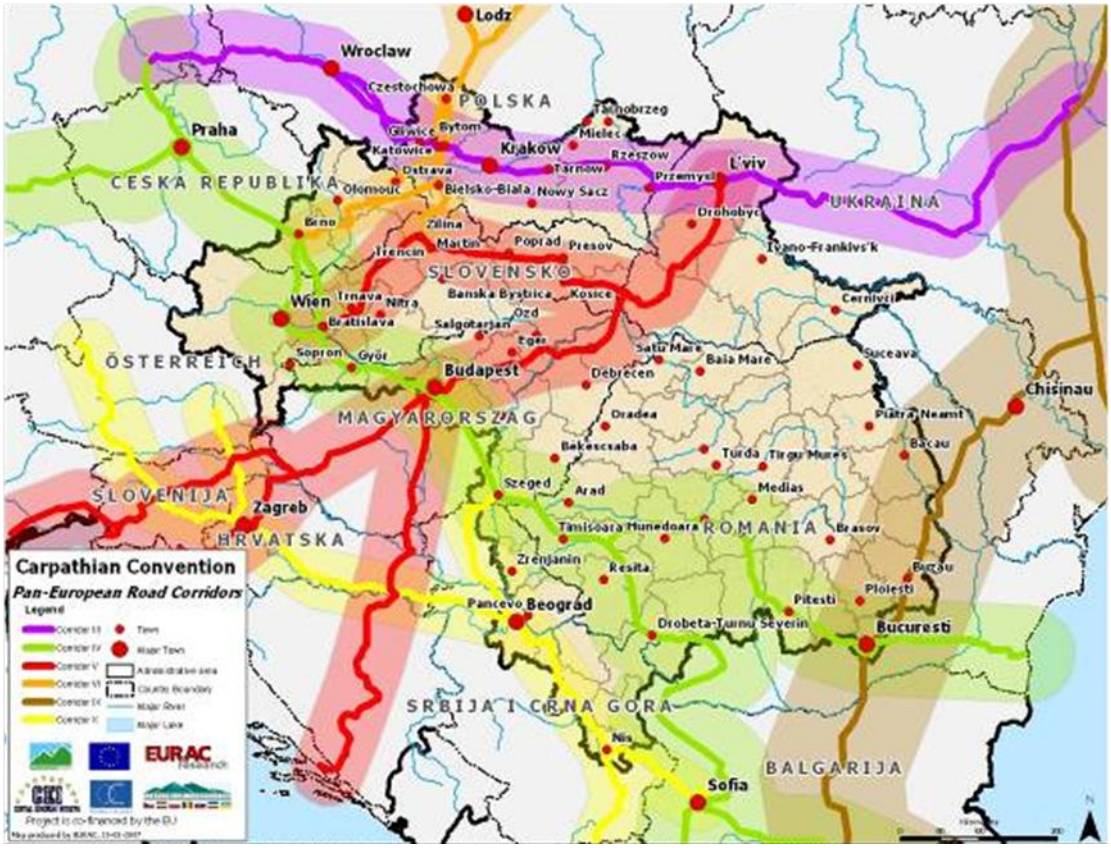
CARPATHIAN CONVENTION

CEI
CENTRAL EUROPEAN INITIATIVE

OVERVIEW ON TRANSPORT SYSTEM IN THE CARPATHIAN SPACE



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This study is the product of the data collected so far within the limits of the project.

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EXECUTIVE SUMMARY

The present study aims at providing a general outlook on the main features of transport system in the countries being Parties to the Carpathian Convention. General considerations on the situation of transport in the Carpathian region and its impact on the environment are presented. An on-site mission in the Carpathian region was also performed in order to collect further information and data. Present day limitations to – as well as possibilities of further development of – transport in the Carpathians are here presented. The study aims at analyzing the transport network in the Carpathians with a focus on environmentally sensitive areas. On the basis of the identified problems of the Carpathian transport system, the study identifies the actions needed to assure the infrastructural functionality of the transport network and to improve urban and tourist accessibility of the Carpathian region in order to promote an approach which is participatory, a socio-economic development which is balanced, and new development opportunities for local communities of the region.

Furthermore, the study collects, compiles, summarizes and suggests appropriate actions to limit the environmental impact of infrastructure and to develop advanced transport management systems. In particular, it addresses the two main issues of expanding international traffic flows towards the East and preserving the natural beauties and outstanding sceneries offered by the Carpathian region. The study highlights the need to develop a multimodal network in the Carpathian countries in order to assure not only better accessibility standards, but also to develop sustainable and environmentally friendly mobility systems within the most valuable natural and tourist areas. The analysis of the situation of the Carpathian transport system provides for the bases for possible intervention strategies and recommendations.

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INTRODUCTION

Carpathian Convention: Article 8 – Sustainable transport and infrastructure

1. The Parties shall pursue policies of sustainable transport and infrastructure planning and development, which take into account the specificities of the mountain environment, by taking into consideration the protection of sensitive areas, in particular biodiversity-rich areas, migration routes or areas of international importance, the protection of biodiversity and landscapes, and of areas of particular importance for tourism.

2. The Parties shall cooperate towards developing sustainable transport policies which provide the benefits of mobility and access in the Carpathians, while minimising harmful effects on human health, landscapes, plants, animals, and their habitats, and incorporating sustainable transport demand management in all stages of transport planning in the Carpathians.

3. In environmentally sensitive areas the Parties shall co-operate towards developing models of environmentally friendly transportation.

Article 8 of the Carpathian Convention promotes the development of a sustainable transport system in the Carpathians. It affirms that the Parties to the Convention shall "take into account the specificities of the mountain environment". On the basis of this article, on the one hand, transport policies should promote an efficient transport system, aiming at guaranteeing accessibility in the Carpathian region and at promoting freight and passenger traffic flows, meeting the economic and social needs of the region; on the other, transport policies should take into consideration also the environmental needs and should minimize the harmful effects of freight and passenger traffic on the Carpathian environment. They should also pay special attention to sensitive areas, which are considered as important heritage for both present and future generations[1]. In these areas, the Carpathian Convention promotes international co-operation among the Parties aiming at developing environmentally friendly transport systems.

This study aims at analyzing the transport network in the Carpathians with a focus on environmentally sensitive areas. On the basis of the identified problems of the Carpathian transport system, the study aims at identifying the needed actions to ensure the infrastructural functionality of transport network and to improve urban and tourist accessibility of the Carpathian region in order to promote balanced socio-economic development. Furthermore the study compiles, summarizes and suggests appropriate actions to limit the environmental impact of infrastructure and to develop advanced transport management systems.

This study is the product of the data collected so far within the limits of the project and can, of course, be further improved.

An overview of the Carpathian transport and mobility system and of the policies, plans and programs applied in the Carpathian countries was developed. In addition, specific case studies were carried out, aiming at analyzing the accessibility to environmental sensible areas in the Carpathian space.

[1] A Heightened Perspective Regional Assessment of the Policy, Legislative and Institutional Frameworks Implementing the Carpathian Convention, REC, EURAC, December 2007.

1. GENERAL CRITICAL ANALYSIS

With EU enlargement, Central and Eastern European countries have increased their exchanges with Western ones. The development of an efficient transport system, including advanced transport services and appropriate infrastructure endowment, is an asset to respond to the increasing needs of passengers and trade.

The Carpathians, due to their peculiar location and shape, represent a natural barrier to the development of East-West networks; however, Carpathian mountain environment is an outstanding resource for the development of tourism and leisure activities.

When dealing with the issue of mobility in the Carpathians, it is essential to consider two basic needs: to expand international traffic flows Eastwards and to preserve the natural beauty and outstanding sceneries offered by the Carpathian region, also with the purpose to create new development opportunities for local communities (e.g. in the tourist sector).

In other words, the development of the transport network (highways, main roads, railways, etc.) crossing the Carpathians could be of great importance for the economic growth of the new EU member countries and a good opportunity for bettering security on Carpathian roads and making areas of tourist or natural interest easier to reach. In fact, diverting international trade transports on the new highways of TERN Corridors could dramatically reduce traffic on other roads, to the advantage of local and tourist traffic, particularly in the mountain districts.

The matter is actually to develop a multimodal network in the various Carpathian countries to assure not only better accessibility standards, but also to develop sustainable mobility systems within the most valuable natural and tourist areas.

There are several issues that need to be considered and faced:

- Lack of coordination of transport services of the various Carpathian countries;
- Transport demand composed of different displacement typologies (residential, working, commercial, tourist, long-and-short route), insisting on the routes, also due to a modal integration that is subject to improvement (road - rail and rail - inland navigation). These routes usually are not endowed with infrastructural capacity and geometric features.
- Road safety standards in the Carpathian countries are still not always in line with EU-15 standards: they are often low from a structural point of view and further decreased by the coexistence of different types of traffic on the same routes;
- Tourist and natural areas are generally not easy to reach, due to the lack of infrastructure (the existing one is usually prone to bottlenecks) and the lack of mobility management services;
- Local public transport plays an important, but decreasing, role also thanks to newer shuttle-bus services;
- The construction of greater highways is being realized in the framework of the TERN Corridors policy, mostly financed by the EU; new corridors can facilitate the transit of international traffic in developing areas (with some positive economic and social effects); however, they can have a high environmental impact in some areas near to natural parks (particularly Moravska Beskydy, Oravska Beskydy, Mala Fatra Narodny Park, Tatransky Narodny Park, Uzans, in the Ukranian sector of the Carpathians and in the Sibiu region in Romania).

The analysis of the critical situation of the transport system in the Carpathians provides the bases for possible intervention strategies and recommendations that were elaborated by EURAC under the guidance of the Working Group on Sustainable Industry, Energy, Transport and Infrastructure of the Carpathian Convention[2]. These recommendations have been addressed to the Implementation Committee of the Carpathian Convention as a background document for its information and consideration, in preparation of the second meeting of the Conference of the Parties of the Carpathian Convention, which will take place in Bucharest, on 17-19 June 2008.

RECOMMENDATION N. 1: OPERATIVE EFFICIENCY OF ROAD AND RAIL NETWORK

To assure infrastructural functionality to transport network

Finalization of rail and road axes in progress, according a functional concept favouring links with trans-European network

Strategic priority for intermodal systems (rail-road and rail-inland navigation), by well connected logistic platforms on the main operative loop of the integrated network

Permeability of trans-European infrastructures by a optimal accessibility standard (rail stations, motorway intersections, road links to the local and urban network, river free ports)

Road, rail and inland navigation lines must be planned in a manner that is rational and functional to trans-European axes; at the same time, road-rail and rail-inland navigation intermodality must be prioritized through logistic platforms placed strategically within the network and properly connected; the permeability of trans-European infrastructure must be optimized through an adequate planning of accesses (train stations for railways, intersections for highways, river free ports for inland navigation).

RECOMMENDATION N. 2: ENVIRONMENTAL IMPACT

To limit the environmental impact of the infrastructural network

Concept and operative layout of new infrastructures and facilities taking account to the negative effects on environment

Building of new infrastructures and facilities favouring the permeability among different ground sections and safeting the bio-diversity, particularly on Carpathian Natural Parks

Environmental impact must be considered from the first steps of planning for infrastructure change. These considerations must take regard of the special needs of the mountain environment, particularly in areas of sensitive landscapes, with endangered and protected species, especially those of special interest for tourism (e.g. green bridges). It is recommended to possibly favour the development of rail over rail infrastructure.

[2] See the Terms of Reference of the Working Group, as approved in their final version by the Implementation Committee of the Carpathian Convention at its first meeting held in Sibiu, Romania, 2-4 April 2008.

RECOMMENDATION N. 3: SUSTAINABLE MOBILITY MANAGEMENT

To adopt management systems for sustainable transport

Application of automated and integrated traffic management system finalized to the control, regulation and selection of traffic, also with the support of ITS – Intelligent Traffic System

Application of solutions like:

- Traffic calming system, with specific layout of road sites, finalized to the separation of different typologies of mobility and the safety of road traffic;
- Parking and traffic limited areas, with "park & ride" facilities linked by low-emission bus shuttle.

A transport system that integrates the different transport modalities must be promoted and the use of transport modes other than road transport could also be favoured so to reach this goal. Traffic management and controlling systems could be introduced in order to regulate traffic, also with the support of ITS (Intelligent Traffic System) systems. Traffic and parking limitations could be enforced in certain areas, while "park and ride" facilities (including shuttle busses) could be considered and promoted in other areas. Models of environmentally friendly must be developed for environmentally sensitive areas.

RECOMMENDATION N. 4: IMPROVEMENT OF ACCESSIBILITY STANDARD

To improve urban and tourist accessibility

Resolution of bottlenecks to the urban entry roads, finalised to improve the accessibility standard reducing congestion and the following gas emissions

Better organisation of bus services, optimising frequency, reliability and comfort, also renewing the fleet of vehicles

Better organisation of signal and traffic light systems, finalised to guidance of flows inside the tourist and environmental interest Carpathian areas

Bottlenecks near urban and tourist areas should be reduced near urban and tourist areas, so to improve the standards of accessibility, as well as to reduce the negative environmental impact of the gas emissions of traffic jams. Rail transport could be improved in order to achieve this result.

RECOMMENDATION N. 5: IMPROVEMENT OF SAFETY STANDARD

To improve safety standards

Reduction of incident rate by the Euro-standardisation of road capacity, above all inside the urban and semi-urban loops

Functional separation of vehicle traffic from pedestrian and bike mobility, by specific separated tracks

Sidewalks and bicycle paths should be further developed, especially in urban areas, while the pavement and traffic signs should be improved to enhance the safety standards of the road network.

Figure 1: Route E75, Cadca-Jablunkov, cars and trucks traffic overlap: speed is set by trucks[3]

In the present document we will analyze, at first, the general aspects (railway system, road and highway system, public transports, local traffic) of transports in the Carpathians and then, in detail, the infrastructure system and the functioning of transport systems as well as related political choices and scheduling.

[3] Source: CSST (the source of all photographs included in this study is CSST)

2. TRANSPORT SYSTEM AND MOBILITY IN THE CARPATHIANS

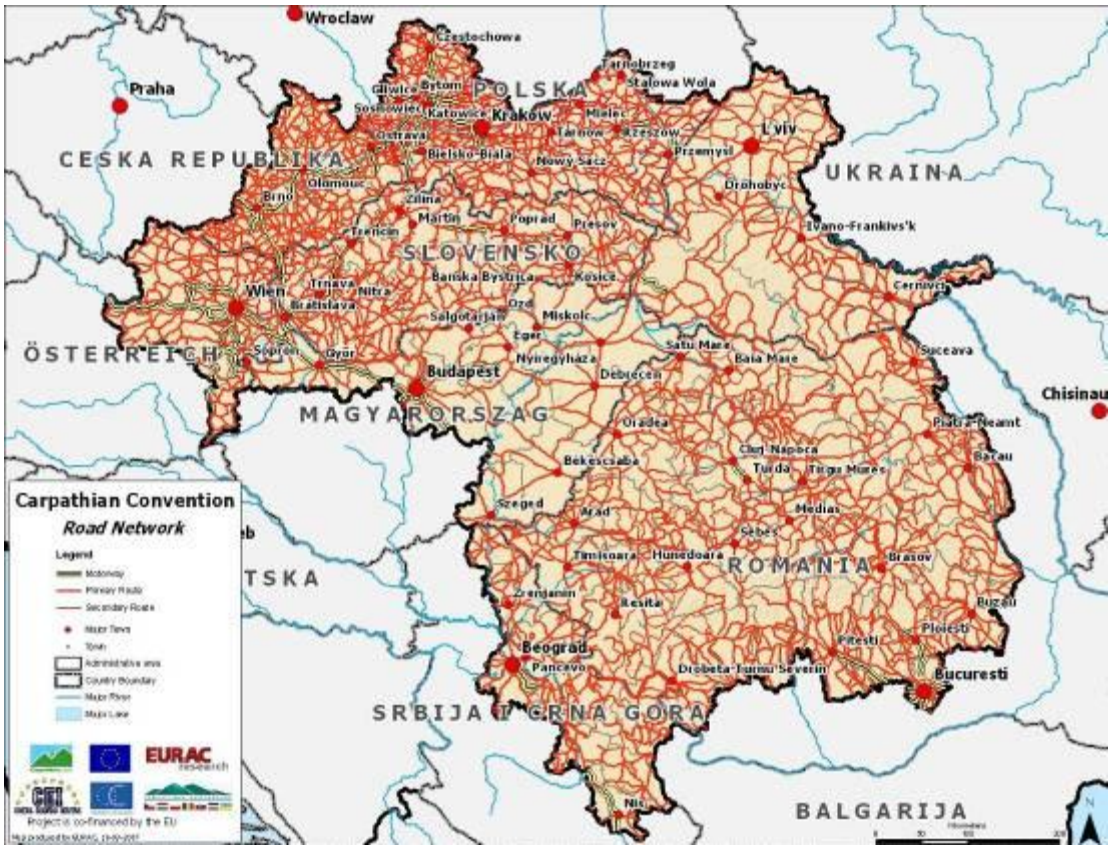

Figure 2: Carpathian Convention Road Network (Source: EURAC)

2.1 ROAD AND HIGHWAY SYSTEM

Two major Corridors (number 5: line Bratislava-Zilina-L'viv, and number 6: lines Katowice-Bielko Biala-Zilina and Katowice-Ostrava-Brno) cross the Carpathians, while other two Corridors lie respectively in the northern (number 3: line Katowice-Krakow-L'viv) and in the southern part (number 4: a line almost entirely crossing the Romanian territories of Timisoara, Sibiu and Bucharest) of the region. The above mentioned Corridors are multimodal, wherein the modal split is favourable to roads, along which about 70% of goods are transported (see: CSST; Master plan data of Poland, Rumania and Czech Republic).

Along these Corridors, technical characteristics and quality of road facilities change from a tract to another. In fact, along the same road some tracts look like highways (two roadways with two/three lanes for each direction), while other tracts look like simple roadways (with one lane for each direction).

In a working day about 20,000-25,000 vehicles run, in the two directions, on the roads of the two main Corridors, particularly along the lines Katowice-Bielko; Biala-Zilina and Katowice-Ostrava-Brno. On this route about 20-40% of the total traffic consists in freight. The Rumanian trans-Carpathian Corridor (route E 60: Oradea-Julia-Sibiu-Pitesti) is crossed by 15,000 vehicles per day. On this route about 25% of the total traffic consists in freight (see: Sectia Traffic, 2006).

This traffic runs on roads that mostly have only one lane for each direction (each 8-9 meters wide), that cross numerous villages and towns and it is not only long-distance freight traffic but also local and tourist traffic. A fact, clearly, that causes heavy problems to people living in the area.

20,000[4] vehicles per day cross the trans-Carpathian Corridor 6, which is along the route E75, that joins Cadca (Slovakia) to Jablunkov (Poland) and Bytca (Slovakia) to Roznov (Czech Republic), a road that lies on a mountainous region and crosses many towns and villages.

Figure 3: Road junction in Cadca

According to on-site observations[5], present road conditions are likely to ease a markedly higher number of car accidents than on the entire trans-European road network (TERN) system.

Freight traffic along Corridors 5 and 6 is progressively increasing as a consequence of the increased industrialization (in large part due to automobile industries: FIAT, GM, Toyota, PSA) of the Ostrava-Zilina-Bielsko Biala area. This forces to plan the construction of infrastructures adequate to the increasing traffic, especially in the north-east/south-west directions.

[4] Source: CSST on-site mission 2007
[5] Source: CSST on-site mission 2007

Figure 4: Route Bielsko-Zilina: high traffic due to automobile industry

Even if there is less traffic than in Corridors 5 and 6, the same problems exist for Corridor 4, joining Budapest to Constance (Black Sea) crossing the mountainous area of Hunedoara, Sebes and Sibiu. These roads are absolutely inadequate to the traffic needs and have a high level of car accidents.

In consideration of these problems and in order to ameliorate the situation of the traffic, works are presently in progress on the two more important Corridors, number 5 and 6. They consist in completion of the highway Povaska-Milowka, line Bratislava-Zilina-Bielsko Biala, and completion of the highways Zilina-Liskova and Vazec-Presov (in the Carpathian territory of Slovakia) and Uzhorod-Kosice (in the Ukrainian-Slovak area).

