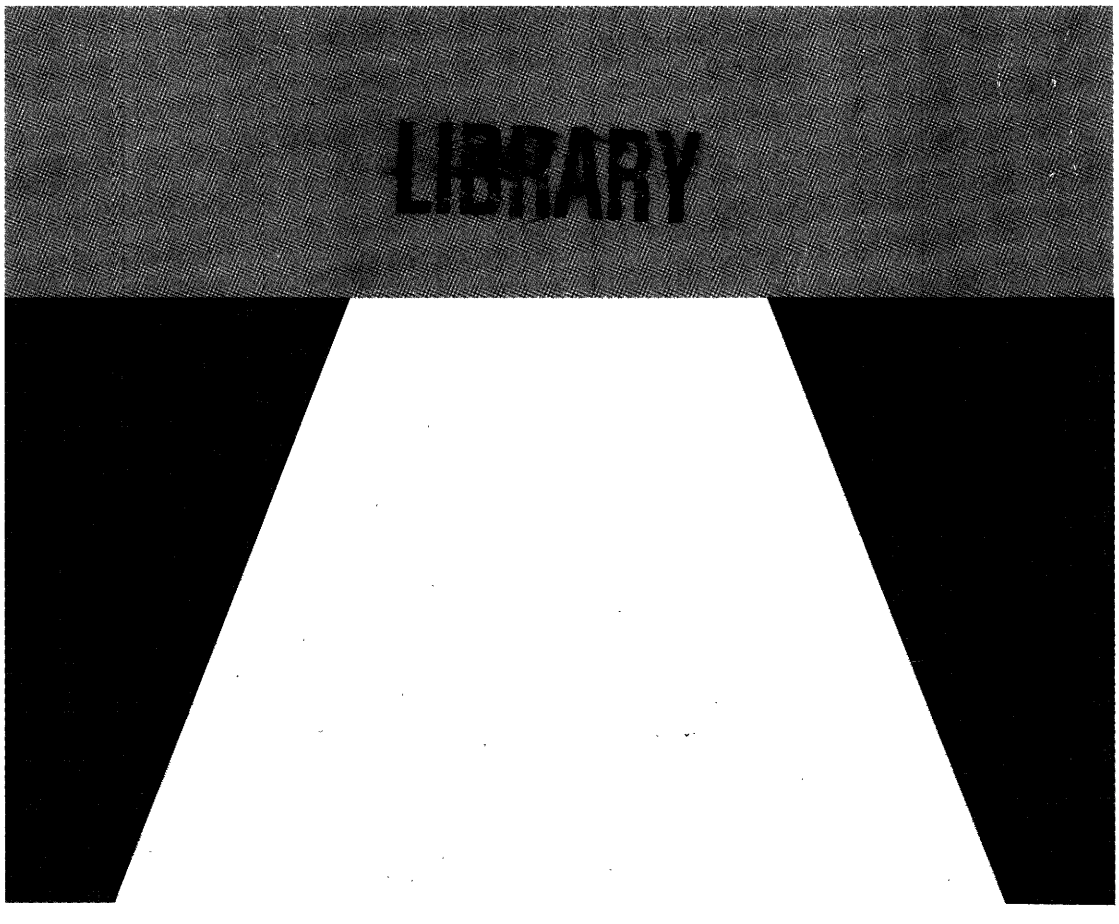
COMMISSION OF THE EUROPEAN COMMUNITIES
Directorate-General for Transport

TRANS-EUROPEAN NETWORKS

TOWARDS A MASTER PLAN FOR THE ROAD NETWORK AND ROAD TRAFFIC



Brussels ● Luxembourg 1993

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TOWARDS A MASTER PLAN FOR THE ROAD NETWORK AND ROAD TRAFFIC

Motorway Working Group Report

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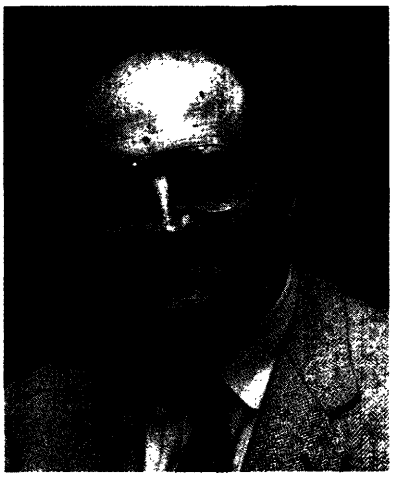

Foreword by Mr Abel Matutes
Member of the Commission

The first of January 1993 signals a new milestone in the history of the European Community. From this date onwards, an economic area without internal frontiers and the single market are a reality.

The main trans-European transport networks will help to optimize the movement of people and goods well beyond the Twelve's existing borders.

This report traces the outline of tomorrow's European road network. It identifies a certain number of priority projects and important guidelines, especially for making road infrastructure a tool for economic and spatial development within the Community by means of an integrated, global approach directed towards a multimodal transport system, whose aim is to help curb road congestion and to improve the integration of roads into their natural environment.

I welcome this initial review which is the product of the close cooperation established between the various administrations, users, operators and industrialists involved. The broad approach which has been developed is a clear illustration of the transport policy which the Commission seeks to promote within the framework of closer European Union, in line with its White Paper of December 1992.

Abel Matutes

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Summary

1. The diversity of Europe's roads

Roads occupy a quite exceptional and indispensable position within the Community's transport system at present, as the lynchpin of land-based transport.

The road network of the 12 Member States, some 2 900 000 km long, does not, however, comprise a uniform system.

On the contrary, it covers a multitude of different forms, ranging from country lanes to motorways, from streets to urban bypasses. Road users are equally diverse: car drivers, lorries, buses and coaches, cyclists and motorcyclists – not forgetting pedestrians. It is therefore very difficult to produce a general picture of Europe's roads.

Where it exists, the motorway network – offering, as it does, ways of reducing distances, saving time and increasing safety – is more and more regarded, from the perspective of European advantage, as the spinal column of the European network and a key factor in economic development. It therefore deserves particular consideration.

2. Worsening traffic problems

However, road transport is today to some extent the victim of its own success.

With marked growth in the demand for transport and the number of cars in the Community, which now exceeds 120 million vehicles, traffic disruptions are becoming ever more common.

Certainly congestion, which affects the central regions more than the periphery, is neither general nor absolute. It does, however, affect a large proportion of road networks in and around towns and between regions, to the extent that on occasion it reaches unacceptable levels from the point of view both of the road users and of the environment.

With increased mobility going hand in hand with economic growth, the most reliable forecasts reckon on a possible doubling of mobility via trunk roads over the coming 20 years. If appropriate measures are not taken, a steady increase in disruption is likely to result eventually in the choking up of the European network.

This would have significant implications both for people's quality of life, the environment and industrial competitiveness, and for the success of the single market and the strengthening of the Community's economic and social cohesion. It would also weaken the position of road-related European industries, including the motor industry, which are already on the front line of international competition and which account, directly or indirectly, for one Community job in 10.

3. The need for a Community policy on roads

The Community, clearly, cannot remain passive in the face of these risks.

Its response must be to adopt a proper road policy as part of the European policy on transport networks which has been taking shape in recent years.[1]

A group of national and international experts, the Motorway Working Group,[2] has been set up within the Transport Infrastructure Committee. This initiative[3] grew out of work done at national, international and Community level, and a number of recent reports on transport issues, such as 'Transport in a fast changing Europe', by the Transport 2000 Plus Group, and 'Aimse (Advanced integrated motorway system in Europe), the motorway project for the Europe of tomorrow', by the International Road Federation.

The Commission presented the Group's interim report to the Council of Ministers in November 1991.[4] The Council duly noted it at its session on 16 and 17 December 1991, calling on the Commission to produce concrete proposals by May 1992 in the light of work in hand.

4. The Group's conclusions

The Group's report sketches the parameters of a broad approach to the road system as a whole and its role within the European transport system.

The present paper is a synthesis of current thinking on this issue; it calls *inter alia* for the adoption of a Community strategy for both the road network and road traffic.

This involves, first of all, adapting the network, (i.e. completing the trans-European road network), promoting the cohesiveness of the Community and access to all regions, improving connections with other means of transport within the framework of a dynamic, multimodal transport policy, promoting the standardization of technical characteristics and increasing the network's standard of comfort.

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1 See , for example ,Council Resolutions of 4 and 5 December 1989 and 17 December 1990 on a European high-speed rail network and the Council Resolution of 30 October 1990 on the combined transport network.
2 See composition of the Working Group, p. 7.
3 Initiative announced by the Commission in its communication Doc.COM(90) 585, 'Towards trans-European networks – For a Community action programme'.
4 Doc. SEC(91) 2274, Transport infrastructure networks.

One must also ensure that road traffic can move freely on major routes and in and around towns, while providing a high level of services, information and safety for users.

Growth in road mobility must be controlled wherever it threatens to strangle the network. Regulating traffic now will help to avoid rationing mobility in the future.

Greater heed will have to be paid, moreover, to environmental constraints, and urban and rural planning requirements.

Finally, financing must be arranged for such a policy and a clean break made with the continual undervaluation of the transport system.

5. A master plan for the road network and traffic

European strategy should take the form of a master plan along the lines of work done on the high-speed train network and combined European transport. Hence it would function in both the long and short terms.

The Group notes with interest that the principle of master plans for transport networks was incorporated into the Treaty on Political Union (Title XII: Trans-European networks) adopted at Maastricht by the Council, as was the principle of strengthened Community cohesion.

Accordingly, it proposes that the Commission deliberate this report, which could constitute the cornerstone of Community policy on the road network and road traffic.

A number of express recommendations have been submitted to the Commission with a view to its reply to the request by the Council of Ministers.

On the basis of the present report, the Commission, in June 1992, adopted a proposal for a Council decision on the creation of a trans-European road network.[1]

It sent, in parallel, the Motorway Working Group report to the Community institutions.

The Commission proposal received favourable consideration from the Council of Ministers at its meeting of 15 March 1993.

[1] COM(92) 231: Transport infrastructure.

Final recommendations of the Motorway Working Group

To enable the Community to contribute to the establishment and development of a trans-European road network, the Group recommends that the Commission formulates the appropriate proposals to the Council in order to:

1. Reach the objective of providing the territory of the Community with a high-quality road network, i.e. a network of motorways and expressways, taking into account:

   (i) the need to complete the interconnection of the national networks, by constructing the missing stretches of road and making the necessary improvements to existing ones, so that full access and cohesion are achieved throughout the total Community area;

   (ii) the need to guarantee the interoperability of the network to a satisfactory level, in particular through road standards and equipment and through traffic management policies.

2. Identify the projects referred to below as of common interest, bearing in mind their socio-economic impact, and establish the priority of Community action in accordance with the following criteria:

   contribution to trans-European axes;

   elimination of bottlenecks;

   integration of areas either isolated, landlocked or situated in the periphery;

   facilitation and safeguarding of international traffic, including transit traffic in cooperation with any third country concerned;

   improvement of links on land/sea routes;

   provision of high-quality links between major conurbations.

These projects are the following:

- The completion of links as depicted on the annexed map and upgrading of links on the existing network.

- Implementation of advanced road telematics and development of road management measures on the trans-European network.

3. Promote in addition, where appropriate and within the framework defined above, the following lines in order to ensure a homogeneous, balanced and durable development of the trans-European road network:

definition of a European level of services;

implementation of the necessary measures to improve road safety;

establishment of a European strategy for road traffic management and for mobility optimization on major trans-European axes, bearing in mind regional aspects and multimodality;

adoption of a concerted plan for road telematics;

implementation of the necessary measures to reduce the impact of the road schemes on the environment;

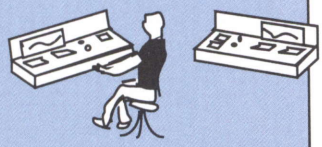
analysis and proposals to finance transport infrastructure.

Benefits of the Master Plan for the Road Network and Road Traffic

TO ROAD USERS

- Increase safety
- Reduce travel time
- Homogenise comfort and service level

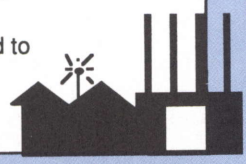
TO PUBLIC AUTHORITIES AND NETWORK OPERATORS

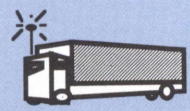


- Make consistent the national planning process
- Evaluate and set up new policies
- Improve efficiency in traffic management and congestion fighting

TO INDUSTRY

- Emphasize benefits from industrial normalisation
- Integrate road infrastructure to logistic chain and to an intermodal transport system
- Increase in competitivity





TO SOCIETY

- Reduce accidents
- Reduce congestion
- Reduce pollution
- Contribute to a sustainable mobility

TO EUROPE

- Facilitate the Single European Market/Frontier-Free Area and contribute to erase the border effects
- Strengthen economic and social cohesion
- Reinforce the European competitivity

Composition of the Working Group

Commission (DGs VII, II, III, XI, XIII, XVI)

Member States

European Conference of Ministers for Transport (ECMT)

UN Economic Commission for Europe (ECE)

International Road Federation (IRF)

Permanent International Association of Road Congresses (PIARC)

Secrétariat Européen des Concessionnaires d'Autoroutes à Péage (SECAP)

European Round Table (ERT)

Association des Constructeurs Européens d'Automobile (ACEA)

International Road Transport Union (IRU)

International Touring Alliance (ITA)

European Investment Bank (EIB)

Part one

The status of the Community's road network

Roads within the context of the transport market

The socio-economic importance of roads for the Community as a whole is so fundamental that it does not have to be demonstrated.

1.1. Breakdown according to favoured modes of transport

On average, roads are used for over 91% of movement of persons (in traveller-kilometres) and over 72% of goods transport (in tonne-kilometres).

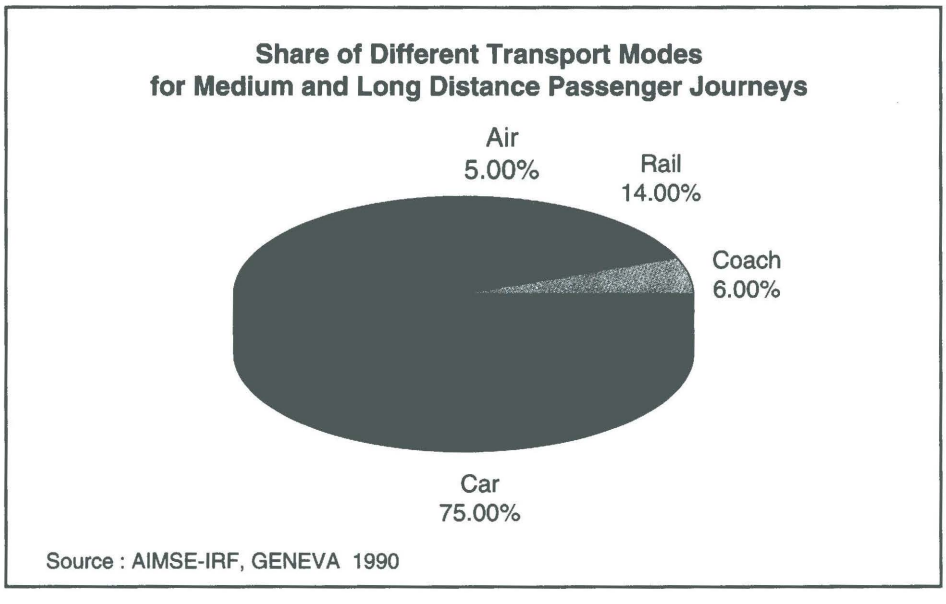
An analysis of the distribution of modes of transport reveals that the preference for roads is very marked.

With respect to travellers, they are used for:

approximately 80% of inter-regional journeys (excluding travel between home and work);

60 to 70% of international journeys, of which a significant proportion is transport by coach;

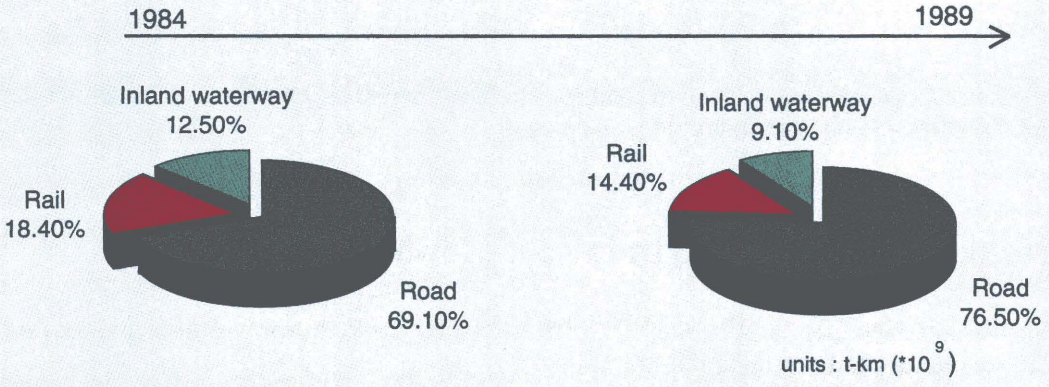
over 70% of long-distance cross-border tourist travel.



With respect to goods, they are used for:

80% of Member States' domestic transport;
60% of intra-Community international transport.

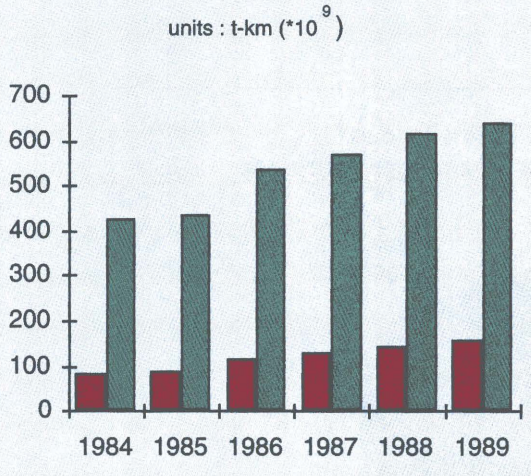
Community Goods Transport Trends 1984-1989, Broken down by Modes of Transport



	1984	1989
Road	69.1	76.5
Rail	18.4	14.4
Inland Waterway	12.5	9.1

1984-1985 : EUR.10/1986-1989 : EUR.12

Growth in Community Carriage of Goods by Road 1984 - 1989



	1984	1985	1986	1987	1988	1989	1989/ 1984
Within Member States	427	435	538	570	615	641	50.10%
Between Member States	85	88	116	130	144	157	84.40%

1984-1985 : EUR.10/1986-1989 : EUR.12

1.2. The popularity of roads

The popularity of road transport is explained by its particular ability to meet the demand for mobility over short, medium and long distances. People prefer the car because it offers the advantage of personal transport; goods are transported by truck because this suits the requirements of the market economy (enabling better and simpler service, flexible administration, fast door-to-door carriage and competitive prices).

Whatever the reason for travel (commuting, business, short stays, holidays) or the type of goods to be transported (farm products, manufactured goods, chemical products, construction materials or raw materials), roads play a leading role, which is influenced to some extent by the distance involved and the competition.

1.3. The recent boom in the high-speed network

Because of the economic and social benefits it brings, great effort has been put into the road network. Investment has been concentrated in particular on high-speed urban and inter-regional roads, through both the upgrading of existing structures and the building of new ones.

In this connection, it should be pointed out that the pace of development of motorway and expressway networks was fairly sustained in some Member States in the period 1960-70, requiring regular budget injections or the introduction of tolls.

In fact, at the beginning of the 1960s only a few national routes were fully-equipped motorways, whereas the Community's motorway network now runs to 35 000 km.

1.4. The motorway network, an essential Community network

Motorways, which adapt to the difficulties of the terrain and climate and allow more rapid travel by substantially reducing distances, enjoy overwhelming popularity. Covering only 1% of the total road network, they account for between 10 and 30% of all road journeys in the Member States.

International traffic accounts for between 15 and 20% of total traffic, but variations can of course be significant depending on the route, the period and the country.

The motorway network therefore clearly constitutes a modern and vital network from the European angle, since it is particularly well suited to the movement of people and goods in a free market area.

The European network in the run-up to 1993

In the run-up to the establishment of a frontier-free area and an era of increased international mobility, the road network seems paradoxically ill-equipped and under threat.

2.1. The network is ill-equipped

The shortcomings of the network are particularly evident from the many incomplete or substandard inter-regional links, and in the peripheral regions.

1. The process of providing Europe with major routes of communication is still largely incomplete. Although the network is particularly dense and nearing stability in Belgium, Luxembourg, the Netherlands and Germany (with the exception of the five new *Länder*) and to a lesser extent in Italy, the system is more diffuse, and still developing, in the United Kingdom, Denmark and France, while at the periphery, roads of a high standard are scarce and often do not connect.

   Major international routes are few and they sometimes lack motorway continuity. Such is the case with the Franco-Italian transalpine links through the Mont-Blanc and Fréjus tunnels, the links between Portugal and Spain, routes to the Channel, routes to Ireland, the Dublin-Belfast link, the Great Belt crossing in Denmark, and the Athens-Patras and Thessaloniki-Evzoni-Yugoslavia sections.

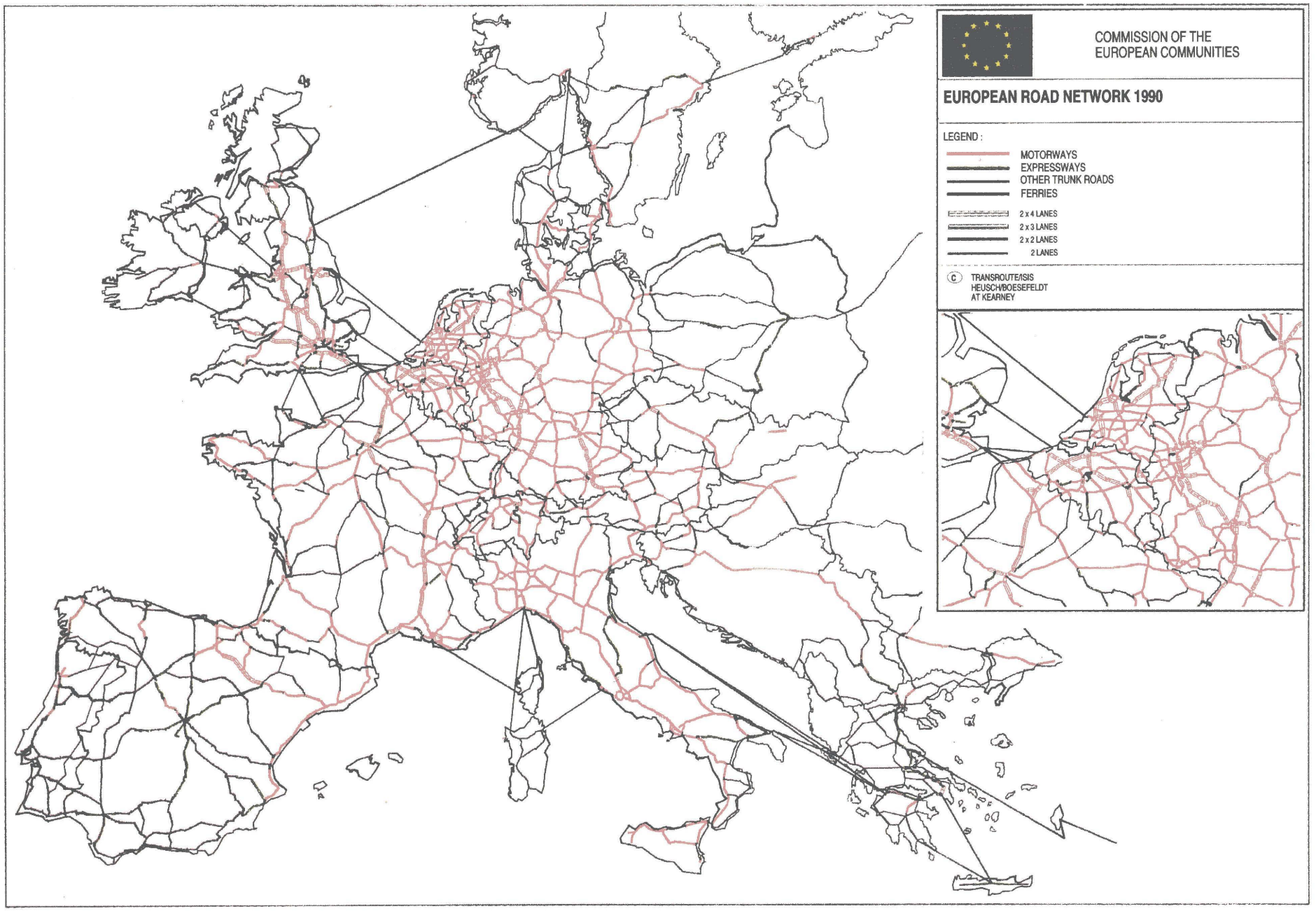
   Overall, too, links with countries outside the Community are inadequate except in the cases of Switzerland and Austria, which are both trading partners and transit countries.

