

EC MOTORWAY NETWORK PERSPECTIVES, 2010 HORIZON

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INTRODUCTION

The General Directorate for Transport (DG VII) of the Commission of the European Communities awarded a contract to the consortium formed by Transroute-ISIS (France, prime contractor), Heusch Boesefeldt (Germany) and AT Kearney (Belgium) to study the perspectives of the motorway network of European interest for the following 20 years, i.e. up to the year 2010. The primary objective of the study is to identify the motorway network which would best serve the long-term interests of the individual EC Member States in their relationships with other Member States in the long term, and for the larger countries, regions within these States.

The study (1) also considers other dimensions related to motorways: motorway standards, traffic and demand management, traffic safety, intermodal aspects, financing and operations.

The present exposé deals with methodological considerations.

1. METHOD FOR ROAD TRANSPORT DEMAND AND DESIGN OF THE MOTORWAY NETWORK OF EC INTEREST

This chapter provides an overview on the methodological framework and the general results of the simulations. It is noteworthy, that in parallel to the Consultants' study, a Motorway Working Group has been set up by the General Transport Directorate. This group was composed by delegates of national transport administrations and related international organizations. Its role was to associate the national decision-makers to the definition of the "Motorway Network of EC Interest" and validate the fundamental assumptions of the Consultants.

1.1. The Key Role of International Road Traffic

The core of the study is based on an analysis of international road traffic for which freight and passenger are dealt with separately.

The geographical coverage consists of 129 regions including the EC Member States and neighbouring countries. The regional breakdown is more detailed for the twelve EC Member States than for the rest of Europe.

The international road freight origin-destination matrix for international road flows has been compiled from available data within international organizations or supplied by national organizations. This freight demand is appraised by a model using GDP as a key variable.

For passenger consequently to the lack of data the international road flow matrix is generated by a model using three types of motives:

- holiday,
- business and
- private.

Due to local features, commuter traffic is not in the scope of the study.

Figure 1: The Regional Breakdown

Source: Transroute ISIS/Heusch Boesefeldt/AT Kearney, 1992.



The key variables for the generation of the origin/destination matrix are:

- population,
- non resident arrivals at any accommodations for tourist attractiveness,
- GDP per capita (mobility), and
- border crossing resistance (cultural effect, border crossing effect).

1.2. Identification of Capacity Problems

The importance of international traffic will be one of the main criteria for identifying the motorway network of EC interest. National traffic is taken into account in order to estimate the risks of capacity problems.

The method is based on the projection of national traffic loads allocated to the reference road network. Furthermore, the risks of capacity problems are resulting from the comparison between projected traffic loads and thresholds linked to the number of lanes.

1.3. Scenarios

The future road transport demand is investigated by Scenarios combining assumptions on:

- GDP growth,
- population growth,
- decrease in border crossing resistance,
- tourist attractivity, and
- national traffic increase.

GDP growth rates have been allocated distinguishing two classes of countries:

- possible high growth perspectives, and
- possible low growth perspectives.

For national traffic increase assumptions, three categories of countries are identified:

- low traffic growth perspectives,
- medium traffic growth perspectives, and
- high traffic growth perspectives.

Figure 2: Country Classification regarding GDP and Traffic Growth Perspectives

Source: Transroute ISIS/Heusch Boesefeldt/AT Kearney, 1992.

	National Traffic Perspectives		
	Low	Medium	High
Possible Low GDP Growth Perspectives	Belgium Germany Luxembourg The Netherlands Sweden Norway Switzerland Austria	Denmark France Italy The United Kingdom	
Possible High GDP Growth Perspectives			Greece Ireland Portugal Spain Eastern Europe

Taking into account this breakdown, the Scenarios are built assuming:

- low economic growth without modal substitution,
- steady economic growth without modal substitution,

- steady economic growth with modal substitution.

Figure 3: Key Assumptions within the Scenarios for Long-Term Economic Growth, Traffic Increase and Modal Substitution

Source: Transroute ISIS/Heusch Boesefeldt/AT Kearney, 1992.

