THE SOCIO-ECONOMIC BENEFITS OF ROADS IN EUROPE

IRF RESEARCH COUNCIL

Roads boost the economy

Roads and sustainable development: setting the record straight

Efficent road infrastructure is what people want

November 2007 edition

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Foreword

All roads lead to Rome...but only seven or so railways go there. A good road network gives people the gift of flexible mobility. It as a source of wealth for society and for men. Roads are also a source of well being, bringing people together from a small village to a large city.

Yet we often tend to take our mobility for granted and just keep on demanding for a faster, cleaner, safer, cheaper – and bigger and smaller at the same time – transportation without actually giving a thought on how it is done.

In my work as an MEP I meet every day people who, with good thoughts and high hopes, want to shift the transport from roads to, for example, railways, in order to make our environment cleaner. To save our planet, they say. Well, who wouldn't save the planet, but in the end of the day, with that kind of modal shift you save only the day of a railway trade unionist.

Modal shift costs more than our societies can afford (the vast majority of the world's population lives in poverty!), and in real terms it gives no relief to our burdened transport system. To bring down greenhouse gas levels, for example, it would be much cheaper and enormously more effective to open the bottlenecks of our road network. Even the Romans realised that good access is needed in order to foster growth and prosperity – now, in 2007, governments seem to be considering freezing the building of motorways and vital infrastructure as a possible solution!

The value of our road network will only increase in the future due to the enormous advantages yielded by the Galileo navigation system. As a matter of fact Europeans are already favouring roads as their preferred mode of transport, as outlined by various Eurobarometer surveys. This is why it is my utmost pleasure to welcome the publication of the updated edition of "**The Socio-Economic Benefits of Roads in Europe**", which offers its readers a pleasant and informative insight on a key sector of the European economy. May the debate continue and may the best arguments win!

Ari Vatanen
Member of the European Parliament

Introduction

Throughout history it is important discoveries and technological developments which have allowed mankind to leap forward, ameliorating its status and improving its standards of living. Reaching back thousands of years, the invention of the wheel generated a revolution comparable only to the invention of the steam engine which sparked the industrial revolution. In a similar fashion, it was the engineering feats of the Roman Empire, which allowed them to reach the furthest corners of Europe. Their roads, originally built for the fast deployment of legions, allowed citizens from all over Western Europe to have a better access to economic centres, thus enlarging the potential market for goods and services.

It is significant to note, in light of the examples mentioned above, that road infrastructure has always played a key role in the progress and economic growth of a nation, both through the direct effects of a higher mobility for citizens and goods and also via the indirect benefits derived from the process of building infrastructure.

In an enlarged European Union of 27 nations and with a population touching the 500 million mark, however, it is of paramount importance to understand the vital link between roads and their socio-economic benefits as a basis for fact-based policies. The Socio-Economic Benefits of Roads in Europe seeks to fill this knowledge gap by offering an insight into the enormous benefits generated at all levels of society by road infrastructure and how technological advancement, forward looking policies and the implementation of Intelligent Transport Systems (ITS) can contribute to achieve a safe, efficient and reliable road transport system.

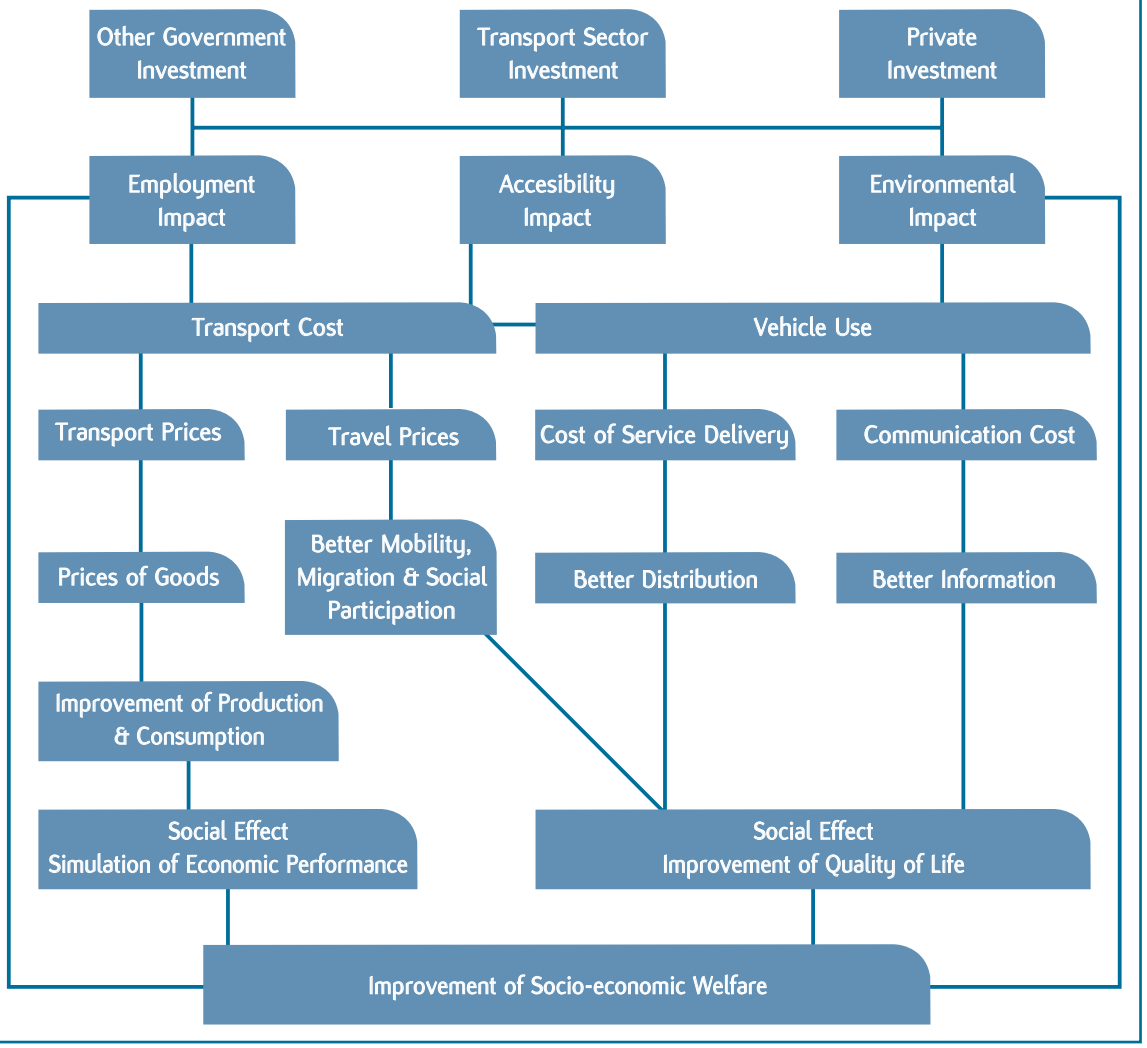
As a global player, it is the EU's role to lead the way and set the example for the rest of the world by adopting policies which reflect the considerable importance of road transport for society. Planning, building and maintaining a road infrastructure which meets the needs of the consumer, in fact, represents the key step leading to important socio-economic improvements. Europe cannot miss on this occasion to take the lead in a sector which has already proved it can multiply the effects of every Euro invested and yield benefits to society as a whole.

1) Roads boost the economy

The economic impact of roads and road transport-related sectors on the European economy is, as this study will demonstrate, tremendous. The economic and social indicators studied demonstrate the absolute importance of this sector for the European continent.

Even without taking into account and measuring in monetary terms the consumption/benefits of transport services internalised within large corporations, road transport-related turnover and employment levels in the road sector make it unquestionably one of the most important sectors in Europe today. Moreover, a fact that is not captured by official data on the road sector published by European institutions is that when figures of the indirect employment in road transport-related professions, such as insurance and logistics, are added, the employment levels of the sector go up significantly.

