

## **CONSIDERATION OF SUSTAINABLE DEVELOPMENT**

Miroslav RUSKO, Karol BALOG, Michal VEREŠ

### **Abstract**

*The fundamental principle of the Transport Policy of the Slovak Republic is sustainable development, which is based on promoting sector balance, supporting transport users, promoting equal opportunities, using land and resources efficiently, and providing open access and a gradual shift of costs to those who cause them. Stemming from the White Paper, this approach is reflected in the basic principles leading to proportional and structurally balanced sustainable transport development and to establishment of new, mutual relations directed internally as well as abroad. Further growth of mobility cannot continue in the same manner as in the past, i.e. without gradual introduction of new environmentally-friendly transport policies. The growth may soon become of unsustainable dimensions. Technological innovation may contribute to reorganisation of the transport system in order to make it able to fulfil growing demand for mobility and, at the same time, ensure energy savings and greater respect for the environment.*

### **Key words**

*environment, mobility, technological innovation*

### **Introduction**

Slovakia currently sees a tendency towards increased road transport, in particular freight and individual car transport, whilst rail transport, suburban bus and urban public transport face a decline. This unfavourable situation in transport contributes to an increasing burden on the environment, including residential areas, by emission of harmful substances and noise from traffic [2].

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Significant changes in the last years were manifested in Slovakia by substantial growth of the number of motor vehicles. Related changes in the transport situation are visible mainly in cities and residential areas, where the environment is increasingly burdened and the health of citizens is affected.

### **Reducing negative impacts of transport on the environment**

The transport sector as a whole has negative effects on all elements of the environment (air, water, soil, fauna and flora). However, the most affected is air due to impacts of combustion of hydrocarbon fuels used by motor vehicles. During the combustion process toxic or carcinogenic substances are created (VOC, CO, NO<sub>x</sub>, SO<sub>2</sub>, solid pollutants, heavy metals) as well as substances which contribute to warming of the Earth's atmosphere (CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>). Development in emissions produced by transport in Slovakia in the last years regarding impacts on the environment is influenced by two significant factors, i.e. the negative impact of fast growth in road transport, particularly the most unfavourable individual car transport along with its increasing volumes and fuel consumption. This impact is positively inhibited by the more intensive application of a new generation of vehicles with environmentally and energetically more suitable parameters, equipped with a three-valve catalyst, thereby enabling significant reduction of the produced harmful substances (CO, NO<sub>x</sub>, VOC). 2005 saw a decline in the levels of monitored harmful substances as compared to the previous year, except for a slight increase in production of NO<sub>x</sub> pollutants and solid substances [2].

As regards to the share of transport in the overall emissions of monitored harmful substances in 2005, transport contributed 38 % of CO emissions, 43 % of NO<sub>x</sub> emissions, and 24 % of NM VOC. Transport accounted for 18 % of solid pollutants and 0,3 % of SO<sub>2</sub> emissions overall in 2005. The share of transport in heavy metal emissions is ca 3,2 %, while the major proportion of heavy metal emissions produced by transport in 2005 was accounted for by copper – 8,7 %, lead – 3 % and zinc – 3,1 %. Similarly, other heavy metals showed a slight increase in measured emissions as compared to the previous year. The main contribution to the overall emission production by transport is accounted for by road transport. The share of other transport modes is very small when considering individual pollutants [2].

In 2006, the transport sector produced 2,407,595.21 tonnes of waste, out of which 64,193.80 tonnes were of dangerous waste and 2,343,401.41 tonnes were of other waste.

Reduction of the negative impacts of transport on the environment is one of the main preconditions for achieving sustainable mobility, while taking into account the objectives of EU documents as well as national goals. By ratifying the Kyoto Protocol – an international agreement stipulating the aim of reducing emissions causing climate changes to the level before 1990, the Slovak Republic committed to an emission reduction of 8 %. This commitment has to be met in all sectors, not excluding the transport sector which contributed around 10 % to the overall CO<sub>2</sub> produced by the national economy.

At the same time, reduction of negative impacts on the environment also has to be ensured by an optimal balance of using the potential of individual transport modes via shifting transport volumes to environmentally-friendly transport modes, including rail transport.