Completing these traffic systems is also likely to reduce the traffic on the nearest (very crowded) roads as well as that of other important roads, like the tract Cadca-Bystrice, route E75, on the Czech-Slovak pass. This reduction is then likely to result in an abatement of road traffic pollution produced along the the other routes, at present overloaded.

Unfortunately, frequently the new highways appear to be highly disfiguring the natural scenery, particularly in the areas of Beskydy Morava (Skalite), Javorniky (Bytca) and to the south of Tatra Park (Batizovce). Infrastructures having a strong visual impact on the land-scape, which could in turn result in an environmental impact of traffic should be accurately designed and properly assessed in terms of costs and benefits possibly arising from them.

Figure 5: Highway in construction: strong environmental impact (Corridor 6 – Poland-Slovakia line)

Figure 6: Highway in construction: strong environmental impact (Corridor 5 – Povaska Bystrica – Zilina line)

Figure 7: Carpathian Convention Rail Network (Source: EURAC)

2.2 RAILWAY SYSTEM

The most important trans-European corridors include the major railways. At present, railways play an important role in the modal split of passenger and freight traffic, with mean quotas larger than those, for example, of the railway lines that cross the Alps.

The central role played by railways in the Carpathian traffic is also a consequence of the social and productive shape of the region, inheritance of the collectivism, typical of the socialist Countries[6].

The new political order in the Carpathians and the opening to the market is producing an increase in freight and passenger traffic and, as a consequence, an increased importance of road systems. However, still 30%[7] of freight and passenger transport in the Carpathian area is railway transport, an important quota if one considers the low quality of trains, railway stations and so on.

[6] In the communist period railway network to a total length of 106,100 km by 1940. During World War II the railway system was central for moving military personnel, equipment and freight. Later the Soviet railway network was re-built. It covered more than 145,000 km of tracks. Still today the Russian economy is more rail-dependent than any other large country in the world (World Bank, 2005) and a similar situation can be found in the countries which were exposed to Soviet influence in the Twentieth century.

[7] T-NEG – Transportation in new EU-Members Countries - General research network for harmonization and integration (September 2003).

Instead, according to our observations, conveyance of passengers has a good standard of punctuality and reliability, especially in the double track lines at the border between Poland, Slovakia and Czech Republic (Trencin-Olomouc, Zilina-Cesky Tesin) or in the Ukrainian line Turka-Velijkyi-Berenznyj-Uzhorod[8].

Figure 8: Railway line in Bystrice (Czech Republic)

The need of a modal integration of transport systems and the aim of privileging the long distance railway transport has caused a relevant multiplication of railway lines connected with the newly industrialized areas and of intermodal terminals in the Carpathian area.

Figure 9: Kia Motors plants railway connection in Zilina (Slovakia)

Consequently, some railway stations near Carpathian mountain passes are gaining strategic importance for the distribution of goods along the railway network. This fact, however, in many stations, for example that of Skalite, line Zilina-Bielsko Biala, causes problems in passengers' conveyance.

[8] CSST on-site mission 2007.

Figure 10: The freight railway station of Skalite (Slovakia-Poland pass)

2.3 LOCAL BUS TRANSPORT SYSTEM

Official statistical data are not available yet, but it is possible to estimate that local public transportation by bus is still one of the most important ways to travel in the Carpathian area, particularly in the case of commuters and students. This can be linked both to the local social-economic conditions and to the history of the region that for many years was ruled by socialist governments, where the "collective" service was very important.

Bus transport, still very convenient and widely present in the region, can play an important role in maintaining a modal split balance, limiting a shifting towards the use of private cars.

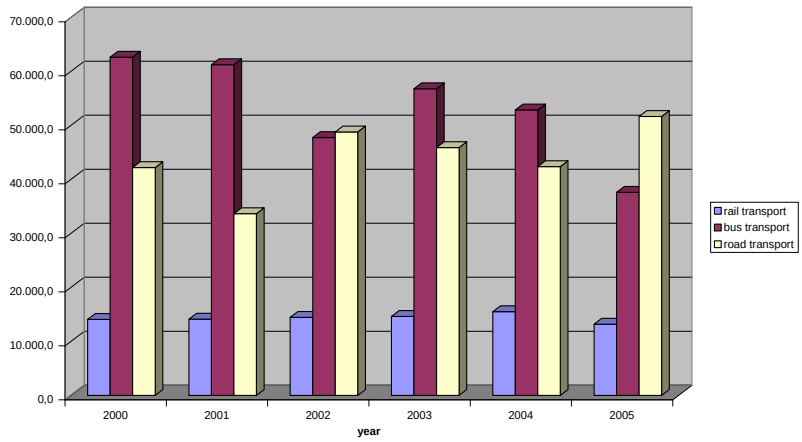

Figure 11: Passenger transport within the region - Moravskoslezsky region (Source: CSST elaboration on the basis of Transport Policy of the Czech Republic for 2005 - 2013)[9]

For example, see the evolution of passenger transport within the region – Morasvskoslezsky between 2000–2005 (thousands passengers)[10].

[9] Reference: Czech Republic, Ministry of Transport July 2005 – from http://www.mdcr.cz/NR/rdonlyres/F961328B-473A-4FA8-9167-76AE5ADD5846/0/DPanglickaverzeFINAL.pdf
[10] Source: Poland Transport Yearbook 2006

The liberalization of bus services currently ongoing in the Carpathian countries has brought a rationalization of the business costs, which did not yet result in turn in better bus services to less populated areas in the Carpathians.

However the new market conditions increased the diffusion of new public transport means and services. In particular the so called "micro-bus" services started working especially in Romania, Ukraine and Slovakia: these buses have got 9-15 seats and provide a service which is appreciated by the local communities, being actually able to satisfy the local demand for displacements and to assure better comfort standards, speed and capillarity compared to the traditional bus services available in these areas.

Mini-bus services are more expensive than traditional ones for customers, though their success is increasing. Many different services can be delivered by these new companies which represent a concrete alternative to the use of private cars. The services commonly provided by micro-bus managing companies are the following:

- Collective taxi on urban and metropolitan routes;
- Outliers' routes services on low-traffic flows routes (e.g. some Carpathian routes);
- Route services on national and trans-European routes;
- National and trans-European "on call-services"

Through an extensive use of different kinds of public transport, there is the possibility to avoid a critical situation that characterizes the Alpine region: the clear prevalence of the use of private cars also for displacements that, in theory are more suitable for the region.

However, local bus transport in the most strategic areas of the Carpathians has some heavy problems, namely:

- The rolling stock frequently consists in old vehicles (mean age: 15 years), heavily polluting and not comfortable;
- Bus stops are frequently badly maintained, do not offer enough protection in the case of bad meteorological conditions, do not give passengers enough information about bus fares, routes, time-table of runs;
- In the towns, buses go along the same streets as urban traffic (there are not many special lanes) that consequently results heavily troubled.

Figure 12: Bust stop and time-table of a Carpathian bus line managed by SAD (Moravska Beskydy)

Clearly, it would be necessary to renew the bus stock and to build new and more efficient bus stops (also through modern infomobility systems) to support a modal split that has an important quota of local public transport.

Figure 13: Mala Fatra National Park – Bus lines in Techova (upper image) and Cieme (lower image)

2.4 CARPATHIAN INTERNAL MOBILITY

The problems of overabundant traffic and mutual disturbance and overlapping of different traffic typologies on the same road network typology have been already discussed.

- Internal-Carpathian mobility: internal mobility within the Carpathian region, i.e. displacements having origin and destination within the Carpathian area;
- Intra-Carpathian mobility: import-export mobility of the Carpathian area, i.e. displacements having origin in the Carpathian region and destination outside this area (or vice versa);
- Trans-Carpathian mobility: mobility across the Carpathian area, i.e. displacements having origin and destination outside the Carpathian area, but crossing the Carpathians mountain range.

The internal traffic quota within the Carpathian road network – which is mainly characterized by circulation of cars, light duty vehicles and vans – is very changeable and it depends on the analyzed area.

This traffic quota should be around 50% across the TEN corridors (for instance on many parts of the Slovak area Zilina – Vasek – Presov); while near the main Carpathian cities (Bielsko Biala in Poland, Zilina in Slovakia, Uzhorod in Ukraine, Ostrava in Czech Republic, Sibiu in Romania) the quota can reach 80-90%[11]

Since the great trans-European corridors are still not completely working, the strong presence of local and urban traffic on the city-crossing road networks represents a bottleneck which it is possible to overcome and brings about a critic delay for the international trans-Carpathian transport system.

At the same time, the inappropriate presence of long-distance traffic on the greater metropolitan viability across the Carpathian cities, due mainly to heavy duty vehicles, affects negatively urban mobility functions, safety and air quality. A growing need to stabilize the mobility

Local extra-urban mobility can also be considered as internal traffic: it can play rather a critical role if it adds to mean- and long- distance traffic, crossing natural parks and environmental and tourist valuable areas.

[11] Source: CSST on-site mission 2007

As stated above, in some Carpathian areas (especially Moravska Beskydy, Mala Fatra and Tatra National Park) existing roads can be inadequate to the necessities of a heavy traffic of vehicles having very different typology. Often these same areas (e.g. Tatra National Park) also have a relevant environmental value and are rich in biodiversity. Local scenery risks then to be affected by inappropriate infrastructure planning. The need to couple accurate and sustainable planning procedures with trade and economic development needs should be particularly felt in these locations.

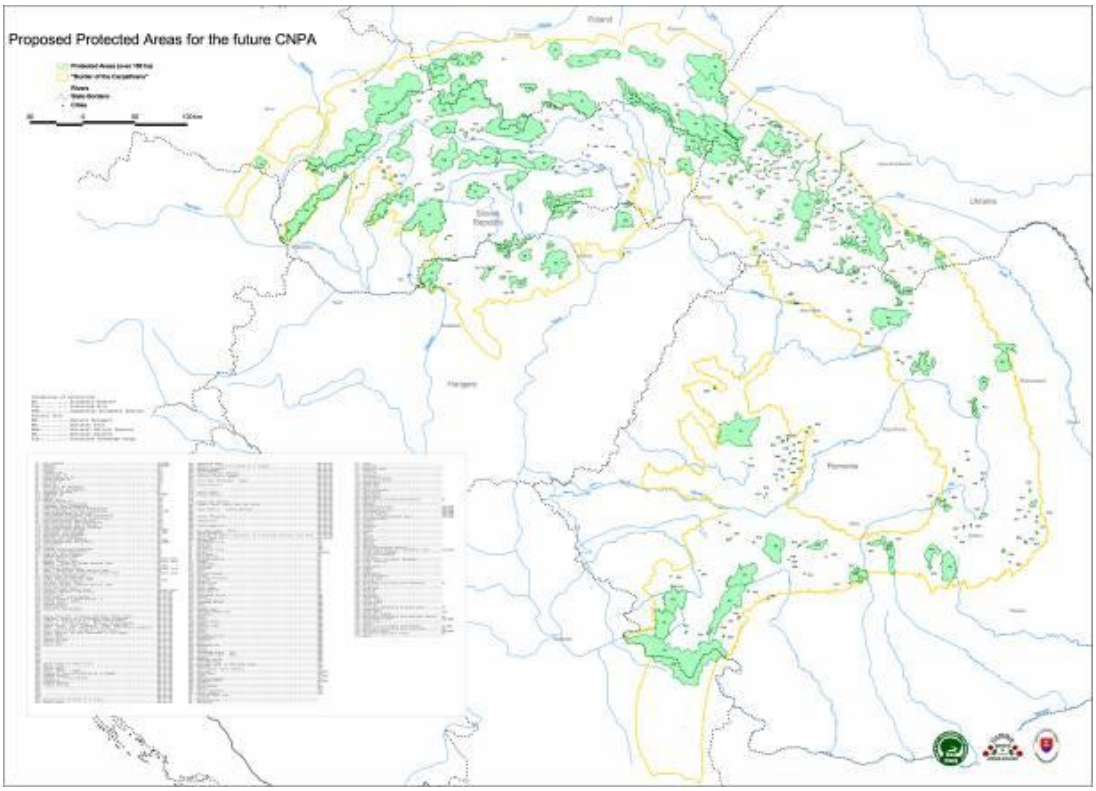

Figure 14: Proposed Protected Areas for the Future CNPA (Source: PAN – Instytut Ochrony Przyrody and DAPHNE – Institute of Applied Ecology)

Moreover, as better explained above, local public transport generally is of low quality in terms of modal integration and of comfort of both vehicles and bus stops.

Other problems of local traffic related to accessibility and internal distribution are:

- Troubles to foot-traffic due to the presence of numerous pedestrians, even in scarcely urbanized areas, and to the frequent lack, in the towns, of sidewalks, footpaths or pedestrian crossings;
- Troubles to bicycle users due to the presence of a large number of cyclists (frequently teenagers) and to the lack of paths to them reserved;
- The limited number of parking lots, particularly in the vicinity of areas of great tourist interest;
- The lack of modern systems of control and traffic management characterized by the presence of road signs frequently inadequate to the needs of the traffic.

Figure 15: Tatra National Park (Poland)- Pedestrian and bicycle mobility

Accessibility and sustainable mobility in the Carpathian protected or tourist areas and related problems will be analyzed in depth and discussed in a section entirely dedicated to this topic (see *infra*).

2.5 CARPATHIAN FREIGHT INLAND NAVIGATION

Historically the Danube River represents one of the main transport routes in the Carpathian region. Along the river internal section, including German, Austrian and the Slovak – Hungarian border sections, freight transport is well developed with reference both to national and international trade.

Figure 16: The Danube Region (Source: Encarta Encyclopaedia)

The Danube River – included in the Trans-European TEN Corridor VII – is a natural communication route crossing the main Central and Eastern Europe countries. The Danubian corridor links the Black Sea to some of most important cities of Central Europe, such as Vienna, Bratislava and Budapest – hosting one of the largest ship river ports worldwide. Navigable channels between the Danube and the Rhine link the Black Sea with the Baltic Sea. The whole Danubian system is 677 km long, from the Rhine–Main confluence to the Danube port of Passau, close to the Austrian border. Freight transport along this navigable route can provide substantial time advantages in comparison with the alternative sea routes between Northern-Western and South-Eastern European regions.

Further developments of navigable connections between Vienna and Bratislava and between the Lower Danube area and Calafat (Romania) have been planned. After the opening of the navigable channel connecting Rhine, Main and Danube rivers in 1992 and benefiting from the use of other navigable rivers (such as Drava, Sava, Tisza and Morava; Danube and Tisza again in Serbia and the Danube-Tisza-Danube channel) the Danube river has become one of the main transport routes through Europe.

Specifically, the Danubian route is an essential element of the so-called DMR system (that is the river connection Rotterdam – Vienna – Budapest – Black Sea) and represents an outstanding resource for both freight and passenger transport in the Carpathian region, since its navigable section mainly lies in this area. The current rate of Danube inland navigation is 5% , with a modal split prognosis of 6,5-7,0% in 2015, that is approximately 2,5 billion of t-Km[12]. In the period 1995-2005, the volume of freight traffic in the Danube Carpathian section doubled, the estimation for the period 2005-2015 is an increase of further 30%[13]).

Freight transport along the Danube river is generally profitable since boats and barges commonly used have the same carrying capacity as 173 heavy duty vehicles and 93 railway wagons[14], and therefore it produces a much lesser environmental impact than other means of transport (a single boat emits approx. 1/3 CO_2 than a heavy duty vehicle)[15].

The Danube navigable channel was planned for large ships navigation (110x11,45 m), though it is possible to use even larger ships in the majority of the river length.

Totally, 87% of the Danube river is navigable (2411 km)[16], 78 ports exist on the river shores and several channels and locks allow travelling to the internal areas of the crossed countries (for example there are 5 locks in Germany and 10 in Austria which allow in-land navigation). In the countries crossed by the Danubian route an enlargement of the system was originally planned aiming at improving the shipment possibilities, but these projects have been often slowed down for raising environmental concerns.

Down the Vienna Freudenau lock, the building of navigable channels was limited due to some infrastructures as the Gabčíkovo dam and the Bratislava and Serbian-Romanian border locks. Down the mentioned locks, the Danube water course to the Black Sea does not have any physical barrier for more than 860 Km.

[12] Source: Economar Brokerage Event Budapest – 12-05-2006 – Danube transport, an intermodal axis for Central Europe – Research and Development needs in the navigation cluster – Dr.Ernö Pàl, Projekt manager – from http://www.kti.hu/downloads/hirek/dantrans.pdf
[13] Source: *KVM Infra*
[14] ICPDR – International Commission for the Protection of Danube River
[15] *The Cleanest Ship Project, Rotterdam, Holland*
[16] Source: ICPDR – International Commission for the Protection of Danube River – from http://www.icpdr.org

Figure 17: Danubian Budapest-Csepel Freeport

A future integration of navigation services along the Danube river has been planned, by providing an intermodal "door to door" exchange service. Nevertheless an intermodal service needs to be further developed especially in the two ports of Gyor-Gonyu and Baja. The implementation of a modern and effective intermodal logistic chain could bring a further development in the European sustainable freight transport by rail and waterways. Currently Budapest hosts the main intermodal freight port for in-land navigation near the Carpathians. With the future developments of its infrastructure, Budapest port is expected become one of the most important river ports in Europe, managing some 50% of the total loading and unloading operations for freight transported along the Danube. An interesting initiative aiming at easing the operations of logistic businesses is represented by a computer-based system promoted by the Budapest University.

Many nautical engineering businesses working in the river port of Budapest use advanced design software and promote R&D of systems aiming at facilitating navigation and freight sorting. The importance that the Budapest port is expected to assume requires a development of railways to assure the shipment directly in the port. It will become necessary to widen the existing railways to loading and unloading of freight from the Danubian Budapest port to the railway itself. The envisaged cost for this work has been assessed in 40 million euro[17]. In addition new facilities are needed to fasten the freight loading/unloading time.

[17] Source: Economar Brokerage Event Budapest

3. TRANSPORT POLICIES AND PROGRAMS IN THE CARPATHIAN COUNTRIES

In this section, we propose a detailed analysis at the national level on transport facilities and supply and the applied and programmed transport policies in the Carpathian Countries.

Our analysis aims at introducing the Carpathian mobility and transport system which is necessarily influenced by national transport policies adopted in the different countries.

Issues discussed in the above section 2 (Carpathian system), are here analyzed in detail: information on the present situation, policies and programs adopted in the Carpathian area are then harmonized with national policy choices.[18]

CZECH REPUBLIC

The Czech Republic has 627 km of motorways and 54,958 km of roads in operation, out of that 6,156 km of class I roads (out of that 336 km of motorways), 14,669 km of class II roads and 34,128 km of class IIII roads. Motorways and major roads carry the biggest portion of traffic volumes and connect the most important administrative, economic and resort centres. This includes a network of international roads (including motorways) marked with the letter E, according to the AGR (European Agreement on Main International Traffic Arteries), in the length of 2,644 km. With the density of 0.70 km of roads and motorways per 1 km2, the Czech Republic ranks among the leading European countries.

3.1.1. ROAD AND MOTORWAYS

There are about 600 kilometres of highways in Czech Republic. New highways are going to be built in Moravia and Carpathian Area (Moravska Beskydy) by 2009. They will connect the western part of the country (from the German border) to the eastern one (to the Polish border).

[18] The following analysis is generally based on homogenous information. Though, some minor inconsistencies might be found due to the unavailability of official homogenous data for all the countries included in the study.

Figure 18: The E 75 motorway in Moravia Beskidy is being developed.

Czech Republic has a developed infrastructure of roads and motorways according to Western European standards. Main motorways and some express roads ensure a good level of service (relationship between capacity, flows and commercial average speed). In addition an extensive network of roads (almost all of them single lane) connecting all major towns can be found in Czech Republic.

