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Environmental Protection and Traffic regulation in Slovenia

1. The Influence of Traffic on the Environment in Slovenia

Traffic is of utmost importance for economic, social and spatial development. The current traffic system, based on the use of fossil fuels, is one of the main pollutants of air, water and soil and a source of noise, as well as the cause of changes in climate, loss of biological diversity, accidents, and a user of non-renewable natural resources and space. All these have negative consequences for human health and also the global, regional and local environment.

In the past few years traffic in Slovenia has increased rapidly. The pressure from international traffic flows in Slovenia, owing to its geographical position as one of the more important traffic junctions in Europe, means that inland traffic flows are rising, as are the number and length of journeys. Forecasts predict continuous high growth of inland traffic and an even higher rise of transit traffic up to 2005, when growth will decrease (Prognos, 1995).

Apart from the growth in traffic Slovenia's infrastructure is also changing. Its share of road traffic is growing in comparison with rail traffic. Passenger traffic is becoming more based on individual transport. In 1997, 60 % of all passengers used personal cars while 40 % used public transport (PT). The latest estimates for the same period are 75:25 in favour of the individual car (Ministry of Transport and Communications). There are different reasons for such growth in the use of individual transport.

Unequal conditions of running the two systems is one of the main reasons, as road users are indirectly subsidised as they don't cover all expenditure. It is also a fact that personal cars offer the highest mobility and flexibility. Other important causes for the growth in motor traffic is the rise in living standards, cheap fuel prices, a low standard of public transport services, the geographical and urban features of Slovenia, lifestyle changes of inhabitants, etc. It is predicted that the future high growth of motorisation in Slovenia will reach the level of other developed European countries. The growth of personal traffic will rise further, while the share of public transport will continue to decrease (Prognos, 1995)

Also, most of the investment in traffic infrastructure is limited to the road network. The drawback of this one-sided development in building a traffic infrastructure is the neglecting of other environmentally-friendly forms of traffic.

The result of this ever increasing amount of traffic from an environmental point of view is the increasing negative influence on the environment, which is two sided. On one hand we have the influences on the environment, that are the result of traffic, and on the other hand there are the influences on the environment as a result of building traffic objects and devices. Big problems in defining the influences of traffic on the environment in Slovenia are caused by the shortage adequate data. A system for capturing important data has

not yet been established, which is why many of the important decisions about the development of traffic systems are based mainly on presumptions and which don't take into account the environmental aspect.

Air pollution is one of the burning environmental problems caused by traffic. While emissions of some dangerous substances, for example SO₂ and hard particles, are generally in decline in Slovenia, we can see an increase in the emissions (except lead) that are a result of motor traffic (NO_x and CO). For the overall emission of CO in 1996 the biggest share comes from motor traffic – amounting to 92 %. Traffic is also the main cause of climatic changes in Slovenia. In 1995 it contributed more than 30 % to the share of CO₂ emissions. Importantly it also contributes to acidification, with a 66 % share of NO_x emissions in 1996. Because of the rapid growth in motor traffic the emission of NO_x is also growing rapidly, even though there is a rise in the number of cars with catalytic converters. Higher emissions due to motor vehicles increase the possibility of photochemical smog, of which the most important component is ozone. In coming years, especially during hot summers, we can expect an increase in dangerous influences on people's health, eco-systems and materials (Ministry of Environment and Physical Planning (MEPP) – HMZ, 1997). Traffic consumes 35 % of energy in Slovenia – which exceeds the average figure of 32 % in the European states, members of OECD (MEPP-HMZ, 1997).

In connection with air quality the specialists of MEPP-HMZ are giving warnings about the incorrect forecasts, that assume air pollution from motor traffic will decrease, after the motorway network is completed. Pollution, including all dangerous substances from exhaust gases, in particular emissions of NO_x and CO, rise with speeds higher than approximately 90 km/h, mainly due to the higher consumption of fuel. That is why the requirement to allow higher speed limits on the motorways are unacceptable from the environmental viewpoint (MEPP-HMZ, 1997).

Emissions of NO_x, CO, non-combusted carbonhydrogens, and lead, can be successfully decreased with catalytic converters and unleaded petrol, but CO₂ emissions can't be lowered with catalytic converters. We ought to stress that the catalytic converter otherwise is a good technical measure for lowering emissions, though it has some shortcomings. Catalytic converters are not effective for short distance journeys with a cold engine (MEPP-HMZ, 1997) and in the present traffic structure this kind of journey is the most frequent, especially in urban areas. For civil aviation traffic the allowed limits of emission are regulated by ICAO regulations and are obligatory for Slovene airports. The problem here is that Slovene airports do not charge additional taxes for technically unsuitable aircraft (IPV, 1996).

