

Poland's location, at the crossroads of the European Union, the CIS countries, central Europe, the Scandinavian countries and the Balkan countries, obliges it to develop an efficient transport network that meets European standards. In order to build such a network, government policy takes into account the natural development of these transit flows and the traffic induced by the country's possible integration into the European Union. From this standpoint, Poland should play an important role in the framework of the TEN.

Road infrastructures

Infrastructures used by international traffic

Recognising the needs of domestic and international traffic, the Polish authorities approved a motorway and expressway development programme in 1993. According to the government, this will be the biggest Polish infrastructure investment project of the next 15-20 years. It is essential in view of the present congestion on the main international routes. It is also presented as an optimal solution from the environmental standpoint and should permit the more rapid integration of the Polish transport system into the European system.

On 27 July 1993, the Polish cabinet accepted the motorway construction programme in its decision 63/93. In December 1993, the Cabinet's Economic Committee recommended that this programme be extended from 1 961 km to 2 600 km.

This project includes a section, already completed, of 140 km of roads to be set up as toll roads. A section of 200 km of single and dual carriageway is to be entirely modernised.

In 1994, the cost of constructing these motorways was estimated at $7.8-8 billion.

The following motorways are part of the priority corridors of the TEN, as defined at the Crete Conference. These projects thus concern horizon 2010:

- A1 (Helsinki) Gdansk-Lodz-Katowice-Gorzyce (Zilina). This motorway constitutes a section of the TEM network, serving 11 European countries and providing a link with eastern Europe;
- A2 (Berlin) Swiecko-Poznan-Lodz-Warsaw-Terespol (Minsk-Moscow);
- A4 (Dresden) Zgorzelec-Wroclaw-Katowice-Krakow-Przemysl (Kiev);
- A12 (Berlin) Olszyna-Krzywa (Legnica).
- one expressway linking Warsaw, Suwalki and Szypliski (Kaunas-Riga-Tallinn) (Via Baltica).

Two other motorways are also included in this programme because they could form part of the TEN in the future:

- A3 Szczecin-Lubawka-Czech border (Prague);
- A8 Lodz-Wroclaw-Bolkow-Lubawka.

All these links are of equal importance for the development of the motorway programme, and all are to be toll motorways. The legal framework for building toll motorways was recently established with the passage of the Toll Motorways Act.

The growing demand for road transport (with 6.5 million vehicles) means that the government must develop and modernise the roads, but also parking facilities. Differentiation of the road system is also necessary to meet the needs of the different users. The construction of bypasses is essential to ensure the smooth flow of transit traffic and eliminate congestion zones on urban roads.

The ten short-term national projects

These are infrastructure or upgrading projects on axes located outside the TEN corridors:

1. Modernisation of the E-36 road (A6 motorway), Kolbaskowo-Szczecin section

This is a section of 21 km in the direction of the border with Germany at Kolbaskowo. Modernisation involves reinforcing the existing concrete carriageway, widening the hard shoulders to 2.75 m, building soft shoulders, erecting safety barriers, constructing interchanges for access roads and second lanes on the bridges over the West Odra (length 206 m) and East Odra (length 227 m). Work started in 1995 and is scheduled for completion in 1997. The cost of the project is 32.8 million new zlotys.

2. Construction of a bridge at Wyszogrod

Construction of a bridge of 1 200 m over the Vistula together with new access roads (10 km) and regulation of the river over 4.5 km. Work should start in 1996 and be completed in 1998. The total cost is estimated at 114.7 million zlotys.

3. *Elimination of bottlenecks on the E-65 road (road N° 3) over the following sections:*

- the Nowa Sol bypass (1st stage), involving the construction of 9.5 km of road, one rail bridge and three road bridges;
- construction of a bypass of 3.4 km round Stare Czarnowo-Zabow, bitumen shoulders over a length of 10.4 km and reinforcement of the carriageway;
- the opening of an interchange at Niedoradz in 1998 (work begun in 1994). The project will cost 57.4 million zlotys.

4. *Road No. 944, reconstruction of a section of 26.2 km between Zywiec and Zwardon (Slovak border crossing)*

The work involves reinforcing the existing road, building a new carriageway to third class technical standards and building certain civil engineering works. Work started in 1995 and is expected to take five years and cost 64.1 million zlotys.

5. *Modernisation of road No. 817 (Radzyn) Wisznica-Slowatycze*

This section will provide a new border crossing with Belarus (Slowatycze-Domaczewo). In addition to the renovation of 21 km, the work, started in 1995, also involves widening the existing road from 6 to 7 m, with reinforcement of the structure and improvement of the longitudinal profile. Total cost is estimated at 14 million zlotys by the end of 1997.

6. *Elimination of bottlenecks on the E-77 road (road No. 7) over the following sections:*

- Construction of a second carriageway over 21.9 km and seven grade-separated interchanges (including one at Siedlin, at the intersection of national roads Nos. 7 and 10) between Zakroczym and Plonsk.
- Bypass of 5.3 km round Milomlyn, reconstruction of the perpendicular road and construction of a pedestrian crossing on two levels.
- Construction of a second carriageway over 10.9 km between Jedlynsk and Radom and a bridge over the Mleczna, reconstruction of the existing intersections with the perpendicular roads, modernisation of the traffic island, installation of lighting.

These projects, planned for implementation between 1993 and 1997, are expected to cost 106.5 million zlotys.

7. *Modernisation of road No. 15 Wojkowice-Jezor over a length of 23.8 km*

The aim is to increase the carrying capacity of the carriageway and improve safety. It is planned to comb the existing road surface over constructions and accesses, replace existing concrete pavement with bitumen, improve the surface of the shoulders, and construct a new polymer-based carriageway.

The bridge is also to be renovated, with the construction of a reinforcement slab adapted to longitudinal and transversal expansion and contraction. The beams and trusses of this bridge are also to be protected. The work is planned for 1995 and 1996, for a total cost of 40.3 million zlotys.

8. Elimination of the bottlenecks on road No. 15 Wojkowice-Jezor over a length of 23.8 km

This work involves reinforcing the existing carriageway and building a hard shoulder on the Zakret-Kolbiel section (over 15.6 km), reinforcing the existing carriageway over a length of 11.1 km between Kurow and Garbow, and reinforcing the existing carriageway and constructing hard shoulders over a length of 8.6 km between Ryki and Zyrzyn. Two years of work are planned from 1995, at a cost of 30 million zlotys.

9. Construction and modernisation of roads Nos. 132 and 133

This concerns 56.6 km of road for the German border crossing (at Kostrzyn), at the intersection with road No. 22, and involves reconstructing the urban segment of road No. 132 to Gorzow Wielkopolski.

It is also planned to construct four bypasses, reinforce the carriageway to 100 kN/axle, widen the road and build a bridge over the railway. At Gorzow Wielkopolski, a new section of road No. 132 is to be built, with a bridge over the Ulga canal. The cost of this project is 116.4 million zlotys for five years of work (1995-2000).

10. Modernisation of roads Nos. 274 and 275, which lead to the German border crossing at Gubinek

This involves building a bypass at Gubin and a new bridge over the Nysa (length 12 km), increasing the loading capacity to 100 kN/axle, widening one carriageway and the shoulders, constructing two bypasses around villages and renovating the road bridge. The north-west bypass of Zielona Gora is also part of the programme. This work (1995-97) will cost 93.2 million zlotys.

Rail infrastructure

The Polish rail network is relatively well developed, even by western European standards. The density is about 7.2 km standard gauge rail track per 100 km^2. The total length of the standard gauge rail is some 23 300 km.

This mode of transport is fairly accessible, thanks to a dense network of some 2 000 freight stations and over 1 700 passenger stations. Of 33 500 km of mainline track, 9 400 have type UIC 60 rails, and some 5 000 are suitable for a loading of 225 kN/axle. In all, 11 496 km of track are electrified, or 49 per cent of the standard gauge lines (3 kV DC). In 1995, 90 per cent of the total traffic (in tonne-km) was transported by electric traction.

International routes

The main international rail routes involving Poland are those defined by the AGC agreement, signed in Geneva in May 1985:

- E59 Swinoujscie-Szczecin-Wroclaw-Opole-Chalupki;
- E65 Gdynia-Gdansk-Warsaw-Katowice-Zebrzydowice;
- E20 Kunowice-Poznan-Warsaw-Terespol;
- E30 Zgorzelec-Wroclaw-Katowice-Krakow-Przemysl/Medyka;

with the following complementary routes:

- Zgorzelec (alternating with Miedzylesie) Wroclaw-Wielun-Belchatow-Piotrkow Tryb-Idzikowice-Kuznica-Bialostocka, particularly for freight traffic;
- for international passenger traffic on the Rome-Vienna-Warsaw-Vilnius-Saint Petersburg route two new stretches appear essential: Idzikowice-Piotrkow and Belchatow-Wielun-Wroclaw;
- for international passenger services on the Scandinavia-southern Europe route (Kracow-Pielkielko-Muszyna), the construction of the Krakow-Tymbark stretch is also planned.

In all, the Polish network has over 5 000 km of lines of international importance.

The enhanced speed and quality of rail services over these links will make it possible to compete effectively with road and air transport.

The master programme drawn up by the PKP for the development of rail infrastructures up to 2010 provides for the modernisation of a certain number of lines.

The government intends to modernise the E20 line over its entire length, i.e. from the German border (Kunowice) to the Belarus border (Terespol), in two stages:

- First, the section to the west of Kunowice via Poznan (478 km). The work, started in 1992, should be completed in 1997 at a cost of ECU 487 million, partly funded by the European Union through the PHARE plan.
- Second, the 210 km of the Warsaw-Terespol section, with the bypass round Warsaw (length 182 km). A feasibility study (financed by the PHARE plan), carried out by the Italian company TEAM, is currently under way.

For the E65 line, studies and tests with Pendolino trains in May 1994 over the Magistrale Centrale Rail (CMK) section, from Grodzisk Maz to Zawiercie showed that it was possible to run at 250 km/h. The PKP plans to adapt this line for 250 km/h operation. This project, together with the modernisation of the following section, Zawiercie-Katowice-Zebrzydowice, will permit high-quality links in the year 2000, with speeds of at least 160 km/h between Warsaw, Krakow and Katowice and on to Prague, Bratislava, Budapest and Vienna.

The third priority is the modernisation of the E30 line for passenger and combined transport traffic. Joint work with the DB AG on the Dresden-Wroclaw section results from the joint application by the PKP and the DB AG to the European Commission for the attribution of PHARE aid for a feasibility study. The PKP management received a favourable opinion for the financing of such a study (carried out by the French company Systra).

A similar agreement was concluded with the Ukrainian Railways (UZ) concerning the modernisation of the line between Przemysl and Lvov. This involves introducing 1 435 mm gauge track on this line and installing it in the Lvov international passenger station (now in the planning stage). This would make possible better connections to Kiev, Odessa and the other major Ukrainian towns. This project, according to the PKP, merits European Union financial aid under the TACIS programme. The modernisation of the entire line would permit operating speeds of 160 km/h.

Rail projects outside the priority corridors

The PKP has proposed a further nine projects for the modernisation of rail sections:

1. E59 Swinoujscie-Szczecin-Poznan-Wroclaw-Opole-Chalupki with the modernisation of the border crossing at Chalupki;
2. CE59 Swinoujscie-Szczecin-Zielona Gora-Wroclaw-Opole-Chalupki;
3. C59/1 Nowa Sol-Wegliniec-Zawidow with the modernisation of the border crossing at Zawidow;
4. C59/2 Wroclaw-Miedzylesie with the modernisation of the border crossing at Miedzylesie;
5. C30/1 Krakow-Tymbark-Muszyna with a branch for Tymbark-Zakopane;
6. Warsaw-Lublin-Dorohusk (Kijow) with the modernisation of the border crossing at Dorohusk;
7. Chelm-Hrebenne (Lvov) with the modernisation of the border crossing at Hrebenne;
8. Gdansk-Bydgoszcz-Poznan;
9. E26 Wroclaw-Idzikowice/Lodz-Warsaw

For each of these projects, the PKP has already started or intends to start work considered particularly urgent, such as:

- Ad 1-E59: Modernisation of the Poznan-Wroclaw section to permit operation at 160 km/h has begun. The work is financed from the state budget and should be completed in 2000. In the meantime, the Swinoujscie-Chalupki section is also to be upgraded to operate at 160 km/h.
- Ad 2,3-CE59: For this route, feasibility studies are being carried out in partnership with the Czech Railways, because in the longer term the rail link between Poland and the Czech Republic will be modernised.
- Ad 4-C59/2: Partial modernisation of this line involves electrification of the Klodzko-Polish border section and is financed by the PKP. The Klodzko-Miedzylesie section is already in service. For the missing section at the border, the Polish authorities have applied for international financial aid, through the PHARE programme. The application for financing (0.8 million ECU) for the feasibility studies for the E59 and C59/2 lines has been submitted.
- Ad 5-C30/1: On the Krakow-Tarnow-Muszyna section, journey times are very long and not suitable for international trains going to Slovakia. Construction of the missing Krakow-Tymbark section (35 km) and upgrading for 120 km/h operation from Muszyna will make it possible to reduce journey times considerably and offer better services to passengers. This is also true of the whole of this line. In addition, the results of feasibility studies are very favourable.
- Ad 6-Warsaw-Lublin-Dorohusk (Kijow): The PKP plans to upgrade the Warsaw-Lublin section to 160 km/h, in line with a programme drawn up in collaboration with Ukraine. The studies and financing plans have been accepted.
- Ad 7-Chelem-Hrebenne (Lvov): The PKP, in co-operation with Ukraine Railways has modernised the border crossing at Hrebenne/Rawa Ruska in order to develop passenger traffic on this line, despite the need to change trains at Rawa Ruska for the 1 520 mm gauge.
- Ad 8-Gdansk-Bydgoszcz-Poznan: PKP traffic studies show that this is a very important line for both freight and passengers. It links three industrial centres (notably those involved in advanced industries: mechanical and electrical engineering, shipbuilding, etc.). The PKP strategic plan for 2015 includes modernisation of this line to permit operation at 160 km/h.

- Ad 9-E26: The PKP is at present seeking the best solution for improving this line, either by the modernisation of the existing Wroclaw-Lodz-Warsaw link, or by the construction of a new line between these towns.

Combined transport infrastructures

There are at present nine land and three sea multimodal terminals in Poland. The main combined transport facilities are located at Gdynia, Malaszewicze, Lodz, Poznan, Wroclaw, Gliwice, Sosnowiec, Warsaw and Krakow. The capacity of the Polish system should increase considerably in the next three to five years, so as to handle efficiently the expected domestic and international freight traffic flows.

Air transport infrastructures

Over the next decade, it is planned to upgrade the terminals, parking facilities, signalling and approach systems of the existing airports to meet ICAO standards. The investments concern Gdansk-Rebiechowo, Krakow-Balice, Wroclaw-Strachowice, Poznan and Warsaw-Okecie airports. For the last, a new control tower is also scheduled.

Warsaw-Okecie airport should continue to play an important role for international and national traffic. The building of a new terminal is envisaged. International traffic is expected to increase at Gdansk and Krakow airports and, to a lesser extent, at some regional airports.

Special efforts are to be made to implement the Uniform Air Traffic Control Management System which should bring together air traffic control, air traffic flow management and airspace management, with a view to joining the European Union, conforming to the European Uniform System, and meeting NATO needs.

Conclusion

Considerable foreign capital is required in order to implement the priority projects. According to the budget forecasts, foreign investments will have to cover half of the financing for upgrading Polish infrastructures to European Union standards (according to the AGR, AGC and AGTC agreements). The authorities need to obtain some $500 to $600 million a year (or 10 per cent of the foreign investment necessary to transform the Polish economy). These estimates take into account receipts from toll motorways. The Polish government will have to guarantee the risks involved in these investments.

Question 3: Capacity problems

Ecological and safety problems should encourage the use of all public transport modes, in particular rail.

Many experts think that action in favour of the environment requires limiting the growth of road traffic and encouraging rail transport, especially because this mode has many advantages for the transport of bulk freight. This is important in a country where coal is the main raw material transported. However, there are those that argue that the modal split in the most developed western European countries, which is largely favourable to road transport, should serve as the model for liberalising access to the transport market.

Polish road transport is entirely liberalised but is experiencing problems. Competition can only increase in coming years, so that operators must fight very hard in order not to be forced out of the market. Only those capable of offering the best quality-price ratio will survive.

Many actors in the road transport sector will disappear, especially since the sector is now dominated by SMEs, often family firms with a maximum of five vehicles. Measures to improve the working conditions of these enterprises are necessary.

As regards infrastructures, the biggest problem in Poland remains the lack of financial resources necessary for the rapid implementation of all the improvement projects.

Question 4: Measures

The Ministry of Transport and the Maritime Economy has been working since 1994 on a transport policy and programme of action to restructure transport to meet market economy requirements and new conditions for economic co-operation in Europe. The Polish government has approved it and parliament is to decide upon it shortly. The Ministry attaches particular importance to improving conditions for international freight transit traffic, whatever the mode or direction. It is therefore paying particular attention to combined transport techniques.

The Polish government has initiated and supported the creation of a private enterprise, Polkombi, to handle the present and future needs resulting from the growth of multimodal traffics. Polkombi should therefore play a key role in the development of Polish combined transport. It has so far already opened five regional branches, in Gdansk, Gdynia, Szczecin, Malaszwicze and Lodz.

PORTUGAL

Area: 92 000 km²
Population: 9.9 million

Question 1: Future freight traffic trends

Rail traffic

According to the Portuguese Ministry of Transport, there has been no significant change in rail traffic since 1993. The growth rates forecast at that time remain valid. Accordingly, over the next 20 years the volume of traffic on the two main railway corridors (the northern line, i.e. the Lisbon-Porto corridor and the Beira Alta line) is expected to double.

Passenger and freight traffic trends [1]
Millions

	1985	1993	1994	94-93
Freight (t-km)		1 665	1 635	- 2
Passenger (p-km)	5 730	5 400	5 150	- 5

Road traffic

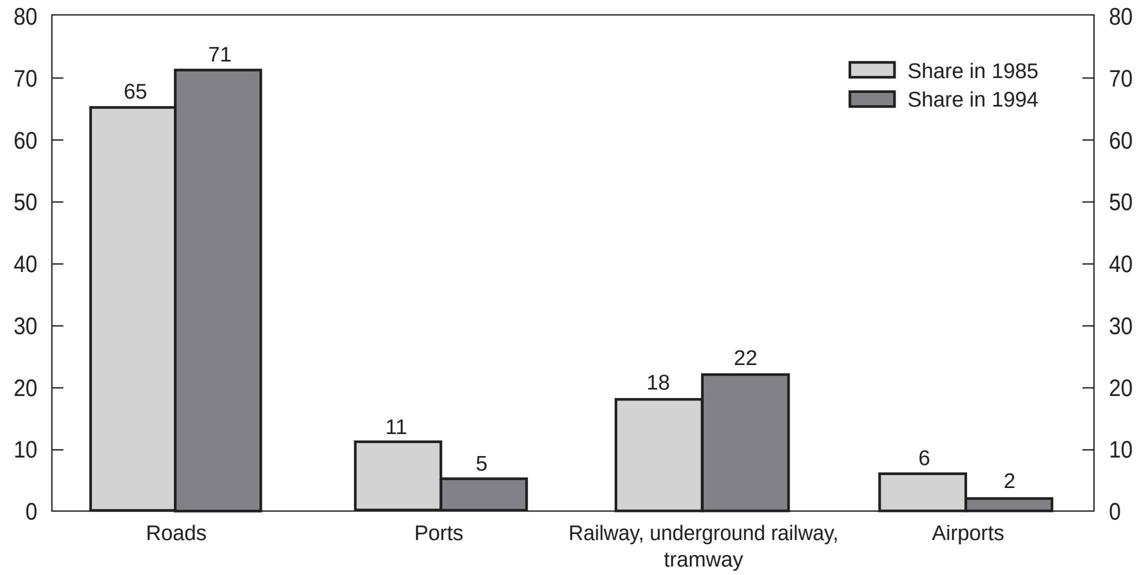
Passenger and freight traffic trends [2]
Millions

	1985	1993	1994	94-93
Freight (t-km)	-	9 957	11 190	+ 12.4
Passenger (p-km)	62 500	94 675	102 550	+ 8.3

Question 2: Present situation as regards infrastructure and investment projects

For the development of Portugal's transport networks, priority is given to investment in the road sector. Ports are receiving less and less funding, owing to the low value added generated by their activities (essentially the handling of domestic bulk traffic). Following the closure in the early 1990s of 500 km of regional railway lines as a result of low traffic levels, the Portuguese government has become aware of the need to develop and modernise the existing network and has launched new investment programmes.

Figure 1. **Share of investment allocated to each mode in 1985 and 1994**
In percentage



Source: ECMT.

Railway infrastructure

The Railway Modernisation Plan for 1995-99 includes a number of investment projects, some of which are already at an advanced stage.

The whole length of the Beira Alta line, for example, should be open for service by the first half of 1997. Work on electrification and signalling is currently under way. The upgrading work aims to ensure smoother traffic flows, increase line capacity and reliability, and cut journey times.

On the Castro Verde/Ermidas-Sines/Pêgo route, some project phases are currently nearing completion, e.g. electrification of the section between Entroncamento-Abrantes and Mouriscas (in the north), and construction of the branch line to the thermal power station. Other work has now begun (for example, on electrification and signalling on the section between Setil and Poceirão in southern Portugal).

Road infrastructure

The road infrastructure investment policy is set out in the Medium-term Road Plan. By the end of 1995, 63 per cent of the work scheduled on the main network (main routes) had been carried out, as well as 40 per cent of the work on the rest of the network (additional routes).

The main network currently comprises 2 700 km of roads, some of which are to be designated as toll motorways (provided traffic forecasts remain high). The additional network is 7 300 km long.

National network

Some sections of the national network still require costly modernisation work.

The motorway network continues to account for a significant share of the total volume of road infrastructure investment. In 1995, its share of total investment was 67.5 per cent. Furthermore, the last concession contract (1996) identifies new projects aimed at developing the motorway network further. The aim is to open an additional 717 km of toll sections in 1997 at a total cost of ECU 1.3 billion; the initial investment in 1995 was ECU 400 million. The new sections will complete the existing network and include bypasses around Lisbon and Porto, connections with the Spanish network and links with the Algarve, a popular tourist destination.

Some sections are already under construction:

- on the A3, the section connecting the town of Braga to the northern Portuguese border, scheduled for completion in 1997-98;
- the A2 extension stretching from Marateca towards the border in south-east Portugal;
- an A6 extension, linking Lisbon to the Spanish border.

Top priority has been given to construction of the A12 motorway linking Setúbal to Lisbon via a bridge over the Tagus.

Local (or municipal) network

Over the past few years, the level of funds invested in the construction and modernisation of local network infrastructure has continued to rise. Two main projects to improve road transport in the metropolitan area of Lisbon are under way:

- the CREL project, which involves the construction of an outer ring-road round the capital and is currently nearing completion;
- the CRIL project, which involves the construction of an inner city ring-road.

Priority projects not included in the TEN

There are five road and two railway infrastructure investment projects which were not selected at the Essen Summit.