Development of suburban rail transport may be considered an efficient way of greening big suburban centres in accordance with experience from abroad.

### **Promotion of sustainable development of population mobility**

Slovakia may achieve the goal of sustainable mobility only under conditions that would accept natural urban and transport connections in the context of transport regionalisation of the Slovak Republic. Rail and intermodal transport are an alternative to less environmentally acceptable road transport.

Efficient and environmentally acceptable nationwide transport services are defined so as to provide trans-regional and regional public and private economic and transport services in urban centres. Localisation of transport infrastructure maintains and develops natural cohesion of the region.

The Priority 4.1 (Specific aim 4 of the Transport Policy of the Slovak Republic) – Development of Public Transport focuses on promoting sustainable development of population mobility. Increasing the share of individual car transport at the expense of the public passenger transport due to increasing living standards of the citizens has a negative impact on the environment. Therefore, public passenger transport plays an important role in the context of sustainable mobility and its development, and thus its promotion is one of significant priorities of transport policy of the Slovak Republic, similarly to the developed countries.

### **Strategic environmental assessment of the Operational Programme Transport for 2007-2013**

The Operational Programme Transport (OPT) is a strategic programme document of the Slovak Republic for drawing financial aid from the EU funds in the transport sector in the period of 2007-2013 [3].

In the National Strategic Reference Framework for 2007-2013 (NSRF), the Slovak Republic has defined a vision for the overall convergence of the Slovak economy to the EU-15 average via sustainable development. Individual priorities of the OP Transport promote the global objective, whereby the OP Transport shall increase performance and competitiveness of the economy and substantially speed up the process of overall convergence. Realisation of this objective shall contribute to enhanced accessibility for Slovakia, its regions and their interconnections, and in synergy with goals of other operational programmes also to reduce regional disparities and support development of economic activities and an increase of Slovak competitiveness [6].

The strategic document Operational Programme Transport is a tool for gradual elimination of unsuitable parameters of transport infrastructure in the regions and solving pressing issues regarding safety, reliability and quality of transport.

### **Project of Renewal of ZSSK rolling stock fleet**

Železničná spoločnosť Slovensko, a.s. (ZSSK) is a rail operator providing for services in the public interest concerning passenger rail transport on the network of ŽSR (Railways of the

Slovak Republic) in the territory of the Slovak Republic, based on the Contract for services in the public interest concluded with the Slovak Republic, represented by the Ministry of Transport, Post and Telecommunications of the Slovak Republic. Železničná spoločnosť Slovensko, a.s. carries out these services under the conditions stipulated by the above-mentioned contract and pursuant to the terms provided by the Decree of the Railway Regulatory Authority no. 654/2005 Coll., i.e. under the conditions of price regulation with a defined maximum fare. ZSSK carries out commercial services only to a minimal extent.

Železničná spoločnosť Slovensko, a.s. was established on 1 January 2005 by a split-up of Železničná spoločnosť, a.s. as one of the two newly founded successor joint-stock companies. The project of the split-up of the former company was based on the principles of the State Transport Policy stipulating performance of transport and business activities concerning rail passenger and freight transport. As regards ownership relationships, the founder and one hundred-percent shareholder of Železničná spoločnosť Slovensko, a.s. is the Slovak Republic. The rights of the State as the sole shareholder are exercised by the Ministry of Transport, Post and Telecommunications of the Slovak Republic.

The Project of Renewal of the ZSSK rolling stock fleet concerning inter-regional public passenger transport consists of three parts or technical solutions:

- purchase of 10 suburban double-deck electric train sets for passenger rail transport,
- purchase of 10 suburban double-deck PUSH/PULL units, modification of 10 electric motive power units of 263 series, purchase of 2 electric multi-system motive power units,
- purchase of 12 inter-regional multiple-unit sets for passenger rail transport.

The project aims at fulfilling the strategic objective of the Operational Programme Transport in the programming period 2007-2013, in particular:

- Specific aim no. 4 – Development of public passenger transport (establishment of conditions for increasing volumes in passenger inter-regional transport),
- Priority aim no. 6 – public railway passenger transport.

