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Ministry of Transport, Construction and Regional Development
of the Slovak Republic

Strategic Transport Development Plan of the Slovak Republic up to 2030 – Phase II

December 2016

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1 Executive Summary

The Strategic Transport Development Plan of the Slovak Republic up to 2030 is a long-term strategic document that guides effective development of the transport sector and determines the implementation of its development vision. It is an output of Phase II of the preparation of the transport development strategy of the Slovak Republic up to 2030 and is the factual implementation of the set ex ante conditionalities. Therefore, the funding of development activities from EU funds for 2016-2020 directly depends on this document, ie its approval by the EC.

The document was prepared in accordance with the Action Plan for the Preparation of the 2014-2020 Programming Period in the Transport Sector, as approved by the Working Group for the Programming in the Transport Sector in the 2014-2020 Programming Period at its second session in November 2012.

Key Transport Sector Issues

Key transport sector issues were identified after extensive analyses. The analytical part focused on individual transport modes divided into road, rail, public passenger, water and civil aviation transport and on the issues extending across transport modes, which limit multimodality in passenger and freight transport.

One of the fundamental issues of the Slovak transport sector is the long-term negative development in the modal split in favour of road, in particular individual (non-public) transport. It should be noted that neighbouring European countries with similar economic development face similar issues.

In 1995, the ratio of public and private transport was almost the same; in 2014, public transport accounts for only a quarter of total transport performance. The logical consequence of this situation is a disproportionate increase in individual vehicle transport (IVT), which will be a burden on the road infrastructure and the environment. A significant negative effect of roads congested beyond the permissible limit are time losses due to congestion, which has an indirect impact on economic activity of the population.

Vision and Objectives of the Transport Sector

The vision and objectives of the Slovak transport sector were set in accordance with European and national legislative and development documents, which set global visions and objectives, and the requirements of the various transport sub-sectors identified in analyses. As a result, the visions and objectives of the Slovak transport sector reflect European requirements and national interests and challenges that the sector faces.

This approach ensures a sufficient level of integration of the Slovak Republic into the European transport area and the gradual elimination of internal issues and requirements.

VISION FOR TRANSPORT SECTOR DEVELOPMENT UP TO 2030

A sustainable integrated multimodal transport system that meets society's economic, social and environmental needs and contributes to the full integration of the Slovak Republic into the European Economic Area.

Global strategic objectives were set in line with the above vision for the Slovak transport sector. They reflect the trends and requirements in the EU and national strategic and analytical documents.

STRATEGIC GLOBAL OBJECTIVE 1 (SGO 1)

Provision of equivalent access to settlements and industrial zones to support economic growth and social inclusion in all Slovak regions (national and EU scale) via non-discriminatory access to transport infrastructure and services.

STRATEGIC GLOBAL OBJECTIVE 2 (SGO 2)

Sustainable development of the Slovak transport system with emphasis on the generation and effective use of funds in relation to user requirements.

STRATEGIC GLOBAL OBJECTIVE 3 (SGO 3)

Increase in the competitiveness of transport modes in passenger and freight transport (opposites of road transport) by setting the corresponding operational, organisational and infrastructural parameters which will lead to an efficient integrated multimodal transport system supporting the economic and social needs of the Slovak Republic. Increase in the quality of transport planning in the Slovak Republic by definition of the optimal target value of the modal split in the Slovak Republic and specification of steps and tools to achieve it.

STRATEGIC GLOBAL OBJECTIVE 4 (SGO 4)

Improved transport safety and security, which will lead to sustainable safe mobility on safe infrastructure, introduction of new technologies/processes using preventive and control mechanisms.

STRATEGIC GLOBAL OBJECTIVE 5 (SGO 5)

Reduced negative environmental and negative socioeconomic impacts of transport (including climate change) due to environmental monitoring, effective infrastructure planning/implementation and a reduced number of conventionally-fuelled vehicles, and use of alternative fuels.

Principles of the Strategy

The Strategic Transport Development Plan of the Slovak Republic up to 2030 is based on the "from analysis to design" principle, which was applied consistently throughout the preparation process. **The target development vision with a 2030 horizon was defined based on the issues identified in the analytical part and in connection with European strategic and development documents.**

The fulfilment of this vision is structured into several levels: global strategic objectives, specific objectives and measures. The strategy involves setting the strategic priorities, ie measures evaluated and prioritised in terms of their potential contribution to the transport sector, economic efficiency and results of the Strategic Environmental Assessment. Each group of priorities has strategic principles to be considered during their implementation.

The success of the strategy will be monitored using indicators set for all global strategic objectives and both types of specific objectives.

Sectoral Strategy Measures

Measures to implement the strategy were defined based on global trends, international agreements and the commitments of Slovakia and issues identified in the analytical part of strategy preparation. Each is a set of activities, initiatives or projects integrated based on the substance of the objective or the issue to be addressed. In line with other parts of this strategic document, the measures are divided into infrastructure, organisation and operation and individual transport modes.

The set of measures is a tool to attain the global strategic objectives, specific objectives and the vision for transport sector development up to 2030. The strategy does not contain a list of specific projects.

Evaluation of Strategy Implementation

For the purposes of future evaluation of the implementation of this strategy in practice, indicators will be set for the comparison of the future situation of the transport sector in the Slovak Republic with the state at the time of its preparation.

The indicators will be defined at the level of global strategic and specific objectives (horizontal and modal) and contain the baseline values in 2015 and the values expected after the implementation of the strategy in 2023 and 2030. The baseline and target value of indicators will be determined based on the outputs of the final transport modelling of measures in the next strategy update.

Table 1 Performance indicators of global strategic objectives

Name/description of indicator	Description of indicator	Unit of Indicator	Measurement method	Approach to target setting
Modal split in passenger transport - share of public/rail transport	The indicator reflects the value of the share of transport in passenger transport - share of public/rail transport	%	Surveys	Policy targets + traffic forecast model(s)
Modal split in passenger transport - the share of non-motorised passenger transport	The indicator reflects the value of the share of transport in passenger traffic - the share of non-motorised passenger transport	%	Surveys	Policy targets + traffic forecast model(s)
Modal split in freight transport - share of rail and inland waterways transport	The indicator reflects the value of the share of transport in freight transport - share of rail and inland waterways transport	%	Surveys	Policy targets + traffic forecast model(s)
Total number of fatalities in transport (excluding air)	The indicator reflects the value of the number of fatalities due to accidents in all transport modes (excluding air)	Count of total fatalities in all transport modes (excluding air) per year	National statistics	Policy targets
Rate of fatalities and severe injuries due to accidents in road transport	The indicator reflects the rate of severe injuries and fatalities due to accidents in road transport considering the volume of road transport	Number of (severe injuries and fatal) accidents per 1 mil. vehkm per year	National statistics	Policy targets/forecast total national road traffic levels per road type + assumed rates per road type
Average travel time of freight traffic between major settlements of the Slovak Republic (in line with Group 1 of KURS 2001 as amended in 2011)	Average travel time savings for longer-distance trips for freight (over 50 km)	Hours	Travel time measurement + current traffic model	Forecast national traffic model
Average travel time of passenger traffic between major settlements of the Slovak Republic (in line with Group 1 of KURS 2001 as amended in 2011)	Average travel time savings for longer-distance trips for passengers (over 50 km)	Hours	Travel time measurement + current traffic model	Forecast national traffic model

CO_2 emissions from transport	The indicator reflects the amount of yearly CO_2 emissions produced by the transport sector	Tonnes of CO_2/year	Current unit vehicle CO_2 emissions assumptions + total national traffic statistics per mode	Policy targets + forecast total national traffic levels per mode with future estimated unit vehicle CO_2 emissions assumptions
Average concentration of PMx per year	The indicator reflects the yearly average of PMx concentration in the air	µg/m^3 per year	Current unit vehicle PMx emissions assumptions + total national traffic statistics	Policy targets + forecast total national traffic levels per mode with future estimated unit vehicle PMx emissions assumptions

Implementation Plan

In connection with the defined strategic principles and priorities, it will be essential to prepare an implementation/financial plan, ie the process of implementing the development strategy. The implementation plan sets the initial direction for the implementation of the strategic development of the Slovak transport sector and will be updated regularly in line with the relevant strategic principles.

The objective of the implementation plan is to achieve the vision and objectives of the Slovak transport sector set for 2030. It involves setting a schedule of measures to correspond with the strategic principles and priorities set out in the strategy and the environmental conditions affecting the process.

Availability of Funds

The fulfilment of the objectives of Strategic Transport Development Plan of the Slovak Republic up to 2030 will be directly related to the availability of funds that can be used for this purpose by the end of 2030. The main sources of funding include state budget funds, EU funds and cooperation with the private sector. By 2020, the dominant sources of funding of the transport infrastructure development will be the EU funds, which have not yet been defined for the period after 2020. As it is not clear now how much money can be estimated for the fulfilment of the objectives, the dynamics of the fulfilment of objectives will vary depending on the available funds.

2 Background Information

Transport infrastructure and transport services are an integral part of everyday life. They are also key to economic growth, increased competitiveness and prosperity. They contribute to an increase in employment and are a key factor for foreign investment, tourism development and help to reduce disparities between regions and countries.

The development of the transport sector is a prerequisite for the successful development of the Slovak Republic as a whole. Thorough planning, continuous preparation and the implementation of development projects which set the direction in all areas of the transport sector is essential, but not sufficient. It is necessary to link development activities with the current potential of the economy as one of the limiting factors. The priority target of transport development must be areas and aspects where the support will result in a sustainable transport system in the medium term. This process must result in a transport system that supports economic growth and the development of the Slovak Republic, not a system that is a burden for the national economy.

The Strategic Transport Development Plan of the Slovak Republic up to 2030 is a long-term strategic document that guides effective development of the transport sector. It fully reflects the above principles and sets the method for implementing its development vision.

2.1 Purpose of the Document

The development of the Slovak transport sector is a demanding process financially and technically, which will continue to depend heavily on EU funds in the medium term.

The Slovak Republic has had access to EU funds in the 2014-2020 programming period since 1 January 2014. The European Commission (EC) sets thematic and general ex-ante conditions for the Member States with respect to the implementation of the policy after 2013. Access to EU funds in the 2014-2020 programming period is subject to the fulfilment of these conditionalities.

The EC's precondition for the transport sector was the preparation of comprehensive transport infrastructure development plans, including plans for the sustainable development of urban, suburban and regional transport. These plans will be based on a thorough needs analyses for the sector and the identification of key bottlenecks (eg missing sections, unsatisfactory infrastructure parameters, etc) and potential development factors whose implementation will significantly improve the existing situation in transport, economic and environmental terms or their combination.

The EC's objective is to ensure long-term economic and social effects of the common strategic framework funds. The Member States are therefore expected to harmonise the contents of national programmes with the policy priorities of the Europe 2020 agenda, with macroeconomic objectives and ex-ante conditionalities which, along with performance incentives and a thematic focus, will lead to more efficient public spending.

For the above reasons, Phase I of the preparation of the strategic transport infrastructure development plan was implemented in 2013, which was a condition for starting the drawdown of EU funds. The European Commission accepted the outputs of this phase, subject to their elaboration in the follow-up phase. Phase II is focused on the development of transport infrastructure, and on the comprehensive development of the Slovak transport sector as a whole.

This document is an output of Phase II of the preparation of the transport development strategy of the Slovak Republic up to 2030 and it is the factual implementation of the set ex-ante conditionalities. Therefore, the funding of development activities from EU funds in the period 2016-2020 directly depends on this document, ie its approval by the EC.

The concepts for development of transport modes prepared by MTCRD SR and infrastructure administrators for a standard period of the next three years will respect the content identified in this document.

2.2 Document Preparation Process

This document was prepared in accordance with the Action Plan for the Preparation of the 2014-2020 Programming Period in the Transport Sector, as approved by the Working Group for the Programming in the Transport Sector in the 2014-2020 Programming Period at its second session in November 2012.

In line with the bottom-up principle, the preparation of the strategic document was preceded by analyses of different transport modes. The following technical working groups of experts from the relevant MTCRD SR sections, its organisations, agencies and relevant stakeholders in each of the analysed transport modes were created to prepare analytical documents:

- Technical Group for Road Transport;
- Technical Group for Railway Transport;
- Technical Group for Public Passenger Transport;
- Technical Group for Water Transport; and
- Technical Group for Civil Aviation.

Each group is headed by an expert guarantor represented by the Director General of the relevant section and the work within the groups was coordinated by external experts. All working groups prepared analyses for the relevant transport mode, identifying key disparities and development potential. Five sectoral analyses were prepared and intermodal transport was included in the rail transport analysis. Subsequently, the results of analyses were incorporated into an overall analytical document for the entire transport sector. This resulted in a combination of the bottom up and top down approach, as it was necessary to harmonise the analytical conclusions in a comprehensive document.

A horizontal working group was established for this purpose, which participated in negotiations on the preparation and partial outputs of this strategic document, representing a major output of Phase II of the preparation of the Slovak Strategic Transport Development Plan up to 2030.

The working group sessions were attended by the relevant Jaspers experts (Joint Assistance to Support Projects in European Regions), who actively responded to the interim versions of the prepared documents and provided methodological guidance on the preparation process. The preparation of the document was monitored by the Working Group for Programming in the Transport Sector in the 2014-2020 Programming Period.

An important aspect in the preparation of the document was the partnership principle, at two basic levels:

1. The composition of the Working Group for Programming in the Transport Sector in the 2014-2020 programming period was conceived on the partnership principles. The group consisted of representatives of the relevant ministries, economic and social partners, HTUs, local authorities and NGOs.
2. The composition of technical working groups respected the relevance of individual members and across-the-board coverage of the issue in question, and contrasting views. The working groups consisted of the representatives of the relevant expert units of MTCRD SR, infrastructure administrators, relevant economic and social partners, local government and academia. The public passenger transport technical group included mainly representatives of self-governments and selected towns and cities.

At both levels, the partnership principle proved to be an effective tool for reaching consensual solutions.

2.3 Connection to the Strategic Environmental Assessment

Given the strategic nature and nationwide impact of the document, it is subject to a strategic environmental assessment under Act No. 24/2006 Coll. on Environmental Impact Assessment and on Amendment to Certain Acts, as amended (Act No. 24/2006 Coll.).

The main objective of using the SEA process is to ensure a high level of environmental protection and contribute to the integration of environmental aspects into the preparation and approval of strategic documents with respect to the promotion of sustainable development. The expert and public assessment of the effects of strategic documents on the environment is focused on finding, describing and assessing their direct and indirect impacts on the environment. The

assessment process includes a comparison of the advantages and disadvantages of draft strategy documents in terms of their environmental impact, evaluation of alternative solutions, including a comparison of the zero variant with each variant solution. The assessment process also uses the identified and evaluated expected impacts to determine measures to minimise or eliminate them. This process provides an expert basis for the subsequent decision-making process on the adoption or approval of the relevant strategy document.

To incorporate environmental issues into the document during its preparation, MTCRD SR contracted an external consultant to participate in sessions of the working groups. The environmental impact assessment thus became an organic part of the document preparation process.

The outputs of each part of the SEA process which took place during the preparation of this document were continuously incorporated in the document.

The strategic environmental assessment of the document consisted of the following steps:

Table 2 Schedule of the strategic environmental assessment of the document

Step	Issue Date
Publication of the strategy document notice	03.03.2016
Comments on the notice by the general public and stakeholders	19.03.2016
Public discussion of the proposed scope of the assessment	05.04.2016
Publication of the scope of the assessment	12.04.2016
Consultations on the strategy document pursuant to Article 63 (1) of the Act	18.03.2016/26.04.2016
Draft strategy document	05.08.2016
Publication of the strategy document and assessment report	19.09.2016
Public discussion on the assessment report and draft strategy document	29.09.2016
Submission of opinions by the general public	10.10.2016
Start of the cross-border assessment process	21.10.2016
End of the cross-border assessment process	December 2016
Preparation of an expert opinion	December 2016
Issue of the final opinion	December 2016

The SEA's impact on the strategic document was as follows:

- Incorporation of comments of the general public, including entities consulted during the SEA process and relevant authorities, which could be made during the entire strategy document assessment process, including cross-border assessment, or during consultations provided for separately under Act No. 24/2006 Coll. on Environmental Impact Assessment and on Amendment to and Supplementation of Certain Acts, as amended (public discussion, discussion on the proposed scope of the assessment, submission of written opinions on the strategy document notice, the scope of the assessment, the assessment report and consultations pursuant to Article 63 (1) of the Act).
- Incorporation of comments by the authors of the SEA who attended all working sessions during document preparation (identification of potential problematic locations in terms of the environmental protection, cooperation on the joint formulation of objectives, measures and principles), and incorporation of their recommendations for the final version of the document (a proposal to amend legislative, information and modal measures to mitigate impacts on greenhouse gas emissions, a proposal to supplement measures to mitigate the impacts of noise and vibrations, a proposal to supplement measures to mitigate impacts on the general population and health, a proposal to supplement measures to mitigate impacts on nature and landscape, and other proposals related to water, risks related to climate change, waste production, compliance with green public procurement principles, preparation of indicators of compliance with global strategic and specific strategy objectives, a proposal for monitoring environmental impacts, including health impacts etc).
- The assessment of measures used SEA inputs related to a qualitative preferential assessment of measures categorised by global strategic objective in terms of their impacts, risks and opportunities for individual environmental components. The assessment results were used to select an optimal modal variant and were

included in the overall combined assessment of the estimated potential of measures from the environmental, economic and multimodal perspective.
For more details, see Section 5.2 of this document.

2.4 Connection to Other Strategic Documents

Transport sector development is a key process for the national economy as it affects many other sectors. It is therefore necessary to coordinate the related activities and to develop the transport sector efficiently so that it generates significant synergies in relation to other sectors. Therefore, significant national and EU development documents were identified to be considered during the preparation of the transport sector strategy.

2.4.1 European Strategic and Conceptual Documents

The EU's conceptual and strategic documents on transport guide the development of transport, safety, the environment, etc. They primarily include:

- White Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, COM (2011) 144 final;
- Europe 2020 Strategy for smart and sustainable growth promoting inclusion, COM (2010) 2020 final;
- 2030 Agenda;
- A roadmap for moving to a competitive low carbon economy in 2050, COM (2011) 112 final;
- Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure; and
- A European Strategy for Low-Emission Mobility (COM(2016) 501 of 20 July 2016).

In addition to the above documents, there are a number of mode-specific papers, eg:

- Action Plan for the Deployment of Intelligent Transport Systems (ITS) COM (2008) 886 final;
- Green Paper: Towards a new culture for urban mobility (2007) and its Action Plan (2009);
- European Parliament resolution of 27 September 2011 on European road safety for the period 2011-2020;
- Blue paper: Commission Communication to the European Parliament, the Council, the European Economic and Social Committee and Committee of the Regions, towards quality inland waterway transport - NAIADES II, COM (2013) 623 final;
- Inland waterway transport and Natura 2000 - sustainable inland waterway development and management in the context of the EU Birds and Habitats Directives;
- Joint Statement on guiding principles for the development of Inland Navigation and Environmental Protection in the Danube River Basin; and
- The EU Strategy for the Danube Region (The Danube Strategy).

2.4.2 National Strategic and Conceptual Documents

With regard to the above, the key national strategic and conceptual documents are listed below. They primarily include:

- Slovakia Territorial Development Concept and its updates.
- Transport Policy of the Slovak Republic up to 2015;
- Policy Statement of the Government of the Slovak Republic for 2016-2020;
- Transport Development Strategy of the Slovak Republic up to 2020;
- Strategic Transport Infrastructure Development Plan of the Slovak Republic up to 2020;
- Public Passenger and Non-Motorised Transport Strategy of the Slovak Republic up to 2020;

- Partnership Agreement of the Slovak Republic for 2014-2020;
- Operational Programme Integrated Infrastructure 2014-2020;
- Energy Policy of the Slovak Republic;
- National Policy for Deployment of Alternative Fuels Infrastructure in the Slovak Republic;
- National Policy Framework for the Development of Market for Alternative Fuels; and
- Action plans for the development of the least-developed districts.

2.5 Document Management and Update

To ensure sustainable development of the sector, the ability to respond to ever-growing transport requirements, compliance with Slovakia's obligations, public demand for high-quality transport infrastructure and services and mitigate the negative environmental impacts of transport, it will be essential to systematically apply the transport strategy in practice, and to incorporate the developments in the sector and to update it regularly.

MTCRD SR will be responsible for the management and regular updates of the document in close cooperation with the relevant partners and under the EC's supervision.

2.6 Basic Principles of Strategy

The Strategic Transport Development Plan of the Slovak Republic up to 2030 is based on the "**from analysis to design**" principle, which was applied consistently throughout the preparation process. The analytical and proposal part of this strategy was prepared using the strategic transport model of the Slovak Republic. In this connection, it is necessary to mention its significant added value represented primarily by the following outputs:

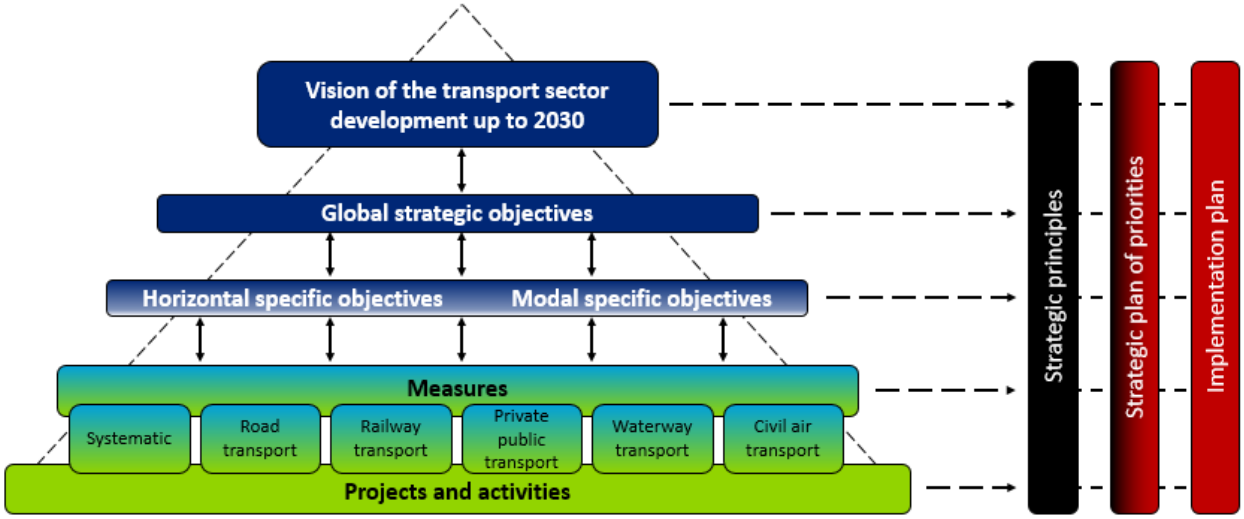
- Identification of the selected types of transport problems;
- Forecast future development of the Slovak economy and population, which was used to model, inter alia, the future demand for different transport modes; and
- Modelling of the selected measures.

The target development vision up to 2030 was defined based on the issues identified in the analytical part and in connection with EU strategic and development documents.

The achievement of this vision is structured into several levels: global strategic objectives, specific objectives and measures. Global strategic objectives are set in compliance with EU development policies and they represent society-wide benefits of the implementation of this strategy.

Specific objectives reflect the current state of the transport sector and its issues. They guide its further development and are divided into horizontal specific objectives common for all transport modes, and modal objectives specific for each transport mode.

Figure 1 Strategy creation diagram (source: own)



The lowest strategic level of this document is the level of measures. This is a set of activities with a direct contribution on the achievement of the vision and objectives of the Slovak transport sector, which eliminate or minimise the issues identified in the analyses.

The strategy includes strategic principles based on a synthesis of the knowledge acquired during the preparation of this document which provides a clear direction for the development of the Slovak transport sector.

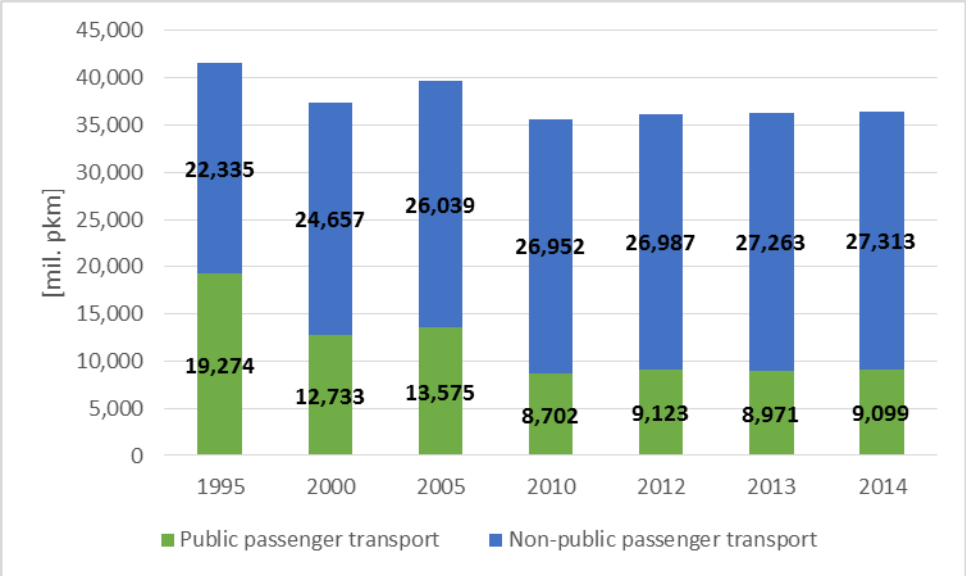
The last element is the implementation/financial plan, which is prepared in connection with the set strategy and ensures its implementation. The success of the strategy will be monitored using indicators set for all global strategic objectives and both types of specific objectives.

3 Key Problems of the Slovak Transport Sector

The key problems of the Slovak transport sector identified by extensive analyses of individual transport sub-sectors are stated below. These facts represent a direct input when setting transport development objectives, the achievement of which will gradually minimize existing problems. **Specific measures to minimise or eliminate the above issues are defined in Chapter 5 of the strategy.**

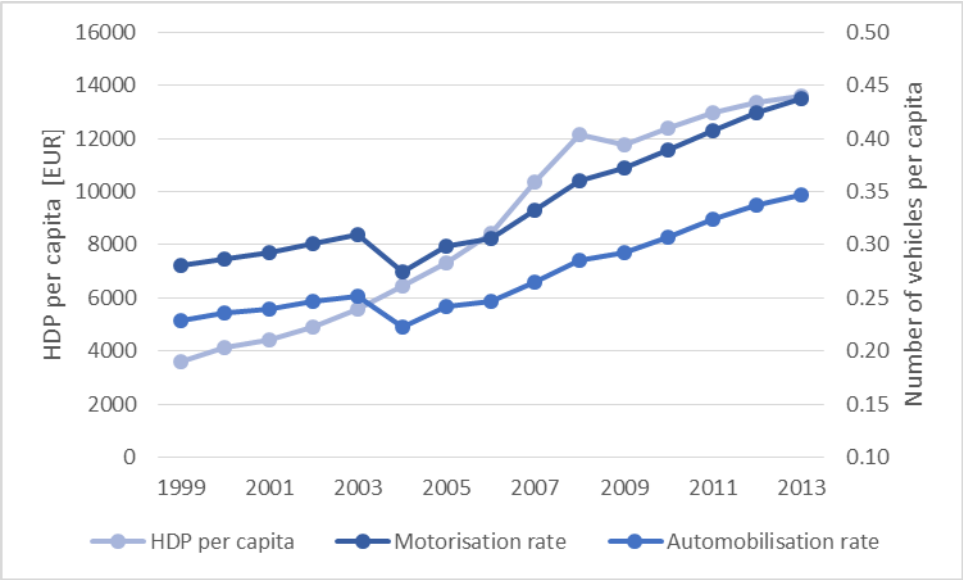
One of the principal problems of the Slovak transport sector is the long-term unfavourable development of the modal split in favour of road transport and individual (non-public) transport. It should be noted that neighbouring EU countries with a similar economic development face a similar problem. This trend is best illustrated by the following charts.