2. Moreover, it is questionable whether the peripheral regions which are lagging behind can catch up: the basic road network remains unsatisfactory because of widespread low standards and inadequate maintenance. The motorway network is still in an embryonic stage, which goes some way towards explaining why those countries are outside the mainstream of intra-Community trade.

   In Portugal, the motorway network (320 km) is confined to the stretch between Lisbon and Oporto, which has recently been completed, and to access to those two main centres of population. There is no transverse route with a really international level of service.

   In Spain, the motorway network (2 368 km) is complemented by a system of expressways *(autovias)*. But there are still significant gaps: for example, Madrid still does not have the continuous motorway service it needs, and the south and west of the country remain cut off.

   In Ireland, the motorway network (25 km) is concentrated on serving Dublin. The main network, and links with Cork, Limerick and Galway are in particular inadequate.


COMMISSION OF THE
EUROPEAN COMMUNITIES
EUROPEAN ROAD NETWORK 1990
LEGEND :
MOTORWAYS
EXPRESSWAYS
OTHER TRUNK ROADS
FERRIES
2 x 4 LANES
2 x 3 LANES
2 x 2 LANES
2 LANES
© TRANSROUTE/ISIS
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Comparison of Motorway Development with Population and Area

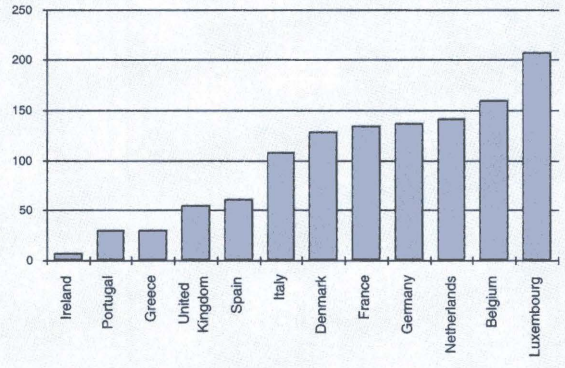
	Population Million inh.	Area 1000 km 2	M-Length km	Motorway/ Population Ratio 1	Motorway/ Area Ratio 2
Belgium	9.938	30.5	1,593	160.3	52.2
Denmark (1)	5.132	43.1	660	128.6	15.3
Germany	79.100	357.0	10,833	137.0	30.3
Greece (1)	10.033	132.0	309	30.8	2.3
Spain (1)	38.888	504.8	2,368	60.9	4.7
France (1)	56.160	544.0	7,588	135.1	13.9
Ireland (1)	3.515	68.9	25	7.1	0.4
Italy (1)	57.525	301.3	6,211	108.0	20.6
Luxembourg	0.378	2.6	79	207.7	30.2
Netherlands	14.849	41.2	2,100	141.4	51.0
Portugal (1)	10.337	92.1	316	30.5	3.4
United Kingdom (2)	57.236	244.1	3,180	55.6	13.0
EC	325.981	2,361.6	35,261	108.2	14.9
Japan	123.116	372.3	4,407	35.8	11.8
USA	248.777	9,372.2	83,964	337.5	9.0

1 Motorway length in 1990

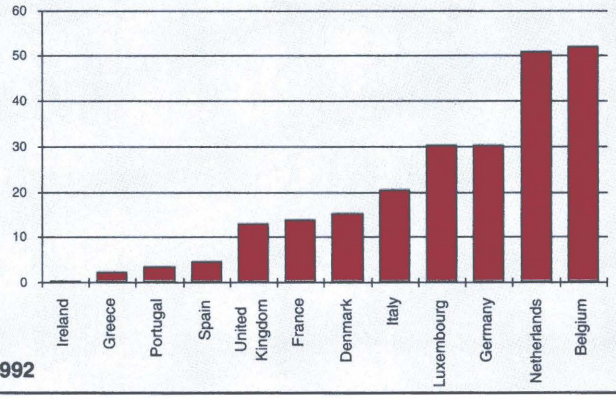
2 Motorway length corresponds to Great Britain in 1989

Source : Compilation of Working Group Sources, 1992

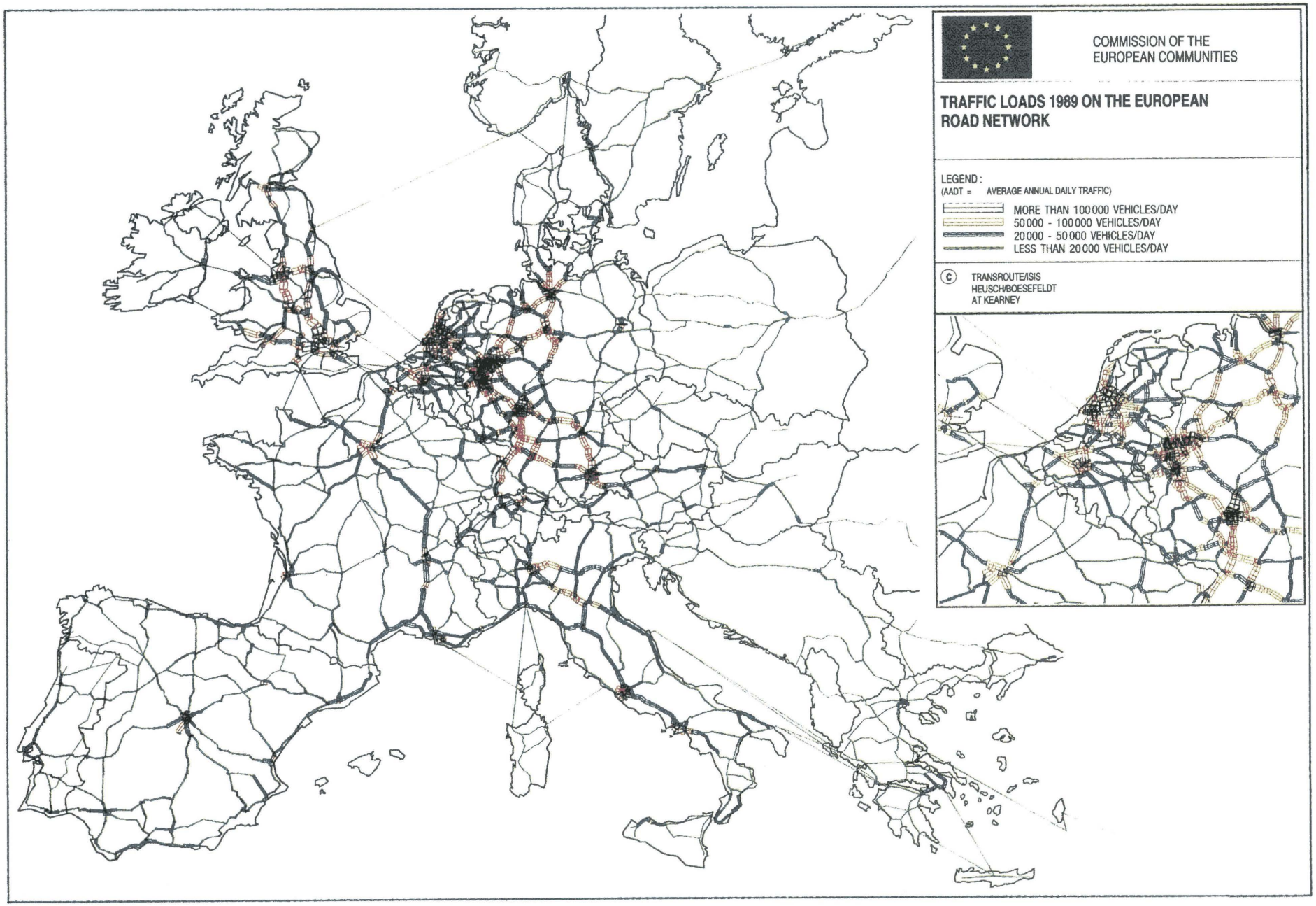
Motorway Length / Population Ratio (km/Mio inh)



Motorway Length / Area (km/1000km²)



Source : Compilation of Working Group Sources, 1992


COMMISSION OF THE
EUROPEAN COMMUNITIES
TRAFFIC LOADS 1989 ON THE EUROPEAN
ROAD NETWORK
LEGEND :
(AADT = AVERAGE ANNUAL DAILY TRAFFIC)
MORE THAN 100000 VEHICLES/DAY
50000 - 100000 VEHICLES/DAY
20000 - 50000 VEHICLES/DAY
LESS THAN 20000 VEHICLES/DAY
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In Greece, the topology (mountain ranges and archipelagos) hampers modernization efforts. There are 300 km of motorway in use, and the main link between Athens and Thessaloniki, which between them account for half the country's population, is still notoriously ill-equipped.

3. The existing network is on the whole interoperable, but not always to a satisfactory degree as regards for example the technical specifications of the infrastructure or road signs.

2.2. A network threatened by traffic growth

Traffic has increased markedly everywhere during the past few years: there has been an overall increase on all the networks of the order of 4% over the period 1985-88, on top of annual growth of 2% in the period 1980-85.

This growth is all the more noticeable on the main network and appreciably greater on the motorway network, where traffic is increasing at substantially twice the rate, if not more.

On an annual average, the increase in motorway traffic over the period 1985-89, in vehicle kilometres, was as follows:

6.0%	in Greece[1];
7.0%	in Italy[1];
7.4%	in Germany;
10.0%	in Belgium;
10.7%	in France ;
11.3%	in the United Kingdom;
13.5%	in Spain[1];
16.4%	in Portugal[1].

On major routes, hold-ups are becoming more frequent, and more and more links in the central countries of the Community are experiencing disruption.

Capacity problems on major links are now reckoned to amount to some 4 000 km of bottlenecks. In addition to these permanent trouble spots, there are highly seasonal traffic peaks on the north-south routes in Europe, particularly in the summer, which cause traffic to be slowed down over several thousand kilometres of road.

Crossing large European metropolitan areas is growing more and more difficult: local traffic (in particular, commuter traffic), which has continued to increase, mixes with through traffic causing traffic jams everywhere in the rush hour, which now last longer and longer. None of the large European cities seems to be spared this phenomenon, which affects smaller towns as well.

The indirect costs, in economic, social and environmental terms, are of course enormous.

[1] On the concessionary network.

Existing Traffic on the European Road Network 1989

	Existing 1989
Total Traffic	
in billions of vehicles x km per year	
Total	**456**
of which	
Motorways	**333**
Expressways	**44**
Trunk roads	**79**
Total International Traffic	
in billions of vehicles x km per year	
Total	**71**
of which	
Motorways	**60**
Expressways	**3**
Trunk roads	**8**
International Traffic for Passenger	
in billions of vehicles x km per year	
Total	**55**
of which	
Motorways	**46**
Expressways	**3**
Trunk roads	**6**
International Traffic for Freight	
in billions of vehicles x km per year	
Total	**16**
of which	
Motorways	**14**
Expressways	**1**
Trunk roads	**1**

Source : EC Motorway Network Perspectives, Transroute-ISIS/ Heusch Boesefeldt/AT Kearney Lyon 1992

2.3. Explanatory factors

This situation is the result of a combination of factors which have had or are having a greater or lesser effect from country to country.

Among the conventional explanations, some are political (such as the lack of bilateral consultation, adduced to account for the lack of continuity at borders), while others are socio-economic:

the elasticity of transport *vis-à-vis* economic growth;

the relative stability of energy costs;

the extraordinary rise in the number of vehicles;

the low level of public-sector investment in the period 1975-85;

the absence of any truly competitive means of transport or failures of physical planning and, in particular, town planning.

One must add that there has been a shift in transport demand caused by:

the rapid expansion of international trade in the run-up to the single European market (20-40% of return journeys by international carriers involve empty vehicles);

the rise in tourism and, in particular, in foreign holidays;

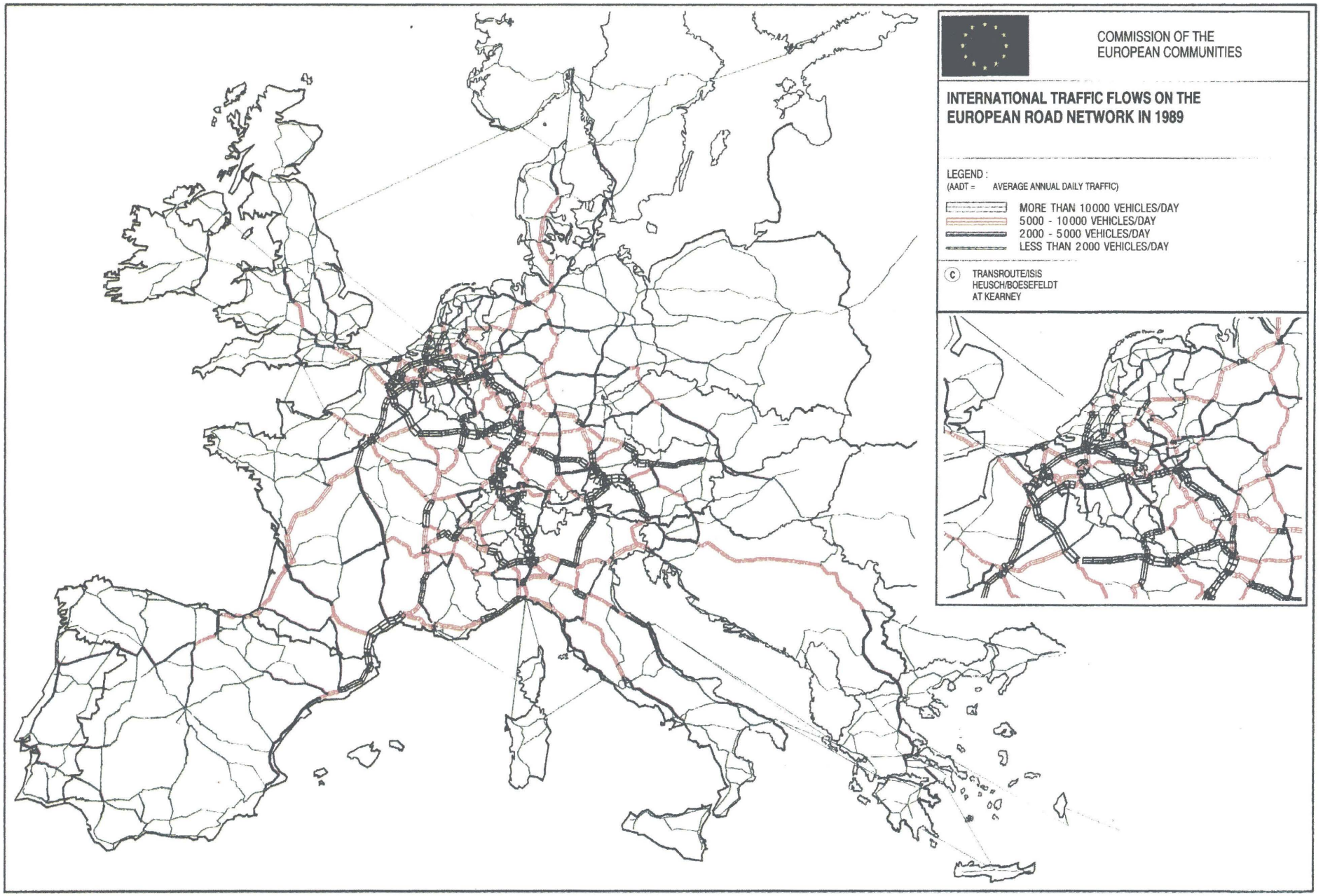
the greater length of the average journey;

the shift in demand towards rapid high-service transport (particularly towards motorways);

the trend among traditional industries towards making products with a higher added value;

new methods of production and distribution (i.e. the development of logistics);

the relative failure to integrate external costs into transport prices – though it is useful to make a distinction between urban and interurban traffic and between cars and lorries.


COMMISSION OF THE
EUROPEAN COMMUNITIES
INTERNATIONAL TRAFFIC FLOWS ON THE
EUROPEAN ROAD NETWORK IN 1989
LEGEND :
(AADT = AVERAGE ANNUAL DAILY TRAFFIC)
MORE THAN 10000 VEHICLES/DAY
5000 - 10000 VEHICLES/DAY
2000 - 5000 VEHICLES/DAY
LESS THAN 2000 VEHICLES/DAY
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Prospects for growth in mobility

The most widely accepted scenarios for the future all involve sustained growth in road transport.[1]

3.1. Traffic growth

On the major European routes, given a favourable economic climate, road transport is likely to almost double over a period of 20 years for both passengers and goods. International traffic, in particular, should increase rapidly because of the likely decline in frontier effects; this will probably tell more on transit than on bilateral traffic.

With regard to passenger transport, the assumption of a twofold increase in mobility between now and the year 2010 is underpinned by the possibility of an increase of some 35% in the number of cars over the next 20 years, which will reach over 500 vehicles per thousand people.

International intra-Community traffic may grow by 110 to 140% by 2015, and links with the countries of Central and Eastern Europe by even more (600 to 800% on certain routes).

Goods transport could continue to grow, at a rate of over 90% by the year 2010. International traffic could increase by anything between 87.5 and 156%, cancelling out the benefits of fuller trucks to be achieved by liberalizing cabotage in 1993.

3.2. Increased congestion

The increase in mobility could have a serious effect on congestion on the Community's major routes. The average annual Community traffic rate per day could climb from 19 000 to between 34 000 and 44 000 vehicles between 1990 and 2010. In the case of motorways, the figure could jump from 25 000 to between 38 000 and 49 000.

There could be three, four or even five times as many bottlenecks as there are today, with tailbacks over some 13 000 to 23 000 km. This would mean that 18 to 30% of the major road system would be subject to severe disruption; 70% of the hold-ups would be on the motorways.

[1] See, for example, the study carried out for the Commission: *'EC motorway network perspectives, Horizon 2010'*, Transroute/ISIS/Heusch Boesefeldt/AT Kearney.

Trends in the Private Car Market

Million Cars	1980	1985	1987	1990	1995	2000	2010
Belgium	3.2	3.3	3.5	3.8	4.2	4.7	5.0
Denmark	1.4	1.5	1.5	1.6	1.9	2.2	2.9
Germany	23.2	25.8	26.9	28.6	29.7	30.6	31.4
Greece	0.9	1.2	1.4	1.7	2.5	3.5	3.7
Spain	1.6	1.7	1.9	2.3	3.1	3.6	4.0
France	18.6	20.8	22.4	24.9	28.6	32.2	33.9
Ireland	0.7	0.8	0.8	0.8	0.9	1.0	1.4
Italy	17.4	22.4	23.0	23.8	26.5	28.8	30.9
Luxembourg	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Netherlands	7.6	9.3	10.0	11.2	12.9	15.3	17.4
Portugal	4.6	5.1	5.4	5.9	6.9	7.6	8.4
United Kingdom	14.5	16.7	17.7	19.4	22.2	24.3	27.7
EC	93.8	108.8	114.7	124.2	139.6	154	166.9

Source : EC Commission

Car Density

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
West Germany	428	446	463	477	489	502	514	527	540	555	569
France	382	388	395	403	410	416	422	426	430	434	437
United Kingdom	344	352	362	375	391	397	402	409	416	422	427
Italy	378	386	398	411	425	440	453	467	480	493	505
Spain	241	249	263	177	390	300	307	313	322	332	345
Netherlands	338	340	340	340	341	344	348	353	356	360	362
Belgium	339	341	350	358	366	374	380	389	397	405	412
Denmark	294	304	310	314	315	318	323	328	335	343	350
Ireland	197	195	196	196	197	197	197	197	196	194	193
Greece	120	122	124	126	129	132	136	139	142	145	148
Portugal	117	121	128	137	145	151	157	163	169	174	180
Sweden	377	388	400	412	419	427	436	443	451	459	468
Norway	364	382	386	383	397	403	409	416	425	433	442
Finland	317	331	341	353	366	376	386	394	402	409	416
Switzerland	404	411	417	423	430	435	440	447	453	459	464
Austria	332	342	351	359	368	376	384	392	399	407	414
United States	479	485	491	493	496	493	491	490	490	490	491
Canada		459	461	465	466	467	470	472	475	477	480
Japan	230	236	242	251	265	278	287	296	304	311	318

Units : Density in Cars /1000 Inhabitants

Source : DRI World Automotive Forecast Report, November 1990

Even the most conservative growth estimates point to capacity problems on a large part of the motorway network: in the Randstad, the Ruhr, on the Hanover-Dortmund route, between Frankfurt and Basle, on the Brussels-Ghent motorway, and between Brussels and Antwerp, London-Birmingham-Manchester, London-Bristol, London-Leeds, Milan-Verona and Parma-Florence.

On roads into and bypasses around major conurbations, traffic jams would get worse: to those cited above, we would have to add Copenhagen, Munich, Hamburg, Berlin, Paris, Lyons, Marseilles, Lille, Rome, Naples, Madrid, Barcelona, Valencia, Bilbao, Lisbon, Athens, Thessaloniki and Dublin.