The total length of road and motorways in the Czech Republic equals to 55,959 Km[19]

[19] Source: Transport Policy of the Czech Republic for 2005 – 2013 – Czech Republic, Ministry of Transport – July 2005 – from http://www.mdcr.cz/NR/rdonlyres/F961328B-473A-4FA8-9167-76AE5ADD5846/0/DPanglickaverzeFINAL.pdf

3.1.2. ROAD AND MOTORWAY NETWORK OF THE CZECH REPUBLIC

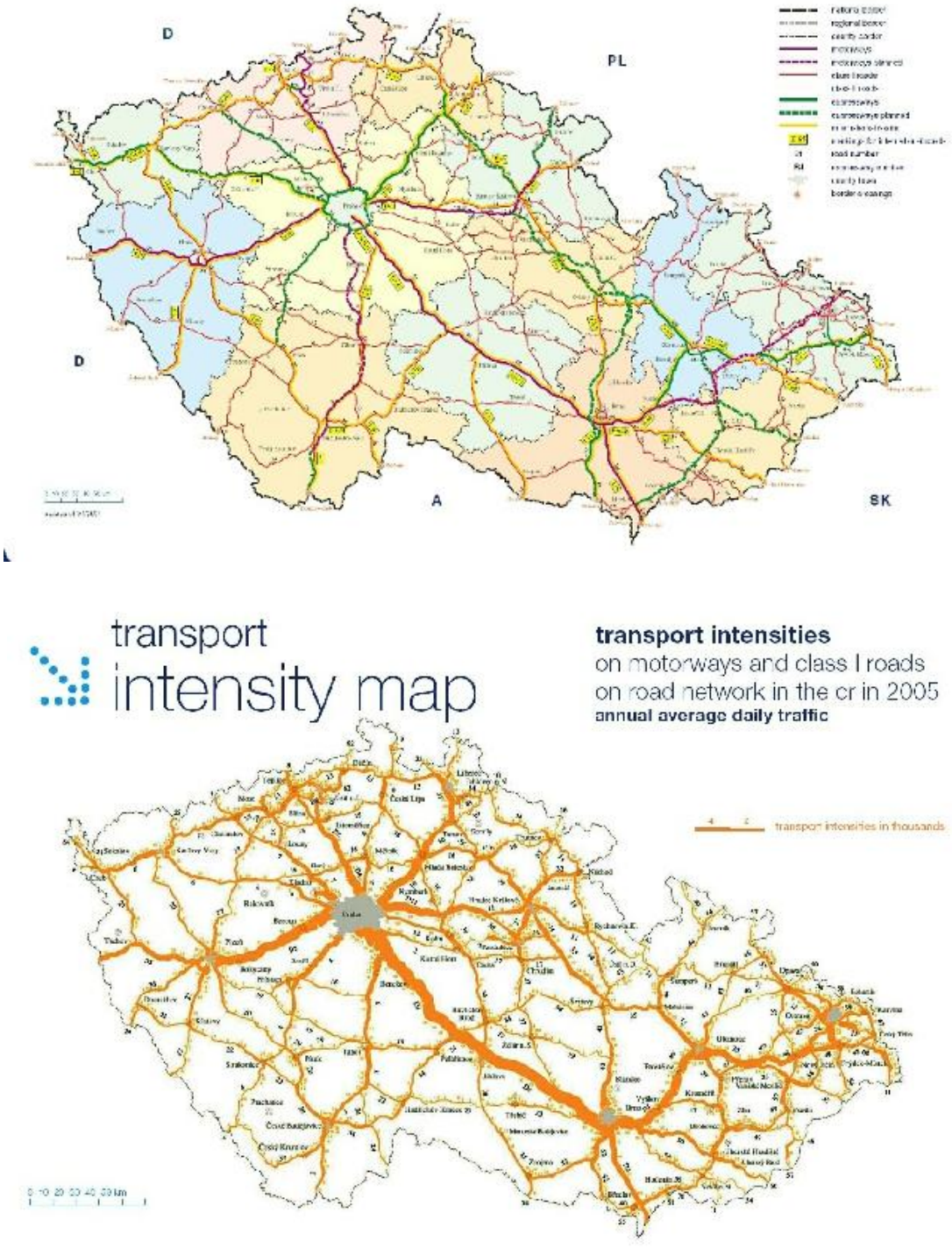

Figure 19: Road and motorway transport system of the Czech Republic

3.1.3. RAILWAYS

The organization of rail transport has changed following the adoption and gradual implementation of Act No. 77/2002 Coll. concerning "*Czech Railways*" and the "*Railway Infrastructure Administration*" (RIA).

"Czech Railways" is joint stock company belonging to the largest companies in the Czech Republic, offering transport and other services on the railway, ensuring operation on national as well as regional lines and carrying out infrastructure maintenance, repairs and modernization –

"*Railway Infrastructure Administration*" (RIA) is a state organization managing the state property mainly represented by the railway infrastructure. It fulfils the role of a rail owner, providing operation, operability, modernization and development of the railway infrastructure. It allocates path capacity on a national and regional rail owned by the Czech Republic.

According to the Act No. 266/1994 Coll. also other licensed carriers can now access the Czech railway infrastructure.

Railway infrastructure charges have been established in rail transport, based on marginal transport costs. Czech rail transport primarily focuses on:

- Fast and high quality passenger transport (both long-distance and regional) assuring regular services;
- Fast freight transport and logistics, where the integration is assured with public logistics centres, door-to-door services are guaranteed;
- Quality suburban and urban transport along the busiest traffic lines in the framework of an integrated regional transport system.

Some essential data can be reported with reference to the specific characteristics of Czech railway infrastructures, supporting the extremely good quality of the service provided and its extension.

- Total length of Czech railway network : 9,435 km;
- Standard gauge: 9,341 km: 1.435-m standard gauge (2,946 km electrified at three voltages; 1,868 km double track);
- Narrow gauge: 94 km 0.760-m narrow gauge.

České dráhy (ČD) (English: Czech Railways) is the major Czech railway company.

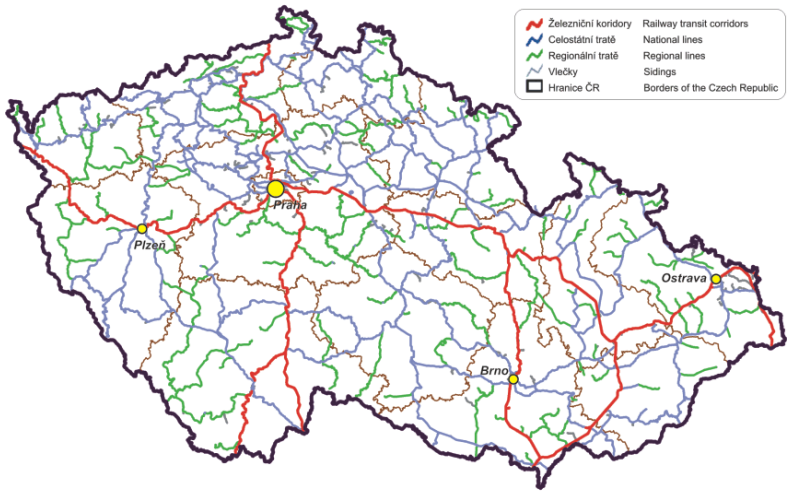

Figure 20: Czech Republic Railway Transport System

3.1.4. TRANSPORT POLICY

Establishment of appropriate conditions and standards for ensuring high-level and competitive transport services inside and outside the country is the main goal of Czech national transport policy. A growing attention is then devoted to economic, social and environmental impact of transport and to encourage a modal split more favourable to rail transport.

Main goals of Czech Republic transport policy include:

- Harmonization of the transport market features and operational conditions;
- Modernization, development and revitalization of the railway transport;
- Improvement of road transport quality;
- Reduction of environmental and public health impacts of transport,
- support to the interoperability among different European rail systems and the pan-European transport network, including primarily EU projects;
- Improvement of transport safety on the national Czech transport network;
    - Encouragement to the adoption of a performance-based charging system on transport;
    - Assuring greater attention towards rights and duties of transport service users;
    - Support to the development of a country-wide multimodal transport system;
    - Support to the development of urban, suburban and regional transport systems as a single integrated system;
    - Focus of the research initiatives on safe, structurally reliable and environmentally friendly transport modes.

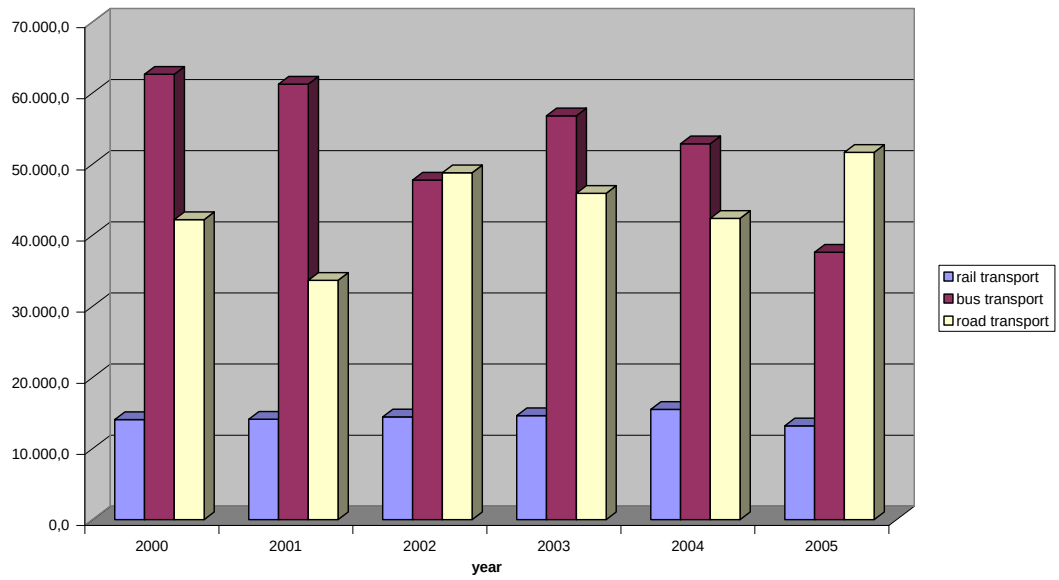

Figure 21: Passenger transport within the region – Moravskoslezsky region (Source: CSST elaboration)

3.1.5. TRANSPORT POLICY PRIORITIES

The following priorities have been set in the framework of general transport policy of Czech Republic:

- Implementation of research and new technologies including automatic data transmission and collection;
- Creation of the appropriate market-based conditions being able to assure the Czech carriers competitiveness in an open-market economy;
- Limiting the environmental and public health impacts of transport in obedience to sustainable development principles;
- Establishment of a network of public logistics centres aiming to provide to neighbouring regions intermodal transport services (rail + inland waterway transport), and to reduce truck transport services in order to avoid traffic flows concentration;
- Harmonization of transport market conditions (for example: internalization of external costs and balance of tax burden at European level);
- Establishment of tasks of independent authorities for each transport mode, (these independent bodies will have to allow the access to the transport market and determine technical and organizational standards in the field of transport according to the European rules);
- Improvement of the maintenance techniques of existing transport infrastructure. Preference is given to conservation of existing infrastructure instead of construction of new infrastructure, in case of insufficient financial resources;
- Promotion of a balanced development of transport networks in consideration of the need to preserve the consistency of interested areas and the international obligations;
- Optimization in access to and use of financial opportunities provided by EU funds and other public sources. An increase of GDP quota to co-finance EU initiatives of to 2.5% is foreseen. A multi-source financing system including the involvement of private capital will be applied for project financing;
- Collection of funds for research and development in transport sector, aiming to support the implementation of new technologies on the national territory, including automatic data transmission and collection systems (e.g. EU Galileo satellite navigation program);
- Improvement of traffic safety;
- Evaluation program of operating reliability and safety of different transport modes by means of several on-site missions;
- Fulfilment of the objectives of the Unified Transport Information System (UTIS).[20]

Concerning road transport, the policy priorities for Czech Republic are the following:

- Implementing a performance-based charging system for users of the road transport infrastructure;
- Adopting measures to minimize traffic congestion (not only through extensive development of infrastructure);

[20] UTIS means the Czech concept of the intelligent integrated management of transport system.

- Securing development of the road network in consideration of international obligations and in compliance with regional legislation, and minimize impacts of the existing infrastructure on the lives of inhabitants in the involved municipalities;
- Determining more stringent rules for training new drivers, including new rules for examining the professional qualification of new drivers and tightening up of the rules of mandatory training of professional drivers;
- Demanding and thoroughly checking the driving times, rest periods and safety breaks of truck drivers as specified by law;
- Checking thoroughly the prohibition on truck flows at weekends as specified by law;
- consistently checking conformity to regulations concerning road transport of dangerous materials;
- Creating the legal and institutional conditions for the implementation of digital tachographs;
- Creating a new legal framework to improve road traffic safety, including a point-based penalization system, and make sure it is thoroughly respected;
- Implementing preventive information activities improving traffic safety;
- Promotion of the adoption of legal instruments for traffic regulation, imposition of charges on parking and access to selected areas, establishment of areas with limited traffic access;

Concerning the rail transport, the policy priorities are the following:

- Request and check of the compliance of rail transport standards with legal regulations, assuring transparent allocations of railway infrastructure capacities and correct grants of licenses to railway carriers;
- Analysis of new economic and legal situation after the adoption of Act No. 77/2002 Coll., on Czech Railways, aiming at assessing the ability of (and, if needed, providing support to) the newly established companies to run their business according to the Commercial Code and, at the same time, in compliance with generally valid regulations. Provisions concerning rights and duties of the carrier and infrastructure manager will also be added to the Act on Railways.
- Ensuring the development of the railway network in compliance with international obligations and the internal and historical coherence of regions;
- Implementation of safety rules according to TSI, modernization and installation of signalling equipment; improvement of the safety parameters of level crossings;
- Reduction of noise levels generated by railway traffic in those locations where such levels exceed the limits determined by national law;
- Possible transfer of regional railways ownership and management from the State to other operators (privatization, transfer to regions) evaluation of regional railways usability and development of appropriate methods to assure infrastructure financing and running of transport service also after the transfer;
- Assuring a partial or limited use of infrastructure for transport reasons also in case of unused, unpromising, and unneeded capacity of the railway infrastructure. Changes in the transport function of the infrastructure are also possible, e.g. utilization of the infrastructure for bicycle routes.

HUNGARY

Hungary's central location in Europe is one of its most important competitive advantages. For Eastern countries, Hungary is considered to be a gateway to Europe, since 4 major European transportation corridors run through the country and has in Budapest a central hub. In order to exploit these benefits, Hungary is determined to preserve and enhance its infrastructural network and to improve its integration into the European network.

3.2.1. ROAD AND MOTORWAYS

NETWORK ANALYSIS

Total public road network covers 160,000 km in Hungary. The Hungarian road network is particularly dense (public road density: 1,720 km / 1,000 sq. km) with respect to the EU-15 countries average (+52 % of road network density).

Budapest represents the main hub of Hungarian road network. Main national highways (7 out of 8) link the capital to the European road network.

Hungarian transport policy proved to be road network oriented in the last few years. Relevant public investment has been made for upgrading and extending the national motorway network and road infrastructure. The Hungarian government is currently engaged in supporting a wide reconstruction aiming at extending four-lane highways, which currently cover some regions in Hungary. According to official statistics, four-lanes highways covered 1,053 km at the end of 2006 and are expected to grow to 2,530 km by 2015. Studies developed recently show that the renovated highway network – linking the major cities in Hungary – is expected to cut the driving times on the main existing intercity routes of approximately 40%.

Figure 22: Hungarian motorway network

Recently national transport policy started to consider the need to enhance international cooperation with neighbouring countries especially in the field of road transport. A strong

need for harmonizing and jointly developing international roads has emerged in the perspective of a wider EU network both to Western and Eastern countries.

3.2.2. RAILWAYS

NETWORK ANALYSIS

The Hungarian railway lines presently have a total length of 7,606 km, of which 7,394 km have a standard gauge, 36 km a broad gauge and 176 km have a narrow gauge.

Standard and broad gauge railways are operated by the State Railways and the same happens to some narrow gauge sections[21]. The other narrow gauge railways are run by State Forest companies or local non-profit organizations, which is of special relevance for minor lines crossing the Carpathian territory of the country. The potential of small mountain railways for regional tourist development in the Carpathians has to be carefully considered and some business studies have been developed on this topic[22].

After the strong, forced development of a wide and overloaded railway network in the 1950s, under the USSR influence, the national company managing the Hungarian railways (MAV) mainly focused on freight transport. Passenger services remain rather poor and large areas of the country are not properly served by higher quality Intercity trains.

Currently the main focus of national Hungarian transport policy is put on the development of highways[23] and attention to the railway system is residual. This same situation reflects in the allocation of available funds to national projects and infrastructure, where road construction is better financed.

[21] These sections are Nyíregyháza-Balsai Tisza-part/Dombrád; Balatonfenyves-Somogyszentpál; Kecskemét-Kiskunmajsa/Kiskőrös and the Children's Railway in Budapest.
[22] A short essay aiming at exploring potential advantages deriving from a wise use and tourist development of local mountain railways in the Carpathians can be found in the final section of the present study, which deals with some interesting case-studies.
[23] GKM – Ministry of Economy and Transport – Republic of Hungary – Strategy 2007-2010 – from http://en.gkm.gov.hu/data/cms1344106/GKM_Strategy_.pdf

Figure 23: Hungarian Railway Transport System

Nevertheless, the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD) have started to give loans for supporting the renovation of Hungarian railways since the 1990s.[24] Loans provided to Hungary by the European Investment Bank (EIB) have exceeded EUR 1 billion in 2006 and reached some EUR 6.3 billion since 1990. Since then, most of EIB resources have been allocated to projects involving infrastructure development (40%)[25]. The priority set by the government to further develop the highways network in Hungary has concentrated the EU aids on motorways construction.

With reference to railways and the need to have a deep restructuring of the whole system, some environmental groups[26] claimed that the tendency of the main national company managing railway transport (MAV) cutting some non-profitable branch lines would not solve the financial problems of the company, since bigger losses concentrate on the management of the main railway lines. A source of concern for a too clearly road-oriented national transport policy has been raised by some environmental associations in Hungary. For example, the Clean Air Action Group and the Hungarian Traffic Club[27] urge that the EU support the restructuring and reconstruction of railways. At the same time a pressure is exerted on the Hungarian government to raise all taxes concerning road transport to the tax level in Austria.

[24] European Investment Bank supported several transport projects in Hungary.
[25] More detailed and updated information on the single projects financed by EIB in Hungary and the involved sectors is available at http://www.eib.org/projects/loans/regions/european-union/HU.htm
[26] As for example the "The Clean Air Action Group" (CAAG) – is one of the best-known environmental NGOs in Hungary. Founded in 1988 by three local green groups, it is now a national federation of 126 NGO's. Its Experts' Board consists of more than 100 specialists of various professions. It is open to anyone who wants to help clean up the environment.
[27] In November 1991 members of the Clean Air Action Group created the Hungarian Traffic Club (Magyar Közlekedési Klub — MKK) dealing with transport and gathering experts and organizations interested in this specific field. In February 1992 the MKK was accepted full member of the European Federation for Transport and Environment (T&E).

3.2.3. TRANSPORT POLICY

Before the beginning of the accession negotiations in 1996, the Hungarian Parliament discussed a national transport policy[28] for the first time after the change of regime.

The main issues to be addressed in the Hungarian transport system at that time were to develop an appropriate backward transport infrastructure; to clarify the role of the state in the transport sector under both an economic and a regulatory point of view; to design environment-friendly transport policies; and to study the appropriate modal split in Hungarian transport.

The consideration of the environmental issue became central in the new Hungarian transport policy. Since then, the aim to develop an integrated transport policy having high regard to the adverse impact of transport on the environment in terms of air pollution, negative effects on nature conservation and visual impact on the landscape in sensible areas was highly considered by policy makers.

In addition, application of economic instruments aiming at shifting external environmental costs on the responsible actors and eventually to modify consumers' behaviour (e.g. "user pays" and "polluter pays' principles), as developed by economic theory and reported by EU law, was also recalled in the framework of a sustainable national transport policy.