Chart 1 Public and non-public passenger transport performance ratio
(Source: own chart based on the SO SR and MTCRD SR data)



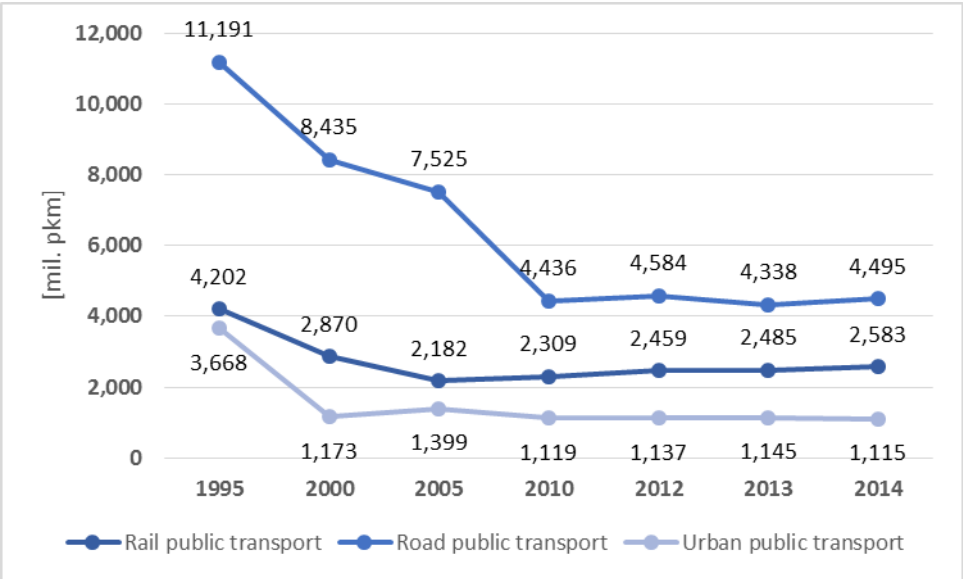
While in 1995, the performance ratio between public and non-public passenger transport was almost equal, in 2014 public transport only accounted for a quarter of total transport performance. The reason for this was the excessive growth of static and dynamic individual vehicular transport, which is a burden on road infrastructure and the environment. A significant negative effect of roads congested beyond the permissible limit is time losses due to congestion, which indirectly affects economic activity.

Chart 2 Transportation and motorisation in the SR (Source: own chart based on SO SR and MTCRD SR data)



The increase in IVT and road transport is captured by transportation and motorisation indicators, ie the number of passenger vehicles or road motor vehicles per inhabitant. While in 1995, there was 1 passenger vehicle for more than 5 people, in 2014 the ratio was 1:2.8. As stated in the introductory chapter, one of the principal parameters influencing the growth in IVT is an increasing standard of living and growing requirements regarding transport quality. Chart 2 also above shows per capita GDP development in the SR.

Chart 3 Modal split in public passenger transport
(Source: own chart based on the SO SR and MTCRD SR data)



As stated above, public passenger and non-motorised transport has recorded a significant decrease over the last 20 years. From 1995 – 2010, there was a sharp fall in transport performance and there has been a relative stabilisation of the situation over the last 5 years and more or less stagnating transport performance in public passenger transport. However, the volume of IVT continues to grow. The trend of a slightly growing performance of railway passenger transport is a positive.

One of the negative impacts of insufficient demand for public transport is its growing financing cost. State and local authorities are obliged to provide basic public transport services and purchase services from operators, which must be subsidised. The volume of such services remains relatively constant (according to the requirements for basic transport services), but the number of passengers on these lines is decreasing over the long-term. As a result, a higher volume of subsidies is requested from the state by private or public operators. This situation is illustrated by the charts below.

Chart 4 Comparison of subsidies and public road transport performance
(Source: own chart based on the SO SR and MTCRD SR data)

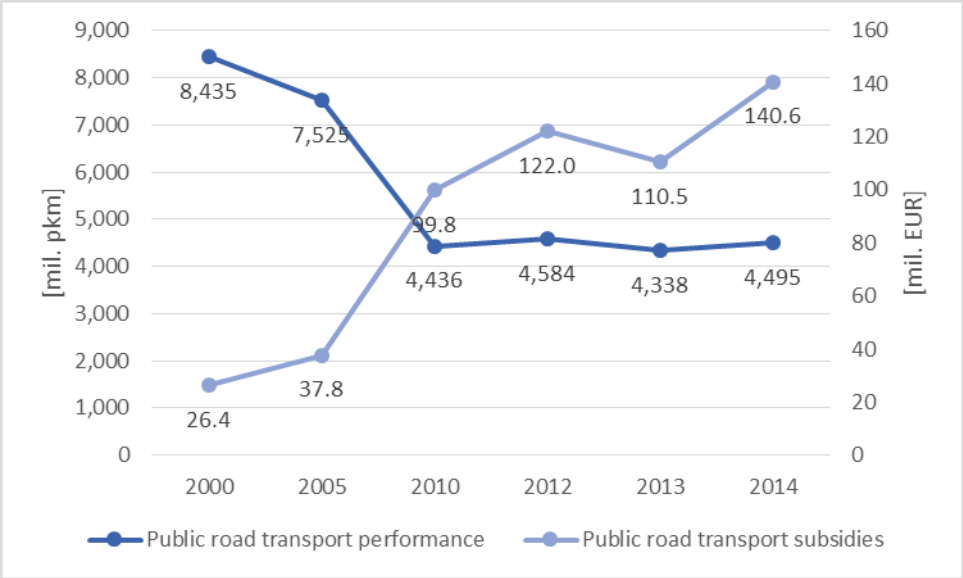
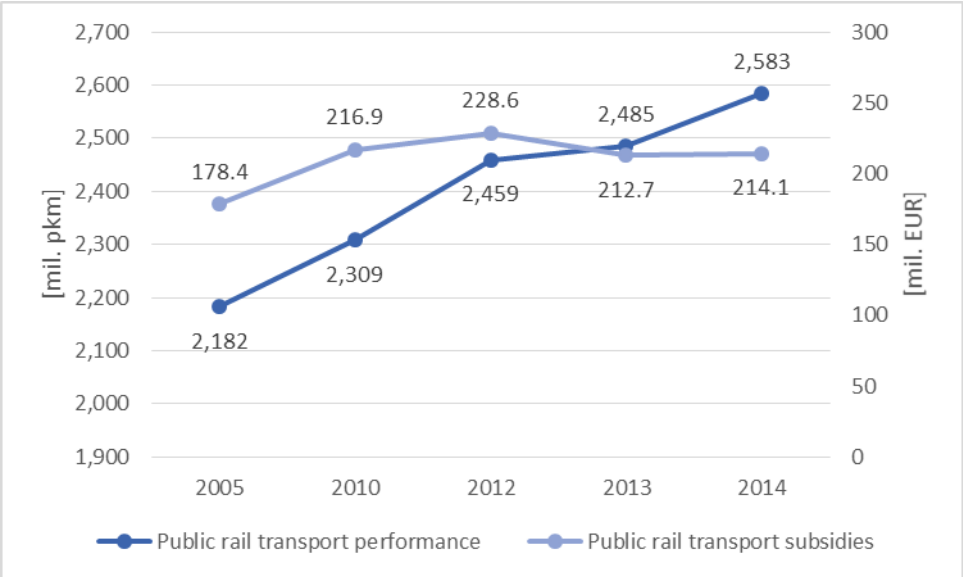
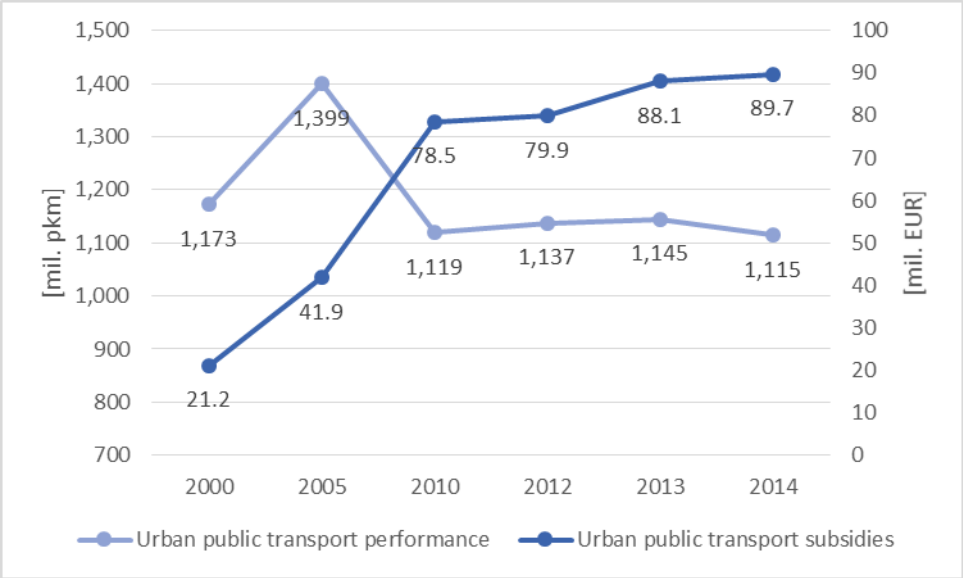


Chart 5 Comparison of subsidies and rail transport performance
(Source: own chart based on the SO SR and MTCRD SR data)



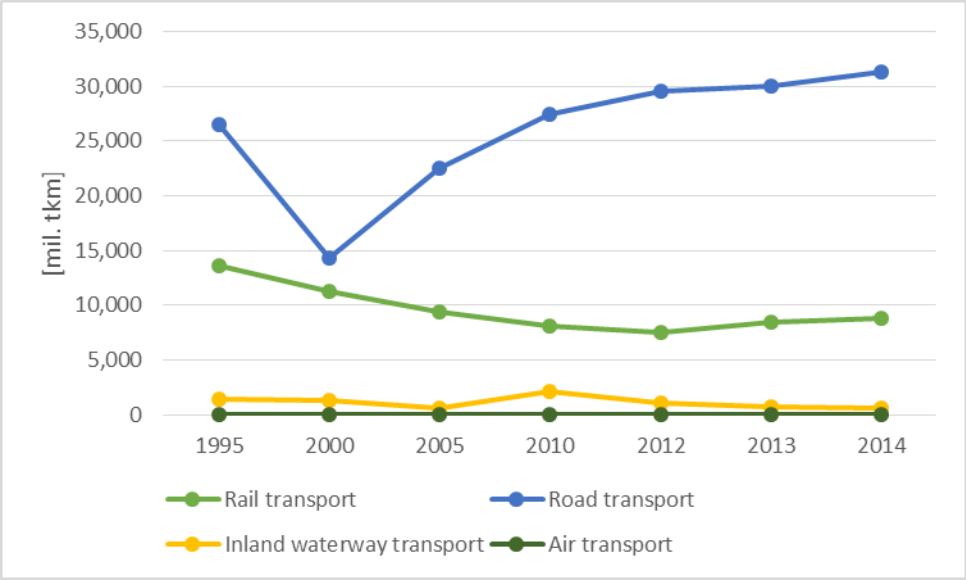
Note: The above amounts of subsidies in Chart 5 are adjusted for a one-off financial settlement of uncovered loss for each year.

Chart 6 Comparison of subsidies and urban public transport performance
(Source: own chart based on the SO SR and MTCRD SR data)



The freight transport situation is not contributing to improving the overall situation. While the significance of transport modes suitable for the transport of large freight volumes without excessively burdening the infrastructure and the environment is decreasing, or its share of the total transport volume is negligible, road freight transport performance has recorded marked growth. The chart below illustrates the development of the modal split in freight transport in Slovakia.

Chart 7 Modal split in freight transport in Slovakia
(Source: own chart based on the SO SR and MTCRD SR data)



The direct and indirect consequences of this situation and key problems of individual transport modes are detailed in the following sub-chapters, and in separate sectoral analyses. See Chapter 5 of this document for specific measures.

The importance of the transport sector and its contribution to employment in the national economy can be demonstrated by employee statistics. It can be claimed that there is currently labour shortage in bus and road freight transport.

Table 3 Average number of employees in transport enterprises registered in the Commercial Register and in the Register of Sole Traders (including government enterprises) *Source: Transport, Posts and Telecommunications Yearbook 2016*

Indicator	2013	2014	2015
Enterprises with 20 and more employees	73,843	75,050	79,118
Enterprises with up to 20 employees	10,264	10,977	13,348
Sole traders	8,952	12,924	8,629
Total transport	**93,059**	**98,951**	**101,095**

Table 4 Average number of employees in transport enterprises (including government enterprises) *Source: Transport, Posts and Telecommunications Yearbook 2016*

Indicator	2013	2014	2015
Rail transport	12,533	12,367	12,535
Road transport excluding urban public transport and taxis	41,562	45,269	47,020
Large enterprises (250 and more employees)	10,384	11,356	12,533
Medium-sized enterprises (50 - 249 employees)	9,849	10,576	10,922
Small enterprises (20 - 49 employees)	5,531	5,400	7,146
(0 - 19 employees)	7,375	7,916	10,554
Sole traders	8,423	10,021	5,865
Urban public transport	4,585	4,425	4,378
Inland waterway transport	428	372	341
Air transport	250	351	353
Subsidiary and auxiliary transport activities	32,030	35,047	33,890
Total transport	**91,388**	**97,831**	**98,517**
	of which in enterprises with 20 and more employees		
Rail transport	12,491	12,325	12,492
Road freight transport	18,363	19,790	23,109
Road transport excluding urban public transport and taxis	7,401	7,542	7,492
Inland waterway transport	403	361	332
Air transport	217	310	256
Subsidiary and auxiliary transport activities	29,162	29,177	30,004

It should be mentioned that the strategic transport model of the Slovak Republic, which was used to prepare this strategy, had significant added value in forecasting future development of the Slovak economy and population. This forecast is the basic parameter, which was used to model the future demand for different transport modes.

For convenience and clarity, the identified problems are categorised from the perspective of a transport mode and in relation to infrastructure, operation, organisation, the environment, etc. The order of presentation of individual problems does not represent their degree of materiality.

3.1 Road Transport

3.1.1 Planning Issues

Unapproved and unapplied change to the road network concept

The current classification of the road network dates to 1946-1950, except for motorways and expressways. Although there have been many changes to the road network, there have been no substantial changes to the classification principles. Changes to the road network since the late 1970s have been made on an ad hoc basis as the existing rules became impractical, but no new rules have been defined.

The first concept for the motorway and expressway network was approved in 1963 and, unlike the concept for the network of 1st to 3rd class roads, it has been repeatedly updated. The division of Czechoslovakia led to the New Motorway and Expressway Construction Project which was approved in 2001 and has been repeatedly amended.

After internal discussion at the MTCRD SR and approval by MTCRD SR's management, the principles of the draft concept will be reflected in the draft of the new Road Act, which will replace Act No. 135/1961 Coll. on Roads (Road Act) as is it is more than 50 years old and does not meet current needs (despite a number of amendments).

The proposed principles will be applied in the draft of the new and more efficient road network classification to all road categories and the proposed development of the road network, ie decisions on the construction of new roads and reconstruction or relocation of existing roads.

According to the new concept, roads will be categorised as follows:

1. Motorways (D);
2. State roads (S);
3. Regional roads (K);
4. District roads (L);
5. Local roads (M); and
6. Dedicated roads (U).

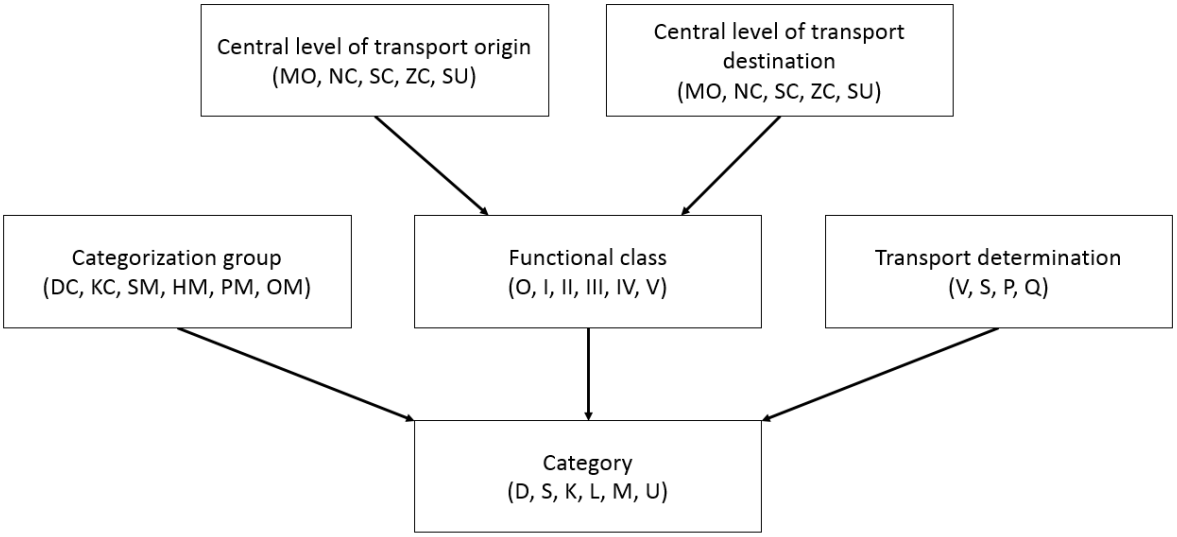
These categories will replace the existing division into motorways, expressways, 1st to 3rd class roads, local and dedicated roads, and the classification rules have been amended.

Roads will now be categorised based on two basic and one additional criteria:

1. Categorisation group – represents the construction and design of the relevant section and its relationship to the surrounding area. There are six categorisation groups: motorway (DC), trunk road (KC) and four categorisation groups for local roads (SM – connecting local road, HM – main local road, PM – access local road, OM – service local road). Categorisation groups replace the existing standardised categories (D – motorways, R – expressways, C – roads, MR – local expressways, MZ – local collection roads, MO – local service roads, MN – local non-motoring roads) and are defined based on different principles.
2. Functional class – represents the transport significance of a road and is determined based on the transport sources and destinations the road links. Transport sources and destinations are transport centres of various central levels (significant destinations) and other settlements and properties (insignificant destinations). There are six functional classes: 0, I, II, III, IV and V. They represent transport significance from continental (0) to local (V).
3. Transport purpose – represents the characteristics of road use. It includes a specific purpose, the feeder road function and the function of a transit section of a municipality.

The combination of these criteria determines the road category – see the Figure 2 below.

Figure 2 Categorisation of roads based on structure (source: Road Network Concept 2015)



The defined rules make the ownership of road categories clear. Národná diaľničná spoločnosť a. s. owns the motorways, except for concession motorways. The state owns state roads and concession motorways. Self-governing regions own regional and district roads and municipalities own local roads. Dedicated roads have various owners. There are some practical exceptions to the general rules, eg motorway feeder roads, regardless of their category, belong to the motorway owner and transit sections at border crossings across EU external borders belong to the state, regardless of the category.

Roads are included in the road network, which consists of a network of core roads and networks of local roads in each municipality. The road network is managed by road administration authorities, ie MTCRD SR for the core road network and municipalities for the local road network. Categories D, S, K and L roads belong to the core road network and M category roads belong to the local road network. U category roads are not part of the road network.

Road network sections are organised into continuous road routes, which are two-way in the core road network and one-way or two-way in the local road network.

Road routes in the core road network are numbered and the road number consists of a category code and a number within that category. Numbering plans are defined for this purpose with appropriate reserves for each area. Road routes may be named, motorways are always named and category S, K and L roads are only named in defined cases, eg important tourist roads or mountain passes.

Road routes in local road networks are primarily named based on the street name or other public space name (if such a name exists). Local road routes are also numbered for registration purposes, but this number is not stated on traffic signs and such numbering is not planned in the future.

Numbering plans for each category use the following numbering ranges:

1. Motorways: D 1 – D 49
2. State roads: S 1 – S 99
3. Regional roads: K 100 – K 999
4. District roads: L 1000 – L 9999

Local roads in cities/towns and municipalities are not considered in the concept, but multiple changes are proposed to the routes of arterial roads of state and regional roads, which will impact local roads in some cities/towns. As a result, the concept proposes the reclassification of some local roads to a higher category.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Implement a new road network concept (OPC1)

Long duration of pre-investment and investment preparation

Investment and particularly pre-investment preparation processes have been significantly enhanced since 2013. This is evidenced by numerous feasibility studies and technical studies, and the advanced stage of EIA, DUR and DSP preparation for individual motorway and expressway sections.

A very long investment and pre-investment preparation period of around 5 to 7 years continues to be a negative aspect. This situation should be improved by the new Act 343/2015 Coll. on Public Procurement and on Amendments to and Supplementation of Certain Acts of 18 November 2015, as amended, which repeals and supersedes the existing Act 25/2006 Coll. on Public Procurement, as amended.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Preparation and implementation of development projects, including related activities (OPS3)

Slow progress in the construction of the motorway and expressway network

With the current 20-year average construction pace for motorways and expressways, the planned date for the completion of core TEN-T (2030) may be exceeded by several years.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Setting the principles of sustainable transport sector funding (OPS1)
- Preparation and implementation of development projects, including related activities (OPS3)

The development of intelligent transport systems still lacks a systemic foundation

NTIS implementation is key to the development of ITS and will be a central element of ITS in Slovakia. To ensure effective NTIS operation, peripheral infrastructure must be constructed based on which the NTIS will generate transport information for end users and traffic management.

Insufficient linkage between the construction of new roads and their equipment with ITS tools and the deployment of ITS technology on 1st class roads and appropriately on 2nd and 3rd class roads is considered an issue at the global level.

As at 31 December 2014, the peripheral infrastructure on motorways and expressways was generally operated in the form of separate technology groups (counter, variable signs, etc), which must be constructed as comprehensive integrating systems of line traffic management in the future – especially around towns/cities with high traffic intensity.

In terms of ITS, 1st class roads are insufficiently equipped as regards traffic monitoring systems, traffic information systems, etc. This implies a significant lack of input data as regards improvement of safety and traffic flow, and effective planning.

Additional aspects include:

- JRS (CEPK) does not cover all types of roads used for public road transport, ie local and publicly accessible dedicated roads. This scope is crucial to address transport issues. The obligation to extend the central register to cover these types of roads is set out in Act No. 317/2012 Coll. on Intelligent Systems in Road Transport and on Amendment to and Supplementation of Certain Acts;
- Inefficient CEPK field data collection technology, the need for new efficient collection technology (mobile mapping) to ensure the safety of the measuring crew, higher quality data and their effective evaluation;
- Insufficient support of the informatisation of processes producing situational traffic data; and

- The lack of intelligent traffic management systems to improve road safety and promote a more effective use of the road infrastructure.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Conceptual development of ITS (OPC4)
- Preparation and implementation of development projects, including related activities (OPS3)
- Regular updates of strategic and development documents (OPS6)

Selected analysis and planning input data not available

There are no data inputs at the level of individual transport surveys, freight transport surveys (the last directional transport survey was conducted in 2007), detailed outputs from the toll system, etc.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Supplementation and ongoing maintenance of subsector databases (OPS4)

Inaccuracy of the pilot transport model and its outputs

The evaluation of transport and engineering parameters of the transport sector used the version of the Transport Model of the Slovak Republic available during the preparation of sectoral analyses. Although it is a national strategic model prepared for an average working day, which excludes its use for some detailed analyses, its functionality has deficiencies which require updating. This primarily means the degree of calibration of the model at the level of road transport intensities and transport relations of individual vehicular transport and public passenger transport (bus + train), which are often slightly distorted at the level of major cities/towns in Slovakia (number of journeys to/from). As a result, it was necessary to limit the scope and detail of the analyses to a level that minimises this fact. The final report of the Transport Model of the Slovak Republic is published on the MTCRD SR's website http://www.telecom.gov.sk/index/index.php?ids=200559.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic (OPS5)

3.1.2 Infrastructure Issues

Design capacities exceeded in certain sections of the D1 motorway

In 2014, 36 km of motorways and expressways were identified as being at the D transport quality level or in worse condition, accounting for 5% of their total length.

Currently and in the near future, the average daily intensities are/will be exceeded especially on the D1 motorway, in particular in the Bratislava urban zone and between Bratislava and Trnava.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Completion of the west-east priority axis (Rhine-Danube Corridor, Czech and Slovak branch) (OPC5)

Design capacities significantly exceeded on 1st class roads in the majority of Slovak regions

Based on the outputs of the transport model, approx. 50% of the length of 1st class roads in the Trnava, Žilina, Trenčín and Banská Bystrica regions are heavily overloaded, which is alarming. Approx. 25-35% of the length is overloaded in other regions.

Low levels of quality (grade E) on longer sections were identified on the I/9 road between Trenčín and Prievidza, I/66 between Banská Bystrica and Brezno, I/70 and I/59 – north-eastern route from Martin to Poland, I/66 in the north-south direction, I/11 between Žilina and Čadca, I/16 between Zvolen and Detva, I/75 between Galanta and Nové Zámky, I/16 continuing to R2 close to Košice, on I/2 and I/63 roads around Bratislava and in eastern Slovakia 1st class roads converging near the town of Strážske (I/18 and I/74).

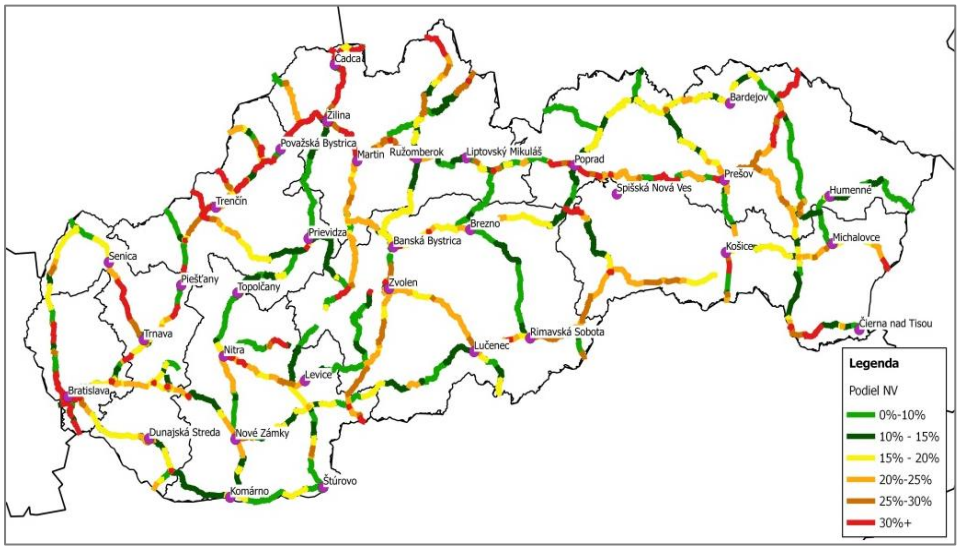
Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Completion of the west-east priority axis (Rhine-Danube Corridor, Czech and Slovak branch) (OPC5)
- Completion of the north-south connection with Poland and the Czech Republic (OPC6)
- Completion of the north-south connection in eastern Slovakia (OPC7)
- Completion of the west-east road axis in central Slovakia (OPC8)
- Completion of the north-south road axis in central Slovakia (OPC9)
- Road network development in the Bratislava agglomeration (OPC10)
- 1st and 2nd class road network development (OPC11)
- Modernisation and development of the other motorway and expressway network if justified (OPC12)

High intensities of freight vehicles on 1st class roads

The major busy roads (according to the Slovak strategic transport model) are sections of the I/18 road on the route of the planned D1 motorway (eg critical transport in Ružomberok and Prešov), the continuation of the I/18 road from Prešov via Vranov nad Topľou to Strážske, and a section of the I/10 road between Bytča, Makov and the Czech border, ie the most important connection of the western and eastern part of Slovakia via northern Slovakia from the Czech Republic to Ukraine. The share of heavy freight transport is alarming on the I/11 road and the I/12 road between Žilina and Čadca to the Czech Republic and Poland, which includes extensive north-south transit and transport between car manufacturers in Žilina and Nošovice in the Czech Republic. In the long term, it is necessary to eliminate transport in built-up areas of municipalities on the I/59 road between Dolný Kubín and the state border with Poland.

Figure 3 Share of freight vehicles on 1st class roads (source: own, transport model of the Slovak Republic)



1st class roads also have large shares of freight transport on sections with motorway sections, eg Trenčín – Čadca and Liptovský Mikuláš – Prešov routes. The busiest routes include a route (the I/21 road) north-east of Prešov towards Poland and the north-eastern route from Bratislava to Záhorie (the I/2 road). An additional problem is that tools for checking carriers in the Slovak Republic are ineffective.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Completion of the west-east priority axis (Rhine-Danube Corridor, Czech and Slovak branch) (OPC5)
- Completion of the north-south connection with Poland and the Czech Republic (OPC6)
- Completion of the north-south connection in eastern Slovakia (OPC7)
- Completion of the west-east road axis in central Slovakia (OPC8)
- Completion of the north-south road axis in central Slovakia (OPC9)
- Road network development in the Bratislava agglomeration (OPC10)
- 1st and 2nd class road network development (OPC11)
- Modernisation and development of the other motorway and expressway network if justified (OPC12)

A high proportion of transit transport in certain towns/cities

The situation in some towns with critical transit values in 2007 (date of the last directional survey) has improved significantly after the opening of sections of motorways, expressways and bypasses of 1st class roads (Žiar nad Hronom, Levoča, Trnava, Banská Bystrica, Svit, Svidník Nitra, Trstená, Poprad). Projects to divert intra-urban transit are under construction near some towns with critical transit values (Bánovce nad Bebravou, Žilina and Ružomberok).