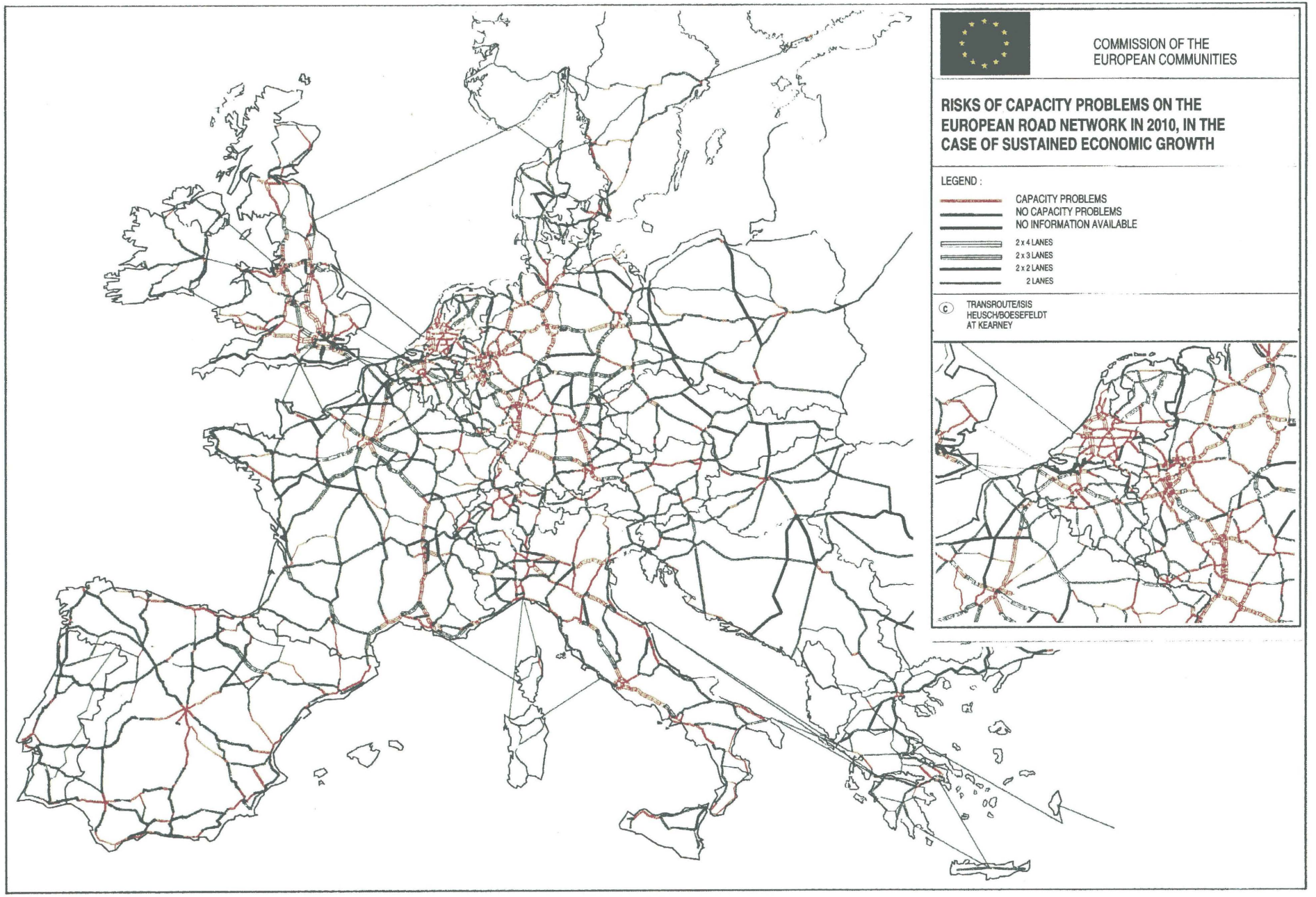
If one assumes higher economic growth, there could be additional congestion on routes such as Hamburg-Bremen, Nuremburg-Munich, Nottingham-London, Lille-Paris-Marseilles-Montpellier-Nice, Rome-Naples, Savona-Genoa, Verona-Venice, Corinth-Athens and the coastal networks of Portugal and Spain.

3.3. New guidelines needed urgently

If nothing is done to prevent such scenarios, the Community is liable to find itself facing serious difficulties which could jeopardize its objective of achieving competitiveness and economic and social cohesion.

From an economic point of view, therefore, it is imperative to consider some degree of regulation of transport demand for the sake of the smooth operation of the internal market.

Similarly, an examination of the environmental aspects suggests that pursuing unrestricted growth in overall transport demand runs counter to the Community's declared objectives.


COMMISSION OF THE
EUROPEAN COMMUNITIES
RISKS OF CAPACITY PROBLEMS ON THE EUROPEAN ROAD NETWORK IN 2010, IN THE CASE OF SUSTAINED ECONOMIC GROWTH
LEGEND :
CAPACITY PROBLEMS
NO CAPACITY PROBLEMS
NO INFORMATION AVAILABLE
2 x 4 LANES
2 x 3 LANES
2 x 2 LANES
2 LANES
© TRANSROUTE/ISIS
HEUSCH/BOESEFELDT
AT KEARNEY

Part two

What form should Community policy on the road network take?

Many of the problems associated with the road network have nowadays such an international resonance that policies at merely national or local level cannot yield a real solution.

Up until now, the Community has concentrated mainly on developing the network of major links, opening up the peripheral regions, conducting research (particularly into communication technology), and limiting the impact of infrastructure and road traffic on the environment.

This approach must be expanded into a broader view of the road network, as part of an overall concept of the European transport networks, in which not only would each network have its own place, allowing the user a free choice, but there would also be a coherent set of objectives, reflected in the integration of external costs into the price of transport.

Developing this systematic approach to the European road network within the transport networks requires the setting up of a proper policy, which might be based around the following objectives:

modernization of the network;

a road traffic policy;

better recognition of external factors;

an overhaul of road infrastructure financing.

In addition, a certain number of analytical and methodological tools would aid Community road policy, for example databases on traffic and, in particular, on trends in international traffic (passengers and goods).

I

Modernization of the network

The trans-European road network

The main purpose of drawing up a network master plan for major infrastucture is to spell out in practical terms the Community's political commitment to optimizing the national networks within a European perspective.

The preceding chapters make it clear that this is greatly needed as regards the main communication routes by road, and that optimizing the national networks involves constructing the missing links required for the completion of the single market and the frontier-free area and for the reinforcement of economic and social cohesion.

The master plan for the trans-European road network will offer an effective instrument for coordinating the Member States' efforts to direct their medium and long-term national planning; it will also provide a frame of reference for Community initiatives.

4.1. A network to be established by 2002

The Group noted that the Member States' plans for adapting the national networks to a European configuration are generally well in hand as a result of work already undertaken at Community level and the improvement of bilateral consultations.

This is why the Group opted for a 10-year time-scale, with a target of 2002 for establishing the network, rather than a long-term perspective of 15 to 20 years. The 2002 date gives the Community a target which is both realistic and ambitious, and which fits in well with the plans generally adopted by the Member States. It is feasible that by this date the Community will largely possess the major infrastructure which it needs to function properly and that the trans-European network of the 12 Member States will have more or less achieved stability.[1]

While the master plan is being carried out, studies of the functionality of the network will be conducted and prospective action continued. The master plan will therefore continue to evolve and can be adapted to the political, economic and social development of the Community.

[1] Certain Member States such as Germany, Greece, Spain, France and Ireland have longer programmes; the completion of some links (5 000 km) in these countries may exceed the time-scale given.

4.2. The methodology of the master plan

The plan includes only those routes necessary to structure the network and allow access to the regions.

The skeletal framework of the European network was formed by juxtaposing the national networks, in particular the motorway networks. However, in regions where these are very dense and essentially for local use, e.g. in the Ruhr and the Randstad, only the major routes were selected. Links serving local areas were not included either.

The Community interest of projects included in national plans and schemes was evaluated using the conventional criteria:

contribution to the creation of major routes;

importance of international traffic, including transit traffic;

elimination of bottlenecks;

integration of landlocked and peripheral regions;

improvement of links on land/sea routes.

Ultimately, given the specific role of the motorway network in the transport economy, as described in the previous chapters, it is no surprise that:

the bulk of existing or planned motorway and expressway networks is included in the master plan;

the trans-European road network is more dense than other European network plans which propose a limited number of corridors.

4.3. General presentation

The plan for the trans-European road network consists of some 54 000 km of major communications routes, of which:

37 000 km was in use on 1 January 1992;

12 000 km is to be completed or upgraded by 2002;
(see footnote on previous page).

The network includes links of motorway or near-motorway standard (expressways) and, to a limited degree, infrastructure of a reduced standard. It also encompasses major works to overcome natural barriers and bypasses around major European conurbations..

The master plan is shown on the map attached to this chapter. Then a detailed breakdown by country is given.

COMMISSION DES COMMUNAUTÉS EUROPÉENNES
COMMISSION OF THE EUROPEAN COMMUNITIES
KOMMISSION DER EUROPÄISCHEN GEMEINSCHAFTEN

SCHEMA DIRECTEUR DU RESEAU ROUTIER TRANSEUROPEEN (HORIZON 2002)

TRANSEUROPEAN ROAD NETWORK OUTLINE PLAN (2002 HORIZON)

LEITSCHEMA DES TRANSEUROPAISCHEN STRASSENNETZES (HORIZONT 2002)

EXISTANT/EXISTING/BESTEHEND

PLANIFIE/PLANNED/GEPLANT

CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN

DEC 1992

The following points should be noted:

1. The capacity of some parts of the existing 37 000 km of the network could be expanded (5 000 km); this is of European interest and it has been possible to detail as part of the overall plan.

2. On intersections of the trans-European road network at which considerable long-distance traffic comes into conflict with local traffic flows, urban bypasses should be constructed or completed, for example in Birmingham, Dublin, Antwerp, Lyons, Lisbon, and Athens.

3. The importance of providing optimal connections between the trans-European road network and other networks (rail, integrated logistics centres for combined transport, inland waterways, ports) was emphasized, particularly with a view to promoting access to an effective, multimodal European transport system. This will be considered further.

4. The working group noted the importance for the Community of conducting studies on a certain number of international links in order to improve the continuity of the trans-European road network and to promote a concerted programme by the Member States. This could include for example:

   Portugal-Spain: Chaves-Verin;
   Italy-France: Turin-Marseilles;
   France-Germany: Strasbourg-Ludwigshafen.

5. With regard to links outside the Community, the plan only includes routes in Community transit countries where international traffic is heavy. Trade ties should be developed both within the European Economic Area and with the countries of Eastern and Central Europe. The next chapter takes stock of the existing links with the Community's partners on its immediate external borders.

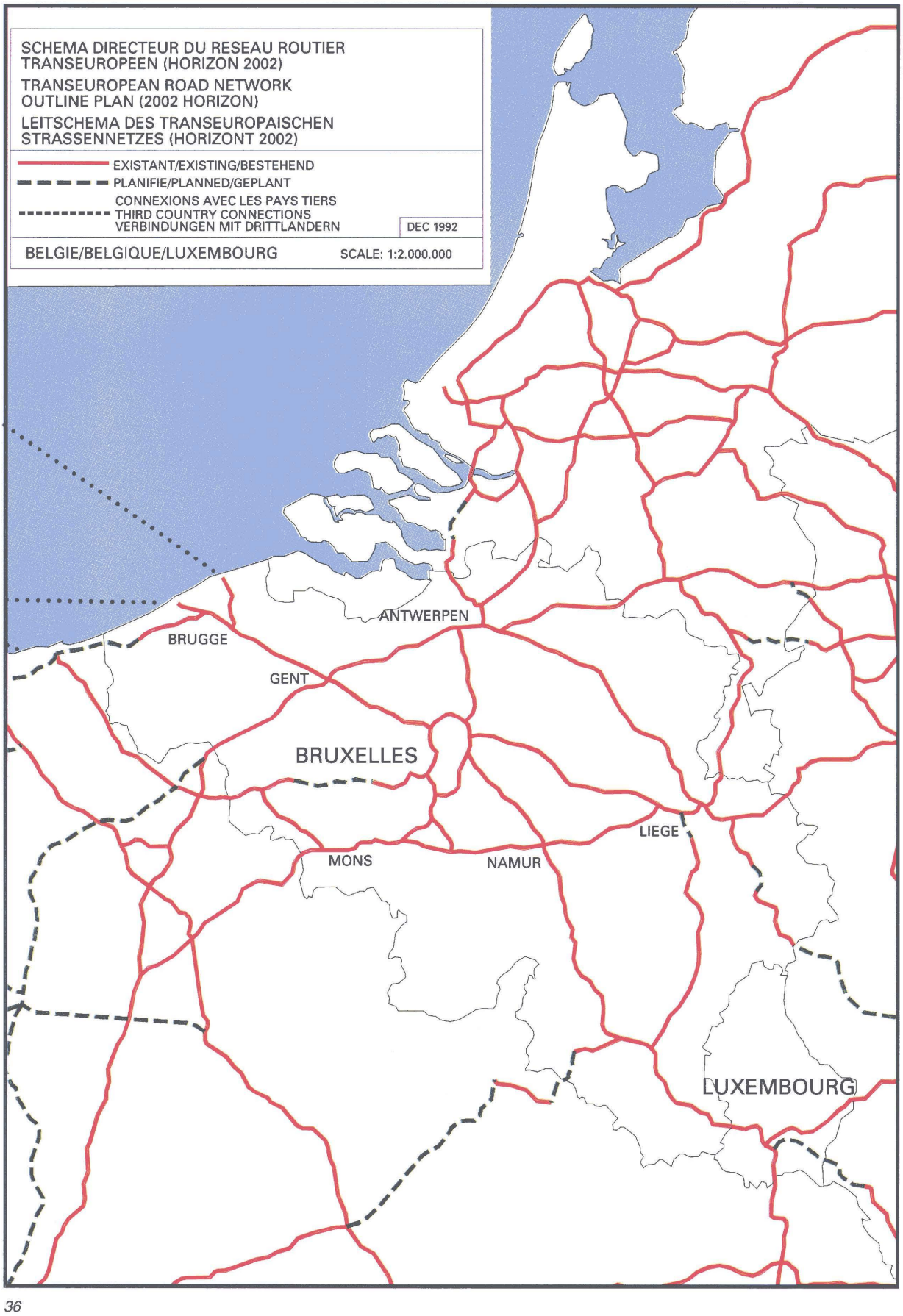
The Community has already been approached with regard to studies concerning the following links:

Ioannina-Albanian border;
Thessaloniki-Bulgarian border;
Alexandropoulis-Ormenio-Bulgarian border.

These studies will be undertaken as part of subsequent work on the master plan.

4.4. Presentation per country

See following pages: the description of the new links, the statistical data and the maps.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PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
BELGIE/BELGIQUE/LUXEMBOURG
SCALE: 1:2.000.000
ANTWERPEN
BRUGGE
GENT
BRUXELLES
LIEGE
MONS
NAMUR
LUXEMBOURG

Belgium

New links

(Brugge)-Veurne-Belgian/French border-(Dunkerque)
(Luxembourg)-Bouillon-Charleville-(Reims)
(Lille)-Tournai-Halle-(Bruxelles)
Liège-Trier
Liège-Bastogne

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	1 415 km
Planned new links	88 km
Total length of the network	1 503 km
New motorways to be realized	88 km

Luxembourg

New links

Luxembourg-(Saarbrücken)

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	70 km
Planned new links	20 km
Total length of the network	90 km
New motorways to be realized	20 km


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EXISTANT/EXISTING/BESTEHEND
PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
DANMARK
SCALE: 1:2.500.000
AALBORG
AARHUS
ESBJERG
KOLDING
ODENSE
KOBENHAVN

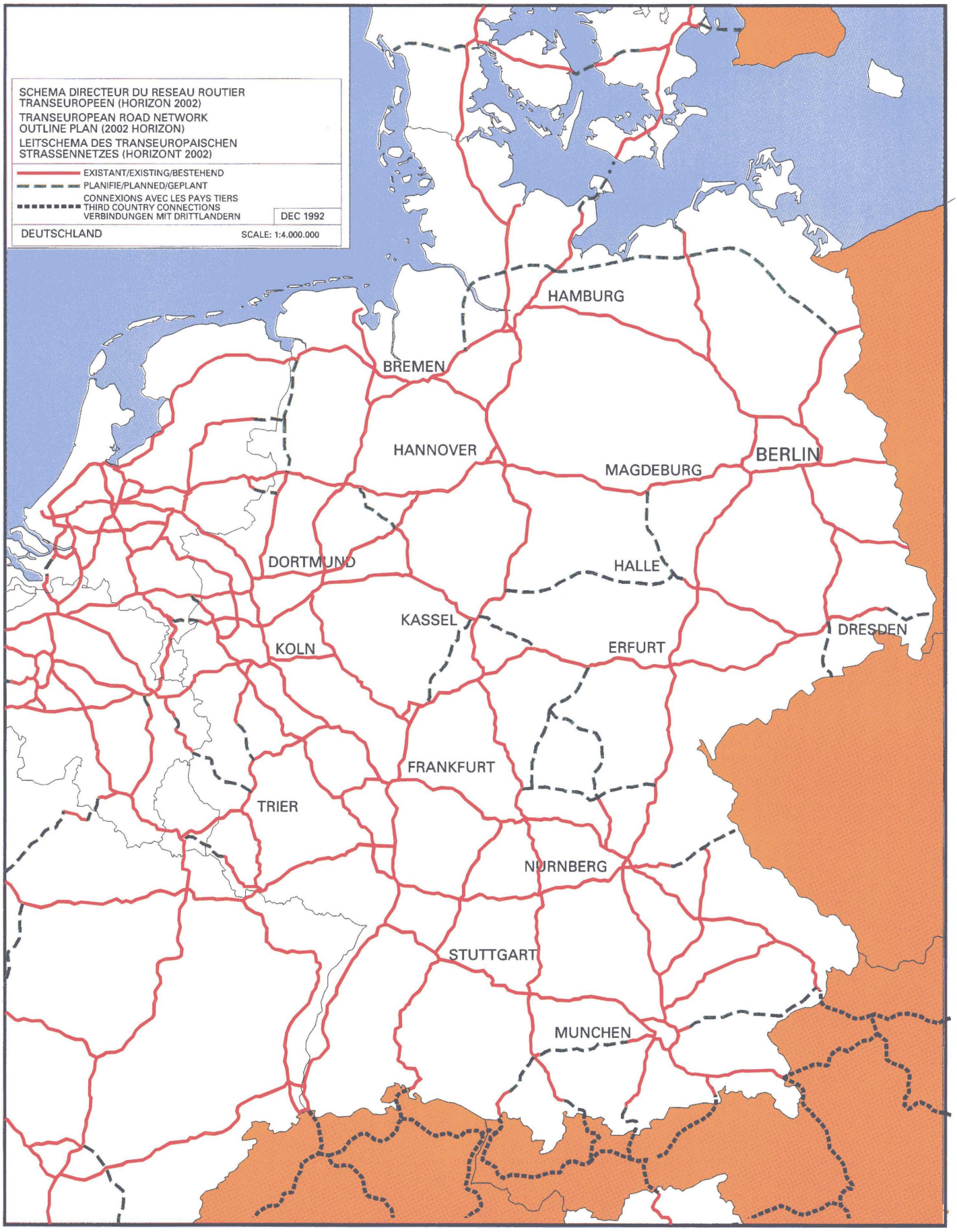
Denmark

New links

Ringsted-Skovse
Kolding - Esbjerg
Aarhus-Randers-Aalborg-Hirtshals/Frederikshavn
Great Belt - Storebæltsforbindelse
Øresundsforbindelse (Denmark-Sweden)

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	510 km
Planned new links	356 km
Total length of the network	866 km
New motorways to be realized	356 km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PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
DEUTSCHLAND
SCALE: 1:4.000.000
HAMBURG
BREMEN
HANNOVER
BERLIN
MAGDEBURG
DORTMUND
HALLE
KASSEL
DRESDEN
KOLN
ERFURT
FRANKFURT
TRIER
NURNBERG
STUTTGART
MUNCHEN

Germany

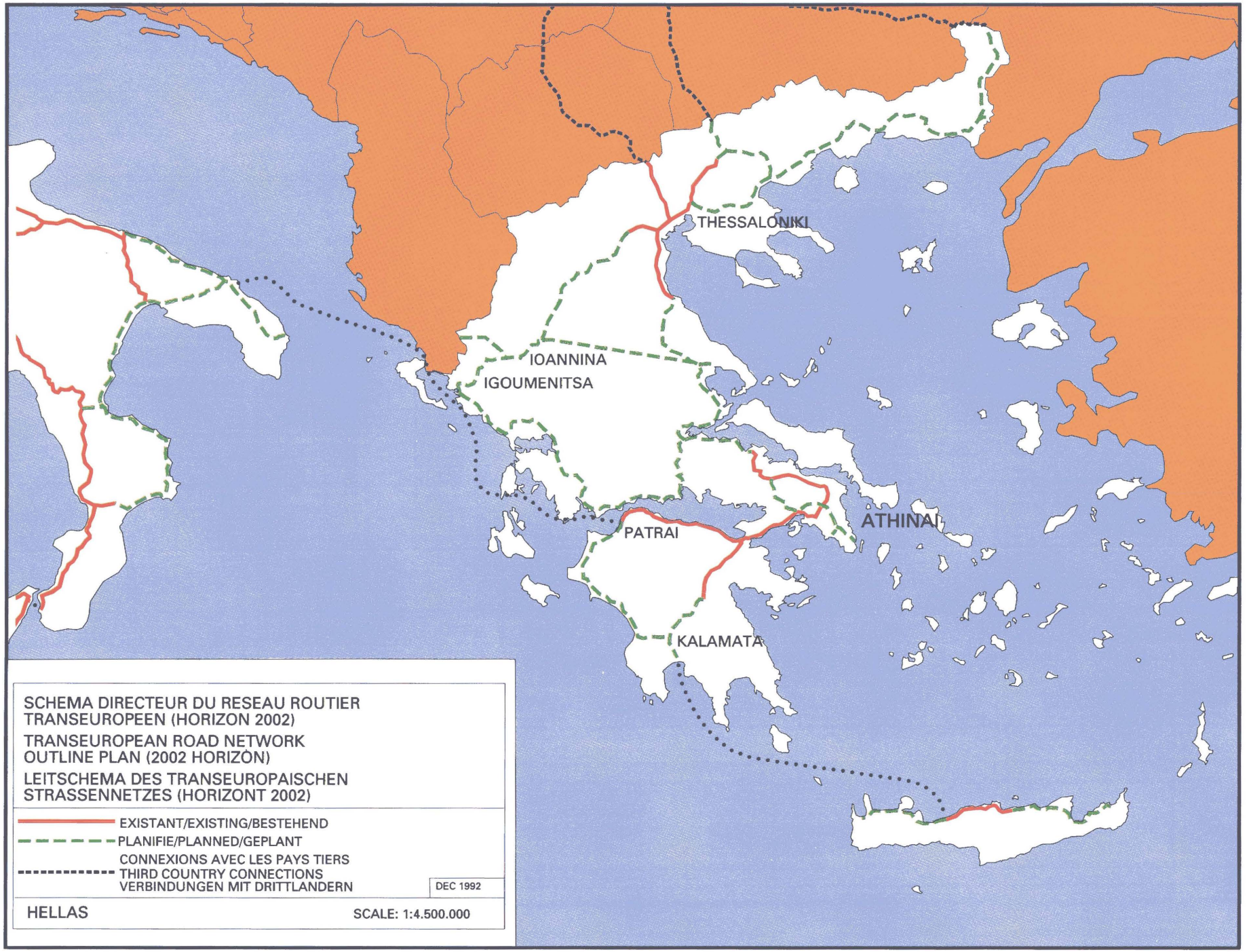
New links

Nord-Ost-Umfahrung Hamburg
Lübeck-Rostock-(Stettin)
Emden-Rheine
Bielefeld-Osnabrück
(Trier)-Daun (A1)-Blankenheim-(Köln)
(Trier)-Wittlich-Bitburg-(Liège)
(Luxembourg)-Saarbrücken
Kassel-Wommen
Bad Hersfeld-Görlitz
Kassel-Frankfurt
Schweinfurt-Bayreuth
Erfurt-Bamberg
Erfurt-Würzburg
Halle-Göttingen
Halle-Magdeburg
Berlin-Nürnberg
Hannover-Berlin/Berliner Ring
München-Bregenz
München-Pocking - (Linz)
Nürnberg-German/Czechoslovakian border-(Praha)

