



Trends and drivers of change in the EU transport and logistics sector: Mapping report

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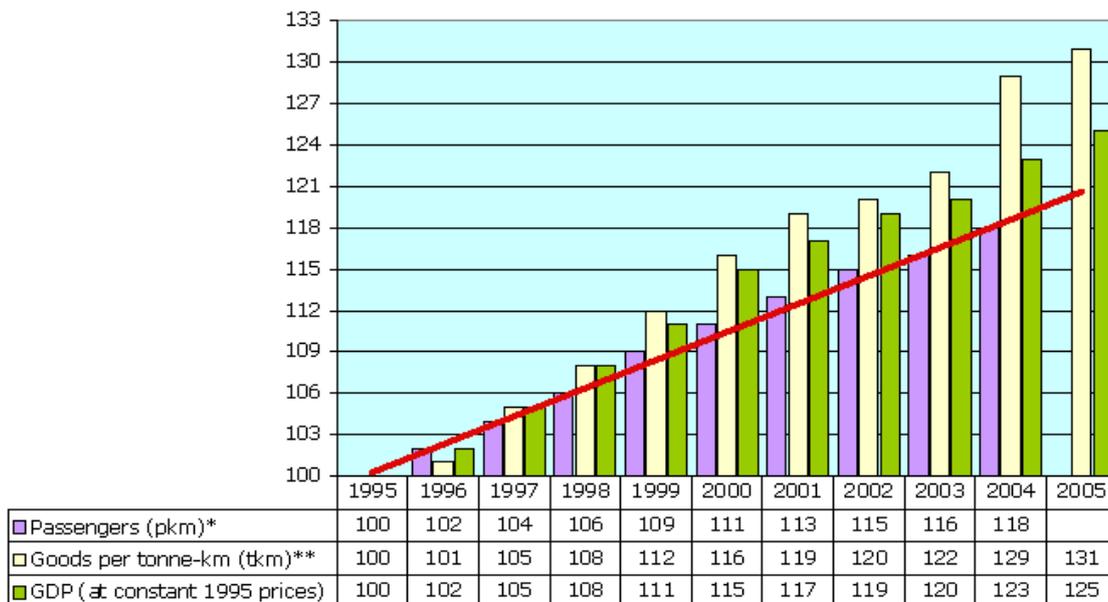


Introduction

Transport and logistics are the lifeblood of societies and a strong association exists between growth in overall economic activity and growth of transport.¹ Figure 1 shows this link, measured on the basis of gross domestic product (GDP), for the period 1995–2005. It seems relatively clear that the movement of people and goods creates wealth and prosperity all over the globe.

Open borders and affordable transport have given Europeans unprecedented levels of personal mobility. Goods are shipped rapidly and efficiently from factory to customer, often with localisation in different countries. The European Union has contributed to this dynamic by opening national markets to competition and by removing physical and technical barriers to the movement of people and goods. Transport is essential for the competitiveness of European industries and, in the words of the European Commission, mobility is also an essential citizen right.

Figure 1: Relationship between GDP and demand for transport, 1995–2005



Notes: * Passengers travelling in cars, powered two-wheelers, buses and coaches, on the tram, metro and railways, by air and sea; a passenger-kilometre (pkm) = 1 passenger transported a distance of 1 kilometre. ** Goods transported by road, sea, rail, inland waterways, pipelines and air; a tonne-kilometre (tkm) = 1 tonne transported a distance of 1 kilometre.

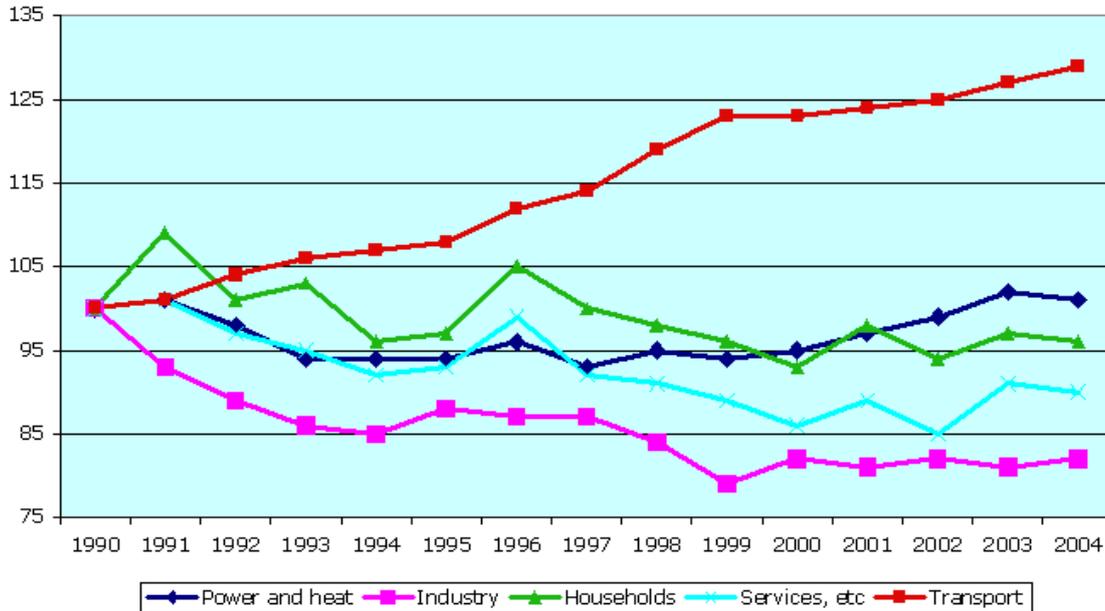
Source: *European Commission, Directorate-General for Energy and Transport (DG TREN), Energy and transport in figures 2006, Part 3: Transport, 2006a*

However, the steady increase in mobility also has social costs such as air pollution, noise, congestion, safety difficulties and health problems – even premature deaths (Krzyzanowski, Kuna-Dibbert and Schneider, 2005). Climate change poses challenges of a new dimension to modern society, and the transport sector contributes substantially to the continuing

¹ The literature and statistics on transport are extensive and initial useful overviews can be found in the EMCC publication *Sector futures – Transport: Where are we going?* (EMCC, 2004b) or the statistical overview from the European Commission Directorate-General on Transport and Energy (DG TREN) *Energy and transport: Figures and main facts*. More detailed statistics can be found in Eurostat and OECD (2006).

growth in carbon dioxide (CO₂) emissions in the EU (Figure 2). Hence, today's transport patterns and growth rates are unsustainable.²

Figure 2: Trends in CO₂ emissions, by area of economic activity, 1990–2004



Source: DG TREN, 2006b

Almost eight million people are employed in the transport and logistics sector, representing about 5% of total employment. Working conditions for the workforce and demand for their competencies will be influenced by political, economic, environmental, sociodemographic and technological changes in the sector – just as the sector will be influenced by changes in the workforce. The trends and drivers of change can be local as well as global.

This report aims to identify trends and key drivers of change in the EU transport and logistics sector with a particular focus on competitiveness, skills and working conditions. The report is based on a study of existing literature and statistics. However, it should be emphasised that literature on transport and logistics in terms of the employment aspect is limited.

Role of transport and logistics in Europe

The transport and logistics sector encompasses the transport of people and goods by rail, road, water, and air, including support activities such as warehousing.³

Access to transport by road, railway, sea and air is crucial to the mobility of passengers and goods, and hence crucial to economic development. In 2003, the average EU citizen travelled 12,092 km on land and 81% of this by car. Some 44%

² http://europa.eu/pol/trans/overview_en.htm

³ In statistical terms, the transport and logistics sector in this analysis is defined as Category H ‘Transport and storage’ in Eurostat’s Statistical Classification of Economic Activities in the European Community (NACE), Rev. 2 (2007) – excluding the postal activities under the universal service obligation (NACE 53.1). In accordance with the terms of reference, this report will use the term ‘transport and logistics sector’ as the analytical term for NACE 49–52.2 (Rev. 2) in order not to confuse it with the NACE definition of Category H ‘Transport and storage’.

of all goods measured in tonnes travel on road, while 90% of international freight transport is done by ship. In 2006, 13.3% of consumer expenditure went on transport. About one sixth of this sum was spent on purchasing passenger transport services and the remainder, €616 billion, was spent on private transport.

Most transport consists of road transport. Demand for land transport of goods in the 25 EU Member States before the accession of Bulgaria and Romania in 2007 (EU25) adds up to 2,318 billion tonnes per kilometre (tkm).⁴ Roads account for 72.6% of this demand and rail for 16.4%, according to data for 2005. Intra-EU maritime transport is estimated at about 1,484 billion tkm. Only 0.1% of freight transport was by air, corresponding to 2.5 billion tkm.