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Completion of the west-east priority axis (Rhine-Danube Corridor, Czech and Slovak branch) (OPC5)
- Completion of the north-south connection with Poland and the Czech Republic (OPC6)
- Completion of the north-south connection in eastern Slovakia (OPC7)
- Completion of the west-east road axis in central Slovakia (OPC8)
- Completion of the north-south road axis in central Slovakia (OPC9)
- Road network development in the Bratislava agglomeration (OPC10)
- 1st and 2nd class road network development (OPC11)
- Modernisation and development of the other motorway and expressway network if justified (OPC12)
- Preparation and implementation of development projects, including related activities (OPS3)

Poor accessibility of motorways and expressways from selected districts

The localisation of the existing operating sections of D1 and D2 motorways and the R1 expressway is obvious from the projection of accessibility of the motorway and expressway network in terms of time. All regions through which stated expressways pass, have the first degree of accessibility of the motorway and expressway network, ie accessibility in up to 15 minutes.

Adjacent regions usually have the second or third degree of accessibility. Peripheral or border districts, ie Snina, Medzilaborce, Rimavská Sobota, Sobrance, Humenné, Komárno, Poltár, Rožňava and Revúca districts, have the worst accessibility. Thus, the graphical representation of motorway and expressway network accessibility suggests the potential for further development of the road infrastructure.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Completion of the west-east priority axis (Rhine-Danube Corridor, Czech and Slovak branch) (OPC5)
- Completion of the north-south connection with Poland and the Czech Republic (OPC6)
- Completion of the north-south connection in eastern Slovakia (OPC7)
- Completion of the west-east road axis in central Slovakia (OPC8)
- Completion of the north-south road axis in central Slovakia (OPC9)
- Road network development in the Bratislava agglomeration (OPC10)
- 1st and 2nd class road network development (OPC11)
- Modernisation and development of the other motorway and expressway network if justified (OPC12)

3.1.3 Administration and Operation Issues

The lack of own technical means for the maintenance of 1st class roads by SSC

As at 1 January 2015, SSC administered and owned a total of 3 166.8 km of 1st class roads, but has no capacities for the routine maintenance and repairs of 1st class roads. The procurement process for maintenance and repair activities is very specific; such activities cannot be accurately quantified and are thus more costly. Flexibility, which is critical in asset management, is excluded in this system, as is control over such an activity, as evidenced by the current road network condition.

When SSC had capacities for routine repairs and maintenance, ie equipment and labour, repairs and maintenance were undertaken more flexibly. SSC was able to react to issues related to winter maintenance promptly – if required it allocated more machinery to problematic sections, minimising maintenance interventions without performance. The

repair of roads (potholes) in winter was more flexible. Greater emphasis was placed on adherence to technological procedures and staff on duty were used for other work in good weather.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Changes in principles and implementing road infrastructure administration and maintenance (OPC2)
- Setting the principles of sustainable transport sector funding (OPS1)

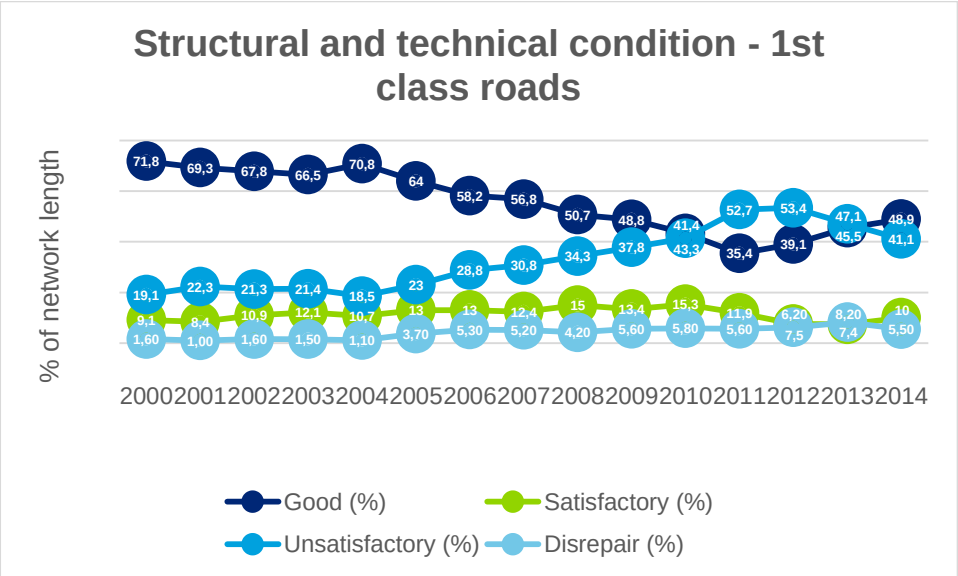
Structural and technical condition of roads and bridges on 1st class roads

The costs of routine maintenance, ie road repairs, filling of cracks, removing unevenness and marking of sub-standard sections increases proportionally with the number of road sections in a state of disrepair or poor condition. Speed limits on such road sections reduce road capacity and driving speed, which negatively impacts road safety.

The assessment of major inspections of 1st class roads administered by SSC carried out in 2014 shows that 1 144 km of 1st class roads are in an unsatisfactory condition, which accounts for 35.5% of the total 3 221 km. Of the above total, 178.5 km (5.5%) of roads are in a state of disrepair.

These roads are degraded in terms of their structural condition, due to an unsatisfactory load-carrying capacity or surface and structure disintegration. Restoring them to a serviceable condition will require costly measures and, in some cases, complete reconstruction of the roadway. This situation is caused by delays in the cyclical reconstruction of roads.

Figure 4 Development of structural and technical condition on 1st class roads (source: own, according to the Road Databank of SSC)



Many 1st class roads are in an unsatisfactory condition as regards longitudinal and transverse roughness and the situation as regards longitudinal roughness is worse. Although the situation has improved in percentage terms since 2012, the figures remain very high in absolute terms. The evaluation of longitudinal roughness shows that approx. 26% (approx. 875 km) of the total network is in an unsatisfactory condition. The figures related to transverse roughness are slightly more positive. Approx. 19% (approx. 639 km) of the total road network is in an unsatisfactory condition.

A total of 1 714 bridges on 1st class roads were assessed, of which 229 are in condition V or worse (in 2014). Another 507 bridges are in condition IV (satisfactory) and their maintenance needs to be enhanced to prevent further deterioration.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Changes in principles and implementing road infrastructure administration and maintenance (OPC2)
- 1st and 2nd class road network development (OPC11)
- Setting the principles of sustainable transport sector funding (OPS1)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)

Unbalanced maintenance funding between NDS and SSC

The disproportion in the funding of routine maintenance as regards NDS and SSC taking into account the length of the administered road network is due to the fact that NDS uses its own resources in addition to state budget funds to finance maintenance. Own resources primarily include revenues from tolls (net toll revenues of NDS for 2014 amounted to approx. EUR 69 million) and the sale of motorway vignettes (revenues from the sale of motorway vignettes for 2014 exceeded EUR 56 million). NDS can also use its own capacities, ie equipment and labour, which enables a quicker response to the current state of roads.

SSC's costs per km and lane of the road network have stagnated over the last 10 years and NDS's costs have grown steadily. In 2014, NDS spent approx. EUR 22 thousand for maintenance per km / lane of roads. SSC's maintenance funds in 2014 amounted to EUR 5 thousand per km / lane on average. Although the operation and maintenance of motorways and expressways as higher-category roads is more costly, the funding disparity is obvious. This clearly shows the lack of funds allocated by SSC to operation and maintenance, resulting in a deteriorating condition of infrastructure and growth in the internal debt as regards maintenance.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Changes in principles and implementing road infrastructure administration and maintenance (OPC2)
- Setting the principles of sustainable transport sector funding (OPS1)

Insufficient funding for the maintenance of 1st class roads administered by SSC

Major issues have been identified with respect to maintenance organisation and funding with respect to 1st class roads. In terms of organisation, SSC does not have appropriate technical equipment to flexibly and cyclically maintain the 1st class road network. The majority of activities are currently carried out by external suppliers, which is inflexible and inefficient. A similar situation applies to funding – SSC is dependent on state budget funds, which are insufficient and have remained relatively unchanged for the last 15 years.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Changes in principles and implementing road infrastructure administration and maintenance (OPC2)
- Setting the principles of sustainable transport sector funding (OPS1)

The amount of internal debt related to the maintenance of 1st class roads and bridges

Approx. EUR 29.1 million are required to eliminate the state of disrepair of 177.2 km of 1st class roadways (with an average width of 8 m and expected costs of approx. EUR 20.5 / 1 m^2). Approx. EUR 130.4 million are required to repair 1 146.8 km of unsatisfactory sections (with an average width of 8 m and minimum expected costs of approx. EUR 14.2 / m^2). The total estimated required funds are approx. EUR 160 million. The required funds may be quantified using the same method as for bridges.

150 bridges are classified as grade V – poor, 64 bridges as grade VI – very poor and 15 bridges as grade VII – state of disrepair. Another 507 bridges are classified as grade IV – satisfactory. To improve and/or maintain the serviceability of bridge structures, approximately EUR 468 million is required for bridge repairs.

The above costs include maintenance costs; the costs are much higher in the event of comprehensive reconstructions.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Changes in principles and implementing road infrastructure administration and maintenance (OPC2)
- Setting the principles of sustainable transport sector funding (OPS1)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)

The existence of two state road administrators

The approach to the construction, maintenance, operation and reconstruction of motorways, expressways and 1st class roads is a systemic deficiency, which results from ineffective coordination of road administration policies.

This situation leads to a lack of coordination of NDS and SSC activities in construction planning, operation and maintenance. As a result, the planning of new construction and the corresponding maintenance is not always effective, especially on the part of SSC, which does not possess the necessary technical equipment, funds, etc.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Changes in principles and implementing road infrastructure administration and maintenance (OPC2)
- Setting the principles of sustainable transport sector funding (OPS1)

3.1.4 Safety and Environmental Issues

Unsatisfactory transport infrastructure parameters as regards safety and its condition (view conditions, horizontal markings, roadside structures, etc)

The EuroRAP assessment using the Star Rating methodology shows that Slovak roads and expressways still contain a number of risks. As regards the risk rate rating for vehicle passengers, only 32% of the monitored network was rated three or more stars. This figure is only 23% for 1st class roads. The inspection also showed a low level of protection for vulnerable road users in the monitored network – pedestrians and cyclists. This fact is slightly distorted as the inspection was mostly undertaken in non-urban sections with a very low number of pedestrians. About half of the monitored sections were not rated in terms of pedestrians and cyclists, as such road users are present on these road sections (usually motorways and expressways).

In the risk assessment for vehicle passengers, the worst results were recorded on the D2 motorway and R2 expressway in the directionally divided road category and on I/65 and I/66 roads in the directionally non-divided road category. In contrast, the best results were for the R2a and PR3 feeder roads (which is, to a large extent, caused by a lower speed limit on these roads), and on the I/11 and I/68 roads.

Regarding the motorway assessment, a large number of unprotected trees were identified on the passenger side, mostly within a distance of 5 m from the roadway. Together with high speeds, these potential barriers represent an extremely high risk for motorways. Another common phenomenon on motorways are unprotected barriers, which can also cause accidents. Driving lanes in opposite directions are mostly separated by a concrete or steel barrier, and dangerous obstacles are rare.

The outcomes of the expressway assessment are similar to the outcomes of the motorway assessment. A number of unprotected trees were identified on the passenger side up to 5 m from the roadway. The central dividing line is mostly protected by a barrier, however, the numbers for expressways (driver's side) are slightly misstated as some assessed sections are not directionally divided.

An analysis of obstacles near 1st class roads showed that the potential for serious accidents is very high on such roads. The biggest problem are trees on almost 50% of the total lengths of the assessed roads. The vast majority of trees are located within 5 m of the roadway, and a substantial number are located up to 1 m distance. Other frequent obstacles are poles and pylons not made of deformable materials (billboard poles, road signs, power lines, etc). Such obstacles are also near the roadway. Another common type of obstacle are unprotected ends of steel barriers (or very short barriers, often only a few meters' long with a short height angle) and unprotected steep slopes next to roads.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Modernisation of motorway and expressway service stations (OPC3)
- Conceptual development of ITS (OPC4)
- Completion of the west-east priority axis (Rhine-Danube Corridor, Czech and Slovak branch) (OPC5)
- Completion of the north-south connection with Poland and the Czech Republic (OPC6)
- Completion of the north-south connection in eastern Slovakia (OPC7)
- Completion of the west-east road axis in central Slovakia (OPC8)
- Completion of the north-south road axis in central Slovakia (OPC9)
- Road network development in the Bratislava agglomeration (OPC10)
- 1st and 2nd class road network development (OPC11)
- Modernisation and development of the other motorway and expressway network if justified (OPC12)
- Regular safety audits and implementation of measures improving transport safety (OPS8)

A far higher number of fatal injuries on 1st class roads than on motorways and expressways

Although the Slovak Republic has successfully implemented a road safety policy which has reduced the number of road accidents, the safety parameters of all categories of road infrastructure must be focused on. Current statistical data shows the need to reduce risk factors and parameters primarily on 1st class roads, which have far higher numbers of fatalities than motorways and expressways.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Conceptual development of ITS (OPC4)
- 1st and 2nd class road network development (OPC11)
- Regular safety audits and implementation of measures improving transport safety (OPS8)

Environmental monitoring and the exceeding of road transport noise limits without taking into account old loads on the existing roads

The lack of environmental monitoring limits the assessment of the current and future environmental impacts of the operation and development of the road transport sector. This is related to air and noise pollution. Due to methodological errors in these surveys, old burdens on existing roads are not considered.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Preparation and implementation of development projects, including related activities (OPS3)
- Regular monitoring of noise and air quality and implementation of measures reducing negative environmental transport impacts (OPS7)

Irregular preparation of strategic noise maps

Rights and obligations as regards strategic noise maps and related action plans for noise protection are regulated by Act No. 2/2005 Coll. of the National Council of the Slovak Republic on the Assessment and Monitoring of Environmental Noise Pollution and on the Amendment of Act of the National Council of the Slovak Republic No. 272/1994 Coll. on the Protection of Health, as amended, by which Directive of the European Parliament and of the Council 2002/49/EC of 25 June 2002 relating to the Assessment and Management of Environmental Noise was transposed into Slovak law.

The above act imposes an obligation to draw up strategic noise maps and action plans for agglomerations, major roads, major railways and major airports.

Strategic noise maps for motorways and expressways were prepared in 2011 – 2013 (stage I and II). The assessment only reflects the situation in 2011 and comments on potential changes in 2012 and 2013. Stage III is planned for implementation in 2016.

The second stage of strategic noise maps for 1st class roads administered by SSC have not been finished. Available strategic noise maps for such roads are from 2006.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Supplementation and ongoing maintenance of subsector databases (OPS4)
- Regular updates of strategic and development documents (OPS6)
- Regular monitoring of noise and air quality and implementation of measures reducing negative environmental transport impacts (OPS7)

The risk of air pollution values being exceeded in Bratislava, Senec and Košice, the Trnava, Nitra and Prešov districts and in the Váh river corridor

More attention should be paid to the above regions and road structures in proposed variants. An increase in traffic intensities in these areas should be regulated or compensated by giving preference to environmentally-friendly public passenger transport (eg CNG and LNG buses, alternative electric buses, trolleybuses) and by promoting individual passenger transport with alternative drive systems. A more expensive solution would be the relocation of roads further away from settlements.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Preparation and implementation of development projects, including related activities (OPS3)
- Regular monitoring of noise and air quality and implementation of measures reducing negative environmental transport impacts (OPS7)

3.2 Railway Transport

3.2.1 Planning Problems

Insufficient link between the collection of transport data and its evaluation, no database on rail freight transport flows

Information on the origins and destinations of freight transport and the type of transported commodity is a basic prerequisite for making strategic decisions on the direction of individual freight transport sectors.

Although the rail freight transport database is processed in great detail by ZSSK CARGO, it is not regularly provided to MTCRD for evaluation and use in planning as, unlike for ŽSR and ZSSK, there is no contractual relationship between MTCRD and ZSSK CARGO that would define such an obligation. The only data available to the ministry on an annual basis concerns the total rail freight performance in grtkm, although in a relatively detailed structured system of line sections (section boundaries are turning points, border stations and the points of important performance changes). This data, however, provides no details on transported commodities or the types of freight trains. Data on road freight transport is insufficient, or unavailable. Without sufficient information about the direction of flows and the type of transported commodities (in all transport modes), it is not possible to define and justify effective measures for the shift of transport from roads to railway, the promotion of intermodal transport or the segment of individual wagonloads. The business confidentiality of private freight operators should not be an obstacle to obtaining a detailed description of freight operations in the transport network. Failure to provide transport data by operators makes it impossible for the state to design infrastructural measures and ultimately it is freight transport that suffers.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050 (OPŽ2)
- Preparation and implementation of development projects, including related activities (OPS3)
- Supplementation and ongoing maintenance of subsector databases (OPS4)
- Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic (OPS5)
- Regular updates of strategic and development documents (OPS6)

Insufficient justification of setting limit where rationalisation would still be efficient

The operation of railway transport on lines that, currently and in the future, will not be able to provide attractive transport services, and which record low numbers of transported passengers, is not sustainable. For these lines, it is necessary to identify if a different method of organising their operation or multimodal cooperation can ensure an attractive offer of transport services, or if the connection on the existing and often parallel road infrastructure does not represent a more efficient way to serve the area. The potential of rail lines in the SR was evaluated in a multi-criteria analysis prepared by the Transport Research Institute in 2015, but the methodology of setting the rail line potential limit where rationalisation would still be efficient, is not clear. The transport model will help to better determine the potential of lines.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050 (OPŽ2)
- Rationalisation of operation on other lines taking into account the operational passenger transport concept (OPŽ11)
- Preparation and implementation of development projects, including related activities (OPS3)
- Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic (OPS5)

3.2.2 Infrastructural Problems

Insufficient functionality of the railway node Bratislava

The largest Slovak agglomeration, which is adjacent to the largest Austrian agglomeration, is already suffering from a lack of capacity. Bratislava lies on the junction of several important pan-European freight transport corridors. In addition to two rail freight corridors (RFC 5 and 7), the River Danube flows through Bratislava, which is a significant origin and destination for commodity transport that can only continue further inland using high-capacity railway transport (bulk raw materials, liquids). Further growth in the demand for transport can be anticipated with the expected continuing urbanisation and growth in the long distance passenger and freight and regional commuter traffic. Bratislava railway node is the main (or one of the main) fulcrums of the entire Slovak railway system and its adequate functioning is a pre-condition for economic growth and sustainable transport development. The node's influence extends beyond borders, until Vienna and the entire Slovak-Austrian-Hungarian-Czech metropolitan (functional) region.

Another potential issue affecting the node is the capacity of stations, in particular the Bratislava main train station.

The above problems are tackled and analysed in detail in the currently ongoing Bratislava Railway Node Feasibility Study.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Modernisation and upgrade of the wider Bratislava hub including relevant affected lines as resulting from the Bratislava Railway Node Feasibility Study (OPŽ7)
- Preparation and implementation of development projects, including related activities (OPS3)

Unquantified internal debt in infrastructure maintenance

The amount of internal debt as regards infrastructure maintenance has never been objectively quantified. Nevertheless, there is evidently a high hidden debt. The long-term lack of maintenance financing creates numerous speed limitations that affect travel times, travel comfort and effect rolling stock maintenance and the condition of areas and equipment for passenger and freight transport. Infrastructure maintenance strategy should be connected with a decision on which rail lines and which services of the railway transport have development potential and maintenance funds should be primarily directed to these areas.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Setting the principles of sustainable transport sector funding (OPS1)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)

Missing link between operating concept, infrastructure and rolling stock parameters

Railway transport infrastructure must be modernised with a clear future operation concept. The operation concept, particularly in the form of a nationwide regular-interval graphic train timetable, will define the location of the main transport hubs in the network and set the requirements for achieving competitive system travel times between them. The required travel times can be achieved in a number of ways, and costly infrastructure reconstruction or construction is the last option. Significant time savings can be achieved by adapting the rolling stock (eg including more dynamic vehicles with a higher power, or with tilting boxes on rail lines with numerous horizontal curves) or by organisational measures – zoning of longer transport sections (slow vs. express trains), shortening of travel times by passing through underused stops, making interchange links shorter and clearer. Similarly, the operation concept clearly defines railway station yard and platform configuration requirements, the location of sidings to increase the capacity of single tracks and the dimensions of the traction system. Costly, but targeted building operations bring unquestionable benefits and are highly efficient.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050 (OPŽ2)
- Completion of the Target 2020 Timetable implementation (OPŽ3)
- Prepare and implement the Target 2030 Timetable – modify the interval and the number of connections at connecting lines for the Žilina - Košice and Kúty state border - Štúrovo/Komárno state border corridor and make the associated infrastructure changes on such lines (OPŽ6)

- Setting the principles of sustainable transport sector funding (OPS1)
- Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic (OPS5)

3.2.3 Passenger Railway Transport Problems

Underestimated service frequency

For a transport service to be attractive, it is important that the travel time (ie the duration of the trip including waiting for the first suitable line in the starting station) from point A to point B is the least dependent on the moment when the passenger decides to make the trip. If, for example, a suburban or regional line is operated at a 120-minute interval, the likelihood of a long waiting time for the next suitable line is very high. This situation makes passengers prefer a more flexible type of transport. Although there is demand for a railway service, insufficient frequency of trains dissuades people from using the train. It is very difficult to fill a train running at a 120-minute interval with passengers (except for peak times), which often leads to the incorrect assumption that the interval can be extended due to the lack of interest by passengers. Continual lengthening of the interval to achieve a higher passenger rate and line efficiency is responsible for the demise of public transport.

Where railway is an efficient alternative for public transport, service frequency should be determined not only by the current demand, but on the basis of an appropriate potential demand estimated on a redefinition of operation and frequency. This should guarantee passengers an attractive quality and reduced overall travel times, plus transparency and easy understanding of timetables.

Although there are considerable differences between Slovak regions in this respect, generally, compared to the standard frequency of services in other Western European countries, the frequency of services in Slovak regions can be evaluated as low and poorly competitive in the long-term.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050 (OPŽ2)
- Completion of the Target 2020 Timetable implementation (OPŽ3)
- Prepare and implement the Target 2030 Timetable – modify the interval and the number of connections at connecting lines for the Žilina - Košice and Kúty state border - Štúrovo/Komárno state border corridor and make the associated infrastructure changes on such lines (OPŽ6)
- Modernisation and upgrade of the wider Bratislava hub including relevant affected lines as resulting from the Bratislava Railway Node Feasibility Study (OPŽ7)
- Rationalisation of operation on other lines taking into account the operational passenger transport concept (OPŽ11)
- Preparation and implementation of development projects, including related activities (OPS3)
- Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic (OPS5)

Institutional setting of minimum service quality standards for all operators providing the public service obligation

As follows from the previous problem, when planning transport services there must be institutional definitions of minimum quality standards for area services to be met by the transport service parameters offered anywhere within the transport network. The principle in this respect is to set a minimum service interval in different segments (long-distance, inter-regional, regional, suburban transport). Other qualitative parameters such as travel comfort, information system quality, disability access, facilities at transport hubs, stations and stops, etc should be defined in detail and uniformly with respect to vehicle parameters for all public service operators.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050 (OPŽ2)

Insufficient intermodal coordination

A typical railway transport feature is its high transport capacity, which predetermines the role of the railway as the public transport backbone. In order to efficiently perform this backbone role, it is necessary to direct rail passengers to the majority of lines.

It is also not possible for railway services to cover an area with too many transport points, as this would unreasonably increase travel times. At transport hubs, it is necessary to connect the railway to other transport means (bus, suburban public transport and individual vehicular transport using P+R parking, walking and cycling).

In addition to operation integration, the intermodal coordination of passenger transport should also include tariff integration, viewed as very important by passengers. It is recommended to introduce a tariff system that offers three tariffs:

- The basic tariff should be network-wide, fully transferable and uniform for all public transport types and segments. This tariff must be accepted by all public service operators (rail and bus operators, urban transport companies).
- The tariff for integrated urban areas should only be valid in a limited section of the transport network meeting the transport needs of agglomerations or catchment areas of the commuting centre (or more centres).
- A commercial tariff, an optional tariff implemented by operators in addition to the basic tariff (a customer always has the option of the basic tariff) – eg temporary seasonal reduced tariff, etc.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050 (OPŽ2)
- Preparation and implementation of development projects, including related activities (OPS3)
- Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic (OPS5)

Poor image of public transport

The Slovak public often view public transport, in particular railway transport, as an unfashionable and outdated mode of transport. This is due to public transport's inability to respond to growing motorisation in the 1990s and the public's attitude to this transport has not improved since then. If this negative development is to be reversed, conceptual changes must be made in transport service planning, for example, as described above. After introducing conceptual changes, the public must be made aware of the new transport options and the public transport must be actively marketed and promoted. A separate issue is the impact of the introduced zero tariff (for children under 15, full-time students under 26 and pensioners) on the public attitude to railway transport, which has resulted in higher interest in these passenger segments.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Completion of the Target 2020 Timetable implementation (OPŽ3)

3.2.4 Rail Freight Transport Problems

Capacity problems and interoperability restrictions on RFC routes

Two of three Slovak RFC corridors run through the Bratislava hub. The Bratislava-Pálenisko port is Slovakia's main access point to the European network of inland waterways with intermodal transport terminal (ITT) located in Dunajská Streda. This terminal has long had the highest volume of processed intermodal transport units of all the Slovak ITTs, although it is not part of TEN-T or RFC (it is connected to the corridors by the low-capacity single-track and non-electrified Bratislava – Komárno rail line). It should be noted that in the Bratislava hub and the Bratislava region as a whole there is great potential for an increase in the number of passenger trains and that many rail lines in important transport directions (in particular cross-border lines and the Bratislava – Dunajská Streda – Komárno – HU state border line) are only single-track lines. Despite this, the problem of insufficient capacity can remain hidden. Railway transport,

unlike road transport, is less flexible and a line operator cannot offer freight transport routes that would not be feasible. As a result of the positive development of passenger transport, freight train routes are shifted to unattractive locations with deteriorating quality (frequent stops for transport reasons). This discourages potential demand for freight transport, although it is not visibly demonstrated in the same way as tailbacks on roads. To limit this effect, it is necessary to maintain extra infrastructure capacity above the current demand and maintain an acceptable quality of routes for freight trains.

In terms of interoperability limitations, the priority should be to electrify lines (Devínska Nová Ves – AT state border), address the lack of ETCS and GSM-R facilities (Kúty – Bratislava – Nové Zámky – Komárno / Štúrovo), and the locally-limited spatial capacity, insufficient effective station track length and a high number of speed limitations.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Completion of the modernisation of the main TEN-T lines in a high degree of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – AT state border (OPŽ1)
- Modernisation of the Žilina - Košice - Čierna nad Tisou backbone line (OPŽ4)
- Modernisation of the Kúty state border - Bratislava - Štúrovo/Komárno state border corridor (OPŽ5)
- Modernisation and upgrade of the wider Bratislava hub including relevant affected lines as resulting from the Bratislava Railway Node Feasibility Study (OPŽ7)
- Modernisation and upgrade of the TEN -T line: Púchov - Horní Lideč (OPŽ8)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)

Insufficient strategy as regards development of intermodal transport and segment of single wagonloads

As stated above, strategic freight transport decisions require a detailed knowledge of the current volume and direction of transports and the type of transported commodities in the rail and road freight transport (no transport surveys undertaken). Without this knowledge, it is not possible to define and justify the requirements for intermodal transport terminals (ITT) or siding stations for the transport of single wagonloads. The development in the halted preparation of the construction of additional public intermodal transport terminals depends on evaluating the impact of the ITT Žilina-Teplička on the shift of freight transport from road to railway and performance development of other non-public terminals.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Improve conditions for combined transport and operation of complete freight transport sets and support the interoperability of freight transport vehicles (organisation, infrastructure and vehicles) (OPŽ9)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)

3.2.5 Other Problems

Insufficient operational management centralisation

The centralisation of operation at one or two control centres for the entire railway network will provide more efficient operational management facilitated by a better overview of the operational situation in the integrated part of the network, or a continual section of a rail line. The connection to the central dispatch centre also facilitates substantial savings on operating staff and operating costs resulting in higher economic efficiency of modernisation projects. Despite some existing plans, its implementation has been insufficient so far.