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	10 200 km
Planned new links	1 533 km
Total length of the network	11 733 km

New motorways to be realized	1 533 km
Existing motorways to be widened by 2002	1 220 km


THESSALONIKI
IOANNINA
IGOUMENITSA
PATRAI
ATHINAI
KALAMATA
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EXISTANT/EXISTING/BESTEHEND
PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
HELLAS
SCALE: 1:4.500.000

Greece

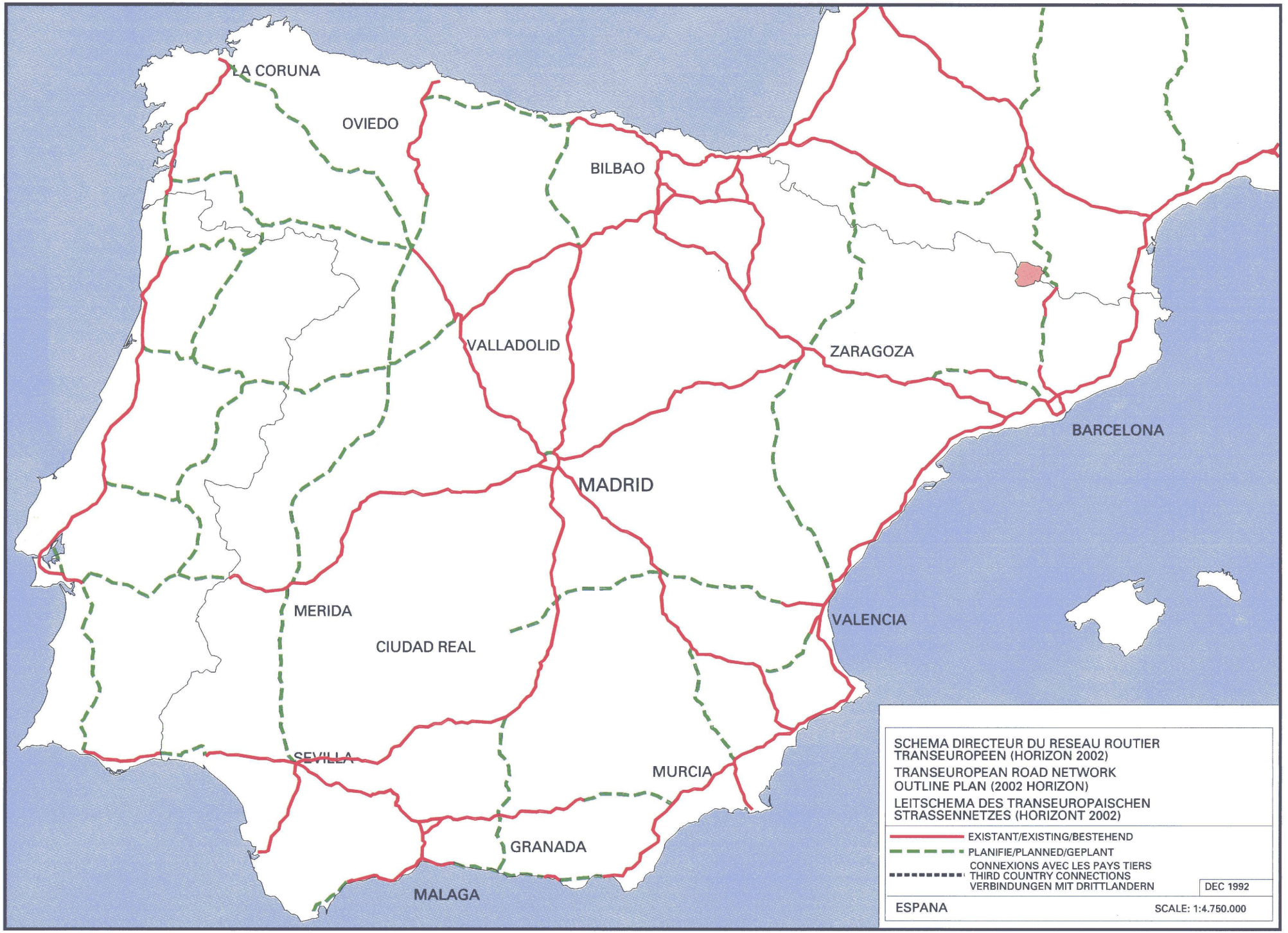
New links

Patras-Athens-Thessaloniki-Greek/ex-Yugoslavian border
Igoumenitsa-Ioannina-Metsovo-Thessaloniki-Kavala-Alexandroupolis-Greek/Turkish border
(Igoumenitsa)-Metsovo-Volos
Igoumenitsa-Patras-Kalamata
(Patras)-Antirrio-Lamia
Korinthos-Tripoli-Kalamata
Elefsis-Thiva
Elefsis-Stavros-Spata-Lavrio
Northern Krete axis
Kavala-Serres-Greek/Bulgarian border
Thessaloniki-Serres-Greek/Bulgarian border
Alexandroupolis-Ferres-Greek/Bulgarian/Turkish border
Ioannina-Greek/Albanian border

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992 (motorways + expressways)	850 km
Planned new links	2 530 km
Total length of the network	3 380 km

New motorways to be realized	530 km
New expressways to be realized	460 km
Existing expressways to be widened by 2002	310 km


LA CORUNA
OVIEDO
BILBAO
VALLADOLID
ZARAGOZA
BARCELONA
MADRID
MERIDA
CIUDAD REAL
VALENCIA
SEVILLA
MURCIA
GRANADA
MALAGA
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EXISTANT/EXISTING/BESTEHEND
PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
ESPANA
SCALE: 1:4.750.000

Spain

New links

Zaragoza-Huesca-Somport-(Pau)
Zaragoza-Sagunto
Barcelona-Spanish/French border-(Puymorens)
Benavente-Vigo
Benavente-La Coruña
Benavente-Oviedo-Santander
Burgo-Aguilar-Santander
Granada-Murcia
Tordesillas-Salamanca-Fuentes de Onoro-(Guarda)
Valencia-Madrid
Ciudad Real-N.IV-N.III
Murcia-Albacete
Almansa-Alcudia
Sevilla-Mérida-Benavente
Barcelona-Lérida
Bailén-Granada-Motril
Almería-Motril-Málaga
(Sevilla)-Huelva-Ayamonte-(Faro)
Málaga-Algeciras

Statistical data
concerning the trans-European road network outline Plan – Horizon 2002

Links existing in 1992 *(autopistas + autovias)*	6 100 km
Planned new links	3 562 km
Total length of the network	9 662 km
New motorways to be realized	3 562 km


LILLE
ROUEN
PARIS
RENNES
STRASBOURG
TOURS
DIJON
CLERMONT FERRAND
LYON
BORDEAUX
GRENOBLE
TOULOUSE
NICE
MARSEILLE
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CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
FRANCE
SCALE: 1:5.250.000

France

New links

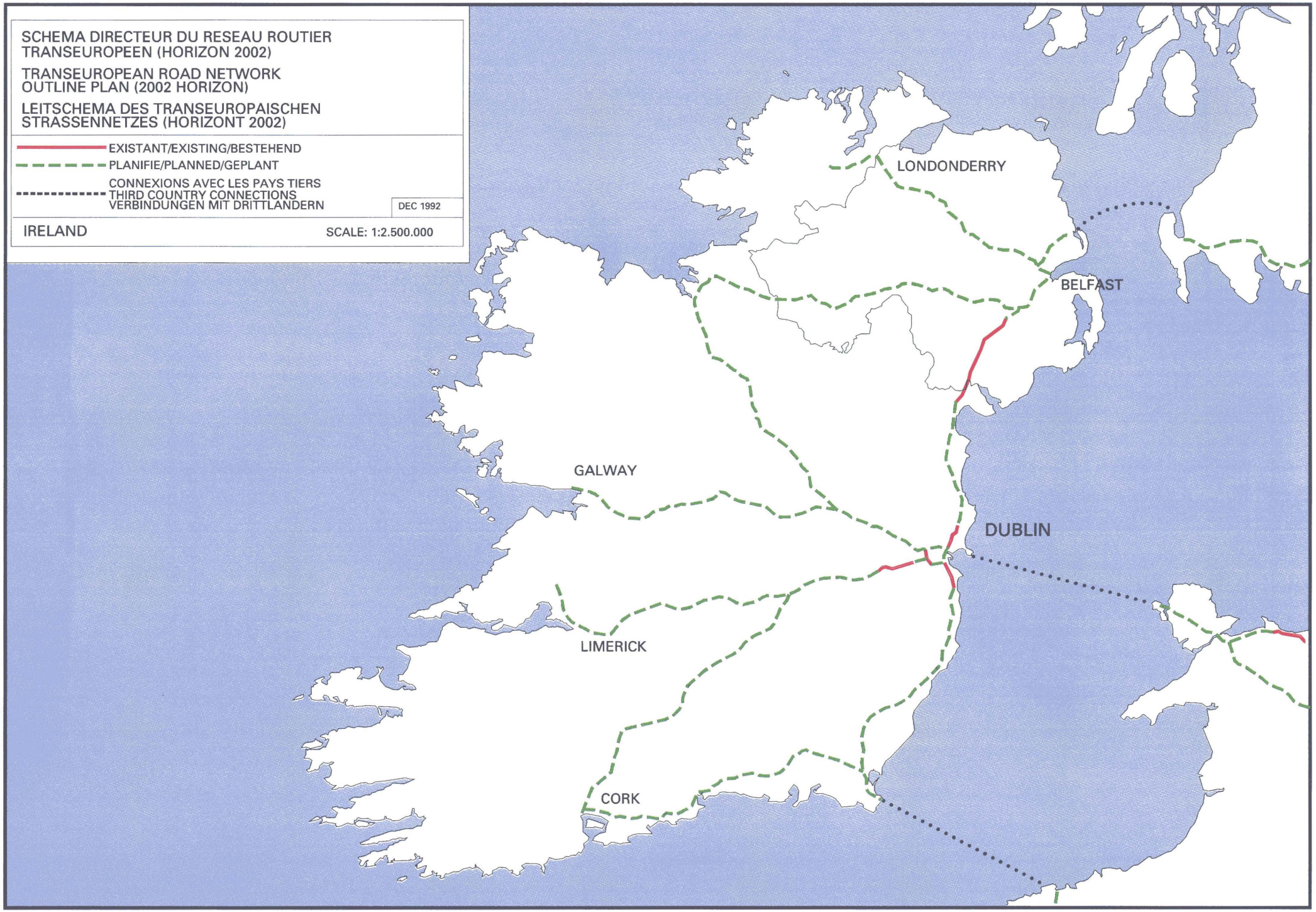
Spanish/French border-Puymorens-Toulouse
Pau-Oloron-Somport[1]
Pau-Toulouse (completion)
Bordeaux-Clermont-Ferrand
Clermont-Ferrand-Béziers
Lyon-Fréjus tunnel
Annecy-Genève
Arles-Salon
Toulouse-Vierzon
Troyes-Paris
Dijon-Dôle-Grenoble-Sisteron-Aix
(A83)-Angers-Le Mans-Rouen-Abbeville
Paris-Amiens-Boulogne-Calais-Dunkerque
Boulogne-Saint-Omer
Vierzon-Tours-Angers
Niort-Nantes-Rennes-Caen-Le Havre-Amiens-Saint-Quentin
Auxerre-Troyes-Reims-Charleville
Orléans-Sens
Le Mans-Tours
Amiens-Lille-(Belgium)
Cherbourg-Caen-(Le Mans)
Nantes-Vannes
Balbigny (A72)-Lyon

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	7 700 km
Planned new links[2]	4 400 km
Total length of the network	12 100 km

New motorways to be realized	3 000 km
Existing motorways to be widened by 2002	582 km

[1] Oloron-Somport: improvement of the existing link.
[2] 1 400 km will be realized after 2002.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EXISTANT/EXISTING/BESTEHEND
PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
IRELAND
SCALE: 1:2.500.000
LONDONDERRY
BELFAST
GALWAY
DUBLIN
LIMERICK
CORK

Ireland

New links

(Belfast)-NI border-Dublin -Wexford-Rosslare
(Rosslare)-Wexford-Cork
Dublin-Kinnegad-Sligo
(Dublin)-Kinnegad-Galway
Dublin-Portlaoise-Limerick-Shannon-Ennis
(Dublin)-Portlaoise-Cork
Letterkenny-NI border-(Londonderry)-(Belfast)
Sligo-NI border-(Belfast)

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	30 km
Planned new links	1 190 km
Total length of the network	1 220 km
New motorways to be realized	371 km


MILANO
VENEZIA
TORINO
BOLOGNA
GENOVA
ANCONA
FIRENZE
ROMA
BARI
NAPOLI
CAGLIARI
PALERMO
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EXISTANT/EXISTING/BESTEHEND
PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
ITALIA
SCALE: 1:5.500.000

Italy

New links

Bari-Brindisi-Otranto
Brindisi-Taranto-Sibari-Catanzaro-Lamezia
Catania-Siracusa
Messina-Palermo
Roma-Perugia-Ravenna-Venezia-Belluno-Italian/Austrian border
Civitavecchia-Livorno-Lucca-Modena
Parma-Verona
Porto Garibaldi-Ferrara-Verona
Brescia-Milano
Bergamo-Como-Varese-Ivrea
Sestri Levante-Tortona
Sassari-Olbia-Cagliari

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	5 800 km
Planned new links	2 111 km
Total length of the network	7 911 km
New motorways to be realized	2 111 km
Existing motorways to be widened by 2002	805 km


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EXISTANT/EXISTING/BESTEHEND
PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
NEDERLAND
SCALE: 1:1.900.000
GRONINGEN
AMSTERDAM
DEN HAAG
UTRECHT
ARNHEM
ENSCHEDE
ROTTERDAM
EINDHOVEN

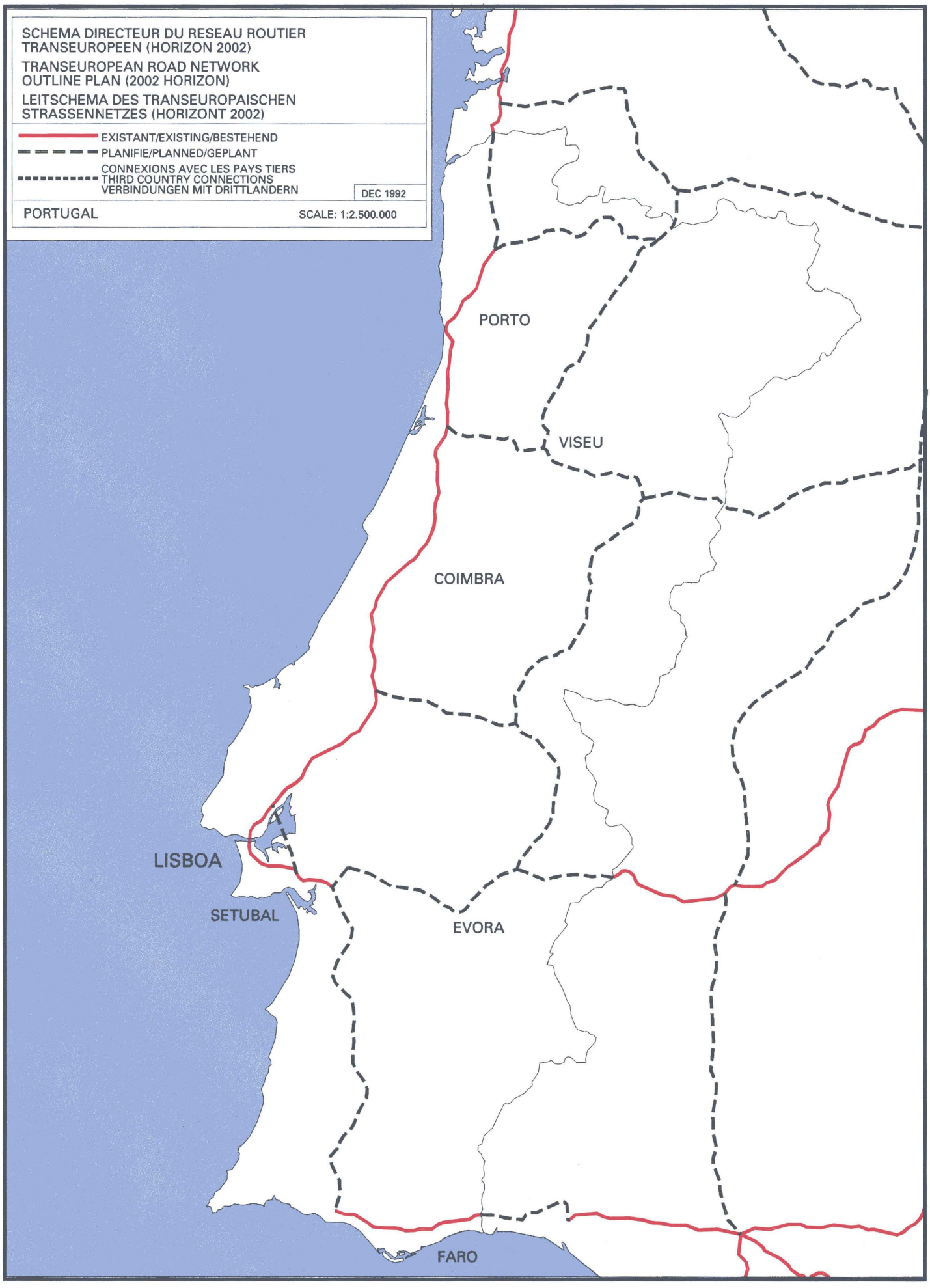
The Netherlands

New links

Venlo-NL/German border
Emmen-NL/German border
Enschede-NL/German border
Roermond-NL/German border
Dinteloord-Bergen-op-Zoom

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	1 575 km
Planned new links	70 km
Total length of the network	1 645 km
New motorways to be realized	70 km
Existing motorways to be widened by 2002	629 km


SCHEMA DIRECTEUR DU RESEAU ROUTIER TRANSEUROPEEN (HORIZON 2002)
TRANSEUROPEAN ROAD NETWORK OUTLINE PLAN (2002 HORIZON)
LEITSCHEMA DES TRANSEUROPAISCHEN STRASSENNETZES (HORIZONT 2002)
EXISTANT/EXISTING/BESTEHEND
PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
PORTUGAL
SCALE: 1:2.500.000
PORTO
VISEU
COIMBRA
LISBOA
SETUBAL
EVORA
FARO

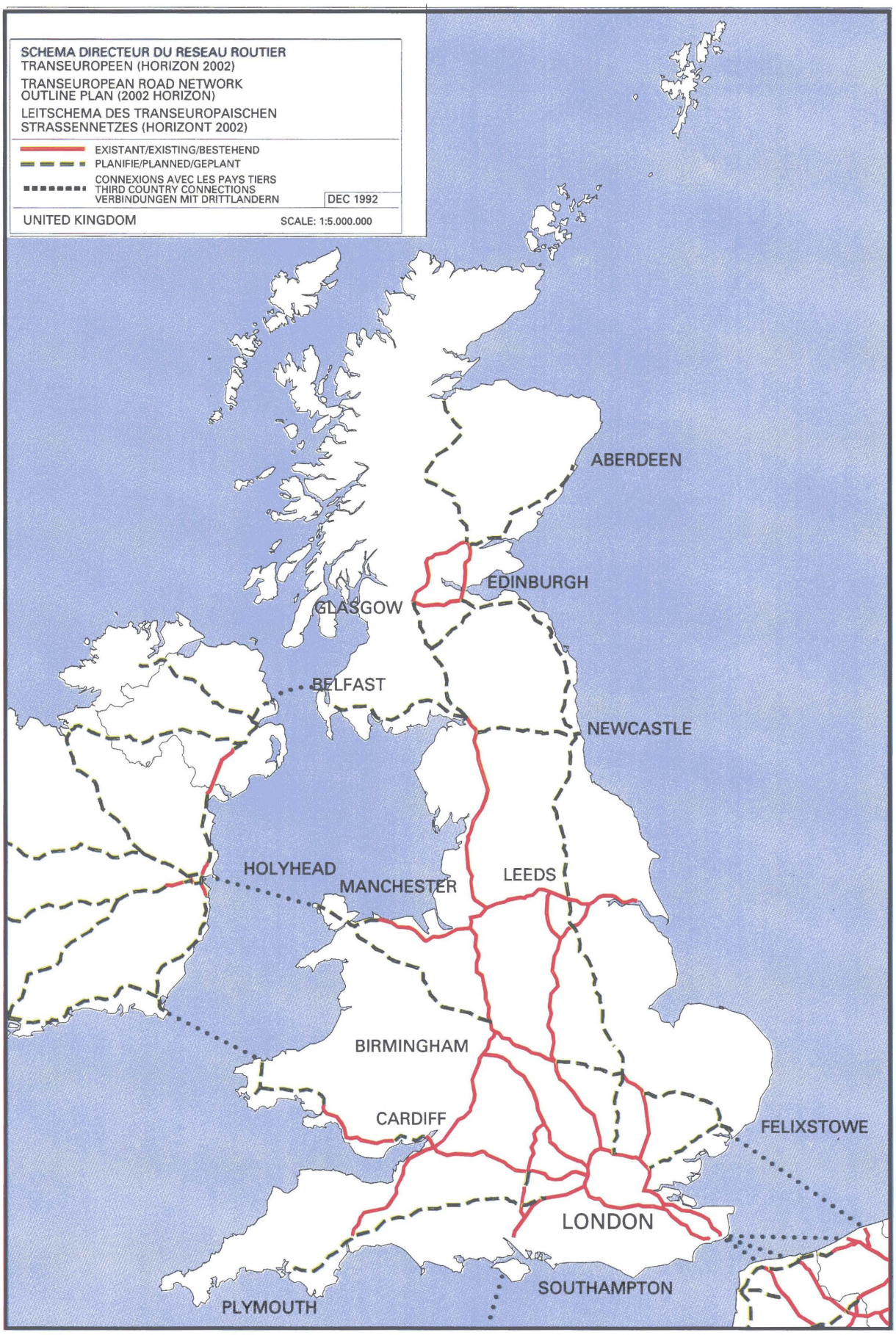
Portugal

New links

(Porto)-Braga-Valença-(Vigo)
(Porto)-Braga-Guimarães-Chaves-(Verin)
Ponte do Freixo and access
Viseu-Vila Real-Chaves
Aveiro-Viseu-Guarda-Vilar Formoso-(Salamanca)
Lisboa-Faro
Lisboa-Évora-Estremoz-Caya-(Badajoz)
Estremoz-Castelo Branco-Guarda
(Alcanena)-Abrantes-Castelo Branco

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	320 km
Planned new links	1 056 km
Total length of the network	1 376 km
New motorways to be realized	860 km
New expressways to be realized	196 km


SCHEMA DIRECTEUR DU RESEAU ROUTIER
TRANSEUROPEEN (HORIZON 2002)
TRANSEUROPEAN ROAD NETWORK
OUTLINE PLAN (2002 HORIZON)
LEITSCHEMA DES TRANSEUROPAISCHEN
STRASSENNETZES (HORIZONT 2002)
EXISTANT/EXISTING/BESTEHEND
PLANIFIE/PLANNED/GEPLANT
CONNEXIONS AVEC LES PAYS TIERS
THIRD COUNTRY CONNECTIONS
VERBINDUNGEN MIT DRITTLANDERN
DEC 1992
UNITED KINGDOM
SCALE: 1:5.000.000
ABERDEEN
EDINBURGH
GLASGOW
BELFAST
NEWCASTLE
HOLYHEAD
MANCHESTER
LEEDS
BIRMINGHAM
CARDIFF
FELIXSTOWE
LONDON
SOUTHAMPTON
PLYMOUTH

United Kingdom

New links

Larne-Belfast-Irish border-(Dublin)
Belfast-Enniskillen-Irish border-(Sligo)
(Dublin)-Holyhead-Birmingham-Cambridge-Felixstowe/Harwich-(Benelux)
London-Felixstowe/Harwich
London-Exeter-Plymouth
London-Peterborough-Leeds-Newcastle-Edinburgh-Dundee-Aberdeen
Carlisle-Glasgow-Inverness
Carlisle-Edinburgh
(Letterkenny)-Irish border-Londonderry-Belfast-Larne-Stranraer-Carlisle-Newcastle-(Scandinavia)
(London)-Severn Bridge-Cardiff-Carmarthen-Fishguard/Pembrock-(Rosslare)

Statistical data
concerning the trans-European road network outline plan – Horizon 2002

Links existing in 1992	2 720 km
Planned new links	1 195 km
Total length of the network	3 915 km

New motorways to be realized	540 km
New high-quality roads to be realized	655 km
Existing motorways to be widened by 2002	812 km

A network of continental stature

The Community must be prepared for growth in trade with non-Community partners.