	Scenario 1	Scenario 2	Scenario 3
(Annual rate in %)			
Long-term economic growth			
Possible low growth countries	1.5	2.5	2.5
Possible high growth countries	2	4	4
National traffic increase			
Low increase perspectives	1.5	2.5	2.5
Medium increase perspectives	2.4	4	4
High increase perspectives	3.25	5	5
Modal substitution for international freight traffic			
Combined Transport			
Growth rate differential			1
Maximum market share			10
Maritime transport			
Deep sea traffic growth			8
Maximum % of base traffic			50
Container traffic differential			1
For national freight and passenger traffic			3

1.4. Networks Taken into Account

Three networks are taken into account:

- Theoretical network,
- Reference road network in 1990,
- Long-term (2010) planned network (see attached map).

The theoretical network is intended to supply an ideal situation where each regional gravity centre is connected within the network. In addition, traffic assignments are made without any constraints. They are used to check the results of the traffic assignment on the planned network and to help identify "missing links".

The existing network has been defined considering E-roads and nearly all existing motorway networks with a few more links in order to establish a consistent network. This network has been submitted to each EC Member State some of which have supplied modifications to be integrated for the final report. The purpose of this network is to calibrate both the model and geographical coverage for the long-term simulations.

The long-term network consists of the existing network integrating the planned motorways and expressways. This network has also been calibrated with EC national representatives.

1.5. Various Traffic

Various traffic consists of:

- primarily, international road flows,
- secondarily, non international traffic.

The core of the simulations and assignments rely on international flows. The total flows are extrapolated from most recent available data. The reference period is 1989. Only international traffic is assigned without constraints (shortest path). Then, the total traffic is considered regarding the capacity of roads (number of lanes) so as to identify corridors likely to be congested.

1.6. Emergence of the Motorway Network of EC Interest

In the first stage, the network is sketched through the importance or share of international traffic as there is also a rough estimate of the level of service (congestion).

Then, a consistency check is realized regarding:

- continuous routes,
- capabilities for international traffic management (alternative routes),
- connections with national motorway networks,
- connections with the other modes of transport (major sea harbours and airports, main TGV stations, and principle combined transport and waterways terminals), and
- connections with Eastern Europe and Africa.

At the end of this stage a more complete network is outlined.

The last stage comprises the analysis of how this network covers the various Member States integrating specific regional considerations such as:

- peripheral situations,
- low population density areas,
- international through traffic, and
- important need for intermodal transport (islands, etc.).

In the economic justification we intend to translate the future catching up of lower GDP per capita countries. However, the national delegations, especially those of peripheral countries, have explicitly expressed their belief that the growth assumptions considered in this study are conservative.

Regarding this criticism, it should be noted that these assumptions were formulated before the study was completed and final results made available. Thus, so as not to base the Motorway Network of EC Interest solely on a "traffic justification", the first sketch of the network was adjusted and completed based on consistency checks and on an analysis of the sufficiency of the Motorway Network of EC Interest to meet the regional needs within countries.

Figure 4: First Sketch of the EC Interest Motorway Network

Source: Transroute ISIS/Heusch Boesefeldt/AT Kearney, 1992.