A relatively high number of staff at some lines is the result of the low level of station and line security system.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Centralisation of operation management (OPŽ10)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)

Practical problems of sharing depots, railway yards and other maintenance and supply facilities

Due to the continuing competition with the transport market, there will be a continuing increase in the number of passenger transport operators on the Slovak railway network. It is thus necessary to choose a strategy of sharing

depots, railway yards and other maintenance and supply facilities by several public service operators (and by commercial passenger and freight transport operators).

Non-discriminatory access must be ensured to refuelling stations and equipment for hygienic maintenance of passenger trains, their refilling with water and electric pre-heating. These activities should be primarily provided by an infrastructure manager at points where the need for such activities will stabilise following the consolidation of the regular-interval graphic train timetable.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050 (OPŽ2)
- Modernisation and upgrade of the wider Bratislava hub including relevant affected lines as resulting from the Bratislava Railway Node Feasibility Study (OPŽ7)

3.3 Public Passenger and Sustainable Local and Regional Transport

3.3.1 Infrastructural Problems

Rolling stock renewal

It is difficult for towns to regularly renew their urban public transport rolling stock. In 2013, the average age of trams was over 20 years, for trolleybuses 19 years and for buses 12 years. The situation has dramatically improved in Bratislava (new trams and trolleybuses) and in Košice (new trams and buses with co-financing from EU funds, although these cities have not considered the next renewal cycle (in Košice - not even the loan instalments on buses), there is future risk attached to all the new vehicles being of the same age.

Regional railway transport rolling stock is renewed using EU subsidies, but ZSSK transport is currently unable to provide transport using modern low-floor vehicles on the majority of lines.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Renew vehicle fleet to ensure appropriate quality (OPVO3)
- Setting the principles of sustainable transport sector funding (OPS1)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)
- Preparation and implementation of development projects, including related activities (OPS3)
- Regular updates of strategic and development documents (OPS6)
- Regular monitoring of noise and air quality and implementation of measures reducing negative environmental transport impacts (OPS7)

Incomplete infrastructure

The lack of transfer terminals, inconvenient design of transport hubs and the poor condition of stops reduce the attractiveness of public passenger transport (PPT) and increases pressure on direct connections without transfers. Missing and unconnected trolleybus lines in Bratislava, Banská Bystrica and Žilina do not allow the realisation of the full potential of trolleybus transport. The tram network in Bratislava does not serve certain important transport destinations, which prevents full use of its potential. The tram network in Košice is incomplete (especially in the city centre) with no connection to the Ťahanovce housing estate. It is not clear whether trolleybus transport will be retained.

No centres have been created for the coordination of PPT sub-systems, and vehicles used in some UPT operations are insufficiently equipped with advanced communication devices. There is a lack of intelligent stops and other information systems providing real time information, which results in insufficient information for passengers on departures and PPT operational issues.

A lack of, or unconnected cycling routes, in the majority of towns and regions limits the use of the bicycle as an alternative transport means. A lack of P+R parking facilities and a lack of, or unsuitable connections to, PPT contribute to a massive entry of IVT into town centres. An emphasis on increasing the road capacity for IVT deteriorates the conditions for other transport modes and other than transport street functions.

The problems include:

a) The number and optimal location of turning sites for urban public transport on road networks (in terms of service quality and operational efficiency), especially in new urban areas; and

b) The number and location of sufficient-capacity facilities for K+R and B+R near major stations and public transport stops.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists (OPVO4)
- Construction of park-and-ride facilities near railway stations and terminals (OPVO5)
- Revitalisation of railway stations and stops to improve the travel culture and quality (OPVO6)
- Preparation and implementation of development projects, including related activities (OPS3)
- Regular updates of strategic and development documents (OPS6)

Maintenance

Insufficient maintenance of tram and trolleybus lines results in a number of point or section restrictions. In Bratislava and Košice, ongoing extensive modernisation is being undertaken with co-financing from EU funds. Some lines cannot currently be used by modern low-floor vehicles. Adequate maintenance and renewal of lines will continue to be necessary after modernisation using EU funds.

Insufficient maintenance and renewal has repeatedly led to interrupted operation (eg closure of the tramline to Bratislava main train station from 2011 – 2015). In Košice, due to the condition of trolleybus infrastructure and the operator's economic situation, the strategic document (Strategy) recommended ending trolleybus operation and seeking another solution using advanced technologies. In the future, the operation of public transport will be threatened by maintenance limitations unless there is an increase in funds for UPT operation and maintenance.

Inadequate maintenance of UPT vehicles results in a higher failure rate and lower attractiveness for passengers.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Renew vehicle fleet to ensure appropriate quality (OPVO3)
- Setting the principles of sustainable transport sector funding (OPS1)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)

Road infrastructure deficiencies

Towns and regions lack sufficient funds for road maintenance, which leads to damage to and a lower speed of PT vehicles.

Roads are not adapted to the operation of UPT. This results in low use of public transport and higher operating costs.

Road PPT is not considered a decisive factor in deciding on road construction or reconstruction. The needs of suburban transport and UPT to ensure fast passing through overloaded hubs and to place stops in them optimally with respect to transfers and other passenger needs are not taken into account, leading to a preference for car transport to the detriment of public transport supported from public funds.

Road infrastructure is developed without regard to the needs of cyclists.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists (OPVO4)
- Preparation and implementation of development projects, including related activities (OPS3)
- Regular updates of strategic and development documents (OPS6)
- Regular safety audits and implementation of measures improving transport safety (OPS8)

3.3.2 Public Passenger Transport Preference Problems

Insufficient legislation and technical standards

The existing legislation insufficiently promotes more environmentally friendly types of transport and directly supports the development of motorisation. An example is Act No. 8/2009 Coll. on Road Transport, as amended, which dramatically increased the number of parking places in towns by legalising parking on pavements. The technical standards for the construction of roads do not sufficiently reflect developments in Europe over the last decades and often lead to the implementation of excessive-capacity solutions for IVT, and insufficient solutions for other transport modes (for example, narrower lanes to allow cycle lanes to be included).

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists (OPVO4)
- Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses (OPVO8)

Insufficient preference of PPT vehicles

Transport policies for towns do not give sufficient preference to PPT vehicles over IVT. In addition, legislation does not set a priority for each transport type when considering transport solutions. For example, Act No. 171/1993 Coll. on the Police Force, as amended, defines as one of the tasks of the police force the supervision of the safety and free flow of road traffic and cooperation in its management, without any regard to more environmentally friendly modes of transport. PPT preference is thus unsystematically applied in practice and IVT is not restricted, or is only restricted to a limited degree.

Urban development and the construction of new housing units is not connected with a conceptual solution for public passenger transport and infrastructure and access for pedestrians and cyclists.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Preference of public passenger transport in urbanised areas (OPVO1)
- Setting the principles of sustainable transport sector funding (OPS1)
- Preparation and implementation of development projects, including related activities (OPS3)
- Regular updates of strategic and development documents (OPS6)
- Regular monitoring of noise and air quality and implementation of measures reducing negative environmental transport impacts (OPS7)

Low preference for improving public transport

Slovak society is strongly oriented towards car use and the building of infrastructure for car transport; relatively limited funds are allocated to public transport. Since many settlements in Slovakia are small, this development does not cause big clashes with environmental protection interests and, in the main, no unacceptable situations occur. In recent years, the situation in Bratislava has become unsustainable, with poor quality public transport and easy parking in the centre combined with above-average living standards leading to very high car use (split IVT:PT 54:46). The modern road network in Košice is also fully used for cars trips that are mostly very fast, the split is also 54:46. Public transport cannot compete as regards speed, although the renewal of the rolling stock provides greater comfort. Smaller towns offer more limited public transport. Although in the last ten years, regional systems have achieved a relatively high quality of bus transport and improvements have also been made to railway transport, services are still relatively limited. With decreasing numbers of passengers and increasing quality, the costs of regional transport have also rapidly increased and its extent is further threatened in the future.

It will be necessary to break the chain of low revenues, low attractiveness, and a decrease in passengers. This will only be possible by increasing the attractiveness of public transport and restricting car access to town centres.

The problem is the low speed of public transport in towns. A crucial measure for better sustainability is a higher speed of public transport. This will increase its attractiveness and decrease its operating costs.

Regions and towns make insufficient use of financial support for innovative public transport projects, eg CEF – Horizon 2020 – smart, green, integrated transport.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Preference of public passenger transport in urbanised areas (OPVO1)
- Establishment of the national transport authority and public transport integration (OPVO2)
- Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses (OPVO8)
- Setting the principles of sustainable transport sector funding (OPS1)
- Preparation and implementation of development projects, including related activities (OPS3)
- Regular updates of strategic and development documents (OPS6)

Limited perception of the importance of public passenger and non-motorised transport

A massive shift to IVT over the past two decades has resulted in the share of public transport of all motorised trips falling to 28% (in large cities 39%); 80% of trips are shorter than 15 kilometres. One third of trips in Slovakia are made on foot and only 7% by bicycle. 10% of the general public use prepaid travel documents for public transport, in large cities the figure is 22%. The modal split is higher for public transport for commuting to Bratislava, for long-distance trips using high-frequency fast rail connections (on the Kúty – Bratislava – Košice and Bratislava – Nové Zámky lines) and frequent bus lines (eg Bratislava – Nitra). Having a minority share of transport users leads to a loss of significance of public transport and its poor quality is not perceived as a major issue by politicians. This approach leads to a further reduction of the importance of public transport.

Non-motorised transport is considered even less important than public transport and its significance is underestimated. The condition of pavements is thus worse than the condition of roads, they are regularly used for parking (pedestrians must often use roads due to insufficient space on pavements), there is no disabled access, large housing estates in some towns provide no access for pedestrians and cyclists, cycling is deemed as a leisure activity rather than a transport system.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Preference of public passenger transport in urbanised areas (OPVO1)
- Establishment of the national transport authority and public transport integration (OPVO2)
- Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists (OPVO4)
- Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses (OPVO8)
- Setting the principles of sustainable transport sector funding (OPS1)
- Preparation and implementation of development projects, including related activities (OPS3)
- Regular updates of strategic and development documents (OPS6)

Insufficient attention to passenger access, quality of premises and motivating factors

Higher use of public transport is also discouraged by the poor condition of stops, stations and access points and non-existent complementary services and marketing.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists (OPVO4)
- Revitalisation of railway stations and stops to improve the travel culture and quality (OPVO6)
- Setting the principles of sustainable transport sector funding (OPS1)
- Preparation and implementation of development projects, including related activities (OPS3)
- Supplementation and ongoing maintenance of subsector databases (OPS4)
- Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic (OPS5)
- Regular updates of strategic and development documents (OPS6)

3.3.3 Public Passenger Transport Organisation Problems

Fragmentation and lack of competences in public passenger transport

Public passenger transport services are purchased by a number of entities (MTCRD SR, HTU, towns, villages; in large towns it is often necessary to accommodate conflicting interests between high numbers of town districts).

Individual purchasers of transport services generally lack a professional qualification for qualified transport planning and evaluation, so their tasks are taken over by operators, who define the specifics of purchased public performance and submit it for approval to the purchaser. This particularly applies to urban public transport and to some HTUs purchasing bus transport services. MTCRD has assumed the role of the purchaser for railway transport, but has insufficient data on the regional needs and insufficient capacity and staff to consult with regions. Regional transport services are also often in conflict with the needs of long-distance transport, which is given preference by the state.

Relatively common is the lack of a function of certain parts in the relationship purchaser (local authority) – provider (operator), particularly in the largest UPT operations. Purchasers may have no knowledge of the planned and actual performance of the operator and may not be fully informed about what is paid for, may not insist on the delivery of services of the required quality, or may not even require adequate quality. The provider may not receive compensation for losses incurred during performance in the public interest. So far, the option to address control activities collectively for all PPT modes via an integrated transport system organiser, or a transport authority has not been applied, even for the existing regional integrated system in the Bratislava Self-Governing Region.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists (OPVO4)
- Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness (OPVO7)
- Setting the principles of sustainable transport sector funding (OPS1)
- Preparation and implementation of development projects, including related activities (OPS3)
- Regular updates of strategic and development documents (OPS6)

Financial problems

MTCRD SR's budget for ordering rail performance in the public interest is approximately EUR 230 million a year (in 2015: EUR 245 million).

Free trains for students and pensioners introduced from 17 November 2014 have brought new rail passengers and increased operational competences, but have also introduced inequality in transport conditions in rail, bus and urban public transport. The state's social policy must be introduced equally for all PPT and the state's social policy activities in transport are a strong argument for the state to assume responsibility for public transport integration.

HTU budgets only allow the financing of basic transport services for their area in suburban areas with a high demand for transport to towns. Suburban municipalities lack funds to finance a higher standard of regional transport. The decreasing use of regional buses and their increasing costs, particularly after the renewal of the rolling stock, represent a large burden on HTU budgets.

Towns and cities have limited funds and limited options to compensate losses of UPT operations compared to other EU countries. Generally, towns do not cover the total loss of loss-making transport operators. Towns with fixed-track transport thus lack funds for maintenance, which is particularly notable for towns with tram transport (Bratislava, Košice). Without a systematic solution to improve financing and inspection of maintenance, it will not even be possible to ensure proper maintenance of new and modernised lines. The current meeting of requirements as regards infrastructure modernisation with the assistance of EU funds is very useful; however, but it cannot be relied on after 2020 as the only possible solution in the medium and long term.

Town revenues, for example from parking fees, are not well used, they could be a source of UPT funding and advantages could be offered to those with pre-paid parking in the form of parking discounts, eg in afternoons and at weekends. Mobility financing will require co-financing of those travelling about town by car, for example, by eliminating widespread parking on pavements, which could result in a significant shift from IVT to public transport.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Renew vehicle fleet to ensure appropriate quality (OPVO3)
- Setting the principles of sustainable transport sector funding (OPS1)
- Regular updates of strategic and development documents (OPS6)

Inconvenient coordination of individual transport sub-systems

Despite the recent positive steps, individual purchasers of public passenger transport services insufficiently communicate with each other, which results in a lack of coordination between rail, suburban, bus and city public transport.

Train timetables prioritise long-distance transport and HTUs cannot always influence the times of regional trains to meet the needs of villages and towns. Given the low quality and low number of regional trains, HTUs often purchase bus services running at the same time as trains on only slightly different routes. The number of regional trains on suburban rail sections of large cities is insufficient as regards capacity and time distribution of services at peak times. Given that suburban rail transport covers the required mobility insufficiently, passengers use and overcrowd long-distance trains and regional express trains. Their insufficient number is supplemented with REX only at peak times.

HTUs often purchase bus transport that runs partially parallel with railway transport and there are no plans to significantly change this approach for the following reasons:

- Elimination of parallel services would cause a significant reduction of purchased bus transport services, which is often in conflict with contracts made with operators, or the shift of services to locations with a lower number of passengers, which would increase the losses of bus operators, necessitating higher compensation from HTU budgets without higher transfer from the state budget.
- Insufficient train frequency or capacity (eg transport to/from work shifts with the set beginning/end).
- Railway infrastructure is of poor quality, with low speeds and a poor standard of stations and stops. No service parking and no changing terminals.
- The location or frequency of train stations and stops is inconvenient.
- Bus lines sometimes offer a better connection to catchment area centres than rail lines.
- Except for integrated transport systems in the Bratislava region and Rajecká dolina, there is no functional tariff integration, and elimination of parallel services would make trips more expensive for passengers and PPT less attractive.
- There is insufficient interoperation between dispatch centres of different transport modes (no information provided on deviations from timetable, connecting lines cannot be guaranteed) and this option is often not available within a single operator.
- Prohibition of parallel services is not sufficiently defined (it is necessary to clearly define the terms “acceptable parallelism” and “unacceptable parallelism”).
- There is no functional check of compliance with the prohibition of parallel services.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists (OPVO4)
- Construction of park-and-ride facilities near railway stations and terminals (OPVO5)
- Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness (OPVO7)
- Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses (OPVO8)
- Setting the principles of sustainable transport sector funding (OPS1)

- Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic (OPS5)
- Regular updates of strategic and development documents (OPS6)

Various interpretations of public interest

No plan of transport services in the SR has been developed; there are no definitions of transport service standards. Although the Act No. 56/2012 Coll., Section 18 (Road Transport Act) defines transport service[1], the definition needs to be detailed.

The term "public service obligation" is defined in Regulation (EC) No. 1370/2007.

There is interest in declaring PPT to be an alternative to IVT, but the funds, particularly in HTUs are only sufficient to cover basic transport services – trips to/from work, schools and medical facilities.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Setting the principles of sustainable transport sector funding (OPS1)
- Preparation and implementation of development projects, including related activities (OPS3)

Inadequate transport planning

Not all purchasers of public transport services use the results of transport surveys for transport planning, or ticket sales data, and not all of them have access to sufficient information, particularly from private bus operators undertaking subsidised public service performance. At the state level, despite the defined concept for purchasing rail services, there is a lack of professional capacities for more detailed transport planning. Transport planning at HTUs using the said data is only performed in a few cases (eg transport department of the Košice Self-Governing Region prepares analyses, tests, modifications of transport services and transport coordination in cooperation with all operators, eliminates parallel services, implements lines to attract new passengers and is planning tariff integration), towns lack the professional capacity to plan and purchase public transport services in the public interest. So far, there has been no use of transport development analyses using transport models describing the comprehensive impact of various transport measures, including intermodal relations. There is also a lack of high-quality information on the relations between different transport modes and estimates of transport induction and transport reduction.

Planning is mostly provided by operators rather than purchasers, often to a high level, but public interest is taken into consideration to a varying degree and often there are insufficient links to other transport systems.

Large cities have no precise data on parking places and the number of cars parking outside those places.

Transport surveys focus almost exclusively on road and public transport, and neglect cycling and pedestrians.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Preparation and implementation of development projects, including related activities (OPS3)
- Supplementation and ongoing maintenance of subsector databases (OPS4)
- Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic (OPS5)
- Regular updates of strategic and development documents (OPS6)

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[1] (1) Transport services for the purposes of this act means the creation of an appropriate extent of transport services offered by domestic transport to provide regular transport in a region or a municipality.

(2) An appropriate extent for the purposes of sub-section 1 means the number of connections per day, the punctuality and regular frequency of individual connections on bus lines to satisfy public demand during different days of the week while considering the options for parallel transport services and transfers, distances to stops, road capacity during the day, transport security, equipment and capacity of vehicles and fares for selected groups of passengers.

3.3.4 Public Passenger Transport Operation Problems

Modal split with a low and decreasing share of public, rail and non-motorised transport

According to an opinion survey and the results of transport modelling, public transport only accounts for about 30% of trips by motor vehicles (the figures are particularly low in rural regions, and in the Bratislava and Trnava Self-Governing Regions).

Only 18% of public transport trips are made by trains. The attractiveness of trains has increased where significantly more frequent services have been introduced to meet demand (eg Bratislava – Pezinok, Komárno – Bratislava). Train services, particularly in suburban areas, are limited and they are not connected to regional buses.

The accessibility of settlements by public transport in regions without modernised rail lines is much slower than in passenger cars.

The expansion of IVT has a negative impact on PPT and non-motorised transport:

- The speed of road PPT is slowing due to queues, the installation of road light signalling, and its costs increase.
- The reduction of PPT passengers in favour of IVT continues, in particular those paying full fare, which causes significant revenue shortfalls with a subsequent negative impact on the amount of loss compensation for the performance of services in the public interest.
- The decrease in the number of passengers is occurring faster in rural regions that do not provide regular-interval transport to catchment centres throughout the day, but only operate selected connections of a social character.
- The decrease of passengers causes the closing of little-used lines, particularly in the evening, which further decreases passenger numbers due to the lower attractiveness of PPT.
- Non-motorised transport is gradually being replaced with car transport. Cyclists are dissuaded by the intensity of IVT on roads, and pedestrians by the legalisation of parking on pavements. The poor design of roads and junctions creates barriers to non-motorised transport in terms of space and time.
- When considering the impact on transport, the requirements of IVT and PPT are considered first, and non-motorised transport is considered as subsidiary transport.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Preference of public passenger transport in urbanised areas (OPVO1)
- Renew vehicle fleet to ensure appropriate quality (OPVO3)
- Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists (OPVO4)
- Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness (OPVO7)
- Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses (OPVO8)
- Preparation and implementation of development projects, including related activities (OPS3)

Insufficient train frequency

The current frequency of trains would not be sufficiently attractive if there was better integration (elimination of parallel bus services). There is room for a radical frequency increase after the optimisation of the railway network, with reduced lost time as regards vehicle use and their full utilisation throughout the day. Here, the costs of transport route and energy increase at the same rate, but other operational costs are mostly negligible compared to the performance increase as they are incurred in the current situation (eg idle time of train staff paid in full).

The main obstacle is currently the high costs of regional rail transport operation and without internal operation optimisation (full-scale regular hour service throughout the day), it will not be possible to significantly increase the frequency. Without significantly increasing the frequency, there will be no major change in the modal split.

On a large part of the network, regional railway transport runs at 2-hour intervals, and cannot therefore play a backbone role and does not represent an attractive commuting option.

The resulting problem is insufficient long-distance transport services, which is largely provided by fast regional services (eg given a higher service frequency and reorganisation it would be possible to use trains for a daily commute of up to 100 kilometres).

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness (OPVO7)
- Setting the principles of sustainable transport sector funding (OPS1)
- Regular updates of strategic and development documents (OPS6)

Insufficient capacity of public transport in towns and suburban transport

Bratislava, Prešov and partially Košice lack sufficient PPT capacity at peak times, which makes it impossible to stop the loss of passengers to IVT.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Setting the principles of sustainable transport sector funding (OPS1)
- Regular updates of strategic and development documents (OPS6)

Confusing regional bus transport system

Regional bus transport systems in the majority of regions are organised depending on passenger demand, and little-used lines are closed. The result is an unsystematic organisation of lines, which is not clear enough to attract new or occasional passengers.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness (OPVO7)

Unresolved operation of integrated passenger transport terminals

The first integrated passenger transport terminals (eg Moldava nad Bodvou) have drawn attention to the unresolved funding of terminal operations and the difficultly of coordinating rail and regional bus transport without the joint purchase of services. The result is insufficient utilisation of terminal potential and higher costs of loss compensation after launching their operation.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Establishment of the national transport authority and public transport integration (OPVO2)
- Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists (OPVO4)
- Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness (OPVO7)
- Setting the principles of sustainable transport sector funding (OPS1)
- Regular updates of strategic and development documents (OPS6)

3.4 Water Transport

3.4.1 Water Infrastructure Problems

Inadequate navigation conditions on the River Danube

The Danube, as a waterway of international importance, should facilitate transport performance according to the international classification of inland waterways which, according to the criteria of the Danube Commission and the AGN Agreement, should be for a minimum of 300 days a year. Better navigability of the Danube would allow a higher and more efficient use of the existing ports on the Danube in the SR. The conducted analysis concludes that all of the Danube sections (Moravia/Danube confluence – Bratislava, Bratislava – Sap and Sap – Štúrovo) have serious shortcomings in terms of ensuring adequate navigation conditions.

- Inadequate navigation parameters in the section between the Moravia/Danube confluence and Bratislava are caused by shallows and narrows, for which it is not possible to ensure guaranteed navigation conditions even with regular dredging, ie minimum navigation depth and width. 5 locations in this section (of which 4 are in the joint Slovak-Austrian section) were identified by the 2014 EU Strategy for the Danube Region as critical, including a narrow point, a stone step in the Devín profile. The effectiveness of work (dredging, groynes) in some sections cannot be further increased, as in part of the section the Neogene layer of the river bed is exposed. Therefore, it is also necessary to consider the possibility of implementing technical measures to ensure minimum waterway parameters in Slovakia according to the recommendations of the Danube Commission.
- Inadequate navigation parameters in the Sap and Štúrovo section due to the implementation of the Variant C solution for the Gabčíkovo – Nagymaros System of Locks (SVD G-N), with a smaller impoundment and damming of the Danube at Čunovo in Slovakia, ie only the Gabčíkovo Dam was constructed, represent a typical navigation obstacle on the Danube. Improvement of navigation conditions in this section is included in the priority TEN-T project, Axis Rhine-Main-Danube, No.18.4 Sap – Mohács, which represents an important waterway axis connecting Western and Central Europe. This project is being prepared and implemented separately by Hungary, and Slovakia must currently maintain the waterway in the Slovak-Hungarian section of the Danube by dredging, in line with the plan agreed at the government meetings of the Slovak-Hungarian Commission on Transboundary Waters. This maintenance is expensive, and these activities do not have the desired long-term effect, as they involve the maintenance of critical points in shallows with a rocky riverbed. This is confirmed by an analysis of the number of navigable days in shallows on the Danube waterway between river km 1811.000 and 1720.000, which concluded that in the reference period from 2003 to 2013, the average number of navigable days a year was 245 (with a low of 196 navigable days in 2011) and an average annual usability of 67.2%.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Implement technical measures to improve the navigability on the ship route of the Danube waterway (OPV1)
- Setting the principles of sustainable transport sector funding (OPS1)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)
- Preparation and implementation of development projects, including related activities (OPS3)
- Supplementation and ongoing maintenance of subsector databases (OPS4)
- Regular updates of strategic and development documents (OPS6)

Almost permanent operation of just one lock at the Gabčíkovo Dam

As regards the continuity of navigation in the Danube section Bratislava – Sap there is a problem with unscheduled emergency repairs of the operated lock in the event of a long-term shutdown of the second lock due to fault, or maintenance. In 2010 – 2015, at least one of the locks was almost continually shutdown (for more than 89% of the time over the last six years). If there is failure or any accident on the second lock (eg accident in 2014 when damage to the head gate of the right lock paralysed navigation on the Danube for four days). This has a negative impact on navigation, which leads to frequent protests against the SR at international organisations.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Implement technical measures to improve the navigability on the ship route of the Danube waterway (OPV1)

Impact of the operation of the Gabčíkovo hydroelectric power plant (GHPP) - handling of flow rates at the GHPP on ship route parameters

Another issue on the Bratislava – Sap Danube section is the operation of the Gabčíkovo hydroelectric power plant (GHPP) and its impact on ship route parameters. Management of the flow rates at GHPP should ensure optimal use of the hydropower potential of the Danube and all other functions of the Gabčíkovo dam. However, as the balancing reservoir of the Nagymaros dam (ND) was not built, ie a lower balancing reservoir below the Gabčíkovo step, which would have eliminated flow volatility caused by peak GHPP operation and the increase in the level of the Danube to ensure ship route parameters on the Danube section below the Gabčíkovo step, GHPP's function is limited. As a result, peak energy cannot be generated at the Gabčíkovo dam and the ship route parameters are limited. In 2015, for example, there was a problem on the section above the Gabčíkovo dam with the silting up of the Hrušov reservoir and of the ship route. They were located at a depth just below the marked ship route so it was necessary to relocate the shipping channel, which also limited the use of the dam to generate electricity.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Implement technical measures to improve the navigability on the ship route of the Danube waterway (OPV1)

No active cooperation with Hungary to ensure all the functions of the old Danube riverbed

In the Bratislava – Sap section, the old Danube riverbed should have retained its waterway status after the completion of the Gabčíkovo Dam. Currently, it cannot fulfil its main functions, which results in problems such as low flood protection in the original Danube channel, navigation not possible if Gabčíkovo Dam approach channel is out of action and no joint bilateral Slovak-Hungarian interest in the development of recreational passenger navigation, recreational and sports activities and tourism. Active cooperation with Hungary is required to address these issues.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Implement technical measures to improve the navigability on the ship route of the Danube waterway (OPV1)
- Cooperate with the watercourse administrator to maintain waterways and shipping structures on the monitored Slovak waterways at the year-round navigability level (OPV5)

Unsatisfactory operational condition of the Váh waterway

The Váh waterway was built from Madunice to Žilina. It runs through diversion channels originally designed for navigation purposes, but due to an unsystematic approach it was only completed for energy and waterwork purposes and there are incomplete locks on its hydraulic plants. As a result, only the head gates of locks are in operation and they are only used to release high water, not for vessel navigation. The Selice Dam has also not been completed, due to a lack of funds.

Komárno – Hlohovec section, there are incomplete sections Komárno – Selice Dam, where there is a significant water-level fluctuation and insufficient navigation depth due to the missing Nagymaros Dam in the Komárno - Selice Dam lock section and the Kráľová Dam – Hlohovec (Madunice Dam) section. The completion of the existing and the construction of the missing water structures could make the waterway usable. This would provide an alternative transport option to industrial centres in adjacent areas. This assumption must, however, be verified by feasibility studies and demand studies.