Economic contributions and social functions of road transport investments



Source: Louis Berger International, Inc., "Study of Transport Investment on Distribution of Income in Remote Areas: Phase I, A report prepared for the United States Agency for International Development", 1979

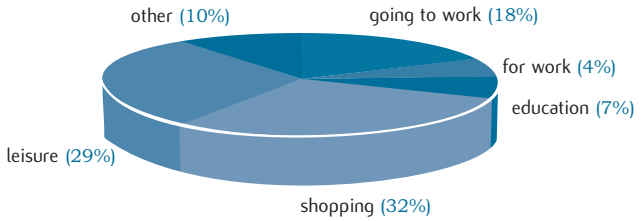
A. Demand for transport

I. Who uses the roads and why?

The demand for road transport originates from different categories of users, ranging from passenger cars & trucks to motorcycles, bicycles and passenger buses, depending on the purpose of travel.

Figures for the United Kingdom suggest that individual car travel is used primarily for shopping, leisure and going to work, with an average of 641 car journeys per person every year. In the 19th century, an average European travelled about 20 km a year, whilst today this figure is 20 km a day[1]. These data explain why access to a car is essential for the majority of people and why car ownership per 1,000 inhabitants has more than doubled since 1970.

Car trip purpose



Source: DTLR, October 2001

The demand for freight traffic originates first from the purchase of goods and services by end users, which require the transfer of raw materials to the manufacturing site, followed by the distribution of products from the manufacturing site to the final point of use via the point of sale. Many sectors strongly depend on road networks, with considerable assets invested in vehicles, petrol, food, logistics, road haulage transport, etc.

Case Study: Nokia

For a company like Nokia, which owns seven manufacturing plants and operates seven days per week, turning out seven telephone sets every second, with each phone comprising of more than 200 components, it is easy to understand why logistics is one of Nokia's key priorities.

Road transport is at the heart of the company's efficient operations as it provides the means to deliver 54% of materials to Nokia's EU-based plants (97 tonnes/day) and to export 60% of the finished goods. The unquestionable advantage of road freight is that manufactured phones can be collated onto pallets and located directly onto trucks waiting at the end of the manufacturing line. This allows Nokia to reduce its storage costs to the absolute minimum.

Source: "Logistics as a Competitive Advantage", speech by Lauri Kivinen, Vice-President, Nokia Corporation, Brussels, 12 July 2005

[1] "Mobility for All", Fédération Internationale de l'Automobile (FIA), 2002

II. What is transported and where?

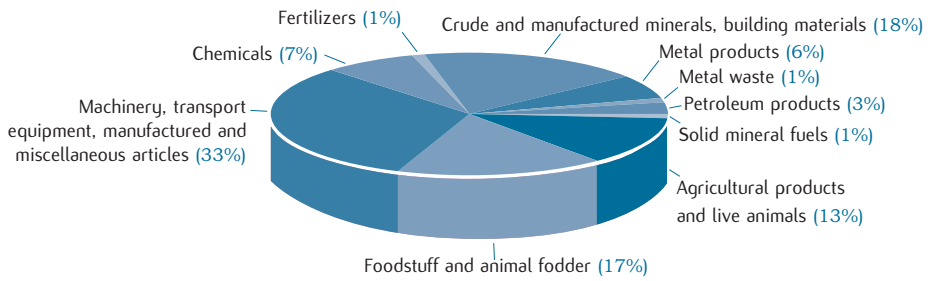
Wealth creation and distribution has always been at the backbone of economic growth. To achieve these goals, it is essential to own the means of transportation that permit the intensification and internationalization of the exchange of goods and services.

The principal mission of the road freight industry is to provide distribution, logistics and physical transport services. Transport can be done on its own account, for instance between different sites of the same company (often excluded from official statistics), and for the benefit of clients. Freight transport plays a key role in the economy, especially in market integration, and has direct impact upon the costs of transactions between economic agents.

Within the transport sector and even despite the limitations of the official statistics, road transport's market share is the largest and keeps increasing with a 47% growth forecast between 2001 and 2010. In the industrialised countries, trucks carry nearly 80% of all goods measured by tonne-km (tkm). This means that every single day trucks deliver 70 kg of goods to each citizen[2].

Not only do roads carry a higher share of inland freight than other modes of transport, but also the average value of the cargo transported is higher. An average road cargo is valued, in fact, at EUR 1,674 per tonne, compared to EUR 924 per tonne for rail freight and EUR 87 per tonne for inland waterway traffic.

Share by type of goods in EU 15 road freight transport - 2003 (tkm)



Source: "European Road Statistics 2007", European Union Road Federation (ERF), June 2007

[2] "Industry as a Partner for Sustainable Development", International Road Transport Union (IRU), 2002

Road transport accounts for about 44% of all the freight moved within the European Union according to the most recent statistics on the subject.[3]

Furthermore road transport plays a vital role in satisfying the mobility needs of European citizens, allowing them unlimited and unrestricted access to the continent's furthermost regions, a fact which is frequently overlooked when computing the overall contributing values for the sector, but which nonetheless significantly contributes to its social aspect.

Quantity does not mean quality

Most official statistics measure freight volumes in tonne-kilometres (tkm). Tkm measurements were introduced as measurements capturing economic value in an economy in which volume and value were intrinsically linked. This is still the case with bulk goods, which are traded in volume, such as raw materials.

From an economic point of view it is crucial to know the value of a transport operation. The value of the goods transported is irrelevant if transport value is measured in tkm. For instance, the cost and congestion implications of forwarding a load of 25 tonnes by one heavy truck for a distance of 100 kilometres cannot be compared with forwarding 100 loads of 250 kilos using commercial vans over a distance of 100 kilometres. And yet in tonnes/kilometres they are equal.

Source: "A different approach to transport data collection at European level", ERF Position Paper, March 2000

[3] "Energy and Transport in Figures", European Commission, 2006

B. ECONOMIC ASPECTS

I. Roads, productivity, turnover & employment

Road transport has greatly contributed to shaping Europe's economies by enabling the emergence of a modern supply chain management. It remains today a key element for many European businesses which seek to gain a competitive edge over their rivals.

Road freight companies themselves have developed considerably during the last decades, becoming one of the largest job creators of Europe's economy, accounting for 43,000 companies and 318,000 jobs (representing 1.9% of private sector employment) in France alone.

The global impact of road transport on the economy is more than considerable. In 2005, the estimated revenues of the road sector in the EU 25 stood at EUR 2,290.4 billion, a figure equivalent approximately to 22% of the EU 25 GDP. As many as fifteen million EU citizens work directly or indirectly for the road sector (automotive suppliers, petrol industry, car insurance companies, etc.), representing approximately 5% of the total EU 25 workforce. The table below offers a more detailed analysis into the economic relevance of the road transport sector in the European Union.

Economic importance of road transport in EU 25

	Turnover (EUR bn)	Value Added (EUR bn)	Employment (million people)	Employment (% of total)
Automotive Manufacturing (Motor Vehicles, Trailers, Semi-Trailers, Powered Two Wheelers and Bicycles)	749	130.4	3.05	1.03
Motor Parts Manufacturing, Accessories, Maintenance, Repair and Sale of Motor Vehicles, Parts and Accessories	959.64	129.57	3.37	1.14
Fuel Retail	141	11.59	0.44	0.1
Road Transport (Freight Transport, Public Transport, Own Account)	310	130	4.2	1.4
Road Construction and Maintenance	115.2	39.7	3.8	0.4
Motorway Operators	15.57	2.86	0.07	0.02
Total Road Sector	2,290.41	444.08	14.93	5.07

Source: "European Road Statistics 2007", European Union Road Federation (ERF), June 2007

II. Economic impact of road construction

Road construction activities themselves generate significant economic growth. The European figures on road transport confirm this statement. According to a nation-wide report commissioned by the French Senate[4] in 1995, an investment of EUR 150 million in roads creates on average some 3,240 jobs, of which 1,210 are directly related to the road construction works, while 575 are linked to the activities undertaken prior to the construction, and 660 are directly related to the production of construction materials in addition to 800 jobs resulting from construction-related investment revenues.

In turn, the American Federal Highways Agency (FWHA)[5] estimates that every USD 1 billion of highway investments generates 44,709 full-time jobs, of which 8,390 are directly related to road construction, while 20,924 are in support industries and 15,395 in the industries benefiting from direct or indirect employment in the service sector.

Furthermore, the French Road Industry Syndicate (USIRF)[6] estimated that Brittany's road development programme which ran from 1968-1982 had led to a growth in non-agricultural jobs by 30% (against 16% nation-wide), During the same period, the population growth rate increased six-fold against the national average. USIRF also measured the jobs created and maintained for every kilometre construction of the A10 motorway between the cities of Chatellerault and Saint-André de Cuzbac[7].