Demand for passenger transport, such as cars, buses, railways, trams and metro, amounted to 5,486 billion passengers transported one kilometre (pkm) in 2003. Intra-EU air transport amounted to 449 billion pkm and sea transport to 35 billion pkm.⁵

Importance of infrastructure

The infrastructure of road and rail in the EU25 supports transport activity. The EU25 is connected by 4.7 million kilometres of paved road and an additional 59,000 km of motorway networks, supporting the transportation of more than 215 million passenger cars and more than 30 million commercial vehicles in the EU.⁶ The rail network counts almost 200,000 km of railway.

However, the extent of railways is decreasing whereas roads are continually being extended. Hence, the European motorway network has grown by almost 25% over the past decade, and in the same period the length of railway lines has declined by more than 6%. The European Commission is concerned about the state of the railway services. Only 8% of goods were transported by rail in 2002, compared with 21% in 1970, and the average speed of international rail freight services has slowed to less than 18 km an hour (European Commission, 2002).

However, the number of kilometres of high-speed rail networks has increased by almost 80% over a 10-year period, rising from 2,386 km in 1995 to 4,238 km in 2004. High-speed rail networks allow speed above 250 km an hour at some point during a journey. Nevertheless, most Europeans still prefer to travel by car or – if travelling longer distances – by plane.

Some 27 airports in the EU carry more than 10 million passengers a year, and almost half of them (13 out of 27) are located in Germany, Spain and the UK. Demand for transport by air is growing rapidly.

⁴ Tkm is a unit of measure meaning 1 tonne transported a distance of 1 kilometre. Pkm is a unit of measure meaning 1 passenger transported a distance of 1 kilometre.

⁵ Alternative modes of transport such as cycling and walking are relatively limited if measured in terms of passengers transported one kilometre. However, measured in terms of the proportion of total trips, 20%–40% of journeys are travelled by bicycle or on foot, according to the European Road Safety Observatory's report *Pedestrians and cyclists* (2006), retrieved on 10 June 2007 from <http://www.erso.eu>. Since cycling and walking do not include any direct relations with the transport and logistics workforce, these transport modes will be excluded from the rest of this report.

⁶ According to the European Commission's White Paper on transport policy (2001), every day another 10 hectares of land are covered by new roads.

Imbalance of modes of transport

The imbalance between the various modes of transport has been increasing over the past decades, and the use of road transport has almost tripled. The number of cars in the EU had accumulated from 62.5 million cars in 1970 to almost 175 million by 2000. Most parts of Europe expect a further 5% to 15% increase in the number of cars. The situation with regard to railroads provides a contrast to such growth. Between 1970 and 1998, the proportion of goods carried by rail in Europe declined from 21.1% to 8.4%.

According to the Community of European Railways and Infrastructure Companies (CER, 2007b), 50% of international rail freight traffic is undertaken by national rail freight undertakings, implying that freight has to be transferred from one train to another at borders. In fact, 70% of the rail freight market transports goods by switching the wagons or groups of wagons from one train to another before reaching the final destination. The switching of wagons between trains is a costly affair in terms of logistics and human resources.

The result is that the rail freight market is losing market share to road freight. According to calculations from CER (2007b), a 1% market share loss results in more than six million additional lorry trips a year and a reduction of revenue to the rail subsector of almost €1 billion a year.

The European Environmental Agency (EEA) points to several reasons why rail modal share is low (EEA, 2007; European Commission, Directorate-General for Economic and Financial Affairs (DG ECFIN), 2007, p. 7).

- Despite congestion, road transport is on average still faster than other transport modes.
- ‘Just-in-time’ and ‘door-to-door’ deliveries require flexibility and reliability, which rail and water transport cannot offer, because they are still characterised by a certain rigidity that cannot match user needs. Even when other transport modes are used, road transport is often needed for the initial and final stages of the journey to the point of loading or unloading.
- Road networks are more developed than rail networks, which makes it more flexible and faster to send freight by road than by rail.
- Spatial planning makes a lot of economic activity only accessible by road. Furthermore, the average transport distance of goods (about 110 km per tonne) is more efficient for road transport than for rail and inland waterways.

Employment and working conditions

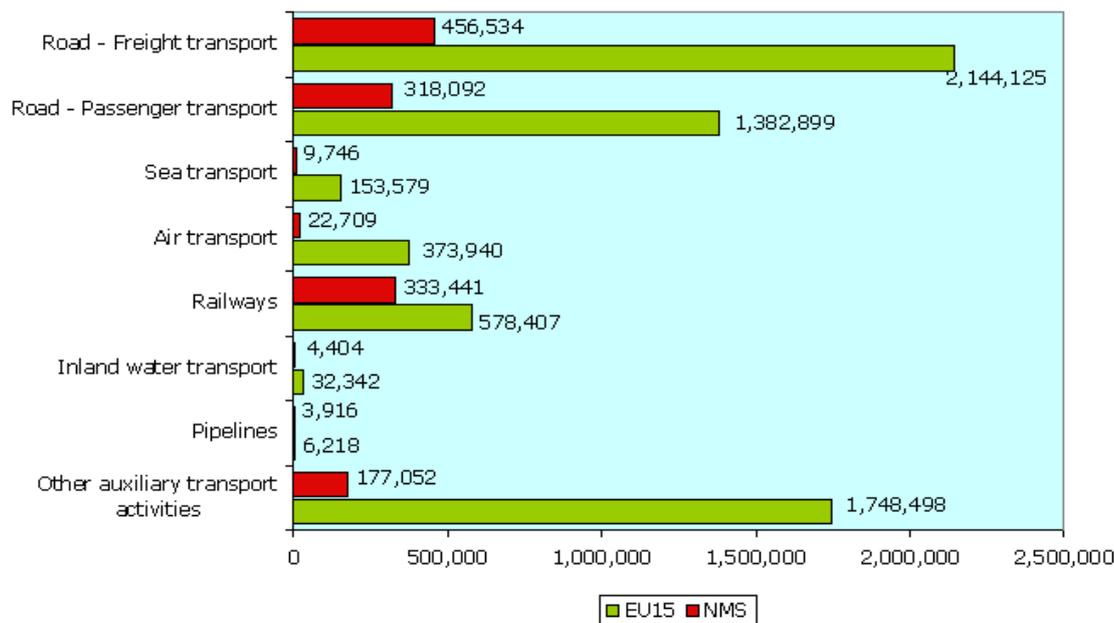
The transport sector is a major employer – particularly in road transport. The sector employed about 7.7 million persons in the EU25 in 2006: 68% work in land transport (road, rail and inland waterways), 2% in sea transport and 5% in air transport, while about 25% are employed in support services. The 15 EU Member States before enlargement of the European Union in 2004 (EU15) represent the largest share of those employed in the transport sector, with 89% of the total number of employees. Figure 3 shows the 2004 employment figures for the EU15 and the new Member States (NMS) according to mode of transport. Road freight transport is the largest employer, with more than 2.6 million workers.

After a long period of restructuring, employment is now stabilising, according to the European Commission’s mid-term review of its 2001 White Paper on transport policy (2006c). In some subsectors, such as rail and road transport, shortages of qualified personnel have appeared. Restructuring in itself need not necessarily lead to significant cuts in overall employment in the sector, but it tends to shift distribution of employment across companies and subsectors in ways that can affect many workers adversely.

Certain forms of deregulation have resulted in fierce competition exerting downward pressure on overall wage levels, although the total remuneration for specific employees is not always seen to fall, because of longer working hours and/or performance-based bonuses. The International Labour Organization (ILO) recognises that downward wage pressure tends to occur through a) negotiated concessions by core workers, and b) the proliferation of low-cost companies that absorb workers (at lower pay) who are laid off from the large companies that are squeezed by the competition. In the road freight subsector, an additional factor in wage pressure is the presence of workers who are enticed to become ‘independent’, that is, officially self-employed but economically dependent on one employer.⁷

Over the years, the amount of employment per unit of transport volume has steadily declined. This is mainly because of technological change, as well as gradually more relaxed work rules and the smaller size of crews in aviation and railways. An increase in the number of hours of active duty has also played a role in the case of long-distance road freight, despite efforts by national and supranational government entities to curb this trend through directives and legislation. Increased flexibility is demanded in occupational functions (multi-skilling) and working time arrangements. This has affected employment contracts – with more short-term or ‘on-call’ contracts, for example – as well as remuneration packages and, in some cases, health and safety.⁸ In the maritime subsector, lack of suitable workers from within the EU has contributed to an increase in the use of foreign labour.

Figure 3: *Employment, by mode of transport, 2004*



Source: Eurostat, cited in DG TREN, *Energy and transport in figures 2006, Part 3: Transport, 2006a. Economic activity according to NACE Rev.1 classification, excluding the category ‘Travel agencies and tour operators’*

⁷ <http://www.ilo.org/public/english/dialogue/sector/sectors/transp/wkingcond.htm>

⁸ <http://www.ilo.org/public/english/dialogue/sector/sectors/transp/wkingcond.htm>

The transport sector reveals a gender imbalance in relation to recruitment. Labour force survey data show that only 21.1% of the people employed in the sector in 2005 were women. In road transport, the female share of the workforce was only 13.9%. The transport sector age profile is also an issue of concern, with only 17.5% of the workforce in the 15 to 29 year age group and a further 57.5% are aged 30 to 49 years. Hence, future labour shortages in the transport sector will be primarily due to the high proportion of workers reaching retirement age.