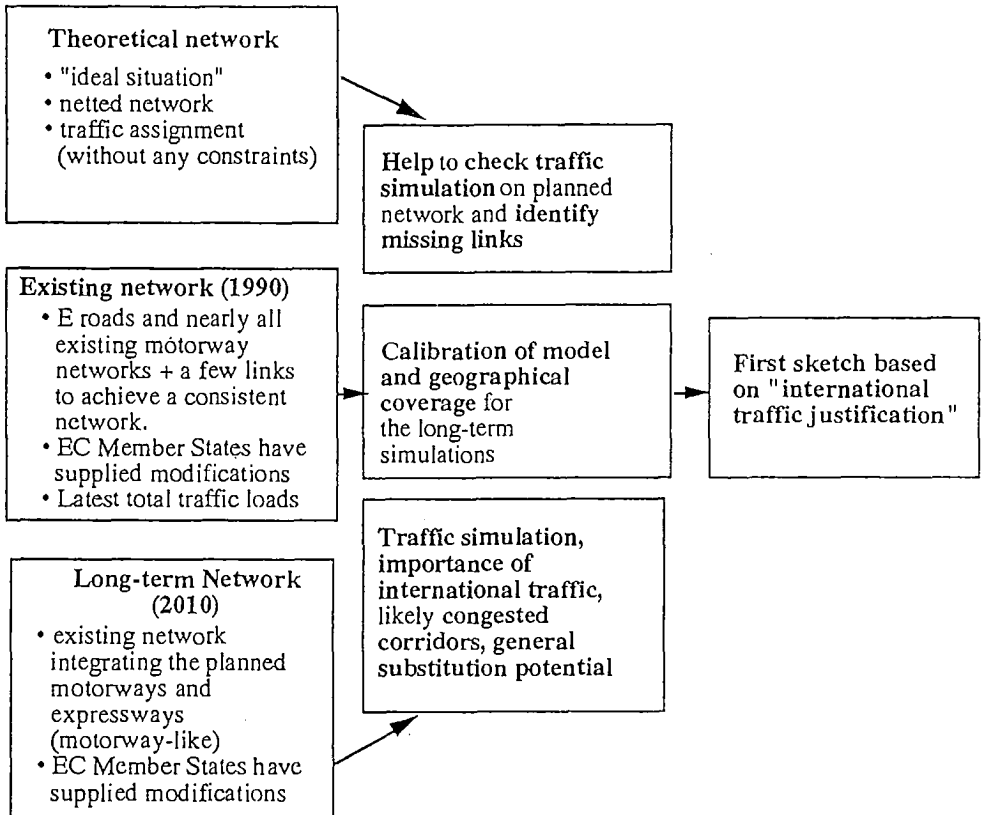
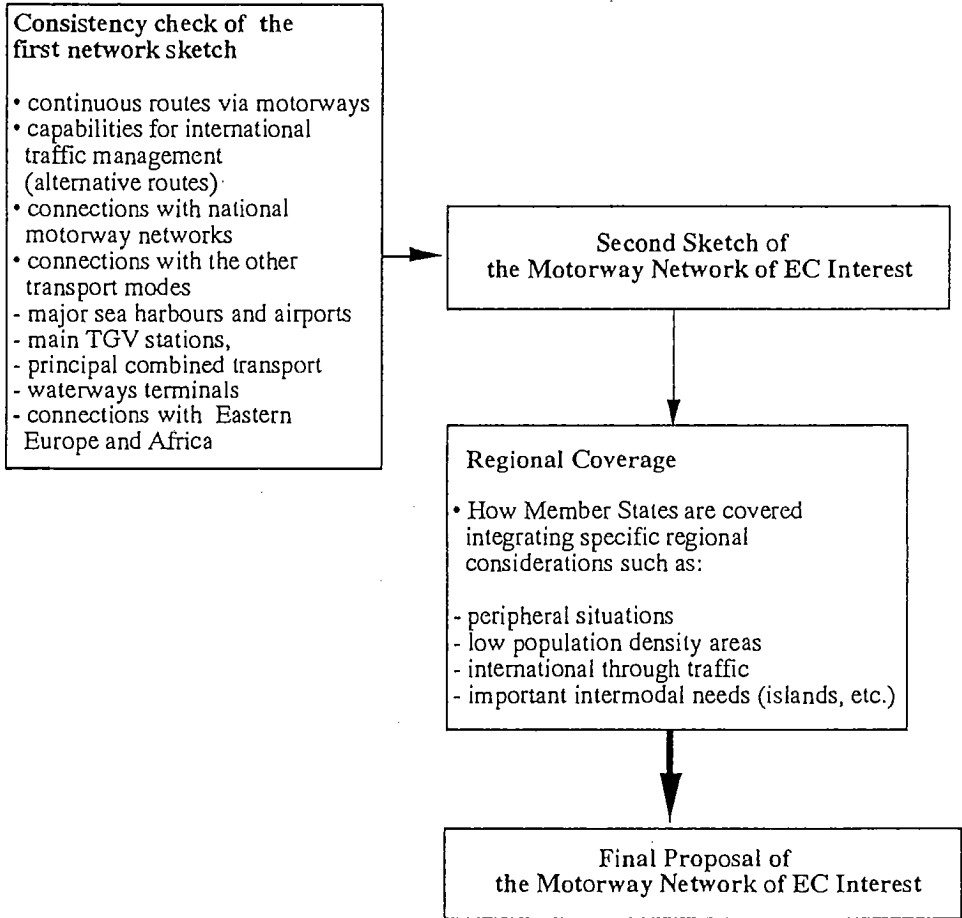


Figure 5: Finalization of the Motorway Network of EC Interest
Source: Transroute ISIS/Heusch Boesefeldt/AT Kearney, 1992.