	Number of jobs	Jobs per km.
Motorway staff	310	1.1
Gendarmerie	142	0.5
Catering	229	0.8
Service stations	153	0.6
Subcontracting	300	1.06
Total	1134	4.06

Source: "Le rôle de la route dans le développement économique", Union des Syndicats de l'Industrie Routière (USIRF), 2002

According to the European Investment Bank's (EIB) 2002 study "Contribution of Major Road and Rail Infrastructure Projects to European Development", out of 14 road infrastructure construction projects, ten had a Return on Investment (ROI) of at least 13% and only one resulted in a net loss. Whereas, out of five rail infrastructure construction projects, with one exception, the ROI rate ranged between 0% and 4%.

[4] "Le financement des infrastructures de transport", J-P. Oudin, Report to the French Senate, Paris, 2000
[5] "FAQs about highway and the economy", US Federal Highway Agency (FWHA), 2004
[6] "Le rôle de la route dans le développement économique", Union des Syndicats de l'Industrie Routière (USIRF), 2002
[7] Ibid.

Case Study: PRN 2000

PRN 2000 was the Portuguese Government's programme to develop a "Strategic Road Network" (main axes linking with cities, ports, airports and frontier zones) and a "Complementary Network" establishing links between the main regional urban centres, ring roads and access to the metropolitan areas of Lisbon and Porto.

The London School of Economics measured how spending on infrastructure development impacted employment levels and regional economies. The conclusion was that over a four-year period, 18 major cities collectively invested EUR 1.82 billion in their roads with a measured impact on employment growth ranging from 0.3% to 1.8%.

Source: PRN 2000, Research Project & Study by the London School of Economics, 2000

III. Fiscal impact of road transport

Road transport represents one the largest single items in national budgets. In 2002 the European Commission released a report on vehicle taxation in the EU 15,[8] which indicated that vehicle-related taxes represented up to 10.2% of the total fiscal income of some EU Member States.

These taxes negatively affect both the consumers' wallets as well as the car manufacturing, construction and insurance sectors, to name but a few. The ACEA Tax Guide[9] estimates that for 2007 the total amount of fiscal revenue for the road sector in the EU 15 will be roughly equivalent to EUR 360 billion, as can be seen from the table below.

Motor vehicle tax revenue in EU 15 - 2007 (EUR billion)

	AT	BE	DK	DE	ES	FR	EL	IE	IT	NL	PT	FI	SE	UK
	€ bn 2004	€ bn 2004	DKK bn 2005	€ bn 2005	€ bn 2005	€ bn 2005	€ bn 2005	€ bn 2005	€ bn 2004	€ bn 2003	€ bn 2005	€ bn 2004	SEK bn 2006	£ bn 2005
Purchase or transfer VAT on vehicles, servicing/ repair parts, tyres	2.14	4.29	n.a	25	5.87	12.47	n.a	0.06	19.34	2.03	1.28	1.25	15	12.83
New vehicles sales	n.a	1.17	n.a	18.2	3.53	7.07	n.a	n.a	n.a	0.74	n.a	0.75	n.a	n.a
Second hand vehicles sales	n.a	0.07	n.a	2.03	0.07	0.61	n.a	n.a	n.a	0.08	n.a	n.a	n.a	n.a
Services and repair+tyres	n.a	1.41	n.a	3.55	n.a	4.78	n.a	n.a	n.a	1.2	n.a	0.49	n.a	n.a
Accessories and spare parts	n.a	0.86	n.a	1.22	2.26	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Fuels & Lubricants	4.27	5.76	14.77	41.1	16.8	37.08	2.35	2.33	32.33	5.85	3.42	3.07	46.6	23.34
Sales & registration taxes	0.44	0.31	21.1	n.a	1.37	1.53	0.87	1.71	2.06	2.87	1.21	1.31	n.a	n.a
Annual ownership	1.4	1.46	8.69	8.67	2.16	1.2	0.7	0.8	5.5	2.1	0.13	0.51	10.7	4.87
Driving license fees taxes	n.a	0.01	n.a	0.06	0.07	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	0.07
Insurance taxes	0.28	0.44	2.04	3.3	0.69	4.05	n.a	n.a	4.3	n.a	n.a	0.21	n.a	n.a
Tolls	1.21	n.a	0.45	n.a	n.a	7.66	n.a	0.03	1.05	n.a	n.a	n.a	n.a	n.a
Customs duties	n.a	0.09	n.a	0.44	n.a	n.a	n.a	n.a	n.a	n.a	0.11	n.a	n.a	n.a
Other taxes	0.55	0.52	n.a	0.28	0.35	1.26	0.01	0.13	n.a	0.1	0.08	n.a	6.5	3.7
TOTAL	10.3	12.15	47.07	78.9	27.34	60.3	3.95	5.08	64.6	12.98	5.92	7.6	78.8	44.82
EURO bn	10.3	12.1	6.3	78.9	27.3	60.3	4.0	5.1	64.6	13.0	5.9	7.6	9.8	65.6
Total = EUR 360 bn														

Source: "ACEA Tax Guide 2005", European Automobile Manufacturers' Association (ACEA), 2005

National figures show a gross distortion between taxes collected and funds re-invested back into the road sector. For example in the UK motorists contributed GBP 44.8 billion to treasury funds in taxes, with as little as GBP 6.58 billion allocated to roads in the national budget.[10] In Spain the taxation raised from motorists in 1999 was 3.5 times higher than the amounts spent by the Government on investments in road infrastructure.

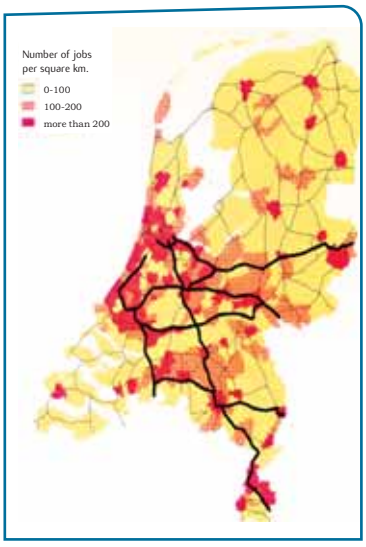
[8] "Taxation of passenger cars in the European Union", European Commission – DG Taxation & Customs Union, 2002
[9] "ACEA Tax Guide 2007", European Automobile Manufacturers' Association (ACEA), 2007
[10] "Road File", Road Users' Alliance (RUA), 2005

C. SOCIAL ASPECTS

I. Roads and land use patterns

By contributing to regional cohesion, roads play a prominent role in the geographic distribution of economic growth. As part of the "Partners for Roads" initiative, the Dutch Directorate for Traffic and Infrastructure measured the impact of roads on regional economies in the Netherlands. The study clearly demonstrated that zones with high job densities (over 200 jobs per square kilometre – in red on the map)[11] were systematically located near major road arteries.

There are a number of reasons behind this concentration. Industries need to be located where they have a direct and easy access to their suppliers, customers and employees. This explains why industrial zones are generally located near roads of high capacity in the outskirts of cities and why roads themselves are so important to regional development (tourism, business location decisions, etc.).



According to the European Investment Bank's (EIB) report[12], road infrastructure can act as a catalyst in fostering development by creating sustainable, autonomous growth zones, which in turn increase the per capita income in less favoured regions to levels closer to the European average.

II. Roads, access to work and social exclusion

As Europe evolves from an old manufacturing-based economy to a service-oriented one, traditional patterns of transport to workplaces are breaking down. While improvements in information and communications technology have helped to make distance less important, the countervailing trend of geographical dispersal of workplaces in many smaller businesses rather than large ones, has considerably increased the demand for road transport. In 2004[13] two thirds of new jobs were created in the suburbs, where roads are often the only means of transportation which can be used for commuting.

According to a study made in 2003 by Mr. J-P Orfeuil, Professor at the University of Paris XII, on "Mobility, Poverty and Social Exclusion in France",[14] shift work has significantly evolved over the last decades. The author based his findings on the example of night-shift work, which used to be applied by major industries. Night workers were assisted with special bus or van services, but at present, night jobs are highly dispersed geographically and available mainly in the services sector, where shift patterns are more flexible and no transport services are organised, making it more difficult to match the services and work patterns.