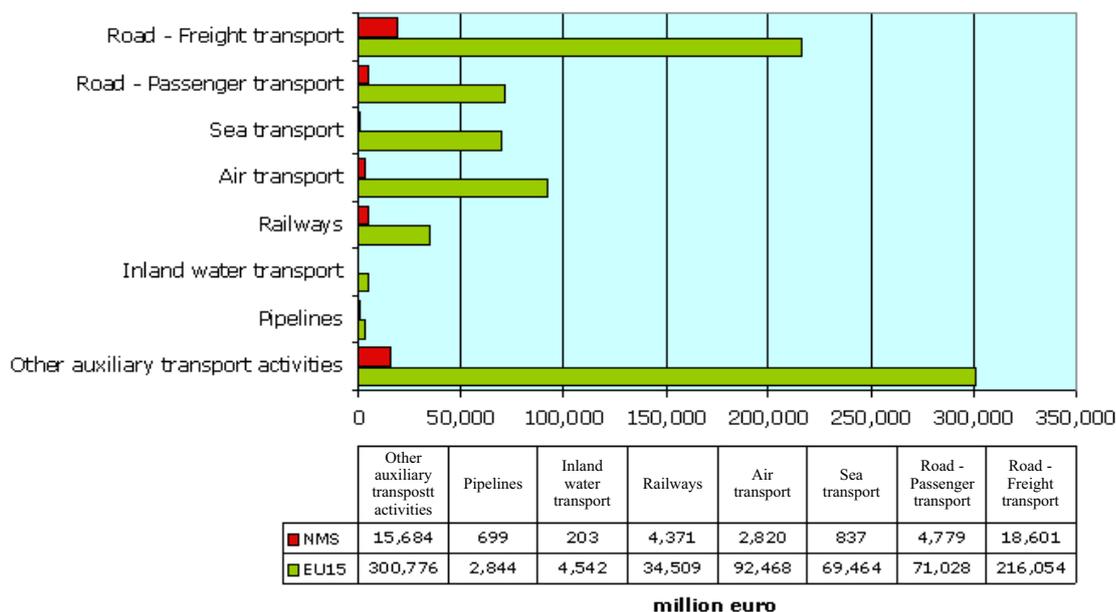
Economy of transport and logistics

The EU15 is responsible for 94% of turnover in the transport sector, which again reflects the correlation between GDP and demand for transport. Infrastructure is also fundamental to economic growth. Therefore, the transport sector of the NMS can be expected to expand as their economies grow.

The largest economic turnover is found in support functions such as cargo handling and storage, and not in actual transport of passengers or goods. In 2004, ‘Other auxiliary transport activities’ – which includes cargo handling and storage, other support activities and activities of other transport agencies – represented the largest turnover in the transport sector with a total of €316,460 million, equivalent to 38% of turnover in the sector (Figure 4).

The second largest mode of transport in economic terms is road transport, amounting to a total turnover of €310,462 million, where freight transport accounts for €234,655 million – corresponding to 28% of turnover in the transport sector. Air transport represents 11% of the total turnover, while sea transport represents 8% and railways account for 5% of turnover in the transport sector.

Figure 4: Economic turnover, by mode of transport, 2004 (millions of €)



Source: Eurostat, cited in DG TREN, *Energy and transport in figures 2006, Part 3: Transport, 2006a. Economic activity according to NACE Rev.1 classification, excluding the category ‘Travel agencies and tour operators’*

Economic activity measured by the number of registered enterprises is by far the highest in road freight transport. No less than 560,000 enterprises are registered in this subsector. Conversely, only 99 pipeline companies and only 560 railway operators are registered.

In the air transport industry, the UK is by far the biggest operator, with a turnover of €26,578 million (Table 1). France is the second largest operator with a turnover of €15,389 million.

In sea transport, Germany is the largest operator, with a turnover of €16,092 million, and Denmark the second largest, with a turnover of €13,901 million. Inland water transport is dominated by enterprises based in Germany and the Netherlands, with total turnovers of around €1,500 million each, compared with the third largest operator France, reporting a turnover of €558 million.

Table 1: Top 10 economic turnover, by mode of transport and country (millions of €)

Road freight transport		Road passenger transport		Sea transport		Air transport		Railways		Inland water transport		Pipelines		Other auxiliary transport activities	
IT	40,948	UK	15,082	DE	16,092	UK	26,578	DE	13,619	DE	1,548	IT	1,937	DE	66,601
FR	34,537	DE	14,068	DK	13,901	FR	15,389	UK	8,739	NL	1,443	DE	452	UK	51,918
UK	30,193	FR	13,364	UK	9,003	DE	10,780	IT	5,687	FR	558	PL	449	FR	49,625
ES	29,883	ES	6,906	IT	8,070	IT	8,884	PL	3,122	IT	298	AT	278	IT	35,345
DE	24,788	IT	6,213	FR	6,692	ES	7,754	ES	1,811	BE	268	HU	250	ES	25,820
NL	15,403	SE	5,659	NL	5,334	NL	7,650	AT	1,618	PL	139	UK	176	NL	15,296
BE	9,619	AT	2,786	SE	3,675	SE	2,852	SE	1,354	UK	128			BE	13,280
PL	7,408	NL	2,590	BE	2,641	AT	2,698	HU	967	SE	109			SE	11,826
SE	7,292	BE	2,206	FI	2,154	DK	2,560	FI	762	RO	99			AT	10,991
AT	7,231	PL	2,185	ES	1,492	BE	2,173	DK	360	AT	78			DK	7,413

Note: See Annex 2 for a list of country codes.

Source: Author's calculations, based on DG TREN, *Energy and transport in figures 2006, Part 3: Transport, 2006a*

Clusters of transport and logistics companies

A forthcoming study from the European Commission's Directorate-General for Enterprise and Industry will aim to identify European transport and logistics clusters.⁹ The present study has searched for clusters at the main gateways or transport hubs of transport: airports, harbours or border stations. Often, rail, road, air, sea and support functions are integrated at the main gateways of transport and a number of support functions are found around the gateways.

The main clusters in Europe are connected in the trans-European network for transport (TEN-T). This network consists of 30 main European transport routes; it includes all modes of transport and carries about half of all freight and passengers. One of the key objectives of creating such a multimodal network is to ensure that the most appropriate transport mode is chosen for each stage of a journey. TEN-T is continuously expanding, and by 2020 it will include 89,500 km of road and 94,000 km of railways, including about 20,000 km of high-speed rail lines suitable for speeds of at least 200 km an hour. The inland waterway system will amount to 11,250 km, including 210 inland ports, while the network also encompasses a further 294 seaports and some 366 airports.

⁹ The study is expected in April 2008 and can be found at http://www.ebusiness-watch.org/studies/sectors/transport_services/transport_services.htm.

Access to networks of sea, rail and air is a crucial factor for regional development. The regions with best accessibility are mainly located from Liverpool to London in the UK and from the Benelux countries southwards along the Rhine in Germany to northern Italy. Moreover, cities such as Madrid and Barcelona in Spain, Dublin in Ireland, Glasgow in Scotland, Copenhagen in Denmark, Malmö and Gothenburg in Sweden, Oslo in Norway, Rome and Naples in Italy, Athens and Thessalonica in Greece, Warsaw in Poland and Budapest in Hungary are central because of their international airports. Outside this central north-south axis, accessibility tends to be below average. The accessibility of international airlines is important for indicators on clusters, and the development of low-fare airline companies may change accessibility for some regions.