5.1. The Community and the European Economic Area

As far as relations with the European Free Trade Association are concerned (Austria, Switzerland, Liechtenstein, Sweden, Norway, Finland and Iceland), the agreement signed on 22 October 1991 on the establishment of a European Economic Area covering all 19 countries as from 1993 will give rise to substantial increases in the movement of both persons and goods.

Road links with Switzerland and Austria are already at a satisfactory level, and only a few extra links will be upgraded to motorways. Bilateral agreements on the transit of heavy goods vehicles (with a few exceptions – Switzerland bars lorries over 28 tonnes, while in Austria there is a system of 'ecopoints' to fix the amounts of nitrogen oxide to be emitted by HGVs) reflect acceptable ceilings on the expansion of road transport from the Community. The development of heavy goods transport routes via the Löschberg, Gotthard and Brenner passes is particularly important in this respect.

Road links with Scandinavia, however, will need to make more significant improvements. In particular, the fixed link between Denmark and Sweden via the Sund, which was agreed upon by the two countries in 1991 and scheduled for entry into service in 1999, is of prime importance. But it, in its turn, raises the question of another fixed link across the Fehmarn Belt, between Denmark and Germany. In addition, there is room for improvement on the Malmö-Göteborg-Oslo-Skien-Kristiansand and Malmö-Stockholm (Helsinki) routes.

5.2. Community transit via former Yugoslavia

The transit route through former Yugoslavia is the most direct, the fastest and the most competitive land route linking the central area of the Community with the Eastern Mediterranean.

It is particularly convenient as a route between Greece and its main trading partners, notably Germany, the United Kingdom, France and the Netherlands. In 1990, 90% of Greece's exports to its EEC partners went by this route.

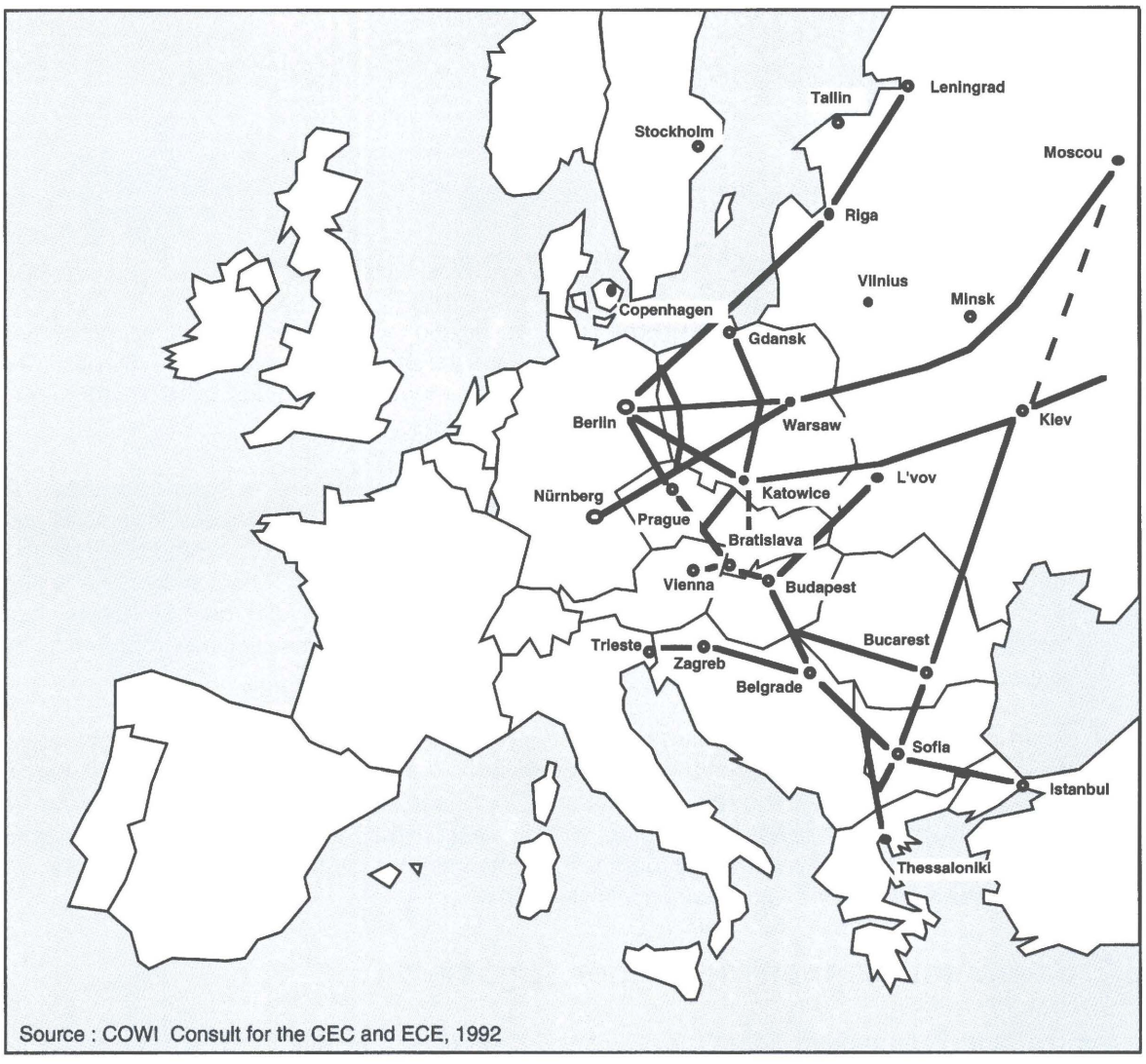
Since the civil war in 1991, traffic has switched to less efficient alternative routes:

via Italy, by sea between Brindisi, Bari or Ancona and Patras or Igoumenitsa, whose ports are equipped to accommodate roll-on/roll-off traffic. In the past these sea routes were used mainly for trade between Italy and Greece and for summer tourist traffic.

further east, via Bulgaria, Romania, Hungary and even Czechoslovakia.

The current position with regard to goods transport is therefore particularly damaging to the Greek economy: transport costs have risen by around 40% and carriage takes substantially longer.

Strategic Road Corridors in Central and Eastern Europe



Source : COWI Consult for the CEC and ECE, 1992

For this reason, the range of quality routes serving Greece should be expanded. Once the political situation in former Yugoslavia is normalized and independent States created, transit traffic should certainly pick up again. In addition, a better road service to the port of Igoumenitsa will make the sea route more efficient by 2000.

5.3. The Community and the countries of Central and Eastern Europe

East-west routes, very few in number up to now, will be essential in the medium term. That is why urgent priority must be given to the establishment of interconnections between the Community's network and that of Central Europe, in particular the following links:

Berlin-Warsaw;
Berlin-Prague;
Nuremberg-Prague;
Italy-Vienna, with spurs to Prague, Bratislava and Budapest.

These programmes must be consistent with the establishment of the TEM (trans-European motorway), backed by the UN (ECE) and aimed at completing a network of 11 000 km of motorway running between the Baltic, the Mediterranean and the Black Seas, 2 700 km of which is in service and 1 200 km under construction. The TEM serves Italy and Greece.

To sum up, major pan-European links between the Community, Scandinavia, Central Europe, the Baltic States and the Slav Republics will eventually reflect the new configuration of Europe. It is now quite realistic to think in terms of a number of major routes linking the Community via the countries of Central and Eastern Europe to Minsk, Kiev, Moscow and St Petersburg, and even a ring road running south of the Baltic Sea, linking Stockholm to Helsinki via Copenhagen, Gdansk, Riga and St Petersburg.

Through the Phare programme, the Community is developing technical assistance which should help to bring about the required road links with Central and Eastern Europe, in particular with Poland, Hungary and Czechoslovakia.

A typology of European roads

6.1. The interoperability of road characteristics is on the whole satisfactory

The principal technical characteristics of roads are similar in the great majority of Member States.

Indeed, efforts have already been made, *inter alia* under the aegis of the UN and the IRF, to standardize the road infrastructure: international conventions now largely cover transverse sections, longitudinal slopes, the clearance of engineering structures, the design of interchanges, etc.

This is why the need for interoperability with respect to roads makes itself felt with less force than with other transport networks, especially as the motor car and driver adapt to the infrastructure.

On interurban links, and more so on international routes, it would, however, be convenient to have a more uniform road typology. Drivers should, in fact, be able to tell at any point the type of road on which they are travelling, in order to adapt their driving and travel in safety.

6.2. Interoperability could be improved

An analysis of the situation in the Community as a whole indicates, however, that only two types of technical characteristics (single-carriageway ordinary roads and dual-carriageway motorways) are very similar from one country to another.

A real gap exists between those two types of infrastructure, notably with regard to their cost, capacity and quality of service, which has justified the adoption of intermediate types in some countries.

This approach was incorporated in the European Agreement on main international traffic arteries (AGR), adopted in 1975 under the auspices of the UN, an agreement which establishes a typology comprising three types of road: motorways, highways with limited access and ordinary roads.

In practice, however, five main types of urban road should be distinguished: normal dual-carriageway motorways, motorways with reduced characteristics, dual-carriageway highways with limited access and at-grade junctions, single-carriageway highways with limited access and with two or three lanes, and ordinary two-lane roads. The AGR seems therefore to be rather too loose as a frame of reference.[1]

[1] PIARC: XIXth World Road Congress, Marrakesh, 1991.

6.3. A point worth considering

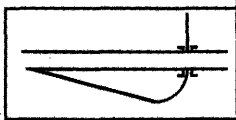
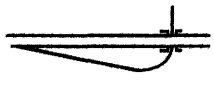
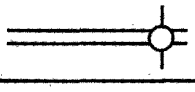
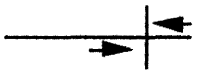
It appears to be desirable, therefore, to reinforce the typology of trunk roads with a view to increasing the continuity of layout characteristics of international routes, although some degree of flexibility may be needed to accommodate environmental constraints.

Such a reinforcement seems all the more useful for the trans-European network, since this will be quite substantially upgraded in the next decade: over 40 000 km of major routes will be upgraded to motorway or near-motorway standards, as set out in the trans-European road network plan (see Chapter 4).

Moreover, defining Community standards would help promote the adoption of more uniform standards in a wider European context (one might even seek to reinforce the recommendations of the 1975 AGR Agreement in the long term). At a time when expanding links with the Community's partners, and developing modern transport networks in Central and Eastern Europe in particular, are on the agenda, this would obviously be advantageous.

This question will therefore be carefully considered, in close consultation with the Member States.

Road Standards and Quality of Service

	Trans-European Road Network			
	Types of Roads	Range of Traffic Flow	Existing Standards	Possible Improvements of Inter-Operability
	Motorway	10,000 to 100,000 Veh/Day	European Agreement of Geneva (AGR) for Geometrical Features	• Routes Signing • Service for Users
	Motorway with Reduced Features	10,000 to 100,000 Veh/Day	Not Completely in Accordance with AGR Agreement	• Fitted Routes Signing
	Highways with Limited Access, Single Carriageway, No At Grade Junction	5,000 to 10,000 Veh/Day	No International Agreement	If this Type of Road is to Be Applied in Many Areas : a Standard is Required
	Highways with Limited Access, Dual Carriageway, Roundabout	Limited by Junctions	No International Agreement	If this Type of Road is to Be Applied in Many Areas : a Standard is Required
	Ordinary Roads	Limited by Junctions	AGR Agreement	Should not Concern Trans-European Network

Infrastructure and standard of comfort

7.1. Road surface characteristics

The characteristics of road and motorway surfaces (in terms of evenness, adhesion and acoustic and photometric properties), whatever the processes used (bitumen products, concrete surfacing), are an essential criterion for satisfying users since they help to determine the standard of comfort and safety.

It is, therefore, particularly important to ensure adequate maintenance of the network, and guard against deterioration. Against a background of budgetary constraints, the deterioration of road surfaces and engineering structures has become a major preoccupation among road authorities in recent years.

Given the predicted growth in traffic, the quality of the surface characteristics will to a great extent be related to the ability of road surfaces to withstand damage from heavy goods traffic and the danger of ruts and premature wear and tear.

It is important to proceed with the research programmes in hand, to implement the appropriate programmes and to encourage the experts in the field to make technical innovations. The costs of road infrastructures are, in any case, so high that even quite minor improvements in maintenance and construction can result in substantial benefits.

7.2. Systems for the future

Road equipment's share in the European network which is to be set up is growing in size, complexity and in terms of its added value.

In the electronics industry alone, for instance, the direct impact of the investment required to equip Europe's motorways will be sizeable.

In more general terms, bringing to fruition all these advanced technological investments in road transport will open up a market in which European companies will generally be well placed to compete with those of North America or the Far East. The expertise gained in the design, production and management of such equipment, together with R&D programmes such as Drive and Prometheus, will help to keep them at the forefront in world technology.

There are four main groups of this type of equipment:

1. **Fixed and variable information equipment**

This type of driver guidance equipment is designed to provide road users with a suitable combination of simple, direct visual indications (road signs), as well as more sophisticated information relayed by means of various devices both inside and outside the vehicle (such as recommended routes).

As far as road signs go, account must be taken of road markings as well as vertical signposting and remotely-controlled or automatic variable messages.

Recommending routes, whether by radio control or by displays of maps on screens or on the windscreen, requires:

ground-based reception and transmission stations all over the network;

relay via cable or ground-based beacon or satellite;

reception and display devices in the vehicle;

a powerful computer set-up to provide the data, and structures to exchange, coordinate and control all the data via control and traffic information centres.

2. **Driver comfort and safety features**

Various types of driving aids are intended to relieve the driver of at least some of the tasks in the ongoing driving of the vehicle. They include the following:

devices to switch headlights on or off when entering or leaving a tunnel, at dawn and dusk or in mist, etc;

ultraviolet or infra-red lighting devices to improve visibility at night or in fog;

radar-type equipment to measure the distance and perhaps speed of fixed obstacles or other vehicles, which would enable a computer, whether on-board or on the ground, to monitor or control the speed and longitudinal position of the vehicle automatically;

lateral guidance systems to keep the vehicle on a given path by means of a continuous line (magnetic cable or rail) embedded in the road surface, which vehicles could follow by means of special sensors.

In this way, the motorist could drive at high speeds and in total safety and without endangering other road users. His progress would also be much smoother.

In the long run, ideally, the aim would obviously be to have such equipment serve as an 'automatic pilot' for the vehicle, at least on motorways or on the major and best-equipped stretches, with the driver free at any time to switch back to 'manual' as preferred or as conditions dictate.

3. User rest facilities

In addition to information and assistance to motorists while they are on the move, a modern network should offer areas for relaxation and various backup services, fitted out with appropriate facilities (see Chapter 11, Optimizing travel time).

4. Automatic toll systems

New technology, based on ground-based transmission and receiving stations, and on microchips on-board, will enable road users to be billed electronically for road charges, without stopping, according to the distance covered, the tonnage of the vehicle and, where appropriate, the time of day or the level of traffic or pollution when the journey was made.

These new types of toll might, at the user's discretion, also include various facilities such as detailed monthly billing, direct debit from a bank account or an on-board 'smart card', sundry payments and subscriptions, etc. The cards might also give access to services such as hotels, car parks, public transport, telecommunications, etc.

Some Italian, French and Spanish motorway companies have already introduced systems for the collection of tolls by automatic identification of vehicles at low speeds, which are mainly aimed at commuter traffic. In addition, trials are under way in some Belgian and United Kingdom areas.

Research is in hand on the strength of specifications drawn up by the Spanish, French and Italian motorway companies (VITA: Vehicle information and transaction aid) and by the Netherlands roads authority, which together are working on the CASH project (Drive II).

7.3. The need for standardization

As far as equipment is concerned, there is far less in the way of standardization than in the case of the actual infrastructure, except in respect of fixed signposting.

The newer types of equipment, such as variable message systems, telecommunications, traffic flow regulation, aids to selecting routes, driving aids and electronic data exchange between vehicles or with road use centres, still require a great deal of work.

This advanced standardization work has a crucial role to play in the creation of a unified European network offering users services which will be straightforward to operate but of a consistently high standard throughout Europe. It is also vital for European industries which will have to compete in this market with American and Japanese products. Standardization will be brought about in close conjunction with specialist organizations such as CEN and Cenelec.

A specific example of the urgency of European standardization

Geographical route information data bases

Eventually, the whole European Community will be covered by a network of geographical route information data bases aimed in particular at in-car navigation systems. Such geographical data bases will cover major and medium-sized conurbations and the main interurban network and contain all the information needed for the journey (e.g. one-way systems, main features of the infrastructure, major transport nodes, links with other modes of transport such as the railway, inland waterways, ports and airports, etc.). At present, constructors and suppliers are expected to submit proposals as early as 1994 in France and Germany.

Used for reference by the authorities, who will set up a real-time route information system, it will allow a simple and effective dialogue on road traffic between users (motorists) and information providers.

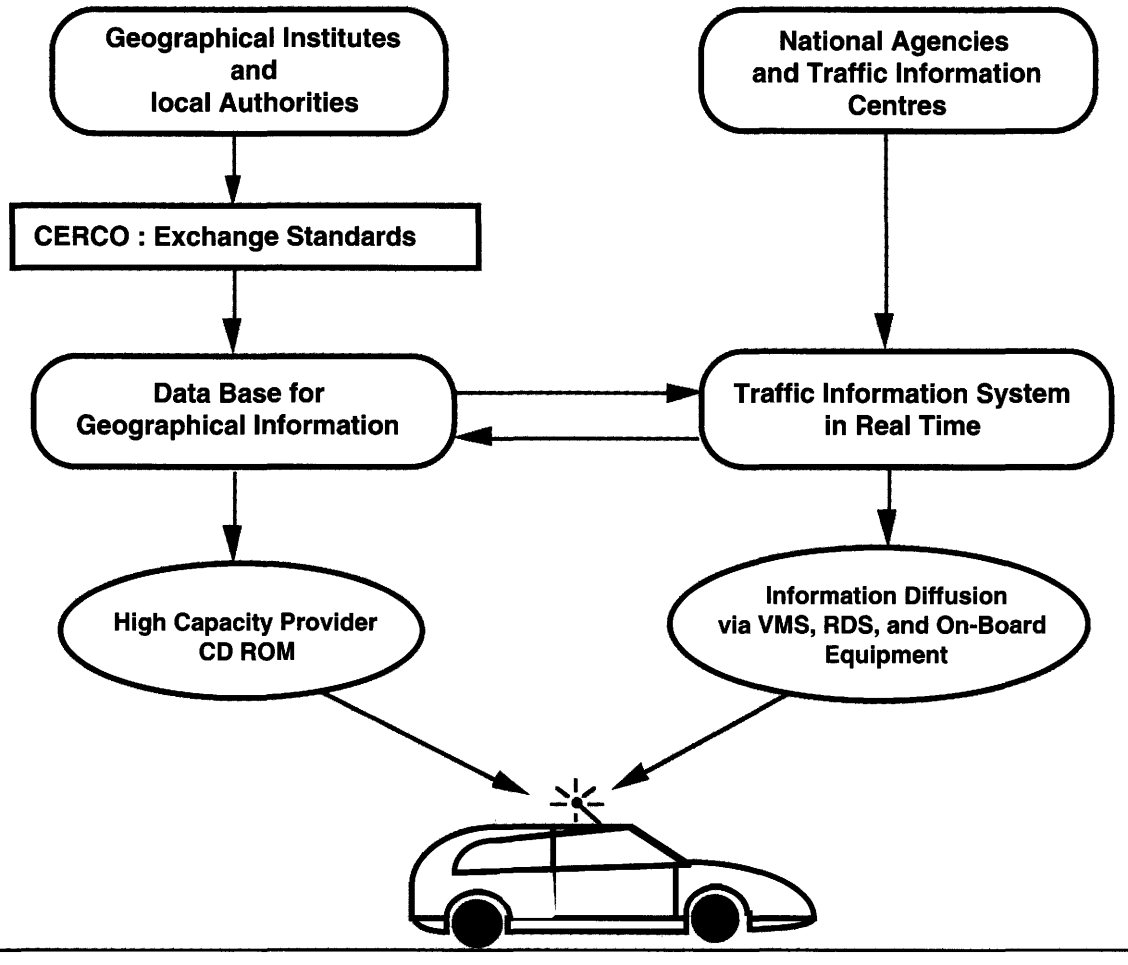
For increased effectiveness, the data bases must contain a common minimum core of information enabling basic questions to be answered, and the various suppliers must agree on an interchange format. In addition, the data bases must have information on other modes of transport (overcoming problems of integration) in order to meet the requirements of multimodal transport.