The Project shall ensure renewal of a part of the rolling stock fleet, which will be purchased or financed via a non-repayable financial contribution from the European Regional Development Fund, the State budget of the Slovak Republic (funds allocated to the Ministry of Transport, Post and Telecommunications), and via a financial contribution of ZSSK.

### **Consideration of the sustainable development principles in the Project**

The project of “Renewal of the ZSSK rolling stock fleet” takes into consideration sustainable development principles, especially by contributing to the renewal of obsolete and technically unsuitable rolling stock. The extent and scope of technical, transport, economic and environmental out-datedness of the rolling stock at the moment is so large that it would be necessary to refurbish almost the whole fleet. Rolling stock renewal is a large-scope, time-demanding and financially-challenging process.

On the sector level, the project leads to promotion of sustainable mobility through development of public passenger transport, making use of the Contract on provision of services in public interest.

From an investment point of view, the project will be realised as a purchase of new rolling stock. The new rolling stock (produced on the basis of a special order by ZSSK) will be subject to standard environmental requirements in terms of tender documents.

The new rolling stock will meet the current, most strict environmental criteria and norms in terms of EN, STN, valid TSI and UIC Leaflets (e.g. TSI- NOISE 01/16-ST05, part 2 for passenger coaches, UIC 563, EU Directive 1997/68EC and its amendment 2004/26/EC related to the number of produced emissions ...), observance of which shall guarantee substantial reduction of noise, products of combustion, reduced risk to ground and surface water by leaking oil products, energy savings, etc.

### **Preventive activity**

The project of “Renewal of the ZSSK rolling stock fleet” takes into account the basic environmental principles:

- efficient use of resources,
- reduced pollution of the environment.

The project partially renews the obsolete rolling stock fleet and thus facilitates preventive activities in the scope of elimination of potential negative impacts by the obsolete rolling stock on the environment.

New units shall significantly affect ZSSK business results by their performances. Besides the possibility of increased revenues from fares, it concerns mainly reduction of operation costs related to:

- fuel consumption,
- electric energy,
- repairs,
- personnel cost,

which will significantly contribute to an enhanced travelling culture as well as reduction of emissions and other impacts on the environment.

### **Harmonisation of technical conditions**

The level of performance, safety, service quality as well as costs of European rail transport depend in particular on compatibility and interconnection of systems in individual Member States, especially as regards inter-operability of the Trans-European conventional rail system. Train operation on the Trans-European railway network requires in particular compatibility of infrastructure characteristics, rolling stock characteristics and interconnection of information and communication systems of the various infrastructure managers.

Directives on the inter-operability of high-speed and conventional rail systems and the Safety Directive and Regulation establishing a European railway agency were adopted in order to remove technical and operational barriers of the European railway system.

As regards to inter-operability, the European railway system is divided into sub-systems which are defined by technical specifications of interoperability (TSI) and are a tool to achieve harmonisation of the technical means and processes of control and command sub-systems of railway operation. Each sub-system and its components, if newly launched into

operation or on the market, or substantially modernised, have to meet the requirements and parameters stipulated by European legislation and TSIs. Existing sub-systems have to be fully compliant with European legislation and TSIs within the periods stipulated in the national implementation plan [1].

On 1 January 2005 TSIs were adopted for the following sub-systems:

- Control, command and signalling,
- Rolling stock in freight transport,
- Telematic applications for freight, and
- Noise [5].

TSIs for further sub-systems of the conventional rail system are in the process of elaboration. Gradual harmonisation of technical equipment and processes by infrastructure managers and railway undertakings in Slovakia is a priority in order to maintain their business activities in the railway sector (Specific aim 5, Priority 5.2).

### **Enhancing internal safety**

Enhancing the internal safety of transport pertains to transport operation, establishment of conditions allowing the reduction of accidents in all transport sectors, and improvement of rules for transport of dangerous goods.

These tasks may be achieved by measures related to the construction of transport vehicles, infrastructure and installations, measures related to traffic rules and enforcement of their application, as well as measures related to education and training of traffic participants.

Rail transport, compared to other transport modes, is a substantially safer manner of transporting passengers; in the last 15 years no fatal injury involving passengers occurred in Slovakia [4].

Introduction of centralised traffic management, automatic safety installations, rolling stock with higher resistance to impacts, and modern safety management have all contributed to significant reduction in the number of fatal injuries in the case of rail accidents.