Some changes occurred in national policy before the accession of Hungary to the EU (2004) and the publication of the EC White Book on transport policy in 2001. Latest guidelines for Hungarian transport policy can be found in the official documents issued by the government, such as the "Transport infrastructure development in Hungary" and the "Strategy 2007-2010" Reports, both edited by the Hungarian Ministry of Economy and Transport[29]. .

Official documents and experts set the main priorities for the future Hungarian transport policy. These ones include actions in several fields, mainly aiming at filling in the gap of unbalanced infrastructural endowment in the country (e.g. most of the infrastructures lay in the surroundings of Budapest), reforming public transport services and introducing the principle of efficient use of public funding, service standards, and customer satisfaction. A larger transposition of EU regulations in the field of transport in Hungary is perceived as essential with reference to competition, public services in passenger transport and railway management reform.

In general a will to open the transport sector to market-driven economy can be clearly perceived in the Hungarian government policy.

At the same time intermodality is supported as a way to reduce the environmental impact of traditional transport means, by shifting traffic from road to rail, inland waterways (which are considered of high importance, with special reference to the Danube river/Corridor VII and the Tisza river)[30] and public transport. In any case, in this moment

[28] Road management in Hungary – Andras Gulyas PhD, director of information, Hungarian Roads Management Company– January 2006 - from http://89.219.148.197/2007/hungary/Hungarian_Road_Management.pdf

[29] Hungarian Ministry of Economy and Transport – GKM Strategy 2007-2010; GKM – Ministry of Economy and Transport – Republic of Hungary – Transport Infrastructure Development in Hungary – 2006 – from http://en.gkm.gov.hu/data/cms1057566/060810_gkm_transport_web.pdf

[30] Hungary has the international obligation to assure the reliable use of the Danube waterway by ships with a draught of 2.5 metres on the entire length of the Hungarian section of the Danube. Along the Danube, water level has to be raised without provoking adverse impacts on the surrounding environ-

"access to the country, the shift/change between transport modes, and the focus on (less polluting) transport modes (…) are hindered by the (…) [need to look at the] deficiencies of transport corridors[31]" (GKM Strategy 2007-2010). Some basic ideas, originally developed in 1996, are still considered in the Hungarian national transport policy, including the need to continue in the full integration of Hungary in the EU, develop good regional connections to foreign countries, foster regional development, improve the quality of life and protect the environment, establish an effective and market-oriented transport system in the country.

A well integrated transport system is considered a pre-condition to support the growing Hungarian economy, according to the classical transport economics theories. In order to achieve this essential supporting role, national transport policy has to cope with the central issues of the quality of passenger and freight delivery services and has to minimize the environmental impact of transport, especially in most natural areas as the Carpathians.

FINANCING OF THE TRANSPORT DEVELOPMENT

According to some estimations, the productivity of investment in transport infrastructure in Hungary is 3-4 times higher than in traditional industry[32]. Most of investment finances the building of the new motorway network, which in Hungary currently is not reaching even the half of the average of 15 EU countries.

Currently the Hungarian state holds the property of national road and rail network and the waterways and there is the intention to keep the present situation. Management of the above mentioned infrastructures can be assigned to private companies, but non-discriminatory public access and use has to be assured, according to Hungarian national law.

Even though all the process of modernization is expected to be strongly steered by the Hungarian state, the positive effects deriving to the national economy from new transport networks could ease and speed up the financing of transport infrastructure. Central government is expected to develop a mixed financing strategy for transport infrastructure and services in Hungary to be achieved through the collection of private funds (issuing of bonds, foreign investment, public private partnerships, etc.).

TOLL POLICY

Collecting funds to cover the costs of the construction of transport infrastructures in Hungary in the 1990s was possible only through foreign private investment. In this case often charging on motorways sections was perceived as too high and eventually provided a disincentive for drivers to use these roads; at that time foreign groups either in part failed to recover the money they spent in Hungarian transport infrastructure or were paid back by the government.

Presently the toll levied by the Hungarian state on national motorways covers the costs of operation and maintenance, but a share of drivers prefer to use alternative routes instead of paying for using motorways. It has been suggested that such a behaviour significantly re-

ment and ecosystems. Infrastructure renovation is also needed in the Northern section of the Tisza river. For further details see "Transport Infrastructure Development in Hungary".

[31] Source: GKM Strategy 2007-2010, p. 46

[32] Source: http://www.imprint-eu.org/public/Papers/IMPRINT5_Kazatsay.pdf

duce the environmental advantages deriving from a well organized transport network, improve the congestion on smaller roads and produce negative externalities in terms of congestion and time costs, safety standards and road accidents[33]. An internal debate exists in Hungary concerning the different possibilities to cover the costs generated by transport infrastructures. These possibilities include car taxation (property & motor vehicle tax, fuel taxes, etc.) and general taxation (e.g. income tax, VAT, etc.). A third opportunity is represented by the coverage of new infrastructure costs by means of charges levied on the use of other infrastructures located either in the whole country or in a specific region. On the other hand, costs generated by transport infrastructures to be covered either by charges or taxes could include costs of operation and maintenance; restructuring and reconstruction costs; loan interests; and external costs.

POLAND

Poland is a key transit country between East and West (the Western part of the European Union (EU), Russia and Commonwealth of Independent States (CIS)) and North and South (Nordic EU members and Southern Europe).

Four Pan-European transport corridors cross the country. While Poland's infrastructure changed substantially over the past decade, further infrastructure development, including policies, institutions and investments to support an appropriate modal split, will be required as an important basis to improve competitiveness, economic growth and environmental benefits.

Harmonization with the EU competition policy will require that the first duty of the Ministry of Infrastructure (MoI) responsible for Transport Sector should be to set and maintain competing transport modes and competing operators within a mode.

Planning, financing and managing the provision and maintenance of infrastructure remain the responsibility of the MoI.

The eastern regions of Poland are characterised by low transport accessibility; therefore, it is necessary to create efficient transport connections with the rest of Poland and other countries.

The lack of territorial cohesion in the east of Poland sustains different development levels between particular areas of the country and the European Union.

Due to the transit location of eastern regions of Poland, the main transport routes in the eastern regions may play a significant role in the handling of international transport between Western and Eastern Europe.

Due to the fact that the TEN-T network includes corridors which run through the two biggest cities of eastern Poland (Białystok and Lublin), the priority axis shall support most of all the modernization of the national roads connecting those two cities with Warsaw into dual carriageways (the S8 and S17 roads).

Therefore implementing the priority axis should improve the connection between the two biggest cities of eastern Poland and Warsaw and accelerate the economic development of eastern Poland - the poorest area of the country -

[33] *Ibid.*

Support will be given to initiatives concerning the preparation of technical documentation of investments that comply with the objectives of the priority axis.

The main beneficiaries of the Priority Axis shall be those entities which are responsible for the management of national roads included in the TEN-T network.

The estimated effects of implementing the Priority Axis are the following ones:

- Increasing the transport accessibility of eastern Poland and attractiveness of the two eastern Poland's biggest cities;
- Increasing the transport capacity of Carpathian passes.

Figure 24: Polish-Slovakian border near Skalite

3.3.1. ROAD AND MOTORWAYS

NETWORK ANALYSIS

Figure 25: Poland road and motorways network

Poland has a poorly developed infrastructure of roads and motorways according to the Western European standards. There are very few main motorways, some express roads with lower speed limits than motorways and several common features and an extensive network of roads (almost all of them single lane) connecting the main cities.

The quality of Polish transportation infrastructure constitutes an important barrier to the country's development, especially in the context of the European integration. The length of major routes connecting major cities equals 18,036 km.

On December 31, 2001, only 398 km of these were motorways (mostly not up to modern standards), while 206.2 km were express roads. Large stretches of the motorways (about 140 km), especially those built before World War II, were in such a bad shape to require complete reconstruction. 4808 km of the polish routes were classified as part of TINA European transport corridors, but only 7% of these (346 km) were up to EU standards (i.e. able to handle loads of 11.5 tons per axle).

In the years 1990 to 2001 only 138 km of motorways and 33 km of express roads were built at the end of 2001 only 38 km of new motorways were under construction. According to the latest data, during 2004, 67 km of the above mentioned motorways were opened to traffic, while 284 km were still under construction (or reconstruction) at the end of the year. 8.6 km of express roads were also completed during 2004.

In recent years, the situation has been improving and the government funds for roads are increasing, due to the inflow of EU funds for infrastructure projects. Currently three major motorways spanning the entire country are being planned or built, and will be finished in the next decade. By 2009 most of the largest towns (including Poznań, Wrocław, Łódź, War-

saw, Kraków, Katowice) will have an motorway connecting them with the Western Europe motorway network. There are also plans to build a system of express roads, which won't be motorways but will have many of their features[34].

The Trans-European Transport Network covers 4816 km of roads in Poland. These are the main national roads with a significant traffic load (including transit traffic). Roads included in the four Pan-European transport corridors crossing Poland are:

- **Corridor I** Budzisko - Augustów - Białystok - Ostrów Mazowiecka – Warsaw: 339 km (Corridor 1A Grzechotki - Elbląg – Gdańsk:114 km);
- **Corridor II** Świecko - Poznań - Konin - Łowicz - Warsaw - Siedlce - Terespol : 682 km;
- **Corridor III** Olszyna / Zgorzelec - Legnica - Bielany Wrocławskie (Wrocław) - Gliwice -Katowice - Kraków - Tarnów - Rzeszów - Przemyśl – Medyka: 818 km;
- **Corridor VI** Gdynia / Gdańsk - Toruń - Włocławek - Łódź - Piotrków Trybunalski - Częstochowa - Katowice - Bielsko-Biała - Sywiec - Zwardoń (Gdańsk - Elbląg - Mława -Warszawa - Piotrków Trybunalski); Dolna Grupa (Grudziądz) - Bydgoszcz – Poznań; Bielsko-Biała – Cieszyn: 1 447 km.

The most important drawbacks of the road network in Poland are the following ones:

- Lack of a cohesive motorway and motorway network. In mid-2006 in Poland there were 674 km of motorways and 257 km of motorways. Motorway connections between the Carpathian border of the country and Kraków and Warsaw are still incomplete. The estimated length of the planned motorway network is approx. 2000 km, and of motorway sis approx. 500 km[35];
- Lack of connections between main metropolitan centres, especially in eastern Poland and Warsaw;
- Low capacity network of motorways in the proximity of metropolitan centres;
- Lack of connections between northern and southern Poland (including motorway connections);
- Poor road maintenance. At the end of 2005, more than a half of the national roads were in a poor or unsatisfactory condition (respectively, 25% and 26%), and 49% of roads were evaluated as being in a good condition[36].

Hence, more than a half of the national roads in Poland require immediate repairs (poor condition) or repairs planned for the near future (unsatisfactory condition). However, it should be stressed that despite this negative situation, the process of further deterioration of roads was stopped, and since 2003 the situation has been gradually improving.

DIRECTING TRAFFIC INTO BUILT-UP AREAS

A significant problem of the Polish road network is the high traffic intensity on national roads, including lorry traffic, which is directed to built-up areas. This problem concerns both bigger and smaller towns, and constitutes both a nuisance and danger for the residents. At the same time, it limits the traffic capacity of roads and decreases the speed of transit traffic.

[34] Source: Poland Transport Yearbook (2006)
[35] *Ibid*.
[36] Conference Road Safety on Four Continents Warsaw, Poland, October 5-7, 2005-06-23.

The poor condition of the road infrastructure is accompanied by an increasing number of cars.

In the years 1990-2005 the number of registered cars increased by 134.5%, and the number of lorries (in the years 1990-2005) by 129%.

The average total daily traffic on national roads in Poland in 1995-2005 increased from 8.5 thousand to 13.5 thousand vehicles (+6.5% every year).

At the moment, Poland joined the European Union and abolished the requirement of separate transport licences, the number of vehicles involved in the international passenger and freight transport of persons and goods increased by over 50%. Most of the transport work carried out by Polish international carriers concerns the routes between Western Europe and Russia, Ukraine and the countries of Central Asia. [37]

GENERAL EVALUATION

A few observations can be made concerning the efficiency of Polish road transport network:

- Technical condition of the road network is not completely satisfactory. At least 40% of the roads require repairs or at least repavement. The reasons are the increase of traffic and cargo loads. The local towns and cities and intersections with railway lines are traffic bottlenecks;
- Roads on the area under consideration are characterised by various speed limits, that range from 40 to 110 km/h;
- In order to protect the environment, it is necessary to respect the required protected areas and to promote public transport and pedestrian traffic. Those require implementation of a special transport policy which will balance the needs of the particular transport system users (residents, holiday makers and tourists) with respect of environmental standards.

3.3.2. RAILWAYS

NETWORK ANALYSIS

Poland is served by an extensive network of railways. In most cities the main railway station is located near the city centre and is well connected to the local transportation system. The infrastructure is operated by PKP PLK (PKP-Polskie Linie Kolejowe - PKP-Polish Rail Lines), part of state-run PKP Group.

The only high speed rail line in central-eastern Europe, Centralna Magistrala Kolejowa (CMK) (Central Railway Route, length 221 km), links Warsaw with Kraków and Katowice. The trains speed on the CMK is up to 160 km/h (some sections up to 200 km/h - but the rolling stock has not yet been adapted to handle higher speed).

[37] Poland - National Strategic Reference Framework 2007-2013 – in support of growth and jobs – Ministry of Regional Development - Warsaw, 14 February 2006 – from http://www.funduszestrukturalne.gov.pl/NR/rdonlyres/733590C1-490B-4902-B242-42E946DC315B/21234/NSRF_140206r.pdf

Other high speed railway lines are:

- Warsaw - Kutno - Poznań - (Berlin) (140, 160 km/h);
- Warsaw - Siedlce - Terespol - (Minsk) (160, 120 km/h) - being upgraded to 160 km/h;
- Warsaw - Puławy - Lublin (120, 140 km/h);
- Opole - Wrocław (160 km/h) and further increased via Legnica to Hamburg;
- The Warsaw - Gdańsk - Gdynia line is being increased up to 200 km/h, and the Warsaw-Łódź line is being increased up to 160 km/h (in order to bind together the Warsaw - Łódź). There are long term plans to build a new high speed line (300 km/h) from Warsaw to Poznań and Wrocław with a fork in Łódź;
- The PKP Group is the fourth largest railway throughout Europe.

The rail system has the following general layout[38]:

- Total length : 23,420 km;
- standard gauge (1.435 m) : 21,639 km (11,626 km electrified; 8,978 km double track);
- broad gauge (1.524 m) : 646 km;
- narrow gauge (various) : 1,135 km various gauges including 1.000 m, 0.785 m, 0.750 m, and 0.600 m (1998).

As of December 2002 narrow gauge railways were no longer owned or operated by PKP. They were transferred to regional authorities or became independent private companies.

GENERAL EVALUATION

The analysis of polish railway infrastructure and the examination of the available datasets on railway transport suggest drawing a few general remarks:

- Existing railway lines are suitable mostly for a 50-80 km/h speed;
- Passengers flows on the railway in the area do not exceed 5,000 persons per day;
- Access to passes crossing the Carpathian border is difficult due to land configuration and technical limitations of the existing railway infrastructure.

Though according to PKP criteria, rolling stock and network conditions are adequate, adaptation and improvement of existing facilities would be a precondition for the establishment of an advanced railway network and service.

3.3.3. TRANSPORT POLICY

GOALS AND TASKS FOR TRANSPORT SYSTEM IN POLAND (LONG AND MEDIUM-TERM)

The general goal of the State's transport policy is to achieve a sustainable transport system according to technical, spatial, economic, social and ecological criteria.

[38] Source: Poland Transport Yearbook 2006

The recently shift of Poland to a market based economic system, as well as the improvement of living standards and the entrance of the country in the international competition system have been considered in setting the national transport policy and in defining the role of Polish transport network in the international and EU transport system.

Implementation of an advanced and sustainable transport system is possible through a gradual change in the development path of the transport sector, the adoption of new technical, organisational and legal measures. At the same time, domestic (accessibility of financial resources, improving social and economic conditions, new policies for spatial planning and environmental protection) and foreign policy (membership in the European Union and NATO, participation in other international agreements on transport, etc.) play a substantial role in steering Polish transport sector development.

Specific goals have been set for national transport policy:

- To influence the transport service demand aiming to reduce transport costs and rationalize domestic mobility;
- To harmonize the spatial planning of the country and decrease transport's negative impact on the environment (including reduction of environmental pollution generated by transport);
- Support to modal split between different means of transport in order to achieve a more balanced transport system;
- Assessment and reduction of external costs of transport through the implementation of concrete measures such as the "polluter pays" principle, the "door-to-door" delivery, etc.;
- Improvement in transport policies and development of transport infrastructure in line with EU requirements in the framework of Poland's integration in the Eu;
- Introduction of user charges (in compliance with EU law and the "acquis communautaire");
- Improvement of the efficiency and accessibility of transport infrastructure network in different areas of the country, in line with existing regional development strategies.

The implementation of State's transport policy will progress at the pace of the process of integration in the EU. The first stage (before accession to the Union) will include introduction of the so called "*acquis communautaire*" into the national legal system. This fact will also affect the organization of national transport system and improve infrastructure development programmes already in progress. The second stage (from the date of accession until the end of the first budgetary period of the EU) will involve realisation of full integration and improvement of management and regulation models in transport as well as intensification of transport infrastructure development programmes; the third stage (up to 2015) will constitute the start of functioning of the fully integrated system.

An analysis of the relation between transport development and economic growth, although based on the "de-coupling" approach, has to consider current and expected trends for Poland (see the chart). Figure 23 shows how transport needs depend on innovation.

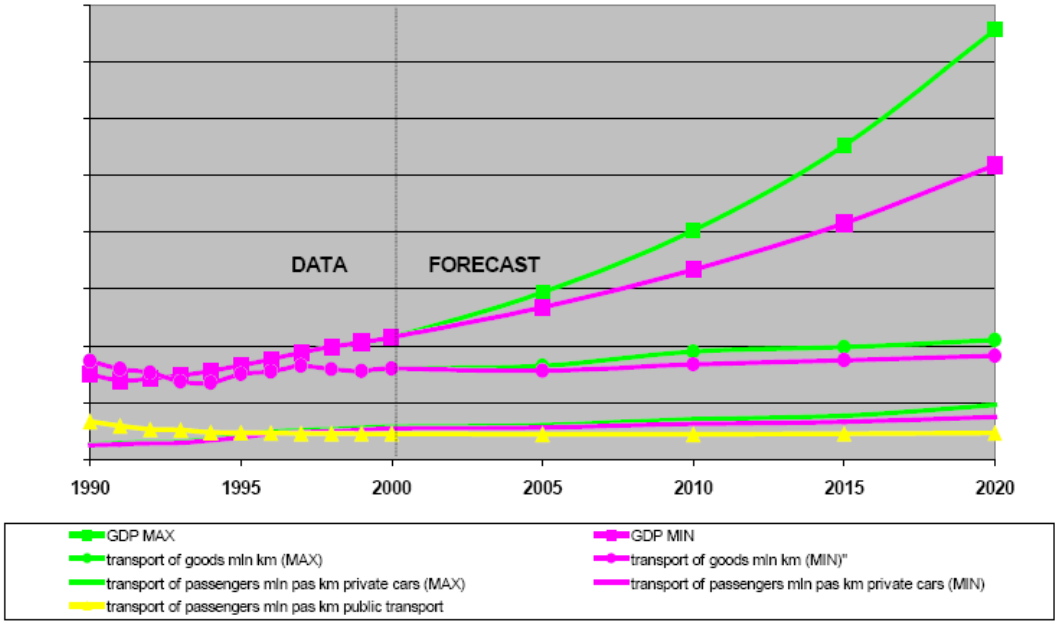

Figure 26: Transport trends and GDP

Interoperability is another basic component of EU transport policy. Advanced transport policies have to introduce this concept in the decision making process at any administrative level. In Poland, inland waterways have to be dealt with apart: this sustainable transport sub-system has never substantially developed in the country (the main waterway is the Odra River in western Poland). In this field the main policy goal is to improve the existing system as a part of wide water management and flooding protection programs[39].