2. EFFECTS ON ROAD TRANSPORT

After the realisation of a unified European market and the elimination of inner European trade barriers, the border effects in Europe will decrease. For the Scenarios, these effects were considered by modifying border factors. For international traffic between the European Community and Eastern Europe a strong reduction of border crossing factors is expected in the long term. Another factor considered in the Scenarios, which will have an influence on future traffic demand, is the improved infrastructures. For certain corridors, i.e. Channel crossing between France and Great Britain, the quality of the connection will considerably improve and lead to increased traffic demand.

Figure 6: Main Results concerning International Passenger and Freight Flows for European-Wide Network in Millions of Passengers and Millions of Tons per Year

Source: Transroute ISIS/Heusch Boesefeldt/AT Kearney, 1992.

	1989	Scenario 1	Increase 1989/2010	Scenario 2	Increase 1989/2010	Scenario 3	Increase 1989/2010
European wide geographical coverage							
International passenger traffic	105	219	108.6%	277	163.8%	269	156.2%
Average annual increase (linear based)			5.2%		7.8%		7.4%
International freight traffic	99	189	90.9%	253	155.6%	245	147.5%
			4.4%		7.4%		7.0%

For the European wide geographical coverage, the total international road passenger flow is estimated at 105 million people in 1989. According to the various Scenarios, this flow may range between 219-277 in 2010. The corresponding yearly increases range from 5.2% to 7.8%.

The considered international road freight flows were approximately 99 million tons in 1989. In accordance with the Scenarios the simulations give range from 189 to 253 million tons. The consequent average annual increases are 4.4% and 7.4%, respectively.

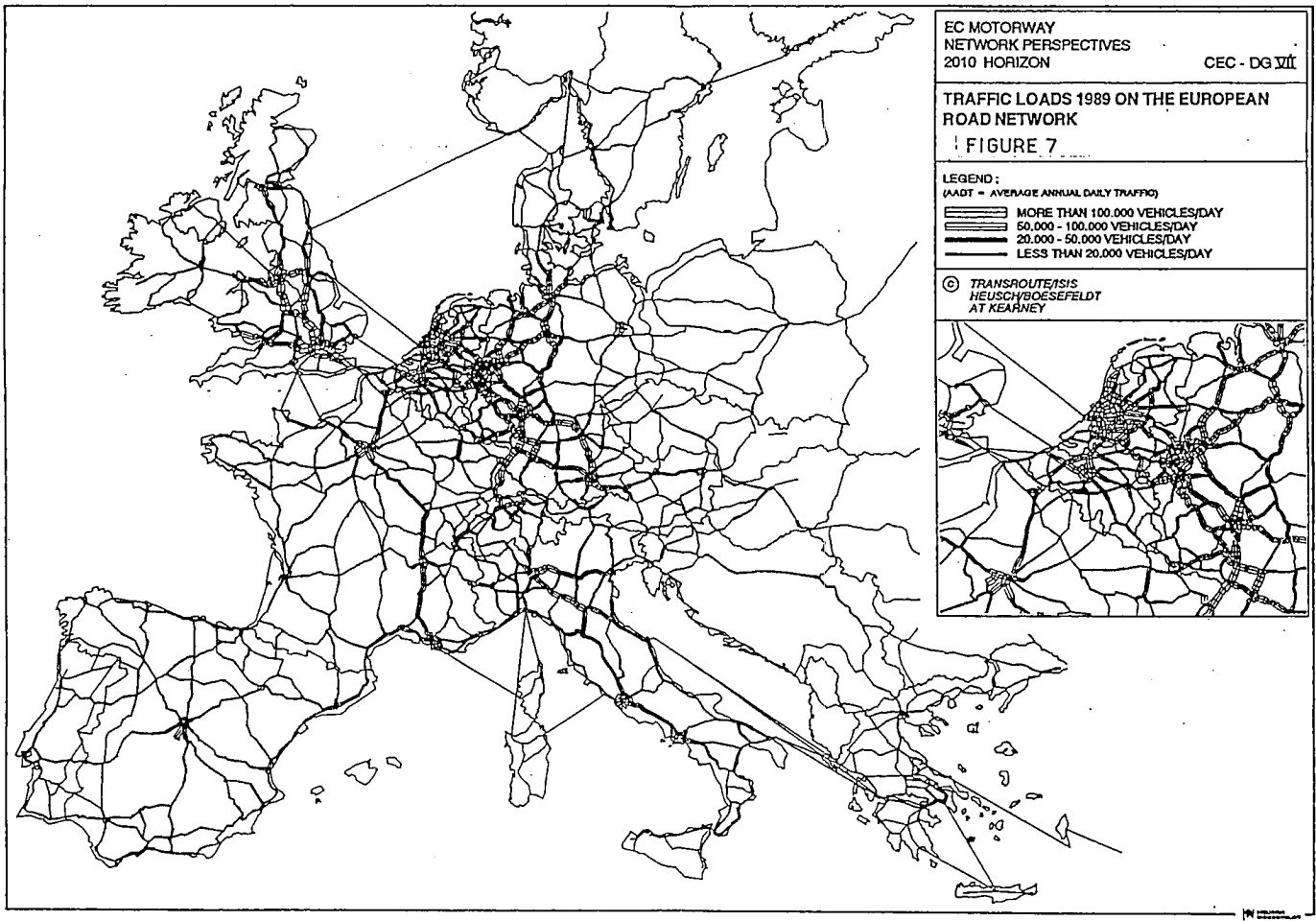
For both passenger and freight traffic, the substitution effect has not been significant; they are estimated to be only 8-10% of the total increase over the period 1989 to 2010 which represents approximately one year of traffic growth projected for this period.