As part of the DRIVE and PROMETHEUS programmes, projects such as PANDORA(Prototyping A Navigation Database Of Road network Attributes), CARMINAT(Eureka project providing a comprehensive in-car information system), RDS(Radio Data System), ALERT and EDRM tested prototypes with a view to producing them on an industrial scale. The only aspect on which studies have not yet been completed is the large-scale collection and maintenance of transport data which can be applied locally.

It is therefore necessary to coordinate and quickly standardize initiatives being undertaken in the Member States so as to ensure consistency in relation to both the road network and multimodal transport.

The relevant projects will in particular be supported by the initiatives taken by CERCO (Comité Européen des Responsables de la Cartographie Officielle), which groups the cartographical departments of 24 European governments, especially in the field of interchange formats.

Route Guidance for European Drivers: Organizational Scheme of Road and Traffic Information Data Base



II

Traffic policy

In tandem with action on the network, action with regard to road traffic seems essential.

It is important, first of all, to combat traffic congestion and to encourage the regulation of road traffic.

It is also necessary to improve the standard of service offered to users. This entails giving special attention to road safety requirements, the improvement of traffic information and management and optimizing travel time.

Combating congestion and regulating mobility

8.1. Combating road congestion

Traffic congestion is a recurring phenomenon of varying duration caused by an imbalance between supply and demand in infrastructure capacity. Curbing it, now and in the long term, represents an exceptionally important challenge for transport policy.

The road network does not appear to be equipped to accommodate unlimited increases in the demand for transport under acceptable conditions, notably in or around urban areas and on the major trans-European links (see Chapter 3, Prospects for growth in mobility).

Of course, improving the integration into the Community of peripheral regions which need development necessarily implies an increase in road transport, at least on the main interurban routes.

If nothing is done to manage change, at least some degree of choking of the system is inevitable in the near future, and any efforts made to modernize the network or to develop traffic management and standardize the level of services to users, and to restrict the environmental impact of roads and road traffic, are likely to be in vain.

There is, therefore, no choice but to regulate mobility today in order to avoid having to ration it tomorrow, since it seems impossible any longer to operate on the assumption of unlimited scope for growth in road transport.

To date, interventions for the purpose of regulating traffic have been on too small a scale and have not always been rewarded with the expected success. In urban areas, for example, the widespread introduction of parking charges since the 1970s has proved effective but has not made it possible to counter growing congestion.

Curbing traffic congestion is forcing public authorities to change their policies. Too often, in the past, the response to traffic growth has been simply to provide more roads. It would seem that those days are over.

On the other hand, letting bottlenecks and delays dissuade motorists and thereby curb traffic is dangerous, since that generates extremely high costs both ecologically (substantially greater pollution because of constant stop-start driving) and economically (unnecessary energy consumption, wasted time, decreased productivity, relocation of businesses to less congested regions, etc.).

Better solutions must be sought. There must be a drive to optimize traffic on the network, encourage a transfer of road traffic to other, complementary, modes of transport, provide new infrastructures if the network really is incomplete, and above all, call on users to bear directly the true costs – both direct and indirect – of the use of the network.

8.2. Regulating mobility on the main trans-European links

1. On the most heavily used international routes, the construction of new infrastructures for the sake of coping with congestion will perforce be limited. In the main European corridors, available space has indeed become scarce; capacity increases might be made to defer saturation, although this will be increasingly difficult. But additional capacity of 10 to 15 000 vehicles per day will offer no more than a small breathing space if traffic is increasing steadily.

2. Better use of road capacity should be possible by the end of the century thanks to large-scale traffic management systems.

   Dynamic management of the major European routes, and, in particular, the north-south trunk roads, with a view to eventually creating truly alternative routes, will enable the effects of linking up the European network to be maximized.

   This kind of dynamic traffic management could be helped by offering attractive rates on toll networks for long-distance traffic.

   Such a management system will, moreover, offer the advantage of being able to weigh up the hazards to motorists in the event of excessive heavy goods traffic, and direct through traffic, where necessary, on to less crowded alternative routes, where they are of a sufficiently high standard.

3. Reallocating some road traffic to other, 'cleaner', modes of transport could also be considered. In practice, however, this course of action will have to be tempered, since no other mode is in any position to replace road transport on a large scale, given the average distribution of traffic between modes at present.

   For medium and long-distance passenger transport, motor vehicles meet a particular demand for transport which is relatively insensitive to variations in the supply of air and rail transport.

   The European high-speed rail network will probably mean a reduction of car traffic on parallel routes of 2.5 to 10% depending on forecasts and routes, which is far from insignificant. In France, where the TGV (high-speed train) network is most advanced and destined for major development, the figure is put at about 4%, for example.

   Moreover, it is necessary to put the volume of traffic on the different modes into perspective.

By way of example, if German railways managed to increase their share of passenger transport by 50% at the expense of the roads, this would mean a decrease of only 7% in road traffic – which expanded by this amount every year between 1985 and 1989.

With regard to the transfer of goods traffic to the railways, particularly on the assumption that the development of combined road-rail transport will be pursued, taking account of the traffic volumes implies that scarcely any decrease in road traffic can be hoped for.

Failing an increase in the price of road transport, the aim of transferring part of the expected growth in trade to the railways is more realistic and would constitute a success in itself. However, the road network, by encouraging high-quality service of the European and regional multimodular interchanges, should play an active role in this move towards the railways and inland waterways and to the sea, particularly for long-distance traffic to or from the centre of the Community.

With traffic on major routes likely to double by the year 2010, the combination of the different solutions is set, however, to have only a limited effect on the congestion of inter-regional links and major European roads.

4. Structural action on charging for the use of the road infrastructure would seem likely to regulate traffic more effectively as well as increasing the effectiveness of the measures outlined above.

From this point of view, users ought to pay more for the use of the network, for which, according to Transport 2000 plus, the charges levied at present, particularly with respect to heavy goods vehicles, are too low.

Until external costs are better reflected in transport costs, mobility will continue to grow and goods will be carried even though there may be no systematic justification for their transport on economic grounds. Such movements tend to be detrimental to the public good, rather than beneficial, because the external costs exceed the commercial profit. The Commission has therefore drafted a directive on the charging of transport infrastructure costs to heavy goods vehicles,[1] which enshrines the principle of internalizing external costs.

A 10% rise in the price of transport, for instance, would yield a reduction in mobility of some 4% and a further saving of 3% in fuel.

In principle, an increase in charges could be effected by an increase in taxes (on vehicles, fuel or road use) or by the levying of tolls. However, the group noted that taxes on vehicles tend to discourage their purchase, but not their use.

From the point of view of regulating mobility, it would be better to promote a form of pricing which generates traffic elasticity.

[1] Doc. COM(90) 540: Proposal for a Council Directive on the charging of transport infrastructure costs to heavy goods vehicles.

Automatic toll collection, which should no longer pose any technical problems by the end of the century, would have the advantage of associating charges for infrastructure and its use more directly, as well as encouraging regulation by route. According to the European Round Table Group of Industrialists,[1] European hauliers are ready to support utilization charges provided that the service offered and the traffic flow are guaranteed.

But this still leaves open the question of the acceptability of tolls in the centre of the Community, where they are the exception, especially since tolls, surely, have to reach a certain threshold before they have any deterrent effect on the demand for transport.

Concerted consideration must be given to finding a solution, whatever it may be. The working party unanimously agreed that the Community cannot afford to do without this.

A permanent, flexible and accurate system for monitoring comparable data on road traffic trends on the major trans-European routes should be introduced. This would enable the effectiveness of any action undertaken to be evaluated in order to improve traffic flows and manage mobility. This would also allow decisions to be made on the validity of particular policies and their impact on the economy and the environment.

8.3. Regulating mobility in urban areas

The urgency of traffic regulation is certainly even greater in and around towns, where motor traffic has continued to grow, to the point where it jeopardizes the original social functions of the towns.

We need to get out of this inflationary spiral of measures favouring motorists (new infrastructures, parking areas, local traffic management systems, etc..) at the expense of pedestrians and residents. This type of management directly or indirectly generates more traffic and in time will make fresh measures necessary. The use of the car in urban areas must therefore be rationalized and a balance struck between the quality of life and the necessary use of the car, which will entail facing up squarely to the problems deriving from too much road traffic.

In the face of these ills which afflict the majority of major urban centres in developed economies, certain Community towns have naturally begun to react. The example set over the past 20 years by the city of Munich, for instance, is well worth following.

It is clear that it falls to the local authorities to take action in this matter, with the Community's task being only to emphasize the urgent need for a strategy, and if possible to draw up a frame of reference within which each competent authority will be able to define its priorities and develop its own initiatives.[2] This frame of reference could be useful to the networks of cities currently being set up in the Community.

[1] ERT 1991, *The missing networks, a challenge for Europe (Les réseaux manquants, un défi pour l'Europe).*

[2] Doc. COM(90) 218, Green Paper on the urban environment.

Since each urban area has its own specific conditions, alternative or additional measures on three different fronts could be considered to modify, rationalize and even substantially reduce the use of the car:

on access to town centres;

on the cost of using the network;

on competitive alternative transport supply.

1. Car access to town centres can for example be totally or partially prohibited. In the event of regulation, traffic can be reserved for residents or limited to certain times or only to public transport. Use of the car can be discouraged by the institution of very strict speed limits (of the order of 30 km per hour), by the placing of a ceiling on the provision of parking spaces and by fixing the price of paid parking spaces at a high level. Policies restricting parking appear to be particularly effective in reducing road traffic.

2. With regard to the cost of using the network, it must be noted that although fiscal or similar levies relating to cars or traffic are already relatively high, in the final analysis the motorist in urban areas bears only a small part of the true cost indirectly suffered in terms of damage to the environment, energy consumption, congestion and accidents.

   Recourse to urban tolls (road pricing) would appear to be particularly effective in encouraging users to rationalize their journeys.

   A number of examples demonstrate the truth of this: the best-known is that of Singapore, where there has been a reduction in congestion of some 20%. In Norway, tolls form a cordon around the cities of Bergen and Oslo. A stabilization in traffic has been noted in Bergen instead of the predicted increase of 7%, whilst in Oslo a reduction of 4% in traffic has been noted. Copenhagen expects a reduction of 25 to 30% in rush-hour traffic and 6 to 7% over the whole day.

   Technical experiments with strategies and mechanisms for managing demand are under way in Barcelona, Cambridge, Bologna and Trondheim. These include charging for infrastructure and congestion, and curbing access.

   In the Netherlands, there are plans to introduce tolls for certain access roads in the Amsterdam-The Hague-Rotterdam-Utrecht conurbations and surrounding areas in order to halve the increase in traffic by the year 2010. Journeys between home and work are being targeted first, the average distance between an employee's home and his place of work being approximately 30 km. Public road transport is expected to expand to help ease overcrowding on the roads.

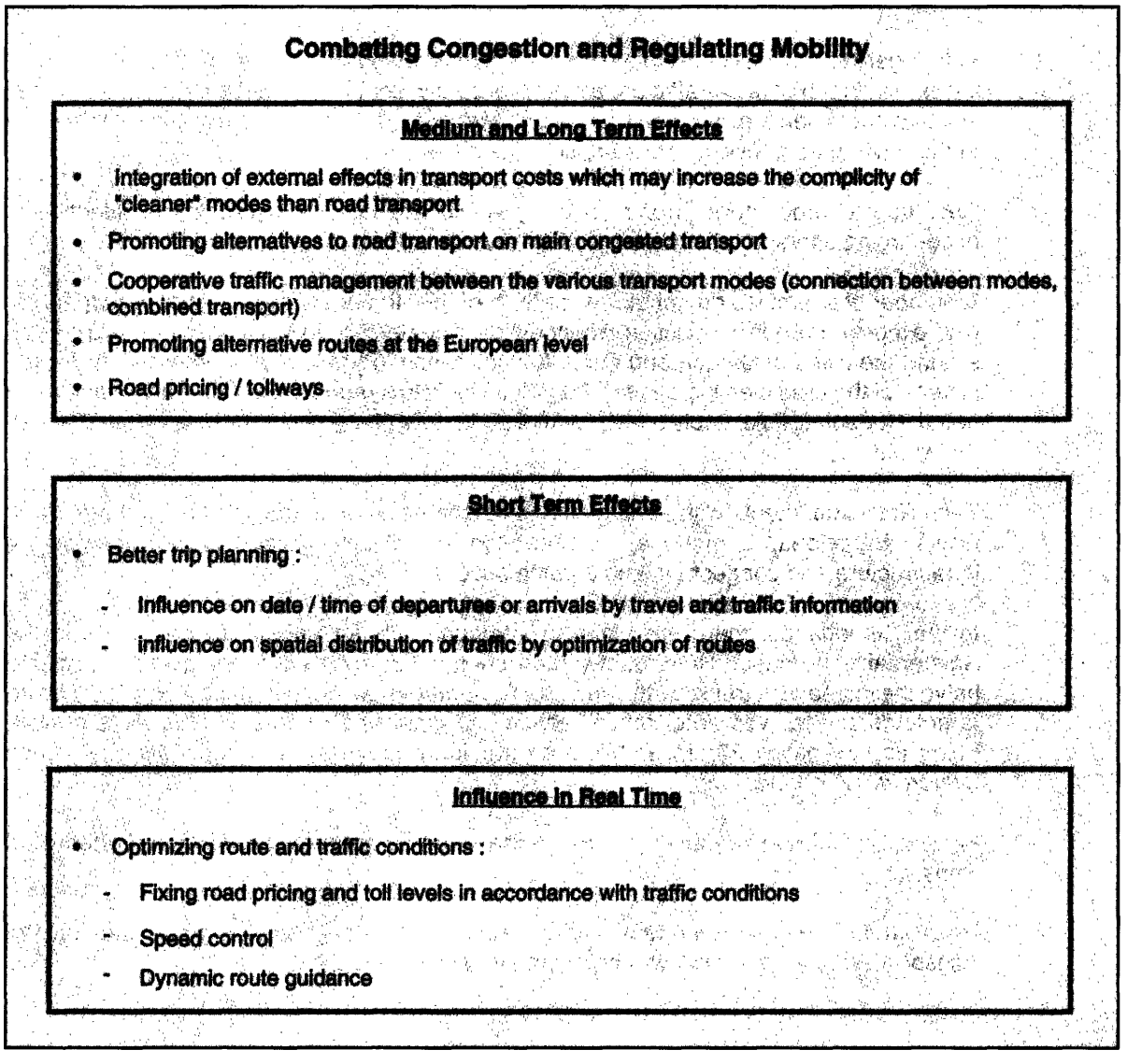
   Feasibility studies are under way in many other large European cities, including London and Paris.

   However, before introducing tolls in urban areas, public authorities need to ensure that the transport system is capable of meeting mobility requirements.

3. Attempts must be made, both qualitatively and quantitatively, to make public transport, which in urban areas has far lower external costs than the car, more attractive.

   Providing reserved lanes above ground for buses and trams, putting new underground or light railway lines into operation and restricting access to town centres to public transport only, with frequent services, is likely to reduce substantially the use of private vehicles and the congestion they cause.

   The profitability of public transport could be improved, for example by indirect and targeted taxes on motorists (by means of urban tolls, proceeds from car parks, etc.) and on the indirect beneficiaries of traffic, such as economic agents directly generating road congestion (town centre shops, hypermarkets on the outskirts) or businesses in the immediate vicinity of public transport. The point is that infrastructure financing, like the network concept, should be seen in the context of a system.



Roads, road safety and road signs

Road safety is without doubt an area in which the Community will become more active.

The Council did in fact ask the Commission to draw up and implement a Community programme in that field,[1] and a high level group on road safety was set up. The Commission will present a programme based on the group's report to the Council in June 1992. One of the priority areas for action put forward in the programme is precisely the role of infrastructure in relation to road safety.

The Motorway Working Group drew special attention to certain points which it considered to be of particular importance:

measures directly concerned with the infrastructure;

the need to harmonize road signs.

9.1. Infrastructure and road safety

It is axiomatic that the choice of design will have a strong influence. Motorway standards offer real advantages here, since, on average, motorway travel is over three times safer than any other form of road travel.

In the same way, certain features and facilities contribute to increased safety and cut accident risks, such as, for example, the separation of local and through traffic, the provision of rest areas or service stations which are sufficiently attractive to make drivers want to break their journey before they get too tired and encourage them to make regular stops on their way, the provision of road traffic information enabling drivers to anticipate bad traffic conditions, lighting at night on major intersections, anti-dazzle panels on motorways and raised road markings. Emergency call points should be provided all along the major European routes.

The group also noted with concern that forecast increases in traffic volume could have a negative impact on the safety of the network, and pointed to the value of eventually developing inter-vehicle anti-collision systems elaborated as part of the Drive programme.

Lastly, one should mention the expected effect on road safety of the Directive on construction products[2] which entered into force on 27 June 1991 and is intended to achieve the free circulation and use of construction products throughout the European Community, provided that they allow the structures in which they are used (including roads) to meet six essential health and safety requirements. One of these concerns safety with regard to hazards caused by shocks and skidding.

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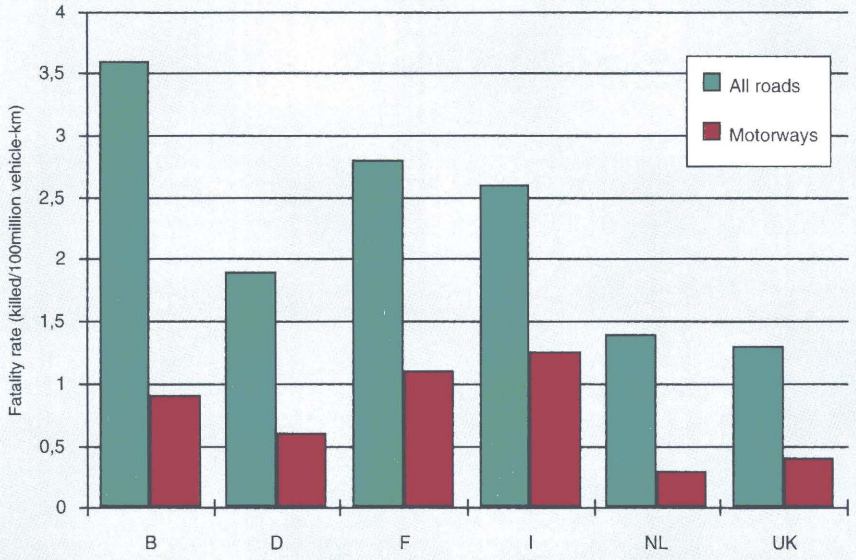
1 Resolution of the Council and the representatives of the governments of the Member States, meeting within the Council, of 21 June 1991 on a Community programme of action on road safety, OJ C 178, 9.7.1991.

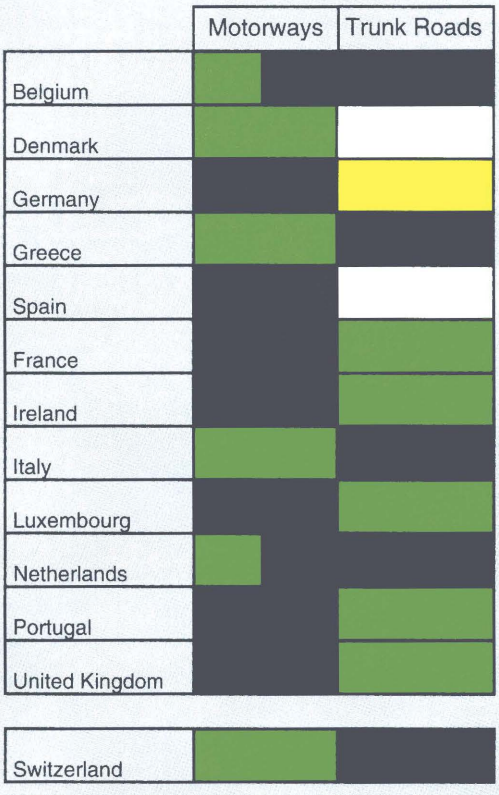
2 Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products, OJ L 40, 11.2.1989 (89/106/EEC).

Comparison Between the Fatality Rate on all Roads and the Fatality Rate on Motorways



Source : Brühning / Alevisos 1991

The Various Colours Associated with Road Types



This requirement is set out in detail in an explanatory passage at the end of a chapter on accidents relating to moving vehicles. The document will form the basis of European standards to be set, which will cover the following fields:

the skid resistance of road surfaces, in terms of materials used;

the skid resistance and day and night visibility of road markings;

the technical specifications of road signs and signals (other than the choice of shapes, colours and pictogrammes);

the essential characteristics of permanent road fittings (crash and safety barriers, shock absorbers, etc.).

9.2. Towards harmonizing road signs

The user of the trans-European network should be able to rely on uniform road signs whether for information of a permanent nature (fixed signs) or temporary messages.

The Vienna Conventions of 1968 on Road Traffic and on Road Signs and Signals (revised in 1971, with an addendum in 1973) have been very important with regard to fixed road signs, particularly markings related to infrastructure standards (arrows, lines, etc.) and traffic signs.

However, the Community should still consider further standardization in this area.

A good example of what remains to be done is of course the different use of colours in direction signs.

Road information and traffic management

10.1. A fresh objective for road management

Road management, which has long been confined simply to maintenance work, has undergone a significant qualitative explosion in the past ten years on account of the introduction of equipment integrating new technological breakthroughs, in particular in electronics.

Among other things, it has been extended to improving services to the users in terms of information, the aim being to break down the driver's isolation.

The field offers vast scope and the early 21st century is bound to see far-reaching changes to the road/vehicle/driver equation as we know it today.

The introduction of advanced transport telematics (ATT) now allows, and will increasingly allow, improvements in information on traffic and demand, integrated management of urban and interurban traffic, freight and HGV fleet management and the management of public passenger transport, as well as driver assistance.

Potentially, therefore, we are on the threshold of a real revolution. In a minimum length of time, or even in real time, data can be collected, processed and validated and communicated to the user, either visually, by radio or via on-board computer.