Random safety rules need to be gradually replaced by rules based on common standards stipulated via technical specifications of inter-operability. New national rules will thus comply with EU legislation and will facilitate migration to a common approach to railway safety.

### **Project Proposal pursuant to Act no. 24/2006 Coll. on the environment**

The Project of “Renewal of the ZSSK rolling stock fleet”, funded from ERDF within the Operational Programme Transport for 2007-2013, is accompanied by a Project Proposal pursuant to Act no. 24/2006 Coll. on the environment.

ZSSK is regularly facing a decline in the number of transported passengers by public rail transport and increased competition from bus, air as well as individual car transport. As compared to other carriers, ZSSK as a railway undertaking is bearing an investment burden of a substantial extent – the rolling stock fleet presents an investment of several million, or even

billion SKK. Together with high track access charges and the so-called tariff commitment imposed by the Regulatory Authority of the Slovak Republic (which limits revenues from fare), ZSSK is in a situation which does not create conditions for solving the key problem – decline or loss of interest by passengers in public rail transport. The current effort of rail transport is to compete with other modes, in particular road transport. One of the main conditions for establishing greater competitiveness is purchase of rolling stock for passenger transport. Nowadays, the rolling stock fleet of the company is significantly physically and morally obsolete and its modernisation or renewal is indeed necessary, in order to limit the faultiness of the rolling stock and increase the overall reliability, safety and operational economy. The majority of the rolling stock fleet does not meet the criteria for modern passenger coaches stipulated by current requirements on the quality of transport, comfort, travelling culture and fault-free operation. Failure to meet these requirements will lead to further lagging behind other railway undertakings, to loss of competitiveness on the transport market and subsequently to further deepening of the loss.

Purchase of the new rolling stock will not increase the current capacity of all vehicles operated by ZSSK, because the obsolete rolling stock (used in other activities of ZSSK, i.e. outside the Project scope) will be gradually put out of operation and discarded.

The projected activity, de facto, has no alternative solution from an investment point of view. ZSSK might resort to two solutions concerning renewal of its rolling stock fleet:

- modernisation of the rolling stock fleet,
- purchase of new rolling stock.

These variants have to exist in a mutually balanced proportion, however, none can present an absolute solution in the approach to the investment asset, which is rather financially demanding and which will be exposed to substantial loss of its original useful value immediately after being launched into operation – to moral and physical wear.

The proposed project is not subject to an obligatory environmental impact assessment (EIA) in terms of Act no. 24/2006; the projected activity is thus not listed in Annex no. 8 of the Act, the so-called List of proposed activities subject to environmental impacts assessment.

### **Positive impact of the Project on the environment**

The Project shall result in renewal of the rolling stock fleet with a minimal negative impact on the environment. As regards to emissions of the main pollutants caused by traffic, the main share of their overall production is caused by road transport. Rail transport accounts for less than 1% of the total emissions. As the project concerns rolling stock, it will present a mobile source of air pollution, and emissions will thus be dispersed and not concentrated in one location. Thanks to the construction arrangement of brakes in the new train sets, the burdening of citizens with noise will also be minimal. Waste produced during the projected activity will be related exclusively to cleaning of the new train sets (it will present communal waste), to their maintenance (accumulators, filters, etc.) and to liquidation of the obsolete vehicles to be replaced (waste consisting of ferrous metals). The destruction/discarding of the given types of waste will be carried out in the form of recycling, burning or storing at a disposal site.

## Conclusion

Compared to other transport modes (road, water, and air transport), rail has demonstrably fewer negative impacts on the environment. The standing of rail transport on the Slovak transport and economic market is strengthened not only by favourable characteristics related to ecology, but also related to costs and social and economic effects, which are the subject of general interest in all developed countries. The project is assumed to have positive effect due to the replacement of obsolete rolling stock by modern-construction vehicles, which will lead to reduction in noise, emissions, vibrations and tremors affecting people and surroundings, in reduction of risks related to possible danger to surface and ground water and soil, as well as in decreased energy consumption and waste production.

As the Project shall substantially contribute to reduce the burden on the environment, at the moment no measures were proposed to minimize its possible negative impacts on the environment.

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