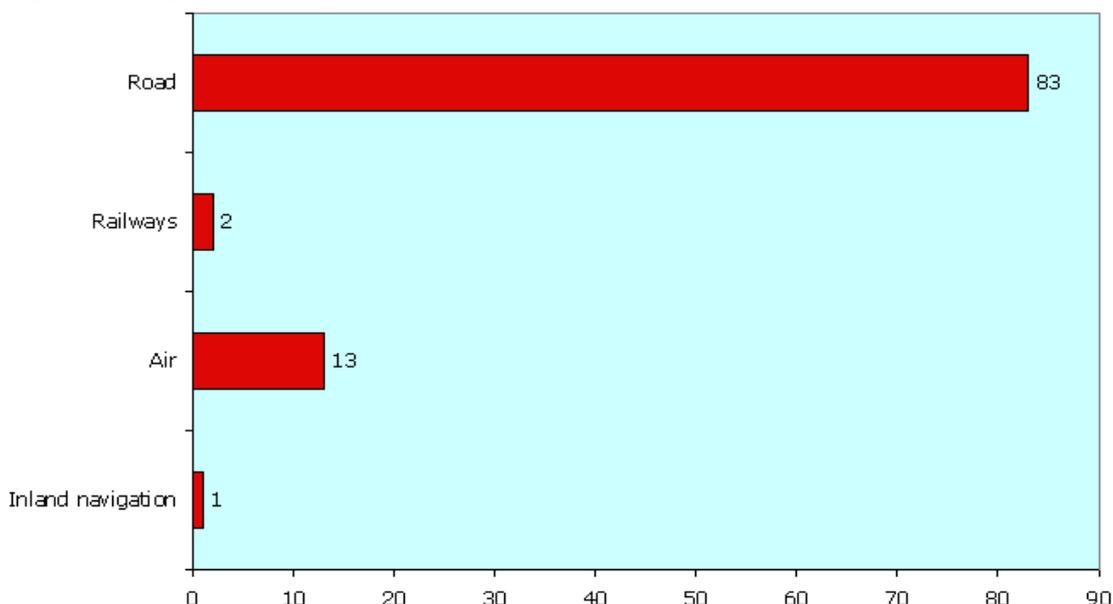
Transport and the environment

The transport sector is strongly dependent on oil supplies, and concerns about climate change combined with long-standing problems regarding congestion, noise and urban pollution – or oil spills at sea – have put environmental issues high on the political agenda. The European transport sector consumes 31% of all energy used – and road traffic consumes 83% of the energy in the sector. In contrast, railways are responsible for merely 2% of energy consumption in the transport sector (Figure 5).

Sustainable transport is an increasingly important issue in European politics – both on a European scale¹⁰ and on a national scale. The aims are to ensure energy security and at the same time to protect the environment and promote minimum labour standards.

In its 2007 report *Transport and environment: On the way to a new common transport policy*, the EEA concludes that ‘the environmental performance of the transport sector is still unsatisfactory. There is a need to intensify efforts to improve it, not least concerning the sector’s contribution to climate change’.

Figure 5: Energy use, by transport mode (%)



Source: Author’s calculations, based on DG TREN, 2006b

¹⁰ European Commission, *Keep Europe moving – Sustainable mobility for our continent*, Mid-term review of the European Commission’s 2001 transport White Paper (2006c).

Two key targets were set by the European Council in March 2007:

- A reduction of at least 20% in greenhouse gases (GHG) by 2020 – rising to 30% if there is an international agreement committing other developed countries to ‘comparable emission reductions and economically more advanced developing countries to contribute adequately according to their responsibilities and respective capabilities’.
- A 20% share of renewable energies in EU energy consumption by 2020 (European Commission, 2008).

Greenhouse gas emissions from the transport sector continue to grow and are responsible for 21% of total greenhouse gas emissions in the EU15. This figure does not include emissions from international aviation and maritime transport. From 1990 to 2004, greenhouse gas emissions declined in most sectors in the EU15 – except in domestic transport. Here, emissions increased by approximately 26% because of increased transport volumes (EEA, 2007). Maritime transport alone is responsible for 13% of the world’s total greenhouse gas emissions.

However, other harmful emissions are declining – especially in the transport sector – due to increasingly strict emissions standards for the different transport modes. Nevertheless, the air quality in cities does not meet the limit values set by the European Commission.

Safety and health issues

Road traffic is a dangerous business. In 1990, 70,628 persons were killed on European roads. By 2003, this number had declined to 42,203 persons in the EU25. During the same period, the number of cars in Europe increased by more than 100 million vehicles. Some 1.7 million people were injured in traffic accidents in 2003. Overall, the financial cost each year is calculated to be €160 billion or 2% of European gross national product (GNP), according to the European Commission’s 2001 White Paper *European transport policy for 2010 – Time to decide*. In comparison, 197 people were killed at sea, 116 people died in railway accidents and 12 people were killed in aviation accidents in 2003. Hence, a shift away from transport on road to other modes will very likely imply fewer traffic accidents. Moreover, policy measures such as intelligent transport systems, safe new vehicles and protection of vehicle occupants are designed to increase safety on the roads.

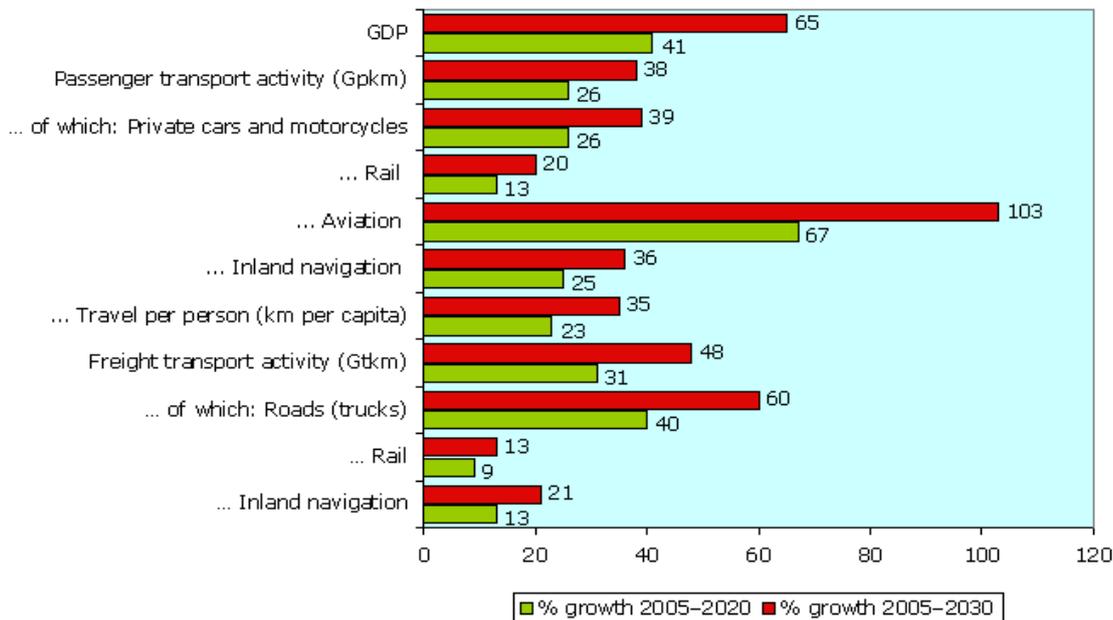
Emissions from transport also cause thousands of premature deaths and health problems in Europe. A literature overview from the World Health Organization (WHO) reveals that transport workers such as tunnel officers, short-bus drivers, taxi drivers and lorry drivers have a significantly increased risk of numerous diseases and health problems. These include arteriosclerotic heart disease, stomach cancer, lung cancer, bronchitis, emphysema, asthma and coronary heart disease, with variations across sub-sectors of employment (Krzyzanowski, Kuna-Dibbert and Schneider, 2005).

Expected growth in transport towards 2030

The main challenge for the transport sector and society is the increasing and continuing growth of the use of transport. Figure 6 reveals that all modes of transport appear to be expanding, along with GDP (European Commission, 2006c; De Ceuster et al, 2005). Where it occurs, growth in transport activity above growth in GDP is highly significant because it diverts from the decoupling hypothesis predicting that GDP growth will exceed transport activity growth. Air transport will see substantially higher growth than both GDP and other modes of transport, while growth in road freight transport is expected to almost reach GDP levels.

In fact, the only mode of transport that is expected to decline over the coming years is public road transport services, with a figure of -1% growth by 2020 and -4% by 2030.

Figure 6: Expected EU25 transport activity growth, by mode, 2005–2020 and 2005–2030 (%)



Note: Gpkm = 1 billion passenger-kilometres; gtkm = 1 billion tonne-kilometres.

Source: Author's calculation, based on DG TREN, *European energy and transport: Trends to 2030 – update 2005, 2006c*

Trends and drivers of change

The following section distinguishes between political, economic, environmental, sociodemographic and technological trends and drivers of change in the transport and logistics sector in Europe. Each aspect will end by summarising in a table the trends and drivers of change, and their potential consequences for the workforce.

Political trends and drivers

Transport policy is becoming ever more important in Europe and an efficient, sustainable and safe transport system is regarded as integral to achieving the aims of the Lisbon Strategy, set at the Lisbon European Council of 23–24 March 2000. European transport policy is formulated in the European Commission White Papers on transport from 1992 and 2001, and in a mid-term review of the latter in 2006. The 2001 White Paper emphasised the need to improve the sustainability of transport whereas the mid-term review focused on optimising use of the different modes of transport, on their own or used in combination.

Liberalisation and harmonisation of railway services

Political initiatives are particularly important for the development of adequate railways because the development of this subsector is not driven by economic growth and individual preferences to the same extent as the road transport subsector (OECD, 2006). Particularly for railways, deregulation and increased competition will be on the agenda in the coming years. The opening of the freight rail markets was due to the first and second railway packages. The third railway package will enhance internationalisation of rail markets and this could spur freight by rail.¹¹ Internationalisation of the rail market carries the potential to increase competitiveness, interoperability and market access. Insofar as this leads to better, cheaper and more flexible services, it could increase demand for transport by rail.