The noise burden on the environment is above limits, even in the present situation. With the current growth trends of traffic it will be even more critical by the year 2012 (Ministry for Transport and Communications (MTC, 1997). The negative traffic influence is especially strong in areas and regions where the ecological balance is particularly sensitive and the air and noise pollution is exacerbated by topographical factors.

The traffic system, with its infrastructure, is an important user of land. The road network covers 0.25 percent of Slo-

vene territory. The building of a motorway network will require a further 0.1 percent of land (MTC, 1997). The natural environment is degraded by the building of a traffic infrastructure and, with the fragmentation of natural areas, it poses a threat to Slovenia's unique biological diversity.

With the growth in traffic and the building of an infrastructure the problem of traffic sector waste is also a major burning issue. Roads, and partly rail traffic, pollute the environment with discarded vehicles and old parts, remains of oil and fuel, and shavings from brake pads and tyres. Intensive building of a motorway network produces high quantities of building waste and there is also a high risk to the environment from the transport of dangerous substances.

2. International start-points for a policy of preserving the environment in traffic areas

Slovenia is a signatory and abides by a series of agreements, that defines the direction and standards of traffic development, for environmental protection. The political process of accession to the EU also has a great influence on traffic development. A basic requirement of the EU in relation to non-member states, relates to the free flow of products and services, and this is reflected in the agreement on traffic from the year 1993 between the EU and Slovenia. The agreement guarantees the EU right to unlimited transit traffic on the road network through Slovenia, and vice versa. Slovenia did not succeed in fighting off the pressure for growing transit traffic, as was the case with Austria and Switzerland. Also questionable is what right Slovenia could exercise in the agreement, in the case of traffic having damaging consequences in Slovenia.

A number of international conferences on sustainable traffic development have been organised in the past few years, with the participation and signature of Slovenia². At the conferences a series of basic principles for sustainable traffic development were drawn up, and with the signing of these declarations they became compulsory for Slovenia in this area. A short summary of the principles is :

- assurance of appropriate access for residents
- reduction of ecological and health risks
- reduction of risk and accidents
- assurance of social, inter-regional and inter-generational equality
- development of personal and public responsibility
- preventive activities
- introduction of an integrated approach to planning
- use of traffic technologies and systems that are environmentally and spatially the most effective – the most protective for users and the environment
- assurance of economic effectiveness – enabling greater political-economic benefits with less damage
- promotion of traffic systems that best fulfil the above principles – that are the most environmentally-friendly, protect the sources in the best manner, are energy efficient, socially equitable, and the safest.

In Slovenia, the principles applied in practice for sustainable traffic development are ineffective and should be more appropriately implemented.

3. The previous policy of traffic regulation in Slovenia

Traffic system development in Slovenia in modern times is less and less balanced, which is mainly the consequence of the Traffic Policy of Republic of Slovenia that is lagging behind with regard to intensive activities, mainly on the building of the motorway infrastructure³. The current traffic development system is defined by two programmes of a financial-executive nature: The National Programme for Motorway Building and The National Programme for Rail Infrastructure. The programmes are unbalanced, since the majority of activities are focused on the motorway programme. Also at present, the state offers no alternative national traffic programs. The most worrying fact is that, at a state level, there are no plans for a more active policy for regulation of public passenger transport, which is to be managed solely by local authorities and transport companies.

Competence for traffic management is split between a number of Ministries and various administration levels that makes the co-ordination of individual measures difficult. The Ministry for Transport and Communications is responsible for road and rail infrastructure and traffic, the Ministry of Science and Technology for internal matters on traffic management, the Ministry of Finance looks after taxation policy; local public transport is under the authority of local authorities, the Ministry of Environment and Physical Planning is responsible for spatial planning of state traffic infrastructure and for emission control of the traffic sector.

The framework and measures for the appropriate integration of an environmental perspective into planning and management of traffic are determined by the Law for Environmental Protection, that also, defines the standards for air quality, noise, the clean-up programme, ensuring a principal 'polluter pays the fine', and estimating the influences on the environment.

Spatial planning for the area of traffic infrastructure was changed at the end of 1995 with the Act on Changes and Additions of Spatial Components for Short and Long Term Social Planning. The problem with the Act is the inconsistency of good, planned aims of traffic development infrastructure of the work carried out. In particular, what stands out is the disproportion between the roles of various traffic subsystems in the executive part of the Act, where the main role is taken by the road system scheme or, to be more exact, the motorway network. A very specific problem is also the non-integration of public transport into spatial planning.