[11] "Partners for Roads – Roads and Regional Development", Presentation delivered at the I European Road Congress (Lisbon, Nov. 2004) by Mr. Michel Goppel, M.Sc and Mr. Benno Bultink, Directorate for Traffic and Infrastructure, The Netherlands
[12] "Contribution of major road and rail infrastructure projects to regional development", European Investment Bank (EIB), 1998
[13] "Transport and Social Exclusion", Fédération Internationale de l'Automobile (FIA), 2004
[14] "Mobility, Poverty and Social Exclusion in France", J-P Orfeuil, Laboratory of l'Oeil of the University of Paris, 2003

Case Study: Contribution of A92 Motorway to Spain's Regional Development

The "Report on Socio-Economic Benefits of the A92 Motorway in Spain" reveals that the original investment in construction of the A92 motorway resulted in the increase in direct employment generating as many as 46,938 jobs, 81% of which are wage-earning with the rest being indirect jobs in support/services industry. The bulk of this increase in demand for employment comes mainly from public construction works and engineering services provided to the construction companies involved in the building projects.

Overall benefits generated by the A92 motorway in the past 30 years are estimated to reach some EUR 39.9 billion, constituted mainly by time saved through shorter journeys, reduction in traffic congestion and the decrease in number of road accidents and fatalities. With the total construction costs estimated to be EUR 11-12 billion, the net gains for society come up to as much as EUR 27-28 billion.

Source: "Socio-Economic Benefits of the A92 Motorway in Spain", Research Report published by Junta de Andalucía, Consejería de Obras Públicas y Transportes, Sevilla, 2000

Another similar study[15] conducted in the year 2000 in the Valencia Region in Spain reaches similar conclusions regarding the positive direct effects from the existence of the A7 motorway stretching through the region. According to this study the A7 motorway contributed as much as 1.5% to the overall regional GDP growth in the year 2000. The socio-economic benefit of the A7 motorway in the Valencia Region is estimated to have reached some EUR 251 million in the year 2000 alone. This net economic gain was achieved mainly through real-time cost savings made on journey times. Finally, the study concludes that the A7 motorway has had tremendous impact on Valencian society through an increase in citizen's wealth, higher property values and the accelerated expansion of the industrial base in the areas along the motorway.

III. Access to education and training

While the picture varies according to the zoning pattern of individual Member States, lack of adequate transport can be a contributing factor to poor educational achievements of children from lower social classes. In Germany, for instance, pupils normally attend the school closest to their house or to their parents' workplace and where education is free of charge.

In the UK travel costs are very high and often considered a considerable barrier to obtaining a successful post-secondary education. A key study released by the Social Exclusion Unit (SEU) in 2003[16] outlined how transport costs are a significant barrier to the take up of post-16 education in the UK, representing the biggest expenditure associated with post-secondary education in this age group. The study also outlines how these same costs drove one in five students to consider dropping out of full time education. Six percent of students were forced to miss their classes during their academic year because of the cost

[15] "Valoración Económica de los Efectos de la Autopista A7 en la Comunidad Valenciana", Universitat de Valencia, Aumar e Instituto de Economía Internacional, 2000

[16] "Making the Connections: transport and social exclusion, final report", Social Exclusion Unit (SEU), 2003

associated with transport, with a further six percent of those between 16 and 24 who had to turn down altogether the offer to pursue their studies because they were unable to get to the educational establishment which was offering them a place.

IV. Access to health care

Health access inequalities have steadily decreased through the years, with the result that today, more and more people can easily reach medical care. This, however, should not distract from the fact that lack of adequate transport can still be a barrier reducing the opportunity to use medical services, resulting in increased costs to health care providers due to missed appointments and delayed interventions.

A survey conducted in the UK by the Social Exclusion Unit (SEU)[17] found that around 31% of people who did not have access to a car found it difficult to travel to a hospital, with a further 7% of them having had to turn down appointments because of transport-related problems. The elderly are particularly affected, with one third of all senior citizens reporting difficulties in getting to health care centres in London due to a lack of affordable transport.

A German Governmental[18] survey in the federal Länder of Schleswig-Holstein came to the conclusion that 94% of people over 64 years of age and with regular access to a car could reach a hospital within 30 minutes, whereas just 0.14% would need more than 60 minutes. Conversely, only 69% could reach a hospital within 30 minutes by public transport and 8.26% would be in a situation where they would need more than 60 minutes.

V. Access to leisure

Changing living patters coupled with the general increase of the standard of living throughout our continent have increased the available time that citizens can dedicate to leisure activities. These often require us to travel to a precise location on a stable basis, something which is made possible by the efficiency of the road network. A study undertaken by the Swiss Federal Administration,[19] in fact, outlines how 80% of visitors to the Jungfrau, Aletsch and Bietschhorn glaciers use the road network to travel to this region, even though, according to the same administration, "rail links are very good". The same study reveals that over half of the entire passenger traffic in the aforementioned region is road related, outlining how a good and efficient road network is of paramount importance for a population which can increasingly afford the time and cost of frequent travel and increasingly looks at the road to satisfy its mobility needs.

[17] "Omnibus Survey", Social Exclusion Unit (SEU), 1999
[18] "Transport and Social Exclusion: a G7 comparison, an overview of the German position", Hemming & Borbach, 2003
[19] "Mobility and leisure time", Swiss Federal Administration, 2005

VI. Road transport and poverty

Road transport also plays an important role in the economic development of backward regions and countries. On one hand, transport contributes to poverty reduction through its indirect impact on economic growth, while on the other hand there is direct impact on the personal welfare of the poor.

Generally speaking, local access roads in poor rural and urban areas make only a modest contribution to national income growth, whereas they are likely to have a direct and significant impact on the daily life of the poor. On the other hand, inter-city transport is of strategic importance to a nation's economy, but it is likely to have only indirect impact in relieving poverty.

VII. Road transport and the environment

The effects of human activities on the environment are more and more being considered as the new battlefront of the current century. The road sector is already at the forefront of the battle to preserve our planet. Roads, in fact, are already being built taking into consideration important "green" aspects such as habitat fragmentation, noise reduction, environmental impact analyses, the use of recycled materials (up to 90%), avoiding water pollution and an efficient use of Intelligent Transport Systems (ITS).

Case Study: Better roads can reduce emissions

A study conducted by the Norwegian research organisation SINTEF and released in the Spring of 2007 has found conclusive evidence that road realignments and upgrades reduce car emissions. In the three scenarios under consideration, single lane road, two lane road and motorway, the emissions of CO_2 were found to be reduced by 11%, 61% and 38% respectively, with CO and NOX values also dropping.

The study also outlines how the increased capacity of the road infrastructure does not lead to an increase in the number of car trips.

Source: "Miljømessige konsekvenser av bedre veier", The Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology (SINTEF), 2007

2) Efficient road infrastructure is what people want

For much of the past decade, spending on roads in the EU has been consistently declining. This trend has persisted, often fuelled by ideological arguments, despite rising car ownership and companies' increasing dependence on road transport for freight. The relative lack of investment has come at the cost of increased congestion and lower safety due to poor maintenance.

A. Declining road investment & maintenance

Public investment in transport infrastructure in the European Union fell from 1.5% of GDP in the 1980's to less than 1% in 2004, despite the fact that the road sector contributes over EUR 360 billion in fiscal revenues to the governments of the EU 15.[20] Less than 1% of this value is re-invested back into the road transport infrastructure, translating into an annual shortfall of billions of Euros every year, with road investment particularly hit.

According to the European Investment Bank (EIB),[21] road construction loans to the EU 15 Member States were overtaken in 2003 by loans granted for the construction of railway lines. Between 2001 and 2005 loans earmarked for road infrastructure moved from EUR 2,627 million to EUR 2,754 million, an increase of 4.8%. During the same time frame loans to the railway sector increased by 103.6%, with the total for 2005 fixed at EUR 3,356 million. In the same year, however, the percentage of freight transport moved by rail represented only 13% (in tkm) of the total, whilst passenger transport figures (in billion pkm) were even lower at 6.5%.