FIRST STEPS IN REALISATION OF TRANSPORT POLICY

In the short run several economic and social changes are likely to take place in the country, such as the democratic consolidation of the political system and the development of a wider internal market and stronger trade linkages abroad. In this context, a few priorities have been set in the framework of general transport policy of Poland:

Reorganization of national railway system in terms of separation of network management from service operation management (the final goal is to achieve – in the medium run – the economic self-sufficiency of transport operators);

- Rehabilitation of the road network by means of intervention on infrastructures (strengthening bridges and road repavement) as well as improvement of road safety and fluidity of traffic in main nodes and transit areas (bottlenecks);
- Speeding up of motorway construction programme through a larger use of the public private partnership (PPP) model according to the specific needs of each project. Priority projects will be implemented on the main networks presenting rather a high traffic intensity. Other projects originally included in the national program have been declared no longer needed.

[39] Most of data and information included in this paragraph were reported in the European conference of Ministers of Transport Committee of Deputies – "Transport policies in the countries of central and eastern Europe" (April 1997 and February 2001).

- Development of public transport in cities and metropolitan areas and traffic limitation in the city centres;
- Improvement of the Okęcie International Airport hub in Warsaw as an incentive for other airports development in the region and as a support to regional development.

The above mentioned policy goals mainly refer to actions to be implemented in the framework of TEN EU policy. The map presented below illustrates the expected transport network development in Poland according to the TEN EU program.

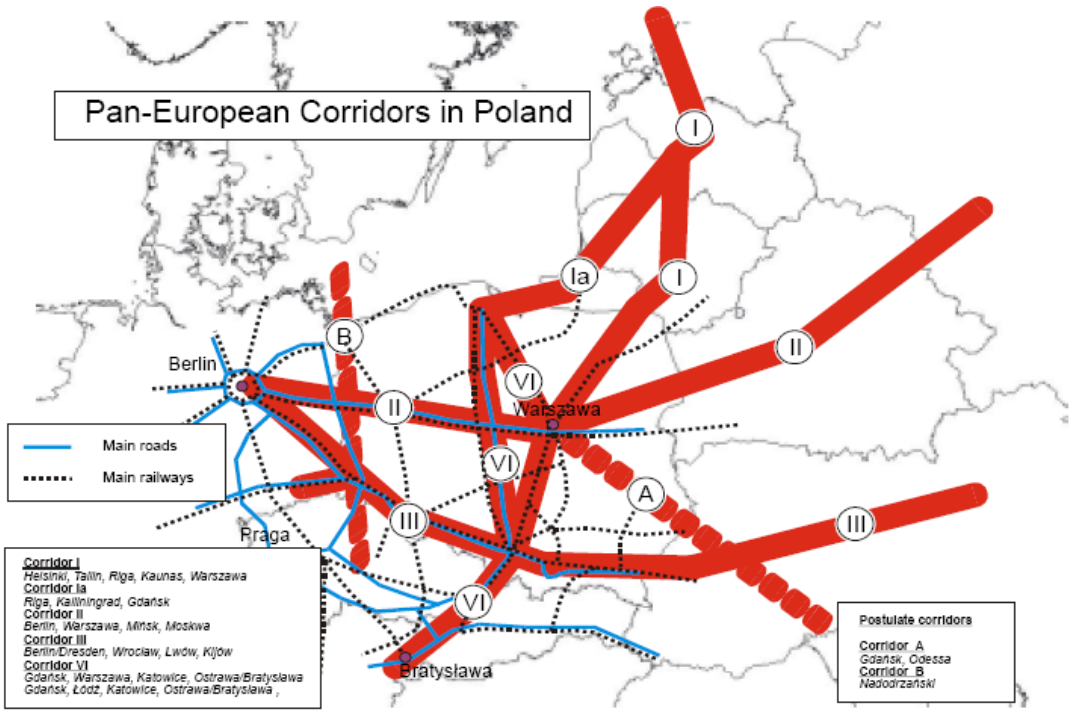

Figure 27: Pan European Corridors in Poland

SPECIFIC POLICIES FOR ENVIRONMENTALLY PROTECTED AREAS

Poland applied a specific policy for the transport's sustainability in the Carpathian environmentally protected areas. A specific attention is paid to Tatra Natural Park.

Figure 28: National Road N69 – Milowka (Poland)

Good accessibility to an area can stimulate its economic development. In this line, transport services can play a relevant role for defining the use of sensible areas. Some of the typical benefits deriving from accurate transport policies for protected areas are listed below:

- Ensuring the area accessibility:
- Stimulating the area economic and tourist growth;
- Providing sustainable transportation services.

In the protected areas, permanent residents assume a rather common transport-oriented behaviour to be found also in other areas of the country; on the other hand non-permanent residents (e.g. travellers, tourists, etc.) can assume a different attitude that should be further analyzed, because of specific features of any single protected area and different personal values of non-permanent residents.

In these cases questionnaires and surveys can be used to investigate entrances in protected areas and parks, recreational activities and weekend or seasonal tourist traffic (both collective and individual). These datasets can then help to develop detailed local analyses and strategies.

Generally speaking, tourist mobility is usually higher than regular residents' mobility. In any case their features are usually different and changes in tourist mobility tend to depend on:

- Season of the year, day of the week;
- Weather conditions;
- Tourist, leisure, or spa offerings of the area (climate, investments).

With reference to tourist traffic intensity, tourist areas are usually characterized by:

- A considerable diversification of traffic intensity in particular seasons of the year, days of the week, or hours of the day (winter, summer, weekend, market days, etc.);
- Diversification depending on weather conditions;
- Different distribution of transport rush hours within a day than in non – tourist areas.

These features determine that when approaching the problem of planning and managing the transport organization in areas of great natural value, the problem needs to be solved on an individual basis and analogies need to be adopted carefully.

The present situation suggests preferring policies focused on public transport, including unconventional means of transport (e.g. electric and hybrid vehicles, horse riding, historic railways, etc.) depending on the area features, as well as pedestrian and bicycle traffic.

In these areas, whose attractiveness in terms of tourist and leisure activities is inversely proportional to their capacity to host and manage a high number of people and vehicles, a regulation of the accessibility is needed. A properly organized system of transport may prove a perfect tool to assure a control on the accesses to an area. Introducing limitations to the area accessibility for individual vehicles traffic, and later for public vehicle transport, can help to strongly reduce the pollution caused by toxic components of exhaust gases and noise. Planning of parking yards for the vehicles outside the stricter protected area, provide barriers to the traffic.

ROMANIA

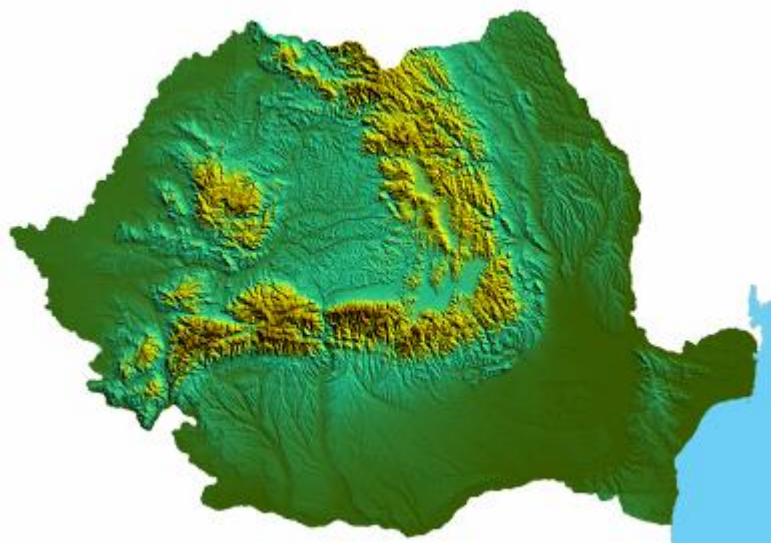

Figure 29: DTM Romania

3.4.1. ROAD AND MOTORWAYS

NETWORK ANALYSIS

Romania's total road network covers about 78,000 km. Public roads in Romania (excluding street networks) are classified in a three-tier system: national (main) roads (14,500 km), district roads (app. 36,000 km), and communal roads (app. 28,000 km)[40].

In addition there are approximately 30,000 km municipal roads serving the rural villages' needs, and farming related activities[41].

National roads are administered and managed by the *"National Company for Motorways and National Roads"* (RNCMNR) - an entity under the responsibility of the Ministry of Transports, Constructions and Tourism. The district (county) roads are administered by the County Council and managed by the County's technical department.

Municipal roads are administered and managed by the village councils with the help of the County council's technical office.

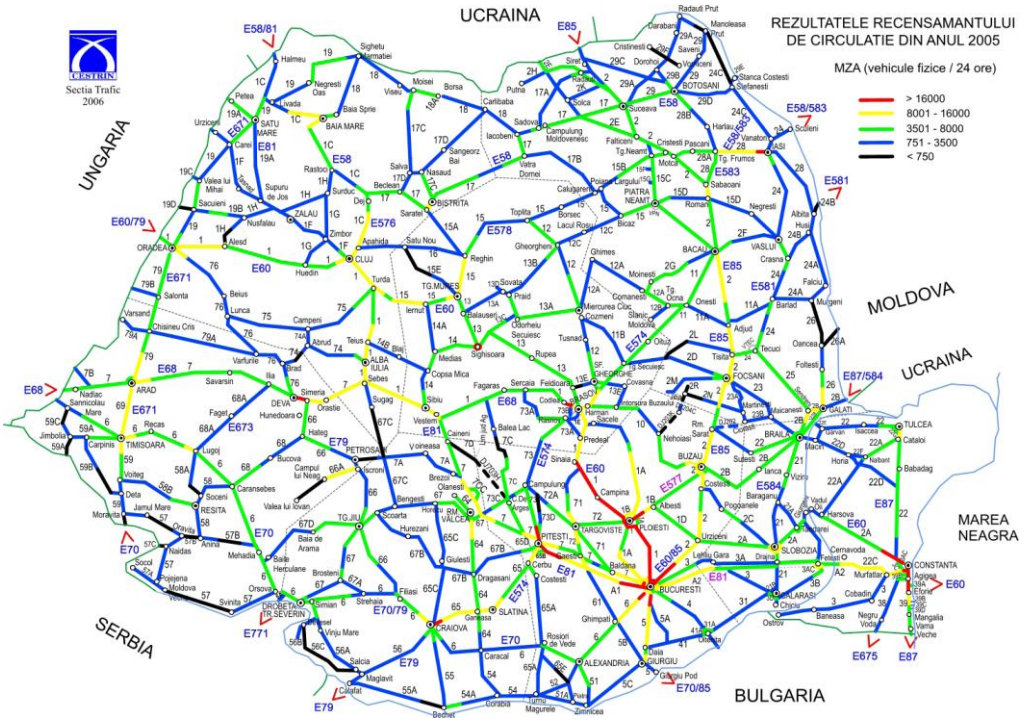

Figure 30: Romanian road network - level of service[42]

Main congested tracks are roads gravitating on Bucharest and Pitesti (around 20-25,000 vehicles per day).

The trans-Carpathian corridor E60, Oradea-Julia-Sibiu-Pitesti, is crossed by 15,000 vehicles per day (average value)[43].

[40] http://wbln0018.worldbank.org/ECA/Transport.nsf/PrintView/D8DA59B427478E7685256FE20052066D?Opendocument
[41] National Institute of Statistic, Romania – Romanian Statistical Yearbook 2006 – Transport, Post and Telecommunications – from http://www.insse.ro/cms/files/pdf/en/cp17.pdf
[42] Source: Sectoral operational program transport, Ministry for Transport, 2006)

CRITICISM OF ROAD TRANSPORT SYSTEM

In spite of all the investments aimed at rehabilitating the infrastructure, it has not yet been developed sufficiently to fulfil the requirements of a growing economy and to reach the European standards. It is necessary that Romania develops its transport infrastructure in order to ensure the base of the economic development. But this must be accomplished in conformity with the environmental sustainability requirements and ensuring an adequate protection of the country's natural and economic assets.

In addition, it is necessary to invest in the main transport international axes (road and rail) crossing Romania (corresponding to the Pan-European corridors IV and IX) and in national transport network and services in order to satisfy the increased accessibility, despite the context of limited available funds.

The main issues under debate are the following:

- The number of vehicles has increased from 1,000,000 in 1999 to 5,000,000 vehicles in 2006;
- There is a large number of roads with a high traffic level (TDA of over 20,000 vehicles/24 hours), roads whose capacity are frequently exceeded. On these roads there are frequent traffic jams, especially during rush hours;[44]
- The need to build new highways. With this aim several projects financed by the Romanian government or by other international financial institutions are being started with the inconvenient of high costs;
- County and local roads are in bad conditions. Only few of these roads have been rehabilitated due to lack of financial resources;
- In spite of the fact that the traffic management systems has recorded a positive growth and is being updated in accordance with the European rules, on some important national roads there are still deficiencies frequently noticed by transport users.

MANAGEMENT OF ROAD SYSTEM

Road financing is arranged through a road found, 45% of which is financed by fuel excises and road taxes (vignette).

This fuel excise tax income is shared between national (65 %) and county roads (35 %)[45]. The road fund income covers administrative expenses, routine maintenance, loan service payments, and limited rehabilitation costs of the national roads. It covers also, as main source of financing, parts of the costs of county roads' rehabilitation and maintenance, even though it is insufficient. Recently, the Government has issued a Policy Letter for the road sector. It includes, inter alia a study to modernize Romanian road fund and road financing.

Over the past decade NAR (National Road Fund) has secured grants (EU-ISPA[46]) and several loans from International Financial Institutions (e.g. the World Bank, EIB[47], EBRD[48]) guaran-

[43] Source: Sectia Trafic, 2006
[44] *Ibid*.
[45] World Bank, Transport in Europe and Central Asia (2006) – from http://www.worldbank.org/transport/transportresults/regions/eca/eca-romania-output.pdf
[46] ISPA is the "Pre-Accession Structural Instrument" of the EU.

teed by the state, to upgrade its main road corridors. The Government is actively pursuing new external IFI financing or Public-Private Partnerships to further modernize the main roads and improve RNCMNR institutional capacity. RNCMNR's *"Multi-year Highway Development Program"* and a *"Multi-year Highway Rehabilitation Program"* are both primarily funded through loans and grants. The municipal road network has recently begun to receive support from EU SAPARD[49] program and the *"World Bank's Rural Development Project"*.

Road transport is privatized and performed by buses and trucks operated either by their owners or buses and trucking companies.

The issue of road safety has been moving inexorably up in the policy agenda in Romania. As in the rest of the world, road accidents are responsible for many deaths and serious injuries each year. In an effort to contrast this trend in Central and Eastern Europe, a strategic alliance has recently been set up between the *"Dutch programme Partners for Roads"* and the World Bank to jointly contribute to further develop and incorporate safe road design and to facilitate the transfer of knowledge in Romania as well as in other countries.

3.4.2. RAILWAYS

NETWORK ANALYSIS

The railway network in Romania comprised 22,298 km of track, of which 36% electrified and 27% double track.

In 2003, the railways carried 8.1 billion passenger-km in addition to 17.3 billion ton-km of freight, and the combined total transportation by rail constituted 45% of all passenger and freight movement in the country. In terms of size and scale of operations, Romanian railways are comparable to largest EU railways[50].

However, like in other centrally planned economies, Romanian railways had very short haul, averaging only 250 km. From 1989, the freight and passenger volumes strongly decreased mainly due to the decline in GDP and competition from road transport.

The rail share decreased significantly from 80% of freight and 70% of passenger traffic in 1960, to less than 40% of freight, and to about 50% for passenger traffic in 2000 years.

From the point of view of network supply, the Carpathian Mountains have several natural passages that could be crossed by transport infrastructure. On Valea Prahovei, the route gets an altitude of 1,050 m, on Valea Jiului the railway is achieved at 720 m, and on Valea Oltului the crossing is performed at 390m. The railway section Bucharest - Pitesti - Rm. Vlacea - Podu Olt - Arada - Curtici provides the link between the centre of Europe and the Balkan area.

The international conferences for the European transport corridors[51] have established that Romania will be crossed by the railway corridors IV, from west to east, and IX, from south

[47] European Investment Bank Group
[48] European Bank for Reconstruction and Development
[49] Special Accession Programme for Agriculture and Rural Development
[50] World Bank, Transport in Europe and Central Asia.
[51] European Conference of Ministers of Transport and Committees of Deputies – Transport policies in the countries of central and eastern Europe (22 April 1997 and 16 February 2001).

to north, on the following routes: Curtici - Arad - Deva - Alba Iulia - Blaj - Brasov - Ploiesti - Bucharest - Constanta and Giurgiu - Bucharest - Ploiesti - Bacau - Pascani - Iasi.

Several measures are necessary to completely satisfy the current requirements of the railway transport. We present them in the following lines.

I. It has been observed that on Bucharest - Ploiesti section the trains on both Corridors IV and XI will operate; moreover, in this section the trains from the six railway main sections permanently operate. This fact leads to the need to increase its transport capacity, especially between Chitila and Brazi stations; according to the national program scheduling the first step to take is the "tripling" of the line, with the possibility of its "quadrupling" in the future.

II. In the national and international economic circuit, the products of any kind that came from Asia, including the oil from Caucaz, once reached to Constanta Port, in order to reach their destination in Central, Northern and Western Europe, will cross Romania using the pan-European corridor IV, from east to west.

Large tonnage train passing over Carpathian Mountains through Predeal, at 1,050 m, on tracks with big ramps of 28%, claims increased costs and a slowdown of the whole railway traffic.

III. In order to provide the development of the train traffic on several routes crossing the Carpathian Mountains, the Romanian state has built railway sections on Valea Oltului, which are not electrified yet, with small ramps of maximum 10 ‰ and on Valea Jiului, which is an electrified line, with ramps of maximum 15 ‰.

In this general context, the electrification of the Valea Oltului section and the correlation of this section with Valea Jiului section is needed.

The positive parts of the achievement of this new route will be the following:

- The doubling of the railway line between Chitila and Golesti stations and the creation of the triangle Golesti - Bradu de Sus - Pitesti;
- The shortest route, of 39 km, has been used;
- The line between Pitesti and Valcele, on 23 km has been used;
- As national route, the distance Bucharest - Podu Olt has been shortened with 51 km in comparison to the route through Brasov and with 128 km in comparison to the route through Piatra Olt.

The negative aspects are:

- The route was not built in parallel with the foot of the mountains, although it seemed more appropriate, because less kilometres of line would have been executed.
- The lack of a data base about this route and the lack of its comparison with other possible routes, even longer, but achievable and, especially, safer;
- The incorrect financing of the work (at the beginning sufficient, then was reduced for various reasons) has determined the reduction of certain important foundation works, enhancing field sliding;
- Due to the lack of achievement of the link between Valcele and Rm. Valcea the electrification of the double railway section Chitila – Golesti and the electrification

of the railways on Valea Oltului were not made, because an integral electrification was needed. These works have been postponed due to the lack of funds.

The main achievements of the second main railway section Valea Jiului are:

- The accessiblity of small hydro-thermal stations that has been built on Olt river, with the accumulation of lakes, disposed in cascades, for retaining the water fury, especially on springtime and during the rainy days, will be improved;
- The railways for the exploitation of the coal mines have been built between Babeni and Alunu, of 44 km, and Tg. Carbunesti - Seciuri, of 23 km. If the 13 km of line between Alunu and Seciuri will be set up , there will be the railway link between Valea Oltului and Valea Jiului, (where the line is already electrified) with the direct link at Tg. Jiu;
- Five tunnels were executed: four tunnel for the double railways between Bujoreni (Valcea) railway station and Cozia Halt, on 23 km distance, and one tunnel on the simple line between Cozia Halt and Lotru station, (3 km long). These tunnels will help a lot the railway traffic, when the double line between Cozia - Lotru will be executed;
- From Bujoreni and up to Rm. Valcea Est, a simple line, of 4 km length, with two bridges (one over Olt River and one over the road) has been built. At the same time, the line between Bujoreni and Cozia has been doubled in order to provide the link with the new route, Valcele - Rm. Valcea, that was achieving.