The five road projects and their investment cost
MECU

Project location	1995	1996	1995-99
Main route 1, northern access to Freixo bridge	7 716	6 114	13 830
Main route 1, southern access to Freixo bridge	29 856	0	29 856
Main route 2, Guarda-Covilhã (1st phase Guarda-Benespera)	256	6 675	46 116
Main route 2, Castelo Branco-Soalheira link	9 228	14 924	24 153
Main route 5, Guarda-Vilar-Formoso (capacity enhancement)	0	8 203	45 117
Total	47 056	35 916	159 071

The two rail projects and their investment cost
MECU

Project location	1995	1996	1995-1999
Link to the Algarve	1 025	7 178	8 203
Northern line	12 817	0	12 817
Total	13 843	7 178	21 020

Question 3: Capacity problems

Rail transport

Infrastructure capacity problems continue to exist on the Ovar-Granja, Alfarelos-Azanbuja and Mortagua-Mangualde sections. Until work scheduled to be done on these “critical” section has been completed, bottlenecks will remain.

The situation on other sections has deteriorated since 1993, given that more trains are needed each day to cope with the growing demand for both passenger and freight traffic.

A frequent source of problems for the Portuguese railways is the absence of a railway line across the Tagus. However, there are plans to build one in the near future on the “25 April” bridge. Construction work has already begun on access lines to the bridge. A public invitation to tender has been launched for the contract to build the track on the bridge superstructure. Introduction of regular passenger service is scheduled for May 1998.

Road transport

The congested road sections are located on the outskirts of Portugal’s two largest cities: Lisbon and Porto.

There are plans to solve the problem of traffic through Porto with the construction, in 1996, of a new road linking the Freixo bridge to the A3 motorway (Braga-Porto).

Transit traffic through Lisbon remains a problem, but the situation should improve following the construction of a road link between Setúbal and Lisbon (A12). Work is scheduled for completion in 1998 and includes a new bridge over the Tagus. Work on the bridge is already under way.

Apart from the A6 motorway, which provides excellent access by road to Spain, links connecting the Portuguese network to its neighbour are poor, particularly in terms of capacity. Consequently, most of the motorway projects are aimed at developing high-speed, high-capacity links with Spain.

At present, the central government is responsible for maintaining and developing the national and local road network. Responsibility for the 12 000 km of local roads is gradually being transferred to the municipalities, which, however, sometimes lack sufficient financial resources to develop the projects planned, not to mention the necessary know-how to implement them.

Question 4: Measures

All the measures to be taken aim at modernising and developing the road and rail networks.

NOTES

1. National and international rail traffic.

2. These data cover national transport for vehicles with Portuguese number plates. National passenger transport includes private car, bus and coach traffic.

ROMANIA

Area: 238 391 km²
Population: 22 680 951

Question 1: Future trends in passenger and freight traffic

Road traffic

Romania supplied very little road traffic data. A road transport survey is currently under way.

Freight traffic

In 1995, a general survey of road traffic in Romania revealed that international road traffic (Romania imports and exports) accounted for 7 per cent of movements and transit traffic 4 per cent.

Passenger traffic

Romania did not supply information on passenger traffic.

Rail traffic

Since 1993 a series of studies have been carried out on trends in rail traffic. The subject areas covered are:

- the restructuring organised by the Railways Authority;
- the rail transport development strategy for the period 1995-2010;
- the financial restructuring strategy for the railways.

The traffic forecasts for the year 2000 are based on economic data supplied by the Statistics Institute, UIC and the World Bank, such as:

- the economic recovery, with GDP growth of between 3 and 4 per cent per year since 1994;
- the increasing value of private sector activity, which now stands at over 30 per cent of the total volume of domestic economic activity;
- the increase in the volume of investment in Romania (part of which is going directly into modernising rail infrastructure);

– the increase in international trade, a direct consequence of which is growth in freight rail traffic.

These studies indicate that freight traffic is benefiting more from the economic recovery than passenger traffic.

Freight traffic forecasts

Thousand tonnes

	Total	International	Transit
1994 (% of traffic)	99 179.0 100.0	19 868.0 20.0	872.0 1.0
2000 % growth (compared with 1994)	115 000.0 18.0	24 000.0 21.0	1 100.0 24.0

Passenger traffic forecasts

Thousand passengers

	Total	International
1994	206 920.0	1 212.0
2000	211 000.0	1 250.0
% growth (compared with 1994)	1.8	2.5

Estimates for distances covered are also up, with approximately 20 per cent growth between now and the year 2000 for goods and 1.8 per cent for total passengers (in number of passengers and in passenger-km).

For international traffic, on the other hand, passenger-km are expected to increase more than number of passengers.

Distance travelled by freight

Tonne-km

	Total distance	International traffic	Transit traffic
1994	21 746	5 321	457
2000	25 600	6 500	570

Distance travelled by passengers
Passenger-km

	Total distance	International traffic
1994	18 313	316
2000	18 650	330

Combined transport traffic

Rolling motorway traffic (RoLa) and swap body flows have risen steeply since 1992. However, the traffic volumes indicated below are still very low compared with European volumes for this type of traffic. The development of container traffic is more complicated: volumes carried were down 40 per cent in 1993 from 1992 but rose 20 per cent in 1994. Traffic forecasts indicate that this trend will continue: up 60 per cent in the year 2000.

Current and forecast traffic

	1992	1993	1994	2000
Lorries loaded on wagons:				
- number of lorries		1 945	4 515	7 200
- thousand tonnes		73.91	171.00	275.00
Swap bodies:				
- number of units	28	123	1 910	8 500
- thousand tonnes	440	1 321	17 018	85 400
Large containers:				
- number of units	141 500	101 000	118 000	190 000
- thousand tonnes	1 701	1 213	1 425	2 300

Question 2: Present situation as regards infrastructure and investment projects

Road infrastructure

The total length of the public road network is 153 358 km, of which:

- 9.6 per cent national roads (14 683 km);
- 17.9 per cent departmental roads (27 423 km);
- 20.2 per cent communal roads (31 054 km);
- 52.3 per cent urban roads (80 198 km).

The national roads form the country’s main network and carry 62 per cent of total road traffic. Most of these roads have two carriageways, i.e. they are bi-directional, and their (reported) traffic capacity is about 7 500 vehicles/day.

National road upgrading projects

Current plans for developing transport infrastructure in Romania are part of a strategy for developing and upgrading transport systems as well as infrastructure. The goal is to achieve technical and economic standards comparable to those of western Europe.

The priority upgrading projects for the period 1994-97 concern 1 053 km on the following national roads:

- E81 and E60, 450 km between Pitesti and Bors;
- E68, E70 and E71, 360 km between Sebes-Nadlac and Arad-Moravita;
- E60, E87 and DN38, 250 km between Bucharest-Giurgiulesti, Comarnic-Brasov and Constanta-Agigea (Bulgarian border).

In a second phase, scheduled for 1997-2001, it is planned to upgrade 1 004 km of roads. Louis Berger SARL-France and SPEA-Italy were commissioned to produce the feasibility studies for these projects:

- DN6, 78 km between Bucharest and Alexandria;
- DN2, 89 km between Urziceni and Râmnicu Sarat;
- DN65 + DN65B, 117 km between Craiova, Slatina and Pitesti;
- DN1, 23 km between Câmpina and Comarnic;
- DN28, 69 km between Sabaoni and Iasi;
- DN24, 20 km between Iasi and Sculeni;
- DN2, 58 km between Râmnicu Sarat and Tisita;
- DN2B, 12 km between Galati and Giurgiulesti;
- DN52, 44 km between Alexandria and Turnu Magurele;
- DN13, 160 km between Brasov and Târgu Mures;
- DN15, 66 km between Turda and Târgu Mures;
- DN1F, 111 km between Cluj and Supuru de Jos;
- DN19A, 48 km between Supuru de Jos and Statu Mare;
- DN19 + DN1C, 33 km between Satu Mare, Livada and Halmeu ;
- DN66, 76 km between Simeria and Petrosani.

Motorway programmes

It is planned to upgrade the Bucharest-Pitesti motorway and introduce tolls and to build other motorways.

Motorway construction programme
Million dollars

		Phase I		Phase II		Phase III	
N°	Route	Length (km)	Estimated cost	Length (km)	Estimated cost	Length (km)	Estimated cost
1	Bucharest-Brasov	-	-	168	1 150	-	-
2	Bucharest South Ring road	58	637	-	-	-	-
3	Bucharest-Pitesti	96	97	-	-	-	-
4	Pitesti- Sibiu	-	-	147	1 435	-	-
5	Brasov-Tg.mures-Cluj-Oradea-Bors	-	-	-	-	688	3 100
6	Bucharest-Buzau-Bacau-Suceava-Siret	-	-	-	-	463	1 620
7	Roman-Iasi-Ungheni-Foscani-Albita	-	-	-	-	95 161	470 725
8	Bucharest-Craiova-Drobeta-Lugoj	-	-	-	-	468	2350
9	Sibiu-Deva	-	-	-	-	115	903
10	Bucharest-Giurgiu	43	150	-	-	-	-
11	Bucharest-Constanta	201	750	-	-	-	-
12	Deva-Lugoj-Nadlac	-	-	196	1 340	-	-
13	Brasov-Sibiu	-	-	140	630	-	-
14	Cluj-Bej-Bistrita-Suceava-Botosani-Stefanesti	-	242	380	2 000	-	-
15	Deva-Arad-Nadlac	-	-	189.6	1 450	-	-
16	Timisoara-Moravita	-	-	-	-	60	250
17	Total	398	1 634	1 220.6	8 005	2 050	9 418

Because the feasibility studies have yet to be carried out, estimates for the third phase are not available. The modernisation of a number of border crossings (Bors, Nadlac, Varsand, Albita, Siret, Halmeu, Petea) is also planned.

The long-term aims of the Romanian infrastructure development plan are to improve road signs on 5 000 km of national roads and to undertake the phased construction of 3 000 km of motorways and 2 560 km of express roads and the construction of bridges and tunnels at the main rail/road intersections.

Rail infrastructures

The current rail network includes 26 per cent double-track line and 34 per cent electrified line. There are eight main railway lines in Romania:

1. Bucharest-Craiova-Timisoara-Arad-Curtici;
2. Brasov-Sibiu-Vintu de Jos-Deva-Arad;
3. Bucharest-Brasov-Cluj-Oradea-Episcopia Bihor;
4. Brasov-Deda-Statu Mare-Baia Mare;
5. Bucharest-Marasesti-Suceava-Vicsani;
6. Marasesti-Tecuci-Iasi-Cristesti Jijia;
7. Bucharest-Urziceni-Galati;
8. Bucharest-Constanta-Mangalia.

Specifications of the Romanian Railways' eight main lines

Line N°	1	2	3	4	5	6	7	8
% double track	48.3	58.2	89.8	11	92	44	47.2	87.3
% stations computerised	100	97	90.6	73	92	79.3	79.4	89.7
% automatic block signalling	100	81	92.2	32	93.8	62.5	61.6	89.2
Top speed (km/h)	120	100	120 100	100	120 100	100	120 100	140 120

In order of priority, the main railway projects are:

- completion of work on line CF Rm, Valcea-Valcele, cost $73.98 million;
- modernisation and development of communication systems, cost $4.89 million;
- modernisation of Giurgiu North and Curtici border stations, cost $3.2 million (scheduled for 1996-97);
- completion of electrification and construction of a second track on the Cluj-Oradea line, total cost $225 million (scheduled for 2000-2005);
- modernisation of high speed sections (160 km/h) planned on the Curtici-Deva-Brasov-Bucharest-Constanta and Bucharest-Giurgiu lines, total cost $826.86 million;
- laying of a second track and electrification on the Constanta-Mangalia line, cost $74.3 million (scheduled for 1999-2001);
- construction of a new line between Albeni-Seciuri-Alunu, cost $117.87 million;
- electrification of the Bucharest-Pitesti-Bradu-Rafinarie line, cost $36.3 million;
- repair and strengthening of the protection at Portile de Fier I, cost $59.3 million;
- upgrading track on the Ungheni-Pascani-Bacau-Ploiesti-Bucharest-Giurgiu line to take high speed trains (top speed 160 km/h on some sections), total cost $636 million;
- construction of railway links with Baneasa-Otopeni airport, cost $300 million;
- modernisation and development of Halmeu border station, total cost $70 million;
- laying of a triple track on the Bucharest-Ploiesti line, cost $126 million.

Question 3: Capacity problems

Road transport

The 1995 traffic survey indicates that the capacity of Romanian roads (7 500 vehicles a day) is being exceeded. The daily average on around 15 sections is as high as 10 710. However, this is well below the levels of road use and congestion in Europe. It would seem from the figures below that the congestion problems mentioned by Romania need to be kept in proportion.

According to the Romanian authorities, roads in and out of some towns are somewhat busier: Ploiesti with a daily average of 14 903 vehicles, Brasov with 8 936 and Sibiu 9 725. The overall daily (24 hour) average is 11 188 vehicles.

Traffic survey results -- maximum number of vehicles per day

Sections of national roads	No. of vehicles per day
Ploiesti-Brasov	15 174
Bucharest-Urziceni	15 357
Ploiesti-Buzau	12 914
Bucharest-Giurgiu	13 567
Craiova-Pitesti	11 845
Brasov-SF. Gheorghe	11 104
Sebes-Deva	17 705
Urziceni-Marasesti	10 942
Lugoj-Timisoara	11 369
Bucharest-Alexandria	10 062
Oradea-Chisineu Cris	5 632
Sibiu- Cluj	8 312
Bucharest-Lehliu	6 019
RM. Valcea-Sibiu	9 123
Bucharest-Pitesti (RN7)	9 995
Cluj-Halmeu	9 010
Timisoara-Arad	8 512
Arad-Chisineu Cris	8 129
Pitesti-Campulung	7 916
Craiova-Calafat	7 804

A 1994 study revealed a considerable rise in waiting times at border crossings.

Rail transport

The main bottlenecks are on the following routes:

– Bucharest-Craiova-Timisoara: The modernisation of this main line will enable it to carry bi-directional traffic on the 517 km of track, as there is still a section of single track between Strehaia, Turnu-Severin and Orsova (223 km of single track on the Craiova-Timisoara section). This limits the daily carrying capacity of this line to 72 trains (36 in each direction).
– Bucharest-Brasov-Cluj-Oradea-Episcopa Bihor: The line has a total of 613 km, of which a section of 66 km between Cluj and Oradea is single track. The daily carrying capacity is 64 trains (32 in each direction).

The Bucharest-Ploiesti double track section, which was closed for a long time for maintenance work, suffers from congestion and delays. In theory, it has a capacity of 256 trains (128 in each direction) a day, but is currently only able to take 200 trains (100 in each direction).

There are 216 daily train arrivals and departures at Bucharest-North station, the busiest in terms of passenger traffic. The tracks need to be modernised and increased.

As regards freight, Halmeu station on the Ukrainian border has experienced a traffic overload. It is the only transhipment station for cargoes of Polish, Slovak and Russian coal and this traffic is set to rise by 7.9 million tonnes a year over the next few years. The construction of a new transhipment facility with new track needs to be planned.

Traffic flows at Giurgiu-North and Curtici stations, at the Bulgarian and Hungarian borders, respectively, are not very good due to lack of modernisation.

Question 4: Measures

Romania does not mention any specific measures. The focus currently seems to be on planning new road and rail projects using specialist European consultancies (French, Italian, etc.).

SLOVAK REPUBLIC

Area: 48 997 km²
Population: 5 300 000

The creation of the Slovak Republic led to radical changes in both the Slovak economy and the transport network. However, the changes are not attributable solely to the current economic transition; they are also part of the process of European integration.

Resolving traffic problems is one of the priorities of national transport policy. The Slovak Ministry of Transport issued a report entitled "The Conception of Transport Development", which was based on an analysis of demand in the current economic context. Approved by the Slovak government on 16 March 1993, this report, and the objectives it sets out for the development of the transport sector, have now become the basic policy document for the Slovak government. In order to expand, the national economy and the transport sector must adapt to the new conditions created by the establishment of the common market and European integration.

Question 1: Future trends in passenger and freight traffic

Rail transport

Passenger traffic

Since the mid-1980s, passenger traffic has steadily declined each year, resulting in a total decrease of around 35 per cent. This trend is directly attributable to the recent political and economic changes in the Slovak Republic.

	1990	1991	1992	1993	1994	1995
Million passengers	117.1	108.4	103.0	87.03	99.1	89.5

According to economic statistics based on GDP and other macro-economic indicators, the economy of the Slovak Republic and traffic volumes have picked up slightly since 1995. Short-term forecasts for the year 2000 and the outlook for 2010 are based on:

- past passenger traffic trends;
- growth and composition of the population;

- forecast improvements in standards of living (in terms of inflation, unemployment and per capita GNP);
- urban development;
- traffic performance;
- the development of new regional employment opportunities.

Over the past few years, the rail sector has undergone major changes in terms of both operating structure and type of traffic carried:

- From 1990, a decline was noted in the number of passengers travelling at standard and reduced "worker" fares, attributable to rising unemployment nation-wide;

- Since 1994, international transport as well as cross-border traffic with the Czech Republic has been increasing:

  - By late 1995, a number of trends of significance for the future of rail transport began to emerge: a modest increase in the population, an increase in the number of private vehicles and a slight improvement in the standard of living as the mobility of the population increased.
  - However, in order to bring about a real improvement in the quality of service provided by the railways, the present rolling stock needs to be upgraded. Demand for rail passenger transport is primarily influenced by the tariff policies of the different modes of public transport modes and by fluctuations in consumer prices, particularly fuel prices. Planned changes to the reduced fare system under the Slovak railway company's new commercial policy should also have a marked influence on the demand for passenger transport by rail.
  - The forecasts obtained for the year 2000 assume modest economic growth over the period 1996-98, higher car ownership levels and an increased number of transport links between border regions. The quality of railway services is also expected to improve: better cleanliness, more catering facilities on board trains and in stations, and better timetable co-ordination to take connection times into account. However, it is unlikely that more trains or more connecting services will be provided.
  - The forecasts for 2010 assume moderate demographic growth (the population is actually expected to decline after 2010) and more attractive railway services. The following tables give the traffic forecasts for the years 2000 and 2010, each based on two scenarios, optimistic and pessimistic (O/P).

Traffic forecasts for selected passenger transport services

Millions passengers

	1994	1995	2000		2010	
Type of journey			O	P	O	P
Normal	28.5	28.4	32.5	29.4	35.4	30.2
Worker reduction	29.0	28.8	27.5	24.6	27.2	23.4
Child reduction	24.02	19.6	20.5	18.6	20.8	18.2
Other	14.68	19.0	23.4	21.2	23.2	19.8
International	2.9	2.8	4.3	3.9	5.1	4.3
Total	99.1	98.5	108.3	97.7	112.0	96.0

Traffic forecasts for selected passenger transport services
Billion passenger kilometres

	1994	1995	2000		2010	
Type of journey			O	P	O	P
Normal	1.52	1.532	1.794	1.623	1.985	1.693
Worker reduction	0.63	0.633	0.599	0.542	0.604	0.515
Child reduction	0.93	0.431	0.451	0.408	0.470	0.401
Other	0.82	1.331	1.641	1.484	1.738	1.483
International	0.65	0.610	0.961	0.870	1.139	0.972
Total	4.548	4.536	5.446	4.927	5.936	5.065

Freight traffic

Since 1989, the operation of the transport market has been strongly marked by the political and economic changes that have taken place in the Slovak Republic. Regardless of mode, these changes have invariably resulted in a decline, to varying degrees, in traffic volumes. However, the steady decline in the volume of freight carried by rail cannot be attributed solely to the economic recession: unfair competition from the road sector is also partly to blame. In fact, unlike the road transport sector, the railways have to pay for their own infrastructure and therefore have to recover costs through the fares charged. It is important to bear this in mind when it comes to creating a level playing field for both modes.

The indicators used in all the relevant studies show a decline in traffic over the period of observation.

- Overall import flows declined by 23.4 per cent. Some categories of freight experienced a particularly sharp decline in traffic: categories 1, 6 and 9 (oil products, cereals and spare parts, respectively) were the hardest hit. This decline was not offset by other categories, since only categories 5 and 7 (timber and “roots”) showed any substantial increase in the volume of traffic carried by rail. In real terms, however, the volumes involved are very small.

- At only 6.8 per cent, the decline in export flows was less marked than in import flows. The freight categories most affected were: oil products, industrial raw materials and spare parts (categories 1, 3 and 9, respectively). But this fall was more or less offset by an increase in categories 0, 6 and 7 (solid fuels, cereals and “roots”, respectively) and, principally, in categories 2 and 4 (i.e. construction plant and materials).

- The flows most affected by the recession were through-traffic flows which were down by 61 per cent, particularly in the construction materials, “roots” and spare parts categories.

The single most worrying development has been that the freight categories which have traditionally been heavily reliant on rail transport experienced even larger decreases in volume than those reported for the above three categories (whose volumes are always lower by comparison). For instance, movements of solid fuels, cereals and other goods (categories 0, 2, 8) declined by 36.7 per cent, 73.8 per cent and 73.1 per cent, respectively, i.e. a total decrease in rail freight traffic of 2 million tonnes.

The sharp decline in rail flows reported in 1993 was in large part due to the deterioration of trade relations between the Slovak Republic and the Czech Republic, on the one hand, and between the Czech Republic and Hungary and other countries of south-eastern Europe, on the other. In fact, it was these trade relations which had originally generated transit traffic through the Slovak Republic.

Methods and projections

As a result of the many political and economic changes that have taken place, the old methods of calculating projections from time series analyses seemed inappropriate. For this reason, the findings of previous studies were revised in the course of work commissioned by the government. This research concentrated on the current expansion of the economy, the reform process, the clarification of different approaches to economic restructuring, and the broad transport policy principles to be adopted by the government.

For the above reasons, two methodological approaches were used to develop traffic projections:

- The first consisted in an evaluation by experts of the reliability of the statistics available and the soundness of the analytical methods used in forecasts. The aim was also to assess the relevance of the parameters used to compute freight traffic projections and to forecast the future growth of rail transport in the overall transport market.

- The second used formal projection models for each type of traffic and each category of freight carried by geographical area. Totals were calculated on a case-by-case basis to ensure greater accuracy.

The following assumptions were made with regard to freight flow trends by product category:

- Following the economic recovery, the transport of solid fuels should show moderate growth but should fall again from 2005 onwards as a result of the steady rationalisation of fuel consumption.
- Flows of crude oil, tar and derivative products should increase gradually for two reasons: first because these products should increasingly replace solid fuels; and second because of rising car ownership levels.
- There should be only a very moderate increase in flows of minerals, metallurgical products and machinery, which should ultimately decrease as metals consumption was rationalised.
- Following the economic recovery, flows of industrial raw materials should rise to 80 per cent of the 1989 level.
- Similarly, flows of construction materials should increase slightly to around 40 per cent of the 1989 level. The tonnage of timber carried by rail should decline steadily: first, because it should become an increasingly “precious” natural raw material (ecological concerns, felling restrictions); and second because there should be stiffer competition from the road mode for timber haulage.
- Population growth and improved living standards should lead to a rise in cereal, food products, livestock and “root” flows.
- Other freight flows should increase to around 80 per cent of their 1989 level.
- Flows of spare parts should increase in real terms to support national commercial expansion, but the volumes involved should be too small to have an impact on total freight traffic.