Hlohovec – Žilina section navigation is only possible on the Váh cascade navigation channels and on reservoirs. The locks were only partially completed and require reconstruction and redesign. There are no locks on the Nosice and Hričov reservoirs and Mikšová and Považská Bystrica dams.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Setting the principles of sustainable transport sector funding (OPS1)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)
- Preparation and implementation of development projects, including related activities (OPS3)

- Supplementation and ongoing maintenance of subsector databases (OPS4)
- Regular updates of strategic and development documents (OPS6)

Insufficiently constructed waterway elements

Waterway elements include vessel moorings at or outside ports, weirs, lock chambers, roadsteads, docks, mooring equipment at ports, bank fortifications, regulation structures, signals, ship routes, waterway buffer zones, water sections, bank modifications and riverfront walls at ports. Only the basic parts have been constructed and it is necessary to complete them and connect them to electricity and drinking water where it is appropriate. The constructed waterway elements require renovation and connection to a maintained access road.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Implement technical measures to improve the navigability on the ship route of the Danube waterway (OPV1)
- Preparation and implementation of development projects, including related activities (OPS3)

Minimum investment in modernisation of waterway infrastructure

In recent years, there has been minimal investment in the modernisation and development of waterway infrastructure due to a lack of funds and uncertainties concerning competences.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Implement technical measures to improve the navigability on the ship route of the Danube waterway (OPV1)
- Setting the principles of sustainable transport sector funding (OPS1)
- Preparation and implementation of development projects, including related activities (OPS3)

Problems with waterway maintenance funding and division of competences

Navigation conditions fall within the remit of the waterway administrator - Slovenský vodohospodársky podnik, š.p. (SVP, š.p.) and it is funded from the chapter of the MoE SR and its own budget. The waterway administrator claims the eligible costs of services from the MoE SR from state budget funds by 31 March each year. However, for several years (since 2005) only 10 – 20% of these costs were reimbursed. Consequently, the state did not comply with its obligations stipulated by a Slovak government regulation. The costs incurred by the waterway administrator for navigation route marking from own funds could not be used for the development and modernisation of waterways and their components.

As a result, in 2011 waterway infrastructure development and modernisation was transferred from the MoE to the transport ministry under the Water Transport Development Agency. However, waterway maintenance has remained within the competence of the MoE and its funding problems persist.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Cooperate with the watercourse administrator to maintain waterways and shipping structures on the monitored Slovak waterways at the year-round navigability level (OPV5)
- Setting the principles of sustainable transport sector funding (OPS1)

3.4.2 Public Port Issues

Non-standard setting of ownership relations and the operational model

Slovak ports have great potential for the development of a freight and a passenger port, which cannot be realised due to the difficult ownership situation regarding the infrastructure and superstructure at public ports. The current ownership situation is non-standard in comparison with practice at other European public ports, as much of the infrastructure is owned by a private entity, which is also the dominant port operator. This infrastructure includes utilities and all roads and railways within the Bratislava and Komárno public ports.

The main deficiencies of the current operation model can be summarised as follows:

- The port equipment and land belong to entities of a different nature, which results in reluctance to invest in new equipment and infrastructure modernisation;

- High risk as regards investments of private entities and obsolete equipment in ports, which limits competitiveness;
- Operational risk with an impact on security management in ports; and
- The entities have limited insight into each other's operations in ports.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Settle the ownership and administration conditions at public ports (OPV4)

Unsatisfactory technical and operating condition of the port infrastructure and superstructure

The ports face many problems in this area, ie unsatisfactory technical and operational condition of port facilities, and of transhipment technologies, communications, utilities, storage areas, mooring elements, stairs to transhipping positions on inclined banks and service pavements. Most transhipment technologies in the Bratislava and Komárno public ports are at the end of their life cycle as minimal funds have been invested in port facilities in recent decades to maintain their serviceability. This agenda should be undertaken by the private operator as it is the owner of the superstructure. The infrastructure of these ports is in a similar condition, ie it does not meet safety and operational requirements for its optimal use. There are insufficient transport connections for pleasure craft and cruise vessels at the Bratislava and Komárno passenger ports. The above reasons have a significant negative impact on the attractiveness of the port and the demand for their services.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Modernise public ports in Slovakia and ensure regular maintenance (OPV3)
- Setting the principles of sustainable transport sector funding (OPS1)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)

Low share of transported containers

A low proportion of containers are transported by water transport given the opportunities for container transport using this transport mode. Container transport only accounts for 0.2% of commodity transport by water transport at the Bratislava port. Although the total volume of containers transhipped at the Bratislava public port is EUR 70 thousand, the majority is transported on a bimodal road-railway basis.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Modernise public ports in Slovakia and ensure regular maintenance (OPV3)

Insufficient provision of high-quality services to vessels in ports and their crews

The main deficiency of the Bratislava public port and other ports, is the provision of services to vessels at the port and their crews, ie drinking water, electricity connection, grocery store, etc. These services are currently partially substituted by a private operator, which is not standard for a public port, and this situation should be addressed.

This area also includes waste collection, which is only provided for Slovak vessels. Under current legislation foreign vessels may not dispose of waste generated during their operation.

Directive 2014/94/EU on the implementation of infrastructure for alternative fuels, regulates the use of alternative fuels in water transport, and requires Member States to ensure an adequate number of LNG filling stations at inland ports to allow the operation of inland water transport vessels using LNG in the core TEN-T by 31 December 2030. Supply points are planned at the Bratislava and Komárno public ports.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Modernise public ports in Slovakia and ensure regular maintenance (OPV3)

Other ports

The Komárno and Bratislava freight ports suffer from a lack of services, and the ownership situation and Komárno suffers from proximity to a residential zone (Komárno is considering relocating the port), and inclined or semi-inclined transhipment edges that require vessel mooring at a greater distance from the bank when the Danube is low.

The Štúrovo port currently only operates as a passenger port. The port's terminal building has not been completed and no tourist services are provided.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Modernise public ports in Slovakia and ensure regular maintenance (OPV3)
- Supplementation and ongoing maintenance of subsector databases (OPS4)

3.4.3 Other Water Transport Issues

Decrease in the total number of vessels and their unfavourable age classification

The analysis of the number of inland water transport vessels for the period 2004-2014 shows that the total number has declined continuously (by 34% in total, and most markedly for barges). The average age of tugboats is around 32-35 years and the average age of freight ships is 43-50 years. The age of propulsion units and auxiliary engines is similar - very few vessels will comply with emission limits under Slovak Government Regulation No. 370/2006 Coll.

Older vessels are also less reliable. The problem is insufficient funds allocated from the state budget for the renovation of vessels to ensure operability. All renovation costs must be borne by the vessel operator, so only a few operators renovate as it represents a significant financial investment. Operators may go bankrupt in the near future as it will no longer be possible to operate their vessels due to high environmental pollution (emissions, noise, etc) and non-compliance with the required technical standards laid down by European legislation (Directive 2006/87/EC and Directive 2008/68/EC – the ADN agreement). A solution could be the rebuilding of older single-hull tank vessels into double-hull vessels and a change of the main propulsion unit (taking into account ecological aspects, such as emissions, noise etc).

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Implement technical measures to improve the navigability on the ship route of the Danube waterway (OPV1)
- Setting the principles of sustainable transport sector funding (OPS1)
- Preparation and implementation of development projects, including related activities (OPS3)
- Regular monitoring of noise and air quality and implementation of measures reducing negative environmental transport impacts (OPS7)

Ensuring the full functionality of the implemented River Information Services (RIS)

The current main problem is the cross-border operation of RIS, particularly in terms of data exchange and service harmonisation in accordance with user requirements, and the full use of the benefits of RIS for the operation, transport management and logistic use of information. The main challenges in this area include the full integration of all transport modes along the TEN-T network and their informational interconnection, which will significantly utilise transport services with a positive impact on their efficient use and the environment.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Modernise public ports in Slovakia and ensure regular maintenance (OPV2)

Vocational training of water transport staff and shortage of skilled crew

There has long been a shortage of qualified water transport workers in Slovakia, as professionally-trained workers have left for the Rhine navigation area. The lowest qualification for a sailor under Slovak legislation requires at least one year's navigation experience on a vessel (ie 180 sailed days per calendar year) as an assistant sailor under the expert supervision of a crew member designated by the vessel's captain. Completed basic education and a minimum age of

16 is also required. In today's economic and operating conditions, it is difficult to provide the necessary practical experience without any advantage.

Vocational training in this area faces a problem of ensuring the professional competences of crew members for various functions on a vessel when acquiring theoretical knowledge. Graduates receive practical training on board the vessel during its operation. The acquisition of other professional competences of crew members is ensured by legislation and in practice.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Modernise public ports in Slovakia and ensure regular maintenance (OPV3)

3.5 Civil Aviation

3.5.1 Planning Problems

Poor quality and availability of data for civil aviation planning and development

In Slovakia, it is currently impossible to determine the potential of transported passengers living in the attraction area of international commercial public airports, wishing to travel via a specific international commercial public airport. This is because there is a lack of input data and surveys. It will be necessary to conduct a survey and collect such data in the SR.

Other reasons include:

- No information on the structure of passengers at individual airports for an evaluation of the competitive position of Slovak and EU airports
- No strategic development and marketing materials for individual airport companies
- Insufficient amount and quality of data on airport infrastructure maintenance (technical and operational)
- Many data inconsistencies from individual airport companies as regards recorded infrastructure, its technical condition and capacity limitations
- No forecasts of traffic volume development in terms of tourism

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Preparation and implementation of development projects, including related activities (OPS3)
- Supplementation and ongoing maintenance of subsector databases (OPS4)

3.5.2 Infrastructural problems

Airport capacity limitations

Letisko Košice – Airport Košice, a. s. airport company

- TWY: Given the various types of aircraft used, it is necessary to widen six TWYs to 23 metres with the related lateral spaces.
- Aprons and parking areas: development of air freight transport is limited by the absence of an apron for freight loading.
- Hangars: future development of air freight transport is limited by the absence of suitable hangars for aircraft and a freight terminal building that would enable the required quality dispatch of consignments.

Letisko Poprad – Tatry, a. s. airport company

- TWY A width: insufficient capacity. The width of TWY A is a capacity limitation and it needs to be widened to 23 m. The construction of a second TWY westwards from the current one to create separated aircraft parking should be considered and use of the shortened RWY during maintenance work on the eastern half of the RWY.
- Apron dimensions represent a partial capacity development limitation.
- Passenger vehicle parking: insufficient capacity - increase in parking capacity required.

Letisková spoločnosť Žilina, a. s. airport company

- The current RWY length, TWY width and the apron dimensions are a capacity limiting factor. Airport infrastructure parameters do not allow aircraft with a higher seat capacity or higher maximum take-off weight. Due to this capacity limitation, the airport can only be used for connecting lines to a transport hub. However, if the current function of the airport is maintained, RWY length, TWY width and the apron dimensions will not limit capacity.
- Passenger cars parking – parking areas and lay-bys: the number of parking places, around 20, is a limiting factor for airport operation.

Letisko Piešťany, a. s. and Letisko Sliač, a. s. airport companies

- A capacity analysis revealed that the capacity of the key infrastructure elements of these airport companies is currently sufficient and will represent a capacity limitation for future projected performance.
- A partially limiting factor for Sliač, a. s. airport company is the current parking area with a capacity of approximately 150 spaces.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Optimisation of the system of airports operated by airport companies to ensure functional and effective planning of civil aviation development (OPL1)
- Modernisation and construction of civil aviation infrastructure to ensure national and regional economic development and increase the quality of services provided as part of natural and special-purpose mobility (OPL2)

Unsuitable technical condition, functional and capacity limitations at TEN-T airports

In terms of the operational performance, the two major airports – Bratislava and Košice airport have recently made investments primarily from own funds. As regards the financing of development, small airports rely and will continue to rely on state subsidies.

In the past, all investment state subsidies for airports were provided to address unsuitable parameters and obsolete facilities at airports, and ensure further development of the airports.

Letisko M. R. Štefánika – Airport Bratislava, a. s.: Based on an assessment of the RWY surface using the surface condition index method, the surface is deteriorated. Both RWYs are still serviceable, but a closer inspection of their surface is essential. The degradation of the technical and operational condition, particularly of RWY 13/31, is continuing at a rate which will make it unsuitable or even unusable in the near future. The signalling equipment installed on RWY 13/31 in 1997 is at the end of its useful life. The biggest problems are maintaining the operability of the centreline lighting and touchdown system. Embedded lights on RWY 13/31 are in a poor technical condition due to operation and winter maintenance and must be replaced. Spare parts are no longer manufactured for constant current sources. To ensure full operation, all the components of RWY 13/31 must be modernised.

The lack of a comprehensive solution for defrosting aircraft is a major technical problem. Currently, all the required tasks related to this activity are performed at a temporary point by direct draining of fluid into a collecting tank, the technical condition and design of which is unsuitable for these activities. This situation must be addressed in the future.

Letisko Košice – Airport Košice, a. s.: as concerns technical and operational condition, the current hangar is a weak point of the airport infrastructure. Its technical condition is unsatisfactory for current operation. The hangar is also partially used to handle freight, although it is not technologically adapted to this activity.

Letisko Poprad – Tatry, a. s.: given the current very poor technical condition of RWY 09/27, its unsuitable parameters, the poor condition of its signalling equipment and the unsuitable technical condition of the TWY, comprehensive modernisation of the RWY and the adjacent movement areas is essential.

Transport connection of airports to the railway network

No airport has a direct rail connection other than Sliač airport, which has a seldom used rail connection to Vlkanová railway station.

Bratislava airport is well connected by public transport via two UPT lines. Passengers must use taxi or busses from Bratislava main train station. There is a regularly used rail connection to the airport for freight transport. A direct connection to the airport for rail passengers would be advantageous to the development of Bratislava airport. This connection has been proposed as part of the TEN-T 17 project, which would connect Vienna and Bratislava airports.

Košice airport is connected via a bus line to the city centre and the train and bus station. The connection of the airport by a railway under preparation as part of the integrated KORID transport project will facilitate further airport development. Standard trams and Regio trains (suburban units) are expected to operate on the rail line.

Related measures from Chapter 4 identified in order to address the above mentioned issues:

- Optimisation of the system of airports operated by airport companies to ensure functional and effective planning of civil aviation development (OPL1)
- Modernisation and construction of civil aviation infrastructure to ensure national and regional economic development and increase the quality of services provided as part of natural and special-purpose mobility (OPL2)
- Periodic preparation of transport infrastructure maintenance plans (OPS2)
- Regular safety audits and implementation of measures improving transport safety (OPS8)

Noise from air transport

Although aircraft have become 75% less noisy over the last 30 years, a high percentage of EU citizens are still exposed to high noise levels with significant negative health effects. To ensure the sustainability of civil aviation, measures targeting the noise impact are necessary at airports. In this context, noise-related measures constrain airport capacity at airports and the aviation system as a whole via knock-on effects. Accordingly, decisions on noise measures and the desired level of noise protection must ensure a proper balance with capacity implications.

Related measure from Chapter 4 identified in order to address the above mentioned issues:

- Regular monitoring of noise and air quality and implementation of measures reducing negative environmental transport impacts (OPS7)

4 Setting the Vision and Objectives of the Slovak Transport Sector

It is necessary to set harmonised development activities and systematically implement a comprehensive vision for a competitive and sustainable European transport system in the European Economic Area. This vision is defined by strategic EC documents, especially the White Paper that defines basic guidelines for determining national development strategies of the Member States.

The vision and objectives of the Slovak transport sector are in accordance with European and national legislative and development documents, which set global visions and objectives, and the requirements of the various transport sub-sectors identified in the analyses. As a result, the visions and objectives of the Slovak transport sector reflect EU requirements and national interests and challenges that the sector faces.

This approach ensures sufficient integration of the Slovak Republic into the European transport area and the gradual solving of internal problems and meeting of needs.

4.1 Vision for Transport Sector and its Background

The European Commission takes into account the diversity of transport issues in its vision for a competitive and sustainable transport system defined by the White Paper and focuses on three main transport modes:

- Medium-distance transport;
- Long-distance transport; and
- Urban transport.

Emphasis is placed on creating new efficient, safe and environmentally friendlier uses of transport, which would most effectively, and if required using a combination of several transport modes, transport more freight and passengers to their destinations. Individual transport is preferred for the final section of the journey, using IT for easier and more reliable transport. This can be achieved by better integration of modal networks. Airports, ports, railway and bus stations should be more connected and should become multimodal transport hubs for passengers. Online information systems and electronic booking and payment systems covering all transport modes should facilitate multimodal travel and freight transport. The relevant passenger rights should be determined for wider public transport use.

At the national level and in line with the above, the Transport Development Strategy of the Slovak Republic up to 2020 set a vision that focuses on:

- High-quality, accessible and integrated transport infrastructure which promotes social inclusion by linking less-developed regions with the superior infrastructure and ensures the international competitiveness of the Slovak Republic using its geographic potential as a transit country;
- Competitive transport services which promote economic growth, meet everyone’s needs – transport users and operators, optimal use of the transport networks, balanced development of various transport services using a logistic approach and accelerating the integration of various transport modes at the national and European level;
- User-friendly transport, which focuses on the user – passenger or carrier, and the carrier’s rights are protected before, during and after transport; and

- Environmentally friendly, energy-efficient and safe transport, which will have a minimal impact on environment and public health.

Given the current state of the Slovak transport sector, the above vision may be considered as required in the future. The purpose of this document and the follow-up activities is to extend and develop the above principles. However, the tools and possibilities leading to their fulfilment may vary due to the general state of development of the Slovak Republic, the current level of expert knowledge and new technical possibilities.

At the highest, strategic level, it is therefore necessary to define a vision for transport development in the Slovak Republic up to 2030, which reflects current and projected trends in the transport sector and the Slovak Republic as a whole, reflects the development, policies of the EU and addresses current and expected issues in the transport sector.

VISION FOR TRANSPORT SECTOR DEVELOPMENT UP TO 2030

A sustainable integrated multimodal transport system that meets society's economic, social and environmental needs and contributes to the full integration of the Slovak Republic into the European Economic Area.

4.2 Global Strategic Objectives and Their Basis

Global strategic objectives were set in line with the above vision for the Slovak transport sector. They reflect the trends and needs set down in the EU and national strategic and analytical documents. The basis for transport development in Slovakia from the EU perspective is given below:

- The achievement of sustainable mobility is a global objective. Delayed or limited introduction of new technologies could condemn the EU transport industry to irreversible decline. The EU transport sector faces growing competition from emerging global transport markets.
- The importance of quality, accessibility and reliability of transport services in the future has increased, inter alia, due to the aging population and the need to promote public transport. Sufficient frequency, comfort, easy access, reliability of services, and intermodal integration are the main attributes of service quality. The availability of information on time spent on road and rail is important for problem-free direct mobility for passengers and freight.
- Europe needs a network of corridors to transport large and consolidated volumes of freight and passengers with high efficiency and low emissions thanks to the extensive use of more efficient transport modes used in multimodal combinations and the use of advanced technologies and infrastructure to supply clean fuels.
- Despite EU enlargement, there are big gaps in transport infrastructure between the western and eastern parts of the EU, which will need to be addressed. Europe must also unite in the area of infrastructure.
- IT tools to facilitate administrative procedures, to facilitate monitoring and search for freight and to optimise travel plans and traffic flows should be introduced (such as ITS, SESAR, ERTMS, SafeSeaNet, RIS). Their deployment should be promoted by their use in the TEN-T infrastructure and by the gradual integration of modal systems.
- The core network must ensure efficient multimodal connection between EU capitals and other major cities, ports, airports and key land borders, and other main economic centres. It should focus on completing the missing links, especially on cross-border sections and on bottlenecks and bypasses, on the modernisation of the existing infrastructure, on the development of multimodal terminals at river ports and on urban logistic consolidation centres. For long-distance transport, better connections must be established between railways and airports.
- Congestion is a major problem, particularly as regards road transport, and this compromises accessibility. There is increased pressure on the public funding of infrastructure and it is necessary to take a new approach to funding and pricing.
- Urban transport needs a combined strategy involving land-use planning, pricing schemes, efficient services of public transport and infrastructure for non-motorised transport modes and charging/refilling of clean vehicles

to reduce congestion and emissions. Towns above a certain size should develop urban mobility plans integrating all these elements. Urban mobility plans should be fully aligned with integrated urban development plans. It will be necessary to establish an EU framework to ensure that road charge systems for the use of intercity and urban roads are interoperable.

- The creation of a single European transport area will facilitate passenger and freight transport, reduce costs and enhance the sustainability of European transport. The most obvious deficiencies are in the internal railway market, and a priority is the creation of a single European railway area. This includes the removal of technical, administrative and legal obstacles which impede entry to national railway markets. Road transport will be more efficient and competitive thanks to the deeper integration of the road freight transport market. It will also be necessary to create an appropriate framework for addressing European challenges as regards inland water transport. The market approach to ports needs to be improved.
- The opening of markets must be better adapted to the quality of jobs and working conditions as human resources are an essential component of any high-quality transport system. It is clear that a lack of skilled employees will be a serious problem for the transport sector in the future. It will be important to unite competitiveness and the social agenda, building on social dialogue to prevent social conflicts, which are known to have caused significant economic losses in several sectors, notably in aviation.
- The selection of projects eligible for EU funding must reflect this vision and focus on European added value. Co-funded projects should also reflect the need for infrastructure that minimises the impact on the environment, is resistant to the possible impact of climate change and improves safety and user security.
- Diversified sources of public and private funding are necessary. It will also be necessary to better coordinate the Cohesion Fund and Structural Funds with transport policy objectives and the Member States must ensure the availability of sufficient national funds when planning their budgets and sufficient capacity for project planning and implementation. Other funding sources to be considered include schemes for the internalisation of external costs and charged use of infrastructure, which could bring additional revenues.
- Application of the “user pays” and the “polluter pays” principles consistently and increased private sector involvement in eliminating non-compliance, including damaging subsidies, in profit-generation and funding of future transport investments.
- Transport security is an EU priority. The EU’s comprehensive approach to the creation of policies, legislation and to the monitoring of air and maritime transport should be further consolidated and strengthened through cooperation with major international partners. Regarding passenger safety, detection methods must be improved to ensure a high security level with minimal discomfort. A risk-based approach should be considered with respect to freight originating outside the EU. It is also necessary to find an appropriate European approach to land transport protection in the areas where EU intervention has added value.
- Establishing a framework for safe transport is essential for European citizens. A European strategy for civil aviation security will be prepared, including adaptation to new technologies and, of course, including international cooperation with major partners. Harmonisation of safety certifications and supervision is essential in the single European railway area. European agencies for the safety of air and railway transport play a vital role in these sectors.
- Although the number of fatal transport accidents in the EU has almost halved, initiatives must be developed (technology, law enforcement, education and especially focus on unprotected road users), which will be key to further significant fatality reductions.
- The extreme weather conditions of recent years make it clear it will be necessary to prepare sustainable mobility plans to ensure the mobility of passengers, goods and rescue forces during emergency events. These emergency events also demonstrated the need to improve the transport system’s resilience by developing scenarios and plans for extreme weather events.
- Under Slovakia’s obligations under international treaties on civil emergency planning, defined transport corridors must be passable for the military equipment of the Alliance forces, or new corridors must be built and diversified. The building of new civil infrastructure must take into account the specific requirements of military

equipment (eg higher roadway load, and bridge and underpass clearance) for transport infrastructure. This should be taken into account for all available types of transport infrastructure (waterways, rail, air, road).

- The EU has called for a drastic reduction in global greenhouse gas emissions to limit climate temperature increases to below 2°C. To achieve this objective, the EU must reduce emissions by 80-95% below the 1990 level, as part of reductions by developed countries as a group. The European Commission's analysis shows that while more significant reductions can be achieved in other economic sectors, greenhouse gas emissions must be reduced by at least 60% by 2050 compared to 1990 in the transport sector, which is a significant and growing source of greenhouse gases. By 2030, the objective in the transport sector will be to reduce greenhouse gas emissions by approximately 20% below the 2008 level. Due to the significant increase in transport emissions over the past two decades, this would still mean emissions were 8% higher than in 1990.
- If we maintain the status quo, the dependence of transport on oil will still be almost 90% and renewable energy sources would only slightly exceed the 10% target set for 2020. CO_2 emissions from transport would be a third higher in 2050 than in 1990. Congestion costs will increase by about 50% by 2050. The difference in accessibility between central and peripheral regions will increase. The social costs of accidents and noise would continue to grow.

Given the above consequences, the EU has set global targets, which have been transposed into European and national documents. These targets must be reflected in the priorities of Slovak transport development.

- By 2030, the EU-wide multimodal "core TEN-T" to be fully operational. By 2050, the network will be of high quality and will have high capacity and there will be a corresponding set of information services.
- Complete the European high-speed railway network by 2050. Triple the length of the existing high-speed railway networks by 2030 and maintain the density of the railway network in all Member States. Most medium-distance passenger transport should be railway transport by 2050.
- 30% of road freight transport over 300 km should be transferred to other modes of transport by 2030, ie railway or water transport; and this figure should be more than 50% by 2050. This should be facilitated by efficient and green freight corridors.
- By 2050, connect all airports on the core network to the rail network, preferably high-speed and ensure that all core seaports are connected to rail freight transport or inland waterways.
- Modernise Air Traffic Management Infrastructure (SESAR) in Europe by 2020 and complete the Single European Sky. Implement the relevant land and water transport management systems (ERTMS, ITS, SSN and LRIT, RIS). Deploy the European Global Navigation Satellite System (Galileo).
- By 2020, develop a framework for the information, management and payment system for European multimodal transport.
- Reduce the number of road fatalities to almost zero by 2050. In line with this objective, the EU is striving to halve the number of road accidents by 2020. Ensure the EU's leadership as regards safety and security of all transport modes.
- Halve the use of conventionally-fuelled cars in urban areas by 2030; completely replace them in cities by 2050; implement CO_2-free urban logistics in large cities.
- Increase the use of sustainable low-carbon aviation fuels to 40% by 2050.
- Apply the "user pays" and "polluter pays" principle consistently and increase private sector involvement in the elimination of non-compliance, including damaging subsidies, in profit-generation and funding of future transport investments.

The definition of global strategic objectives for transport development of the Slovak Republic up to 2030 takes into account all of the above facts and groups them into five integral and interrelated objectives fulfilling the above vision.

Strategic Global Objective 1 (SGC 1)

Providing equivalent access to settlements and industrial zones to support economic growth and social inclusion in all Slovak regions (national and European scale) via non-discriminatory access to transport infrastructure and services.

Strategic Global Objective 2 (SGC 2)

Sustainable development of the Slovak transport system focussing on the generation and effective use of funds in relation to the real needs of users.

Strategic Global Objective 3 (SGC 3)

Increase the competitiveness of passenger and freight transport (vs. road transport) by setting operational, organisational and infrastructural parameters leading to an efficient integrated multimodal transport system supporting the economic and social needs of the Slovak Republic. Increase the quality of transport planning in the Slovak Republic by the definition of the optimal target value of the modal split in the Slovak Republic and specification of steps and tools to achieve it.

Strategic Global Objective 4 (SGC 4)

Improved safety and security of transport, leading to sustainable safe mobility on safe infrastructure, introduction of new technologies/processes using preventive and control mechanisms.

Strategic Global Objective 5 (SGC 5)

Reduced negative environmental and negative socioeconomic transport impacts (including climate change) as a result of environmental monitoring, effective infrastructure planning/implementation and a reduced number of conventionally-fuelled vehicles, and use of alternative fuels.

The above strategic global objectives of the Slovak Republic will be fulfilled in close accordance with the ongoing initiatives defined by the White Paper and other strategic EU documents focused on global issues at the European level. They primarily include the following issues:

Effective and integrated mobility system

Single European Transport Area

Issues:

Road freight transport, genuine internal market for rail transport services, completion of the Single European Sky, airport capacity and quality, suitable framework for inland water transport, multimodal transport of goods: e-Freight, Energy Union (http://www.consilium.europa.eu/sk/policies/energy-union/).

Promoting high-quality jobs and good working conditions

Issues:

Social code for mobile workers in road transport, social agenda for maritime transport, socially responsible aviation sector, evaluation of the EU approach to jobs and working conditions in all transport modes.

Protection of transport from acts of unlawful interference

Issues:

Freight protection, high level of passenger security, security of land transport, full security.

Work on transport safety

Issues:

Towards Vision Zero in road safety, European strategy for civil aviation security, safer water transport, rail transport safety, transport of dangerous goods.

Quality and reliability of services

Passenger rights, easy direct mobility, sustainable mobility plans.

MODERN INFRASTRUCTURE AND SOUND FUNDING

Transport infrastructure: territorial cohesion and economic growth

Issues:

Core network of strategic European infrastructure – European mobility network, multimodal freight corridors for sustainable transport networks, criteria for ex-ante evaluation of projects.

Coherent funding framework

Issues:

New framework for funding of transport infrastructure, private sector involvement.

Correct pricing and prevention of irregularities

Issues:

Sound pricing and taxation.

INNOVATION FOR THE FUTURE: TECHNOLOGY AND ACCESS

European research and innovation policy for transport

Issues:

Technological plan, innovation and implementing strategy, regulatory framework for innovative transport.

Support for sustainable behaviour

Issues:

Traffic information, labelling of vehicles according to CO_2 emissions and fuel efficiency, carbon footprint calculators, ecological driving and speed limits.