4. Aims and measures of the environment protection policy in the area of traffic

The basic aim of the future development of the traffic sector must be to assure sustainable traffic development that, in the first place, follows the principles of protection and prevention. The protection principle recommends reduction of all emissions that pose a threat to human health and the natural environment, while the prevention principle expresses the need to avoid future ecological threats. Cycling, walking and public transport are the modes of transport that fit best into the basic defined principles of sustainable transport development. That's why the main purpose of reaching sustain-

nable traffic development should be the promotion of former traffic subsystems and more effective control of motor traffic. These aims must be simultaneously supported with promotional actions for environmentally-friendly behaviour in the area of mobility. Achieving these long term principles requires a series of aims and measures that are outlined in the continuation to this document ⁴.

The basic purpose of traffic development in Slovenia must be the assurance of sustainable traffic development respectively reaching the level and structure of traffic consistent with the principles of sustainable development to preserve human health and ecosystems, reduction in the use of natural resources, a contribution to human welfare, social and economic equality, fulfilment of needs for security, access and mobility and the reduction of a negative traffic influence on the environment and human health. The following measures are required for reaching sustainable traffic development:

- preparation of a National Strategy for sustainable traffic development on the basis of the current recommendations of international organisations that would, amongst others, include:
 - collection and grading of information about pollution, noise and energy consumption conducted by international methodology;
 - a scenario on emission changes and energy use;
 - definition of emission value aims, limit values and standards for air quality, pollution of water, soil and noise, that follow the directions of WHO and other international documents;
 - the definition of criteria for energy efficiency and use of non-renewable sources
 - an implementation scenario of environmental standards and aims passed by the Government;
- preparation and execution of a campaign and educational program with the aim of:
 - raising the awareness about the influence of traffic on the environment;
 - the encouragement of sustainable modes of manufacture and use, inclusive of sustainable travelling habits;
 - support for sustainable decisions in the traffic sector;
- enforcement of the principal 'polluter pays', which would encourage efficient economic and environmental development of traffic;
- preparation and enforcement of National Directions for integration of traffic and spatial planning;
- introduction of measures in spatial planning that would as much as possible reduce the potential use of traffic, especially of personal cars;
- introduction of economic instruments to enforce the use of sustainable traffic systems (i.e. tolls, differential taxation for purchase of cars, differential tax depending on quality of fuels);
- governmental financial and organisational support for local authorities to reach sustainable traffic development;
- government financial support for the programs and projects in the field of environmental protection from traffic pollution;

The next goal for traffic development must be the promotion of vehicles running on fuels with low emission that would cause less pollution. That indirectly means the promotion in manufacturing, sales and the use of road and rail vehicles, aircraft and boats, as well as fuels that fulfil international environmental standards, energy efficiency and safety, accepted by the international authorities. Also the limitation and the gradual abolition of using environmentally unsound ve-

hicles that do not correspond to international regulations and agreements on emissions. To reach the defined goals the following measures need to be met:

- ratification and consistent implementation of international conventions and protocols, measures and standards in the area of the environment and human health protection from the negative influence of traffic;
- assurance to consistently respect all kinds of homologous measures and regular periodic control of all emission from all means of traffic;
- preparation and implementation of programmes to stop using the most environmentally-unfriendly means of traffic and the assurance to dispose of them in an environment friendly manner i.e. recycling;
- severe regulations on fuel quality, withdrawal of leaded fuels and the introduction of alternative fuels;
- preparation and the execution of a programme for the reduction of energy-use in traffic and, amongst the others, the promotion of energy-saving vehicles, by definition of different levels of taxation for various environmentally-friendly classed vehicles;
- introduction of payments for technologically unsound aircraft and differentiation of taxation for take-offs and landing, depending on emissions;
- finding an appropriate solution for recycling old cars and spare parts, in the national strategy for waste management;
- organisation of regular, periodical, monitoring of all relevant emissions, on the basis of internationally accepted methodologies.

Promotion of sustainable and effective traffic systems for transport of goods and people and shifting the road and air traffic to: rail, maritime, river and combined traffic, to public transport in cities and suburban areas and encouraging cycling and walking. To achieve this the following measures must be met:

- preparation of national programs for development of sustainable traffic systems (cycling, walking and above all public transport);
- development of internationally comparable indicators for judging the effectiveness and environmental suitability of traffic;
- introduction of economic and regulative instruments to establish healthy competition between different modes of traffic; and promotion to shift part of the road and aviation traffic to environmentally more suitable means of traffic;
- promotion of logistic and telemetric systems to cut down on travel distances, unnecessary journeys and increase good use of the means of traffic;
- to establish national trusts for public transport and combination transport;
- identification of obstacles and the acceptance of measures for their removal, for successful development of combination transport.