Projection model, minimum scenario
Million tonnes

		Scenario A		Scenario B	
	Total transport	Rail	Freight	Rail	Freight
1993	104.5	64.83	36.62		
1994	88.83	58.9	30.2		
1995	94.48	60.8	32.2		
2000	100.7	65.9	44.4	61.6	41.6
2005	107.3	67.9	46.3	63.8	43.7
2010	112.7	68.8	47.4	64.9	44.7

Scenario A: Rail's share increases slightly, transport does not fall below 40 per cent.
Scenario B: Rail's share decreases steadily to 30 per cent by the year 2010.

Projection model, minimum scenario
Million tonnes

		Scenario A		Scenario B	
	Total transport	Rail	Freight	Rail	Freight
1993	104.5	64.83	36.62		
1994	88.83	58.9	30.2		
1995	94.48	60.8	32.2		
2000	107.7	76.6	38.5	71.6	36.1
2005	120.4	85.3	43.7	80.9	41.4
2010	125.4	86.1	43.8	81.6	41.5

Traffic in million t-km	2000	2010	
		O	P
Export	2.5	2.7	2.6
Domestic	3.7	4.1	3.8
Import	2.8	2.7	2.5
Trough traffic	4.0	4.1	3.8
Total	13.0	13.6	12.7

Projections for through rail traffic for the years 2000 and 2010

Country of origin	Destination country	2000	2010
Bulgaria	Scandinavia	1.5	2.0
	Poland	10.0	11.5
	Other	2.0	3.0
	Total	13.5	16.5
Bulgaria	Germany	10.0	14.5
	Other	7.0	8.5
	Total	17.0	23.0
Hungary	Scandinavia	180.0	190.5
	Poland	198.0	227.0
	Other	20.0	22.0
	Total	398.0	439.5
Hungary	Germany	133.0	151.5
	Other	594.0	655.0
	Total	727.0	806.5
Romania	Scandinavia	10.0	10.5
	Poland	27.0	31.0
Romania	Other	10.0	12.0
	Total	47.0	53.5
Romania	Germany	40.0	42.0
	Other	28.0	30.5
	Total	68.0	72.5
Total south-west		**812.0**	**902.0**
Total south-north		**458.5**	**509.5**
Austria	Scandinavia	5.0	6.0
	Poland	10.5	12.0
	Other	55.0	70.0
	Total	70.5	88.0
Austria	CIS	19.0	21.5
Germany	CIS	168.0	191.5
Other	CIS	18.0	20.5
Total west	CIS + east	205.0	133.5
Germany	Bulgaria	11.0	12.5
	Hungary	190.5	196.5
	Romania	30.5	34.5
	Other	172.5	196.5
	Total	404.5	440.0
CIS	Austria	691.0	655.0
	Germany	42.0	45.5
	Hungary	64.0	60.0
	France	10.5	13.0
	Italy	5.5	7.0
	Other	30.5	35.0
	Total	843.5	815.5

Road transport

Two methods were used to make road transport projections:

- determining road transport growth factors, based on the projected annual number of vehicles and a regression analysis of parameters such as:
  - population growth;
  - increase in car ownership;
  - increase in the number of kilometres travelled annually by cars.

- analysing trends in people's mobility in the Slovak Republic and in neighbouring countries. The analysis indicates a moderate increase in road transport to the year 2000. In fact, forecasts indicating mild stagnation in the economy and in purchasing power to the end of the century should have an impact on the rate of vehicle acquisition.

Once the period of stagnation is over, traffic should pick up again.

Over the past few years, high fuel prices have kept the average annual number of kilometres travelled relatively low. Currently, most private vehicles travel between 6 000 and 8 000 kilometres a year. However, to determine the outlook for growth in the road mode, the gradual increase in the number of kilometres per year travelled in the countries of Europe as a whole was taken into account.

The use of heavy goods vehicles and buses is the same as in western Europe. It would therefore be unrealistic to predict any real increase in their use (particularly as regards buses). Current market trends suggest that the present modal split between road and rail transport (currently 30/70 per cent) might be reversed in favour of road transport. A gradual shift of some rail traffic to road mode is therefore expected and consequently a modal split that is more and more akin to that of European Union member states, i.e. 60 per cent road/40 per cent train. The results obtained using the above criteria and monitoring of current flows are shown in the table below.

Indicator	1994	2000	2010
No. of inhabitants	5 354 500	5 499 000	5 681 100
No. of vehicles	994 046	1 158 700	1 583 500
Car ownership level	5.39	4.75	3.59
All vehicles	1 382 863	1 545 520	1 965 480
Vehicle ownership level	3.87	3.55	2.89

The scenarios relating to the future outlook for road transport take into account the statistical data on other central European countries.

Average vehicle ownership level in central European countries

Indicator	1994	Minimum 2010	Maximum 2010
Cars/1 000 inhabitants	185.6	210.0	350
HGV and bus/1 000 inhabitants	27.6	27.6	39
Total vehicles/1 000 inhabitants	213.2	237.6	389

Passenger traffic flow projections

Indicator	1994	2000	2010
No. of inhabitants	5 354 500	5 499 000	5 681 100
Cars/1 000 inhabitants	185.6	210.7	278.7
Car ownership level	5.39	4.75	3.58
No. of cars	994 046	1 158 700	1 583 500
Current year	8 200	11 000	13 000

Freight traffic flow projections

Indicator	1994	2000	2010
No. of inhabitants	5 354 500	5 499 000	5 681 100
HGVs /1 000 inhabitants	27.6	27.6	39.0
Heavy vehicle ownership level	36.2	36.2	35.8
No. of HGVs and buses	147 988	151 720	158 700
Current year	22 100	22 500	23 000

International traffic flows through the Slovak Republic are given in the tables below. The analysis of these statistics shows a substantial increase in international traffic, particularly at the Rusovce, Berg and Jarovce border-crossing points, with steadily increasing flows between Hungary and Austria.

Average number of vehicles per day

Austria	1990	1995	Growth rate
Cars	8 230	12 681	1.54
HGVs	126	370	2.94
Buses	162	153	-1.06

Traffic at borders with the Slovak Republic in 1995

Czech Republic	Cars	Buses	HGVs	Total
Kuty-Breclav	1 856 986	24 488	250 734	2 132 208
Brodské-Lanzhot	243 726	5 833	33 744	283 303
Holic-Hodonin	1 260 470	26 621	171 029	1 458 120
Skalica-Sudomérice	1 449 334	1 229	78 604	458 992
MyJava-Vel'ka nad \/elickou	157 649	5 812	18 403	181 864
Moravské Lieskové-Strani	521 545	18 949	47 183	587 677
Driemota-Stary Hrozenkov	648 056	23 053	118 866	789 975
Horné Srnie-Bylnice	560 860	15 447	27 179	603 486
ÉV~a nod MAkYLOL'-Strelna	307 658	1 006	62 882	371 546
Makov-Horni Becva	762 601	11 172	134 568	1 136 943
Svrcinovec-Mosty u Jablunkova	1 083801	43 547	118 261	1 245 609
Nova Bosaca-Brezova	92 377	30	17 484	109 891
Klokocov-Bila	268 139	10 633	14 428	293 200
Podzavoz-Sance	99 118	0	0	99 118
Cerveny Kamen-Nedasova Lhota	61 523	17	663	62 203
Total	8 532 268	187 837	1 094 028	9 814 135

Austria	Cars	Buses	HGVs	Total
Jarovce-Kitsse	913 445	1 044	0	914 494
Bratislava-Berg	3 561 767	54 627	132 361	3 748 755
Moravsky sv. Jan-Hohenau	153 231	57	2 786	156 074
Total	4 628 443	55 728	135 147	4 819 323

Poland	Cars	Buses	HGVs	Total
Skalité-Zwardon	255 976	1 773	3 295	261 044
Oravska Polhora-Korbielow	119 873	561	907	121 331
Prstena -CHyzné	707 142	28 413	68 365	803 920
Sucha Hora-CHocholow	162 724	4 872	0	167 596
Javorina-Lysa Pol'ana	589 719	7 027	2 878	599 624
Podspady-Jurgow	3 582	0	0	3 582
Lysa nad DunaJcom-Niedzica	208 934	2 344	0	211 278
Mnisek nad Popradom-Piwniczna	147 512	6 925	0	154 537
Becherov-Konieczna	105 164	508	0	105 672
Jysny Komarnik-Barwinek	520 975	16 601	41 669	579 245
Total	2 821 700	69 024	117 104	3 007 829

Ukraine	Cars	Buses	HGVs	Total
Vysné Nemecké-Uzhorod	603 863	31 388	57 253	692 504
Ubl'a-M. Bereznyj	94 896	130	315	95 341
Total	698 759	31 518	57 568	787 845

Hungary	Cars	Buses	HGVs	Total
Slovenské Nové Mesto-Satoraljaujhely	281 060	5 790	10 422	297 272
Host'ovce-Tornanadaska	27 172	461	0	27 633
Domica-Agtelek	14 286	430	0	14 716
KraI-Banreve	300 250	3 079	23 643	326 972
Siatorska Bukovinka-Salgotarian	407 806	4 960	22 808	435 574
Slovenské Darmoty-Balassagyarmat	248 016	2 973	28 474	279 463
Sahy-Parassapuszta	475 616	20 193	55 617	551 426
Salka-Letkés	86 659	453	0	87 112
Sturovo-Prievoz-Esztergom	74 951	46	0	74 997
Komarno-Komarom	1 472 229	15 570	53 140	1 540 939
Medved'ov-Vamossabadi	668 906	2 988	160 515	832 409
Rusovce-Rajka	1 695 977	24 002	146 646	1 866 625
Total	6 019 814	97 054	561 085	7 780 120

Projected daily transit-traffic flows through border crossing points

Austria	1995	2000-10	Growth rate
Cars	12 681	19 500	1.54
HGVs	370	750	2.03
Buses	153	200	1.31
Hungary			
Cars	16 493	19 132	1.16
HGVs	1 537	1 860	1.21
Buses	266	375	1.41

These tables show the figures for overall vehicle flows in 1995 at border crossing points between the Slovak Republic and neighbouring countries. On the border with the Czech Republic, there are five road crossing points, three on the border with Austria, 11 on the border with Hungary, two on the border with the Ukraine and ten on the border with Poland.

Question 2. Present situation as regards infrastructure and projects for investment

Railway infrastructure

Current state of infrastructure

The Slovak railways currently possess:

– a total of 3 661 km of track, of which 1 011 km of mixed gauge track, 52 km of narrow gauge track and 102 km of wide gauge track;
– only 8.4 per cent of the network (by length) can be travelled at a speed of 100 km/h. The length of non-electrified track is 1 422 km, or 39.3 per cent of the network, with a 25kV/50Hz a.c. traction supply over a length of 707 km and a 3kV d.c. supply over a length of 735 km.

The network and its installations

Automatic blocks (UAB)	580 km
Semi-automatic block relay	1 057 km
Level crossings	2 562
A-grade level crossings with barriers	1 153
Operating Control Point (OCP)	555
Mean distance between OCPs	6.6 km
Stations	256
Signal points	10 149
Buildings	6 084

The Slovak railway system was largely built in the late 19th and early 20th century. It is made up of local lines with some international lines, running east/west and north/south. It has been divided into four categories of track ranked by tonnage and capacity.

Under the AGC and AGTC agreements, the following lines are now part of the main European railway line network:

– C-E 61: Kuty-Bratislava-Komarno (the country's second main line);
– C-E 40: Cadca-Zilina-Kosice-Cierna nad Tisou (the country's first main railway line);
– C-E 63: Bratislava-Puchov-Zilina (line connecting the first and second main railway lines);
– C-E 52: Devinska Nova Ves-Bratislava-Nové Zamky-Sturovo.

The "southern" line connecting Kuty-Trnava-Leopoldov-Zvolen-Kosice is somewhat unusual. The most efficient line is the Bratislava-Kosice line via Zilina, as it is a reversible, electrified line with automatic blocks.

Investment projects

A number of projects aimed at enabling Slovak railways to play a greater role in international rail transport in Europe are currently under way. They include:

- Construction of a second line to Bratislava and a freight depot at Petrzalka. The main objectives for this project are to:

- renew the Petrzalka-Kittsee-Parndorf connection at the Austrian border;

- speed up traffic between Vienna and Bratislava;

- enable the re-routing by rail of HGVs from the Devinska Nova Ves-Marchegg border crossing point;

- to construct a second track along the Bratislava-Petrzalka section and a freight terminal in Bratislava, to rebuild the station at Petrzalka and to add a new reception building.

  The upgrading of the Petrzalka-Kittsee-Parndorf border crossing point should greatly improve connections between Austria and the Slovak Republic and enable the opening of a fast rail link between Poland and south-eastern Europe via Zilina, Cadca and Zwerdon.

  Work is under way, the construction of the Bratislava station is complete and a start has been made on most of the substructure and superstructure work between Bratislava and Petrzalka. The project was approved by the ZSR on 15 July 1994. The contract was let to Doprastav.

Capital investment and state of progress

Cost of works		State of progress	Start of works	Ownership
SK 800.1 million	20.73 MECU	Under construction	06/1995-12/1997	Resolved

- Modernisation of the second track on the Kuty-Bratislava-Sturovo line, Nové Zamky-Komarno. The railway line running from the north to the west and from the south to the east of Europe is part of the international network classified E-61 and E-25. It connects Berlin to Prague, Bratislava and Budapest. It is also the fastest line, with sections allowing speeds of up to 140 km/h. In order to respond to European demand, and given the financial possibilities, this line will be upgraded to allow trains to be operated at speeds of 160 km/h.

- The work to modernise the line will be undertaken in two phases. Currently, most of the work required in the plans for renewal is related to increasing track speed to 160 km/h on sections where the track is straightest and needs a minimum of work. In order to speed up the modernisation of rail structures, alterations on the Bratislava tunnel must be completed. Upgrading work on stations and halts has already been completed. However, due to the very high capital costs, speeds on the section from Bratislava’s main station to Dev-Nova Ves will only be increased to 120 km/h.

Capital investment and state of progress

Cost		State of progress	State of work	Ownership
SK 9 000 million	234.2 MECU	Planning stage	1996-2010	Resolved

- The Cadca-Skalité-Zwardon rail line. The renewal of this line and the Cadca station will enable higher commercial train speeds on connections to the PKP and OBB networks. The connection from the north of the Slovak Republic to Poland will be substantially improved. The conditions for long-distance transport will be improved in order to reduce journey time between Cracow, Bratislava, Vienna and Budapest. The project also aims to increase maximum train speeds to 100 km/h (instead of 70 km/h at present) on the Skalité-Zwardon section. This will be quite difficult given the subsurface geology of this region.

Capital investment and state of progress

Cost		State of progress	Start of work	Ownership
SK 971.7 million	25.2 MECU	Under construction	08/1995-1998	Resolved

Plans for initial alterations to Cadca station, the first phase of the project, were produced in August 1995 and are to be approved in December 1996 at a cost of SK 142.2 million.

According to ZSR, plans for the second phase of alterations, the second stage of the project, will be approved in December 1996 at a cost of SK 142.2 million. Track construction work scheduled for the period 1996/1997 (SK 309.5 million) is still at the planning stage.

The schedule for the electrification of the Cadca-Zwardon line has been drafted. Work is to begin over the period 1996-98 and will require a total budget of SK 620 million, to be financed by the government.

The technical details for this project were approved by the Ministry of the Environment (MZP) in June 1996. The project and its completion are therefore guaranteed under Act No. 263/93 of the Code.

- Upgrading the Presov-Plavec line. There are two projects: circuitry and electrification. These two projects are the first step in increasing the capacity of the main north-south line in the eastern part of the country.
- Work to incorporate the Muszyna (PKP)-Plavec-Kysak-Cana-Hidesnémeti (MAV) section into the AGTC network (electrification of the Presov-Plavec and Cana-Hidesnémeti sections). These projects should:
    - increase the fluidity of traffic on this line;

- dispense with the need to change locomotives at Plavec and Presov;
- save on fuel;
- lessen environmental impacts.

The contract has been approved, a construction permit has been obtained and ownership issues have been resolved.

Capital investment and state of progress

Cost		State of progress	Start of work	Ownership
SK 478.4 million	12.4 MECU	Under construction	07/1995-07/ 1996	Resolved

- The second project relates to ZSR lines from Cana to the Hungarian border. The invitation to tender was issued in 1995. All that now remains is to prepare the project documentation. To complete the construction programme (scheduled for a few years' time), the release of SK 34.9 million (in equity capital) will be timed to match the main investment schedule. During the first stage, the project monitoring stage, it is planned to allocate 41.3 per cent of the annual programme budget, i.e. SK 14.4 million. The work will cost SK 18.6 million, i.e. 53.3 per cent of the annual budget.

- Modernisation of the Bratislava-Puchov-Zilina line. This line is part of international line E-63. Following the latest round of negotiations, train speeds will be increased from 140 to 160 km/h on the Bratislava-Puchov section and from 100 to 120 km/h on the Puchov-Zilina section. The project documentation is ready, but has not yet been approved.

Capital investment and state of progress

Cost of work		State of progress	Start of work	Ownership
SK 5 500 million	142.5 MECU	Planning stage	1996-2000	Resolved

In addition to these projects, which are designed to increase through traffic, other investment projects are planned, such as:

- cabling of the line between Krivan and Fil'akovo;
- electrification of the line between Zvolen-Banska Bystrica;
- a junction at Bratislava;
- rebuilding of the Mat'ovce-Hanisk pri Kosiciach line broad gauge track;
- electrification of the Zvolen-Fil'akovo line;
- upgrading of the single gauge line between Ziar nad Hronom and HronsLà Dubrava to a mixed gauge line;
- modernisation of the Cierna and Tisou transhipment stations.

There are also projects to improve information systems (JSPD, IRIS, etc.).

In the course of negotiations in July 1995, the Slovak government gave the go-ahead for two projects: "The Programme of Transformation and Development of Railway Transport up to 2000" and "The Long-term Programme of Railway Route Development". The latter contains practical measures for the modernisation of transit corridors IV, V and VI.

After the start of the work on the Petrzalka-Kittsee line in 1995 and on the Cadca-Zwardon line in 1996, plans to modernise ZSR lines that were part of the TEN scheme were accorded priority project status at the Pan-European Conference in Crete in 1994. The trans-European corridors run through the following towns:

- Corridor IV-north-west Europe: from the Czech Republic via Kuty, Bratislava to the Balkans via Hungary;
- Corridor V-south and south-east Europe: from Hungary through Sturovo, Bratislava, Zilina, Cierna n. Tisou to the Ukraine;
- Corridor VI: from the Baltic through Zwerdon, Cadca and Zilina.

These three corridors are very important for different reasons:

- they affect domestic rail traffic in the Slovak Republic;
- they concern states with direct access to the sea and provide rapid links to ports on the Adriatic and the Baltic;
- they are indispensable for any country seeking rapid rail links to the CIS and the Ukraine.

In order to make these corridors a reality in the Slovak Republic, it will be necessary to comply with AGC standards. Therefore, if it is to integrate its rail network with European networks, the Slovak Republic will have to accept the conditions set in the AGC agreements.

Road infrastructure

Of the total Slovak road network, 1 597 km come under the TEN scheme.

The Slovak road network

Category	Length in km
I	3 074
II	3 820
III	10 843
Total	17 737

The Slovak Republic has 263.6 km of four-lane roads, i.e. 26.6 km more than in 1993. Of the 650 km of motorway planned, 197.9 km have already been built and 36.7 km are now under construction. The basis for the development of the road network is still the government's resolution on transport infrastructure development.

The following is a list of the main infrastructure investment projects to the year 2000. These projects will go ahead as and when financial resources allow, the objective being to improve road safety and transport conditions.

Major projects and start dates

1995-2000

1. E71-1/50 Kosice
2. E75-1/11 Cadca by-pass
3. E77-I/59 Oravsky Podzamok-H. Lehota, Podbiel bypass
4. E371-I/73 Nova Polianka-Svibnik bypass
5. E571-I/50 Zvolen-Sekier-Tornal'a-Kosice
6. E571-I/50 Zaroovica and Nova Bana bypass

The above list of road projects scheduled for the period 1995-2000 is very different from the one previously established. Current infrastructure policy appears to place more emphasis on the development of the motorway network than in the past, as can be seen from the number of motorway construction projects listed below.

List of motorway network projects

1996-1998
D1 Chochina-Nemsova
D1 Hybe-Vazec
D2 Bratislava-Slovak/Hungarian border
D61 Bratislava-Slovak/Austrian border
Branisko-Fricovce

1996-1999
D1 Nemsova-Ladce
D1 Nové Mesto n. V.-Chocholna

1996-2003
D1,3 Visnové-Slovak/Polish border

1997-1999
D1 Ladce-Sverepec
D1 Horna Streda-Nové Mesto n. V.

1997-2001
D1 Sverepec-Visnové
D1 Vazec-Janovce

1998-2000
D61 Bratislava Mierova-Senecka

1999-2003
D1 Visnové-Martin

2000-2004
D1 Janovce-Beharovce
D1 Fricovce-Presov
D1 Budimir-Slovak/Ukrainian border

2000-2005
D1 Martin-Ivachnova
D2 Bratislava Lamacska-Staré Grunty

2002-2004
D1 Slovak/Czech Republic border

2003-2005
D61 Bratislava Viedenska-Pristavoy most/Port bridge

The priority aim, as regards road infrastructure, is to build a road and motorway network that can be integrated into the European transport network (TEN). With this end in view, the main motorway projects are still:

- construction of the Bratislava-Slovak/Hungarian border section on the D2 and the Bratislava-Slovak/Austrian border section on the D61.

- construction of the Horna Streda-Zilina-Kosice (Ukraine) section on the D61/D1.

- construction of the Zilina-Cadca-Slovak/Polish border section (as part of the TEM, D18 project); this section will shorten the route by approximately 60 km and will dispense with a number of border crossing points with the Czech Republic.

Motorways which pose major problems (i.e. tunnels) or which have low traffic flows will be built in stages.

The modernisation of category I roads is still on the agenda and is focusing mainly on the European E-road network. The following projects are as listed in the previous report:

- Unrestricted access Category 1 road consisting of very few restricted access sections (i.e. bypass roads). These 2 x 2 lane highways will be widened to 4 x 4 lanes. Some will be built as 4 x 4 lane highways from the start, such as the E571 Trnava (D61)/Sered/Nitra/Sasovské Podhradie, which will be linked to the existing 4 x 4 lane Sasovské Podhradie/Zvolen road.

- 2 x 2 lane express roads (with the possibility of widening to 4 x 4 lanes):

  - North-south direction: Slovak/Polish border-Trstena-Martin-Zvolen (via Kremnica or Banska Bystrica with a link to the existing Ul’anka-Zvolen 4x4 lane highway)-Sahy-Slovak/Polish border.
  - East-west direction: Zvolen-Lucenec -Kosice, with a link to the D1.

Infrastructure for other modes of transport

Redevelopment of Bratislava and Komarno ports

Redevelopment at these ports is linked specifically to increasing flows of goods, international trade and the integration of the Slovak Republic into European structures. The issue of land ownership in the ports (the existing surface area) has been settled by a government resolution. The investments needed to develop the ports are estimated as follows:

- SK 1-2 billion for a bulk liquids freight terminal in the port of Bratislava, necessary because of environmental problems. It is scheduled to be brought on line in approximately five years.

- SK 2.4 billion to complete improvements to infrastructure at the port of Bratislava. The work should take another ten to 15 years.