¹¹ Experience from Member States with open rail markets shows a link between the liberalisation process and an increase in freight by rail (European Commission, 2006c).

European transport corridors

Infrastructure is increasingly being planned and discussed at EU level. The EU promotes major transport infrastructure projects across Member State borders, the so-called trans-European networks (TENs). Among the priority TEN projects are:

- the removal of bottlenecks on the main east-west inland waterway linking the Rhine, Main and Danube;
- a programme to regulate traffic on the busy shipping lanes off the EU coasts;
- north-south and east-west rail upgrades.

The emphasis on major cross-European transport corridors can be expected to be a continuing driver of change in the future, highlighting the need for cross-border planning and internationalisation of the transport labour market.

Liberalisation of air markets

Air markets are in a process of liberalisation. The Open Skies Aviation Pact adopted on 22 March 2007 denotes the full liberalisation of air travel between the US and the EU in March 2008, and the pact carries the potential for more transatlantic air traffic and increased competition. A similar trend is the establishment of the European Common Aviation Area (ECAA) that integrates EU Member States, Norway, Iceland, Switzerland and partner countries in south and east Europe. Since these ECAA countries have agreed to adopt European Community (EC) legislation and regulation on aviation, the agreement carries extensive opportunities for dynamic development of the aviation industry across 36 countries. Moreover, the agreement is continually being expanded to include more neighbouring countries.

Open Skies agreements like these constitute important drivers of change in terms of increasing supply of affordable and flexible air routes. Hence, liberalisation as a driver of change in aviation could very well add to the existing trend of aviation as a growing industry.

EU enlargement

The accession of the NMS in 2004 and 2007 is expected to create an even larger transport sector as EU enlargement should spur economic growth in the NMS and enhance mobility of passengers and goods within these countries and across the borders between the EU15 and the NMS. The implications are very likely to include significant growth in car ownership and increased demand for freight transport.

Liberalisation of road freight transport

By 2009, cabotage (carriage of goods within one country by a haulier from another country) will be open to the NMS (European Commission, 2006c). Moreover, as part of the EU Action Programme for reducing administrative burdens, the Commission has suggested easing documentation obligations in road transport (European Commission, 2007b). One of the aims of this proposal is to harmonise the monitoring process across Member States (European Commission, 2007d).

More sustainable transport modes

Bottlenecks, congestion and pollution have put transport sustainability on the European transport agenda. As part of this agenda, the EU aims to boost the more sustainable transport modes, that is, trains, bicycles, walking and ferries, and reduce the use of roads (European Commission, 2006c; Statistics Denmark, 2006, p. 37). The use of freight by road constitutes a particular challenge in this respect because it is one of the few areas in which transport growth has not been decoupled from economic growth.

Political efforts to change the balance between transport modes can be expected to continue in the future, as long as environmental issues and problems such as congestion remain unresolved. While the modal shift is sought, it is also important to increase the efficiency of trucks by improving their routings, increasing their loading factors and reducing their empty running.

International and regional liberalisation of trade

The completion of the internal market has increased regional trade in Europe and therefore demand for freight transport has grown. The movement towards lowering trade barriers also happens internationally in terms of World Trade Organization (WTO) agreements and continuing negotiations. The recent accession of China to the WTO is of paramount importance in this respect. International liberalisation of trade is likely to remain an important driver of change in the future, even if new WTO agreements are not concluded.

Table 2: *Political trends and drivers of change*

Political trends and drivers of change	Consequences for the workforce
Liberalisation and harmonisation of railway services in the EU	The need arises for cross-border education and training. This is partly addressed by the third railway package, which introduces a European rail driver’s licence. However, liberalisation and harmonisation might also trigger the need for pan-European training of other groups
European transport corridors	Labour markets will be internationalised. Increased need will arise for skills and competencies enabling the workforce to work in an international environment
Liberalisation of air markets	In the maritime and aviation subsectors, common certification systems are being developed. However, it is important to emphasise the need for further international regulation in this area because EU regulation could inhibit the competitiveness of EU-based operators
EU enlargement	Increasing demand for transport arises but also increased labour supply. This could put downward pressure on wages in the EU15
Liberalisation of road freight transport	The proposal for harmonisation of the monitoring process of road transport will enhance working conditions of road transport workers by raising the standards of professional qualifications
Changing the balance of transport modes	A political focus on the need for intermodality also means that there is a need to develop the skills of professional transport managers as regards organisation and integration of intermodal freight transport (De Ceuster et al, 2005, p. 39). A shortage of bus drivers and railway personnel (drivers and engineers) could inhibit the political aim to change the balance of transport modes towards buses and railways
International and regional liberalisation of trade	Increasing demand arises for transport and transport workers, but labour markets also become more vulnerable to fluctuations in international markets

Economic trends and drivers

Economic growth and transport growth are closely associated and interdependent. Infrastructure is fundamental to economic growth, but economic growth also affects the demand for transport. Economic characteristics such as energy prices, labour costs and economic integration affect demand for transport and the relative distribution of demand for different modes of transport.

Economic growth

Economic growth increases demand for freight and passenger transport and there is every reason to assume that this tendency will continue (OECD, 2006; EEA, 2007; Infrastrukturkommissionen, 2007). This issue is particularly critical following accession to the EU as most of the NMS are experiencing real GDP growth rates of 6%–12% (DG ECFIN,

2007).¹² The Organisation for Economic Co-operation and Development (OECD) even finds that car ownership has increased at a faster pace than personal income in recent years and contends that a 1% increase in GDP boosts passenger traffic by 0.6%–1.4%. Economic growth also raises personal income, which in turn increases demand for consumer goods and hence freight of goods. According to the OECD, a 1% increment in GDP is accompanied by an increase in freight transport of 0.7%–1.5% (OECD, 2006). Moreover, economic growth is expected to continue in the next 10 years in the 27 EU Member States (EU27) and the highest growth rates will presumably be seen in the NMS for the years ahead. Affluence will not only raise demand for freight transport and increase daily commuting distances, it will also boost demand for air transport for leisure.

Globalisation of trade and production

Increasing integration of national and regional economies into the world economy requires more transport (EEA, 2007, p. 13; European Commission, 2006c, p. 5). Globalisation of the world economy means that production costs are now more important than transport costs, particularly in industries with a high labour input (EEA, 2007, p. 13). Moreover, the production process itself is increasingly spread across several countries and continents, and this ‘fragmentation of production’ (Jones and Kierzkowski, 1990; Jones, Kierzkowski and Lurong, 2005) spurs international demand for transport even further. The movement towards an economy based on services could potentially diminish freight transport’s share of GDP (OECD, 2006; Infrastrukturkommissionen, 2007, pp. 13–14). However, this tendency is mitigated by the substantial growth in international and interregional trade, which increases demand for freight transport (see also debate in McKinnon, 2002, pp. 19–21). Furthermore, a service economy requires more intensive passenger transport (OECD, 2006).

Oil prices

The process of globalisation is fuelled by low energy prices and thus easy access to transport. In some industries, rising energy prices – and higher oil prices in particular – will make it less attractive to outsource the production of goods. Oil prices are projected to increase between 2010 and 2030 (DG TREN, 2006c, p. 19). And thus, the global division of work and transportation that thrives on low energy prices are at the same time one of the causes of rising oil prices. The average price in 2007 amounted to \$73/barrel and already in 2008 the peak has gone beyond \$100/barrel.

Sourcing of labour

As regards road freight transport, outsourcing mainly takes place within the EU. As economic growth increases in the NMS, so do wages and this could foreshadow outsourcing to EU neighbour countries such as Ukraine and Belarus. Subcontracting makes it possible for north and western European-based companies to use cheap labour while escaping strict regulations on working conditions. For workers in countries with relatively lower wages, such as Poland and the Czech Republic, this constitutes an opportunity to achieve higher wages than a local company can offer. However, the trend also raises questions regarding the working conditions and rights of these workers and the potential shortage of labour supply for Polish-based companies which may be unable to attract the necessary labour.

¹² As European societies become richer, the cost of transport becomes less decisive in choosing means of transport (EEA, 2007, p. 10). Hence, insofar as the car still constitutes the most flexible means of transport, the use of it is growing and people are commuting longer distances in their cars (DG ECFIN, 2007). According to economic theory, transport’s share of income is constant, which means that if income grows people will increase their spending on transport proportionally. Other writers (Zahavi in Crozet, 2005) note, however, that the income effect is somehow compensated by the limited individual time budget. This effect can be seen in Figure 1, where the passenger transport grows slightly less than the GDP and the freight transport slightly more than GDP. However Figure 1 leaves a strong impression of a growing GDP and growing transport (Crozet, 2006, Time and passenger transport, ECMT, 2005 http://halshs.archives-ouvertes.fr/docs/00/19/45/83/PDF/ECMT_CROZET.pdf)

Localisation decisions

Decision variables regarding where to localise transport and logistics companies are rather similar to those of other companies, namely, labour costs, business clusters, capital and supply of labour – including the supply of labour with the necessary skills. Questions regarding localisation decisions will be discussed in more detail in a separate report in this series on the transport and logistics sector.