The goal for encouraging sustainable development of traffic in the cities and reduction of dangerous consequences of traffic on health, the environment and land use, in cities and other densely populated areas could be reached with the following measures:

- preparation of a National strategy for the development of sustainable traffic use in the cities and encouragement to prepare integrated traffic policies for cities;
- preparation of directives and measures for urban planning to reduce the need for travel and encourage the use of sustainable modes of traffic;

- accelerated modernisation and building of a public transport infrastructure for public transport, pedestrian and cycling traffic;
- stimulation to have parking policies in cities that would result in the reduction of personal car-use in city centres.

To stimulate the safe transport of dangerous materials and prevention of accidents the following measures are required:

- preparation of a National Directive for Transport of Dangerous Materials;
- introduction of licenses for transport of dangerous substances;
- preparation and implementation of measures for transport of dangerous substances by rail.

Reduction of the risk of sea and atmosphere pollution or to prevent pollution of waters by boats, inclusive of devices for loading, re-loading and unloading and reducing the negative influences from air traffic, could be reached by the following measures:

- assurance to consistently follow all kinds of homologous acts and the periodic control of all emissions from traffic;
- preparation of a study, to define goal values for the quality of the atmosphere, with regards to traffic pollution and the measures to reach them, on the basis of WHO standards;
- preparation and execution of regulations on environmentally friendly manoeuvres of aviation operations, winter cleaning and the execution of environmentally-friendly measures generally in aviation;
- assurance to implement all signed international conventions and protocols in the area of maritime traffic and the aim to sign up to the others;
- co-operation with the International Maritime Organisation (IMO) in relation to emission standards of maritime traffic;
- promotion of environmentally-friendly building and maintenance of harbours and moorings;

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Notes

- 1 The article summarises the draft of the chapter prepared by the author as part of the National Programme for Environmental Protection. The statements made by the author in the article are his own and do not necessarily coincide with the statements of the Ministry for Environment and Physical Planning of the Republic of Slovenia.
- 2 *Conference on environment and development*, UN, Rio de Janeiro, 1991;
For Sustainable Development, OECD, Vancouver, 1996;
Conference on Settlements – Habitat II, ZN, Istanbul, 1996;
Traffic and the Environment – declaration of ministers for environment of Central European countries, New York, June 1997;
Traffic and the Environment – UN-ECE (European economic commission), ministerial conference, Vienna, November 1997.
- 3 The national traffic policy is at present in the phase of adoption by the National Assembly in Parliament, also signed by Slovenia.
- 4 Goals and measures are based on the ministerial declaration of the UN, *Traffic and the Environment* – UN-ECE (European economic commission), Vienna 1997, also signed by the Slovene delegation.

For literature and sources see page 57.

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Design in Spatial Planning of Highways

1. Introduction

The National project of highway construction in Slovenia started one of the most important development and even professionally challenging enterprises. However, there is still time, to consider other conceptual and methodological relations between development and traffic policies, between legislature and road management, between the quality of the road, urban and landscape space and the conditions for creating new identity.

Design of roads is not a technological problem any more, but it includes identification of optimal routes in still possible, spatially limited corridors. The essential element of construction is economic rationality, although it is a twenty year project, meaning that certain costlier solutions could be accepted in the short term. Lately, drives for improving aesthetic qualities of particular objects have been heavily criticised as “unacceptable expenditure” and “building monuments for individuals”. The problem in assessing spatial impacts on the environment is therefore, how to adequately assess particular effects and optimise decision making concerning routes and design of particular segments.

An object of infrastructure, such as a road, because of its monumental nature and physical fatality in a given space cannot be judged only on its functional merit; it is an element of the human cultural landscape and a method of (re)designing space. Interdisciplinary solving of problems can provide solutions, when an efficient road enriches a place and generates further development in the space where it passes. A road is not a disturbing part of the landscape, it is a complementary feature.

Such an attitude means, that to invent an ideal method for indisputable long-term interventions in space without unwanted consequences isn't possible, in which professional ethical demands for creating a better, clearer model of procedures for optimising spatial interventions are important. It is an infinity count of possible trends for betterment. In other words, we speak of the human nature in complex perception of space, that cannot be realised without surplus in it, without considering non-essential elements that supersede technologically functional solutions.

2. A Critical Overview of Established Criteria for Selecting Routes

2.1 General

When completing the National programme of highway construction the first question that arises is the question of methodology and possibilities for selecting the optimal route from an array of possibilities, designed for particular segments of the new highways. The long-term consequences of a monumental object in space demand considerable deliberation concerning the endeavour before imple-