According to the optimistic traffic growth scenario, it will be necessary to build port infrastructure for industry and distribution without implementing the resolution on land ownership. Such an investment will require some SK 4 billion. This is a long-term project.

Construction of the new (Voolfsthal) Canal from Bratislava

The canal will enable navigation of the slow-flowing sections of the river Morava. This is an international project. With regard to the section on Slovak territory, the problem of ownership is virtually settled. The investment costs (approximately SK 10 billion) will depend on the agreements reached with the countries involved. The main work should be completed five years from now. However, it is not possible to give a completion date for the overall project until bilateral agreements have been signed with Austria and the Czech Republic.

Improvements to the river Vah at Zilina

Total investment is estimated to amount to around SK 6 to 8 billion. Work to make the slowest flowing sections of the Vah navigable has already started. The technical option selected to improve the mouth of the Vah for shipping depends on the method used to construct the Nagymarros canal on the Danube. This work will also enable a river link from Zilina via Cadca to Ostrava, thereby providing access to the river Oder and the Baltic sea. This latter project will require funding in the region of SK 20 billion.

Rendering the rivers in the eastern part of the country navigable and connecting the Tisza and the Danube

Ownership problems have not yet been resolved. Their resolution will depend on international co-operation with Hungary and on the navigability improvements on the Hungarian section of the river Tisza. It is not possible to determine what the investment costs will be for the moment. However a likely estimate is in the region of some tens of billions of SK.

Bratislava-Sered river link

This link is heavily dependent on the progress made on work on the Vah and on the growth of goods flows in this region. The new river route will improve links between the upper and central regions of the Vah and the upper Danube. It will also enable the western plains of the Slovak Republic to be served by the river transport network. Costs are estimated at around SK 10 billion.

Making the various branches of the Danube and its tributaries navigable was, until now, simply aimed at developing a variety of different activities (leisure, tourism, etc.) in the Slovak Republic.

Air transport infrastructure

- Completion of work on Bratislava's MR Stefanic airport. Henceforth, this will be the country's main international airport.
- Redevelopment of the Poprad-Tatry airport terminal, in order to meet tourist demand.
- Improvements to bring the runway at Kosice airport into compliance with ICAO Category II landing standards.
- Redevelopment of Piestany airport.
- Air traffic control infrastructure plans include the installation of a new radio system, an Air Information System and participation in joint control of Central European air space.

Question 3: Capacity problems

Rail transport

Bottlenecks persist on:

- the first main line, on the Zilina-Vrutky and Kysak-Kosice sections;
- the second main line, on the Kuty-Breclav section;
- the southern line, on the Lucenec-Kosice and Leopoldov-Kozarovce sections.

Road transport

Road traffic density

The government roads survey, carried out every five years since 1959, is the main source of data on vehicle movements on the Slovak road network. The overall results of the survey in 1995 showed a general increase in traffic and, consequently, in capacity problems.

Road traffic density in number of vehicles per day

	Express	Coeff.	Class I	Coeff.	Class II	Coeff.
1980	4 888	1.0	4 074	1.0	1 835	1.0
1985	5 866	1.2	4 089	1.0	1 857	1.01
1990	7 626	1.3	4 509	1.11	1 898	1.03
1995	10 422	1.41	5 153	1.14	1 969	1.04

The results of the survey show that, between 1985 and 1995, annual traffic grew by 14 per cent on Class I roads and by 3 per cent on Category II roads. The highest growth rates were on roads that are part of the European network, particularly motorways, with an annual growth rate of 8 per cent. The average traffic density on main roads was 4 500 to 5 000 vehicles per day, of which 25 per cent were HGVs (as opposed to 20 per cent between 1985 and 1990). International traffic levels appear to have remained relatively unchanged and continue to account for 12 per cent of total road traffic.

Trends in road network capacity

Thousand vehicle-kilometres per day

	Class I	Class II	Total	%
1980	11 378	6 885	26 323	1.00
1985	12 275	7 176	27 241	1.03
1990	13 804	7 322	30 753	1.17
1995	15 888	7 509	31 851	1.21

This table shows that Class I and II roads carry 70 per cent of the traffic in terms of vehicle-kilometres. Over the period 1985-95, traffic volume grew by 21 per cent compared with 17 per cent over the period 1980-90. The two tables given below indicate traffic loads and the length of the sections concerned.

Length of four-lane highways according to traffic intensity

Number of cars/24h	Length of road sections
7000-7999	
Total	321 km
4 lane roads	30 km
%	9.3
8000- 8999	
Total	233 km
4 lane roads	38 km
%	16.3
9000-9999	
Total	220 km
4 lane roads	61 km
%	27.7
10 000-	
Total	788 km
4 lane roads	134 km
%	17.0

Length of roads by traffic loads
Kilometres

Number of vehicles per day	1973	1980	1985	1990	1995
1-999	4 816	3 242	3 870	3 610	3 027
1000-1999	3 083	2 771	3 322	3 162	2 526
2000-2999	1 264	1 232	1 404	1 459	1 448
3000-3999	845	681	791	864	1 016
4000-4999	357	395	487	671	686
5000-5999	200	285	362	330	603
6000-6999	157	241	225	288	348
7000-7999	92	131	187	142	321
8000-8999	55	52	88	162	233
9000-9999	26	21	59	98	220
10000-	77	113	116	178	788
Total	10 972	9 164	10 911	10 962	11 216

The sections with the heaviest concentrations of traffic are the same as in 1993:

- I/61 (E50, E75) Nové Mesto-Trencin-Dubnica, which had a daily traffic load of 11 500 vehicles;
- I/66 (E77) Banska Bystrica-Zvolen, which had a daily traffic load of 13 000 vehicles;
- I/18 (E50) Zilian-Martin, which had a daily traffic load of 12 050 vehicles;
- I/50 (E571) Kosice-Roznava, which had a daily traffic load of 11 650 vehicles.

The main problem with regard to traffic safety and fluidity remains the excess loading on the road network. However, it would seem that the highway authorities have been able to distribute vehicle flows relatively successfully, as the rate at which road capacity is exceeded has remained unchanged since 1990, whereas overall traffic intensity has increased (regardless of type of road):

- capacity exceeded on 23.5 per cent of the total length of Class I roads;
- capacity exceeded on 5.8 per cent of the total length of Class II roads.

Question 4: Measures

Rail transport

The Slovak authorities reaffirm their desire to change the ZSR. The measures envisaged remain the same:

- privatisation of certain activities, primarily those not directly involved in traffic flows;
- general reduction in the number of employees;
- reduction in traffic volume, primarily on local lines;
- separation of network maintenance activities from the operating side;

- introduction of emergency regulations;
- sale of buildings and infrastructure, etc.;
- change in passenger and freight tariffs.

Other measures, which are more the responsibility of the State, are being considered to increase the financial profitability of the ZSR. These measures are aimed at reducing the level of indebtedness of the ZSR and at redefining the public service provided by the railways.

Road transport

The measures envisaged for this sector remain:

- increasing the capacity of the network by means of systems designed to regulate flows on sections where capacity has already been exceeded;
- improving road safety;
- protection of the environment against nuisances caused by road transport.

SLOVENIA

Area: 20 000 km²
Population: 2 000 000

Slovenia is one of the countries which have adapted best to the changes due to the economic transition. Owing to its rapid economic growth and its geographical position, it has been able to develop many links with its European neighbours. Since it is located on the Barcelona-Kiev corridor, it is a transit point for freight flows between the Mediterranean countries in the European Union and the central and eastern European countries. Slovenia exports a third of its production -- or the equivalent of almost 60 per cent of its GDP -- and the European Union accounts for over 70 per cent of its total exports. It should be pointed out that its trade has probably been stimulated by the co-operation agreement concluded with the European Union in 1993 and by its status as an associate EU member state, as of June 1996.

Question 1: Future trends in passenger and freight traffic

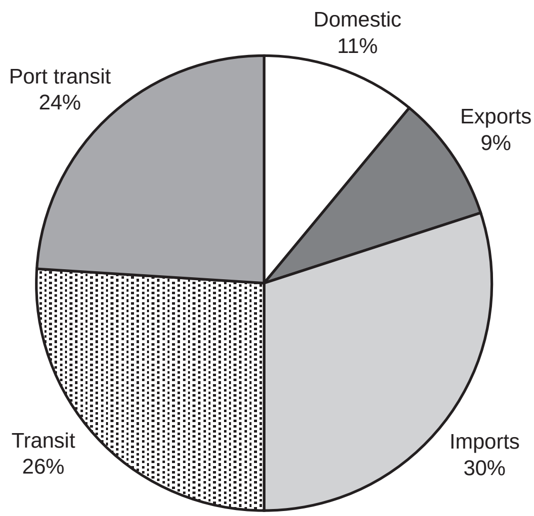
Slovenia has provided information on present and past traffic flows but no forecasts. Since 1992 industrial output and export trends have been very similar. Owing to a slowdown in growth in industrial output in 1995 from the previous year, exports rose less in real terms than imports, by 5 per-cent and 11.5 per cent, respectively. Despite a regular increase in trade in goods, the trade deficit rose from $180 million in 1994 to $782 million in 1995.

Forecasts for growth in trade
Percentage

	1994	1995	1996	1997	1998
Exports	2.0	5.0	5.2	5.2	5.7
Imports	1.0	6.5	7.0	7.0	7.5

A breakdown of freight flows by origin shows that transit accounts for half of total freight traffic, while imports represent 30 per cent of the total, or three times the figure for domestic freight. As the level of imports should continue to rise until 1998 (according to the above table), an increasing tonnage can be forecast for the coming years.

Figure 1. **Breakdown of the tonnage carried in 1995**



Source: ECMT.

It should be pointed out, however, that both freight and passenger traffic have declined regularly since 1985-86, despite a slight recovery in 1994, particularly in freight.

Road transport

Freight traffic

Between 1980 and 1994, the number of lorries rose by 20 per cent. Road transport, however, accounts for only 25 per cent of total freight carried in Slovenia, where rail remains the leading mode.

Traffic trends, 1980-94

	Traffic (thousand tonnes)	Traffic (millions of t-km)
1980	22 085	3 043
1985	18 649	3 772
1990	11 268	3 440
1991	8 379	3 043
1992	6 411	2 260
1993	5 664	1 989
1994	5 442	1 935

Domestic freight accounts for 60 per cent of the road freight tonnage, while 10 per cent of international traffic in fact consists of freight carried on vehicles in transit. Traffic expressed in tonne-km reflects the same breakdown between national, international and transit traffic.

Passenger traffic

In this segment of the transport market, traffic is shared almost equally with rail. In 1994, road transport's share of passengers carried for urban and intercity trips was 53 per cent and that of rail was 42.4 per cent.

Trends in the vehicle fleet, 1980-94

	Buses	Private cars
1980	2 506	416 448
1990	3 077	578 268
1991	2 855	594 289
1992	2 676	606 820
1993	2 527	632 563
1994	2 486	657 287

The number of private cars rose by almost 60 per cent between 1980 and 1994, to 3.1 vehicles per 10 inhabitant or 333 per 1 000.

	Passengers (thousands)	Passenger-km (millions)
1980	5 057	68.2
1990	8 562	112.1
1991	6 334	105.7
1992	1 327	28.6
1993	1 172	28.6
1994	1 000	23.5

It is difficult to evaluate these figures, as the same methods were not used for counting from one year to another. The very high traffic volumes recorded for 1990 and 1991 were due to the statistical method used, since the results cover transport on own account for all registered vehicles; from 1992, the statistics take into account only those enterprises or organisations operating more than one vehicle with at least ten seats, but not the traffic on own account performed by public road carriers.

Rail transport

Freight traffic

In 1994, rail accounted for 15.7 per cent of total tonne-km, as against 15 per cent in 1990. In terms of freight, however, rail accounted for 60 per cent of the tonnage carried.

Volume of freight traffic by type of traffic
Thousand tonnes

	1980	1985	1990	1991	1992	1993	1994
Domestic traffic	12 528	13 073	8 594	6 065	3 366	3 064	1 866
International traffic of which:	9 394	11 319	13 851	11 168	9 679	8 836	11 154
- exports	2 535	3 151	4 093	2 934	1 126	1 186	1 390
- imports	2 985	3 672	3 920	2 817	2 462	2 451	4 086
- transit	3 874	4 496	5 838	5 417	6 091	5 199	5 678
Total traffic	21 922	24 392	22 445	17 233	13 045	11 900	13 020

The only strong trend is in domestic traffic, which recorded an 85 per cent decrease between 1980 and 1994. The situation is more complex for international rail transport, with growth of 18 per cent over this period but a 20 per cent decrease in tonnage between 1990 and 1994. The results for international transport are due to transit and import traffic flows, which rose by 46 per cent and 36 per cent, respectively, between 1980 and 1994.

Passenger traffic

Rail accounted for 50.2 per cent of total passenger-km in 1994 as against 46.3 per cent in 1990. It also had very good results for domestic traffic. Even so, the total volume of rail traffic has declined by almost 40 per cent since 1980. Between 1980 and 1994, international lines had the greatest decrease in rail passengers, with a decline of 49 per cent, as against 35 per cent for domestic traffic.

Trend in rail traffic, 1980-94
Thousands of passengers carried

	International traffic	Domestic traffic	Total
1980	1 959	18 882	20 841
1985	1 503	27 646	29 149
1990	1 669	19 427	21 096
1991	1 023	14 264	15 287
1992	1 331	10 955	12 286
1993	1 042	11 594	12 636
1994	992	12 113	13 105

In terms of passenger-km, traffic was down even more. Both international and national traffic declined by about a factor of three.

Question 2: Present situation as regards infrastructure and investment projects

The increase in trade fully justifies the development of Slovenia's transport infrastructure. The country's socio-demographic structure also requires a dense infrastructure, as Slovenia is highly decentralised and very attached to the "urban village" concept. There are very few large population centres, the capital Ljubljana has only 270 000 inhabitants, and only three towns have a population of over 30 000. Therefore, the transport network must be sufficiently dense to meet the population's mobility needs.

Developing the transport and telecommunications system therefore meets a number of objectives:

- increase economic competitiveness by reducing transport and communication costs;
- prepare for integration into the European Union;
- develop the transport network in response to the increase in mobility and trade;
- improve transport safety.

In order to meet these objectives, the Ministry of Transport drew up in 1993 an overall strategy for the various modes based on a number of master plans:

- a national programme for the construction of motorways in Slovenia;
- a national programme for the development of combined rail/road infrastructure;
- a national programme for the development of railway infrastructure.

These programmes focus on the construction of four-lane motorways, the modernisation of railway tracks, and the provision of new rail/road connections.

The national plan for other roads, which is now being prepared, is aimed at improving access to the motorway network and to multimodal facilities, providing better inter-regional connections, and facilitating commercial and tourist traffic flows.

In connection with these programmes, a number of transport and telecommunications infrastructure operations have been approved or are being implemented:

- the reconstruction of 148 km of tracks by 1997;
- the modernisation of signalling devices on the line Ljubljana-Sezana by 1998;
- the renewal of railway telecommunication devices by 1998;
- the construction of the new railway link between Slovenia and Hungary by 1999;
- the construction of 358 km of east-west motorway by 1999;
- the construction of 113 km of north-south motorway by 2004.

Road infrastructure

Present situation

Although the volume of construction work has doubled since 1980, motorways account for only 2 per cent of the total length of the Slovene road network.

Breakdown of the Slovene road network, 1980-94
Kilometres

	1980	1985	1990	1994
Motorways	122	199	228	277
Main roads	1081	1082	1357	1356
Regional roads	3706	3694	3395	3396
Local roads	9741	9137	9572	9781
Total	14 650	14 113	14 552	14 810

Of this network, 663 km are classified as international roads.

Priority projects not included in the TEN corridors

The national road infrastructure programme will not be defined before the end of 1997. So far, the Slovene authorities have not referred to any priority project at national level.

Rail infrastructure

Present situation

The particularity of Slovenia's rail infrastructure is that, until 1991, the Slovenian Railways (Ljubljana Rail Authority) did not operate all lines on the Slovene territory, in particular those located around Lendava, but it was responsible for certain lines in Croatia: Sapjone-Rijeka (excluding its station), Buzet-Pula and Lupoglav-Rasa. Two networks are therefore to be distinguished:

Length in km	Slovenian Railways network	Network of the Republic of Slovenia
1980	1 229	1 058
1985	1 228	1 058
1990	1 366	1 196
1994	1 201	1 201

In both cases, 40 per cent of the lines are electrified and 27 per cent are double track. The amount of rolling stock has decreased regularly since 1990, after rising from 1980 to 1985. In 1996, it consisted of 209 electric and diesel locomotives, and 113 electric and diesel motor trains.

Priority projects not included in the TEN corridors

These include:

– construction of a second track on existing lines:

  - Divaca-Koper section (45.8 km): start of work scheduled for 1998 and start of service in the year 2000 (part of the Crete corridor n° V);
  - Maribor-Sentilj section (16.5 km): start of construction after the year 2000;
  - Ljubljana-Jesenice section (71.2 km): start of construction after the year 2005;

– construction of new rail links:

  - Puconci-Hodos section (25 km): start of work in 1997 and start of service in 1999 (part of Crete corridor n° V);
  - Beltinci-Lendava section (20 km): start of work in 1998 and start of service in the year 2000;

– construction of a high-speed line:

  - Trieste-Ljubljana-Zidani Most-Budimpesta-Belgrad line: start of construction after the year 2005 (part of Crete corridor n° V).

Question 3: Capacity problems

Slovenia is confronted with a number of road and rail capacity problems which are to be resolved by the implementation of the national motorway construction and railway development programme. Mobility, particularly for commuter traffic, is increasingly affected by tailbacks on the main routes, a limitation which has to be taken into account in the choice of a job and is a real brake on rapid economic and social development.

Road transport

National statistics show a disturbing increase in road accidents. Efforts to improve road safety between 1980 and 1990 appear to have been successful, but with the increase in the number of vehicles on the road, the number of accidents rose again between 1990 and 1994 to the figures for 1980, i.e. before the start of the policy to reduce accidents. Slovenia is among the European countries with the highest accident rates.

	Number of accidents (injured or dead)
1980	6 941
1985	5 481
1990	5 177
1991	5 479
1992	5 882
1993	6 290
1994	6 586

Question 4: Measures

No measures were announced.

SOURCES

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SPAIN

Area: 497 500 km²
Population: 39 million

Question 1: Future trends in passenger and freight traffic

Passenger traffic

Domestic traffic

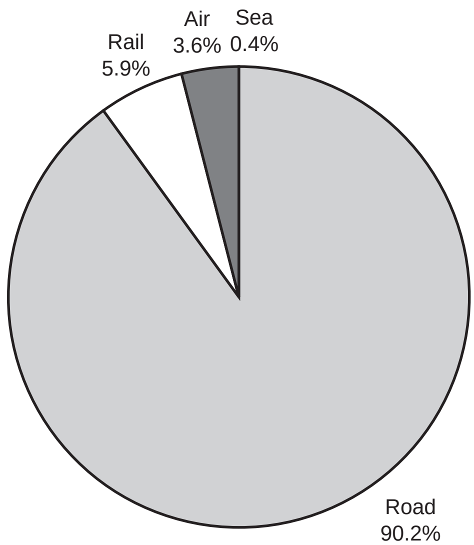
The traffic forecasts for the year 2000 were made in 1989 on the basis of an analysis of traffic levels over the period 1985-89. Results observed since 1990 suggest that these forecasts remain valid, particularly for road traffic.

The situation for rail traffic is less clear, since, for the past five years, growth in the rail sector has been very uneven: up 7.3 per cent in 1992 but down 5.71 per cent in 1993.

Trends and forecasts for domestic interurban inland transport
Billion passenger-kilometres

	1989	1990	1991	1992	1993	1994	1995	2000
Road	197	209.0	220.0	231.0	237.0	245.0	253.5	308
Rail	16	16.7	16.3	17.5	16.5	16.1	16.6	24
Total	213	226.0	236.0	248.0	253.0	261.0	270.1	332

Figure 1. **Domestic passenger traffic in 1995: modal split**



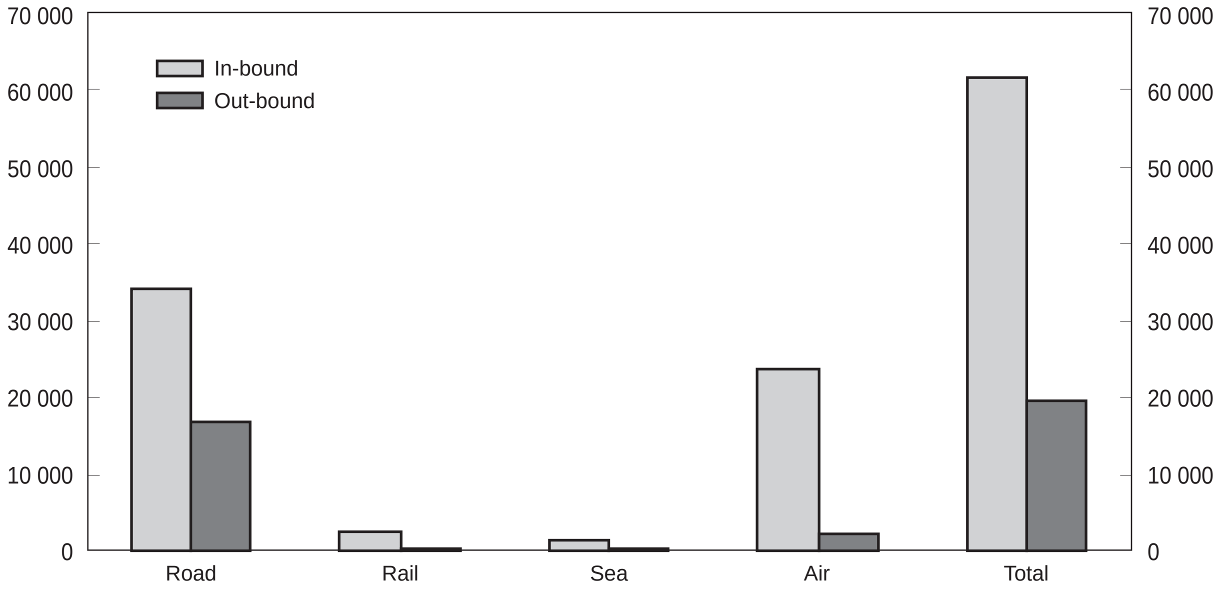
Source: Statistical Directory, Transport and Communications, Ministry of Public Works, 1995.

Growth has been higher for air transport than for other modes over the past five years (+58 per cent), but road transport has by far the largest share of the market. Rail traffic's share of total traffic volume has increased by only 0.6 per cent since 1989.

International traffic

Road transport dominates international traffic somewhat less than it does the domestic market. As a result of the large increase (+65 per cent) in the volume of road traffic between 1990 and 1991, the road sector accounts for as much as 65 per cent of total cross-border traffic. Air transport comes second with 28 per cent of the international passenger market. International rail traffic, on the other hand, accounts for less than 4 per cent of total traffic. Traffic volume quadrupled in 1991, but has since remained stable. Since 1989, there has been virtually no change in maritime transport's share of the market (less than 3 per cent of all traffic).

Figure 2. **International passenger traffic in 1994: modal split**
Thousands



Source: Statistical Directory, Transport and Communications, Ministry of Public Works, 1995.