Table 3: *Economic trends and drivers of change*

Economic trends and drivers of change	Consequences for the workforce
Economic growth	Increased demand for all modes of transport carries the potential to increase demand for labour in the transport and logistics sector
Globalisation of trade and production	Globalisation necessitates improved education in transport and particularly logistics. The European Council has emphasised this by asking the European Commission to improve lifelong learning and the education of logistics personnel and recognition of qualifications across Member States
Oil prices	If oil prices go up, it will primarily affect oil intensive industries such as air and road. Hence, demand for labour in these areas will decrease
Sourcing of labour	Outsourcing of transport business from richer parts of Europe to poorer parts could raise demand for transport workers (drivers) in the latter regions, while reducing demand in the outsourcing countries. This could imply two counteracting tendencies: better wages for central and eastern European transport workers and lowering of working standards
Localisation decisions	Increasing importance of transport clusters and specialisation could raise demand for specific skills and lifelong learning

Environmental trends and drivers

A strong link emerges between economic growth and transport volume but unfortunately also a strong link between transport volume and pollution. Transport is responsible for 28% of EU CO₂ emissions, and 84% of these emissions stem from road vehicles (European Commission, 2003b, p. 12). Hence, increasing emissions from the transport sector constitute a paramount challenge if the EU is to meet the target of reducing CO₂ emissions, as these are in fact rising constantly. Other environmental issues in the transport sector are noise and land use.

To the extent that policymakers will succeed in encouraging a shift in transport demand from road and air transport to more sustainable modes of transport, such as rail and sea, this will affect the workforce.

Shifting to sustainable transport modes

Road transport is expanding and dominates the transport market at the expense of rail transport. Rail transport and sea transport are traditionally thought of as being the environmentally sound choices, but not in all cases, as the EEA states in its 2007 report. Policymakers are discussing the possibility of adopting economic incentives to make people use public transport rather than their cars, and further policy awareness in this field is anticipated. The pricing of transport can encompass car taxes, energy taxes, road pricing, congestion charges and parking fees, as well as direct subsidies to sustainable transport modes.

Technological solutions

Controlling emissions, improving vehicle efficiency and development of alternative transport fuels bring some hope of technological solutions. However, technology improvements alone cannot solve the problems within the foreseeable future, but only reduce the magnitude of the problems (EEA, 2007, p. 28). Nevertheless, ongoing and rapid technological development is likely to continue in the future, and this carries perspectives for improved energy and resource efficiency.

Working environment

The general wealth in society has led to considerable focus on the working environment and this trend is also seen in the transport sector. Issues like violence and health and safety now feature high on the agenda among trade unions, and future demands from transport workers are likely to include various suggestions concerning the working environment.

Congestion in cities

European metropolises such as London, Paris, Rome, Stockholm and Athens suffer from a constant and accumulating growth in transport, particularly on roads. However, other cities also experience congestion.¹³ In the cities, this leads to a high demand for more efficient urban transport systems such as bicycles, metro, buses and trams. This trend towards diversified demand for transport is expected to continue in the future.

Table 4: *Environmental trends and drivers of change*

Environmental trends and drivers of change	Consequences for the workforce
Shifting to sustainable transport modes	Success of the political aim to shift the balance of transport modes will necessitate adaptability and training of the workforce
Technological solutions	Alternative fuels, reduced emissions and more efficient vehicles could reduce the pressure on a shift in transport modes – thus continuing the growth in road transport. This would imply more employees in the road subsector and fewer workers in the rail subsector
Working environment	Transport workers will demand better working conditions related to a better working environment. Issues like health and safety and violence are already on the agenda
Congestion in cities	Diversification of transport demand requires transport workers for public transport such as the metro, tram and bus. Moreover, political attention to intermodality in cities could imply a growing demand for logistics personnel

Sociodemographic trends and drivers

Changes in the demographic structure of the European population and changes in lifestyle and preferences will influence demand for transport – and the ability of the transport sector to meet that demand.

Demographic changes and labour shortages

Healthier living, better housing and working conditions, advances in medical technology and low fertility imply that the European population is ageing – and thus also the age of the average transport worker. This demographic trend exacerbates existing shortages of transport labour, particularly engineers (Danish Technological Institute (DTI), CAS and Lloyds Register Rail Europe B.V., 2007; Wilson, Homenidou and Dickerson, 2006). Hence, future labour market policies will have to work actively in the areas of: recruitment of new groups of people, particularly women; human resource management; and strategies to retain older workers.

Importing labour – migration

Labour shortages in the transport sector and open borders increase the mobility of labour, and migration from the NMS to the EU15 has proliferated since accession. Geographic mobility is a major policy challenge for the EU. Too little mobility may mean reduced adaptability and competitiveness; by contrast, too much mobility – between the poorer

¹³ The boom in the housing markets of most European cities is probably contributing to increased congestion as still more citizens are commuting between suburbs/towns and larger cities (Infrastrukturkommissionen, 2007, p. 18).

regions of eastern Europe and richer parts of northern and western Europe – may create tensions in national labour markets. For both the receiving and sending regions, a high level of mobility is a continuous challenge to social cohesion and economic performance within the regions and also between regions, in other words, attempting to balance a possible ‘brain drain’ versus ‘brain gain’.

Recruiting labour

Working in the railways or working as an engineer used to be an attractive high-status job, but this is likely to have changed. Currently most European countries are experiencing difficulties in recruiting sufficient numbers of students for transport-related education and staff for existing positions. The challenge for governments and the industry will be to change the image of the sector, and perhaps the work organisation in the sector itself will have to change to be sufficiently attractive (Sørensen and Piester, 2006). The lack of skilled employees is seen across the sector: aviation lacks pilots and engineers, railways lack drivers and engineers, the maritime subsector hires labour from Asia and bus companies lack bus drivers. Existing problems with labour shortages are expected to continue in the next 10 to 15 years.

Table 5: Sociodemographic trends and drivers of change

Sociodemographic trends and drivers of change	Consequences for the workforce
Demographic changes and labour shortages	<p>The demographic changes will be reflected in the composition of the workforce in the transport sector. The sector must find new groups to recruit. Hiring older people and people from other sectors will compel the sector to look at new ways of training and lifelong learning initiatives.</p> <p>Transport is a male-dominated sector with women only representing 25% of transport sector employment. Gender mainstreamed recruiting strategies will have to be considered</p>
Importing labour – migration	<p>Substantial differences in wages and working conditions between the NMS and the EU15 impel social partners to establish dialogue. Increasing mobility of the workforce across Member State borders and third-country workers from outside the EU requires social skills as regards working in a multicultural environment.¹⁴</p> <p>Migration of workers from the NMS will probably decline in the future as wage differences are already diminishing. On the other hand, this might imply import of labour from third countries</p>
Recruiting labour	<p>Labour shortages will very likely impel trade unions to demand higher wages and better working conditions in the future; in order to accommodate labour shortages, employers will probably have to meet some of these demands</p>

Technological trends and drivers

Road congestion, noise, energy prices and air pollution will make alternative transport systems more attractive in the future and technological development carries the potential to make this feasible.¹⁵ Rapid technological development requires a workforce with adaptable and flexible skills. On the other hand, modern technologies also require specialised and highly skilled personnel. These two counteracting trends pose serious challenges for future education and training in the transport sector.

¹⁴ In the 2007 report Rail training 2020 by DTI, CAS and Lloyds Register Rail Europe B.V., data show that the internationalisation of rail training is limited and that this could pose a potential challenge for future rail training.

¹⁵ See, for example, <http://faculty.washington.edu/~jbs/itrans/>

Alternative powering technologies

The transport sector represents 70% of European oil consumption, and alternative powering technologies are essential for environmental, resource and security reasons. Only fundamental changes in behaviour and transport structure can deliver sustainable solutions (DG TREN, 2005).

Cleaner technologies, such as new successful alternative powering technologies, more efficient engines or improvement in the standards for gaseous emissions and noise, can contribute to a more sustainable transport sector. Several powering technologies can influence the transport sector by substituting part or all of the use of fossil fuels, such as the following innovations.

- **Bio fuels.** Bio fuels are becoming more common on the market and the EU is currently seeking to agree on a common bio fuels policy.¹⁶
- **LPG.** Liquid propane gas (LPG) and compressed natural gases (CNG) are still limited to niches of the market but contribute to security of supply and job creation (EEA, 2007).
- **Hydrogen.** The future of hydrogen is as yet uncertain as technical problems remain. If these issues are resolved, this could be a source of renewable energy.
- **Solar energy.** Teams of engineers are competing in solar car races every year – see <http://www1.wsc.org.au/>, the home page for the world solar challenge.
- **Electricity.** The electric car and electric motorcycle are already in production. See <http://www.evworld.com/>, where a number of variations are shown. Tax systems and the necessary infrastructure have to be in place for the technology to spread to a wider market.