European Investment Bank (EIB) loans to EU 15 - 2001-2005 (EUR million)

	2001	2002	2003	2004	2005	Total 2001-2005
Road	2,627	2,486	2,326	2,978	2,754	15,412
Air transport	1,014	2,082	1,174	2,079	1,279	8,264
Railways	1,648	2,474	2,594	3,262	3,356	13,848
Urban transport	1,618	1,771	2,755	2,367	4,862	13,809
Maritime transport	623	386	450	468	661	2,588
TOTAL	7,530	9,199	9,299	11,154	12,912	53,921

Source: "European Road Statistics 2007", European Union Road Federation (ERF), June 2007

[20] "ACEA Tax Guide 2007", European Automobile Manufacturers' Association (ACEA), 2007
[21] "Statistical Report", European Investment Bank (EIB), 2005

A report published by the French Senate in the year 2000[22] paints an alarmist picture of the distribution of public investment in transport infrastructure. Out of an estimated EUR 8 billion allocated by the government, 60% was earmarked to the loss-making rail sector, with perhaps 25% invested in road infrastructure development. During the same fiscal year, tax perceived on the road sector in France alone was estimated at EUR 50 billion, against EUR 730 million for the rail sector.

Conversely, not investing in road maintenance costs road authorities and users money. According to the PIARC report entitled "How road transport gets countries moving", for every EUR 1 not invested in preventive road maintenance, road users waste EUR 3 on extra transport costs and road authorities will spend EUR 4 on asset reconstruction costs. In France it is estimated that the maintenance of the entire road transport infrastructure costs national, regional and local authorities EUR 1.2 billion, whilst spending on the 31,000 km of rail lines costs around EUR 3 billion every year.[23]

Roads are important and very valuable assets to societies, providing users with the mobility they require and EU Member States with important tax revenues. A survey of current road maintenance conducted in several European Union countries (Denmark, France, Spain, Germany, Finland, Sweden, Belgium and Portugal)[24] revealed that the budgets currently spent on road maintenance are grossly insufficient. In the analysed countries, the budget actually available represented only around 76% of the required expenditures.

This demonstrates that current budgets should be increased by an average of 30% in order to meet road demands properly. In absolute terms, this means that a further EUR 8 billion per year would be needed to ensure a safe and high quality European road network.

Roads pay their full costs to society

Through their mobility choices road users indeed inflict costs upon society: they deteriorate the roads they use, they slow down the speed at which others travel, they may cause accidents involving themselves and others and they emit pollutants which create environmental damage. Confronting motorists with these external costs could theoretically ensure efficient usage of the infrastructure

However, transport in general and roads in particular also play an economic role of prime importance through taxes and job creation generating substantial social benefits.

The Dutch Government attempted, in the late 1990's, to quantify the impact of "social pricing" on all transport modes and concluded that with "social pricing" fully applied to them road prices would stay stable, while rail transport would see its prices jump up by 50% to 100%.

Source: "Efficient prices for transport", Report by the Centre for Energy Conservation and Environmental Technology, The Netherlands, 1999

[22] "Le financement des infrastructures de transport", J-P Oudin, Report to the French Senate, 2000
[23] "Infrastructures de transport, mobilité et croissance", Rémy Prud'homme et al, Conseil d'Analyse Économique (CAE), 2007
[24] "Sustainable investment in road maintenance", European Union Road Federation (ERF) Position Paper, 2001

B. Connecting Europe's new Member States

The European Commission's 2001 White Paper: "European Transport Policy for 2010, Time to Decide", rightly stated that "the first challenge in making the EU Enlargement a success will be to connect the future Members States to the Trans-European Network." The Commission has put the cost of this interconnection at some EUR 100 billion, based on the final conclusions of the 1999 Transport Infrastructure Need Assessment (TINA) programme.

This amounts roughly to 20,000 km of roads and 30,000 km of rail tracks which need to be built or significantly upgraded. Work has already begun, thanks to Europe's pre-accession instruments such as the Instrument for Pre-Accession (IPA), Poland and Hungary Action for the Reconstruction of the Economy (PHARE) and long-term loans from the European Investment Bank (EIB), almost half of which have gone to transport projects.

Much still needs to be done, however, in order to align the road infrastructure standards in the new Member States with those of the EU 15. To cite one as an example, only 3% of the Polish road network currently meets EU standards for maximum axle loads, with the result that international traffic is limited to main transit routes. The upgrade of Polish roads alone will require EUR 1 billion per year over the next 15 years.

Overall, the average density of motorways in the new Member States is less than one fifth of the current EU average. These figures suggest that simply in order to reach average European levels of motorway accessibility, 14,000 km of motorways need to be built in Central and Eastern European countries within the next 10 years.

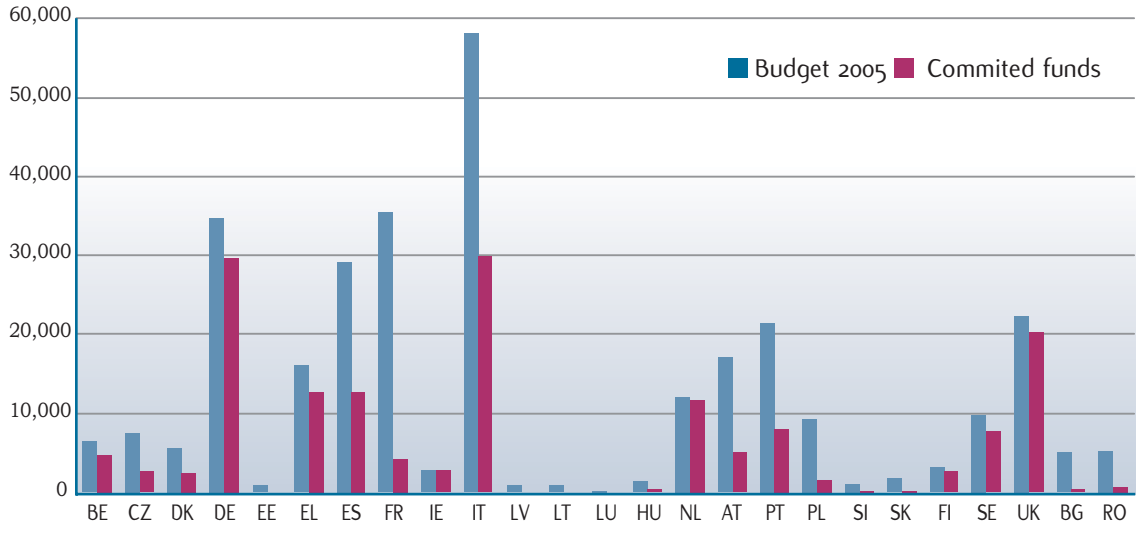
C. The Trans-European Transport Network (TEN-T)

The Trans-European Transport Network is one of Europe's major infrastructure programmes, expected to deliver a better mobility for passengers and freight with an increased efficiency and speed.

This large pan-European infrastructure project will have a huge impact on the growth potential of the enlarged EU as well as directly and indirectly generating thousands of new jobs throughout the Union. Furthermore, according to a 2004 study carried out for the Commission, significant time-saving and a 6.3 million tonnes-per-year reduction of CO_2 emissions would be gained from the completion of the current 30 priority infrastructure projects.

Completing the network by 2020 involves the construction and upgrade of a considerable amount of infrastructure. Accordingly there needs to be a stable commitment of funds by the authorities to guarantee the timely completion of these projects. As the table below suggests, in fact, too often there is a discrepancy between the budgeted funds for the TEN's and what is actually allocated to be spent, a situation which risks penalising the entire EU and delaying much needed infrastructure links which its citizens strongly support.

State of financing of TEN's Priority Transport Projects per country in 2005 (EUR million)



Source: "European Road Statistics 2007", European Union Road Federation (ERF), June 2007

D. Car ownership and freight transport will increase

According to the European Automobile Manufacturers' Association's (ACEA) figures, registrations in 2006 in the EU 25 totalled 22.3 million, an increase of 8.5% when compared to the value for 2004 (20.6 million vehicles registered).[25]

Passenger transport by road (whether by car or bus), which already represents 92% of total passenger transport, has seen an increase of 16.5% between 1995 and 2004.