Road transport

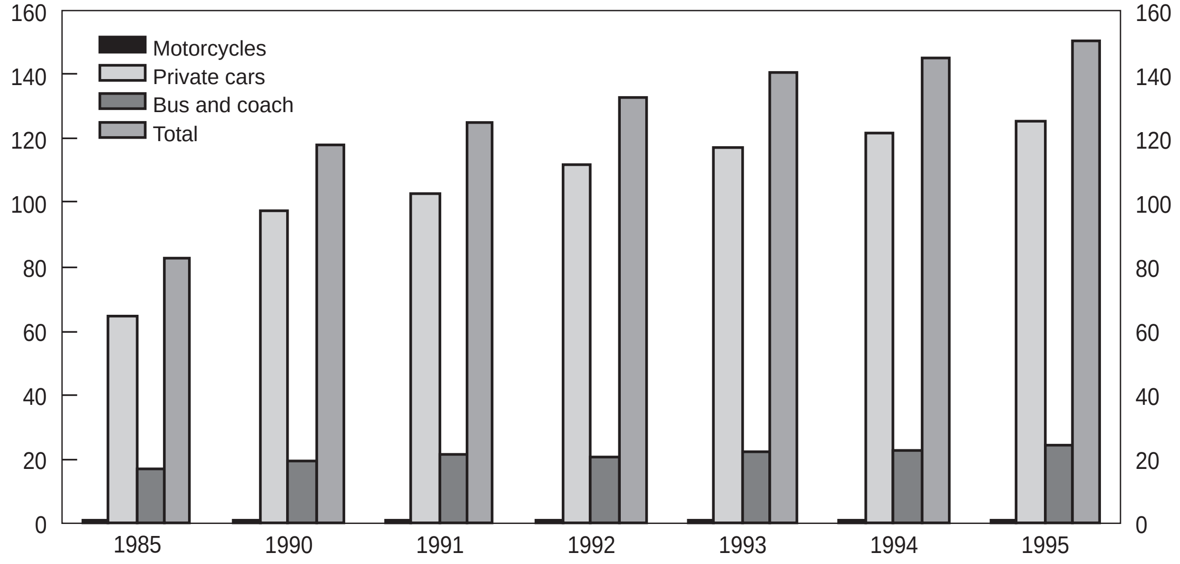
Traffic trends on the Spanish road network, 1985-95[1]
Million vehicle-kilometres

	1985	1990	1991	1992	1993	1994	1995
Motorcycles	856	840	960	962	890	1 014	998
Private cars	64 695	97 490	102 744	111 611	117 160	121 509	125 201
Bus and coach	16 813	19 631	21 182	20 291	22 305	22 723	23 943
Total	82 364	117 961	124 886	132 864	140 355	145 246	150 142

1) Data from network (motorways and roads) owned by the Central Administration (21 945 km).

Figure 3. **Traffic trends on the Spanish road network, 1985-95**[1]

Million vehicle-kilometres



1. Data from network (motorways and roads) owned by the Central Administration (21 945 km).

Source: Statistical Directory, Transport and Communications, Ministry of Public Works, 1995.

An analysis of traffic over the period 1989-94 confirms the growth rates forecast for the early 1990s in the Second Road Plan (1992-2000). It was forecast that, after a long period during which the volume of road traffic is expected to rise steadily, in terms of both vehicle-kilometres and passengers or tonnes, traffic levels will stabilise, notably in the freight sector. Heavy vehicle traffic over the forthcoming period is expected to grow at just under half the rate for the previous period.

Actual and expected annual traffic growth rates, by type of vehicle

Cumulative annual rates	1989-94 Actual rate	1988-95 Forecast	1995-2000 Forecast
Light vehicles	4.83	4.9	3.2
Heavy vehicles	2.96	3.0	1.8
Total	4.53	4.6	3.0

Rail transport

After a lengthy period during which rail transport was neglected, the Spanish authorities are relying on modernisation of the rail network and the introduction of high-speed services to revive long-distance traffic. In terms of the number of passenger-kilometres, traffic is expected to have risen by a factor of 2.5 by the year 2000.

However, growth rates of this magnitude appear to be highly optimistic, given the declining trend in demand for long-distance rail traffic (down 33 per cent between 1989 and 1994).

Demand for long-distance passenger traffic
Billion passenger-kilometres

	1989	1990	1991	1992	1993	1994	1995	2000
AVE (high-speed train)				0.5	1.09	1.19	1.29	
Long distance	8.62	8.45	7.99	7.79	6.38	5.74	5.81	
Total				8.30	7.48	6.94	7.10	17.18

Regional and suburban rail traffic has recently experienced an upturn and, following a decline in private car use, once more accounts for a significant share of the market. Since 1991, the number of passengers travelling by suburban rail transport has increased by 30 per cent and the number of passenger-kilometres has risen by 14 per cent.

This renewed growth is the outcome of the policy to develop suburban rail transport set out in the Cercanias Plan (1990-93). Of the ECU 1.2 billion earmarked for suburban rail transport under the Plan, half was spent on infrastructure development, and the other half was used to renew rolling stock in 13 towns and cities.

Regional and urban traffic trends
Billion passenger-kilometres

	1989	1990	1991	1992	1993	1994	1995	2000	Overall growth rate	Annual growth rate
Regional	2.32	2.42	1.90	2.15	2.08	2.02	2.08	2.21	23.5	1.4
Suburban	3.76	4.59	5.13	5.84	5.66	5.88	6.14	6.43	47.3	2.6
Total	6.08	7.02	7.03	7.99	7.74	7.91	8.22	8.65	40.4	2.3

Freight traffic

Domestic traffic

Growth in the road sector (passenger and freight) would seem to confirm the forecasts of the early 1990s. In the rail sector, on the other hand, the volume of traffic forecast for the year 2000 will be more difficult to attain. In the case of both these modes, freight traffic trends are identical to the trends in domestic passenger traffic. Road traffic is growing at a steady rate, whereas growth in the rail sector is more uneven.

Maritime transport remains the second largest mode of freight transport in Spain, despite a heavy drop in volume (down 15 per cent between 1989 and 1994).

Trends and forecasts for domestic interurban inland transport, 1989-2000

Billion tonne-km

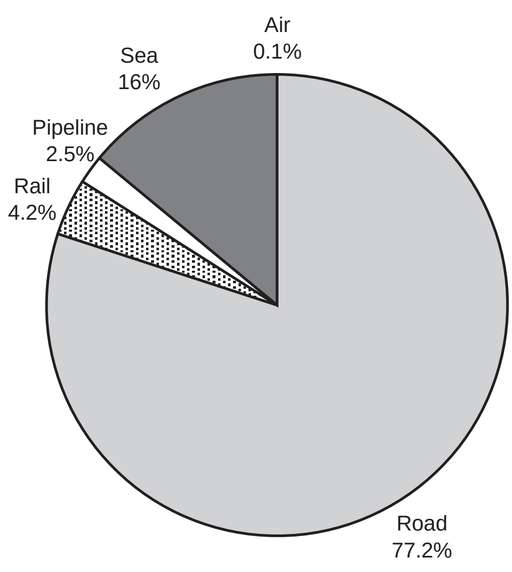
	1989	1990	1991	1992	1993	1994	1995	2000
Road	145	151.0	157	160.0	164	172	183	184
Rail	12	11.6	10	9.5	8	9	10	16
Total	157	162.0	167	170.0	172	181	193	200

Changes in the modal split, 1989-95

Billion tonne-km

	1989	1990	1991	1992	1993	1994	1995
Road	145	151	157	160	164	172	183
Rail	12	11.6	10	9.5	8	9	10
Pipelines	4	4.2	4.7	5.2	5.5	5.4	5.9
Maritime	35	33	34	32	28	30	38
Air	0.10	0.091	0.090	0.096	0.094	0.098	0.082
Total	196	199	206	208	206	217	237.1

Figure 4. **Modal split for domestic freight traffic in 1995**

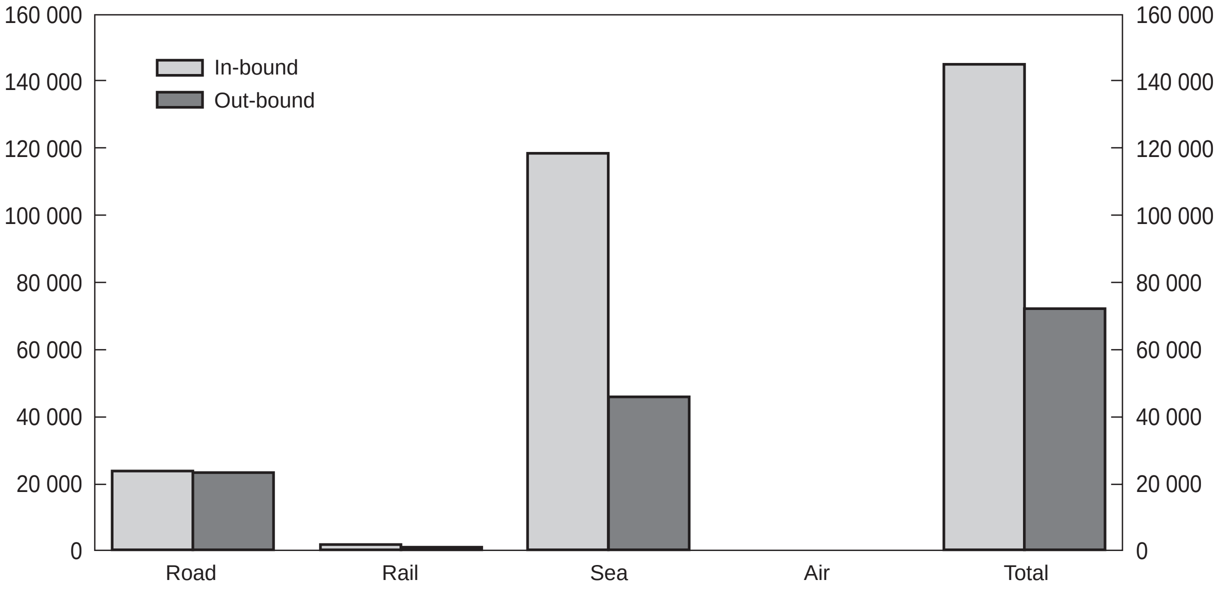


Source : Statistical Directory, Transport and Communications, Ministry of Public Works, 1995.

International traffic

The modal split in the international freight sector highlights the importance of maritime transport. The overall volume of international freight traffic is shared between maritime transport and road transport (76 per cent and 23 per cent, respectively). Rail transport accounts for only 1 per cent of traffic, while air freight traffic accounted for less than a million tonnes in 1994. The latter therefore does not appear on the graph below; however, the volume of goods transported by plane has risen by 40 per cent since 1991, the largest increase since 1989.

Figure 5. **Modal split for international freight traffic in 1994**
Thousand tonnes



Source: Statistical Directory, Transport and Communications, Ministry of Public Works, 1995.

Question 2: Present situation as regards infrastructure and investment projects

Description of existing infrastructure

After deep cuts in 1986, the Spanish budget for infrastructure investment has grown rapidly over the past few years. In 1991, it totalled Ptas 1 000 billion, three times the amount in 1986 and twice the average for the period 1980-84. The level of funds allocated to infrastructure investment fell slightly in 1992 and has now stabilised at around Ptas 900 billion. Budget cuts can be expected over the next few years (notably in 1996 and 1997) owing to problems associated with meeting the Maastricht criteria.

In 1994, infrastructure investment amounted to 1.4 per cent of GDP, compared with 1.6 per cent in 1991. Between 1987 and 1991, favourable economic growth in Spain led to a sharp increase in spending on infrastructure. During this period, GDP rose by between 5 and 6 per cent a year.

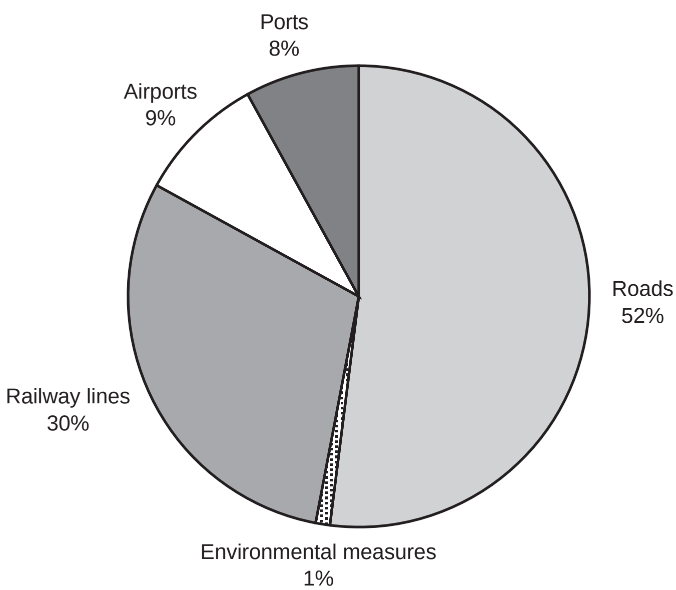
The main feature of Spain's transport investment policy over the past ten years has been the growing emphasis placed on road infrastructure (71 per cent of the investment budget in 1994 compared with 47 per cent in 1985). Despite renewed investment in railway infrastructure, with the construction of a high-speed line between Madrid and Seville (1989-91), the rail share of the investment budget has dwindled from 31 per cent in 1985 to only 14 per cent in 1994. Between 1993 and 1994, it fell by 30 per cent.

Ports and airports have also experienced a decline in funding. In 1994, their shares of the investment budget were 6 per cent and 9 per cent, respectively.

The new master plan for the development of interurban transport infrastructure (1993-2007) seeks to restore the balance in terms of the amount of funding allocated to each mode. It aims to increase investment in the rail sector through a slight reduction in the funds allocated to road infrastructure.

Figure 6. **Distribution of investment funds allocated to interurban transport, 1993-2007**

Billion Ptas in 1992



Source: Statistical Directory, Transport and Communications, Ministry of Public Works, 1995.

	Billion pesetas, 1992	%	Annual average
Roads	5 468	51	365
Combined transport	121	1	8
Railway lines	3 222	30	215
Ports	800	8	53
Airports	1 000	9	67
Environmental measures	128	1	9
Total	10 739	100	716

Railway infrastructure

The Spanish railway network comprises 14 700 km of line, built for the most part in the 19th century and modernised in 1960. Insufficient investment has resulted in a shortage of track, which in turn has resulted in severe congestion, particularly in the north of the country. Non-electrified single track makes up half the network. In addition, the operation of international services is hampered by the track gauge, which is specific to Spain.

As a result, a great deal of traffic is transferred to competing modes, particularly road transport, and, in the case of long-distance traffic, to air transport.

Length of the Spanish rail network
Kilometres

	1980	1985	1990	1992	1993	1994	1995	94/93 %
Total network	15 728	14 896	14 618	15 021	14 588	14 683	14 291	0.7
Of which total RENFE	13 542	12 710	12 560	13 041	12 601	12 646	12 280	0.4
Of which total FEVE	*1 508*	*1 509*	*1 301*	*1 222*	*1 222*	*1 191*	*1 193*	*-2.5*

RENFE infrastructure

	1994	1995	%
Electrified double track	3 269	3 261	25.84
Non-electrified double track	21	21	0.17
Non-electrified single track	3 730	3 593	29.50
Non-electrified single track	5 626	5 405	44.49
Total	12 646	12 280	100.00

Since the 1960s, railway infrastructure policy has been characterised by very irregular investment cycles.

Investment trends in the rail sector
Million pesetas

	1980	1985	1990	1992	1993	1994	1995	94/93 %
Total	62 933	89 994	247 036	238 644	203 719	141 921	160 100	-30.3
Of which total RENFE	48 306	44 057	152 799	192 394	134 649	68 662	73 227	-49
- Rolling stock	*11 426*	*24 869*	*64 184*	*93 422*	*67 324*	*27 788*	*39 144*	*-58.7*
- Infrastructure	*32 476*	*17 907*	*76 186*	*89 006*	*60 771*	*39 023*	*28 317*	*-35.8*
- Other	*4 404*	*1 281*	*12 429*	*9 966*	*6 554*	*1 851*	*5 766*	*-71.8*

Between 1990 and 1994, investment in trains, underground railways, and tramways fell by 50 per cent, even though improvements to the rail network are considered an absolute priority, as clearly stated in the new transport infrastructure master plan.

New railway construction projects aim to achieve these improvements by ensuring better links between the Spanish network and the European high-speed network. Priority has been given to the entry into service of a high-speed line between Madrid, Barcelona and Montpellier and to the construction of another line through the Pyrenees on the western side of Spain.

The other important priority of investment policy in the rail sector is the development of efficient public transport networks. Following the success of the Cercanias Plan, a new plan was submitted in October 1995, aimed at developing suburban rail services in Madrid over the period 1996-2001. The plan includes proposals for developing public rail transport as well as combined transport, in a number of Spanish cities.

Road infrastructure

Since 1990, the annual road infrastructure investment budget, which was only Ptas 90 billion in 1985, has not fallen below Ptas 600 billion. Consequently, the road network has steadily improved in terms of both quality and length, particularly with regard to motorways and expressways. Moreover, only 2 000 km of the national road network (162 000 km) are toll roads.

Length and breakdown of the Spanish road network

Kilometres

	1985	1990	1991	1992	1993	1994	1995	94-93
Motorways and expressways	3 170	5 126	5 801	6 988	7 404	7 736	8 133	4.5%
Roads administered by central government	17 786	16 570	16 193	15 629	15 862	16 534	16 652	4.2%
Roads administered by the autonomous regions	69 717	70 414	70 269	70 269	70 626	71 076	70 981	0.6%
Roads administered by local authorities	62 825	64 479	64 660	64 660	65 972	67 095	66 851	1.7%
Total	153 498	156 589	156 923	157 546	159 864	162 441	162 617	1.6%

Development of the Spanish road network, 1991-95

Growth rate (%)	1991	1992	1993	1994	1995
Road network	0.2	0.4	1.5	1.6	0.1
Motorways and expressways	13.2	20.5	6.0	4.5	5.1

Priority infrastructure projects not included in the TEN

These are projects which were not selected during the Essen Summit but which are included in the Infrastructure Master Plan for the period 1992-2007.

Road infrastructure

Five construction projects are currently in progress:

- access roads into Galicia;
- the Cantabrian corridor;
- the Somport-Valencia corridor;
- extension of the Mediterranean corridor as far as the Costa del Sol;
- the "Silver" highway from Asturias to Seville.

All of these projects involve the construction of high-capacity infrastructure. The different solutions adopted (construction of a second highway in certain corridors, extension of corridors) depend on the particular section of road under construction. The ultimate aim is to build a modern road network consisting of two-lane double carriageways of motorway standard.

The project completion dates are not yet known, but the roads must be open for traffic by 2007 at the latest.

Assuming that it costs between Ptas 400 and 500 million to build one kilometre of high capacity road, the total cost of the projects is expected to amount to one thousand billion pesetas.

Railway infrastructure

The main railway infrastructure project concerns the Mediterranean coastal line, which is to be upgraded to allow trains to be operated at 200 km/h. The link in question is 500 km long and connects Barcelona, Valencia and Murcia. The total cost of the project is Ptas 500 billion.

Question 3: Capacity problems

The rail network's failure to keep up with technological progress has meant that congestion is a problem affecting not only northern Spain and lines into major cities but also the development of an efficient combined transport system.

The other difficulty frequently encountered in the rail sector, and sometimes in urban road transport as well, concerns implementation of infrastructure development policies. Co-ordination between the services responsible for transport and the services in charge of territorial development is lacking. Policy conflicts between the different authorities concerned (i.e. central government, regions, towns and other local organisations) are not uncommon.

Question 4: Measures

In order to build the additional 8 850 km of roads scheduled in the master plan by 2007, new financing sources must be found. Several alternatives are currently under consideration:

- use of tolls to fund private road projects;
- the introduction of user fees on the main national and express roads;

- higher fuel and/or vehicle taxes;
- more responsibility transferred to the autonomous regions and local authorities.

The first alternative seems highly unlikely at present, given the small volume of traffic recorded on toll roads during previous experiments, not to mention the financial problems encountered by the two companies responsible for managing the toll sections in the 1970s.

SWEDEN

Area: 411 000 km²
Population: 8.9 million

Economic forecasts made in 1987, 1990 and 1992 estimate annual GNP growth to the year 2020 at 2 per cent at most and 1-1.5 per cent at worst. The government foresees average growth of 1.5 per cent between 1990 and 2005.

The population should continue to rise slowly to 9.1 million in 2005 and 9.4 million in 2020. There will be no stop to rural depopulation. The number of jobs will go on increasing until the end of the century and gradually decline thereafter.

The trend in the transport sector largely reflects the national economy, but it is also affected by structural changes in society:

- the growing specialisation of industry;
- the reduction of activity in heavy industry and raw materials processing;
- the growing importance of high-technology industries so that freight tonnage is declining while the value added of the goods carried is rising;
- the growing internationalisation of markets and increases in transport distances.

Question 1: Future trends in passenger and freight traffic

Since the price of oil should rise strongly until 2005, the highest increase in the various transport cost components will be in fuel (up 40 per cent). The cost of road transport will, however, rise more slowly over this period (up 30 per cent), because fuel consumption per kilometre should decline.

Freight traffic

In the early 1990s, total freight traffic (both domestic and international traffic carried by Swedish operators) marked time. The forecasts, based on observation of the economic cycles for industrial output, are for growth in road transport, stabilisation of rail traffic and quite a marked decrease in sea traffic.

Domestic traffic

In the last decade, domestic traffic rose on average by 1.2 per cent a year. Freight tonnage declined, while average transport distances increased. This applied particularly to the rail sector, where the average freight transport distance rose by 16 per cent, from 290 to 340 km. The average transport distance in 1990 was 490 km for certain flows, such as the transport of ores and ferrous products.

Until 1987 road and rail traffic grew at the same pace. After that date, road freight grew at a slightly faster rate.

Modal split in domestic long-distance traffic (> 100 km)

Road	44%
Rail	40%
Sea	16%

Forecasts for domestic traffic growth

	Period 1990-2005		Period 1990-2020	
	% tonnes	% t-km	% tonnes	% t-km
Road, short-distance	23.8	24.4	55	63
Road, long-distance	25.5	25.6	76	79
Rail	23.2	27.9	58	70
Cabotage	16.0	14.6	38	35

International traffic

This traffic consists of transport flows that start in Sweden and continue abroad after crossing the Baltic (or vice versa). It is estimated that international traffic is carried over a distance of at least 650 km and accounts for 40 per cent of Swedish transport activity.

Modal split in import and export flows in 1990

		Sea	Rail	Road	Total
Exports	Million tonnes	29.7	18.1	8.4	56.2
	%	53.0	32.0	15.0	100.0
Imports	Million tonnes	41.6	3.2	8.4	53.2
	%	78.0	6.0	16.0	100.0

Maritime transport is still the leading mode for foreign trade.

Forecasts for growth in traffic between 1990 and 2020

	1990 Million tonnes	1990-2005 % growth	1990-2020 % growth
Road	16.8	48	165
Sea	71.3	20	70
Rail	21.3	9	44

Despite a very sharp increase in road traffic, maritime transport will still be the leading mode for this type of traffic in 2020, with 120 million tonnes. However, the road sector's share of the market will exceed the rail sector's by 15 million tonnes.

The increase in rail tonnage does not necessarily mean a similar increase in the number of goods trains. Instead of using heavier trains or increasing the number of complete train loads, productivity per train (or daily utilisation) could be increased in order to meet market demand more effectively.