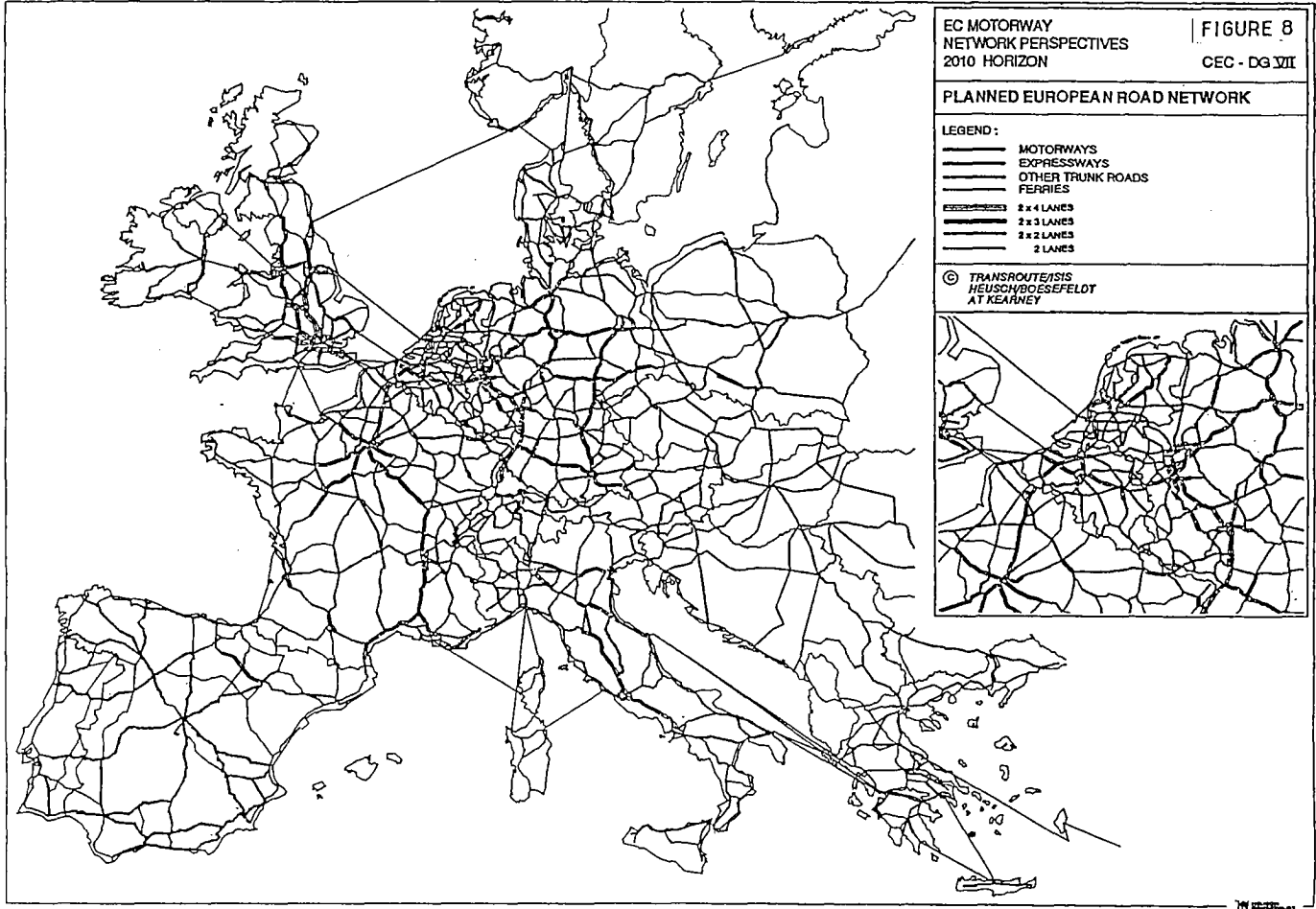
For freight, a rough analysis of modal substitution per origin country to destination indicates that the combined transport market share would never exceed 19%. The most significant shares correspond to flows between:

- Germany-Italy 18.6%
- Austria-Germany 13.6%
- Switzerland-Germany 12.0%
- France-Italy 8.7%.

The total traffic performance increase related to the reference road network according to the Scenarios ranges from 92% to 140% in the EC for the period 1989-2010. This increase is explained mainly by the expected economic growth, increase in household mobility and the sustained phenomenon of concentration of traffic on high capacity roads, i.e. motorways and expressways.

International traffic should increase slightly more than national traffic which may be considered as a rather conservative result due to expected effects induced by a unified market. Therefore, perhaps the resulting effects of a unified market would not necessarily cause a high increase in international traffic compared to the increase in national traffic. However, in the long term, the effect would be more in terms of the effectiveness of the transport system such as the reallocation of traffic flows and a reduction of empty returns for trucks.





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INTERNATIONAL TRAFFIC FLOWS ON THE
EUROPEAN ROAD NETWORK IN 2010

SCENARIO 1 | FIGURE 9

LEGEND :

(AADT = AVERAGE ANNUAL DAILY TRAFFIC)

-  MORE THAN 10,000 VEHICLES/DAY
-  5,000 - 10,000 VEHICLES/DAY
-  2,000 - 5,000 VEHICLES/DAY
-  LESS THAN 2,000 VEHICLES/DAY