CRITICISM OF RAIL TRANSPORT SYSTEM

Road transport competes aggressively with rail and has continued to gain in the share of the combined freight market (in terms of tonnage), and of the intercity passenger transport market (in terms of number of passengers). International trade is still important for the Romanian railways with imports accounting for 11% of the traffic, exports about 6%, and transit about 1%[52].

Railways incurred losses caused by decline in market share, overstaffing, outdated equipment, and historical non-payment by many loss-making state-owned enterprises (SOEs).

The lack of proper financing of the infrastructure maintenance led to degradation of its technical conditions, with negative impact on the quality of transport services and safety. In order to maintain the safety standard of rail transport, it was necessary to introduce lower speed limits adapting the functional class of certain lines.

On 31 December 2005 there were 429 speed limits for a total length of 621 km. Out of these, 97 were covered by the time slots and 330 were not. Out of the last 330 speed limit restrictions, 186 were due to the improper status of the tracks and track equipments and 52 were due to the improper status of the works. During that period of time there were 1.147 dangerous points, on a total length of 565 km.

Programs of necessary works and deadlines were established in order to remove both speed restrictions and dangerous points. Capacity to finalize these programs relies on the availability of the necessary financial resources.

[52] World Bank, *id.*

With reference to the safety standard of rail network, one section of Bacau loop and Bacau-Pascani have been realized during 2003 and 2004 and other sections are in progress. Estimated investment needs for the modernization of Corridor IX is 1,183 billion Euros[53].

Other investment programs in progress are:

- Modernization of the electronic interlocking[54] systems in 18 stations with an investment of 105 million Euro. The deadline of the investment programme is 2010;
- Modernization of five railway stations: Craiova, Timisoara, Cluj Napoca, Iasi and Constanta, financed by EBRD, with a value of 24 million Euro;
- Rehabilitation of 15 railway stations, financed by Credit Suisse First Boston, London with a value of 60 million USD. The deadline of the execution is 2007.

MANAGEMENT OF THE RAIL SYSTEM

Railways could not finance maintenance and investment in facilities and equipment. Railways covered the losses by accumulating arrears of the state and through debt to other creditors. As a result, the Government launched a railway reform program in 1996 – supported by World Bank, EBRD, EU-PHARE. The previous state railway company (SNCFR) was initially separated into five companies, subsequently merged into three: infrastructure (CFR), freight (Marfa), and passenger (Calatori), with the state as the only shareholder in all three. The restructuring also created a regulatory agency (AFER) within MTCT, in addition to the Ministry's railway department that coordinates the operations o f the railway companies.

The infrastructure company owns the track, buildings (stations and other buildings), depots, the majority of surplus assets (wagons and locomotives), and also owns and operates some other non-core activities such as hotels (however, non-core activities have been continuously reduced in the past years).

CFR's main income source is the Track Access Charge (TAC) levied on all the operating companies. The passenger company, Calatori, provides extensive but uncompetitive passenger services at low tariffs. This is supported by the state through Public Service Contract (PSC).

The freight railway company, Marfa, is managed commercially, receives no subsidies, and legally has the freedom to manage and set tariffs.

The three railway companies, CFR, Calatori and Marfa, own several subsidiaries which sell services for them and other purchasers. In the last years the MTCT has licensed a few private rail freight operators which share the use of the rail tracks and pay the TAC to CFR.

The private operators now have 10-15% of the rail freight market. Romania Railways has received several sovereign guarantee loans (the World Bank, EBRD, EIB, JBIC) and grants (EU-ISPA) to improve the physical facilities, especially in the main corridors, the rolling stock, and organization and management of the railways.

[53] UNECE, Transport Situation In Romania in 2006 – from http://www.unece.org/trans/doc/transsitdocs/2006romania.pdf

[54] "Interlock" means the automated inhibition of transit in the stations with single rail track

Figure 31: Oradea train station near the Romanian-Hungarian border

3.4.3. TRAFFIC TRENDS

At present, Romania is experiencing a permanent evolution of the traffic that increased in 2006 in comparison to 2005.

For 2007 and the following years, the integration of the national transport network into the European and international network is expected, with the balanced development of the local and regional economy, improvement of the passengers comfort and the increase of their safety, better efficiency of the freight transport and increase the mobility of population at the same time.

Within this context, the following facts concerning transport infrastructure can be taken into consideration:

1. Modernization and development of the road and railway transport structure on the TEN-T network, mainly on the Pan-European transport corridors IV and IX that cross Romania;
2. Rehabilitation, modernization and development of the infrastructure on the Danube, navigable canals and port infrastructure on the European corridor VII;
3. Increase of airport capacity and of air-transport safety;
4. Development and modernization of transport means and installations in view of improving the quality of services, security of traffic, safety and quality of the environment and ensuring the interoperability of the transport system;
5. Removal of the traces left by the natural calamities upon the transport infrastructure.

Generally, the evolution of transport activities shows the level of transport demand, which was generated by economy during the period 2002-2000. (tables 1- 4).

The goods and passenger volume increased due to the positive evolution of economy and the high level of investment in transport infrastructure. The railway and road transport registered lower growths and the maritime and inland waterway transport registered higher

growths due to the access to the Black Sea and Danube, as well as due to the low costs of these modes of transport compared to the inland and air transport.

In the field of railways transport, in 2003, the passenger traffic registered a slight increase compared to the previous year. 2003 is also the first year where the passengers company registered no losses.

The railway market share decreased in 2003 from 38% to 36% out of the total freight transport market, but the volume of the transported freight remained the same during the last 3 years (about 69.4 mill. tonnes).

In the field of road transport, in 2003, the transport enterprises were classified taking into account the categories of goods and the type of transport (goods, passengers, technologic), both in domestic and international transport. The private transport account decreased in favor of the public one.

The passenger transport knew an expansion of the served itineraries, the frequency, the comfort and the quality of the services.

As concerns the yearly evolution of the number of vehicles, the number of private cars increased by 2.5%, and the number of freight vehicles increased by 9.5% in the period 2000-2003.

All the vehicles purchased in 2003 meet the requirements of EURO 3 standards.

Table 1

Mode of transport	Goods transported in 2002* million tonnes	Goods transported in 2003** million tonnes	2003 in % against 2002	Goods transported in 2004** million tonnes	2004 in % against 2002
railways	70.7	71.0	100.4	72.0	101.8
roads	267.1	269.6	100.9	276.5	103.5
inland waterways	13.9	14.5	104.3	15.0	107.9
maritime	0.3	0.4	133.4	0.5	166.7

Table 2

Mode of transport	Distance covered by goods in 2002* million tonnes/km	Distance covered by goods in 2003** million tonnes/km	2003 in % against 2002	Distance covered by goods in 2003** million tonnes/km	2004 in % against 2002
railways	15,218.1	15,265	100.3	15,480	101.7
roads	25,349.6	25,610	101.0	26,270	103.6
inland waterways	3,641.2	3,770	103.5	3,900	107.1
maritime	1,332.6	1,776	133.3	2,220	166.6

Table 3

Mode of transport	Passengers transported in 2002* million passengers	Passengers transported in 2003** million passengers	2003 in % against 2002	Passengers transported in 2004** million passengers	2004 in % against 2002
railways	95.6	96	100.4	97	101.5
roads	159.0	162.5	102.2	167.3	105.2
air	1.2	1.2	100.0	1.3	108.5
inland waterway	0.2	0.3	150.0	0.4	200.0

Table 4

Mode of transport	Travels performed by passengers in 2002* million passengers/km	Travels performed by passengers in 2003** million passengers/km	2003 in % against 2002	Travels performed by passengers in 2004** million passengers/km	2004 in % against 2002
railways	8,501.8	8,640	101.6	8,730	102.6
roads	5,282.1	5,365	101.5	5,520	104.5
air	1,842.0	1,842	100.0	1,996	108.3
inland waterway	17.8	27	151.7	36	202.2

3.4.4. TRANSPORT POLICY

ROAD TRANSPORT

Road safety is the main goal of Romanian transport policy, according to the National Master Plan.

The following measures have been taken with the aim to improve the situation in the areas where there are bottlenecks:

1. Identifying the areas with a high traffic flow;
2. Increasing the efficiency and safety in the transport sector;
3. Noticing the effects on environment in case of ongoing projects, with the aim to prevent irreversible effects on the environment;
4. Drawing up projects for removing the causes that contribute to accident occurrence (reducing visibility, imperfect delimitation of the crossings, lack of clear signalling);
5. In order to reduce the number of the old cars in the car stock and also to reduce the negative effect of these cars on the environment, a financial incentive has been set, allowing replacing old cars with a value ticket representing a part of the new car cost.

As a results in the legislation frame, it can be stressed that the harmonization of an important part from the national legal frame with the European one has been carried, by adopting some new laws in order to transpose European Directives or by modifying the existing laws.

In the field of transport infrastructure, in 2006 a new section from the Pan – European Corridor no. IV – Fetesti – Cernavoda, with a total length of 17,58 km has been completed[55]. Another achievement is represented by the works on Transylvania Motorway, Cluj-Napoca – Zalau- Bors sector (Hungarian border), on the sectors Campia Turzii – Gilau and Suplacu de Barcau – Bor. On other sections the design contract is ongoing.

In Romania there are differences between the social and economic development in the eastern part of the country and the more balanced development from the rest of the country.

A solution offered by Romania was the construction of the Budapest - Odessa Corridor (Budapesta-Nyiregyhaza-Csengersima / Petea-Baia Mare-Borsa-Suceava-Iasi-Sculeni-Chisinau-Perfomaise / Kucurham-

[55] Source: National Master Plan of Transport System

Odesa), 1065 km long. Both Hungarian and Romanian parties had expressed the support for the motorway project on the route Petea – Satu Mare – Baia Mare and the design works are presently progressing. This solution will enhance economic development, creating a link between Austria – Hungary – Romania – Moldavia - Ukraine.

This direct road is a link to M3 motorway from Hungary, part of the Pan-European corridor no V, and it will represent the third high-speed connection between Romania and Hungary, the first two connections being already planned to be realized on the routes Szeged-Nagylak/Nadlac-Arad and the axis Debrecen-Biharkesztes/Bors- Cluj-Napoca

During 2006, on the national road N6, a secondary part of the Corridor IV, rehabilitation works have been realized and, at the end of this year, two sections will be finalized: Craiova – Filiasi and Ciochiuta – Drobeta Turnu Severin. The purpose of these works was to realize a better connection of the National Roads with the European Road network.

In order to avoid congestion, projects have been developed to realize city bypasses in the cities where an increased volume of traffic flow has been registered. Thus, at present, bypasses have been financed by the state budget and other 7 bypasses by co – financing between the state budget and other international financing institutions. Their role is to take over the traffic flow excess.

RAIL TRANSPORT

One fifth of total length of the railway network lies on sections of the Pan-European Corridors numbers IV and IX which cross Romania. These sections are crossed by more than half of the total traffic, and investments are focused on them. The aim is to upgrade the lines for a speed of 160 km/h.

On the Romanian part of Corridor IV: Curtici-Arad-Alba Iulia-Brasov-Bucharest-Constanta, which has 1.362 km, the necessary investments are about 3 billion Euro finalized to:

6. The section Bucharest-Campina works have been finalized;
7. The sections Curtici-Arad-Deva-Simeria, Simeria-Coslariu, Coslariu-Sighisoara-Brasov and Brasov-Campina, feasibility studies were elaborated and international financing is sought in order to realize the works;
8. The sections Bucharest North-Bucharest Baneasa and Fetesti-Constanta works are performed on the basis of a loan received from JBIC – Japan Bank for International Cooperation;
9. The section Bucharest Baneasa–Fetesti works are realized through ISPA EU fund;
10. On the Romanian part of Corridor IX, 595 km long, the modernization works realized or in process are:
11. Modernization of Giurgiu North station, financed by PHARE funds;56
12. Rehabilitation of Girugiu-Russe bridge, financed by PHARE funds and realized together with the Bulgarian part;
13. Feasibility studies for sections Bucharest-Videle, Videle-Girugiu, Ploiesti-Buzau, Buzau-Focsani.

[56] PHARE – pre-accession EU fund for Central and Eastern European Countries

BUS PUBLIC TRANSPORT SERVICES

Surface public transport has always been subsidised in Romania. In the 1990s, especially between 1995 and 1997, there were successive tariff increases for surface and underground public transport, as well as significant increases in fuel prices. Bus public transport is generally managed by municipalities.

Public transport has a strong social aspect, which explains the high percentage of tariff subsidies. Generally, the municipality bears 70 percent per trip of the cost of surface public transport.

The subsidy received by RATB[57] during 1990-1995 was between 72 percent and 82 percent of total revenues. The purpose of this measure was to maintain a high level of public transport use.

At the national level, the Ministry of Finance has established a policy to guarantee social protection, and it approves tariffs and subsidies for public transport.

Because government policy is oriented towards the market economy, public transport efficiency is a priority.

Consequently, RATB has implemented a series of measures to increase the efficiency of its activities by separating some auxiliary activities (a complete overhaul, construction of tram track, the washing of vehicles) from the main activity of passenger transport.

The percentage of subsidies allocated to RATB is high compared to the percentages of subsidies allocated to other transport companies in large cities around the world — companies whose performance parameters are similar to those of RATB[58].

The significant subsidy reduction is due to the fact that the municipality of Bucharest faced an acute financial crisis that made it impossible to grant budget allowances in the amounts required and justified by RATB in compliance with the norms in force.

The subsidy for 2003 was 20 percent lower than the average amount of previous years. The impossibility to allocate the calculated amount led to the restriction of RATB's activities. RATB's financial resources include:

14. Revenues from tickets and monthly passes sold at RATB's own centres (which represents approximately 30 percent of the costs);
15. The tariff difference allocated by the Local Council, which is calculated in accordance with the Methodological Norms of the Ministry of Finance and represents the social protection offered to certain categories of citizens;
16. Budget allowances to cover capital expenses, in compliance with the Law on Public Finances.

In order to reduce pressure on the local budget, the efficiency and attractiveness of public transport service should be further increased. The primary way to do this is through investments in infrastructure and vehicles stock modernisation.

[57] Bucharest public transport management company
[58] Source: CSST

The efficiency of public transport should not be evaluated by operational revenues[59], but rather by the indirect advantages for the urban community (increased environmental protection, low fuel consumption, comfort and safety).

SLOVAKIA

The transport system in Slovakia, constituted by a well developed rail system combined with a highway system, has a low density and is still in expansion. The basic network is based on the network designed by the Hungarian state, which followed a north – south pattern in order to connect with Budapest. Both the rail system and the highway system have been subjected to a series of upgrading, due to the increase in freight transport and automobile traffic; the first, in the early 21st century, and the second after the Slovakian independence (1993).

3.5.1. ROAD AND MOTORWAYS

NETWORK ANALYSIS

The road network in Slovakia is composed of 42,696 km of roads (except highways and motorways), of which 3,341 km are first-class roads, 3,734 km second-class roads, 10,401 km third-class roads and 25,220 km local roads (2000). In December 2007, there were 368 km of highways and 135 km of motorways.

Figure 32: Slovak road transport network[60]

The maximum legal speed on highways is 130 kilometres per hour, on smaller roads the maximum speed in 90 kph, the limit in towns is 60 kph.

[59] Incomes originated by public transport service (tickets for passengers).
[60] Source: The Ministry of Transport, Posts and Telecommunications of the Slovak republic Transport infrastructure - from http://www.unece.org/trans/doc/2007/wp5/Presentations/Slovakia-3.pdf

3.5.2. RAILWAYS

NETWORK ANALYSIS

The railway network includes (2006 values) 3,662 km of railways. 3,512 km are in standard gauge (1435 mm), 100 km in broad gauge (1520 mm) and 50 km in narrow gauge (1000 or 750 mm); therefore the infrastructure is not homogeneous in all the country.

There are significant international connections from Bratislava to the Czech Republic, Austria and Hungary. The most important railway line in the country is from Bratislava to Košice via Žilina.

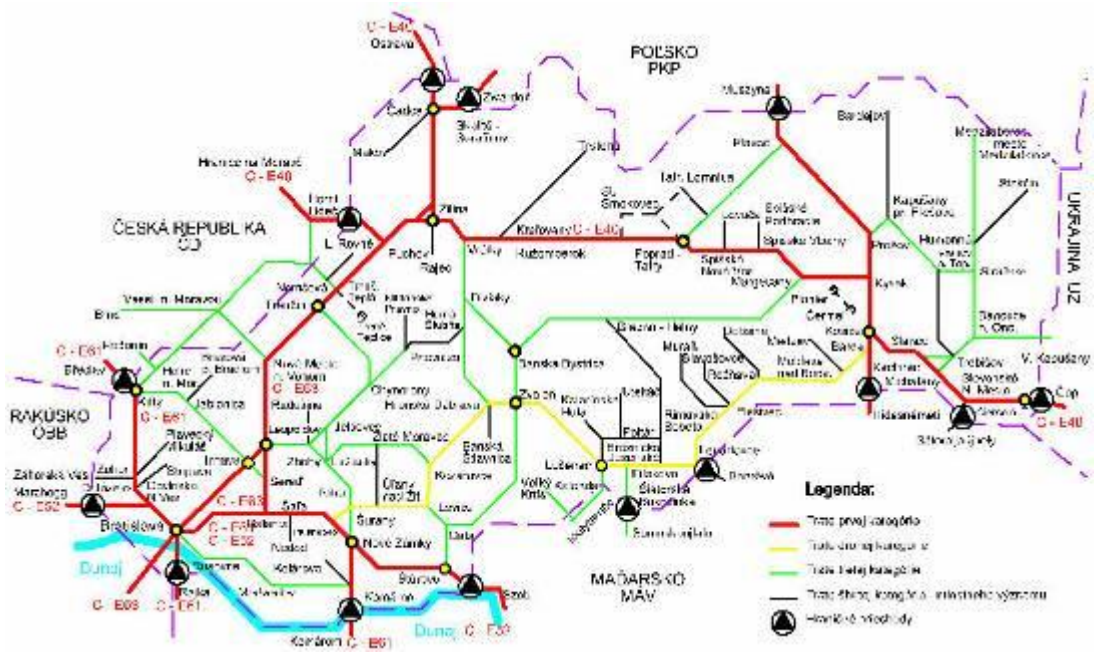

Figure 33: Slovak railway network

In order to get in line with EU regulations regarding railway traffic, Slovakia is improving the railway infrastructure. The objective is to meet EU standards with trains that will reach the speed of 160 kilometres per hour.

Another important issue is the inclusion of Slovakia in the Fifth European Corridor (2,831-kilometre corridor travels from Italy to Ukraine via Slovenia, Hungary and Slovakia). The Slovak part of the corridor (19% of the total corridor length) is 545 kilometres long, and runs from Bratislava to Čierna nad Tisou via Žilina and Košice. The infrastructures belonging to this corridor have been subjected from 2008 to an improvement, with the objective to harmonise the Slovak system with the European transport system.[61]

3.5.3. TRANSPORT POLICY

The Transport Policy of Slovakia until the Year 2015 ("transport policy") has been formulated on the basis of two main pillars:

[61] Source: http://www.spectator.sk

1. The documents approved at national and European level:
   - Principles of the "State Transport Policy for the Slovak Republic";
   - Developments in the sector of transport related to other developments at national and regional level;
   - White Paper – EU Transport Policy until the Year 2010 – Time to Decide, Lisbon Strategy;
2. An analysis of strengths and weaknesses, opportunities and threats (SWOT analysis).

The transport policy of the Slovak Republic started to be clearly formulated in relation to the establishment of the Slovak Republic (1993). The new political structure required a new definition of objectives, approaches and strategies for economy and integration.

In the field of transport, the objective was to ensure the development of infrastructure; in order to fulfil this objective, in 1993, the Government of Slovakian republic adopted two basic documents defining the new scope, direction and quality of the transport policy of the independent Slovak Republic: the "Principles of State Transport Policy" and the "Conception of the Development of Transport of the Slovak Republic". The principles of the "State Transport Policy for the Slovak Republic" have been updated in 2000, originating a basis document for the development of transport policies: the "Government Resolution 21/2000", which represents the most recent expression of transport aims and policies in Slovakia. This document was draft in order to ensure the compatibility with the European development of transport: in particular, regarding the harmonised development of the individual transport components and the revitalisation of railways.