It is difficult to assess the future development and uptake of technology in society. However, technologies are evolving rapidly and social partners and governments must be aware of future changes in skills needs as a result of these developments.

Intelligent infrastructures evolving

Technologies for intelligent and efficient use of existing roads, rail and motorways, and of seaport and airport infrastructure are emerging. Standardisation of new technologies such as radio-frequency identification, Galileo and the global system for mobile communications (GSM) ease cross-border traffic, make logistics and handling of goods more efficient, and improve just-in-time deliveries. Moreover, these technologies could also ease congestion in cities. New and emerging technologies include the following:

- **RFID.** Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders – a wireless bar code. The RFID technology has many perspectives and holds the promise of advanced supply chain management and logistics. RFID is already applied in passports and identity cards, for payment of transportation, and product tracing in the automotive industry. RFID tags are often envisaged as a replacement for Universal Product Code (UPC) or European Article Number (EAN) barcodes. However, RFID is also associated with higher costs and it could take several years before the technology is sufficiently advanced to have a fundamental impact on transport and logistics.

¹⁶ The EU directive on the promotion of bio fuels dates from 2003 but transposition to the Member States has yet to be seen.

- **Galileo.** This is a satellite navigation system built under authority of the EU and enhances precision in navigation compared with the existing Global Positioning System (GPS). Galileo was originally expected to be in use by 2010 but is now subject to delays. Nevertheless, the Galileo system will offer numerous transport applications in controlling, monitoring, signalling and passenger information services. Galileo could also boost the competitiveness of railways compared with other modes of transports because it will be possible to reduce safety distances between trains and thus increase train frequency.¹⁷
- **Track and tracing.** Web-based systems that give access to centralised, real-time logistical information such as shipment tracking and speed-to-market performance are already in place. This increases visibility of inventory and transportation activity throughout supply chains.
- **EDI.** Electronic Data Interchange (EDI) for processing shipment-related transactions, quoting, tracking, inventory and shipping records, as well as customised reports, and demand-planning tools are becoming essential instruments in the area of logistics.
- **ERTMS.** The European Rail Traffic Management System (ERTMS) is the European substitute for all national control-command systems and communication systems. The European Train Control System (ETCS) is the new control-command system and the Global System for Mobile communications – Railway (GSM-R) is the new radio system for voice and data communication. ERTMS is intended to be the new signalling and management system for Europe, enabling interoperability throughout European rail networks. It is expected to be in certain corridors by 2009 but a full implementation in Europe is probably not within reach in the next five to 10 years. The introduction of a European system will ease cross-border operations and facilitate competition across the sector in the longer run. Standardisation of components implies that maintenance workers will have to be trained in replacing rather than repairing.
- **Intelligent transport systems.** Information and wireless communications technology will be applied to transport infrastructure and vehicles. The result will be better management of vehicles, loads and routes to improve safety and reduce vehicle wear, transportation times and fuel consumption. Examples of use could be automatic toll collection on pay roads, intelligent road signs or automatic emergency calls. Other intelligent systems could include automated highways with driverless cars and platooning, where cars are coupled and drive very close together. Although such systems have been tested, development seems to be more on automation of cars than automation of infrastructure.
- **Automation.** Europe's first driverless metro opened in Lille, France in 1983 and since then driverless trains have become widespread. In aviation, flight planning, crew briefing and aircraft scheduling are jobs that are increasingly being taken over by information technology (IT) systems. Engine rooms in ships are controlled by computers and some container terminals operate entirely without labour. Tickets for airlines and trains are sold over the internet. Hence, IT and automation means that, although technical expertise is required, a number of job functions are becoming obsolete and people need retraining.

¹⁷ The website (<http://www.intelligentroads.org>) for the global navigation satellite system (GNSS) introduction in the road sector (GIROADS) explains the advantages: 'Through GPS and the European Geostationary Navigation Overlay Service (EGNOS), satellite-based intelligent transport systems (ITS) already constitute an important component of the global answer to the challenges raised by increased personal and freight mobility. In a matter of years, the integrity, continuity, accuracy and availability provided by the GALILEO satellite system will open the doors to new ways of reducing the negative impact of road transport while at the same time offering new services to a wide range of stakeholders.'

Emerging transportation technologies

New transportation technologies are constantly discussed and proposed, and some of the suggestions have the attention of infrastructure decision makers.

- **High-speed trains.** The most prominent evolution in the new future is the development of high-speed trains running across Europe at speeds reaching 320 km an hour. High-speed railways in Austria, Belgium, France, Germany, the Netherlands and Switzerland have joined to form Railteam. A number of technical issues and language complications still have to be resolved, but the trains have the potential of taking some business from airlines and the road (Economist, 5 July 2007). High-speed trains require that railway staff gain new skills.

Developing new and unconventional transport systems can take a long time. New transport modes are emerging in a more distant future and cannot be expected to influence the markets in a five to 10-year perspective.

- **Smart cars.** Proposals for vehicle automation have been around for decades. Automating the guidance of cars is attractive for utilisation of highway space and safety. Smart cars of the future will use advanced technology to perform such functions as automatic cruise control, lane departure warnings and correction, hazardous object avoidance, driver awakenings, position and satellite monitoring, self-parking and driverless transportation (www.future-car.net). Emerging transport telematics technologies offer many possibilities for improving vehicle control, comfort and safety. New materials and nanotechnologies will reduce weight and energy use. Promoting the development of cars that are smarter, safer and cleaner is part of the EU 'European Information Society 2010' (i2010) strategy to boost growth and jobs in the digital economy.
- **RUF.** The Rapid Urban Flexible (RUF) is a system where electric vehicles can drive on normal roads or on top of a monorail for longer distances. A substantial part of the system is automated and the system design promises higher efficiency in transport, low energy use and increased safety. (See <http://www.ruf.dk>)
- **Superbus.** Delft University of Technology in the Netherlands has developed a superbus, which switches seamlessly between ordinary roads and dedicated supertracks. The bus reaches speeds of 250 km an hour (Economist, 2007). The project plans to unveil a fully functional prototype at the Beijing Olympics in 2008.
- **Maglev.** Magnetically levitating (maglev) trains are already operating in Shanghai, China, at speeds of up to 430 km an hour (<http://www.maglev.de>). Germany plans to build a 37 kilometre stretch of maglev tracks from Munich Central Station to the airport. The train will travel at up to 450 km an hour (<http://www.magnetbahn-bayern.de/ENGLISH/english.html>).

Table 6: *Technological trends and drivers of change*

Technological trends and drivers of change	Consequences for the workforce
Alternative powering technologies	A widespread use of alternative powering technologies does not seem likely in the near future. Change in infrastructure will eventually reduce the number of workers needed to produce, store, distribute and sell fossil fuels – and increase the number of people needed to establish, produce, store, distribute and sell alternatives
Intelligent infrastructures evolving	<p>More skills will be in demand. New technologies in infrastructure imply that people will have to be trained to use modern equipment and navigation systems.</p> <p>Technical skills will be in demand. To a number of workers, this will be a challenge and require training not only in using the new equipment but also more basic IT skills or even reading and maths skills. Increased international rail transport requires a solution to the language issue.</p> <p>Language skills will be in demand. International standards increase the demand for cross-border traffic and thus also for workers with better language skills.</p> <p>Automation or accessible user interfaces may curtail the demand for the level of skills</p>
Emerging transportation technologies	Except for high-speed trains, most new transportation technologies seem to lie far in the future. The use of high-speed trains requires intensive training of drivers and rail personnel, especially in cross-border driving

SWOT in the transport and logistics sector

SWOT analysis is a tool used to evaluate the strengths, weaknesses, opportunities and threats in a given area – in this case in the transport and logistics sector. SWOT is a creative tool for generating possible recommendations by asking and answering each of the following four questions, many times: How can we use each strength? Stop each weakness? Exploit each opportunity? And defend against each threat?

Identification of SWOTs is essential because subsequent steps in the process of recommendation to the European Monitoring Centre on Change (EMCC) are derived from the SWOTs. The SWOT below is developed for the transport and logistics sector as a whole because several issues cover more than one mode of transport. Specific modes of transport are mentioned where specific issues exist.