Transport of passengers by mode in EU 25 - 1995-2004 (billion pkm)

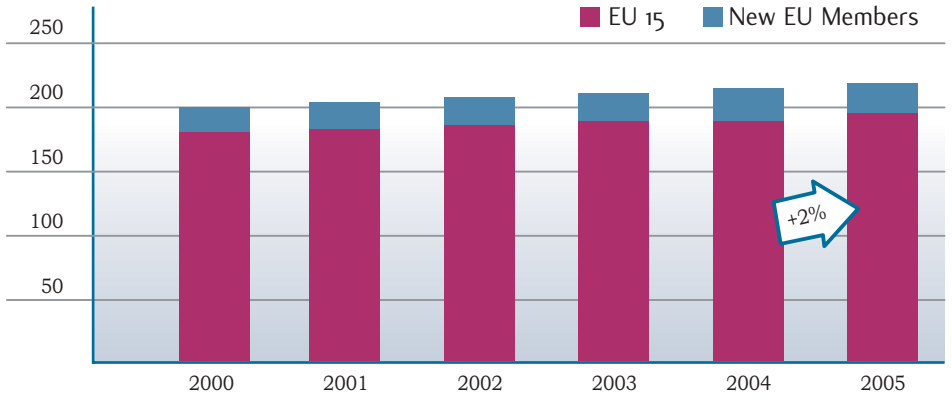
	Passenger Cars	Bus & Coach	Railway	Tram & Metro	Total
1995	3,787	474	324	65	4,650
1996	3,852	479	322	65	4,718
1997	3,927	478	326	66	4,797
1998	4,021	484	329	67	4,901
1999	4,119	485	339	69	5,012
2000	4,196	492	353	71	5,112
2001	4,277	493	355	71	5,196
2002	4,370	489	351	72	5,282
2003	4,399	493	347	73	5,312
2004	4,458	502	352	75	5,387
1995-04	+18%	+6%	+9%	+15%	+16%
per year	+2.1%	+0.7%	+1%	+1.8%	+1.9%

Source: "European Road Statistics 2007", European Union Road Federation (ERF), June 2007

[25] "Motor Vehicle Registrations", European Automobile Manufacturers' Association (ACEA), 2007

Similarly the registration of commercial vehicles of more than 3.5 tonnes increased from 377,183 units in 2005 to 396,148 in 2006 in the EU 25 countries.[26] Road freight is expected to grow by 47% in tkm in the EU 25 by the year 2010 with respect to its 2001 values.

EU 25 car fleet 2000 - 2005 (in millions)



Source: "Vehicles in Use", European Automobile Manufacturers' Association (ACEA), 2007

The real cost of congestion

Congestion, often an unavoidable fact of life in modern cities, causes slower speeds and longer travel times, imposing costs on the economy and generating multiple impacts on urban regions and their inhabitants. However the situation in Europe varies widely from one country to another, which means that there is no all-embracing solution to traffic problems and even no common definition of "congestion". A high concentration of vehicles on the road is not itself a characteristic of congestion; it would need to be accompanied by low flow speeds to create a situation in which capacity is saturated. Likewise, motorists tend to subjectively exaggerate the duration of their journeys to work, rendering accurate measurements very difficult.

Congestion can be measured in several ways. Free-flow speeds can be used as reference to calculate the cost of time lost through congestion. Under this very crude definition, several authors suggest that congestion costs the European economy 2% of its GDP every year, whilst other point to a more modest 1%.

Systematic fluid traffic conditions also suggest infrastructure overcapacity, which is why the Netherlands has decided that the optimal level of congestion is where 2%-3% of motorists encounter congestion on an average day. In the greater Paris Region, Professor Prud'homme estimated the true cost of congestion at EUR 500 million, or 0.15% of the same Region's GDP. Furthermore he estimated that a 7.5 km journey in the same region would take 25 minutes by car and 36 by public transport, with the value for the car diminishing to 15 minutes when roads are not heavily trafficked.

Sources: "Is Our Present Transport System Sustainable?", Rémy Prud'homme et al, Presses de l'Ecole Nationale des Ponts et Chaussees, 1999; "Infrastructures de transport, mobilité et croissance", Rémy Prud'homme et al, Conseil d'Analyse Économique (CAE), 2007; "Managing Urban Traffic Congestion", European Conference of Ministers of Transport (ECMT), 2007

[26] "European Road Statistics 2007", European Union Road Federation (ERF), June 2007

E. Point-to-point connection

Roads are the only mode of transport which can provide a door-to-door connection even when adequate rail infrastructure exists.

Christian Gerondeau measured car journeys before and after the construction of the high-speed rail line between Paris and Lille in 1996 and concluded that traffic had broadly remained constant.[27] In similar fashion the new TGV fast train line Paris-Strasbourg which entered into service in 2007 did not affect the number of vehicles using the road network for the same journey.[28]

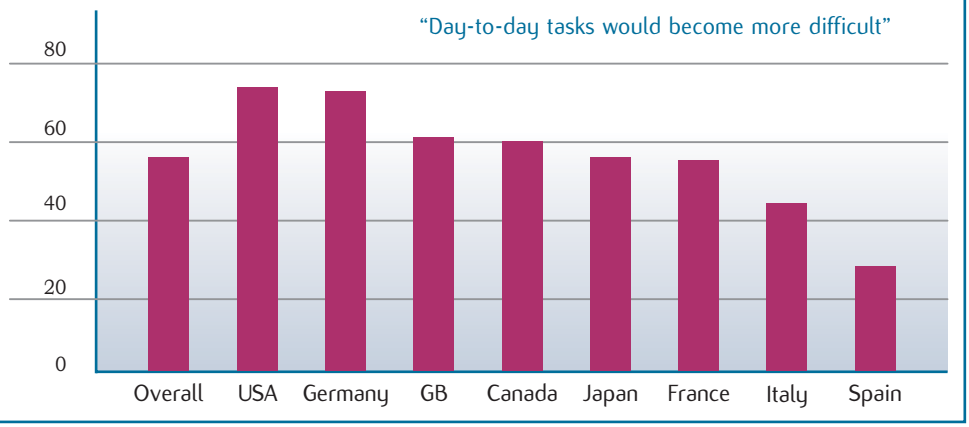
Many factors can explain this observation, chief among which is the fact that intercity rail transport caters almost exclusively to passengers travelling to and from city centres. Whenever traffic is between two suburbs, car travel clearly remains the first choice for short-distance trips.

The latest Eurobarometer opinion poll on transport topics outlines how "motorized individual transport is the most widespread in the EU (53%), followed by non motorized individual transport (23%), and the least popular mode is using public (or community) transport (21%)."[29] If citizens no longer had access to a car, over half of them believe their day-to-day tasks would become more difficult as a result.[30]

Cars allow direct and simple access to a destination, which is of particular importance to those travelling with children, the handicapped and the elderly. Imposing restrictions on mobility choices will always penalise the weaker sections of society as they are unable to switch (because of costs or, as mentioned above, social issues) to alternative means of transportation.

Consequences of no longer having a car

Q. If you no longer had a car which, if any, of the following consequences would you expect apply to you?



Source: "The Automobile and Society", Fédération Internationale de l'Automobile (FIA), 2004

[27] "Les transports en Europe", Christian Gerondeau, EDS Editeur, 1996
[28] "TGV Est", Le Figaro, 26 June 2007
[29] "Attitudes on issues related to EU Transport Policy", European Commission (EC), 2007
[30] "The Automobile and Society", Fédération Internationale de l'Automobile (FIA), 2004

F. Journey time

Roads save enormous amounts of travel time and provide access to a large number of destinations in a relatively short time.

The average time in Europe for a home to work journey by car is estimated to be 20 minutes. The corresponding figure for public transport is estimated to be in the range of 38 minutes, or almost twice as much.

When citizens who normally use their cars to go to work were asked to take public transport instead, they reported a journey time increase to 49 minutes, which means that cars save them an hour of their time every day.

Furthermore what originally began as a home to work journey, is now increasingly becoming a complex array of smaller journeys that begin in the morning to end in the evening, such as dropping-off children at school, shopping for food etc.[31]

G. Cost-efficiency

According to the Fédération Internationale de l'Automobile (FIA), the average European household spends some EUR 1,750-1,850 per year on car travel, corresponding to 10%-12% of all household expenditures for the year 2003.