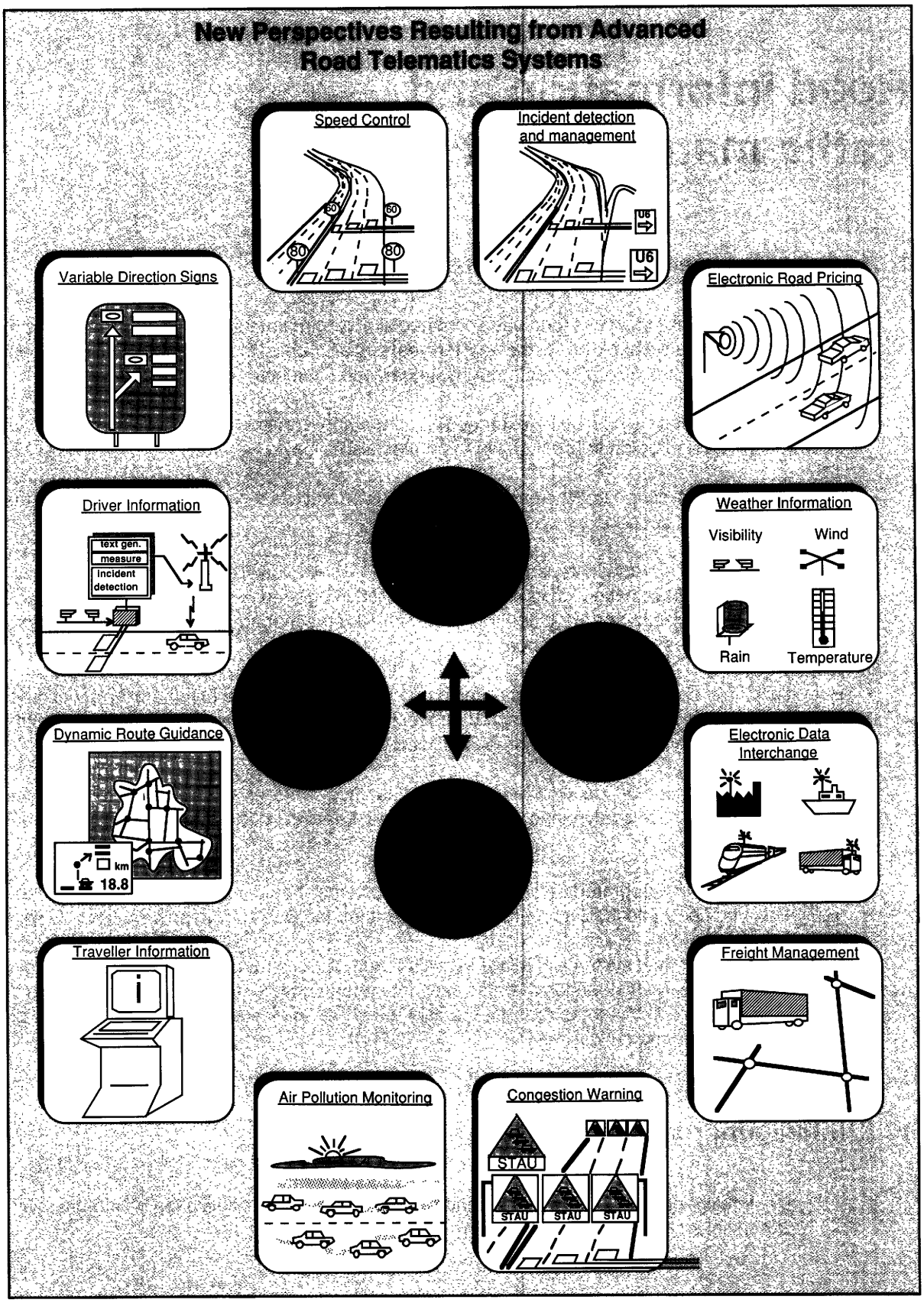
Conventional information on weather or obstacles (accidents or road works) can now be complemented by data on dynamic traffic management, for which there are a growing number of applications.

In the medium term, integrated traffic management systems should make it possible to increase traffic flows by up to 5 to 10% in interurban areas and up to 10 to 15% in and around towns.

It is clear, however, that systems of this kind, which promote maximum use of available capacity in order to improve the distribution of traffic over time (staggering of demand) and space (use of alternative routes) still cannot guarantee the user a level of service equivalent to that of a road where traffic flows smoothly all day.

10.2. Intelligent roads and vehicles

- Intelligent roads technology should be perfectly suited to application on motorways, urban links and in very congested towns and cities.


New Perspectives Resulting from Advanced Road Telematics Systems
Speed Control
Incident detection and management
Variable Direction Signs
Electronic Road Pricing
Driver Information
text gen.
measure
incident detection
Weather Information
Visibility
Wind
Rain
Temperature
Dynamic Route Guidance
km
18.8
Electronic Data Interchange
Traveller Information
Freight Management
Air Pollution Monitoring
Congestion Warning
STAU

Highly sophisticated data collection systems (automatic logging, video cameras, etc.) positioned at nerve centres on the network are gradually coming into use in the infrastructure. Once processed, the data are most usually displayed via variable message signs located at main interchange points. This is an effective arrangement because the messages are read by all road users, so this type of display is becoming more and more common and should spread still further through the network.

The first integrated traffic management systems are under development. They include Sirius in the Île-de-France region, Ulisse in Lyons and Autoguide in the London area. Pilot schemes are also being run by Member States and by local authorities under the Drive II programme (see Corridor pilot scheme for interurban travel and Polis for urban areas).

- As for the vehicle, the Prometheus research programme will result in the development of on-board telematics. The role of the car as an element within the transport system, instead of as almost an autonomous system, will be strengthened.

Eventually, 'intelligent vehicles' might, with the help of ground-vehicle links, interface with transmitters on the infrastructure, thereby offering drivers an additional source of information and services.

It is generally acknowledged that the full fruits of the research under way in the motor industry will be plucked only if there is sound European cooperation on a common vehicle-infrastructure interface. There, too, we see the need for a proper Community road policy; the implications for industry are plain to see.

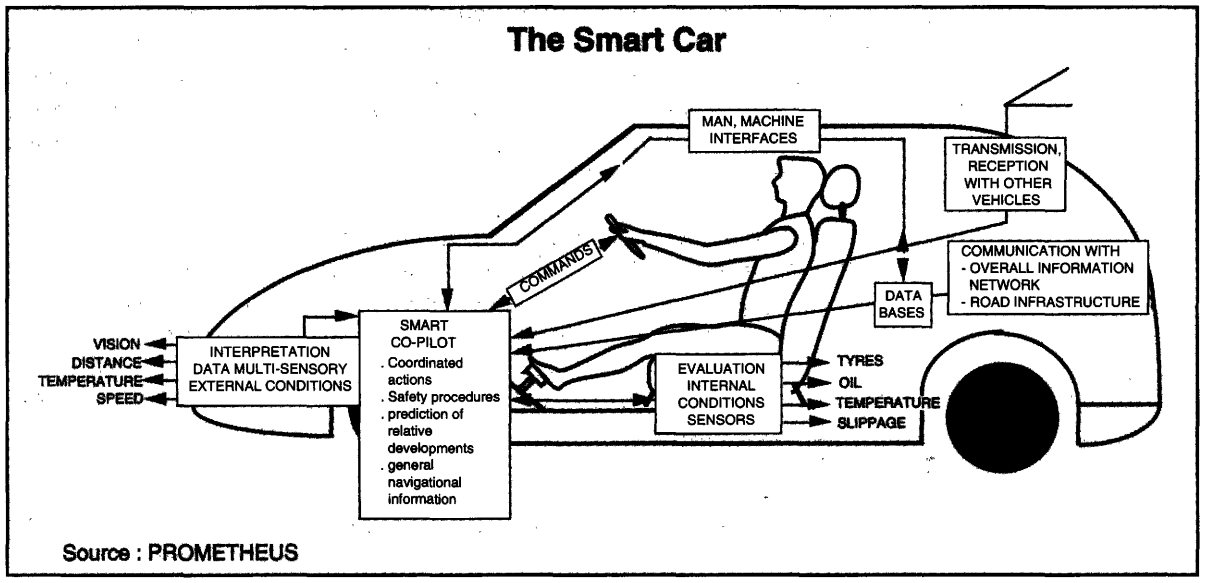
10.3. A new view of traffic

Let there be no mistake, this new dimension in road information raises a major problem above and beyond the hardware: how can the user be given the information he needs in a fully intelligible form?

The urban or suburban environment, where driver reactions are still something of a closed book, is a particularly thorny one since many drivers seem to be very attached to their habitual routes, especially when it comes to the journey between home and work. On medium to long journeys, on the other hand, drivers appear to be more prepared to try something new and to follow the routes suggested.

If the information is going to get to where it is most needed, it is essential to develop a strategy in terms of journeys and not just in terms of traffic. This implies reference to a subjective assessment on the part of the drivers, which will vary depending on the reason for the trip (work, home-to-office, pleasure, weekend, holidays, etc.) and the conditions under which they are travelling (whether or not they are familiar with the route, whether the distance is long or short, how much traffic there is, whether the infrastructure is comfortable or not, the weather, etc.).

This is a challenge to operators: how to evolve a proper teaching method *vis-à-vis* users in order to encourage them to move about within the network, in other words within a space of potential itineraries.



This is a ground-breaking departure in traffic management. It definitely marks a move away from the conventional perception, which was based on half-measures and improvements which were restricted in both time and space terms.

10.4. The need for political clarification

The time has come to specify the role which telematics will be given in tomorrow's road network at the widest level.

No traffic policy offering a high level of service to the user can be drawn up unless a reply is first found to the question of what type of intelligent roads, what type of intelligent vehicles and what type of transport system to put into the equations.

At the end of the day, it is for the public authorities to answer that question.

There are, indeed, a number of unknown quantities:

the role of the public authorities;
the design of the public service provided by the operators;
the role of the users and respect for their individual rights;
the commercial or non-commercial nature of certain services, etc.

In the light of the technological possibilities, it is important for the above clarifications to emerge as soon as possible so as not to delay or complicate the introduction of integrated traffic management systems.

A European plan for introducing such systems would, moreover, appear to be particularly useful. The Group considered the IRIS document carefully.[1]

These will be key questions for the European master plan.

[1] IRIS, 'Integrated road safety, information and navigation system', by the Drive Infrastructure Group, 1992.

10.5. A concerted plan for introducing telematic equipment

In order to ensure that traffic policies achieve maximum efficiency, such a plan should not only allow the number of standards to be reduced but should provide for the coordinated phasing-in of the equipment.

At present, it appears that infrastructure systems should be developed faster in the initial phase than systems of the in-car technology type.

In particular, traffic data collection equipment, traffic control and information systems and demand management systems (including electronic payment) deserve priority and should be planned in the short term on the major routes of the trans-European network.

10.6. A Community objective: integrated traffic management

Some particularly valuable actions can be taken right now in order to promote international traffic management for both light and heavy vehicles.

In countries such as France, Luxembourg, Italy, Spain and Portugal, during the large seasonal migrations which slow down the traffic over hundreds of kilometres, international traffic coming from the north and centre of the Community may account for up to 50% of total traffic, or three times as much as the daily average over the year.

For this reason, a very flexible European traffic management structure based on improved co-ordination between national road traffic authorities should be set up and become operational in the short term to improve management of peak traffic flows.

This would be responsible, for instance, for:

promoting information on the network (choice of routes, recommended routes, regular or occasional traffic hold-ups, forecast peaks, sources of traffic information, toll details, the distribution of rest and service areas, special facilities for long-distance travel and for foreign nationals, the availability of other modes of transport, in particular, links with multimodal interchanges, etc.);

preparing for the interconnection of traffic management systems on the major European roads and of national centres, on the one hand, and the interoperability of national transport policies on the other.

Optimizing travel time

Whatever the length or purpose of a journey, it will be increasingly possible to optimize travel time both for passengers and for hauliers. The steps undertaken so far show that users attach great importance to measures to improve the quality of the service in that field.

- Rest areas are designed to make travelling more pleasant and less tiring for all road users, especially on long journeys. They offer an agreeable atmosphere and rapid service: meals, toilets, children's games, service stations, shops, etc.

  Increasingly, they may also offer special video and telematic services: route advice, hotel, parking area, railway and plane bookings, banking and foreign exchange operations, etc.

  At present there are wide disparities between the various Member States. The French and Italian concessionary networks set what might be taken as the reference standard.

- Professional drivers (of lorries, coaches, taxis, etc.) increasingly enjoy a whole range of specially designed services at these motorway stations: lodging, vehicle maintenance and checks, freight rates, communication by keyboard and screen with their bases and their clients, places for assembling and opening their loads, and sometimes clearing them through customs at the entrances to cities, etc. With a view to optimum integration in the logistic chain, management of fleets by satellite, already practised in the United States, is on the cards.

- For all those, whether in a professional or private capacity, who use not only the roads but also other modes of transport, intermodal exchange complexes will offer ways to ease and rationalize transfers from one means to another. In other words, at the point where one or more roads meet a railway, an airport and/or a river or coastal port, there will be appropriate infrastructures to enable passengers to change from one to the other, handling and transport apparatus for containers and pallets, and parking and storage areas for goods vehicles.

In addition, of course, these complexes will have to have highly sophisticated telecommunications and information systems.

Rest area

Source: SAPRR.

Service area

Source: AISCAT.

III

External factors

Adapting the European network will necessarily require that better account be taken of secondary effects – both positive and negative – which are traditionally so hard to evaluate.

In this respect, the integration of the infrastructure into the environment (negative effect) and spatial development (positive effect) must be optimized.

Roads, traffic and the environment

The Community's roads policy must include a significant environmental component. Roads and road traffic cause substantial damage to the environment in the form of air, soil, and noise pollution and damage to flora and fauna, the landscape and the historical and cultural heritage.

12.1. Limiting the physical impact

Impact assessment for infrastructure or development projects, which embodies a compromise between economic and ecological imperatives, aims to maximize the benefits and minimize the disadvantages.

Legislation on environmental impact assessment goes back no further than the 1970s, even in the most advanced States.

Progress has been made in the design of infrastructure, down to the very road-building techniques, in order to limit the negative effects on the natural surroundings.

At bottom, however, roads remain a source of pollution.

This means that care must be taken to:

integrate roads into the landscape;

limit the effects of cutting up land;

provide sound protection and noise-reducing road surfacing;

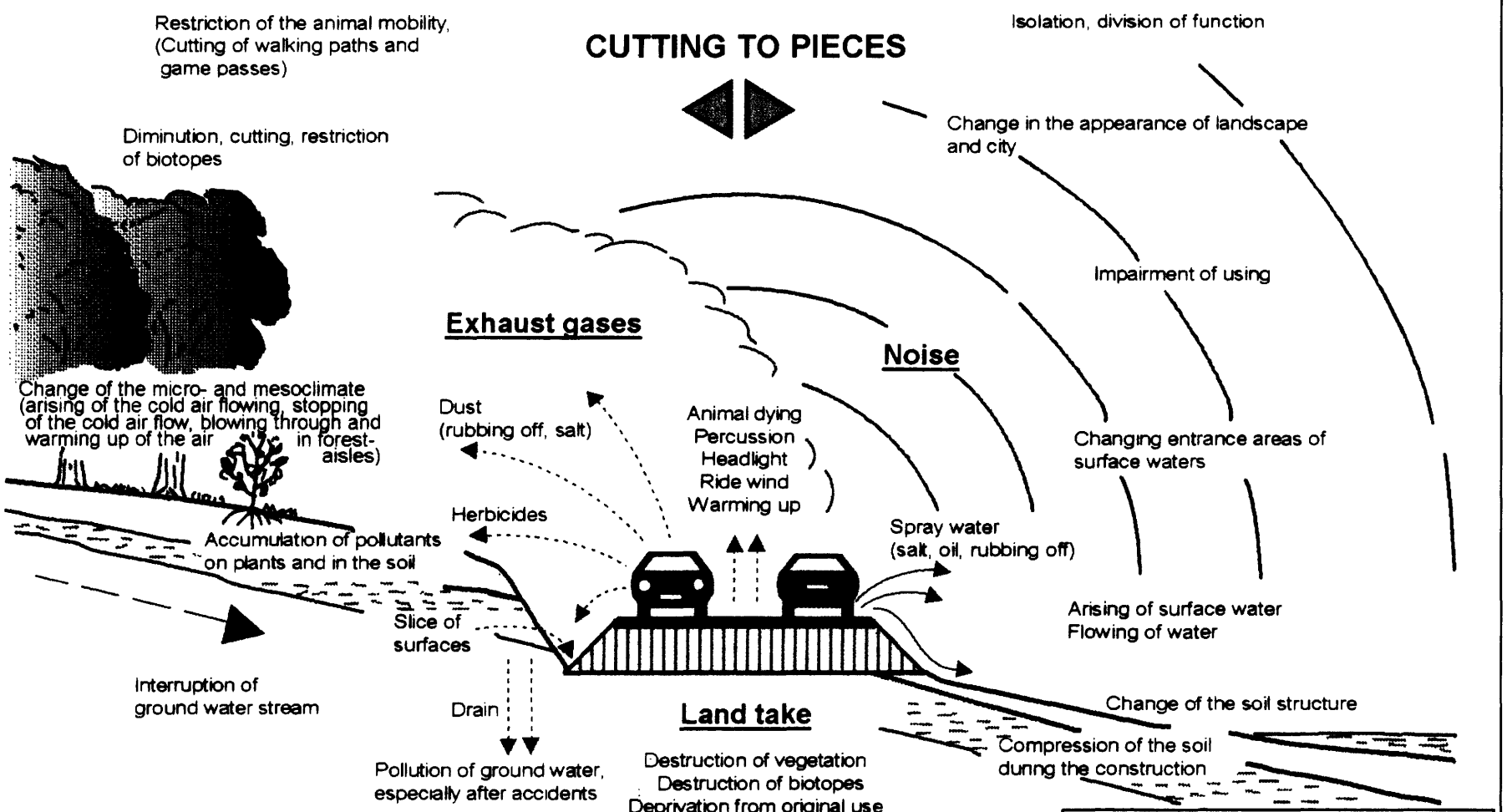
lay on underpasses;

provide appropriate drainage, etc.

In the long run, one should consider tightening up the requirements of Directive 85/337 on the evaluation of the environmental effects of certain private and public projects, in order to achieve a new stage in the development of quality and strictness going beyond the current Community minimum requirement.

This should be reflected in the growth of the share of financing allocated to environmental protection in the budgets for building or upgrading infrastructure.

The Influence of Road and Traffic on the Environment



Source: Planungsgruppe für Umwelt, 1986

12.2. The imperative of air pollution

(a) Local impact

The working group noted that energy consumption is determined by the type of road: the use of infrastructures to which access is controlled via grade-separated junctions means that braking and acceleration are reduced and vehicles can travel at constant speeds, thereby cutting fuel consumption. Using the motorway, for example, enables a heavy goods vehicle to enjoy energy savings of from 10 to 25% over an ordinary road.

Relieving built-up areas of through traffic significantly reduces both air and noise pollution.

Finally, computerized traffic management systems should lead to reductions in gas emissions in urban areas and on very busy roads.

(b) Impact on global pollution

The forecast growth in road traffic over the next 20 to 25 years flies in the face of the Community's strategy on the control of carbon dioxide and the greenhouse effect.

It has not yet been possible to calculate to what extent the trans-European network, and in particular international traffic, will contribute to this growth, but it is unlikely to match urban traffic in this respect.

Technical improvements to vehicles in order to lessen their environmental impact are unlikely to make up for the increased demand for transport. OECD (Organization for Economic Cooperation and Development) projections indicate that catalytic converters and other emission control systems could cause emissions to fall in the period 1990-2000 even if demand continued to rise, but that the impact of growth could be felt again after the year 2000.

There is no technical potential for reducing carbon dioxide emissions due to road traffic at present.

The only way of reducing fuel consumption and carbon dioxide emissions would be to influence transport demand so as to cut the number of kilometres driven and encourage a switch to other means of transport.[1]

The Commission has made initial proposals in a Green Paper on the impact of transport on the environment, with a view to opening up debate on this subject, although of course the economic and social effects of these proposals have yet to be evaluated. Such measures must be compatible with achieving economic efficiency in the Community and respecting the freedom of choice of transport system users.

[1] Doc. SEC(91) 1744, 'A Community strategy to limit carbon dioxide emissions and to improve energy efficiency'.

The trans-European road network and spatial development

13.1. Local level

Roads, and particularly major road infrastructures, constitute a favoured instrument of economic development, and undeniably have far-reaching effects on industrial, technical and service activity. In this connection the organization of the trade system, and especially its density, is particularly important.

However, it does sometimes happen that road constructions give rise to only a small enhancement of territory or serve only slightly to open areas up. Maximizing the value of an infrastructure requires, right from the design stage, an overall logic with respect to local, regional, national, and, increasingly, European development.

This logic must include complex considerations of:

the identity and specific features of the region served;

its economic activity;

urban planning schemes;

local services;

the additional infrastructure implied;

integration into the natural surroundings;

enhancement of the cultural heritage and tourist potential;

balance between urban expansion and rural development.

The communities served by such facilities thus have responsibility for making the best use of the roads and organizing the best possible networks of feeder roads around them.

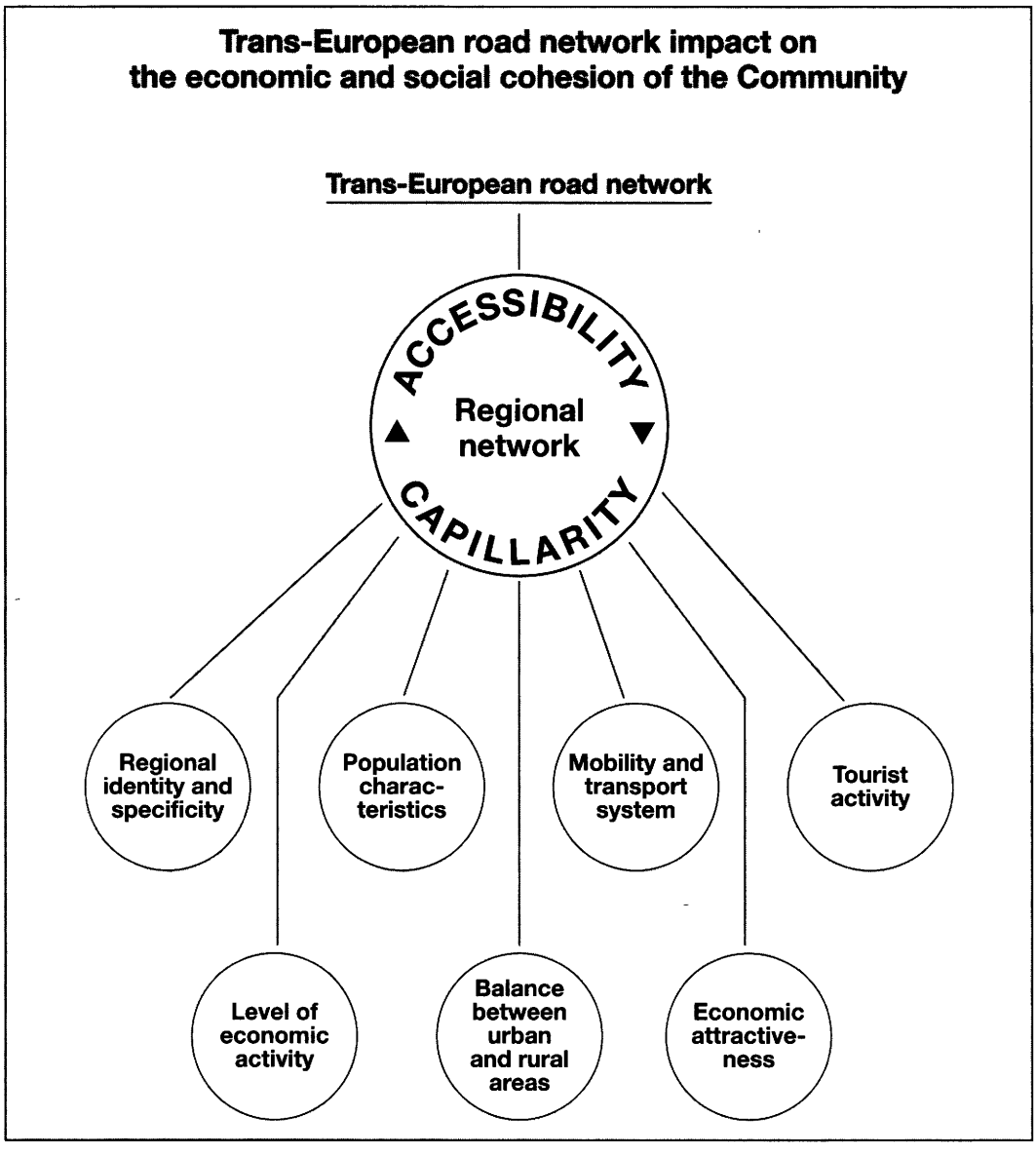
13.2. European level

It is increasingly becoming clear that the Community must act in unison to bring about a more balanced transport system to offer all its citizens and economic agents a consistently high level of service whatever their geographical location.