The transport policy also takes into account the Lisbon Strategy of EU, whose strategic aim for the following decade is to build a dynamic and competitive economy. Regarding transports, this aim will be achieved particularly by the development of the transport infrastructure, support for the liberalisation of transport services and the development of information and communication technologies.

3.5.4. ANALYSIS OF STRENGTHS AND WEAKNESSES

The formulation of the transport policies in Slovakia takes in account, as a basis for policy development, the strength, weakness, threats and opportunity aspects of the Slovakian transport system. The main strength points of the Slovakian transport system are the location of Slovakia in a strategic position (as a part of the European transport network and considering the direct access of the Slovakian transport system to the European Transport Corridor VII), the adequate density of the transport infrastructure, and the project of introducing performance – based fees for the utilisation of road infrastructure. The main weaknesses are the underdevelopment of the infrastructure included in the TEN – T network, the scarce integration of the transport system with information and communication technologies, the poor technical conditions of the railway system (related to high fees for utilisation), and the low technological level of intermodal nodes and transport terminals.

The main opportunities of the Slovakian transport system are represented by the wide possibility to develop sustainable mobility through environmentally friendly transport modes, the general improvement of the transport infrastructure caused by the connection to the TEN – T network, and the big potential for air and water transport, which is still to be developed. Some risks and threats are also related to the development of transport in the Slovakian Republic; in particular, there is the risk of negative environmental effects that could be caused by the growth of the transport system, the risk of the deterioration of the

transport infrastructure due to the lack of financial resources for development, maintenance and operation, and the risk of the increase of transfer from freight traffic from railways to road due to the increase in volume of freight traffic.

3.5.5. THE TRANSPORT POLICY UNTIL THE YEAR 2015

The development of the Slovakian transport system until the year 2015, as highlighted in the "Principles of State Transport Policy" and the "Conception of the Development of Transport of the Slovak Republic", is based on the principle of sustainable development, (support of balance between different sectors, orientation to transport users, support of equal opportunities, effective utilisation of territory and resources, openness of the access and gradual transfer of the costs to their originators) [62].

This basis is reflected in the policy, economic, environmental and social principles for transport policies in Slovakia, which are described in the following sections.

Transport policy principles:

- Transport should be perceived as a compact transport system, integrating the different transport modes;
- Transport should be developed in a sustainable way;
- It is necessary to achieve an optimal balance between the potential of the different transport modes;
- Transport should be user – oriented.

Economic principles:

- The financial resources should be used effectively;
- Total transport cost, including externalities, should be incurred by their originators.

Environmental principles:

- The objective of pollution reduction should be a guiding principle for the development of the transport system;
- The resources (recoverable and unrecoverable) should be used effectively;
- The principle of individual liability for damages caused to the environment should be promoted

Social principles:

- Social interests should be promoted instead of individual or local interests;
- The main topics to address should be health protection, the prevention of car accidents and the improvement of the quality of life of the population.

SERBIA

Transport in Serbia is organized in different sub-sectors, though at a glance several problems of the national transport system have to be dealt with.

[62] Transport Policy of the Slovak Republic until 2015 - Approved by the Government of the Slovak Republic No. 445 from 8. June 2005 – from http://esteast.unep.ch/default.asp?community=esteast&page_id=D8E765A5-0030-4E34-9BA9-8B313811C458

Notwithstanding the inclusion of Serbia in the international routes defined by the trans-European corridors, currently smaller roads represent the highest quota of the road infrastructure network and in general roads host less traffic than their capacity would permit. With reference to rail infrastructure, only an unimportant share of the network has a double-track.

Traffic volume on Serbian road network has declined since 1990s and most of the circulating fleet does not meet the EU technical standards. At the same time, railways need to be renewed and equipped with higher technologies, since for example only a minor share of the network is presently electrified and the current service does not meet the travellers' needs.

It is essential to recall the prominent possibility to develop a modern and sustainable water freight transport system in Serbia, which is represented by the waterways: Tisza, Sava and Velika Morava rivers and especially the Danube. These waterways are navigable for almost all the year long and can support the integration of national transport policy in a larger international framework, including other bordering countries as Slovenia, Croatia, Bosnia & Herzegovina. Inland navigation routes and ports already exist in Serbia and can be considered a good infrastructure base for further development, especially in a perspective of modal shift policies supported by the EU.

3.6.1. ROAD AND MOTORWAYS

NETWORK ANALYSIS

The road network of the Republic of Serbia is 48,423 km long, including 18.000 km of primary roads (380 km of motorways and 165 km of secondary motorways) and 30.000 km of local smaller roads, of which some 20.000 km are managed locally and 10.000 km regionally. In the Serbian road network, some 2000 km of roads belong to the European system of roads (E roads), 400 km of toll highways with separated lanes, and some 160 km of toll highways without separated lanes.

In the whole Serbian road network, 2/5 of roads are paved roads and dirt roads. In addition more than 30% of arterial and regional roads are more than 20 years old. Only 14% of the road network has been built less than 10 years ago.

There is still a strong need for investment in road infrastructure in Serbia. Infrastructure maintenance and operation are not assured and a very low budget is presently used to finance these activities (570 US $ per km), if compared with OECD countries average expenditure per km, which is almost 26 times higher than in Serbia (on average between 15,000 and 45,000 US $)[63].

A new highways construction program has been envisaged by the government in Serbia and relevant changes to the current road transport network are expected in the near future.

In this line upgrade of the existing road network is expected to take place in Serbia and at the same time a road management system should be applied in order to improve the efficiency and effectiveness of national transport policy. Technical and safety standards in compliance with EU requirements are not yet available in Serbia and appropriate planning

[63] Serbian government official web site, transport data: http://www.srbija.sr.gov.yu/pages/article.php?id=97

procedures (including a proper environmental impact assessment procedure) need to be applied.

Road rehabilitation and reconstruction can also benefit of EIB and EBRD loans and the World Bank funds. In the long run, several infrastructural works have been scheduled with special reference to major cities (Belgrade) and new motorways (e.g. Horgos-Pozega route, via Belgrade).

A road toll system is currently applied over 600 km of motorways along the whole country. 35 toll stations were available in 2004, which levied a toll on more than 28 millions vehicles on the track, collecting some 100 millions euros in 2004. Adjustment of Serbian toll system to EU standards is a goal for the national transport policy.

Action is required to harmonize Serbian standards to the EU level mainly in road and pavement design, road and bridge construction, traffic signals, and road maintenance. A special attention has to be paid to the safety standards in a country which is expected to substantially increase its vehicle fleet in a very short time, as it usually happens in countries at a early development stage.

Environment has been included in the competencies of Serbian Road Directorate (SRD). Training initiatives (e.g. seminars, courses, etc.) have started and environment and transport policies are expected to combine thanks to specialized staff working in the "Environmental Unit" of SRD, established in 2004[64].

Figure 34: Serbia's road network[65]

[64] B. Jocic, "Building tomorrow's transport infrastructure in South East Europe", report presented in Belgrade, 16-17 November 2005. In this presentation several information on the existing road infrastructure and projected changes in Serbia are available. This document is available on-line at: http://www.irfnet.eu/images/see/15.%20B.%20Jocic.pdf

[65] Source: from: http://www.irfnet.eu/images/see/15.%20B.%20Jocic.pdf

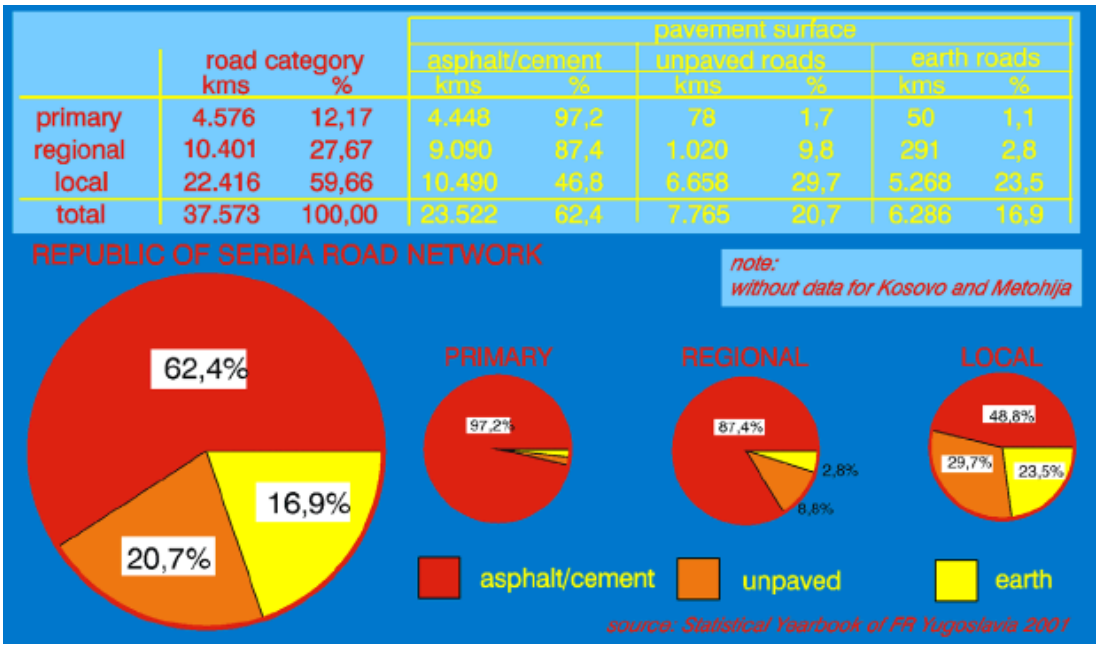

Figure 35: Basic characteristics of the road network in the Republic of Serbia[66]

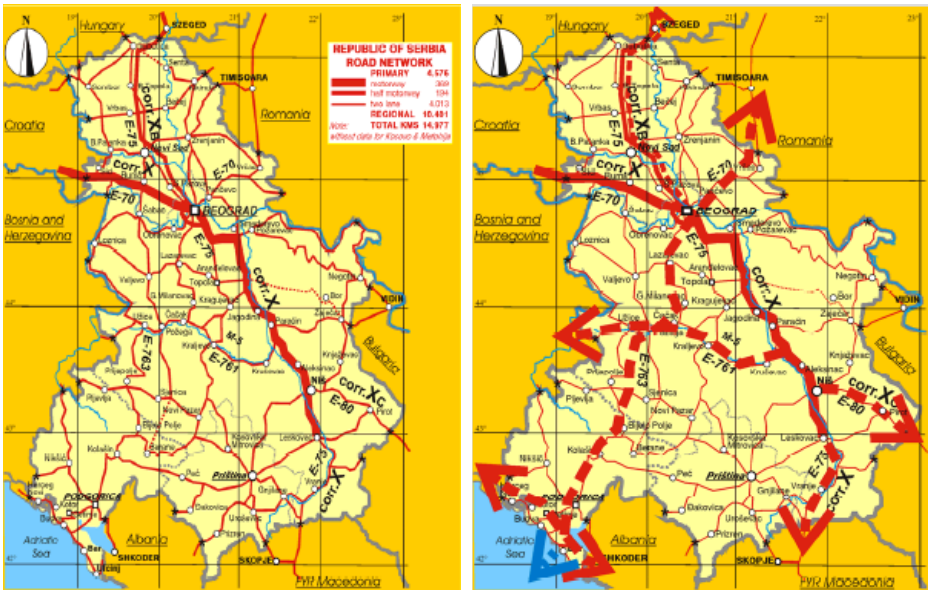

Figure 36: Long term plan for road network in Serbia[67]

3.6.2. RAILWAYS

NETWORK ANALYSIS

Some international railway lines link Serbia with other parts of Europe. The total railway track length is 3.808 km of which 3.533 km single track and only 275 km double track.

Internal rail services are generally poor and often unreliable and unsafe.

[66] Source: http://www.seetoint.org/site/pdf/42-e13a.pdf
[67] Source: http://www.irfnet.eu/images/see/15.%20B.%20Jocic.pdf

A partial reconstruction of the damaged lines started in the 1990s, after the Yugoslavian war. A strong reform of the railway system in Serbia is felt as a strict need and the company charged with the lines management provided a business plan, wherein structural changes are reported.

Main modifications to the present features of the Serbian railways recalled in the strategic document cited above include the creation of a market-oriented sector involving private actors; the identification of most appropriate means to finance system change – in close cooperation with the Serbian government; the issuing and implementation of transport national law being consistent with the EU principles on this matter; the adoption of a new organizational and managerial structure; a general improvement of the quality of service both for freight and passenger transport based on sound business analyses[68].

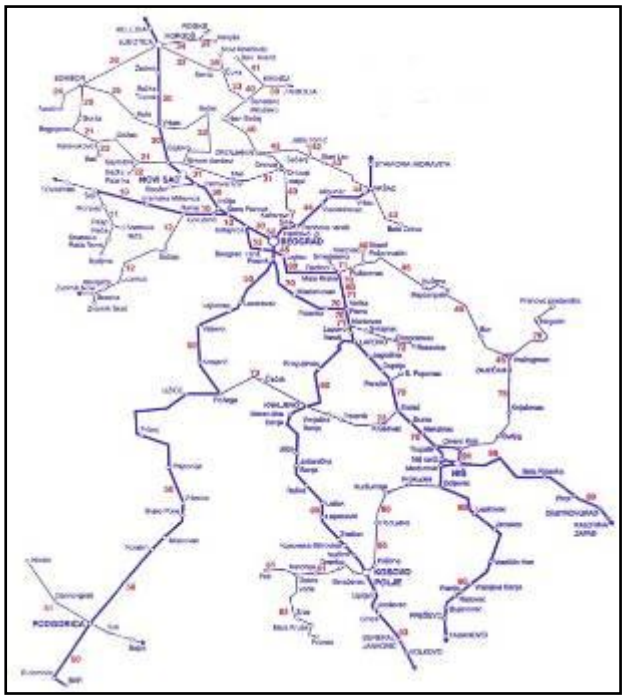

Figure 37: Map of the railway network in Serbia and Montenegro[69]

3.6.3. TRANSPORT POLICY

The national Serbian legislation regarding transport has been subjected to some interventions from the political changes in 2000: the aim of these interventions is to harmonise the national Serbian legislation with the European legislation. Accordingly, strategies for reducing the risks deriving from traffic are being developed. The development of the Serbian transport policies (of which the Ministry of capital Investment is responsible) isn't specifically related to sustainable transport, as no studies have been carried out on this issue; in general, the Serbian legislation has adopted sectoral laws focusing particularly on road, rail, water and transport. This legislative framework allowed providing a legal basis for the

[68] Details on the railway system reform promoted by Serbian railways can be found in the Action Plan Supporting 2003-2007 Business Plan Implementation issued by the Serbian railways themselves. See: http://www.serbianrailways.com/active/en/home/glavna_navigacija/o_preduzecu/business_plan/akcioni_plan_20032007.html

[69] Source: http://www.travelserbia.info/railway.php

organization and the utilization of the transport system, including the transport of hazardous goods. While road remains the dominant mode of transport, rail and water transport represent an important part of the legislative framework on transport in Serbia: in particular, plans on inland water transport are in preparation aimed at identifying priorities for the development of infrastructure (water routes, harbours), investments and capacities.[70]

UKRAINE

In Ukraine a wide range of transport modes has developed, including railway, motor, sea, air, river, pipeline and electric transport.

Railway transport plays a leading role in transport communications. Total length of Ukrainian railroads is 22,800 km including 8,300 km of electrified tracks. The Ukrainian railway transport system is the fourth in the world, in terms of length, after Russia, the United States and Canada.

Over 300 million tons of freight are transported on the national rail network and more than 500 million passengers travel by train every year in Ukraine. Highest railway network density is to be found in the Ukrainian regions of Donbas, Prydniprovia and in the western regions of the country.

Road transport development has been increasing in recent times, and its role is continually growing.

Over a billion tons of freight are transported and 2.5 billion passengers travel on the Ukrainan road network. The length of motorways reaches 169,000 km. Highways link Ukraine with other countries integrating it with the European road network, by Corridors III – V and IX.

[70] *A Heightened Perspective Regional Assessment of the Policy Legislative and Institutional Frameworks Implementing the Carpathian Convention*, REC, EURAC, December 2007

Geographic features, landscape shape and climatic conditions of the area have been facilitating the development of sea transport in Ukraine. Black Sea and Sea of Azov do not freeze in colder seasons and allow to link Ukraine to the Mediterranean through the straits of Bosporus and Dardanelles. The total length of the sea coastal line exceeds 2,000 km. Regular sea transportation started back in the 18th century, and its development is still continuing today. Most significant Ukrainan sea ports are Odesa, Izmail, Illichivsk, Kherson, Mykolaiv, Sevastopol, Yalta, Feodosia, and Kerch. The Black and Azov Sea Fleets form the basis of the sea transportation system. Ukraine has 18 ports and 8 ship yards[71].

3.7.1. ROADS AND MOTORWAYS

As it happened with rail traffic, there has been a significant decrease in the volume of road freight shipping.

According to the Ukrainian Ministry of Transport, non-rail surface carriers moved approximately 163 Million tons of cargo in 1995, compared with 437 million tons in 1993. Until recently, Ukraine's truck shipping system was based on state-owned holding companies acting as state monopolies and managing regional truck shipment enterprises.

Figure 38: Road Corridors interesting the Ukraine Carpathian Area

Recent regulatory changes, however, opened the transport industry to competition among private enterprises and stimulated the growth of service providers, from three points of view: dimension and number of companies and volume of deliveries.

There are over 1,000 road transport enterprises in Ukraine in 2004, using 80,000 trucks and other vehicles, and is foreseen the major growth in traffic over the next several years[72].

[71] Source: EU/UKRAINE Action Plan 2004 – from http://ec.europa.eu/world/enp/pdf/action_plans/ukraine_enp_ap_final_en.pdf

[72] Business Information Service for the Newly Independent States (BISNIS), Transportation in Ukraine (2002).

In the next years, trade and investment opportunities in this sector in Ukraine will include long-haul trucks; road reconstruction and repavement; development and sale of software and hardware for transport services and distribution management, consultancy services in the field of transport.

3.7.2. RAILWAYS

Rail transport plays an important role in connecting Ukraine's industrial and urban centres, and port facilities with neighbouring countries. Four major railroad lines run through Ukraine.

The heaviest concentration of rail tracks is in the Donets Basin and the Dnipro (or Dnieper) River provinces. The largest railroad centres, hosting the main national railway stations, are Kharkiv, Kiev, Dnipropetrovsk, Bakhmach, Ysinoviataya, Debaltsevok, Kovel, and Kupyansk.

According to reliable data and studies only 60 percent of the railroad network capacity is currently being exploited in Ukraine. As mentioned above, recently Ukrainian railway transport has suffered a critical period: according to recent data, the volume of goods transported by rail decreased of 7.4 percent in 1995 compared with previous year's figures.[73]

Declining demand for rail transport services had as a consequence some cutbacks in state subsidies. Currently, monopolist rail carriers have little incentive to modernize the system or improve the quality of rail transport services. Privatization of the railroad sector may be an important factor in attracting the necessary foreign capital to modernize and restructure this potentially lucrative industry. Most commercial opportunities in the rail sector will be in computerized car-control systems, switching systems, track upgrading, refrigerated cargo handling, cost accounting systems, and telecommunications.

3.7.3. TRANSPORT POLICY

One of the main objectives for the Government of Ukraine is a strong development of the international Transport Corridors crossing the country and the integration of Ukraine's transport network into the European system[74].

The program for the development, construction and management of International Transport Corridors in Ukraine up to 2005 has been approved by the Government.

Scientific research in the economic field is being carried out to provide a set of rules as a basis for the creation and development of a national network integrated in International Transport Corridors. European and Ukrainian construction standards have been analysed and compared: as a result, there is an effort to use European ENV standards (CEN) [75]in the design of new buildings in Ukraine.