Road transport

In terms of tonne-km, road transport is a major mode. In terms of the value of the freight carries, it would lead the field.

Road transport on own account and public road transport. 1990-93
Millions

	Public transport		Transport on own account	
	In tonnes	In t-km	In tonnes	In t-km
1990	307.3	23 005	80.8	3 514
1991*	288.6	22 219	72.8	3 149
1992*	273.2	21 189	69.8	3 096
1993	254.5	22 652	60.5	3 256

* Estimated.

Total road freight in tonne-km will rise by 44 per cent up to the year 2020 (i.e. 20 per cent between 1993 and 2005 and 20 per cent between 2005 and 2020) owing to the increasing volume of trade in products with a high value added. Road transport will account for half the increase in total freight traffic.

Rail transport

Until the 1980s, sea and rail transport were the main long-distance modes, particularly for exports. In the 1990s, rail traffic started to decline and road traffic began to rise. Investments are planned, however, for rail and sea transport in order to improve their market share.

Trends in rail freight traffic, 1990-94
Millions

	In tonnes	In t-km
1990	53.7	18 756
1991	53.2	18 575
1992	51.5	19 202
1993	51.5	18 578
1994	55	19 054

Passenger traffic

Long-distance traffic has increased faster in recent years than short- and medium-distance traffic (30 per cent and 12 per cent, respectively).

Between 1990 and 2005, total Swedish traffic expressed in passenger-km should rise by 18 per cent (or by 1.1 per cent a year), despite the current economic recession. In the period 2005-2020, growth should be lower (14 per cent, or 0.9 per cent a year).

Annual growth in total passenger-km in Sweden, 1960-2025

1960	3.9%
1970	2.1%
1980	1.9%
1990-2005	1.1%
2005-2020	0.9%

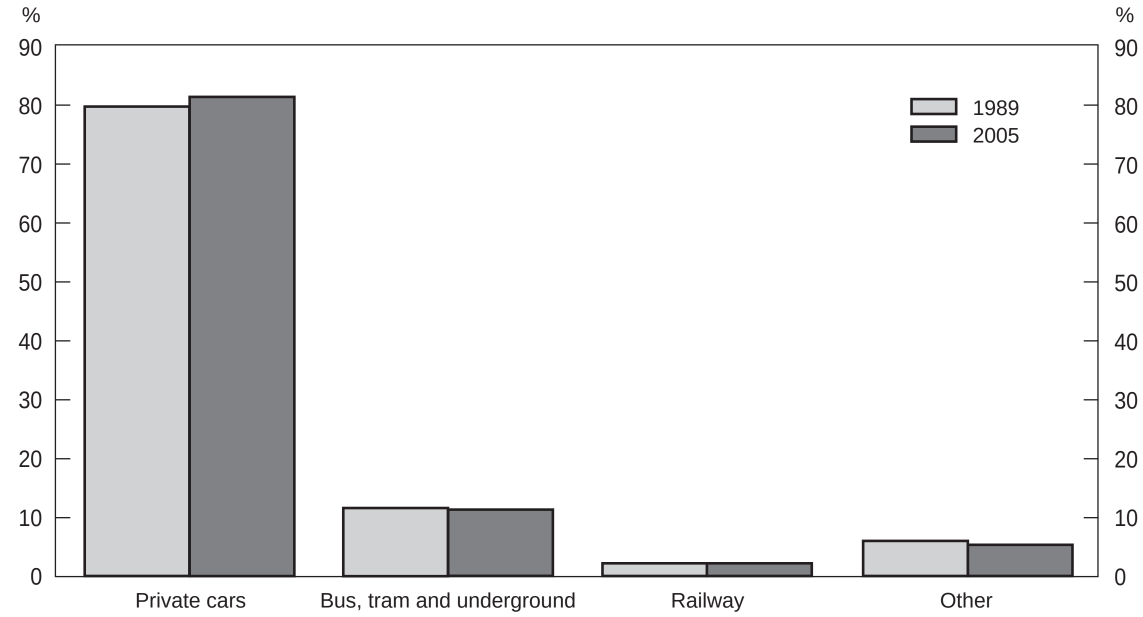
The number of trips should decrease but trip lengths should increase. Growth in national and regional travel for professional reasons will exceed that of local travel.

The 20th century is marked by radical changes in travel habits. The average use of the private car by the end of the century should amount to 45 to 50 km per day. The average distance travelled on public transport, which is now 10 km a day, should not exceed 13 km a day in the year 2020.

Short- and medium-distance traffic

This traffic should increase by about 10 per cent. The best means of transport for short- and medium-distance passengers is still the private car. In densely populated areas, however, public transport can compete with the car.

Figure 1. **Modal split comparison for short- and medium-distance trips in 1989 and 2005**



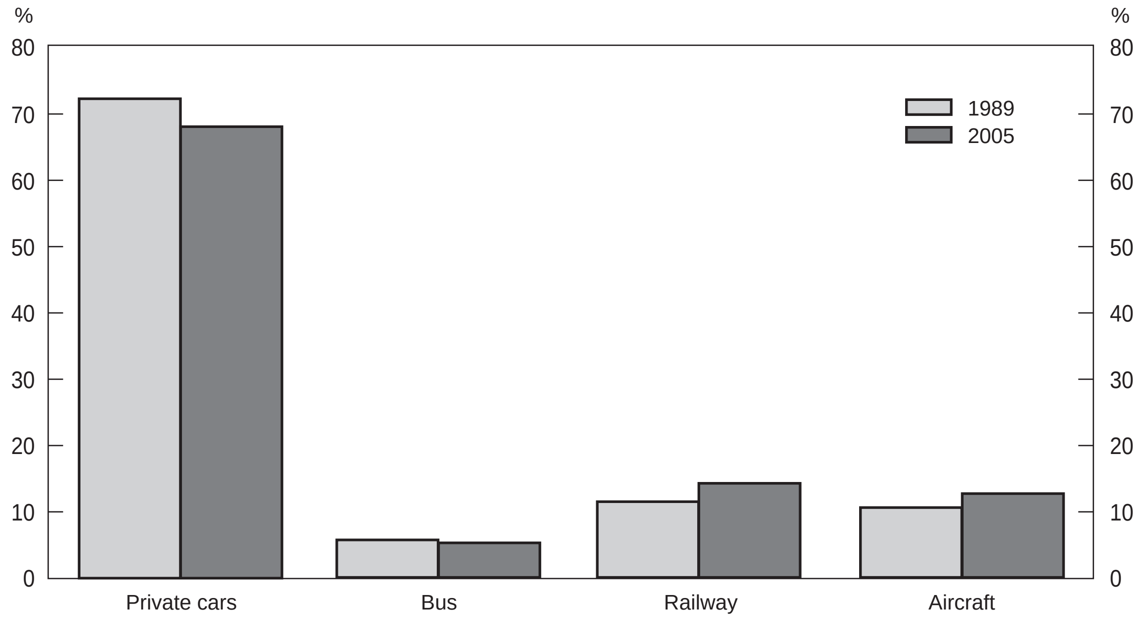
Source: ECMT.

Current investment in rolling stock points to a marked increase in the long term in medium-distance rail traffic (up 20 per cent between 1990 and 2020). At present, however, rail is regularly losing ground, as its 10 per cent decrease in market share in 1990 indicates.

Long-distance traffic

This traffic involves trips exceeding 100 km, which account for a third of total passenger-km in Sweden.

Figure 2. **Modal split for long-distance trips in 1989 and 2005**



Source: ECMT.

In the period 1990-2020, travel for professional reasons by air and train will have the highest growth, with increases of 55 and 65 per cent, respectively.

Rail transport

Extensive streamlining of the airline industry and substantial investment in infrastructure and aircraft compared with 30 years of low investment in rail have largely helped to make air transport relatively cheaper than rail.

Rail has also lost traffic to road transport, since trip times by car have been considerably reduced owing to frequent investment in infrastructure and technical improvements to vehicles.

The forecasts for rail traffic growth are based on the assumption that investment in infrastructure will be substantial. The improvement in trip times, particularly through the introduction of high-speed trains, should increase rail's share in total traffic.

Correlation between market share and transport time

	Trip time	Market share
Situation in 1989	6h00	25%
Scenario 1, year 2005	6h00	18%
Scenario 2, year 2005	5h00	24%
Scenario 3, year 2005	3h40	34%

Question 2: Present situation as regards infrastructure and investment projects

Road infrastructure

The Swedish Parliament, the Riksdag, has made the SNRA (Swedish National Road Administration) responsible for managing Swedish roads (state roads) and for road safety and environmental issues.

Road management means the operation and maintenance of national and county roads and investment in national roads. Investment in county roads is the responsibility of the county administration boards.

With regard to traffic, the SNRA's policy is aimed at:

– providing a transport system which will meet not only the transport needs of the general public but also industrial and commercial requirements;
– ensuring that the transport system complies with road safety provisions;
– integrating the transport system in the environment by managing resources in the best possible way;
– restoring regional balances through the construction of new infrastructure;
– ensuring optimum use of the community's resources.

In June 1993 the Riksdag adopted a resolution on the planning of new infrastructure for the period 1994-2003. Accordingly, investment in road infrastructure should also make it possible to:

– increase road capacity in response to economic growth;
– improve road safety;
– fully integrate environmental and regional balance objectives;
– find new ways of increasing capacity on existing roads;
– using the state roads as a basis, define and develop a national trunk road network of the highest standard to serve international traffic.

The following sums are to be allocated for this purpose:

– Skr 40 billion over ten years for national roads;
– Skr 9 billion for transport infrastructure, all modes combined, in the counties (county roads, local airports, regional rail services, etc.);
– Skr 7 billion for the development of the existing road network's capacity.

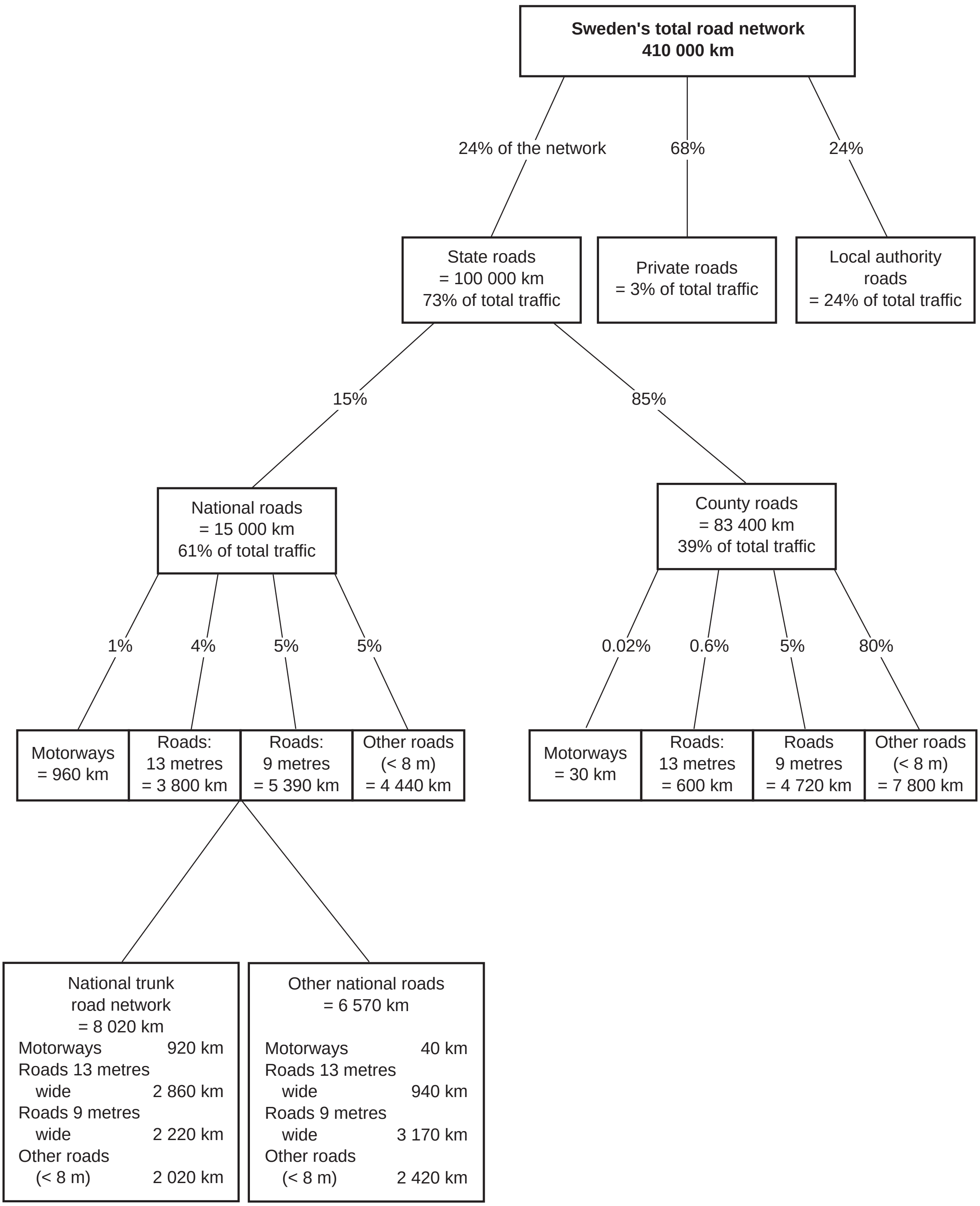
A budget of between Skr 59 billion and 93 billion should be allocated to the SNRA for the operation and maintenance of state roads. Parliament has not yet approved the final budget, as it has not decided whether to maintain or increase the level of taxes (paid by users) allocated directly to infrastructure. At present there are therefore two possible levels for future investment.

Compulsory contribution by road users

In kroner

	Tax on vehicles	Tax on fuel
Current low level	350/quarter	0.5/litre
Level in year 2000	560/quarter	0.5/litre

Over the period 1994-2003, Skr 33 billion should be allocated to improving the roads in the national trunk road network. The objective for the year 2003 is not to extend this network but to modernise it in order to increase its efficiency. It will therefore still be 8 020 km in length, as in 1992, but the total length of the motorway sections will be doubled.



Source: ECMT.

Private roads account for only 3 per cent of total vehicle-km.

The SNRA has worked out a construction plan for the period 1994-2003.

Rail infrastructure

National railway lines consist of two types of networks: the trunk railway, comprising the main national and international lines, and the county railway, comprising local lines on which freight capacity is low.

The trunk railway network is electrified and takes a freight train axle load of 22.5 tonnes at an average speed of between 90 and 100 km/h. Until recently, passengers were not carried at over 120-130 km/h. Since 1989, the West Main Line (serving as a showcase for Swedish Rail) has offered a high-speed train service with the use of X2000 trains running at 200 km/h.

Banverket (Swedish National Rail Administration) plans to invest Skr 3 billion a year up to 2003. The objectives set for this period are:

- to create a high-speed train network on the main routes;
- to provide freight services of the highest standard;
- to provide efficient passenger and freight services to and from the continent.

In 2003, high-speed trains (170-200 km/h) should be in service on the main lines running from Gothenburg and Stockholm to Malmö and Copenhagen, from Gothenburg to Malmö, and from Stockholm to Sundsvall, Västeras, Eskilstuna, Karlstad and Borlänge.

A large number of sections will be modified to increase speed from 130 km/h to 160 km/h. The Arlanda line will be completed and include an extension to the north as well as a third track to Stockholm. The line linking Gothenburg to Oslo will be extended, as will the line from Sundsvall to Umea. Freight transport will also benefit from all these improvements. The freight line crossing the Bergslagen region as well as the switching centres and freight terminals on the entire network are to be modernised.

Aviation infrastructure

Sweden’s aviation infrastructure is quite modern, for air transport has been developed regularly to meet the growing demand for the transport of passengers and of goods with high value added. The investment planned up to the year 2003 is not strategic in nature. The Board of Civil Aviation has budgeted Skr 1.5 billion a year from 1995 to 1998 and Skr 1 billion from 1999 to 2003. The main projects are the opening of a third runway at Arlanda, the construction of a new airport at Karlstad and the replacement of the Arlanda control tower.

No substantial investments should be made between 1994 and 2003 in local airports for which the counties are responsible.

Some new air services should be opened: Gothenburg-Malmö, Gothenburg-Östersund, Lulea-Sundsvall, Umea-Kristianstad and Umea-Arvidsjaur.

Maritime transport infrastructure

The capacity of the existing infrastructure is quite sufficient to cope with the expected growth in sea freight. The main investments concern the local authorities and ports. The National Administration of Shipping and Navigation intends, however, to improve the channels between Stockholm and Lulea and those in the Sound.

Question 3: Capacity problems

Road network

Total road traffic generates emissions of 18 million tonnes of carbon dioxide and 160 000 tonnes of nitrogen oxide a year with the result that 150 000 to 200 000 people are exposed to atmospheric pollution that exceeds the recommended standards. In addition, 340 000 people are subject to noise levels of over 65 decibels.

The vehicles of 66 per cent of road users are not subject to the exhaust emissions test introduced in 1989. The total vehicle fleet is quite old. Of the 3.6 million private cars in service, 40 per cent are between five and ten years old, as are 50 per cent of lorries. The quality of 200 km of state roads and 1 800 km of county roads is particularly unsatisfactory. Some 15 per cent of state Roads and 7 per cent of county roads are congested. The most congested segments are on roads which are seen as important in the European context: the E20, E18, E4, E6, E22 and the Rv40. About 800 km of these roads are affected by congestion problems.

In the Swedish road network as a whole, all cases of congestion occur within the Gothenburg, Stockholm and Malmö triangle. The outskirts of these three towns are also extremely congested.

Rail network

In rail transport, the same part of the country is marked by capacity and congestion problems as in road transport: the region bounded by Gothenburg, Stockholm and Malmö.

Maritime transport services

There are no particular capacity problems in maritime transport, especially as service frequency can be easily adjusted to meet increased demand.

Question 4: Measures

Rail transport

Since 1989 a number of measures have been taken to promote passenger traffic, such as:

- the implementation between 1989 and 2005 of a programme to improve and increase infrastructure capacity;
- a plan established in 1993 to develop the infrastructure required for high-speed trains and to increase the frequency of services;
- the preparation of a strategic rail plan to improve infrastructure and service quality has just been completed but has not yet been approved.

SWITZERLAND

Area: 41 293 km²
Population: 7 000 000

Although Switzerland is not part of the European Economic Area (EEA), the question of membership in the European Union remains, and this is evident in the country's traffic forecast scenarios, which require modification in the light of recent and profound changes in the socio-economic environment. Scenarios A1 and A2 (the "go-it-alone" scenarios) reflect the situation should Switzerland elect not to join the European Union. Scenarios I1 and I2, instead, reflect the situation in the event that Switzerland does opt to become a member.

Question 1: Future trends in passenger and freight traffic

With regard to passenger transport, the figures for 1992 show a decline in the growth of public transport (rail and road). However, there is no cause for alarm, as public transport has been able to maintain and even increase its share of the overall market and traffic forecasts for 2015 are highly optimistic. Indeed, the number of air transport passengers is expected to almost double by the year 2015.

Forecasting methods and overall results

In order to update its traffic trend projections to the year 2015, Switzerland used a set of quite divergent scenarios, as follows:

- A1 Go-it-alone/economic stagnation;
- A2 Go-it-alone/economic growth;
- I1 Integration/economic stagnation;
- I2 Integration/economic growth.

In all these scenarios, passenger traffic (all modes) is expected to increase from now to the year 2015, although less rapidly than it did over the past 20 years. In terms of passenger-km, it is expected to increase by approximately 40 per cent, from 98 billion passenger-km in 1990 to 135-140 billion in 2015.

A sensitivity analysis of the passenger traffic study was conducted using three reference scenarios. The minimum population scenario, M1, assumes a stabilisation of Switzerland's population at 7.1 million in 2015 and an unfavourable economic climate. Even so, passenger traffic is expected to increase from 98 billion to 121 billion passenger-km. In addition, the "Environment" scenarios M2 and M3, which assume that car prices will go up, predict a lower rate of car ownership. Scenarios M2 and M3 also assume that car running costs will increase relative to scenario I2 (by 25 and 50 per cent, respectively) as a result of pollution abatement taxes. The impact of these taxes would only be felt above a certain level and after some time. Even though these are not hard-and-fast forecasts, the assumptions do not suggest a massive increase in motor traffic.

The forecasts indicate that freight traffic will continue to increase, and even that it will increase at a faster rate. Over the period 1970-92, freight traffic in tonne-km increased by 2.1 per cent a year. Over the next 20 years, the rate of growth forecast varies between 2.7 and 3.5 per cent a year, depending on the scenario.

A sensitivity analysis was also conducted for freight traffic forecasts using a minimum scenario, the M scenario, which was used to calculate a "lower bound" for freight traffic growth. Based on the minimum assumptions, a rate of growth of 2.2 per cent in overall freight traffic is obtained, i.e. a rate about the same as that observed in the period 1970-92.

Rail traffic

The overall trend in rail traffic in Switzerland is not linear: it shows some peaks and troughs. But, overall, performance in 1994 was down compared with 1990.

Total train-kilometres on the Swiss Railways (CFF) network increased from 122.3 million in 1990 to 123.5 million in 1992, only to fall to 121.9 million in 1993 and to 119.9 million in 1994.

Similarly, density (in train-km per kilometre of track) increased from 112.5 million in 1990 to 113.8 million in 1992, dropping back again to 111.9 million in 1993 and 110.1 million in 1994.

Passenger transport

International rail passenger transport, which had increased until 1992, showed a marked drop from 1992 to 1994. However, even the most pessimistic scenarios forecast growth, with rail's share in overall passenger transport increasing by between 13 and 18 per cent by 2015.

Freight transport

Rail freight transport fell in the period 1990-93, chiefly due to a large drop in north-south transit traffic. However, it picked up again in 1994.

Transalpine traffic tonnage carried by rail and combined transport increased over the period 1992-94 by 2.3 and 2.2 per cent, respectively.

In 1981, rail and road carried substantially the same total flows in tonne-km. Since then, rail's share has dropped by 40 per cent, but according to the two scenarios that assume stricter environmental policies (A2 and I2) there will bee a return of growth. However, the A1 and I1 scenarios suggest that the current decline in rail freight traffic will continue.

From 1994 to 1995, total rail and road traffic through the Swiss Alps increased by 3 per cent. The traffic carried by rail (combined transport and complete trainloads) increased by 1 per cent, as opposed to 6 per cent by road. Even so, rail still carried 73 per cent of the total tonnage of freight crossing the Swiss Alps in 1995, i.e. 17.9 million tonnes.

Combined traffic showed an increase of around 5 per cent in 1995, a much smaller increase than in the previous year, when it had been boosted by the opening of the Saint Gothard piggy-back link.

In 1995, conventional traffic carried (complete trainloads) showed virtually no change from 1994.

Breakdown of freight traffic through the Alps
Million tonnes net, rounded for each type

	1993	Annual variation	1994	Annual variation	1995
Combined traffic	6.17	18 %	7.30	5 %	7.65
Complete trainloads	9.79	8 %	10.53	-1 %	10.43
Total rail	15.95	12 %	17.83	1 %	18.08
Total rail and road	21.54	11 %	23.99	3 %	24.60

Source: CFF.