Integrated urban mobility

Issues:

Urban mobility plans, the EU framework for charging for urban roads, strategy for “urban logistics with near-zero emissions” by 2030.

4.3 Specific Transport Sector Objectives and their Background

Specific objectives will facilitate the fulfilment of global strategic objectives. Unlike global strategic objectives, they do not only reflect global European trends and needs, but also specific national needs resulting from international commitments and agreements and current transport problems.

To set a coherent overall transport development strategy, and not just as a set of individual transport modes, specific objectives are defined in two complementary categories:

- Horizontal specific objectives; and
- Modal specific objectives.

Horizontal specific objectives determine the direction in the selected areas of all transport modes and will comprehensively influence the future development of the transport system. These are cross-cutting objectives that must be met irrespective of the transport mode using different types of systemic or mode-specific measures.

Mode-specific objectives reflect the particularities of individual transport modes, which cannot be covered by horizontal objectives. They are objectives to be met by modal measures and their combinations.

4.3.1 Horizontal Specific Objectives

Horizontal specific objectives of the transport sector of the Slovak Republic up to 2030 in line with the above characteristics are defined below.

ŠHC1: ENSURE PREPARATION AND CONDITIONS FOR SYSTEMATIC AND CONCEPTUAL TRANSPORT DEVELOPMENT IN SLOVAKIA

Ensuring preparation and conditions for systematic and conceptual transport development in Slovakia is an important cross-cutting objective aimed at effective planning and preparation of development activities.

The objective will be fulfilled by implementing measures focused on the methodological incorporation of development documents, pre-investment preparation, funding, changes in transport organisation, including associated amendments of legislation, education in professions, etc.

To efficiently meet this specific objective, a database supporting various decision-making processes must be created.

ŠHC2: IMPROVE THE SAFETY, EFFICIENCY AND SUSTAINABILITY OF TRANSPORT OPERATIONS BY ENHANCING NEW TECHNOLOGIES

Improving the safety, efficiency and sustainability of transport operations is a primary objective and shall be achieved i.a. by introduction of new technology. Solutions include information systems, management systems, support for the development of and preference for integrated transport systems, security systems, etc.

An important aspect of achieving this objective must be coherence in the implementation of new technology across transport modes. It will indirectly stimulate the competitiveness of transport modes and create the potential for changing the modal split.

ŠHC3: SYSTEMATICALLY REDUCE NEGATIVE SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS BY TRANSPORT

Reducing socio-economic and environmental transport impacts is an important objective focused on:

- Reducing greenhouse gas emissions;
- Minimising the number of inhabitants affected by transport noise, vibrations, accidents and other health determinants;
- Decreasing the energy consumption;
- Scope of landtakes;
- Nature and landscape;
- Water structures;
- Risks associated with climate change; and

- Minimising waste production and ensuring environmentally-friendly waste management.

Primary reference shall be legislation on protected areas and EU environmental aquis.

ŠHC4: SYSTEMATICALLY INCREASE SAFETY PARAMETERS AND PROTECTION OF POINT AND LINE ELEMENTS OF THE TRANSPORT SYSTEM

In addition to increasing safety by introducing new technologies, basic parameters of the transport infrastructure must be focussed on. For example, reducing the number of black spots, and prevention by modifying unsuitable design parameters of roads, waterways, etc identified by safety audits. In the multimodal context, this objective will be fulfilled by focusing on infrastructural modifications of railway crossings and critical infrastructure in terms of safety. To meet the objective, security must also be considered, particularly as regards civil aviation.

4.3.2 Modal Specific Objectives

Modal specific objectives are defined for each transport mode and, with the horizontal objectives, they allow the definition of measures leading to their fulfilment and the implementation of this strategic document.

Road Transport

ŠC1: ENSURE THE ACCESSIBILITY OF ALL SLOVAK REGIONS USING EFFECTIVE AND SUSTAINABLE INFRASTRUCTURE

Ensuring national and international accessibility of Slovak regions is a fundamental multi-modal objective of the strategy. For most of the country, this is guaranteed by road, which also serves for the public transport. In the areas where is an adequate and potential provision of the rail based public transport, the optimal combination of measures will be identified through multi/inter-modal assessment. This will include not only infrastructure solutions, but also interventions on policies, parking, ITS etc. The measures that will lead to its achievement must involve increasing the accessibility of backbone infrastructure and increased accessibility of settlements and industrial zones with insufficient infrastructure. Each measure must be sustainable in respect of future maintenance and economic efficiency associated with traffic demand, which is represented by the corresponding choice of design parameters for infrastructure.

Rail Transport

ŠŽ1: STRENGTHEN THE ROLE OF RAIL AS THE BACKBONE TRANSPORT MODE OF THE PUBLIC TRANSPORT SYSTEM WHERE JUSTIFIED

An effective and efficient rail based public transport has a potential to be a modern, safe and environmentally-friendly transport mode, which should be supported as the backbone part of the PPT transport system at the international (cross-border), inter-regional and suburban scale. Rail is generally an appropriate solution when there is a sufficient demand to justify the cost and environmental impact (both for construction and operations).
Where traffic volumes are lower, other rail-based solutions may be the most effective (eg tramways) or trolleybus and bus solutions (supported by BRT (bus rapid transit) and/or preferably powered by alternative fuels).

ŠŽ2: INCREASE RAIL FREIGHT TRANSPORT'S SHARE OF TOTAL TRANSPORT PERFORMANCE

Rail freight transport's share of total transport performance is very low. Rail has the potential to increase this share and contribute to a reduction of the environmental burden and increased operational safety. There is development potential mainly in combined transport and compact freight trains over longer distances. This objective will be achieved by ensuring interoperability on TEN-T lines, ensuring sufficient capacity for the development of rail freight transport,

setting a sustainable strategy for transport charges, improving conditions for combined transport, support for the development of loading areas and increasing efficiency of freight transport operations.

ŠŽ3: ENHANCE THE QUALITY AND ENVIRONMENTAL IMPACTS OF RAILWAY OPERATIONS

Enhancement of the quality and environmental impacts for passenger and freight transport will be required to strengthen the role of railway as backbone PPT and increase freight transport performance. The objective in freight transport is the interoperability, efficiency and environmental friendliness of driving vehicles. The emphasis in passenger transport is a sufficient number (and capacity) of modern and comfortable vehicles in the PPT system. An equally important objective on non-electrified lines, especially in urban and suburban areas, is to increase the number of environmentally-friendly vehicles by promoting alternative fuels.

This objective is achieved by ensuring the necessary legislative adjustments for long-term non-discriminatory support for purchasing and modernising rolling stock, complying with quality standards for passenger trains, funding the acquisition and operation of vehicles for PPT, maintaining PPT vehicles and their facilities and modernising rolling stock to reduce the environmental burden.

Public Passenger and Non-Motorised Transport

ŠVO1: ENSURE THAT PUBLIC AND NON-MOTORISED TRANSPORT IS AN ATTRACTIVE SOCIAL BENEFIT AND THE NATURAL CHOICE IN URBAN AGGLOMERATIONS

Public transport is offered mostly as a public service. However, different social standards and transport service standards are applied at the national level and the system would not be able to accommodate an increase in demand for transport around larger towns and improve their accessibility and the environment. The National Transport Authority will need to unify social, transport and tariff standards as a mandatory minimum offer across Slovakia, and prioritise the use of railways with connecting and individual bus service at the minimum social standard. In areas with increased demand, urban and regional transport services must be interconnected and integrated suburban and urban transport created, which will be offered to passengers appropriately and its increasing use monitored.

ŠVO2: RE-ORGANISE PUBLIC TRANSPORT INSTITUTIONAL SET-UP

The playing field of purchasers of public transport services in Slovakia is fragmented and this usually results in insufficient coordination between rail, regional bus and urban public transport. Unnecessary and inefficient competition between public transport modes should be avoided. To cover all types of public transport, it will be necessary to consider a national transport authority with competence to purchase rail transport, single nationwide rail tariff and to purchase connecting and individual bus transport in the extent of the minimum standards in coordination with urban and regional purchasers. It will be necessary to define nationwide standards and legal regulations and ensure nationwide connectivity and compatibility of integrated transport systems. Activities of suburban and urban transport purchasers at the level of self-governing region and/towns and cities will be required. The formal structure will be left to the discretion of towns and regions, but municipal and regional authorities will need to assume full responsibility for purchasing urban and suburban traffic, and its integration and coordination with nationally traffic, with methodological support of the National Transport Authority.

ŠVO3: TERRITORIALLY AND TECHNICALLY INTEGRATE PUBLIC TRANSPORT IN URBAN AGGLOMERATIONS AND THEIR SURROUNDINGS AND AT THE NATIONAL LEVEL

Due to fragmented competencies and a failure to fully take into account passenger needs, public service is not always offered in the appropriate extent, suburban transport timetables are often confusing and services are not always sufficiently coordinated. New transport services are not sufficiently marketed to customers. Suburban integrated transport systems must be created at the local level with strong involvement from town mayors, municipalities and municipal administrations and in cooperation with regional transport departments. Integrated transport systems must

be adapted to local needs so funds for the compensation of losses are used with maximum effectiveness and there is maximum use of services offered beyond the minimum standards. The National Transport Authority will integrate rail transport with connecting bus transport and main bus lines, particularly in rural regions. The connection of the lines to water transport could be considered in the future. The National Transport Authority will closely cooperate with self-governing regions on coordination and will be a partner of suburban integrated systems during the preparation of suburban and urban integration. The interface between nationally-integrated transport and suburban systems will be a matter of agreement and the national authority will have to adapt to the needs of towns and regions.

ŠVO4: Ensure better conditions for cyclists and pedestrians at local and regional levels

As the construction of transport infrastructure in Slovakia has long been focused on the construction of urban roads, expressways, motorways and town bypasses for fast car transport with large capacity demands, safe cycling is practically impossible and the conditions for walking have worsened in Slovak towns. Cycling infrastructure is very limited, new walkways have only been built for access to new houses or commercial zones and not at the town level, pavements by roads have barriers and crossings and are often dangerous due to increased vehicle traffic intensity. A series of measures must be adopted, including a change in approach to spatial planning towards priority for non-motorised modes and modification of existing spaces wherever space for vehicular traffic is not fully used, or used contrary to basic urban functions. Pavements must be cleared of parked cars, new spatially-integrated infrastructure for pedestrians and cyclists must be designed, funded and implemented where necessary.

Water Transport

ŠV1: Improve navigability conditions of the Danube if and where proven to be justified and feasible

The Danube is a waterway of international importance according to the international classification of inland waterways. The objective in this context is focused on improving navigability and this will have a significant impact on more extensive and efficient use of the existing Danube ports in Slovakia. It will also greatly enhance the role of waterways for freight transport for distances over 300 km as an important transport mode in the multimodal transport system. While waterway transport has the potential to bring about modal shift and can contribute to reducing emissions, noise etc. the rules related to Water Framework Directive, protection of sensitive protected areas and Natura 2000 sites have to be adhered to.

ŠV2: Improvement of the Slovak public ports system

The objective is to ensure technical and operational condition of public ports and related infrastructure for the identified demand needs. Improving the technical and operational condition of public ports system will minimise negative impact of water transport on environment and public health by contributing to modal shift (primarily in cargo transport), any infrastructural measures need to be in line with environmental legislation on the national and EU level.

ŠV3: Determine justifiability and conditions for the development, modernisation and reconstruction of other monitored waterways

Proper determination of such a justifiability and conditions will contribute in future to reducing road congestion, improved safety of road freight transport, achievement of greater energy efficiency and environmental protection.

4.4 Relations between Global Strategic and Specific Objectives

The relations representing the fulfilment of the vision for the transport sector of the Slovak Republic up to 2030 are shown in the table below.

Tab. č.1 Relations between global strategic and specific objectives

Strategic global objectives		Specific objectives	
SGC		ŠC	Name
SGC1	Providing equivalent access to settlements in support of economic growth and social inclusion in all Slovak regions (national and European scale) via non-discriminatory access to transport infrastructure and services.	**ŠC1**	Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure
		ŠŽ1	Strengthen the role of rail as the backbone transport mode of the public transport system where justified
		ŠV1	Improve navigability conditions of the Danube if and where proven to be justified and feasible
		ŠV2	Improvement of the Slovak public ports system
		ŠV3	Determine justifiability and conditions for the development, modernisation and reconstruction of other monitored waterways
		ŠVO3	Territorially and technically integrate public transport in urban agglomerations and their surroundings and at the national level
SGC2	Sustainable development of the transport system in the Slovak Republic with an emphasis on the generation and effective use of funds in relation to the real needs of users.	**ŠŽ1**	Strengthen the role of rail as the backbone transport mode of the public transport system where justified
		ŠŽ3	Enhance the quality and environmental impacts of railway operations
		ŠV1	Improve navigability conditions of the Danube if and where proven to be justified and feasible
		ŠV2	Improvement of the Slovak ports system
		ŠHC1	Ensure preparation and conditions for systematic and conceptual transport development in Slovakia
		ŠVO2	Re-organise public transport institutional set-up
SGC3	Increase competitiveness of transport modes as regards passenger and freight transport (vs. road transport) by setting operational, organisational and infrastructural parameters leading to efficient integrated multimodal transport system supporting the economic and social needs of the Slovak Republic.	**ŠŽ1**	Strengthen the role of rail as the backbone transport mode of the public transport system where justified
		ŠŽ2	Increase rail freight's transport share of total transport performance
		ŠVO4	Ensure better conditions for cyclists and pedestrians at local and regional levels
		ŠV2	Improvement of the Slovak public ports system
		ŠV3	Determine justifiability and conditions for the development, modernisation and reconstruction of other monitored waterways
		ŠVO1	Ensure that public and non-motorised transport is an attractive social benefit and a natural choice in urban agglomerations
SGC4	Improved safety and security of transport, leading to sustainable	**ŠV1**	Improve navigability conditions of the Danube if and where proven to be justified and feasible

Strategic global objectives		Specific objectives	
SGC		ŠC	Name
	safe mobility on safe infrastructure, introduction of new technologies/processes using preventive and control mechanisms.	**ŠHC2**	Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies
		ŠHC4	Systematically increase safety parameters and protection of point and line elements of the transport system
SGC5	Reduced negative environmental and negative socioeconomic impacts of transport (including climate change) as a result of environmental monitoring, effective infrastructure planning/implementation and a reduced number of conventionally-fuelled vehicles, or use of alternative fuels.	**ŠVO4**	Ensure better conditions for cyclists and pedestrians at local and regional levels
		ŠHC3	Systematically reduce negative socio-economic and environmental impacts by transport

5 Definition of Sectoral Strategy Measures

The measures to implement the strategy were defined based on global trends, international agreements and commitments of Slovakia and problems identified in the analytical part of the preparation of the strategy whose outputs are summarised in Chapter 3.

Each measure is a set of activities, initiatives or projects integrated based on the substance of the objective to be met or the problem to be addressed. In line with other parts of this strategic document, the measures are divided into infrastructure, organisation and operation and individual transport modes. A separate group are systemic measures whose definitions apply to the transport sector as a whole. Such an approach will facilitate the preparation and implementation of the strategic implementation plan.

The set of measures is a tool to attain the global strategic objectives, specific objectives and the vision for the transport sector development up to 2030.

5.1 Systemic Measures

The category of systemic measures is a group whose measures are related to the transport sector as a whole, regardless of the individual transport modes. Definitions of individual measures are based on the identification of recurring issues in individual sub-sectors.

OPS1: Setting the principles of sustainable transport sector funding

One of the major problems of the Slovak transport sector is insufficient funds, so it will be necessary to prepare a specific plan on how to obtain and use them effectively.

This plan must reflect the needs of the transport sector as a whole and consistently address financial planning for all transport modes, including the settlement of their internal debt. To improve the assessment of the impact of the transport policy and the making of strategic decisions, which must be evidence-based, systemic conditions must also be created to strengthen analytical capacities and the performance of necessary activities by systemising the internal capacities of the relevant MTCRD SR expert units implementing this measure.

With respect to objectives:

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

OPS2: Periodic preparation of transport infrastructure maintenance plans

The measure is designed to ensure implementation of multiannual plans for maintenance of transport infrastructure at regular intervals. This measure will ensure a conceptual approach to maintenance, which will support effective management of funds, including the paying down of the internal debt of each transport infrastructure mode.

With respect to objectives:

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

OPS3: Preparation and implementation of development projects, including related activities

The investment planning process is based on European and national binding conventions, which include the most important investment activities. The measure is designed to ensure the processes of transport infrastructure development in the necessary scope and depth. This measure will introduce a conceptual approach to transport infrastructure development, which will support effective planning and management of funds.

Actions co-funded from European funds structured according to the EC's priorities make up the largest volume of medium-term projects. It is therefore necessary to set procedural and methodological processes for implementing individual parts of the pre-project preparation, which will be linked to the implementation parts. It will also be necessary to increase the exchange of information between state administration authorities, or investors as constructors of infrastructure projects, and local authorities to eliminate or reduce the negative impact of such structures on public health during their preparation, construction, operation, and modernisation. The actions taken by investors as constructors of infrastructure projects must also be coordinated when planning and implementing transport infrastructure projects to minimise the risk of negative cumulative environmental and public health impacts, especially near protected areas.

With respect to objectives:

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

OPS4: Supplementation and ongoing maintenance of subsector databases

Input data to facilitate detailed transport sector development planning is lacking and this measure is intended to supplement the data or set processes that will ensure the data is available. Plans for continuous data updates must be an important part of the implementation of this measure.

The implementation of this measure will, in addition to the continuous supplementation and maintenance of the database necessary for effective development planning of the transport sector, also contribute to ensuring the necessary data for updating and ensuring the functioning of the transport model of the Slovak Republic is available. Special attention must be paid to data availability for professional associations, academia, research organisations, etc. Under this measure, legislative obstacles must be removed to ensure that transport data is provided to the educated public.

With respect to objectives:

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

OPS5: Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic

Improved functionalities of the multimodal transport model is key to set the processes of effective transport planning and transport infrastructure development in the Slovak Republic. Equally important is its continuous updating based on available data. This process is directly linked to the fulfilment of the systemic measure OPS3 - Supplementation and ongoing maintenance of subsector databases.

With respect to objectives:

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

OPS6: Regular updates of strategic and development documents

Important strategic and development documents must be regularly updated. This is the only way of ensuring the continuity of the planning process, which will be able to respond to the current development in environmental conditions directly affecting the Slovak transport system.

With respect to objectives:

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

OPS7: Regular monitoring of noise and air quality and implementation of measures reducing negative environmental transport impacts

As transport is one of the leading air polluters and noise producers, these negative impacts should be monitored regularly to allow planning of preventive and corrective measures. Continuous monitoring of the relevant indicators in the field and preparation of the related analyses is important for the creation of conceptual, regulatory, organisational and infrastructural measures; their implementation will reduce negative environmental impacts of transport.

When preparing strategic noise maps and actions plans, the multimodal transport model and model intensities for the current transport network development scenario up to 2030 should be used. This will enable prospective transport intensities to be taken into account and the preparation of long-term measures to reduce the current and anticipated noise levels to which the population is exposed.

Transport emissions should be monitored (focusing on particulate matter PM_{25} and benzo(a)pyrene) in regions with the highest occurrence of potential deterioration of the emission situation compared with the concept's zero variant, ie Bratislava and Žilina regions. In these regions, regular traffic counts should be performed on backbone roads (eg by an adequate location of automatic traffic counters) to update traffic models and the transport emission evaluation of regions. If an upward trend of transport emissions is identified in the above-stated regions compared with other Slovak regions, the transport strategies of these regions must be updated to reduce the health risks associated with above-limit pollutant concentrations.

Legislation to reduce negative environmental transport impacts promoting the purchase of new vehicles by motivating citizens using direct financial support from the state or tax instruments, and by exempting alternative fuel vehicles from toll payments. The reduction of motor vehicle tax will be subject to an inter-ministerial discussion between the Ministry of Transport, Construction and Regional Development of the SR and the Ministry of Finance of the SR to motivate road freight carriers to buy new environmentally-friendly vehicles (to reduce road transport emissions and noise). Improved functionality and stricter conditions as regards regular technical checks of vehicles (eg completeness of exhaust systems) can also be a suitable instrument. Information activities to support car sharing and eco-driving, and the introduction of low-emission zones in large towns will also further reduce negative transport impacts.

This is also associated with changes to parking rules in cities and municipalities to support the use of alternative fuel vehicles with a lower production of greenhouse gases and regulate the use of other vehicles.

Rail electrification in accordance with feasibility studies and/or promotion of low-carbon fuels in aviation can also contribute to improving air quality.

Support for the use of alternative fuels is related to objectives and policies for reducing the environmental impact of transport, specifically the objectives related to emission reductions. In Slovakia, support should be given to the construction of charging and filling stations for alternative fuels in the transport infrastructure network, or applications of different preferential treatment of the acquisition and operation of transport means that use alternative fuels. Promotion of the use of more environmentally-friendly ships via a financing scheme for reconstruction and installation of new engines using alternative fuels on ships will reduce the environmental impact of water transport.

The activities carried out under this measure will reduce the negative environmental impacts of transport and focus on other health factors, nature and land, water bodies and climate change risks.

The following supporting documents must be prepared for the next update of this document:

- Studies of migration routes of large carnivores for the entire Slovakia. The study results must be respected when planning the route of structures and measures to mitigate negative impacts.
- Studies of necessity and suitability of making waterways navigable. In addition to an analysis of water transport demand and the available capacity of parallel transport modes, especially rail, and an economic analysis of financial investments and benefits, the study must include an analysis of provided ecosystem services, the value of which will be reduced by the construction of waterways.

With respect to objectives:

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠVO1: Ensure that public and non-motorised transport is an attractive social benefit and becomes the natural choice in urban agglomerations

OPS8: Regular safety audits and implementation of measures improving transport safety

In addition to safety audits and statutory inspections in the phases of planning, construction and putting into operation of new/modernised infrastructure, regular safety audits must be undertaken of transport infrastructure. Audit outcomes are key inputs for the design of measures to enhance safety and prevent accidents.

Systematic and effective spending to minimise the health and material consequences of accidents should be supported by education in addition to the above construction or technological measures. Road safety and the safety of vulnerable road users can be improved by an appropriate organisation of transport for children to educational institutions and improvements to transport organisation eg to sport centres, including access for persons with reduced mobility. In addition to safe operation, it is necessary to ensure the security of critical infrastructure, eg airports.

With respect to objectives:

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and the security of point and line elements of the transport system

5.2 Infrastructure Measures

5.2.1 Road Transport

OPC3: Modernisation of service stations (see development concepts for service stations)

Given increasing traffic and the growing share of freight transport, the number of rest areas must be increased and service stations modernised on older sections of motorways. The basic requirements for the location and equipment of service stations are stated in the Concept for Location and Equipment of Service Stations on Motorways and Expressways in the Slovak Republic. In accordance with the implementation of Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure and the National Policy on the Deployment of Alternative Fuels Infrastructure in the Slovak Republic, conditions for the construction of recharging and refuelling points with alternative fuels (eg CNG, LNG) at service stations must be created for alternative fuel vehicles. Given the significant share of 1st class roads as regards road transport, it is necessary to address the issue of building service stations on 1st class roads, especially where there is no plan to build a motorway or an expressway, and as for motorways and expressways, search for suitable models for the construction of recharging and refuelling points with alternative fuels.

With respect to objectives:

ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

OPC4: Conceptual development of ITS

To obtain high-quality traffic data, efficiently plan road networks and manage and control traffic, motorways, expressways and 1st class roads must be equipped with ITS devices, including weather stations, changeable traffic signs, automatic traffic counters, equipment for directional survey of transport, systems for line traffic management, systems for dynamic weighing, etc.

As ITS devices will collect large amounts of data, they will need to be integrated and processed within the NDIC/NSTI for further use. However, the implementation of this measure must be preceded by preparing a single ITS development concept to evaluate the necessity and effectiveness of the deployment of different technologies on specific routes and sections. The fast-paced nature of this measure will require a justified and flexible approach which would be put together in an ITS deployment strategy. This should ensure that the systems are upgradeable and compatible.

With respect to objectives:

ŠC1: Ensure the accessibility of Slovak regions using effective and sustainable infrastructure

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

OPC5: Completion of the west-east priority axis (Rhine-Danube Corridor, Czech and Slovak branch)

The core multimodal TEN-T Rhine – Danube corridor included the R6 expressway connected to the Czech Republic, which will improve accessibility between the north-western region and other parts of the Slovak Republic and the Czech Republic. This section connects to the D1 motorway, which is the most important west-east motorway connection across Slovakia and part of the road network backbone. After completion, it will connect 6 regional capitals and 8 of the ten largest towns in Slovakia and their adjacent regions. It significantly contributes to improving accessibility of these towns and a connection with Ukraine and it will provide the necessary capacity in these transport directions. Motorway and expressway sections are supplemented with 1st class roads (I/18, I/19, I/20, I/49 and I/61) on this route. Their sections currently substitute the capacity connection to the TEN-T.

With respect to objectives:

ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

OPC6: Completion of the north-south connection with Poland and the Czech Republic

The Slovak Republic is a major transit country for north-south road transport. In the west, there is the busy multimodal Baltic-Adriatic TEN-T corridor, which includes the D1 and D3 motorways. However, the current technical road network parameters are insufficient in terms of capacity and safety. A rapid completion of the D3 motorway is required along with the connecting R5 expressway (part of the TEN-T comprehensive network), which will significantly improve the accessibility of Slovakia, the industrial region of Žilina and the economically-important Ostrava and Upper Silesia. The

Slovak Republic has undertaken to complete this connection in international treaties with Poland and the Czech Republic. The north-south route is currently covered by 1st class roads I/11, I/12, I/60 and I/61. Until the completion of this corridor, alternative medium-term solutions need to be properly considered and implemented on the existing 1st class road.

With respect to objectives:

ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

OPC7: Completion of the north-south connection in eastern Slovakia

Given the significant volume of freight transit between Poland and Hungary across this region and the current 1st class road connection which is unsatisfactory in terms of capacity and safety, it is necessary to address this connection by completing the R4 expressway or modernising the capacity-sufficient sections of the I/21 1st class road, which will serve international transit traffic in that direction and improve the connections between Košice and Prešov, and Miskolc, Budapest and Rzeszów. This route is a part of the comprehensive TEN-T.

With respect to objectives:

ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

OPC8: Completion of the west-east road axis in central Slovakia

The construction of the R2 expressway as a part of the comprehensive TEN-T will contribute to improving the connections between Trenčín, Zvolen/Banská Bystrica and Košice and with remote areas negatively affected by structural economic changes and high unemployment. The construction of this road axis will provide the necessary capacity and safety levels, which are currently considered very unsatisfactory on some sections of the I/9 and I/16 1st class roads.

With respect to objectives:

ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

OPC9: Completion of the north-south road axis in central Slovakia

It is important to improve the connection of towns in central Slovakia (Banská Bystrica, Zvolen) with northern Slovakia (Žilina, Martin, Ružomberok) via a high-capacity road on which the traffic will not be significantly affected by weather, as is the case now in winter at the currently-used mountain passes. A high-capacity road connection for transit traffic between Poland and Hungary is required to improve the connection between central and northern Slovakia and

important economic centres in neighbouring countries. The connection is part of the core and comprehensive TEN-T and will contribute to the meeting of international commitments (eg R1 and R3 expressways). The expressways are supplemented with 1st class roads (I/14, I/59, I/65, I/66, I/70 and I/78) in some sections of the route. The priority submeasure is to conduct a comprehensive comparative assessment of possible potential alternatives in order to define the most cost-effective and environmentally friendly solution to achieve the proposed measure.

With respect to objectives:

ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

OPC10: Road network development in the Bratislava agglomeration

The existing higher-category road network consists of the D1, D2, D4, I/2, I/61 and I/63 sections. The capacity of the current road network in the Bratislava region has long been exceeded and is unsatisfactory in terms of safety, comfort and increasing traffic intensity. This problem will be solved by building the outer Bratislava bypass (D4 motorway, a part of the comprehensive TEN-T), by increasing the accessibility to the capital by means of an optimal and sustainable combination of capacity increase in the road network (e.g. by building the missing sections of the connecting roads) and traffic management solutions (ITS, public transport, Park & Ride, parking policy etc.). The optimal combination will be identified through a multimodal assessment to be carried out by means of a regional / wider metropolitan transport masterplan.

With respect to objectives:

ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

OPC11: 1st and 2nd class road network development

To reduce travel time between towns and regions, bypasses and relocations of 1st class roads need to be built, especially on sections with unsatisfactory technical and capacity parameters and where TEN-T routing is not envisaged (eg 1st class roads I/51, I/64, I/66, I/68, I/74, I/75, I/76, I/79). Specific priority 1st and 2nd class road sections will be defined based on a feasibility study. Given the issues identified with respect to the congested 1st and 2nd class roads, the MTCRD SR must create legislative space under Act No. 56/2012 Coll. on Road Transport for the checking transport permits of all carriers in the Slovak Republic in cooperation with the Ministry of Finance of the SR to prevent the breach of road transport agreements by carriers.