Table 7: *SWOT analysis*

Strengths	Weaknesses
<ul style="list-style-type: none"> • The demand for services in the transport and logistics sector is rising with the growth in the European and global economy. • The importance of a European-level social dialogue is already on the political agenda. • Freight and transport corridors for road and rail across Europe are on the European Commission agenda. • European recognition of skills is on the DG TREN agenda. • Europe holds a strong position in global sea freight transport. • European transporters have strong knowledge and experience of transportation. • Liberalisation of air markets, including travel between the EU and US, means more competition and opportunities for new handling agents at airports and different airlines competing for customers – and for workforce. • Liberalisation in railways creates many new companies and new job opportunities for the workforce. • In railways, the road subsector and support functions, more jobs are becoming multifunctional. This calls for a wider set of skills, which could lead to more ‘interesting’ jobs. 	<ul style="list-style-type: none"> • A slow penetration of new technologies means that the transport and logistics sector is slow to reap the corresponding benefits. • Infrastructure is a decisive factor for the localisation of many transport companies. However, infrastructure changes slowly and decisions in this regard are expensive and difficult to revert. • Language barriers impede cross-border traffic, particularly for railways. Although infrastructure and technologies are taking shape, the question of language and national tradition might slow the process even more. • Decision makers and social partners for the transport and logistics sector often have a national focus – especially on railways – which limits the benefits of a free international labour market. • In a time of rising demand for services and shortages of labour supply, flexible working hours, new technologies and later retirement ages climb up the agenda. However, relaxing well established rights may prove impossible. • Jobs will be more demanding and stressful because of higher expectations and a multifunctional aspect. • In the rail subsector, training facilities may have the capacity for training people but, with shortages of workers, the trainer job may end up being unattractive. Recruiting sufficient numbers of qualified trainers is difficult in the railways and maybe other transport modes as well. • Increased competition and new technologies demand lifelong training. Training facilities may not be ready for this task and the market signal of what is needed must be clear. • Concise information, data and statistics on skills needs in the sector are sparse in most European countries. This makes it difficult for training centres to deliver workers with the right skills. • New skills combinations may cross traditional sectors, which might require a reorganisation of the background social organisations.

Table 7: SWOT analysis (cont'd)

Opportunities	Threats
<ul style="list-style-type: none"> • Technologies to improve efficiency, safety and the environment in both freight and passenger transport are known and under development. However, implementation may take a long time. • Technical systems such as Galileo, RFID and ERTMS hold the future promise of more international work in the transport and logistics sector. • Shortage of labour supply leads to demands for higher wages among workers and better working conditions. Higher wages are considered an opportunity from the perspective of workers. • Economic growth and higher income, combined with new technologies, mean better working conditions in many sectors and improved occupational health and safety. • New skills require a service orientation, adaptability to new technologies, ability to think logically and troubleshooting. More jobs will require reading skills, IT skills, communication skills and the ability to work in teams with people of the opposite sex, with different ethnic backgrounds or a different mix of skills. 	<ul style="list-style-type: none"> • The change in the demographic structure means a shortage of skilled workers. • A shortage of workers in the transport and logistics sector means that the demand for services cannot be met efficiently. Blue-collar and white-collar workers are in demand. • Shortage of labour supply leads to demands for higher wages and expenses towards better working conditions. These represent threats from the perspective of employers. • Congestion and the climate debate increase the likelihood of a changed political agenda in the transport and logistics sector, with incentives diverting from road and air to the railway subsector. • Liberalisation of markets triggers national demands for more protectionist regulation. • Migration and outsourcing may put established levels of wages and working conditions under pressure. At the same time, this solves the problem of a shortage of workers. • While east-west migration might help the transport sector in the west, it is creating labour shortages in the NMS. • Railways are under great competitive pressure from both road and air transport. Even high-speed inter-region trains may come under pressure from low-fare airlines. • Automation and ICT means that some blue-collar and middle technical level jobs become obsolete, while engineers are in demand. • Gender, age and ethnicity issues call for greater attention to the cultural values and learning environment in companies. • Oil prices are expected to rise; sudden and high price increases could put air and road transport under pressure. • Wage conflicts in one transport mode reduce competitiveness in relation to other transport modes if passengers and customers have other options. • National regulations hinder road transport efficiency when, for example, traffic rules prevent drivers from one country driving trucks from a second country in a third country.

Recommendations

Attracting workers

Demand for services in the transport and logistics sector is rising; at the same time, the existing workforce is retiring and the potential workforce is increasingly looking for jobs and education in other sectors. This diverging situation is already putting transport companies under pressure. The workforce dilemma might turn out to be a more pressing issue to be solved than designing new technological systems or infrastructure. The social partners in rail, road, air, sea and support functions could discuss the issue in an effort to find solutions to the following questions.

- What type of measures can be taken at EU policy level and among the social partners at EU, national and company level to convince the existing workforce to remain in work longer with retraining, better and more flexible working conditions, or different pension schemes?

- What type of measures can be taken at these same levels to convince potential workers to pursue a career in the transport and logistics sector? The potential workforce consists of young people currently seeking education and training in other sectors.
- By which means can groups other than men aged 25–50 years be recruited to work in the transport and logistics sector? Many countries are in the process of implementing systems and processes to recognise competencies achieved through informal and non-formal learning. Could that be the way forward and, if so, what role could the European social partners play?

Measures should be agreed to encourage employers to adopt new ways of management and to improve the work environment and working culture more broadly in order to widen the recruitment base. Employers must consider how to make their companies and working cultures attractive for new types of transport workers, namely, women, people from other sectors and ethnic minorities.

Improving skills

Workers are increasingly expected to be more flexible to deliver in multifunctional roles, cope with new technologies and maintain a service orientation at constantly higher levels of skills. On the one hand, numerous studies show that this requires new ways of managerial management and work organisation practice. On the other hand, the sector has to be more efficient in order to encompass national, regional and international competition. Hence, the social partners must discuss how to secure workers' training, retraining and the money for time and training.

Multifunctional jobs can create more interesting roles and new career paths. However, they can also be more stressful if too much is demanded or if employees lack the appropriate qualifications. A clearer understanding of the evolution of job functions and their specific content must be provided in order to improve the relevance of training opportunities. Definitions of different tasks should be developed and discussed.

Training facilities and educational institutions are essential but they cannot provide the right set of skills if a lack of information exists on the competencies needed in the transport and logistics sector. Indicators and competence demand must be described at regional level and for each transport mode. Moreover, methods for early identification of skills needs for each transport mode must be put into practice where relevant and also in a transversal manner in order to encompass eventual new job functions that arise from technological development and sector convergence. The degree of information and data today on sector forecast skills requirements is insufficient and unsatisfactory. The social partners and the educational sector should discuss this issue.

Lack of trainers might be a problem in the railway subsector and possibly other areas as well. The social partners and policymakers could address this issue.

The EU Seventh Research Framework Programme supports research on greener and smarter transport with a budget of €5.2 billion over seven years. However, if investment in better transport technology shall truly have an impact on society, it is also vital for the EU to consider the uptake and diffusion of new transport technologies in society. Hence, cooperation between research, innovation, industrial, education and employment policies is recommended to ensure that the labour force has adequate skills for the new technology and that workers already in the transport industry can be retrained in accordance with new technological developments.

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Annex 1: List of relevant international organisations

Directorate-General for Energy and Transport (DG TREN), European Commission

European Commission

Intergovernmental organisations

Convention concerning International Carriage by Rail (COTIF)

European Civil Aviation Conference

European Conference of Ministers of Transport (ECMT)

European Transport Safety Council

Institute for Energy, Joint Research Centre of the European Commission

International Civil Aviation Organization (ICAO)

International Maritime Organization (IMO)

Organisation for Economic Co-operation and Development (OECD)

Trans-European network for transport (TEN-T)

World Trade Organization (WTO)

Worker organisations

Aircraft Engineers International

European Cockpit Association (ECA)

European Transport Workers' Federation

International Federation of Air Line Pilots' Associations

International Federation of Air Traffic Controllers' Associations

International Federation of Air Traffic Safety Electronics Associations

International Federation of Trade Unions of Transport Workers

International Labour Organization (ILO)

International Transport Workers' Federation (ITF)

Employer organisations/Non-governmental organisations

Airports Council International (ACI)

Air Transport Action Group (ATAG)

Air Transport Association (ATA)

Civil Air Navigation Services Organisation (CANSO)

Community of European Railways and Infrastructure Companies (CER)

International Air Carrier Association (IACA)

International Air Transport Association (IATA)

International Road Federation (IRF)

International Road Transport Union (IRU)

International Union of Railways (UIC)

Annex 2: List of country codes

EU15 15 EU Member States prior to enlargement in 2004

NMS 10 new Member States that joined the EU in 2004 (CY, CZ, EE, HU, LT, LV, MT, PL, SI, SK)

EU25 15 EU Member States, plus the 10 NMS

EU27 25 EU Member States, plus Bulgaria and Romania, which joined the EU in 2007

EU27

AT	Austria	DE	Germany	NL	Netherlands
BE	Belgium	EL	Greece	PL	Poland
BG	Bulgaria	HU	Hungary	PT	Portugal
CY	Cyprus	IE	Ireland	RO	Romania
CZ	Czech Republic	IT	Italy	SK	Slovakia
DK	Denmark	LV	Latvia	SI	Slovenia
EE	Estonia	LT	Lithuania	ES	Spain
FI	Finland	LU	Luxembourg	SE	Sweden
FR	France	MT	Malta	UK	United Kingdom

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