Road traffic

Passenger transport

Overall traffic trends in Switzerland show a decline in private transport by road in 1993, no doubt due to the recession and higher fuel taxes. However, from 1990 to 1993, overall private car traffic (domestic, entries/exits and transit) showed an increase of 3.4 per cent. The forecasts appear to confirm this trend, as private road transport is expected to show a lower growth rate than other public transport modes.

Freight transport

In the course of the period 1990-93, road freight traffic figures trended as follows:

– + 2.5 per cent for light goods vehicles (delivery vans);
– - 0.4 per cent for heavy goods vehicles (HGVs).

In the case of the latter, the recession really began to bite in 1992.

Whereas road freight traffic fell over the period 1990-93, transit traffic increased substantially. Indeed, transalpine traffic increased -- in terms of tonnage carried -- by 19.6 per cent over the period 1992 and 1994. In 1995, road traffic through the Alps increased by 6 per cent and carried 27 per cent of the total freight tonnage crossing the Swiss Alps.

Over the same period and in the same areas, the number of HGVs increased from 847 000 to 986 000, i.e. by 14 per cent. Transit traffic through Switzerland accounted for over half of these vehicles (530 000).

Between 1994 and 1995, border-to-border transit grew by 13 per cent as in 1993 and 1994. However, for freight transit traffic alone, tonnage was up by 26 per cent. The forecasts confirm this trend: overall road freight transit traffic (light goods vehicles and HGVs together) is expected to double from 5.4 billion vehicle-km to 10 billion in 2015. Meanwhile, total road traffic -- domestic plus inbound/outbound traffic -- showed no change over the period 1994-1995.

The detailed trends for transalpine vehicle flows in 1995 were as follows:

- the number of HGVs on roads to Saint Gothard increased by 8 per cent;
- the number of HGVs on roads to the Grand Saint Bernard, Simplon and San Bernardino passes fell by 2 per cent;
- the average number of HGVs crossing the Swiss Alps per working day was 3 961, of which 83 per cent crossed via the Saint Gothard pass.
- 64 per cent of HGVs crossing the Swiss Alps were foreign-registered vehicles, as against 49 per cent in 1981 (the first year after the opening of the Saint Gothard tunnel). The proportion of foreign-registered vehicles taking the Saint Gothard road tunnel increased from 42 per cent in 1981 to 66 per cent in 1995.

Trends in HGV traffic by year (values rounded for each category)

Alpine crossing	Type of traffic	1993	Annual variation	1994	Annual variation	1995*
Saint-Gothard	Transit	369 000	15 %	424 000	14 %	483 000
	Other**	368 000	4 %	383 000	1 %	388 000
	Total	736 000	10 %	807 000	8 %	871 000
Grand Saint Bernard + Simplon + San Bernardino	Transit	47 000	-5 %	44 000	7 %	47 000
	Other**	123 000	9 %	134 000	-5 %	127 000
	Total	170 000	5 %	179 000	-2 %	175 000
Total	Transit	415 000	13 %	468 000	13 %	530 000
	Other**	491 000	5 %	517 000	0 %	516 000
	Total	906 000	9 %	985 000	6 %	1 046 000

* Estimated transit figures.
**Other = Domestic plus inbound/outbound traffic.

Source: DFTCE Transport Studies Service, General Secretariat.

Question 2: Present situation as regards infrastructure and investment projects

Railway infrastructure

On the three priority rail corridors of interest to Switzerland, a number of measures to increase infrastructure capacity have been taken. They are all at different stages:

- Laying of a second track on the Loetschberg line, completed in 1992.

- Increasing throughput on the St-Gothard line (first piggy-back rail corridor, the Basel-Brug-Erstfeld-Lugano-Chiasso line), completed in 1994.

- Berne-Mattstetten (Grauholz) diversion, completed in 1995.

- New double track layout on the Gorgier-Onnens line (Bienne-Geneva corridor), to be brought into service in 1999-2000. Work is under way as part of the first stage of the Rail 2000 project. After the renovation of the line, trains will be able to run at speeds of 180 km/h. The work will cost a total of SF 420 million.

- Upgrading of the Aarau-Rupperswil line to four tracks, to be brought into service in 1997.

- The Adler tunnel, on the second Muttenz-Liestal line, to be brought into service in 2001.

- The new Zurich-Thalwil high-speed line, to be brought into service in 2001.

- The new Rothrist-Mattstetten high-speed line, to be brought into service in 2003-2005. This will be a two-track line designed for running speeds of 200 km/h. Work has started as part of the first stage of the Rail 2000 project at a cost of SF 1.46 million.

- The Loetschberg base tunnel, which is likely to be brought into service in 2004. This will involve boring a tunnel 33 km long. A start has been made on some of the work. The costs for the baseline option are expected to total SF 4.25 million (but may be lower if single track is used for part of the route).

- The Saint Gothard base tunnel (57 km) and the Monte Ceneri base tunnel (12.7 km), to be brought into service in 2006. Baseline costs are an estimated SF 9.5 million.

The first stage of Rail 2000 is scheduled for completion in 2005.

Road infrastructure

Of the major motorway corridors designated under the TEN scheme, some sections in Switzerland are under construction:

- National road A1: the Faoug-Payern section (E25) is to be opened to traffic by the end of 1996.

– National road A1: the opening of the entire Morat-Yverdon section will complete the St. Margrethen-Zurich-Berne-Geneva motorway. It is to be opened to traffic in 2001. Total costs for this section are estimated at SF 2.700 billion. The opening in 2001 will also complete the second Berne-Lausanne motorway link.

– National road A3: the opening to traffic of the Frich-Birrfeld section (E1) which completes the second Basel-Zurich motorway link, brought into service in mid-1996. This is part of the north-south Basel-Zurich-Coire-San Bernardino-Bellinzone corridor. The total costs for this section are estimated at SF 1.2 billion.

– National Road A4: opening to traffic of the Winterthour-Schaffhouse (E41) section at the end of 1996 completes the Zurich-Stuttgart express road link. Total costs amounted to SF 850 million.

– National roads A4 and A20: the (partial) opening to traffic of the Zurich West bypass and the Uetliberg and Knonau (E41) branch roads in 2007 will complete the Basel-Coire (N3) route and the Schaffhouse-Uri-Tessin (Saint Gothard route). The projected costs for this section are SF 4.1 billion.

– National road A2: the north Basel bypass which links France's A36 motorway with Switzerland's A2 and A3 motorways is under construction. It is likely to be brought into service in 2009. The work will cost approximately SF 1.2 billion.

With the exception of Zurich's urban motorways and the Bienne (Biel) motorway bypass, the Swiss national road network, as designated by Parliament, should be completed by 2012.

Question 3: Capacity problems

The explanatory report on the Federal bill concerning a distance/weight-based tax on HGVs (19 June 1995) gives data on external and environmental and accident costs and on the external benefits of HGV traffic. The studies conducted in this area show that HGVs over 3.5 tonnes generated the following external costs in 1993:

– accidents, SF 18 million;
– damage to buildings, SF 312 million;
– noise, SF 257 million.

These SF 590 million do not even account for all external costs. Others which should be factored in are those to health, external costs resulting from damage to crops, and the effect on climate. Studies are being conducted to establish the health costs.

Surveys have shown that the external benefits of road traffic are negligible and, furthermore, that the actors involved do all they can to internalise them and to foist external costs onto the government (externalisation).

If the unrecovered costs of infrastructure are factored in, some SF 160 million according to studies conducted from 1988 to 1992, the total rises to SF 750 million, which could be recouped from traffic through charges.

Question 4: Measures

Rail transport

As regards transport planning, two decisions appear crucial:

- the decision of 6 December 1987 to implement the Rail 2000 project;
- above all, the referendum of 27 September 1992 approving the new transalpine line (the NFLA).

The decisive factor in this project was the fact that volume of road and rail traffic via the Swiss Alpine passes (15 million tonnes) could triple over the period 1993-2015. Of course, maximum growth would be attained only if all freight flows through the Alps continued to take the shortest route, i.e. through Switzerland, and of course, the NFLA could divert some of the road traffic that uses passes in other countries to the Swiss passes.

Road transport

As regards transport policy, the approval of the decision to convert current HGV charges to a charge based on performance (kilometres travelled and vehicle weight) and the approval of the article in the constitution on the protection of the Alps voted in February 1994 warrant mention. Together, they give the green light for the gradual introduction of a transport system based on "real costs".

For the Swiss authorities, the introduction of a fee based on the performance achieved should also improve competition conditions between rail and road.

The Federal Law of 17 June 1994 on road transit traffic in the Alps (LTRA), specifies the corridors that are open to this type of traffic and addresses capacity problems. Under Article 2 of the law, the only roads open to transit traffic in the alpine region are:

- the Thusis-Bellinzone north section of the San Bernardino road;
- the Amsteg-Göshenen-Airolo-Bellinzone north section of the Gothard road;
- the Brigue-Gondo/Zwischbergen (border) section of the Simplon road;
- the Sembrancher-north tunnel portal section of the Grand Saint-Bernard road.

Article 3 prohibits any increase in capacity on transit roads, i.e. no new lanes are to be added even on existing roads. However, under Article 4, the construction of urban bypasses is allowed.

TURKEY

Area: 780 000 km^2
Population: 58 687 000

The seventh transport plan covers the period 1995-99. The general aim of these plans is to develop a “healthy” transport system, increase the sector’s productivity, rationalise the use of existing resources as far as possible, and allow the national economy to function smoothly.

Question 1: Future trends in passenger and freight traffic

Transport plans are drawn up on the basis of freight and passenger traffic forecasts and take account of future trends in a number of parameters (population growth, GNP, the modal split, and infrastructure investment programmes).

Results for freight and passenger traffic are set out below.

Rail traffic

The seventh five-year plan is predicated on an annual growth rate for domestic rail freight traffic of 10.9 per cent per year (the previous plan anticipated growth of only 8.9 per cent). On this basis, domestic freight traffic should account for 14.8 billion tonne-km by the end of the period (1 billion tonne-km more than previously predicted). Rail’s share of the modal split for freight transport is not expected to exceed 10 per cent between 1995 and 1999, whereas four years’ previously the rail share was expected to be 11.7 per cent.

According to the forecasts, rail traffic in Turkey will total 5.1 billion passenger-km and 14.75 million tonne-km by the year 2000. Considering the traffic volume expected in 1997, it seems difficult to achieve the forecasts made for 2000.

Rail traffic trends, 1989-97

	1989	1994	1995	1996 (estimated)	1997 (forecasts)
Number of passengers (thousands)					
Suburbs	122 886	92 495	80 983	80 000	100 000
Main lines	23 364	26 842	23 522	21 800	23 300
International	109	196	130	200	200
Total	146 359	119 533	104 635	102 000	123 00
Passenger-kilometres (millions)					
Suburbs	3 163	2 394	2 097	2 064	2 580
Main lines	3 648	3 882	3 661	3 526	3 770
International	33	59	39	60	60
Total	6 844	6 335	5 797	5 650	6 410
Freight traffic					
Tonnes (thousands)	13 146	14 675	15 288	15 800	16 400
T-km (millions)	7 571	8 215	8 516	9 138	9 440

Road transport

The road sector currently accounts for 95 per cent of domestic transport. According to forecasts, road transport will retain this high share, as its operating costs are lower than those of other modes.

As the table below shows, road traffic fell in 1994 as a result of decisions taken on 5 April 1994. These decisions have not been disclosed. Despite this fact, road's share of total domestic traffic is still 95 per cent. Turkish transport policy aims to improve these results, both in passenger and freight sectors.

Road traffic trends in the passenger and freight sectors, 1993-96
Millions

	Tonne-km	Passenger-km
1993	97 843	146 029
1994	95 020	140 743
1995	112 515	155 202
1996 (forecasts)	118 140	167 618

Air transport

After a sharp drop in domestic air traffic between 1990 and 1991, the air transport market now seems to be booming. Over five years, the number of air passengers doubled.

Domestic air traffic trends, 1989-95

	Passengers	Passenger-km	Tonnes	Tonne-km
1989	2 339 000	1 087 000 000	17 052	96 000 000
1990	2 595 000	1 213 000 000	20 991	108 000 000
1991	1 788 000	846 000 000	13 729	76 000 000
1992	2 418 000	1 148 000 000	18 583	103 000 000
1993	3 422 064	1 734 000 000	26 103	154 000 000
1994	4 189 886	2 278 000 000	27 342	199 000 000
1995	4 942 014	2 691 587 642	32 183	234 520 552

Pipelines

Oil and natural gas trends, 1985-95

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Domestic											
Crude* (million t-km)	1 248	1 669	2 437	2 470	2 676	2 582	3 126	3 111	3 151	2 999	2 972
Natural gas (million m^3)			515	1 182	3 107	3 362	4 098	4 467	4 977	5 341**	6 710**
International (transit)											
Crude*** (million t-km)	30 700	30 800	37 947	50 383	53 144	29 274					

* Total volume of crude oil transported via the Batman-Dörtyol, Ceyhan-Kirikkale and Selmo-Batman pipelines.

** The volume forecasts for 1994 and 1995 also include NLG (natural liquefied gas) transported by tanker (377 million m³ and 1125 million m³ respectively).

*** The figures shown are for Iraqi oil transported via the pipeline between Iraq and Turkey. This traffic ceased in August 1990.

Question 2: Present situation as regards infrastructure and projects for investment

Road infrastructure

The Turkish road network is 60 999 km long. In 1995, the motorway network was 1 246 km long and by the end of the year, 530 km motorway were under construction.

Motorway construction
Kilometres

	1996	1997
Planned	209	321
Opened	134	n.a.

In 1980, roads were constructed to tolerate a load of 8 tonnes/axle, but the present requirement is 13 tonnes, so that roads built to the earlier specifications no longer meet the standards. The new plan therefore seeks to improve the quality of existing roadways, while taking account of problems related to dimensions, rather than to invest in building new roads.

The target is to bring national and provincial roads up to the new standards with the help of loans from the World Bank. This means rehabilitating a large number of roads so that ultimately all national roads and 73 per cent of provincial roads receive a bituminous surface.

The road network, by type of surfacing

	Type of road	Asphalt	Stabilised	Earth	Primitive	Total
1992	Motorways	826				826
	National roads	29 274	1 535	178	448	31 435
	Provincial roads	19 471	6 581	1 395	960	28 407
	Total	49 571	8 116	1 573	1 408	60 668
1993	Motorways	1 070				1 070
	National roads	29 617	1 263	128	416	31 424
	Provincial roads	20 076	6 089	1 297	884	28 346
	Total	50 763	7 352	1 425	1 300	60 840
1994	Motorways	1 167				1 167
	National roads	29 686	1 311	69	323	31 389
	Provincial roads	20 695	5 583	1 212	953	28 443
	Total	51 548	6 894	1 281	1 276	60 999
1995	Motorways	1 246				
	National roads	29 683	1 269	82	388	1 246
	Provincial roads	21 001	5 404	1 248	924	31 422
	Total	51 930	6 673	1 330	1 312	61 245

The main motorway projects are located:

- around Ankara, in the direction of Istanbul and Greece;
- near Izmir, heading southwards down the Aegean coast;
- near the Syrian border, linking the Mediterranean towns of Pozanti, Mersin, Adana, Gaziantep and Antalya (on the border).

Motorway projects identified in the 1995 investment programme

Name of project	Length (km)	Cost (million LT)	Dates	Status
Bala-Kulu	68	282 240	1993-1996	Open to tenders
Antalya-Yayladagi	56	592 100	1977-1997	Open to tenders
Ulukisla-Pozanti (includes a bypass around Ulukisla)	47	5 000 000	1996-2000	Will be opened to tenders
Ankara-Kirikkale-Derince	127	687 400	1996-1998	Open to tenders
Zana-Erbaa bridge	60	736 960	1992-1996	Open to tenders
Erbaa-Resadiye	73	620 760	1992-1996	Open to tenders
Pülümür-Askale	97	1 243 600	1986-1996	Open to tenders
Askale-Eszurum	65	838 600	1993-1996	Open to tenders
Diyadin-Gürbulk	76	435 960	1993-1996	Open to tenders
Birecik-Sanliurfa-Cizre-Habur, border	444	3 300 000	1996-2000	Will be opened to tenders

Part of the plan to modernise the network also involves connecting villages to the national and provincial road network. The private sector is expected to play a large role in the construction of new roads.

Railway infrastructure

The existing rail network comprises 10 466 km of line (8 549 km of main lines and 1 917 km of secondary lines).

Some data give an account of the current railway infrastructure capacity, particularly as far as electrified and non electrified tracks are concerned (1995 figures).

State of the rail network, 1995
Length in km

Type of line	Electrified	Non-electrified	Total length
Main lines	939	7 610	8 549
Secondary lines	154	1 763	1 917
Total	1 093	9 373	10 466

The transport plan includes the renewal of 2 090 km of track, bringing the total length of electrified line to 2 956 km and the length of line equipped with the signalling system to 4 216 km by the end of the period 1996-2000.

During this period, 171 km of line will be upgraded to double track (44 km between Yenice and Mersin, and 127 km between Incirlik, Toprakkale and Iskenderun).

For the period 1997-2001, a number of planned railway infrastructure projects should improve the average speed of freight traffic on the Turkish territory:

- projects for new lines:
  - Istanbul-Bosphorus: estimated cost, $637 million;
  - extension Kars-Tblisi: estimated cost, $400 million;
  - rail link Lake Van: estimated cost, $450 million;
  - rail section Ankara-Sivas: estimated cost $600 million.

- upgrading of existing lines:
  - Ankara-Istanbul rail link: estimated cost, $240 million.

- upgrading projects:
  - repair of 1 796 km of track;
  - welding of 100 000 rails;
  - improvement of signalling on 1 854 km of track;
  - electrification of 2 068 km of track.

Question 3: Capacity problems

Road transport

In 1994, the Turkish motorised vehicle fleet consisted of:

- 3.23 million private cars;
- 90 000 buses;
- 719 000 lorries;
- 124 000 other vehicles;

for a total of approximately 4.16 million vehicles.

Vehicles counts were carried out in 1995 on UN route E. The highest volume of traffic was obviously in and around Istanbul. On average, 177 920 vehicles cross the Bosphorus bridge each day, a 10 per cent increase over the previous year. Average daily traffic on the Fatih Sultan Mehmet bridge is 101 310 vehicles.

Although not on a scale comparable with Istanbul, traffic volume is also high along the Bulgarian border and on the Istanbul-Bolu-Ankara-Adana route.

Average daily traffic on major motorways, national roads and bridges, 1995

1. Edirne-Istanbul-Ankara Motorway:

Section	Length (km)	Average daily traffic
Edirne-Havsa	19.9	2 199
Havsa-Babaeski	27.2	2 457
Babaeski-Luleburgaz	24.4	3 304
Luleburgaz-Saray	28.8	4 647
Saray-çorlu	202	5 221
çorlu-Kinali 1	30.8	6 188
Kinali 1-Silivri 1	6.8	10 961
Silivri 1-Selimpasa	12.1	10 961
Kinali-Selimpasa	18.9	10 961
Selimpasa-çatalca	13.4	13 675
çatalca-Hadimköy	12.6	16 992
Hadimköy-Avcilar	6.0	25 045
Avcilar-Mahmutbey	11.4	33 696
çamilca-Kurtköy	24.8	30 657
Kurtköy-Sekerpinar	9.4	28 232
Sekerpinar-Gebze	10.0	19 844
Gebze-Izmit	35.3	19 856
Izmit-Adapazan	38.4	13 034
Adapazan-Akyazi	15.8	7 828
Akyazi-Düzce	60.3	7 828
Düzce-Kaynasli	21.0	6 882
Bolu-çaydurt	19.0	3 786
çaydurt-Gerede	38.8	5 151
Gerede-Pelitcik	46.3	3 708
Pelitcik-çeltikci	15.7	3 804
çeltikci-Mürted	44.3	3 957

2. Izmir-Alaçati motorway

Section	Length (km)	Average daily traffic
Sehitlik-Seferihisar	12.2	13 602
Seferihisar-Urfa	9.7	11 365
Urfa-Karaburun	11.0	9 559
Karaburun-Zeytinler	10.4	8 028
Zeytinler-Alaçati	17.0	7 599

3. Izmir-Aydin motorway (Izmir-Tahtali section)

Section	Length (km)	Average daily traffic
Isikkent-Tahtaliçay	11.5	8 006
Tahtaliçay-Torbali	13.5	8 764
Torbali-Belevi	21.5	8 222

4. Pozanti-Tarsus-Adana-Gaziantep motorway

Section	Length (km)	Average daily traffic
Pozanti-Tarsus	63.4	6 919
Tarsus-Adana	19.0	6 262
Adana-Ceyhan	61.5	5 047
Toprakkale-Bahçe	41.5	2 588
Bahçe-Gaziantep	36.1	1 700

Rail transport

On the UN international routes (see annex map), two sections stand out owing to the high number of trains per day (over 160):

- the H.Pasa-Gebze section (44 km in Asia);
- the Halkali-Istanbul section (28 km in Europe).

Their load factors are 91 per cent and 98 per cent, respectively.

The 87 km Gebze-Arifiye section has a 63 per cent load factor with 58 trains per day.

Two other sections have 100 per cent load factors:

- Çetinkaya-Malatya (140 km between Sivas and Malatya);
- Malatya-Narli (181 km towards the Syrian border).

Capacity of the rail network between 1994 and May 1996

Section	Maximum capacity train/day	Present rail freight traffic train/day	Present rail passenger traffic train/day
Halkali-Sirkeci	178	8	167
H.Psas-Iemit	178	6	520
çetinkaya-Malatya	32	28	2
Malatya-Narli	27	24	4

Question 4 : Measures

The principal aim of Turkish transport policy is to modernise transport networks and operations, in terms of organisational structures and management techniques, and to introduce commercial measures designed to make particular modes more attractive (e.g. the railways and ports for transit traffic).

Pricing policy is also concerned with procedures involving imports delivered f.o.b. so that national vessels can benefit from the import trade as much as possible.

In the light of the most recent traffic data, the present plan will place greater emphasis on measures to promote the transfer of both goods and passengers from the road to the railway.

Road transport

In addition to infrastructure investment, the policy to modernise the road network covers maintenance and repair services.

A system of direct and indirect taxes will be introduced so that users contribute more to investment.

In addition, measures will be taken to protect the environment and curb pollutant emissions.

Rail transport

The policy to modernise the railway has a number of aims, notably to:

- promote the use of containers and develop a rapid and reliable integrated transport system;
- adapt rail transport to market requirements, with greater emphasis on meeting customers' needs;
- introduce more modern management techniques (involving the recruitment of more qualified staff).

In order to achieve these aims, a strategy has been defined for restructuring the national railway company (TCDD). The key priorities are to:

- reduce TCDD's financial losses;
- improve the efficiency of the services provided;
- improve management of marketing and sales;
- adapt TCDD's policies to market requirements.

By the end of the period covered by the strategy, studies should have been completed on the following topics:

- a restructuring programme;
- railway law;
- contractual arrangements between TCDD and the Turkish government;
- implementation of the strategy.

The strategy will also seek to identify ways of improving combined transport through reorganisation and the establishment of rules and management procedures for this sector.