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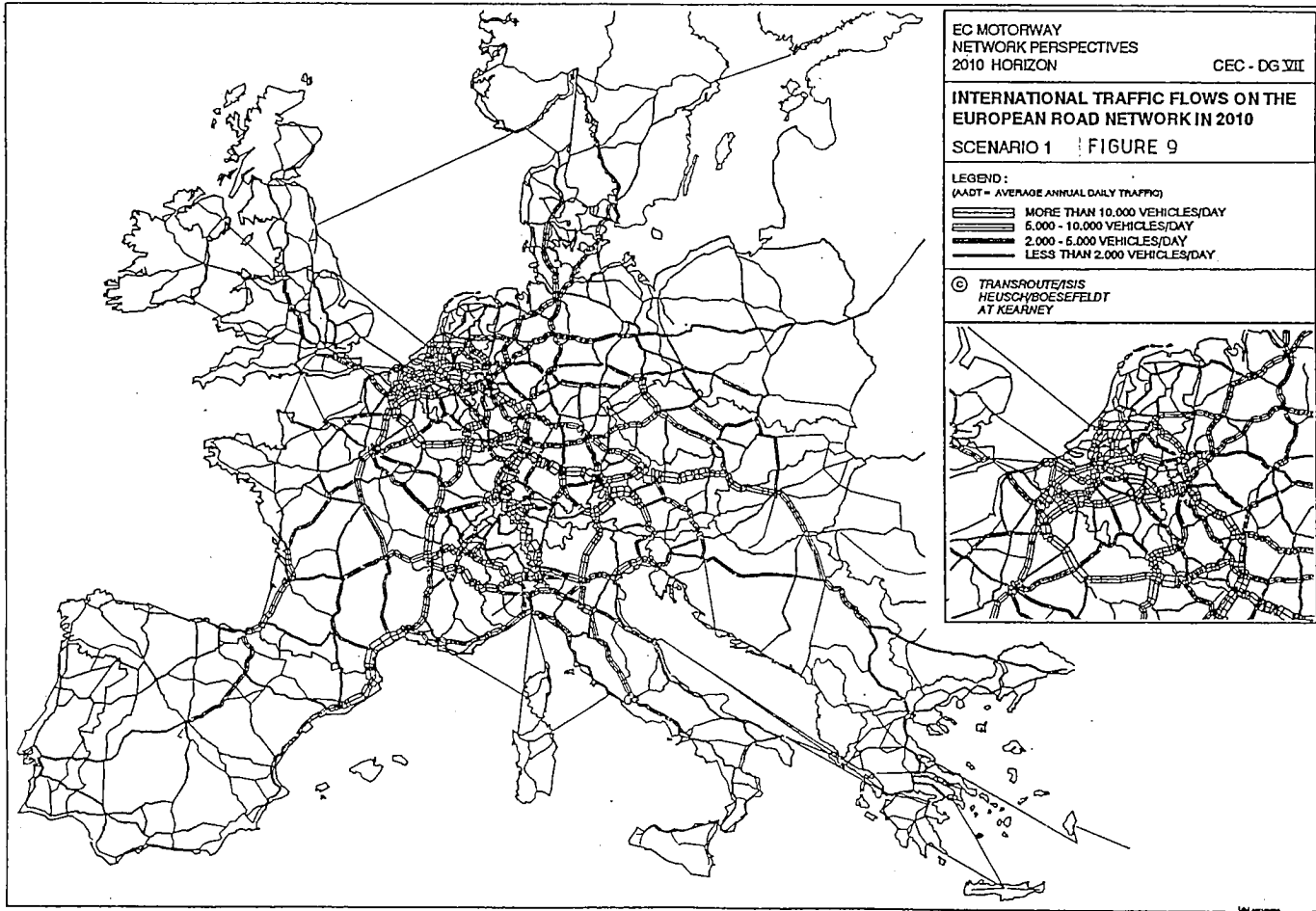


Figure 10: Main Results concerning Traffic Performance in the EC within the Simulations, in Billions of vehicles x km per Year

Source: Transroute ISIS/Heusch Boesefeldt/AT Kearney, 1992.

	1989	Scenario 1	Increase 1989/2010	Scenario 2	Increase 1989/2010	Scenario 3	Increase 1989/2010
EC geographical coverage							
Total traffic performance in billions of vehicles x km per year	456	875	91,9%	1134	148,7%	1094	139,9%
of which							
International passenger traffic	55	110	100,0%	141	156,4%	137	149,1%
International freight traffic	16	30	87,5%	41	156,3%	38	137,5%
Total international	71	140	97,2%	182	156,3%	175	146,5%
Share of International traffic in %	15,6%	16,0%	0,4%	16,0%	0,5%	16,0%	0,4%
European wide geographical coverage							
Total traffic performance in billions vehicles x km per year	509	1003	97,1%	1310	157,4%	1263	148,1%
of which							
International passenger traffic	67	140	109,0%	179	167,2%	174	159,7%
International freight traffic	17	35	105,9%	47	176,5%	44	158,8%
Total international	84	175	108,3%	226	169,0%	218	159,5%
Share of International traffic in %	16,5%	17,4%	0,9%	17,3%	0,7%	17,3%	0,8%

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