[73] BISNIS, *id.*
[74] Source: EU/UKRAINE Action Plan (2004)
[75] CEN, the European Committee for Standardization, was founded in 1961 by the national standards bodies in the European Economic Community and EFTA countries. CEN is contributing to the objectives of the European Union and European Economic Area with voluntary technical standards which

The so-called "Railways of Ukraine Development" project is being implemented in cooperation with the European Bank for Reconstruction and Development (EBRD): the project aim is to reconstruct and modernize the railway infrastructure on the L'viv-Zhmerenka-Kyiv railway line. The reconstruction of the bridge passage on Zakhidny Bug River on the Ukraine-Poland state border in the Yahodyn - Dorogusk crossing point has also been started.

Cooperation in the field of Pan-European transport corridors extension is also ongoing. Ukraine is taking part in 9 out of 16 projects included in the implementation 2002-2003 Programme established by the Intergovernmental TRACEKA Commission[76],. Another project called "Improvement of the ferrying Illichivsk - Poty" has been completed, and it now enables the connection of Corridor 9 with the TRACEKA corridor. With reference to Corridors III – V, EBRD financed the reconstruction of motorway Kyiv-Chop .

Some progress has also been made in the field of law making: draft laws "On amendments to Code of merchandise sea-shipping of Ukraine", "On sea ports of Ukraine", and the 2nd version of the Code of inland water transport of Ukraine have been completed, in accordance with the EU directives.

promote free trade, the safety of workers and consumers, interoperability of networks, environmental protection, exploitation of research and development programmes, and public procurement.
[76] Europe-Caucasus-Asia Commission for transport corridor development

4. CASE STUDIES

CASE STUDY 1: STRATEGY FOR THE FUTURE DEVELOPMENT OF SUSTAINABLE TRANSPORT, INFRASTRUCTURE, INDUSTRY AND ENERGY FOR THE CARPATHIAN REGION – THE PLACE OF TOURIST AND FORESTRY RAILWAYS IN SUSTAINABLE REGIONAL REGENERATION.

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4.1.1. INTRODUCTION

The question of why Tourist Railways should have a place in the issues of Sustainable Transport, Infrastructure, Industry and Energy is one that can be easily answered. Most of the region's tourist railways, or potential tourist railways have their foundations in either local and regional transport, or in Industrial uses, such as Forestry, that are themselves generators of industrial employment. The Infrastructure both of the Rail Transport network and of Traditional Industries can be sustained by the diversity that is introduced by Tourist Railways. As a result of that regeneration there comes an increasing demand for energy that needs to be programmed to meet current demands for sustainable and environmentally friendly power.

With the regional problems in provision of sustainable employment, it is reasonable to look at the existing transport assets which may today be under-used or indeed disused to review how they can be utilised to play their part in the regional regeneration of, particularly, rural and semi-rural areas.

Under-used industrial railways, such as those in the network of forestry railways that cross most of the Carpathian Region have a problem in economic operation to sustain their historic Industrial, Employment and Transport roles moving raw materials, finished products and people. Therefore any supplementary role, such as transporting tourists whose increasing thirst for access to the most beautiful unspoilt parts of the Carpathian Region reflects the growing disposable income and leisure time of the residents of the Region, will provide a revenue stream that can work in partnership to support employment in the traditional industries as well as new jobs in the tourism industry.

Tourism is a fact of life that will impact on the sensitive bio-diversity of the Carpathian Mountain Region across all the member countries of the Carpathian Convention, particularly as individual disposable income increases with the broadening impact of membership of the European Union, or of being a neighbour of a member.

However, Tourism will provide the catalyst to complement the efforts to deliver a sustainable strategy for Transport, Employment, Industry, Infrastructure and Energy across the rural areas of the Carpathian Mountain Region. Without a complementary business strategy to produce a supporting income stream that can be invested not just into regeneration projects, but also provides for the personal needs of local people, there will be a gradual abandonment of the rural settlements that service the needs of the mountain regions. Such abandonment with the resulting migration into the larger conurbations of the region will lead to major socio-economic changes to the Carpathian Region and a loss of the opportunity to regenerate and sustain critical major areas of the Central European Landscape.

The business strategy needs to be planned and managed with extreme care to balance the critical needs of the sensitive bio-diversity of the Carpathian Mountain Region against the temptations to allow unfettered commercial development to create permanent and irreversible environmental damage. The uncontrolled drive towards maximising income generation can be as damaging environmentally as the depopulation caused by failing to plan and implement an appropriate tourism strategy within a sound business plan.

One of the foundations of any successful tourism strategy is the recognition of the need for transport and the planning of those transport needs within an over-riding assessment of their impact on the environment. For example, an uncontrolled drive towards new and improved road access without paying due regard to the potential of existing rail infrastructure can destroy an area as effectively as industrial pollution.

In order to design a Tourism Strategy we must start from an assumption that there is potential to attract people to come to visit a specific place or area. In fact, from experience across most of the continents of the world, tourism potential can be shown to apply to a greater or lesser extent in almost every type of location, from the most beautiful unspoilt landscapes such as can be found in the Carpathian Mountain Region to the scarred battlefields of history and the industrial heritage of the more recent past. Therefore there is potential for creation of economic benefit from the infrastructure and industrial assets we already have and the Strategy becomes the Instruction Manual, or Bible, which lays down the route map for us to follow in achieving the balance between exclusive conservation and unfettered exploitation.

4.1.2. REGENERATION THROUGH TOURIST RAILWAY DEVELOPMENT IN THE EUROPEAN UNION

Tourist Railway development across the European Union Countries can be traced back over 50 years when changing demand for its products led to high unemployment and the closure of industrial railways in Wales. Small groups of industrial heritage enthusiasts and local people with vision did not want the areas concerned to die as people moved away seeking employment. Therefore they banded together to develop the former industrial railways as attractions for visitors. This created alternative employment and kept communities alive.

Today some of those railways carry up to 175,000 passengers each year and the slate industry, whilst a shadow of its former self, has survived and is substantially regenerated by its own tourist attractions to visit the slate mines and to see and learn about the industrial heritage and processes of their industry. The conversion of a redundant slate mine to an award winning living industrial museum with the opportunity for visitors to go underground now attracts more than 110,000 visitors each year and this partnership created the economic framework to make for a sustainable industry. (Source: Visits to tourist attractions 2006 – ISBN-13 978-1-905866-11-3)

The seeds sown in Wales half a century ago have flourished not just in the UK, but across Europe and into other parts of the world as innovative actions to counter downturns in traditional industries and to re-use infrastructure have regenerated communities and regions.

Visitors to tourist railways and museums in the UK and Ireland have grown from 7.8 million to 10.3 million per year between 1997 and 2007. At the same time, revenue has risen from 63.1 million Euros to 95.3 million Euros per year. This is purely direct revenue and studies in various regions have concluded that the multiplier effect is between 2 and 6 times the

actual spend at the attraction. (Source: Heritage Railway Association of UK and Ireland Statistics 2006).

Looking at the broader European situation, Fedecrail IVZW, the European Federation of Museum and Tourist Railways represents approximately 520 organisations across its 26 member countries. It is estimated that there are approximately 33 million visitors to those organisation's tourist railways each year. (Source: Fedecrail IVZW 2007).

Tourism remains the world's top growth industry and provides the chance for regeneration of existing underused or redundant Transport and Industrial Infrastructure to create new opportunities for impoverished communities across the Carpathian Region.

4.1.3. THE PLACE OF TRANSPORT WITHIN A TOURISM STRATEGY

Transport is one of the foundations upon which life depends, whether it is the need in a basic existence to move around to gather berries or similar foodstuffs to survive or at the other extreme, building major infrastructure projects to facilitate movement of goods or people. Within a successful Tourism Strategy, most relevant forms of transport from the pedestrian to the most technically complex have to be taken into regard and their effects on the environment considered and mitigated.

For many of our Tourist areas, transport infrastructure in one form or another already exists. It may to a greater, or lesser, extent be suitable for use, or for development as part of a Tourist Strategy. An impact assessment of its use for what may be new purposes should be carried out. Thus, many rural areas in the mountain region have narrow gauge forestry or other industry railways whose industrial use is either reducing, or has disappeared. The infrastructure, or the works associated with the line of route may still exist and can be economically re-used in one form or another. This can often be an economical option when compared with opening up sensitive rural areas by development of other modal access, particularly uncontrolled modes such as roads.

Whilst infrastructure for other modes of transport, such as walking or motor vehicles is part of the overall tourism strategy, this paper relates specifically to the use of existing railway infrastructure to provide access to tourist sites as an alternative to the use of private motor vehicles and the enhancement of road infrastructure to support such access. There are many examples across Europe and other parts of the world where constraints on the free use of private motor vehicles coupled with development, or sustaining of existing rail routes has resulted in a significant enhancement of economically sustainable tourism coupled with limitation of environmental damage. This can be demonstrated for routes of the national railways as well as those secondary narrow gauge and industrial railways for which a new economic role is practical.

4.1.4. TOURIST RAILWAYS IN A TOURISM STRATEGY

In this respect, the term Tourist Railways includes railways of any track gauge and history that can provide a positive benefit to an area's development by the sustainable provision of environmentally friendly access to the area or to the specific attraction concerned.

In most cases, the railway will have been part of the area for many years. The recycling of its assets to serve a developing tourism industry provides an alternative to use of new

scarce resources to serve what is in many cases the only potential source of regeneration of an area and the provision of support for a sustainable economy for the local population.

For rural areas where forestry has been a staple industry, steam locomotives that use locally grown fuel are still available and consume the waste products of the timber industry which is regenerated as part of the normal industrial process. Wood for fuel is in sufficiently plentiful supply to support railway operations formerly associated with other industries.

It can be shown in many countries that there is a positive "steam effect" that delivers extra visitor numbers where historic locomotives and rolling stock are used on tourist trains.

Visitors coming to an area to visit a tourist railway, or an attraction reached by a tourist railway, spend money in that local area in addition to their train fares. This includes food and drink, services such as overnight accommodation, souvenirs, gifts and fuel. The level of spend will vary from country to country depending on the level of disposable income available to the visitors. Overseas visitors can be expected to produce a higher level of spend as the move from domestic tourism to international tourism implies an increased level of disposable income. The opening up of international borders that have been closed or restricted for many years also creates a new market of "local foreign tourists" visiting areas associated with past generations of their families that had been arbitrarily separated by the political boundaries created as a result of the conflicts of the last Century and in some cases even earlier.

A key advantage in the development and use of tourist railways particularly in eco-sensitive areas is that the visitors are packaged into manageable chunks and can be guided through the most sensitive areas. Educational and Museum areas can be established as part of the Visitor Experience at locations appropriate to the environmental needs of the area concerned.

With the spread of education regarding the dangers of global warming and the need for managed conservation, leaving their road vehicles behind and travelling on a train creates a positive feeling in the visitors of actually making a personal contribution to safeguarding the future.

For many years, the planned economies of the Carpathian countries have tended to divorce public transport from local interest as being one of the services provided by national government. This has prevented changes in local economies being reflected in changes to local railways, or making such reaction slow, resulting in alternative solutions such as road transport being found by the population. The resulting downward spiral in the economics of operation of local railways has lead to the inevitable decision at national level of closure.

The need, before it is too late, is to follow the example of other countries that have been faced with the same situation and to pass the ownership and control of local railways to local authorities and to local people. By that means, local decisions can be made which reflect the needs of the local community. Whether it is to run trains at different times for market days or special events, or to get the local community and children to help tidy up their local station, or even to sell off redundant buildings to local businesses for conversion for other uses, the best decisions for local and tourist railways are always going to be the local decisions. This can be seen in practical examples across the world.

The transfer to local ownership allows development of a community spirit and also a volunteer culture of doing things to help your home village without necessarily expecting of payment for every task. This fosters a pride in the locality that is needed as much in the local transport as in conservation.

Insecurity in regard to heritage assets is a common problem that acts against strong development of a deliverable and sustainable Tourist Strategy. Why develop a Forestry Museum, or a Tourist Railway using assets that have been part of the community perhaps for a hundred years when they could be taken for modern redevelopment tomorrow? The answer must be that the Tourism Strategy is complemented by a robust national policy of identifying and protecting heritage assets, whether they are an ancient forest, a 100-year old railway, or a steel works! As can be seen in many countries, there is a tourist interest in visiting old industrial heritage sites as much as unspoilt countryside.

4.1.5. CARPATHIAN TOURIST RAILWAY OPPORTUNITIES

Tourist railways already exist in every member-state of the Carpathian Convention carrying varying visitor numbers. Alongside those which operate today there are many potential projects that could contribute to regeneration of their local communities as part of a robust strategy for sustainable tourism paralleling conservation. To achieve that, there is a need for recognition of financial support and security to go hand in hand with local community support.

The level of real difference that can be made by tourist railways can be seen in the visitor numbers achieved today. In Poland, the Bieszczady Railway had 42,000 visitors in 2006. Outside the Carpathian Region, in Latvia the Banitis Railway had over 31,000 visitors in the same year. In the UK, a number of tourist railways regularly carry 300,000 visitors each year.

In every case, these achieve the objective of bringing regeneration to their locality, coupled with the ability to handle the visitors in a controlled manner to reduce the damage caused by free ranging activities in their sensitive ecological sites.

4.1.6. THE CARPATHIAN WAY FORWARD

Governments are asked to sign up to a recognition that tourist railways, particularly those making use of existing heritage equipment and structures that have been part of their local landscape for many years, can play a vital part in a sustainable Tourism strategy. Tourism provides the catalyst for sustainable regeneration and diversification of Transport, Infrastructure, Industry and Energy by the re-use to best advantage of existing infrastructure and resources coupled with development of new resources in an environmentally sensitive manner.

As such, policies should be put in place to ensure that such assets are protected against predatory destruction or sale for short-term gain, either privately or by the local or state authorities.

Policies are needed to make it possible to transfer ownership and responsibility for local railways into the care of local communities with powers to make decisions appropriate to maximising the contribution of such railways to sustainable regeneration of their areas. Such transfers should be supported by funding agreements to provide finances to enable

the initial transition to local control and development of a sustainable business structure in a robust manner.

Where existing Industrial Railways are in private ownership, assistance should be given to assist with the development of complementary tourist activities which are able to create an economic environment such as to sustain the traditional employment opportunities and industrial activity and infrastructure in parallel with the tourist railway opportunities.

Positive encouragement is needed to make partnerships of differing organisations working to enhance the long term future of their region. This includes particularly encouragement of cross-border partnerships of groups with common interests that could make them more eligible for trans-national project funding.

Tourist Railways are a success story in many countries of the world. The Carpathian community of countries, entrusted with one of the few remaining unspoilt mountain areas, certainly in Europe, are able to take steps to ensure that their success can be spread through this region in partnership with ecological policies to protect the landscape.

4.1.7. ACTIONS

We in the New Europe Railway Heritage Trust believe that actions speak louder than words. Accordingly, with FEDECRAIL IVZW we have already launched two initiatives to assist with the development of tourist railways in the Carpathian Mountain Region.

The CERT Project (Central European Railways for Tourism) with Public Body partners will assist the development of six existing and proposed tourist railways in the Carpathian Convention Region from Poland, Slovakia, Hungary, Romania and Ukraine. This is being prepared for submission in the First Call for the Interreg IVC programme.

Under the new Culture 2007 – 2013 programme, FEDECRAIL IVZW has submitted an application to support establishment of a Central Europe office based in Hungary. A key activity will be to assist with development opportunities for tourist railways in the Carpathian Region as well as other parts of Europe.

It is hoped that these positive action proposals can be proactively supported by the Central European Initiative and that we will be able to deliver these as positive and quantifiable proof of the regenerative effects of Tourist Railways in the Carpathian Region.

CASE STUDY 2: ENVIRONMENTALLY PROTECTED AREAS: HIGHWAY D47 – MIGRATION STUDY – PROPOSAL OF PROVISIONS FOR THE ASSURANCE OF THE PERMEABILITY OF THE CONSTRUCTION FOR BIG MAMMALS.

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4.2.1. INTRODUCTION

The section of the new D47 highway between towns Lipník nad Bečvou and Ostrava (60 km) belongs to the most problematic constructions in the Czech Republic from the nature conservation point of view. The route of the highway is passing through a broad valley of the

Odra and Bečva rivers and copies the border of the Carpathian region in its entire length. This valley separates the Moravskoslezké Beskydy mountain region (part of Carpathians) from the Oderské vrchy and Jeseniky region. These mountain regions are only few kilometres far from each other. And right in this valley the migration of big carnivores (bears, wolfs and lynxes) from the Moravskoslezské Beskydy through Oderské vrchy to the Jeseníky region is still happening. These migrations are not very frequent (only few individuals per year), but are still crucial for the Czech populations. This area is very important for next survival of all species of big mammals, because it is the only migration link between the Carpathians and whole Hercynian region (which includes majority of Bohemia and Moravia). This is the reason why it is so important to preserve the migration permeability of this region for big fauna species. The permeability of proposed highway is highly complicated because the valley is densely populated and some other frequented roads and railways have passed already through. For this reason it is so necessary to solve not only the problem of highway permeability, but also to create safe and continuous connection (wildlife corridors) from the Carpathian region to the Jeseníky Mountains. In case that the permeability will not be solved, the migration connection between the Moravskoslezké Beskydy and Jeseníky and thereby the only connection between Carpathian and Hercynian populations will be lost forever.

4.2.2. TARGET SPECIES

Big mammal species are the most effected species by habitat fragmentation. Following species are present in the described area:

Lynx, wolf and bear – The Beskydy region is the main distribution area of all three large carnivore species in the Czech Republic. Northwest migration to Jeseníky, due to the positive natural development of the Carpathian populations of all three species, is happening here. Time to time migrations from Beskydy Mountains to Jeseníky are the only possibility for connection of Carpathian populations with unstable Czech populations in the inland.

Red Dear – Lives in all forested areas in the surrounding of the highway construction (Oderské vrchy, foothills of Jeseníky, Hostýnsko-Vsetínské vrchy and Moravskoslezské Beskydy). Bidirectional migrations are frequent in the surrounding of the highway construction.

Moos (Elk) – many records are known from the construction area. It is necessary to count with irregular southwest migration from Poland along the line of D47 highway.

Regular occurrence of wild boar, roe deer, fox, badger, otter and beaver is documented in surrounding of the construction.

4.2.3. SOLUTION

All distribution data of wolf, lynx, bear and moose from the broader area in last 10 years were evaluated within this study. The permeability of the area before the highway construction was assessed. All current migration barriers were identified (mainly built-up areas, traffic infrastructure, pasture enclosures etc.). After detailed analysis ten migration corridors for big mammals were identified in the area.

Permeability proposal - According to the valuable methodology for the Czech Republic, a passage for big mammals through the highway should be built regularly after 3-5 km in the migratory significant areas. However, this recommendation cannot be carried out in study

area because of high density of settlement, where there are long highway sections unsuitable for migrations. This is the reason why passages were proposed in all places where the identified migration corridors are crossing the route of the highway.

As passages were proposed:

1. Wildlife overpasses (green bridges) with the minimal wide of 60m.....(2x)
2. Underpasses over the water courses with the usable wide (except of water surface) of minimally 50m and with the high of minimally 5m .....(7x)
3. Tunnels .....(1x)

The study further proposes other arrangements for ensuring the permeability – mainly guidance fences around the passages, planting of trees and bushes around the accessing communications etc.

4.2.4. CONCLUSIONS

The study recommends fulfilling the following conditions for the preservation of the permeability of the D47 highway for wildlife (the recommendation is given to the Ministry of the Environment, which should require these conditions during the request for permission of the construction):

1. Sufficient amount of passages for wildlife through the highway will be built within the construction. Ten suitable passages identified as a possible migration routes for big mammals are considered as a minimum;
2. Provisioning of the conservation of the accessing communications to the passages will be solved. Incorporation of this protection to the spatial planning documentation is suitable way of further protection. This protection should apply to the whole length of the forested areas on both sides of the highway;
3. Detailed construction plans of all passages, guidance fences and plans of vegetation adjustments of all passages and accessing communications will be worked out. Before the construction is realized, agreement of nature conservation authorities with all the above mentioned plans is required.

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