With respect to objectives:

ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

OPC12: Modernisation and development of the other motorway and expressway network if justified

In addition to the sections defined in the measures relating to priority road routes, other motorways and expressway sections need modernising to achieve the desired parameters of accessibility and comply with transport quality standards on the road network. This includes, the development of the R7 and R8 expressways outside TEN-T, and modernisation of the D2 motorway and R1 expressway. The promotion of city and municipality bypass construction to improve traffic flow and reduce fuel consumption must also be a priority.

The construction and modernisation of motorway and expressway sections in the regions with no such infrastructure will significantly improve transport accessibility and change transport relations, however any intervention needs to be justified by dedicated studies in combination with outcomes of local and/or regional Master Plans.

With respect to objectives:

ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and security of point and line elements of the transport system

5.2.2 Rail Transport

OPŽ1: Completion of the modernisation of the main TEN-T lines in a high degree of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – AT state border

Modernisation of interstation sections and stations, speed increase, preparation for transition to AC power supply system. Changes in timetables due to the reduction of travel time.

The above-stated lines form an integral part of today's backbone of the Slovak railway system. They are included in the core TEN-T and RFC and they have high transport potential as regards passenger and freight transport.

With respect to objectives:

ŠŽ1: Strengthen the role of rail as the backbone transport mode of the public transport system where justified

ŠŽ2: Increase rail freight transport's share of total transport performance

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and the protection of point and line elements of the transport system

OPŽ4: Modernisation of the Žilina - Košice - Čierna nad Tisou backbone line

Modernisation of interstation sections and stations, relocations of selected sections, speed increase, preparation for the transition to the AC power supply system.

Changes in timetables, increase in the number of connections.

Slovakia's east-west backbone line. It is part of the core TEN-T network and RFC9 and the busiest line in terms of freight transport with growth potential. It is the only rapid east-west connecting passenger railway line. Modernisation under the approved feasibility study will ensure interoperability and reduce travel time.

With respect to objectives:

ŠŽ1: Strengthen the role of rail as the backbone transport mode of the public transport system where justified

ŠŽ2: Increase rail freight's share of total transport performance

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

OPŽ5: Modernisation of the Kúty state border - Bratislava - Štúrovo/Komárno state border corridor

Modernisation of interstation sections and stations, speed increase .

Changes in timetables, increase in the number of connections.

The backbone line of south-western Slovakia, is important for international passenger transport, suburban transport around Bratislava and international freight transport. It is a part of TEN-T and RFC7. Modernisation under the approved feasibility study will ensure interoperability and reduce travel time.

With respect to objectives:

ŠŽ1: Strengthen the role of rail as the backbone transport mode of the public transport system where justified

ŠŽ2: Increase rail freight transport's share of total transport performance

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

OPŽ7: Modernisation and upgrade of the wider Bratislava hub including relevant affected lines as resulting from the Bratislava Railway Node Feasibility Study (OPŽ7)

The functionality of the rail node of Bratislava including stations is of key importance due to its strategic location on the main rail corridors and its potential to contribute to the sustainable long distance and regional transport. The current infrastructure status, limited functionality and operations are not sufficient to meet the future transport needs.

All this will be tackled and analysed in details in the currently ongoing Bratislava Railway Node Feasibility Study. Based on the results of the Feasibility Study the measures will be adjusted and possible projects will be included to the implementation plan.

With respect to objectives:

ŠŽ1: Strengthen the role of rail as the backbone transport mode of the public transport system where justified

ŠŽ2: Increase rail freight's share of total transport performance

ŠŽ3: Enhance the quality and environmental impacts of railway operations

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

OPŽ8: Modernisation and upgrade of the TEN-T line: Púchov - Horní Lideč

Modernisation (lengthening) of stations, ensuring interoperability, preparation for transition to AC power supply system.

International connecting line of intermediate significance. It is part of the core TEN-T network and RFC9. The line has transit passenger and freight transport development potential taking into account the forthcoming optimisation of a connecting line in the Czech Republic (Horní Lideč - Hranice na Moravě).

With respect to objectives:

ŠŽ2: Increase rail freight transport's share of the total transport performance

ŠŽ3: Enhance the quality and environmental impacts of railway operations

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

5.2.3 Public Passenger and Non-Motorised Transport

OPVO1: Preference of public passenger transport in urbanised areas

In practice, transport policies of towns and cities do not favour PPT vehicles, legislation does not prioritise PPT, and the construction of new residential units is not linked with a conceptual solution of PPT. A systematic preference of PPT vehicles in integrated transport systems and at traffic-light intersections, and the creation of preferential lanes reserved for trolleybuses and buses, where necessary, must become an integral part of sustainable urban mobility development. Roads must be equipped with facilities that appropriately serve PPT needs, eg location of public transport stops at intersections of lines to minimise walking time for a connection, and the construction of a sufficient number of bus turning circles at optimal locations as regards service quality and effectiveness. New residential and commercial unit projects should take into account solutions for non-motorised and public passenger transport and provide sufficient capacity to the expected vehicular traffic. This will require changes to legislation, standards and transport policies.

With respect to objectives:

ŠVO1: Ensure that public and non-motorised transport is an attractive social benefit and becomes the natural choice in urban agglomerations

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

OPVO4: Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists

It will not always be possible to address the obsolescence of pedestrian and cycle paths in towns and cities and their surroundings using funds and available space by limited construction of new infrastructure. It is much more important to gradually adapt urban areas and roads near towns and cities to the needs of non-motorised transport during the reconstruction of surfaces. Solutions must be implemented prioritising pedestrians and cyclists, also by potentially limiting vehicular traffic, including barrier-free access for people with reduced mobility under Regulation No 1371/2007 of the European Parliament and of the Council on rail passenger rights and obligations.

With respect to objectives:

ŠVO1: Ensure that public and non-motorised transport is an attractive social benefit and the natural choice in urban agglomerations

ŠVO3: Territorially and technically integrate public transport in urban agglomerations and their surroundings and at the national level

ŠVO4: Ensure better conditions for cyclists and pedestrians at local and regional levels

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

OPVO5: Construction of park-and-ride facilities near railway stations and terminals

To increase the use of rail transport, it is necessary to support combined transport by individual and public transport. This option is currently used to a limited extent. Demand is high where relatively frequent suburban transport services are faster than travelling by car, eg in the suburban Trnava – Bratislava railway section. Therefore, park-and-ride facilities with sufficient capacity will be constructed to reduce peak traffic in towns and cities and increase rail use. Parking areas with sufficient capacity for passenger vehicles will also have to be constructed close to integrated transport terminals to integrate bus and rail transport. If the analysis of the potential of public passenger water transport shows economic sustainability of a national water carrier, it is possible to consider building parking areas for public transport in ports to expand integrated transport with water transport.

With respect to objectives:

ŠVO1: Ensure that public and non-motorised transport is taken for granted as an attractive social benefit and is the natural choice in urban agglomerations

ŠVO4: Ensure better conditions for cyclists and pedestrians at local and regional levels

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

OPVO6: Revitalisation of railway stations and stops to improve travel culture and quality

Poor-quality railway stops, stations and access roads and insufficient passenger handling and information equipment discourage use of regional and long-distance rail transport services. The modernisation of railways and systematic reconstruction of major higher-standard railway stations and basic-standard stops is required to increase the use of rail transport. Travel quality is improved by ancillary services, eg Wi-Fi, or space for luggage and bicycles. To attract the travelling general public, the quality of services must be continually improved.

With respect to objectives:

ŠVO1: Ensure that public and non-motorised transport is an attractive social benefit and the natural choice in urban agglomerations

ŠVO4: Ensure better conditions for cyclists and pedestrians at local and regional levels

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

OPVO7: Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness

Entities providing public passenger transport services do not cooperate enough; rail transport, suburban bus transport and urban public transport are not coordinated; and there are no appropriate premises available for the interconnection

of suburban and urban connections, or buses and trains. To support integration, it is advisable to construct interchange terminals, which must be compact, occupy minimum space, incur minimum operating costs and operate very effectively and efficiently based on the pre-defined integrated public transport concepts, which will be tested in practice and which will ensure a higher quality of provided services without undue increase in operating costs.

With respect to objectives:

ŠVO1: Ensure that public and non-motorised transport is an attractive social benefit and the natural choice in urban agglomerations

ŠVO3: Territorially and technically integrate public transport in urban agglomerations and their surroundings and at the national level

ŠVO4: Ensure better conditions for cyclists and pedestrians at local and regional levels

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

OPVO8: Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses

Over the past decades, tram and trolleybus lines in Slovak towns and cities and the maintenance base have only been maintained to the degree allowed by the funds of carriers, or as part of one-off modernisation co-financed by EU funds. No systematic heavy maintenance and regular reconstruction and modernisation of infrastructure is undertaken. Currently, lines need to be modernised using EU co-financing. In the future, it will be necessary to introduce financial models in towns and cities for rail and tram transport, which will finance infrastructure modernisation without endangering safety and the traffic public transport vehicle traffic. It will be necessary to construct intelligent stops and develop information systems providing real-time information to passengers about departures and the PPT traffic situation. Where suitable and effective, the infrastructure for recharging and refuelling points with alternative fuels (such as CNG and LNG) must be constructed for urban and suburban public transport to reduce emissions of greenhouse gases, nitrogen oxides and particulate matter in urban agglomerations areas and reduce the noise levels.

With respect to objectives:

ŠVO1: Ensure that public and non-motorised transport is an attractive social benefit and the natural choice in urban agglomerations

ŠVO3: Territorially and technically integrate public transport in urban agglomerations and their surroundings and at the national level

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

5.2.4 Water Transport

OPV1: Implement technical measures to improve the navigability on the ship route of the Danube waterway

The measure is aimed at implementing technical measures to ensure the required parameters of the ship route of the Danube waterway. Two priority measures and related measures have been defined as part of this measure.

The first priority measure will ensure the required parameters of the ship route of the Danube waterway, where it will be proven to be justified and feasible, ie the depth and width of the ship route, radius of the curve, and the height under bridges for the relevant class of the waterway. Technical measures will be implemented in line with feasibility study results.

The second priority measure focuses on the reconstruction and modernisation of the lock chambers of the Gabčíkovo dam due to their state of disrepair.

In connection with priority measures, measures related to improve the navigability on the ship route will be addressed in order of importance where justified and feasible. The measures will eliminate narrow and shallow areas depending on how such areas limit navigation. The implementation of the measures will depend on their assessment by feasibility studies.

Related measures will be technical measures ie construction of waterway components (mooring areas for vessels in ports or anchorages, roadsteads, quays, navigation paths, etc).

The OPV1 measure implementation must be governed by the Joint Conclusions of the Strategic Environmental Assessment of the Gabčíkovo-Nagymaros Project. With respect to the implementation of technical measures, good practices are defined in the PLATINA platform (Manual on Good Practices for Sustainable Waterway Planning).

With respect to objectives:

ŠV1: Improve navigability conditions of the Danube if and where proven to be justified and feasible

ŠV2: Improvement of the Slovak public ports system

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

OPV2: Introduce extended river information services

The measure will improve the use of river information services (RIS) to enhance safety and develop communication and information infrastructure for water transport. The measure requires the ECDIS (Electronic Chart Display and Information System) to be implemented on the Danube. RIS implementation on other monitored waterways is subject to the results of feasibility studies related to such waterways and the implementation of technical measures on such waterways.

With respect to objectives:

ŠV1: Improve navigability conditions of the Danube if and where proven to be justified and feasible

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

OPV3: Modernise public ports in Slovakia and undertake regular maintenance

The measure will modernise ports on the Danube. Ports will be modernised based on the results of feasibility studies. Two ports on the Danube will be modernised by 2030. The measure will increase water transport performance, liberalize business conditions and modernise Danube port infrastructure.

Bratislava port modernisation is a priority project. Modernisation will focus on investments in port infrastructure and superstructure, investments in transhipment sites and equipment, including the provision of intermodal transport and enabling the operation of inland water transport vessels using LNG, and the construction of new storage and handling technology for new types of goods and new port operators, including allowing waste disposal from water transport operation by constructing waste recycling centres and waste collection sites to achieve a harmonised system of waste disposal from water transport operation under uniform EU rules.

With respect to objectives:

ŠV2: Improvement of the Slovak public ports system

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

5.2.5 Civil Aviation

OPL2: Modernise and construct civil aviation infrastructure to ensure national and regional economic development and increase the quality of services provided as part of natural and special-purpose mobility

Measures to modernise, construct and maintain airport infrastructure are based on the needs of airport companies related to the operated infrastructure, ie comprehensive modernisation of airport infrastructure, construction of new freight transport infrastructure or maintenance work.

Measures will be implemented to promote the development of civil aviation including the creation of active instruments to support the market entry of major air carriers, develop mobility, support national and regional economic development and create a functioning, high-quality and optimised civil aviation infrastructure network in Slovakia.

With respect to objectives:

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

5.3 Organisational Measures

5.3.1 Road Transport

OPC1: Implement a new road network concept

The new road network concept will define principles for the organisation of the road network taking into account the transport significance of individual routes. It will also define the application of these principles in practice. In many cases, road classes do not currently correspond to their transport significance. This is, inter alia, due to inadequate funding of administration and maintenance. The implementation of the new concept will directly impact sustainable and systematic road network development.

With respect to objectives:

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

OPC2: Changes in principles and implementing road infrastructure administration and maintenance

The effectiveness of road network administration and maintenance is hampered by unbalanced capacities and competences at the road administrator companies (Národná diaľničná the Company a.s., Slovenská správa ciest). Slovenská správa ciest does not undertake maintenance using own resources, maintenance is outsourced and there is a long-term lack of funds for cyclical renewals, etc. Maintenance and repairs of roads and bridges are included in the bridge management system and roadside management system, and to ensure they work effectively, the administrators should be equipped with appropriate diagnostic technology and staff. Regular diagnostics will enable effective decision-making on the reconstruction of road sections and bridge structures in a state of disrepair.

With respect to objectives:

ŠC1: Ensure the accessibility of Slovak regions using effective and sustainable infrastructure

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

5.3.2 Rail Transport

OPŽ9: Improve conditions for combined transport and operation of complete freight transport sets and support the interoperability of freight transport vehicles (organisation, infrastructure and vehicles)

Support for the development of combined transport, support for the interoperability of traction vehicles and renewal.

Construction of central dispatcher's offices, adjustment of the block signalling system for transition to central management. Resolution and resumption of ITT construction.

This measure aims to increase rail freight competitiveness by increasing flow, eliminating bottlenecks, and setting competitive prices compared with road transport.

The analysis shows that combined transport is the future for rail freight transport development. Therefore, it is necessary to support and develop combined transport terminals and support the development of locations for loading goods on railways. The goal is to facilitate the transfer of freight transport from road to rail and reduce CO_2 emissions.

The single wagonload operation promotion model will be the subject of other partial strategies and documents and/or the internal implementation strategy of the relevant carriers, and the selected approach will respect the results of the market demand analysis for this segment and the financial limits of the state budget. It is vital for the Slovak Republic to maintain and/or increase heavy goods transport from road to rail, even for single wagonloads. Conditions must also be created to develop rail freight transport in this segment under the rules set by the EU and applied in EU Member States. Based on foreign experience, under state aid rules, the promotion of minor measures should be analysed to contribute to meeting the White Paper goals, ie shifting 30% of road freight transport over 300 km to other modes, ie rail or water transport, by 2030.

With respect to objectives:

ŠŽ2: Increase rail freight transport's share of total transport performance

ŠŽ3: Enhance the quality and environmental impacts of railway operations

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

5.3.3 Public Passenger and Non-Motorised Transport

OPVO2: Establishment of the national transport authority and public transport integration

A national transport authority should be established to oversee the operation of the public transport organisation system by a body representing the state, region or a town/city. If proven feasible and justified, regional versions of such an authority could be established. This organisation will represent individual regions and will be responsible for transport facilities and access as regards interconnecting long-distance and regional transport and urban and suburban transport systems. It will ensure the application of a single state social policy, the introduction and operation of the basic national integrated transport system based on transport, physical, legislative, information and tariff integration in which rail will play a key role. It will create an order for rail transport, selected long-distance bus transport connections and lines and regional transport relevant for national transport facilities and access and connection with long-distance lines. It will also guarantee the application of the state social policy to the entire transport system, introduce a uniform nationwide rail tariff and the connectivity of individual integrated transport systems. At the national level, it will integrate public transport operated under a public service contract and its coordination with commercially operated and international lines whose national sections will be fully integrated into the national system. It may also become the owner of a part of the rolling stock purchased using an investment subsidy and lease it to carriers. With respect to rail passenger transport liberalisation, the national transport authority must also address connections associated with the liberalised lines, for both rail and bus transport.

With respect to objectives:

ŠVO1: Ensure public and non-motorised transport is an attractive social benefit and the natural choice in urban agglomerations

ŠVO2: Re-organise public transport institutional set-up

ŠVO3: Territorially and technically integrate public transport in urban agglomerations and their surroundings and at the national level

ŠVO4: Ensure better conditions for cyclists and pedestrians at local and regional levels

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

5.3.4 Water Transport

OPV4: Settle the ownership and administration conditions at public ports

The measure is primarily aimed at resolving property relations at the Bratislava port. The settlement is also one of the basic conditions for financing of the Bratislava port development from EU funds. The long-term aim is to operate the Bratislava port using a business model with several operators. The model assumes the ownership and administration of infrastructure under the purview of a single entity, the port operator - Verejné prístavy, a. s.

With respect to objectives:

ŠV2: Improvement of the Slovak public ports system

OPV5: Cooperate with the watercourse administrator in undertaking the maintenance of waterways and shipping structures on the monitored Slovak waterways at the year-round navigability level

MTCRD SR will assist in implementing operational measures associated with the administration and maintenance of Slovak waterways and shipping structures on waterways to ensure year-round navigability and the required parameters of the ship route on waterways in accordance with the Transport Ministers' Declaration on Effective Waterway Infrastructure Maintenance on the Danube and its Navigable Tributaries. Given the competences stipulated by Slovak law, this measure requires close cooperation with the watercourse administrator.

With respect to objectives:

ŠV1: Improve navigability conditions of the Danube if and where proven to be justified and feasible

ŠV3: Determine justifiability and conditions for the development, modernisation and reconstruction of other monitored waterways

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

5.3.5 Civil Aviation

OPL1: Optimise the system of airports operated by airport companies to ensure a functional and effective planning of civil aviation development

The common operational and organisational measures taken by airport companies operating airports in Slovakia to optimise their number and the scope and nature of services provided.

With respect to objectives:

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

5.4 Operational Measures

5.4.1 Rail Transport

OPŽ2: Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050

Appoint a central public transport coordinator and organiser, prepare a national operational public transport concept and its implementation plan.

Construct multimodal interchange terminals at selected locations, including technical and hygienic maintenance infrastructure.

Bus and rail passenger transport is currently not coordinated in Slovakia. Buses and trains run on parallel lines, which is ineffective. At numerous locations in Slovakia, rail has the potential to be the public transport backbone without the need for significant infrastructure investment, however, assuming fleet renewal, which is currently obsolete to a high degree in Slovakia.

With respect to objectives:

ŠŽ1: Strengthen the role of rail as the backbone transport mode of the public transport system where justified

ŠŽ3: Enhance the quality and environmental impacts of railway operations

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

OPŽ3: Completion of the Target 2020 Timetable implementation

Change timetables, increase the number of connections.

Eliminate bottlenecks at selected locations.

The Target 2020 Timetable aims to improve rail interchanges by modifying the times of regular-interval trains and eliminating rail infrastructure bottlenecks which prevent the introduction of a uniform regular-interval timetable.

With respect to objectives:

ŠŽ1: Strengthen the role of rail as the backbone transport mode of the public transport system where justified

ŠŽ3: Enhance the quality and environmental impacts of railway operations

OPŽ6: Prepare and implement the Target 2030 Timetable – modify the interval and the number of connections at connecting lines for the Žilina - Košice and Kúty state border - Štúrovo/Komárno state border corridor and make the associated infrastructure changes on such lines

Prepare the operational Target 2030 Timetable concept and the related infrastructure and organisational measures, including an implementation plan.

Construct new passing loops at selected locations as required by the operational concept.

After the modernisation of the Žilina - Košice - Čierna nad Tisou and Kúty state border - Štúrovo/Komárno state border lines, the times of trains at connecting stations will change due to shorter travel times. To ensure connections from connecting lines, organisational and infrastructure measures for connecting lines must be defined. This only applies to lines with passenger transport potential.

With respect to objectives:

ŠŽ1: Strengthen the role of rail as the backbone transport mode of the public transport system where justified

ŠŽ3: Enhance the quality and environmental impacts of railway operations

ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia

OPŽ10: Centralisation of operation management

Prepare an implementation plan for the centralisation of operation management, prepare the construction of central dispatcher's offices.

Construct central dispatcher’s offices, adjust the block signalling system for transition to central management.

The centralisation of operation management will lead to operational savings and increase operation reliability.

With respect to objectives:

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

OPŽ11: Rationalisation of operation on other lines taking into account the operational passenger transport concept

Determine potential rationalisation measures on selected regional lines based on the operational concept.

The remaining rail network may or may not have potential for long-term transport in the territory. There is currently irregular or no passenger transport on a large number of lines, which is not sustainable. The operation on such lines should be rationalised, and if they are not used for public transport, other potential uses should be sought, eg as tourist rail lines. Economic, transport, strategic and social aspects will be considered during the setting of rationalisation measures.

With respect to objectives:

ŠŽ3: Enhance the quality and environmental impacts of railway operations

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

5.4.2 Public Passenger and Non-Motorised Transport

OPVO3: Enable the renewal of the vehicle fleet of an appropriate quality

It is very difficult for public transport carriers to regularly renew their vehicle fleet. The national rail carrier (ZSSK) does not have funds to renew rolling stock, particularly for suburban transport. To address this critical situation, EU funds will continue to be required, and it will also be necessary to predefine the financing and operation of public transport (eg greater involvement of private carriers) to enable vehicle fleet renewal using funds acquired during the ordinary operation (revenues and compensations) even given a growing demand for rail and tram transport, public transport integration and the strengthening of the role of rail and tram transport.

With respect to objectives:

ŠVO1: Ensure that public and non-motorised transport is an attractive social benefit and the natural choice in urban agglomerations

ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies

ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport

ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system

5.5 Links and Relations Between Measures

Basic links with other measures have been identified for all infrastructure measures. This reflects the fact that the maximum efficiency of infrastructure investments will only be achieved given implementation of operational and organisational measures.

In the tables below, such links are marked with crosses – an operational or organisational measure may affect the final effectiveness of one or more infrastructure measures. The tables also mark strong links (in bold). Such links indicate the need for support measures to be implemented to prevent inefficient use of infrastructure investments in the long term.

Table 6 Links and relations between measures – road transport

	Measure ID	Measure name	Infrastructure measures								
			OPC 3	OPC 5	OPC 6	OPC 7	OPC 8	OPC 9	OPC10	OPC11	OPC12
			Modernisation of service stations in the motorway and expressway network	Completion of the west-east priority axis (Rhine-Danube Corridor, Czech and Slovak	Completion of the north-south connection with Poland and the Czech Republic	Completion of the north-south connection in eastern Slovakia	Completion of the west-east road axis in central Slovakia	Completion of the north-south road axis in central Slovakia	Road network development in the Bratislava agglomeration	1st and 2nd class road network development	Modernisation and development of the other motorway and expressway network if justified
Other	OPC1	Implementation of new road network concept		x	x	x	x	x	x	**X**	**X**
	OPC2	Changes in principles and ensuring of the road infrastructure administration and maintenance		x	x	x	x	x	x	**X**	**X**
	OPC4[2]	Conceptual development of ITS	x	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

[2] Measure OPC4 was included in other measures in this table given its strong links to other infrastructure measures.

Table 7 Links and relations between measures – public passenger and non-motorised transport

	Measure ID	Measure name	Infrastructure measures					
			OPVO1	OPVO4	OPVO5	OPVO6	OPVO7	OPVO8
			Preference of public passenger transport in urbanised areas	Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists	Construction of park-and-ride facilities near railway stations and terminals	Revitalisation of railway stations and stops to improve travel culture and quality	Ensuring high-quality terminals, interchange hubs and stops with minimum barriers and maximum compactness and effectiveness	Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses
Other	OPVO3	Renew vehicle fleet to ensure appropriate quality						x
	OPVO2	Establishment of the national transport authority and public transport integration	x	x	x	x	**X**	x

Table 8 Links and relations between measures – water transport

	Measure ID	Measure name	Infrastructure measure		
			OPV1	OPV2	OPV3
			Implement technical measures to improve the navigability on the ship route of the Danube waterway	Introduce extended river information services	Modernise public ports in Slovakia and ensure their regular maintenance
	OPV4	Settle the ownership and administration conditions at public ports			**X**
	OPV5	Cooperate with the watercourse administrator to maintain waterways and shipping structures on monitored Slovak waterways at the year-round navigability level	**X**	**x**	x

Table 9 Links and relations between measures – rail transport

	Measure ID	Measure name	Infrastructure measures				
			OPŽ1	OPŽ4	OPŽ 5	OPŽ7	OPŽ 8
			Completion of the modernisation of the main TEN-T lines in a high degree of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – AT state border	Modernisation of the Žilina - Košice - Čierna nad Tisou backbone line	Modernisation of the Kúty state border - Bratislava - Štúrovo/Komárno state border corridor	Modernisation and upgrade of the wider Bratislava hub including relevant affected lines as resulting from the Bratislava Railway Node Feasibility Study	Modernisation and upgrade of the TEN -T line: Púchov - Horní Lideč
Other	OPŽ2	Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050	x	X	X	X	x
	OPŽ3	Completion of Target 2020 Timetable implementation	x				
	OPŽ6	Prepare and implement Target 2030 Timetable – modify the interval and the number of connections at connecting lines for the Žilina - Košice and Kúty state border - Štúrovo/Komárno state border corridor and make the associated infrastructure changes on such lines		X	X	X	
	OPŽ9	Improve conditions for combined transport and operation of complete freight transport sets and support the interoperability of freight transport vehicles (organisation, infrastructure and vehicles)	X	X	X	X	X
	OPŽ10	Centralisation of operation management	x	X	X	X	X
	OPŽ11	Rationalisation of operation on other lines taking into account the operational passenger transport concept					

5.6 Link Between Measures and Specific Objectives

The purpose of each measure is to contribute to the fulfilment of the strategy, ie to the meeting of the set specific objectives that contribute to the fulfilment of global strategic objectives and implement the target transport sector vision. In this respect, the tables below describe such links where each measure contributes to the fulfilment of at least one of the specific objectives.