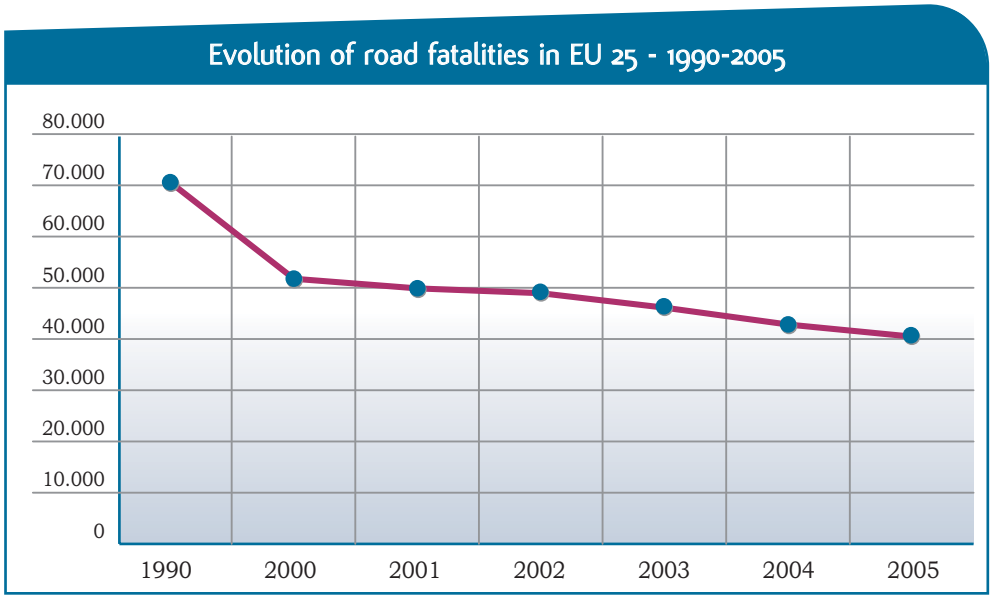
The decision to buy a car and to spend such a part of the household budget can only be explained by the fact that the economic advantages of using roads (saving money, a more efficient use of time, increased comfort and quality of life) outweigh the direct costs of owning and using a car. Nobody has ever forced anybody else to buy a car and use it.

H. Safety

Road fatalities will always be regarded as a tragedy of modern history, but the situation is slowly improving.

The number of fatalities in the EU declined by 50% between 1972 and 2000 despite a strong increase in traffic volumes, to the extent that a CCFA-SOFRES study on "The Automobile and Society"[32] revealed that 80% of French citizens think that road transport is safer than it used to be ten years ago. Fifty-five percent of those surveyed thought the trend was due to car manufacturers, while 27% pointed to the public administration and 18% to driver behaviour.

[31] "Durante uno spostamento in automobile da casa al lavoro", Matteo Ignaccolo, University of Catania, 2006
[32] "Automobile and Society", CCFA-SOFRES survey, 2002



Source: CARE Database, European Commission (EC), 2006

However these general trends hide significant discrepancies within the EU, with some Member States reporting four times fewer casualties per km travelled than others. Most safety specialists now recognise that the old "fix the driver" approach is obsolete and insufficient, particularly in a context of converging enforcement and driver training policies.

Research conducted in the EU suggests that the road environment and its interactions with the driver and his vehicle are a determining factor in the causes and consequences of at least a third of all road accidents.

Motorists are too often the first casualties of poorly planned, designed, signposted and maintained road networks. Collisions with obstacles account for as much as 20%-40% of all serious road accident-related injuries and deaths on average in Europe.[33] A total of 14,000 European citizens lose their life every year in single-vehicle crashes, most of them as a result of a collision with a roadside object which was insufficiently protected or not protected at all.[34] For motorcyclists, 10%-16% are attributable to sub-standard safety barriers alone.[35] Detailed analysis of the causes of fatal road accidents point to the fact that very often configuration of the road infrastructure is thought to play a direct part in as many as 46% of accidents in France.[36]

One of the most effective ways of preventing these accidents from taking place is to conduct systematic Road Safety Audits and Inspections at the planning, design, construction and operating stage of roads by qualified teams of experienced auditors undertaking a review of potential hazards before they occur. The European Commission recently estimated that by implementing Road Safety Audits and Inspections on all the main roads of Europe, at least 1,300 lives could be saved every year.[37]

[33] European Transport Safety Council (ETSC)
[34] RANKERS Project, European Commission (EC) co-funded project to develop scientifically researched guidelines on road infrastructure safety
[35] Federation of European Motorcyclists' Associations (FEMA)
[36] Réagir Campaign, data from 20,000 accidents analysed between 1983 and 1996
[37] EuroAudits Project, European Commission (EC) co-funded project to develop a European auditor training scheme

3) Roads and sustainable development: setting the record straight

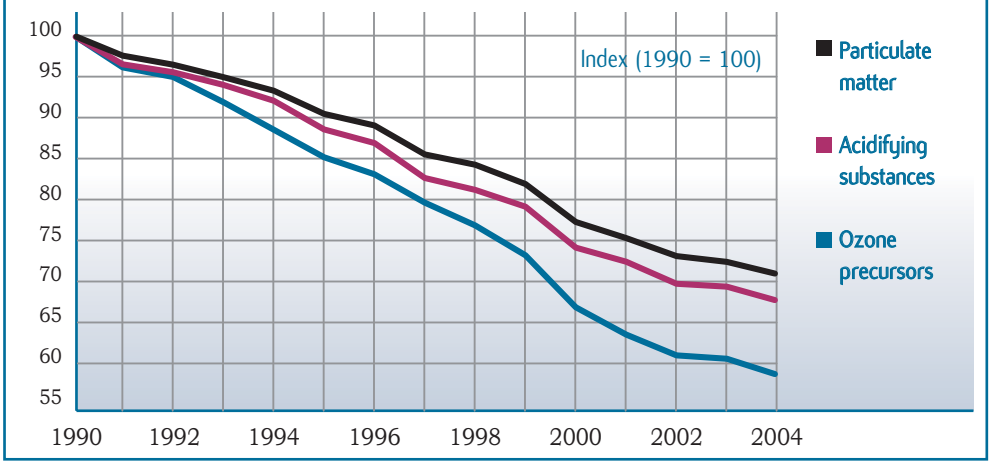
The environmental impact of roads is a criterion which is often used to prevent new infrastructure being built or to orientate choices towards transport alternatives such as rail. However, new research points in a different direction, outlining the relevant contribution offered by the road sector through the years in reducing its impact on the environment. This has also led to an ongoing process of reconsideration over a sector of the economy previously branded as "eco-unfriendly", but that is of paramount importance for modern economies.

The following chapter repositions the debate on the direct and indirect environmental impact of roads and demonstrates that the road sector has nothing to fear from an impartial appraisal of its environmental performance due to the progress made to date. Furthermore it will also offer an insight into the ongoing research that will reduce the "environmental footprint" of road transport still further.

A. A coordinated approach to global warming

The need to reduce CO_2 emissions and prevent global warming is seriously taken into account by the road sector. In fact, road transport is becoming less polluting thanks to the combined effects of stringent measures, new anti-pollution standards, modernisation, cleaner fuels and new manufacturing and building techniques. A 2007 European Environmental Agency (EEA) study[38] shows that the emissions of acidifying substances, particulate matter and ozone precursors from transport fell by 30% to 40% from 1990 to 2004 in EEA member countries (excluding international aviation and maritime transport). The introduction of new European emission threshold of 130g CO_2/km by 2010 for light duty vehicles and tighter standards for cars, vans and trucks (Euro 5/6) will also help to reduce harmful pollutants emissions.

Evolution of road transport emissions



Source: "Transport and environment: on the way to a new common transport policy", European Environmental Agency (EEA) Report, 2007

[38] "Transport and environment: on the way to a new common transport policy", European Environment Agency (EEA) Report, 2007

Worldwide, transport contributes to a bit less than a fifth (18%) of total CO_2 emissions and to around 14% of greenhouse gas (GHG) emissions, which makes it the third contributor, jointly with agriculture and industry.[39] Road transport is mainly responsible for these emissions, as more roads are being built around the word and an estimated 70 million road vehicles enter the market every year. However, it is possible to act on reversing the current trend of GHG growth in transport by improving the performance of roads. A Norwegian study released in 2007[40] concludes that better alignment coupled with sufficient width and infrastructure capacity giving traffic the possibility to flow steadily, leads to a decrease in CO_2 emissions. The micro-simulations also supported the idea that a restrained road capacity is not a feasible measure to limit the use of vehicles.