In particular, a dense network of motorways well connected to the local networks and to other means of transport will allow outlying regions and those which are still cut off to benefit from improved accessibility and to integrate, as the Commission pointed out in its communication on the prospects for the development of the Community territory.[1]

[1] Doc. COM(91) 452, 'Europe 2000: Outlook for the development of the Community's territory'.

In the long term, seen in this light, the road network will be a dynamic vector of homogeneous development between the centre and the regions of the Atlantic coast, the Eastern and Western Mediterranean, the Alps, Scandinavia, the Baltic, and Central and Eastern Europe.



IV

Financing

Financing requirements

14.1. The crisis in infrastructure financing

The objectives of completing the trans-European network, strengthening economic and social cohesion, stepping up the level of service to the user and taking better account of external factors raise questions about the financial resources available to promote them.

Investment in the construction, running and maintenance of roads currently runs at ECU 40 thousand million per year, of which 55% is spent on the construction of new roads. These figures are conventionally regarded as underestimates.[1]

As is the case with other transport networks, total investment allocated to the road network is insufficient compared with its needs and the level of mobility.

Investment fell by 2.8% per year over the period 1975-85, and increased by 6.3% over the period 1985-89. The 1989 level barely matched that of 1975, although goods traffic in that period increased by 3.8% per year and passenger transport by 2.5%. Although each country is more or less an individual case, the lack of finance nevertheless goes some way towards explaining the worsening traffic conditions and the persistence of missing links.

More should be invested in this field, in particular investment should be more closely aligned with trends in GDP.

14.2. Financing requirements of the master plan

Preliminary work on the master plan for the trans-European road network was not aimed at drawing up a balance of financing requirements.

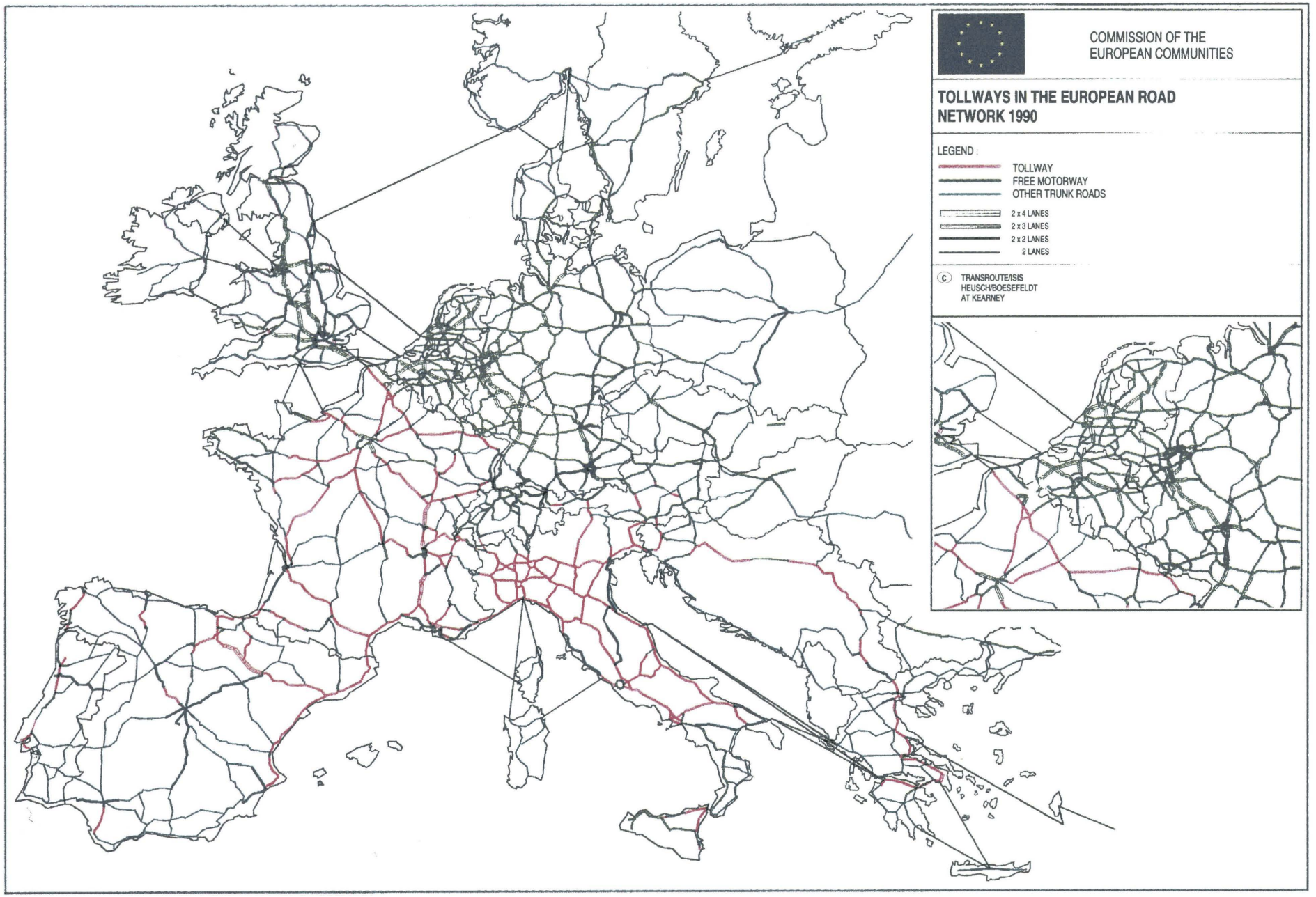
However, initial estimates put the cost of the plan at some ECU 120 thousand million.

This initial estimate for the period 1992-2002 covers the following investment projects:

completing the proposed network plan (investments in EC only), enlargements and major urban bypasses;
introducing measures to curb the physical impact of the infrastructure on the environment;
introducing modern road equipment;
developing policies for traffic management and improving services to users;
setting up interconnections with other major transport networks.

Are traditional means of financing sufficient to meet these financing requirements?

[1] Development in transport infrastructure investment in ECMT countries in the 1980s, ECMT, 1991.


COMMISSION OF THE
EUROPEAN COMMUNITIES
TOLLWAYS IN THE EUROPEAN ROAD NETWORK 1990
LEGEND :
TOLLWAY
FREE MOTORWAY
OTHER TRUNK ROADS
2 x 4 LANES
2 x 3 LANES
2 x 2 LANES
2 LANES
© TRANSROUTE/ISIS
HEUSCH/BOESEFELDT
AT KEARNEY

14.3. Traditional financing methods

To meet this need for finance, public authorities can either increase the budget resources devoted to the road network, or allocate at least a small part, if not more, of the taxes levied on traffic, cars and fuel to the implementation of road policies, or else encourage alternative funding involving the introduction of tolls. Such mechanisms could, of course, be run side by side.

With budgetary constraints in the public sector being particularly heavy, it is illusory to rely just on them.

On the other hand, demands on indirect beneficiaries could be stepped up with a view to the constitution of a permanent fund for the road infrastructure.

Recourse to alternative financing is another way of achieving the desired result: this has become widespread in five Community States (Spain, France, Italy, Portugal and Greece), where tolls have become the norm, with 40% of the Community's motorway network now being subject to tolls. It is worth noting that the current scale of tolls varies considerably from country to country.

A certain number of large road structures, such as bridges and tunnels, have also been financed through recourse to capital markets: the Mont-Blanc, St Bernard and Fréjus tunnels in the Alps, the Cadi Pyrenean tunnel, the tunnel under the Schelde at Antwerp, the Tancarville bridge over the estuary of the Seine, the Dartford bridge over the Thames, a bridge on the Dublin ring road, etc. Other projects are in hand: the bridge over the Great Belt, the Birmingham ring road, the Severn bridge, the Normandy bridge and the Puymorens tunnel. In France, some urban toll routes are being constructed (e.g. Marseilles, Lyons).

This demonstrates the extent to which it is worth attracting the users direct to finance the infrastructure.

Toll Rates per km in 1989 for SECAP Countries in ECU Cents

	Light Vehicles	Heavy Vehicles	HV/LV Ratio
Greece	0.5	1.1	2.20
Spain	7.3	15.2	2.08
France	4.6	9.6	2.09
Italy	4.6	11.0	2.37
Portugal	3.6	9.2	2.56
Austria	11.8	42.9	3.64
Yugoslavia	1.2 (5)*	7.5 (29.9)*	6.25 (5.98)*
Average (6)	5.4	14.8	2.74

(*) Higher rate for foreign vehicles in Yugoslavia.

Source : SECAP, 1991

Overhauling the financing of infrastructure

It is likely that the system of financing the road infrastructure will be overhauled, partly on account of trends in transport costs and partly because of the need for greater mobilization of financial capacity.

15.1. The price of transport and its new functions

The trend towards higher transport costs, whether by means of taxation or through tolls, as a means of internalizing external costs and regulating road traffic, is likely to mean a reshuffle of the financing system. New financial resources will be unlocked.

The share of transport prices related to internalizing external costs (which remain hard to quantify) would enable the negative impact of the infrastructure on the environment to be offset as far as possible and action on this to be developed in a more systematic way.

The share of transport prices related to regulating mobility should be allocated to optimizing the transport system.

Obviously, these broad outlines must be opened up for discussion, and they must be compatible with the objective of harmonizing the costs of using road infrastructure in the Community.

15.2. Wider mobilization of financial capacity

Although private investment in the road infrastructure, whether with or without any risk on the investor's part, is still the exception today, it will need to become more widespread. This technique is particularly suited to meeting contemporary financing requirements and mobilizing savings both within and outside the Community.

It offers the further advantage of better incorporating the principle that the user pays, a key concept for the smooth development of road mobility in Europe.

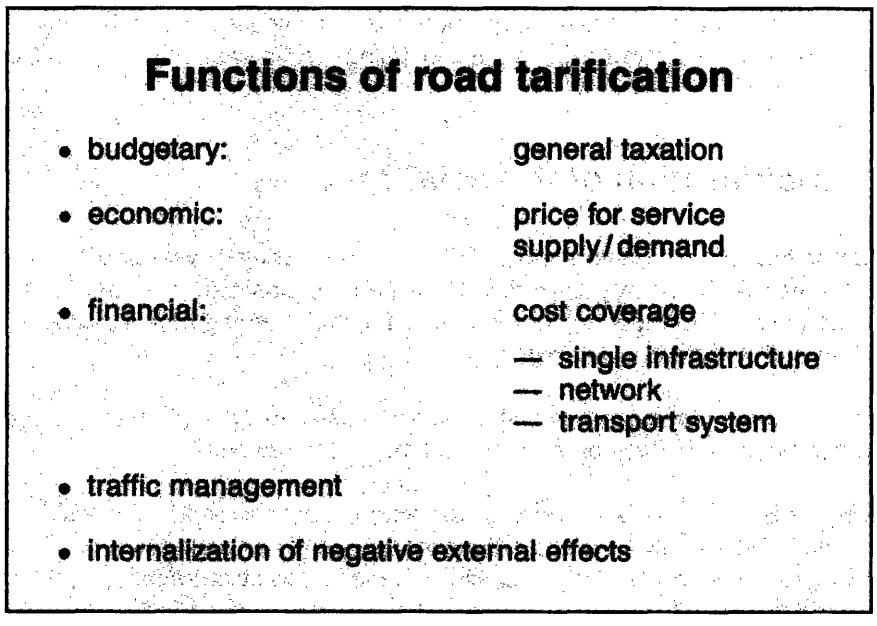
Financial packages, which are generally based on concessions for construction, maintenance and operation, may involve a greater or lesser degree of risk on the part of the concessionaire. The decision whether to take on the risk will of course largely be determined by the financial return.

The risk is relatively limited when the concessionaire obtains financial guarantees from the State or local authorities. More often than not, toll motorways have been constructed in this way.

On the other hand, the risk may be unlimited when no guarantee is given to the concessionaire; this is pure private financing, which warrants a fair reward for the risk being taken. The question of setting tariffs is particularly tricky in this context, whether it is done by the contracting authority or the concessionaire.

The option of mixed financing, i.e. financing involving private investment and public subsidies from local or national authorities or the Community (in the form of direct grants or interest subsidies) should not be rejected out of hand. Mixed financing should constitute a suitable arrangement to meet the need for very costly road projects, such as roads crossing mountain ranges or sea inlets, motorways in awkward terrain or those unlikely to be heavily used. The countries of Central and Eastern Europe are also looking very closely at this type of idea.

Imposing tolls on users may seem quite inappropriate in certain countries, but the concession system is sufficiently flexible to allow public authorities, and in particular the State, rather than the user directly, to bear responsibility for reimbursing the costs of construction and financing. This kind of system could be used for example in Germany to promote infrastructure financing in the new *Länder.*



Conclusion

The modernization of the motorway network and its integration into the European Economic Area is of crucial importance for the European transport system.

The Community needs to set itself consistent and concrete objectives in this connection. In other words, it has to adopt an overall road policy which is perfectly integrated into the common transport policy and its objectives with regard to the environment and spatial development.

The justification for the proposal of a master plan for the road network and traffic, setting out guidelines for joint action, lies within this framework.

This undertaking will allow the Community to face up to the challenge before it: that of ensuring a modern, integrated road system underpinning the harmonious promotion of mobility in the transport system throughout the continent of Europe.

Annex 1

Pilot projects under way in Drive II on motorways and in cities

In the CEC R&D programme Drive II (1992-94), several pilot projects in the field of road transport telematics are under way in order to validate the basic R&D results and to prepare the full-scale implementation of these systems in Europe.

1. Pilot Projects on motorways

1.1. Applications considered

A considerable number of pilot projects have been launched on European motorway corridors dealing with a multitude of applications making use in one way or another of advanced road transport telematics systems. Among the most interesting applications should be mentioned:

the provision to all road users of attractive, user friendly, affordable and reliable traffic and travel information, trip planning and route navigation/guidance tools;

the integration and verification of promising road transport telematics systems and evaluation of their impact on safety and efficiency, such as automatic incident detection, road condition monitoring, image processing techniques, variable message signs, weight in motion, etc.;

the demonstration of the possibilities to prevent or reduce incident delays by fast and adequate emergency handling and congestion delays by integrated and automatic traffic control systems;

better communication with and services to the driver such as a pan-European automatic debiting system for toll motorways;

organization of the interchange of significant traffic information between the traffic authorities in different European countries;

development of traffic control strategies (e.g. re-routeing, ramp metering plans, etc.)

1.2. Project descriptions

Pleiades (UK + F + B): demonstration of an integrated driver information and network management system in the Paris-London corridor.

Melyssa (F + D): test site is the motorway corridor between Stuttgart and Lyons with its extension to Spain. Applications envisaged: interconnection of traffic control centres, pre-trip, at-stop and on-trip information, dual mode route guidance, integrated network management.

Portico (P): surveillance of hazardous goods vehicles, driver information and early warning system, including incident detection and integrated automatic debiting combined with overload detection system (weight in motion).

Quo Vadis (UK + DK): traffic modelling and variable message signs strategies (VMS).

Artis (E): Pilot project on the Junguera-Seville corridor dealing with travel and traffic information, knowledge-based intelligent traffic control, automatic incident detection using artificial vision techniques, variable message signs operated via radio data system-traffic message channel (RDS-TMC) and dangerous goods control.

Gerdien (NL): development of a coherent network in the Netherlands for road traffic data collection and exchange.

Rhapit (D): improvement of the powerful traffic management system in the Rhine-Main area via a dynamic route guidance system and interfacing the motorway traffic management system with public transport in the urban area of Frankfurt.

Roses (NL + UK): fully integrated road and weather monitoring system implemented on two pilot test sites (the Netherlands and Wales) and in a test vehicle.

ADS (F + I + GR): automatic debiting, multilane non-stop payment, multimodal information exchange for advanced ferry booking.

Euro-Triange (B + D): feasibility study for establishing integrated traffic control and information systems along corridors linking Flanders, Wallonia and North Rhine-Westphalia. Main applications: image processing, incident handling, interconnection of control centres.

Gemini (E + F + I): development of an integrated driver information system focusing on the use of the radio data system-traffic message channel and variable message signs.

Accept (D + F + NL): testing of RDS-TMC cross-border (Dutch Rhine corridor + German Bevei project) and in an urban environment (Île-de-France).

2. Pilot projects in cities

Five Drive projects involve pilots in 19 principal European cities. However, the cities represented in the Drive II projects are not limited to these – no less than 10 other cities are represented to a lesser extent.

2.1. Applications considered

In those five projects there is a wide coverage of applications of road transport telematics. Each of the projects emphasizes different aspects; however the most important applications are:

the improvements that can be made in the organization and implementation of traffic control techniques both resulting from the continuing improvements in road transport informatics (RTI), and from the realization of the benefits to be gained from combining or integrating control strategies which currently exist side by side;

the increased availability of accurate and up-to-date travel and traffic information covering all modes of transport will bring efficiencies in the use of road space. Travellers, and system users in general will increasingly be able to plan their routes, choose their travel times and most appropriate parking locations. Pre-trip information will enable better decisions on choice of mode (public and private) of transport to be made. Route guidance systems as well as information systems will both benefit from the spread of GSM and other improved communications channels;

the technological advances in electronic payment systems including multi-use, multi-service smart cards will allow payment for services such as parking, public transport and road tolls to be paid for through automatic debiting and without personal identification where this is necessary. These developments mean that more acceptable demand management schemes can be evolved for our city centres.

the efficiency of public transport scheduling and information will provide services which are more integrated and related to user needs.

The nature of urban problems is that in general they are the same as those between cities and in suburban areas, but of greater intensity.

2.2. Project descriptions

The cities involved in the five major projects are:

Quartet: advanced research on telematics for environment and transport

Athens: environmental control, pollution, route guidance;
Birmingham: public transport management and information, traffic and travel information;
Stuttgart: emergency call systems, dynamic and dual route guidance, traffic travel information;
Turin: integrated road transport environment (IRTE) architectures.

Gaudi: generalized and advanced urban debiting innovation

Barcelona: central zone access control, information systems;
Bologna: public transport mangement, access control;
Dublin: payment card standardization, public transport;
Marseille: multi-service smart cards, public transport, information systems;
Trondheim: automatic debiting, multi-servicing;
Rome: central access control.

LLAMD: London, Lyons, Amsterdam, Munich and Dublin

Amsterdam: dynamic route guidance, information systems;
Dublin: accident data response, impact of route guidance;
London: radio-based dynamic route guidance;
Lyons: public transport information, integration of urban and interurban data;
Munich: integration of information services, with emphasis on public transport.

Scope: applications of ATT in Southampton, Cologne and Piraeus

Cologne: strategic information linked to transport planning and traffic control;
Piraeus: coordinated traffic management;
Southampton: route and mode choice information and advanced traffic control.

Cities: cooperation for integrated traffic management and information

Brussels: traffic control, travel and traffic information – RDS-TA;
Göteborg: travel and traffic information, dual mode route guidance;
Paris/Île de France: travel and traffic information, Carminat, traffic control, interactive public transport.

Cities participating to a lesser extent are: in Belgium – Antwerp (Invaid II); in Germany – Bremen, Bochum and Hamburg (Astra) and Berlin (Liaison Berlin); in Denmark – Helsingor (Astra); in Spain – Madrid (Artis); in Portugal – Lisbon (Adept); in Greece – Thessaloniki (Adept); and in the United Kingdom, Leeds (Primavera).

3. Pilot projects on freight transport operation

The projects dealing with freight transport operation can be split into two groups, a group dealing with problems related to general freight operation and management, and a second group focusing on the specific problems related with the transport of hazardous goods.

3.1. Applications

The projects concentrate on the following applications:

advanced information and telecommunications techniques for freight operation with major emphasis on the use of mobile communications (radio, satellite, cellular radio, microwave, tagging) and the access to information services (EDI) and/or databases (traffic information, hazardous goods database, etc.);

integration of the three levels in management and operations of a fleet of vehicles operating on a European-wide scale;

information services for intermodal transport operations using automatic tracing of cargos;

hazardous goods transport monitoring, considering the requirements of both transport operators and road authorities.

Although the demonstrations focus on long-distance transport, the needs of urban and regional delivery services as part of the whole transport chain are also demonstrated. For this reason a strong relation with the other pilot projects (urban and interurban) is established.

3.2. Project descriptions

Combicom: road/rail information system for status reporting of combined traffic units (swap bodies or containers). Test site: railway link – München-Kufstein-Brenner-Verona.

Frame: control and monitoring of hazardous goods shipments both on land and maritime crossings. Test sites: Welsh corridor and the crossing to Ireland, remote terminal operation between the Netherlands and Greece (perishable goods monitoring).

Citra: integrated monitoring and control system to optimize hazardous/dangerous goods transport. Test site: Alpine crossing (D + A + I).

Metafora: Mobile data communications (MDC) and electronic data interchange (EDI); application of road transport informatics in small and medium enterprises (SMEs). Test site: 11 pilot tests on alternative routes between north-west Europe and Greece.

IFMS: open systems architecture specification for computer-aided and integrated transport (OSA-CAIT). Test site: N-S European motorways, France and Spain, Alpine crossing. Active participation of the terminal of Bremen.

Cooperation is established with the Melyssa, Pleiades, Rhapit, Artis and Portico projects as test sites for the above applications.

Annex 2

Composition of the Motorway Working Group

Composition of the Motorway Working Group

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