Investment plans in rail infrastructure

N°	Name of the project	Objective	Planning starting date	Planning closing date	Expected cost
1	Istanbul-Bosphorus rail tunnel	Control bottlenecks in the ferry lines through the Bosphorus and increase operating speed	1996	2000	$637 million
2	Rail extension Kars-Tblisi	Link Turkish rail network with Georgian network to speed up European and Asian rail link	1996	2000	$400 million
3	Upgrading Ankara-Istanbul link	Improve efficiency in order to speed up traffic and improve quality of services	1996	1999	$240 million
4	New line Ankara-Sivas	Reduce travel time between Ankara and Sivas (important transit route)	1997	1999	$600 million
5	New line Lake Van	Control bottlenecks at the Lake Van ferry crossing, to improve the speed of operations	1997	2001	$450 million

UNITED KINGDOM

Area: 241 000 km²
Population: 58 600 000

For the United Kingdom, information relating to rail traffic and strategic developments in this mode of transport is very complete. With regard to road transport, however, the information provided only covers current and forecast traffic levels.

Question 1: Future trends in passenger and freight traffic

Rail traffic

Passenger traffic

Current traffic levels

The tables given below indicate a decline in the number of passenger journeys and the distances travelled by rail (main-line, urban and suburban services) over the period 1990-91/1995-96. This trend broadly reflects current economic conditions. Both the number of trips and the distances travelled picked up in 1995-96.

Trips on all rail networks, 1990-96
Million trips

	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
All tickets	762.4	740.8	744.8	713.2	702.2	718.7

Source: Transport Statistics Great Britain 1996.

Rail traffic, 1990-96
Billion passenger-km

	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
All tickets	33.2	32.5	31.7	30.4	28.7	30.0

Source: Transport Statistics Great Britain 1996.

The number of journeys made is not necessarily representative of the revenue earned, however, since business trips are often longer and usually generate higher fare yields. Real receipts for all passenger rail networks are shown in the table below.

Receipts from passenger ticket sales, 1990-96

Million pounds, 1995-96 prices

	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
All tickets	2445.9	2365.4	2310.5	2286.4	2224.0	2379.4

Source: Transport Statistics Great Britain 1996.

Overall passenger receipts followed a downward trend over the period 1990-91 to 1994-95. Ticket sales declined sharply between 1990-91 and 1991-92 as a result of the economic recession. In 1994-95, on the other hand, yields were affected by industrial action. Fare yields recovered significantly in 1995-96, with ticket sales rising to a level close to that recorded in 1991-92.

The Channel Tunnel was fully opened to passenger traffic in 1994. In 1995 it carried over 7 million passengers on Eurostar and Passenger Shuttle services.

Traffic forecasts

The principal external factors influencing future trends in passenger traffic and thus ticket sales are:

- economic growth;
- employment levels in London;
- ticket prices.

In addition, privatisation of the railways is expected to have a number of positive impacts, such as operational and marketing innovations and stronger incentives to use rail, which will increase the number of tickets sold. Indeed, the privatised rail industry has already begun to identify new service opportunities. When it issued its flotation prospectus, Railtrack estimated that passenger rail travel would grow at an annual rate of around 2 per cent. However, the Rail Department of the UK Ministry of Transport does not issue data of this nature.

Freight traffic

Current traffic levels

Trends in the movement of freight, by commodity, in the rail sector are illustrated in the table below. Freight traffic followed the same downward trend observed in the passenger sector, particularly in traditionally strong markets for rail such as coal traffic (down 34 per cent between 1990-91 and 1994-95). It is not possible to say whether freight traffic recovered in the same way as passenger traffic over the period 1995-96 as data for this period are not yet available. The only two types of rail freight whose levels had recovered by 1994-95 were building materials and other traffic. However, these were the two types of freight which had been least affected by the decline in rail traffic in that the volume of building materials traffic declined by merely 7.4 per cent throughout the period, while other traffic remained stable.

Rail freight traffic by commodity
Billion tonne-kilometres

Commodity	1990-91	1991-92	1992-93	1993-94	1994-95
Coal	5.0	5.0	5.4	3.9	3.3
Metal	2.3	2.4	2.3	2.1	1.7
Building materials	2.7	2.5	2.5	2.3	2.5
Oil and petroleum	2.0	2.0	2.0	1.9	1.8
Other traffic	3.8	3.8	3.3	3.5	3.8
All traffic	16.0	15.3	15.5	13.8	13.0

Source: Transport Statistics Great Britain 1996.

The Channel Tunnel carried 4 million tonnes of through-train freight and 400 000 freight vehicles on the Freight Shuttle.

Traffic forecasts

Overall activity in the freight market correlates closely with the level of GDP but is also linked to other factors. The volume of rail freight is closely linked to output from heavy industry, a sector on which rail has traditionally been heavily dependent. In view of this link, the current decline in heavy industry has led to a significant reduction in rail traffic.

In addition, the rail sector is also facing fierce competition from road haulage. Now that the rail sector is largely privatised, it is thought that the commercial operators will reverse this decline and commitments have already been made for new rolling stock orders.

Railtrack expects to see a further decline in the carriage by rail of bulk industrial materials (including coal), but believes that this decline can be offset by strong growth in its share in other market segments such as European inter-modal transport activities and Channel Tunnel freight traffic.

Road traffic

The national road traffic forecasts apply to the entire UK road network. They have been produced for the period for which the road plans are evaluated, i.e. 30 years. They serve as a basis for the planning, routing and construction of main roads. The latest forecasts date from 1988-89 and are currently being updated.

The forecasts calculated in 1989 are based on assumptions regarding economic growth and the rate of increase of fuel prices. The main determinant of traffic growth is income, i.e. GDP; the price of fuel has less influence. Since future levels of these variables cannot be given with any precision, the traffic forecasts have been presented in each case as a range, with a minimum and a maximum.

Both possibilities are considered to be equally probable and the evaluation is therefore based on two scenarios.

The levels used in the forecasts are as follows:

% growth compared with 1995	By the year 2000	By the year 2025
GDP	10-17 %	75-152 %
Fuel prices	6-16 %	19-29 %

Expected annual rate of growth	Until 2000	Until 2025
Economy		2-3 %
Population	1 %	<1 %

Demographic trends also have a major impact on traffic growth. Population growth is expected to be 1 per cent a year until the year 2000 and thereafter insignificant.

The forecasts are based on traffic levels observed in 1988 and take account of trends in traffic, car ownership and use, road freight and the trends observed over the past 30 years. The forecasts are therefore for traffic growth rates, which can be used to calculate long-term trends but which are not necessarily valid for shorter periods. According to these forecasts, traffic levels are expected to rise as follows:

% growth compared with 1994	By the year 2000	By the year 2025
Total traffic	11-18%	58-92%

In 1994, overall road traffic amounted to 417.8 billion vehicle-km, broken down as follows:

- 82.6 per cent private cars;
- 9.2 per cent light goods vehicles;
- 4.3 per cent lorries (2 and 3 axles);
- 2.8 per cent lorries (4 axles and over);
- 1.1 per cent buses and coaches.

Trends in overall road traffic (excluding motorcycles), 1994-2025

	Low growth		High growth	
	Billion veh-km	Index	Billion veh-km	Index
1994	418	100	418	100
1995	426	102	431	103
2000	464	111	495	118
2005	503	121	558	134
2010	542	130	621	149
2015	582	139	682	163
2020	620	148	744	178
2025	660	160	804	192

It should be recalled that these forecasts were made for the long term and that the intermediate results, for the short and medium terms, are not necessarily valid or applicable as such. The forecasts for total traffic are in fact obtained by combining the individual calculations for cars, coaches, light goods vehicles and lorries. Moreover, if the forecasts are compared with those made in 1988, the two forecasts for the same period of study, i.e. from 1995 to 2025, have been significantly modified. Under the low-growth assumption, the traffic levels forecast for the period 1995-2025 have been adjusted upward by 11 per cent compared with the levels forecast in 1988. The indices have been revised downward by 13 per cent compared with those forecast in 1988. For the high-growth assumption, the traffic levels forecast in 1994 are slightly higher than those forecast in 1988, although less so than the forecasts based on the low-growth assumption, and amount to an increase of 2-3 per cent. The annual indices are 20 per cent lower than those calculated in 1988.

Passenger traffic

Forecasting methods

Forecasts for car traffic are made up of two elements: forecasts of household car-ownership rates and forecasts of car use (average annual kilometrage). Several factors influence growth in these two elements. Among them, those used for the forecasts include:

- individual and household income;
- purchase cost;
- operating cost;
- travel needs depending on the place of residence;
- road quality;
- work and leisure activities;
- availability and cost of parking;
- quality and availability of public transport;
- evolution of individual expectations and preferences vis-à-vis the car;
- number of drivers in the household.

Among the demographic factors, the distribution of the population and the size and number of households are recognised as also having a particularly strong influence on changes in demand.

Private car traffic

Car ownership has continued to increase in all countries. In 1992, the highest car ownership rate was reported in the United States with 573 cars per 1 000 inhabitants; in that year, the rate in the United Kingdom was 378 cars per 1 000 inhabitants. The other European Union countries with a higher car ownership rate were:

- France with 418 cars;
- Germany with 494 cars;
- Italy with 487 cars.

No country has as yet reached the saturation level, which is estimated at 90 per cent of the population of driving age owning a car. On this basis, the saturation level would correspond to an ownership level of 650 cars per 1 000 inhabitants.

Car ownership growth forecasts are primarily aimed at establishing the date at which the saturation level will be reached. To this end, the models need to address factors which have a major impact on the car ownership levels of households, such as:

- per capita income;
- growth in vehicle costs (maintenance);
- population growth and characteristics;
- degree of road saturation;
- a residual factor (the temporal trend) covering the other influences which are not identifiable individually.

The forecasts made in 1989 were obtained by taking the average results of two models. The first model applied to the household, which was considered as the decision-making unit. It used instantaneous cross-sectional data and times series taken from the Family Expenditure Surveys from 1965 to 1986. This model simultaneously integrates the effects of income and of time. The temporal trend is represented by the average number of driving licences per adult over the country as a whole. Over the period for which the model was calibrated, this term increased almost linearly. Over the next few years, the rate of growth is expected to decline, given that there should be fewer young adults and hence fewer new drivers.

The second model used cross-sectional data taken from the National Survey of 1985-86 and was aimed at determining the effect of income. It is a regression model (extrapolatory model) in which car ownership is taken as a function of income, the cost of car use and the temporal trend. It is based on the assumption that car ownership reaches saturation level (unlike the first model).

The main difference between the forecasts produced by these two models lies in their estimation of the temporal trend. As there is no way of distinguishing the predictive power of either of the two models, the mean of the results of each model has been taken. The realism of these results has been verified on the basis of international experience, notably by comparing income elasticities in different industrialised countries.

Trend in car ownership rates (per 1 000 inhabitants), 1994-2025

	Low growth	High growth
1994	375	
1995	382	385
2000	411	428
2005	438	467
2010	463	501
2015	487	530
2020	508	557
2025	529	579

According to these forecasts, the car ownership rate should increase by 10 to 14 per cent between 1994 and 2000 and by 41 to 54 per cent up to the year 2025. These results are well below those forecast for other countries. In addition, the high-growth scenario has been revised downwards compared with the 1988 forecasts. The car ownership rates forecast above amount to only 95 per cent of the levels calculated in the 1988 study. In contrast, the results obtained in 1988 for the low-growth scenario remain valid.

The main determinants of car use (expressed as annual kilometrage per car) are income and the price of fuel. The elasticities are calculated on the basis of analyses of the 1985-86 surveys and observation of the effect of the increases in real fuel prices between 1974 and 1977 and between 1978 and 1982. The result is that the annual kilometrage per car is expected to increase by between 0 and 2 per cent by the year 2000 and between 8 and 17 per cent by the year 2025.

The forecasts of traffic in vehicle-kilometres are in fact a combination of the preceding forecasts of car ownership, car use, population growth, etc. They indicate that car traffic will grow by 11 to 19 per cent until the year 2000 and then by 57 to 87 per cent by the year 2025 compared with the level recorded in 1994.

Forecast growth in private car traffic (in vehicle-kilometres)

Index 100 = 1994

	Low growth	High growth
1994	100	
1995	102	103
2000	111	119
2005	121	134
2010	130	148
2015	139	161
2020	148	174
2025	157	187

Bus and coach traffic

Buses and coaches account for around only 1 per cent of total vehicle-km. In recent years, their use has nonetheless increased, probably due to the deregulation of this segment of the transport market. However, there is no clear indication at present that this growth is part of a long-term trend. On the contrary, several factors would seem to indicate that the total kilometrage covered by this type of vehicle will remain constant until 2025. According to forecasts, bus and coach traffic levels will remain unchanged between 1994 and 2025, regardless of the scenario (low growth versus high growth).

Freight traffic

Current freight traffic levels

UK statistics distinguish between lorries and light goods vehicles. Total goods vehicle traffic accounts for only 7.1 per cent of all road traffic expressed in vehicle-km.

Modal split in 1994

	Traffic in billion t-km	Percentage market share
Road	144	65
Rail	13	6
Waterways	52	24
Pipeline	12	5

At present, there is no indication that road's market share of the past few years is likely to decline.

Traffic forecasts

The main determinant of growth in freight traffic is the growth rate of GDP. The forecasts have therefore been calculated on the basis of an elasticity of tonne-km with respect to GDP, with the resulting trend being applied to the modal split. These two variables were deduced from the observation of past trends.

A detailed breakdown of tonne-km by category of freight cannot be used for two reasons. First, it is not easy to make such breakdowns for many goods which are hard to classify and for consignments consisting of several types of good. Second, no data are available on the price or service quality of the different modes of transport. What is more, consumption patterns change, because products (like consumption habits) change. Therefore, many factors of a technological, commercial and locational nature strongly influence transport.

While it cannot be denied that the Channel Tunnel will improve prospects for growth in rail freight services, it is also clear that rail will not be able to challenge the supremacy of the road mode for domestic flows. The rules of the single market in Europe will also have an impact on future growth in road traffic. The implications of these developments have been taken into account in GDP forecasts.

Past experience gives no reason to suppose that the share of transport in GDP might fall. Although the trend in final household consumption is likely to become more concentrated on light and expensive goods (notably electronics), higher standards of living will at the same time require additional flows of cheap and heavy goods such as building materials and leisure equipment and facilities. For all these reasons, the tonne-km elasticity with respect to GDP for the forecast period is taken as unity.

On the basis of these forecasts, the UK authorities have decided to determine how this volume of traffic would be split in coming years between the different types of vehicle used for freight transport and to forecast the implications in terms of flows (vehicle-km). The results indicated that a very large share of the expected growth in road haulage would concern the heaviest categories of vehicle (four axles and over), whose traffic would increase by between 15 and 25 per cent by the year 2000 and between 97 and 195 per cent by the year 2025 (compared with 1994), amounting to almost twice the total lorry traffic over the same period.

Over the past few years the number of light goods vehicles has very closely matched the trend in GDP growth, and is likely to continue to do so in the future. This assumption has been taken into account in the forecasts. The level of traffic of light goods vehicles, measured in vehicle-km, is likely to increase, compared with the 1994 level, by 12 to 20 per cent by the year 2000 and by 78 to 160 per cent by the year 2025.

Forecasts of road traffic by category of vehicle

Vehicle-km, index 100 = 1994

	Light goods vehicles		Lorries (2 and 3 axles)		Lorries (4 axles and over)		Total lorries	
	Low	High	Low	High	Low	High	Low	High
1994	100		100		100		100	
1995	102	103	101	102	102	104	101	102
2000	112	120	105	110	115	125	109	116
2005	123	140	110	118	128	149	117	131
2010	135	164	114	128	143	178	126	148
2015	148	191	119	138	159	211	135	167
2020	162	223	124	149	177	250	145	190
2025	178	260	129	160	197	295	156	215

Despite the predicted growth in traffic, it should be noted that the above forecasts are less optimistic than those made in 1988, regardless of the category of vehicle and the assumptions used.

Question 2: Current situation as regards infrastructure and investment projects

Rail transport

British Rail had planned a number of projects relating to suburban rail services which have been postponed owing to the decline in traffic levels resulting from the recession. Whether these projects are warranted is still under discussion and they will only be approved if economic conditions are favourable for growth in traffic and if the necessary funding is available. The projects include the modernisation of infrastructure (platform extensions) on lines in the south-east and eastern suburban network.

Another major project involves the construction of new underground lines through central London, a project that is seen as a means of relieving congestion in the public transport network in the capital. This project is known as “Thameslink 2000” and consists in the upgrading of tracks near London Bridge and the construction of a new underground station at King’s Cross. The signalling system on the London-Tilbury-Southend line is also to be renovated in order to increase capacity. As yet unspecified new infrastructure would also be required to relieve the congestion on the lines entering south-east London (Dartford, Charing Cross or Cannon Street).

Moreover, the rail link through the Channel Tunnel, which belongs to the non-subsidised sector, is not considered a means of helping to resolve congestion problems. The benefits expected from completion of this project are seen more in terms of time savings than as a contribution to relieving congestion.

Major investment projects:

- Channel Tunnel Rail Link (CTRL)

  In February 1996, London and Continental Railways (LCR) won the contract to design, build and operate a new high-speed Channel Tunnel Rail Link (CTRL). LCR was also awarded European Passenger Services, which operates the UK arm of the Eurostar services between Waterloo and Paris/Brussels. The government will provide funding worth around £1.4 billion for this project, the construction costs of which are expected to amount to £3 billion. CTRL is forecast to produce benefits worth around £6 billion, principally to international and domestic passengers. The project is also expected to contribute to renovating the Thames Gateway region, with new stations at Stratford and Ebbsfleet. Depending upon progress, the link is expected to open in 2004.

- West Coast Main Line (WCML)

  The WCML provides a key link between London and the north-west, serving the three largest cities in England and the largest city in Scotland.

  Railtrack is moving forward with a £1 billion core modernisation programme on the WCML. Funded through standard track access charges, this programme includes the introduction of a modern train signalling and control system, the replacement of infrastructure and improved power supply. Railtrack and OPRAF (Office of Passenger Rail Franchising) are also considering a high-speed passenger upgrade, which will provide shorter journey times for passengers. In addition, Railtrack is assessing the feasibility of an upgrade to carry higher gauge freight.

  The WCML and CTRL have both been designated as priority projects in the Trans-European Rail Network (TEN) programme.

- Thameslink 2000

  Railtrack is proceeding with this project, which is aimed at improving the existing north-south link across central London and at increasing services between stations such as Bedford and Brighton. The centrepiece of the project is the construction of a new underground station at St. Pancras, adjacent to the CTRL terminal. The project will also require infrastructure work, primarily at London Bridge and Blackfriars, and also the construction of new track and purchasing of new rolling stock. Thameslink 2000 is expected to be operational by the summer of 2002. Railtrack will bear most of the capital cost of the project, estimated to amount to around £650 million, with the government contributing around £100 million. This project provides a good example of how the public and private sectors can work together in developing a major investment project.

– Heathrow Express

BAA is the promoter for a high-speed rail link between Heathrow airport and London Paddington. The construction cost is estimated to amount to £350 million. Full services are due to begin in 1998.

– Crossrail

Crossrail is a scheme for a new major rail link between eastern and western London, running through the City and the West End. This link should provide fast direct rail services from outer areas to central London. Costing around £3 billion, the project will go ahead only if substantial funding can be secured from the private sector following completion of the CTRL.

Road transport

The UK authorities have not provided information regarding future investment in road infrastructure.

Question 3: Capacity problems

Rail transport

Railtrack has primary responsibility for allocating available capacity between the competing demands of passenger and freight traffic. Where there is a commercial case for removing bottlenecks, Railtrack may decide to increase capacity. Thameslink 2000 is an example of a project designed to ease capacity constraints in central London. It should allow new services to be introduced, thus increasing train frequency from 6 trains an hour to 24 trains an hour.

Other projects such as the WCML and CTRL should also allow train frequency to be increased.

The model used to forecast traffic trends is the one developed following the Greater London Transportation Survey in 1981.[1] The data were taken from origin-destination surveys supplied by the various operators concerned. The results produced by the model give forecasts to horizon 2001:

- private car traffic should increase by 10 per cent in the morning rush hour in the London area;
- rail traffic should increase by around 15 per cent, with an increase of 20 per cent for British Rail and 13 per cent for London Underground;
- journeys between railway stations and the Underground are expected to increase by 20 per cent during the morning rush hour.

The UK authorities consider the current downtrend to be temporary and expect growth to resume in the long term. It is clear that the level of traffic predicted in the above-mentioned study for the year 2000 will not be attained. It would seem reasonable to assume that by that date demand will have climbed back to the level recorded in 1988, i.e. 8 per cent below the original forecast.

Road transport

The UK response makes no mention of capacity problems with regard to infrastructure.

Question 4: Measures

Rail transport

Privatisation

The Railways Act of 1993 resulted in a major restructuring of the railway industry in the United Kingdom. Previously, British Rail (BR) was the sole owner of almost all rolling stock, track, stations and other rail infrastructure and operated virtually all freight and passenger services. A very different structure is now emerging.

By introducing the same rules as those governing the private sector (competition, innovation and flexibility), the government's objective is to create a more efficient and reliable railway system, with greater responsiveness to customers and a higher quality of service. The overall aim is to encourage greater use of rail rather than road for both passenger and freight transport.

Most of BR's track, signalling, stations and depots are now owned by Railtrack, an infrastructure authority. All of these assets were privatised via a stock market flotation. Railtrack derives most of its income from the charges it levies for access to its infrastructure, either directly for track and major stations, or through leasing arrangements in the case of most stations and depots.

The Railways Act provided for the appointment of a Rail Regulator whose functions include regulating the activities of Railtrack, encouraging competition in the provision of rail services, and promoting the use of the network.

The passenger operations previously managed by BR have been divided into 25 train operating companies (TOCs). The Office of Passenger Rail Franchising (OPRAF), a government department, is progressively franchising these TOCs by competitive tender to parties who are committed to their future development. Franchises are let on the basis of the amount the franchisee requires in subsidy (or is willing to pay the government) for operating a specific set of services, otherwise known as the Passenger Service Requirement (PSR). The franchisee is also free to operate services in addition to the PSR. Tenders are normally invited on the basis of a duration of seven years, but the Franchising Director is willing to consider franchises for longer periods in cases where, for example, he wishes to secure investment in rolling stock which would not otherwise be made or if the franchisee is able to demonstrate that the extension is warranted in terms of improved value for money.

The first franchises entered into operation in February 1996 and the programme is expected to be completed by spring 1997. The competition for franchises has been intense and the first franchises have already produced commitments to new rolling stock and station improvements as well as reductions in the amount of subsidy required from the government.

Most freight operators are now in the private sector, such as Rail Express Systems, Freightliner and the Trainload Freight. Railfreight Distribution, the operator of services through the Channel Tunnel, is due to be privatised towards the end of the year.

Nearly all passenger rolling stock is now owned by three ROSCOs, which were privatised early in 1996. These ROSCOs, which own mixed portfolios in terms of the age and type of vehicle, generate income by leasing their rolling stock to the train operators who need it.

Privatisation has also included ancillary functions of BR such as maintenance and track renewal companies, design offices and specialist engineering businesses.

Railtrack and the freight operators have established measures to increase the commercial attractiveness of rail compared with other modes. The increasing impact of road congestion and the relaunching of the government's freight grants scheme (aimed at securing environmental benefits from the transfer of freight from road to rail) should ensure that rail freight services enjoy better growth in the future. However, this must still remain an assumption since there are no forecasts as yet available for rail freight use.

NOTE

1. The "LTS" model, managed by MVA Consultants for the Department of Transport.

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