Finally, the complex relationship between roads and CO_2 cannot be put aside when dealing with the environmental cost of roads. As proven in a recent World Bank study on Morocco's multi-annual road development programme, greater access to roads can also lead to indirect positive effects on GHG, such as improved agricultural practices. Contrary to what is often suggested, a developed and performing road sector can have both short and long-term positive side effects on the environment.

Case Study: CO_2 performance in France

France has enjoyed a stable level of CO_2 emissions since 2003 of 138 million tonnes. To reduce this level by 1 million tonnes every year one would have to shift 15 billion tkm of freight from road to rail, which is equivalent to a 40% increase of rail freight capacity with respect to its 2005 values. Another million could be saved by the combination of 1,800 km of new high speed rail connections and an increase of 20% in the number of people using urban transport.

By comparison, at least 35 billion tonnes of CO_2 could be saved if the entire vehicle fleet were to emit 120g CO_2/km or less.

Source: "Infrastructures de transport, mobilité et croissance", Rémy Prud'homme et al, Conseil d'Analyse Économique (CAE), 2007

[39] "The Economics of Climate Change", UK Government - Nicholas Stern, 2007
[40] "Miljømessige konsekvenser av bedre veier", The Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology (SINTEF), 2007

B. Roads and noise reduction programmes

Traffic noise has emerged in recent years as an ever present but often underestimated pollutant in our lives. About 120 million people in the European Union (more than 30% of its total population) are exposed to road traffic noise levels above 55 Ldn dB(A), which is considered to be seriously annoying.[41]

Significant reductions from individual sources have been and will be achieved thanks to technological progress and to the European legislation fixing maximum sound levels or technical standards on acoustic classification. The noise from individual cars has already been reduced by 85% since 1970 and the noise from lorries by 90%.[42]

Research, which is mainly led by industry, is a major leeway to fight against traffic noise. In total motorway operators routinely allocate 20%-30% of total road construction investment in noise mitigation and environmental protection.

Noteworthy progresses were made by the automotive sector itself to optimise vehicle composition (car tyres design, wheel arches and engine). In addition, road constructors are making efforts to develop energy-efficient measures and techniques to improve road infrastructure so that it can yield abatements in the level of noise through a smoother road-tyre interaction.

The European project SILENCE showed that quiet road surfaces[43] have the potential to cut road noise by 50%-75% compared to standard surfaces. The enhanced acoustic performance of some types of road surface material (for instance two-layer porous asphalt) is combined with cost-efficient solutions such as rail dampers, barrier tops and acoustic grinding. Finally, addressing the environmental impact of noise also requires the implementation of traffic management strategies such as the regulation of traffic volumes, day-night traffic, speed limits, etc.

C. The potential offered by ITS and Galileo

Intelligent Transport Systems (ITS) use information technology to better coordinate road transport (transport flow, speed limits, etc.) and empower motorists to make informed route choices, offering almost unlimited potential to maximise the use of scarce network capacity and share transport policy (e.g., parking policy, "tailoring" public transport to demand, promoting car-sharing, etc.).

ITS solutions have already demonstrated their capacity to optimise road energy consumption and reduce urban congestion. Computerised route planning and digital maps already represent a potential improvement in road transport fluidity and energy savings, estimated at approximately 15%. With additional data covering congestion, road works, accidents, etc., that figure could jump to 25%. When applied to the management of parking spaces, ITS can lead to enhanced urban transport policy by reducing the proportion of search traffic, estimated at approximately 30% of total traffic in major European cities during peak hours.

[41] World Health Organisation (WHO), 2003
[42] "Green Paper on Future Noise Policy", European Commission (EC), 1996
[43] "Project Outcomes", SILENCE, www.silence-ip.org

In a matter of years, Europe's satellite navigation programme, GALILEO, will provide the technological infrastructure needed to further reduce the negative impact of road transport. The monitoring and management of traffic fluidity will be significantly improved when a great number of cars are equipped with satellite navigation receivers and guidance systems. For example, if the average speed of the cars equipped with GALILEO receivers on a given road sector drops significantly, a control centre can anticipate a traffic jam and suggest that approaching vehicles choose a different route.

GALILEO applications in the road sector are currently been studied and promoted by the European research initiative GIROADS (GALILEO Introduction in the Road Sector – www.intelligentroads.org).

Galileo applications in the road sector

End users	- Advanced driver assistance	- Pay per use insurance pricing - Taxi service pricing - Car rental pricing - Recovery after theft	- Navigation services - Information for vulnerable road users - Fleet management - Passenger transport management
Road operators	- Emergency services management	- Speed limit enforcement - On street parking pricing - Accident reconstruction	- Traffic management - Road lighting management - Infrastructure management - Road research
End users & road operators		- Road user charging - Livestock tracking - Tracking of special vehicles	- Traffic information - Transport on demand
	Safety-critical	Liability-critical	Non-liability critical

Source: GIROADS Programme, www.intelligentroads.org

D. Achieving a global road research agenda

The substantial progresses achieved by the road sector over the years in reducing its negative impact and in fostering new technologies have been largely the result of public and private efforts in conducting research activities in these fields.

Increased investment in road research is key to achieving the objectives spelt out by the EU's Heads of States in Lisbon to "become the most competitive and dynamic knowledge based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion."[44]

Recognising the value of efficient knowledge-sharing and pooling of research resources at a global level, the International Road Federation recently launched the IRF Research Council (www.irfrc.org), a horizontal catalyst of expertise and skills committed to improving the sustainability and efficiency of the road sector. With the support of a Steering Committee, the IRF Research Council will take on a global coordination role in the areas of Safety, Mobility, Environment and Competitiveness and offer road sector stakeholders and international research bodies a forum to discuss strategic research priorities, promote knowledge transfer and encourage participation in international road research programmes.

[44] "Conclusions of the Lisbon European Council", European Council, 2000

Conclusion

In compiling "The Socio-Economic Benefits of Roads to Europe" particular attention was devoted to research in order to offer readers an informative paper detailing the absolute importance of the road sector in Europe. Many papers and reports were analysed, together with specific web tools and academic articles, in order to give an unbiased insight which would be praised for its excellence and used as a basis in deciding about the future of the road sector.

There is a need, in fact, to shift away from the old concept of the road being merely the place for motorists to drive their vehicles and accept the reality that this sector is one of the most important for modern economies, generating levels of turnover and employment which cannot be ignored. Furthermore the constantly rising levels of demand for road related mobility from European citizens ought to be carefully considered at all levels of the policy planning stage. Strategies aimed at artificially shifting demand to other modes of transport, in fact, have already proved their counter-productivity throughout the continent.

As has been shown in this paper, investment in road transport infrastructure across the EU 27 is falling, even though the receipts from this mode of transport have reached the record level of over EUR 360 billion in 2006. Can the European continent really afford to invest so little in one of its most strategic infrastructures, so necessary to complete the ultimate objective of the European Union, a complete and undistorted internal market fully guaranteeing the free movement of goods, people, services and capital?

At the current rate, it will not be long before the majority of Members States will be investing less than 1% of their GDP on the road network. We hope that this paper has conclusively demonstrated that such low levels of investment will result in lower levels of GDP and employment.

We believe that this is not a viable solution and hope that this paper has contributed to clearly and concisely explain the correlation between the existence of efficient road networks and the opportunities for economic and social advancement. The fact that roads in Europe act as purveyors of socio-economic welfare ought to be, in our opinion, a "self-evident truth", driving legislators to formulate policies which take into account this important role and foster the development of an efficient, reliable and eco-friendly road transport infrastructure.

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The European Union Road Federation (ERF), the Brussels Programme Centre of the International Road Federation (IRF) wishes to express its gratitude to the following organisations for the support offered:

The IRF Research Council

Today, billions of dollars are invested every year around the world on applied research and technological development by the private road sector. The International Road Federation (IRF) itself is at the forefront of numerous research initiatives with leading international institutions.

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- Road safety
- Smart mobility
- Sustainable roads
- Competitiveness

and offers road sector stakeholders and international research bodies a forum to discuss strategic research priorities, promote knowledge transfer and encourage participation in international road research programmes. For further information please visit www.irfrc.org.

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