Table 10 Link between measures and specific objectives – systemic measures

Measure ID	Measure name	Horizontal specific objective			
		ŠHC1: Ensure preparation and conditions for systematic and conceptual transport development in Slovakia	ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies	ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport	ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system
OPS1	Setting principles of sustainable transport sector financing	x			
OPS2	Periodic preparation of transport infrastructure maintenance plans	x			
OPS3	Preparation and implementation process of development projects, including related activities	x			
OPS4	Supplementation and ongoing maintenance of subsector databases	x			
OPS5	Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic	x			
OPS6	Regular updates of strategic and development documents	x			
OPS7	Regular monitoring of noise and air quality and implementation of measures reducing negative environmental transport impacts	x		x	
OPS8	Regular safety audits and implementation of measures improving transport safety		x	x	x

Table 11 Link between measures and specific objectives – road transport

Measure ID	Measure name	Modal specific objective	Horizontal specific objective			
		ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure	ŠHC1: Ensure preparation and conditions for a systematic and conceptual transport development in Slovakia	ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies	ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport	ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system
OPC1	Implementation of a new road network concept		x			

Measure ID	Measure name	Modal specific objective	Horizontal specific objective			
		ŠC1: Ensure the accessibility of all Slovak regions using effective and sustainable infrastructure	ŠHC1: Ensure preparation and conditions for a systematic and conceptual transport development in Slovakia	ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies	ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport	ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system
OPC2	Changes in principles and ensuring of the road infrastructure administration and maintenance	x	x			x
OPC3	Modernisation of service stations in the motorway and expressway network	x				x
OPC4	Conceptual ITS development	x		x	x	x
OPC5	Completion of the west-east priority axis (Rhine-Danube Corridor, Czech and Slovak branch)	x		x	x	x
OPC6	Completion of the north-south connection with Poland and the Czech Republic	x		x	x	x
OPC7	Completion of the north-south connection in eastern Slovakia	x		x	x	x
OPC8	Completion of the west-east road axis in central Slovakia	x		x	x	x
OPC9	Completion of the north-south road axis in central Slovakia	x		x	x	x
OPC10	Road network development in the Bratislava agglomeration	x		x	x	x
OPC11	1st and 2nd class road network development	x		x	x	x
OPC12	Modernisation and development of the other motorway and expressway network if justified	x		x	x	x

Table 12 Link between measures and specific objectives – rail transport

Measure ID	Measure name	Modal specific objective			Horizontal specific objective			
		ŠŽ1: Strengthen the role of rail as the backbone transport mode of the public transport system where justified	ŠŽ2: Increase the rail freight transport share of the total transport performance	ŠŽ3: Enhance the quality and environmental impacts of railway operations	ŠHC1: Ensure preparation and conditions for a systematic and conceptual transport development in Slovakia	ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies	ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport	ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system
OPŽ1	Completion of the modernisation of the main TEN-T lines in a high degree of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – AT state border	x	x			x	x	x
OPŽ2	Prepare an operational passenger rail transport concept (as part of the national operational	x		x	x			

Measure ID	Measure name	Modal specific objective			Horizontal specific objective			
		ŠŽ1: Strengthen the role of rail as the backbone transport mode of the public transport system where justified	ŠŽ2: Increase the rail freight transport share of the total transport performance	ŠŽ3: Enhance the quality and environmental impacts of railway operations	ŠHC1: Ensure preparation and conditions for a systematic and conceptual transport development in Slovakia	ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies	ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport	ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system
	public transport concept) and its implementation plan up to 2030 with an outlook to 2050							
OPŽ3	Completion of the Target 2020 Timetable implementation	x		x				
OPŽ4	Modernisation of the Žilina - Košice - Čierna nad Tisou backbone line	x	x			x	x	x
OPŽ5	Modernisation of the Kúty state border - Bratislava - Štúrovo/Komárno state border corridor	x	x			x	x	x
OPŽ6	Prepare and implement the Target 2030 Timetable – modify the interval and the number of connections at connecting lines for the Žilina - Košice and Kúty state border - Štúrovo/Komárno state border corridor and make the associated infrastructure changes on such lines	x		x	x			
OPŽ7	Modernisation and upgrade of the wider Bratislava hub including relevant affected lines as resulting from the Bratislava Railway Node Feasibility Study (OPŽ7)	x	x	x		x	x	x
OPŽ8	Modernisation and upgrade of the TEN -T line: Púchov - Horní Lideč		x	x		x	x	x
OPŽ9	Improve conditions for combined transport and operation of complete freight transport sets and support the interoperability of freight transport vehicles (organisation, infrastructure and vehicles)		x	x		x	x	
OPŽ10	Centralisation of operation management					x		
OPŽ11	Rationalisation of operation on other lines taking into account the operational passenger transport concept			x		x		

Table 13 Link between measures and specific objectives – public passenger and non-motorised transport

Measure ID	Measure name	Modal specific objective				Horizontal specific objective			
		ŠVO1: Ensure that public and non-motorised transport is taken for granted as an appealing social benefit and becomes a natural choice in	ŠVO2: Re-organise public transport institutional set-up	ŠVO3: Territorially and technically integrate public transport in urban agglomerations and their surroundings and at the national level	ŠVO4: Ensure better conditions for cyclists and pedestrians at local and regional levels	ŠHC1: Ensure preparation and conditions for a systematic and conceptual transport development in Slovakia	ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies	ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport	ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system
OPVO1	Preference of public passenger transport in urbanised areas	x					x	x	
OPVO2	Establishment of the national transport authority and public transport integration	x	x	x	x	x	x	x	
OPVO3	Enable the renewal of the vehicle fleet to ensure appropriate quality	x					x	x	x
OPVO4	Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists	x		x	x	x	x	x	x
OPVO5	Construction of emergency side and parking areas near railway stations and terminals	x			x			x	
OPVO6	Revitalisation of railway stations and stops to improve the travel culture and quality	x			x				x
OPVO7	Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness	x		x	x		x		x
OPVO8	Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses	x		x		x			

Table 14 Link between measures and specific objectives – water transport

Measure ID	Measure name	Modal specific objective			Horizontal specific objective			
		ŠV1: Improve navigability conditions of the Danube if and where proven to be justified and feasible	ŠV2: Improvement of the Slovak public ports system	ŠV3: Determine justifiability and conditions for the development, modernisation and reconstruction of other monitored waterways	ŠHC1: Ensure preparation and conditions for a systematic and conceptual transport development in Slovakia	ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies	ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport	ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system
OPV1	Implement technical measures to improve the navigability on the ship route of the Danube waterway	x	x					x

OPV2	**Introduce extended river information services**	x				x		x
OPV3	**Modernise public ports in Slovakia and ensure regular maintenance**		x					
OPV4	**Settle the ownership and administration conditions at public ports**		x					
OPV5	**Cooperate with the watercourse administrator in maintaining waterways and shipping structures on the monitored Slovak waterways at the year-round navigability level**	x		x				x

Table 15 Link between measures and specific objectives – civil aviation

Measure ID	Measure name	Horizontal specific objective			
		ŠHC1: Ensure preparation and conditions for a systematic and conceptual transport development in Slovakia	**ŠHC2: Improve the safety, efficiency and sustainability of transport operations by enhancing new technologies**	**ŠHC3: Systematically reduce negative socio-economic and environmental impacts by transport**	**ŠHC4: Systematically increase safety parameters and protection of point and line elements of the transport system**
OPL1	**Optimisation of the system of airports operated by airport companies to ensure functional and effective planning of the civil aviation development**	x			x
OPL2	**Modernisation and construction of civil aviation infrastructure to ensure national and regional economic development and increase the quality of services provided as part of natural and special-purpose mobility**		x		x

5.7 Link Between Measures and Transport Sector Issues

The links between measures and issues identified by analytical activities are presented below.

In both cases, it is a very important part of the strategy, which states how to achieve the target situation, ie fulfil the transport sector vision.

Table 16 Link between measures and issues – road transport

Key road transport issues		Planning						Infrastructure					Administration and operation						Administration and operation				
Measure ID	Measures	Selected analysis and planning input data not available	A change in the road network concept not approved and not applied	Long duration of pre-investment and investment preparation	Slow progress in the construction of the motorway and expressway network	Development of intelligent transport systems still lacks a systemic foundation	Inaccuracy of the transport model and its outputs	Design capacities exceeded in certain sections of the D1 motorway	Design capacities significantly exceeded on 1st class roads in the majority of Slovak regions	High intensities of trucks on 1st class roads	A high proportion of transit transport in certain cities	Bad accessibility of motorways and expressways from selected districts	The lack of own technical means for the maintenance of 1st class roads by SSC	Structural and technical condition of roads and bridges on 1st class roads	Unbalanced funding of maintenance between NDS and SSC	Insufficient funding for the maintenance of 1st class roads administered by SSC	The amount of internal debt related to the maintenance of 1st	The existence of two state road administrators	Unsatisfactory parameters of transport infrastructure as regards safety and its condition (view conditions, horizontal markings, roadside structures, etc)	A far higher number of fatal injuries on 1st class roads than on motorways and expressways	Environmental monitoring and exceeding of road transport noise limits	Irregular preparation of strategic noise maps	The risk of air pollution values being exceeded in Bratislava, Senec and Košice, the Trnava, Nitra and Prešov districts and in the Váh river transport corridor
OPC1	Implementation of a new road network concept		x																				
OPC2	Changes in principles and ensuring of road infrastructure administration and maintenance												x	x	x	x	x	x					
OPC3	Modernisation of service stations in the motorway and expressway network																		x				
OPC4	Conceptual ITS development					x													x	x			
OPC5	Completion of the west-east priority axis (the Rhine-Danube Corridor, Czech and Slovak branch)							x	x	x	x	x							x				
OPC6	Completion of the north-south connection with Poland and the Czech Republic								x	x	x	x							x				
OPC7	Completion of the north-south connection in eastern Slovakia								x	x	x	x							x				
OPC8	Completion of the west-east road axis in central Slovakia								x	x	x	x							x				

Key road transport issues		Planning						Infrastructure					Administration and operation						Administration and operation				
Measure ID	Measures	Selected analysis and planning input data not available	A change in the road network concept not approved and not applied	Long duration of pre-investment and investment preparation	Slow progress in the construction of the motorway and expressway network	Development of intelligent transport systems still lacks a systemic foundation	Inaccuracy of the transport model and its outputs	Design capacities exceeded in certain sections of the D1 motorway	Design capacities significantly exceeded on 1st class roads in the majority of Slovak regions	High intensities of trucks on 1st class roads	A high proportion of transit transport in certain cities	Bad accessibility of motorways and expressways from selected districts	The lack of own technical means for the maintenance of 1st class roads by SSC	Structural and technical condition of roads and bridges on 1st class roads	Unbalanced funding of maintenance between NDS and SSC	Insufficient funding for the maintenance of 1st class roads administered by SSC	The amount of internal debt related to the maintenance of 1st [illegible]	The existence of two state road administrators	Unsatisfactory parameters of transport infrastructure as regards safety and its condition (view conditions, horizontal markings, roadside structures, etc)	A far higher number of fatal injuries on 1st class roads than on motorways and expressways	Environmental monitoring and exceeding of road transport noise limits	Irregular preparation of strategic noise maps	The risk of air pollution values being exceeded in Bratislava, Senec and Košice, the Trnava, Nitra and Prešov districts and in the Váh river transport corridor
OPC9	Completion of the north-south road axis in central Slovakia								x	x	x	x							x				
OPC10	Road network development in the Bratislava agglomeration								x	x	x	x							x				
OPC11	1st and 2nd class road network development								x	x	x	x		x					x	x			
OPC12	Modernisation and development of the other motorway and expressway network if justified								x	x	x	x							x				
OPS1	Setting the principles of sustainable transport sector financing				x								x	x	x	x	x	x					
OPS2	Periodic preparation of transport infrastructure maintenance plans													x			x						
OPS3	Preparation and implementation process of development projects, including related activities			x	x	x					x										x		x
OPS4	Supplementation and ongoing maintenance of subsector databases	x																				x	

Key road transport issues		Planning						Infrastructure					Administration and operation						Administration and operation				
Measure ID	Measures	Selected analysis and planning input data not available	A change in the road network concept not approved and not applied	Long duration of pre-investment and investment preparation	Slow progress in the construction of the motorway and expressway network	Development of intelligent transport systems still lacks a systemic foundation	Inaccuracy of the transport model and its outputs	Design capacities exceeded in certain sections of the D1 motorway	Design capacities significantly exceeded on 1st class roads in the majority of Slovak regions	High intensities of trucks on 1st class roads	A high proportion of transit transport in certain cities	Bad accessibility of motorways and expressways from selected districts	The lack of own technical means for the maintenance of 1st class roads by SSC	Structural and technical condition of roads and bridges on 1st class roads	Unbalanced funding of maintenance between NDS and SSC	Insufficient funding for the maintenance of 1st class roads administered by SSC	The amount of internal debt related to the maintenance of 1st [illegible]	The existence of two state road administrators	Unsatisfactory parameters of transport infrastructure as regards safety and its condition (view conditions, horizontal markings, roadside structures, etc)	A far higher number of fatal injuries on 1st class roads than on motorways and expressways	Environmental monitoring and exceeding of road transport noise limits	Irregular preparation of strategic noise maps	The risk of air pollution values being exceeded in Bratislava, Senec and Košice, the Trnava, Nitra and Prešov districts and in the Váh river transport corridor
OPS5	Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic						x																
OPS6	Regular updates of strategic and development documents					x																x	
OPS7	Regular monitoring of noise and air quality and implementation of measures reducing negative transport environmental impacts																				x	x	x
OPS8	Regular safety audits and implementation of measures improving transport safety																		x	x			

Table 17 Link between measures and issues – rail transport

Key rail transport issues		Planning		Infrastructure			Passenger transport				Freight transport		Other issues	
Measure ID	Measure	Insufficient link between transport data collection and assessment, unavailability of the data basis describing freight road transport flows	Insufficient justification of the selection of a limit line potential for an even more effective rationalisation	Insufficient functionality of the railway node in Bratislava	Unquantified internal debt in the infrastructure maintenance	No link between the parameters of the operational concept, infrastructure and rolling stock	Underestimated service frequency	Non-uniform determination of minimum service quality standards for all public service carriers	Insufficient intermodal coordination	Negative perception of public transport by the general public	Capacity issues and interoperability limitations on RFC lines	Inadequate strategy of the further development of intermodal transport and wagonload freight segment	Insufficient centralisation of operation management	Practical issues related to the sharing of depots, railway yards and other maintenance and other equipment
OPŽ1	Completion of the modernisation of the main TEN-T lines in a high degree of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – AT state border										x			
OPŽ2	Prepare an operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050	x	x			x	x	x	x					x
OPŽ3	Completion of the Target 2020 Timetable implementation					x	x			x				
OPŽ4	Modernisation of the Žilina - Košice - Čierna nad Tisou backbone line										x			
OPŽ5	Modernisation of the Kúty state border - Bratislava - Štúrovo/Komárno state border corridor										x			
OPŽ6	Prepare and implement the Target 2030 Timetable – modify the interval and the number of connections at connecting lines for the Žilina - Košice and Kúty state border - Štúrovo/Komárno state border corridor and make the associated infrastructure changes on such lines					x	x							

Key rail transport issues		Planning		Infrastructure			Passenger transport				Freight transport		Other issues	
Measure ID	Measure	Insufficient link between transport data collection and assessment, unavailability of the data basis describing freight road transport flows	Insufficient justification of the selection of a limit line potential for an even more effective rationalisation	Insufficient functionality of the railway node in Bratislava	Unquantified internal debt in the infrastructure maintenance	No link between the parameters of the operational concept, infrastructure and rolling stock	Underestimated service frequency	Non-uniform determination of minimum service quality standards for all public service carriers	Insufficient intermodal coordination	Negative perception of public transport by the general public	Capacity issues and interoperability limitations on RFC lines	Inadequate strategy of the further development of intermodal transport and wagonload freight segment	Insufficient centralisation of operation management	Practical issues related to the sharing of depots, railway yards and other maintenance and other equipment
OPŽ7	Modernisation and upgrade of the wider Bratislava hub including relevant affected lines as resulting from the Bratislava Railway Node Feasibility Study (OPŽ7)			x			x				x			X
OPŽ8	Modernisation and upgrade of the TEN -T line: Púchov - Horní Lideč										x			
OPŽ9	Improve conditions for combined transport and operation of complete freight transport sets and support the interoperability of freight transport vehicles (organisation, infrastructure and vehicles)											x		
OPŽ10	Centralisation of operation management												x	
OPŽ11	Rationalisation of operation on other lines taking into account the operational passenger transport concept		x				x							
OPS1	Setting the principles of sustainable transport sector financing				x	x								
OPS2	Periodic preparation of transport infrastructure maintenance plans				x						x	x	x	
OPS3	Preparation and implementation process of development projects, including related activities	x	x	x			x		x					

Key rail transport issues		Planning		Infrastructure			Passenger transport				Freight transport		Other issues	
Measure ID	Measure	Insufficient link between transport data collection and assessment, unavailability of the data basis describing freight road transport flows	Insufficient justification of the selection of a limit line potential for an even more effective rationalisation	Insufficient functionality of the railway node in Bratislava	Unquantified internal debt in the infrastructure maintenance	No link between the parameters of the operational concept, infrastructure and rolling stock	Underestimated service frequency	Non-uniform determination of minimum service quality standards for all public service carriers	Insufficient intermodal coordination	Negative perception of public transport by the general public	Capacity issues and interoperability limitations on RFC lines	Inadequate strategy of the further development of intermodal transport and wagonload freight segment	Insufficient centralisation of operation management	Practical issues related to the sharing of depots, railway yards and other maintenance and other equipment
OPS4	Supplementation and ongoing maintenance of subsector databases	x												
OPS5	Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic	x	x			x	x		x					
OPS6	Regular updates of strategic and development documents	x												
OPS7	Regular monitoring of noise and air quality and implementation of measures reducing negative environmental impacts of transport													
OPS8	Regular safety audits and implementation of measures improving transport safety													

Table 18 Link between measures and issues – public passenger and non-motorised transport

Key public passenger transport issues		Infrastructure				Sustainability					Organisation					Operation				
Measure ID	Measures	Vehicle fleet renewal	Unfinished infrastructure	Maintenance	Road infrastructure deficiencies	Insufficient legislation and technical standards	Weak preference of PPT vehicles	Slight political preferences to address public transport issues	Limited perception of the public passenger and non-motorised transport significance	Insufficient attention paid to the approach to passengers, infrastructure quality and motivating factors	Fragmentation of public passenger transport competences	Financial issues	Unsatisfactory coordination of transport subsystems	Different interpretations of the term "public interest"	Insufficient transport planning	Modal split with a low and decreasing share of public, rail and non-motorised transport	Insufficient frequency of trains	Insufficient public transport capacity in urban and suburban transport	Non-transparent regional bus transport system	Unresolved operation of integrated passenger transport terminals
OPVO 1	Preference of public passenger transport in urbanised areas						x	x	x							x				
OPVO 2	Establishment of the national transport authority and public transport integration					x		x	x	x	x	x	x	x	x			x	x	x
OPVO 3	Renew vehicle fleet to ensure appropriate quality	x		x								x				x				
OPVO 4	Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists		x		x	x			x	x	x		x			x				x
OPVO 5	Construction of park-and-ride facilities near railway stations and terminals		x										x							
OPVO 6	Revitalisation of railway stations and stops to improve the travel culture and quality		x							x										
OPVO 7	Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness										x		x			x	x		x	x
OPVO 8	Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses					x		x	x				x			x				
OPS1	Setting the principles of sustainable transport sector financing	x		x			x	x	x	x	x	x	x	x			x	x		x
OPS2	Periodic preparation of transport infrastructure maintenance plans	x		x																

Key public passenger transport issues		Infrastructure				Sustainability					Organisation					Operation				
Measure ID	Measures	Vehicle fleet renewal	Unfinished infrastructure	Maintenance	Road infrastructure deficiencies	Insufficient legislation and technical standards	Weak preference of PPT vehicles	Slight political preferences to address public transport issues	Limited perception of the public passenger and non-motorised transport significance	Insufficient attention paid to the approach to passengers, infrastructure quality and motivating factors	Fragmentation of public passenger transport competences	Financial issues	Unsatisfactory coordination of transport subsystems	Different interpretations of the term "public interest"	Insufficient transport planning	Modal split with a low and decreasing share of public, rail and non-motorised transport	Insufficient frequency of trains	Insufficient public transport capacity in urban and suburban transport	Non-transparent regional bus transport system	Unresolved operation of integrated passenger transport terminals
OPS3	Preparation and implementation process of development projects, including related activities	x	x		x		x	x	x	x	x			x	x	x				
OPS4	Supplementation and ongoing maintenance of subsector databases									x					x					
OPS5	Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic									x			x		x					
OPS6	Regular updates of strategic and development documents	x	x		x		x	x	x	x	x	x	x		x		x	x		x
OPS7	Regular monitoring of noise and air quality and implementation of measures reducing negative transport environmental impacts	x					x													
OPS8	Regular safety audits and implementation of measures improving transport safety				x															

Table 19 Link between measures and issues – water transport

Key water transport issues		Infrastructure								Public ports					Other issues		
Measure ID	Measure	Insufficient navigation conditions on the Danube	Almost permanent operation of just one lock chamber at the Gabčíkovo dam (GD)	Impact of the operation of the Gabčíkovo hydroelectric power plant (GHPP), or the handling of the flow rates at the GHPP on ship route parameters	Non-existence of active cooperation with Hungary to ensure all functions of the old Danube bed	Inappropriate serviceability of the Váh waterway	Insufficiently constructed waterway components	Minimum scope of investments in developing and modernising the infrastructure of waterways and their components	Ongoing issues with the financing of waterway maintenance and competence division	Non-standard setting of ownership relations and the operational model	Unsatisfactory technical and operating condition of the port infrastructure and superstructure	Low share of transported containers	Insufficient provision of high-quality services to vessels standing in ports and the crew of such vessels	Other ports	Decrease in the total number of vessels and their unfavourable age classification	The need to ensure the full functionality of the implemented River Information Services (RIS)	The issue of vocational training of the water transport staff and the shortage of skilled crew members
OPV1	Implement technical measures to improve the navigability on the ship route of the Danube waterway	x	x	x	x		x	x							x		
OPV2	Introduce extended river information services															x	
OPV3	Modernise public ports in Slovakia and ensure regular maintenance										x	x	x	x			
OPV4	Settle the ownership and administration conditions at public ports									x							
OPV5	Cooperate with the watercourse administrator to maintain waterways and shipping structures on the monitored Slovak waterways at the year-round navigability level				x				x								
OPS1	Setting the principles of sustainable transport sector financing	x				x		x	x		x				x		
OPS2	Periodic preparation of transport infrastructure maintenance plans	x				x					x						
OPS3	Preparation and implementation process of development projects, including related activities	x				x	x	x							x		x
OPS4	Supplementation and ongoing maintenance of subsector databases	x				x								x			

Measure ID	Measure	Key water transport issues	Infrastructure								Public ports					Other issues		
			Insufficient navigation conditions on the Danube	Almost permanent operation of just one lock chamber at the Gabčíkovo dam (GD)	Impact of the operation of the Gabčíkovo hydroelectric power plant (GHPP), or the handling of the flow rates at the GHPP on ship route parameters	Non-existence of active cooperation with Hungary to ensure all functions of the old Danube bed	Inappropriate serviceability of the Váh waterway	Insufficiently constructed waterway components	Minimum scope of investments in developing and modernising the infrastructure of waterways and their components	Ongoing issues with the financing of waterway maintenance and competence division	Non-standard setting of ownership relations and the operational model	Unsatisfactory technical and operating condition of the port infrastructure and superstructure	Low share of transported containers	Insufficient provision of high-quality services to vessels standing in ports and the crew of such vessels	Other ports	Decrease in the total number of vessels and their unfavourable age classification	The need to ensure the full functionality of the implemented River Information Services (RIS)	The issue of vocational training of the water transport staff and the shortage of skilled crew members
OPS5	Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic																	
OPS6	Regular updates of strategic and development documents	x				x												
OPS7	Regular monitoring of noise and air quality and implementation of measures reducing negative transport environmental impacts															x		
OPS8	Regular safety audits and implementation of measures improving transport safety																	

Table 20 Link between measures and issues – civil aviation

Key civil aviation issues		Planning	Infrastructure		
Measure ID	Measures	A low level of quality and availability of data for the full civil aviation development planning process	Airport capacity limitations	Unsatisfactory technical condition and functional limitations of TEN-T airports	Noise generated by air transport
OPL1	Optimisation of the system of airports operated by airport companies to ensure functional and effective planning of civil aviation development		x	x	
OPL2	Modernisation and construction of civil aviation infrastructure to ensure national and regional economic development and increase the quality of services provided as part of natural and special-purpose mobility		x	x	
OPS1	Setting the principles of sustainable transport sector financing				
OPS2	Periodic preparation of transport infrastructure maintenance plans			x	
OPS3	Preparation and implementation process of development projects, including related activities	x			
OPS4	Supplementation and ongoing maintenance of subsector databases	x			
OPS5	Improvement of functionalities and administration of the multimodal transport model of the Slovak Republic				
OPS6	Regular updates of strategic and development documents				
OPS7	Regular monitoring of noise and air quality and implementation of measures reducing negative environmental impacts of transport				x
OPS8	Regular safety audits and implementation of measures improving transport safety			x	

6 Assessment of Measures and Development Strategy

This part of the document describes a strategy leading to the fulfilment of the Slovak transport sector vision and the elimination or minimisation of issues identified by analyses.

The strategy includes strategic principles, which are based on the synthesis of the knowledge acquired during the preparation of this document and provide a clear direction for the development of all areas of the Slovak transport sector.

The preparation of strategic principles is based on a multimodal approach to the transport system reflecting strong links between infrastructure, organisational and operational components. It reflects general transport sector issues and objectives and takes into account the outputs of the strategic assessment of measures focused on their effectiveness – in terms of the impact on the transport sector and the related investments.

This approach will ensure the definition of transport sector development activities that will lead to attaining the top strategic level, ie the fulfilment of the vision and global strategic objectives.

6.1 Development Strategy Creation Principles

The methodological procedure of the transport development strategy creation can be divided into two principal parts, preceded by an analytical part and a proposal of measures. These parts are interlinked in terms of procedures and outputs. They include:

- Strategic assessment of measures; and
- Creation of strategic principles.

The basic methodology principle is given below.

Figure 5 Strategy creation scheme (source: own)

Strategic assessment of measures

The strategic assessment of measures involves the following assessments:

a) Expert assessment;
b) An assessment based on the transport model outputs (only infrastructure measures); and
c) An environmental assessment.

The strategic assessment of measures is a comprehensive process aimed at selecting measures for optimal and efficient achievement of strategic global objectives and specific objectives in environmental, transport and economic terms. This process is based on defined measures. Horizontal specific objectives and modal specific objectives and the associated measures contributing to their achievement were defined for each strategic global objective. Each strategic global objective is therefore achieved using a number of alternative measures that represent the available modes of transport. In addition to these mode-specific measures, systemic measures extending beyond one transport mode were defined.

Given the nature of these measures, which must be implemented on an ongoing basis and without undue delays, systemic measures were not included in the strategic assessment.

The output of the strategic assessment is a list of measures ranked by aggregated results of each assessment: an assessment of the impact on specific transport parameters (an expert assessment), an assessment based on the outputs of the transport model and an environmental assessment.

The resulting list of measures provides a selection of optimal measures for achieving the set objectives in line with the assessment results. The measures are also feasible in terms of the expected total funds available until 2030.

Creation of Strategic Principles

In the second step, strategic principles forming the basis of the development strategy are prepared in line with the basic requirements for the implementation of systemic measures. The strategic assessment outputs are then prepared, containing lists of assessed infrastructure, operation and organisation measures and the formulated related strategic transport sector development principles.

Strategic principles, along with the above-stated measures and their strategic assessment, are the main outputs of this strategy. They also form a basis for the preparation an implementation plan.

6.2 Measure Assessment Methodology

6.2.1 Definition of Assessment Parameters

To assess the measures, a list of assessment parameters was prepared in line with the defined strategic global objectives.

The assessment parameters determined for expert assessment and assessment based on the outputs of the transport model allow assessing the degree of positive impact of the implementation of measures on:

- **Transport accessibility**

  This is a parameter describing the time needed to travel between settlement units in Slovakia (cities, towns, municipalities, etc). Transport accessibility improvements are reflected in shorter travel times due to the construction of capacity infrastructure, the introduction of new technology, changes to the PPT organisation, etc.

  The assessment must take into account national and international aspects – the connection to neighbouring countries.

- **Competitiveness of transport modes**

  The competitiveness of transport modes is a parameter assessing measures in terms of their potential to change the modal split. An example in PPT is a change in the tariff policy, the introduction of integrated transport systems, etc.

  This parameter should also be taken into account with respect to freight transport (roads vs. other transport modes). The result – passenger/freight – will be stated in the assessment.

- **Transport supply**

  The transport supply reflects geographically localised measures (transport network bottlenecks due to incomplete capacity infrastructure, operational or technical limitations, etc) and systemic measures, such as insufficient supply of PPT connections, rail and bus transport interconnection, etc.

- **Traffic safety**

  Traffic safety involves reducing the number of traffic accidents and their consequences in all transport modes. It is aimed at eliminating existing problems and preventing the occurrence of problems – eg measures regulating technical infrastructure parameters, the introduction of new signalling block technology and systems in the rail subsector, etc.

- **Environment**

  The environmental impact parameter assumes a reduction in greenhouse gas emissions and the number of inhabitants exposed to noise due to the implementation of this measure. Examples include rail electrification, noise barrier construction, use of alternative fuels, increase in traffic flows due to bypass construction and ITS development, etc.

- **Financial sustainability of operation**

  The financial sustainability of the transport sector requires measures remedying the current underfinancing of maintenance and operation, transport financing as a whole, effective distribution of funds between entities, etc. Another example is effective construction planning taking into account future operating costs.

- **Freight transport**

  This is a parameter reflecting positive measures related to freight transport, which is an important segment as regards the national economy. It reflects the significance of measures in terms of the transport connection of significant economic/industrial locations, and the management of freight transit transport and support for freight multimodality.

These parameters were assessed using a 1 – 5 scale (1 is minimal or no positive impact of the measure under the relevant criterion).

For environmental assessment, measures were assessed in terms of their impacts, risks and opportunities for individual environmental components:

- Air;
- Greenhouse gas emissions;
- Noise and vibrations;
- Population and health;
- Nature and land;
- Surface water and groundwater;
- Climate risks;
- Geological environment and mineral resources;
- Soils;
- Cultural heritage; and
- Waste.

The above parameters of environmental assessment were rated on the scale of -2 to +2, ie from significantly negative impacts and risks to significantly positive impacts and opportunities.

6.2.2 Assessment Based on the Transport Model

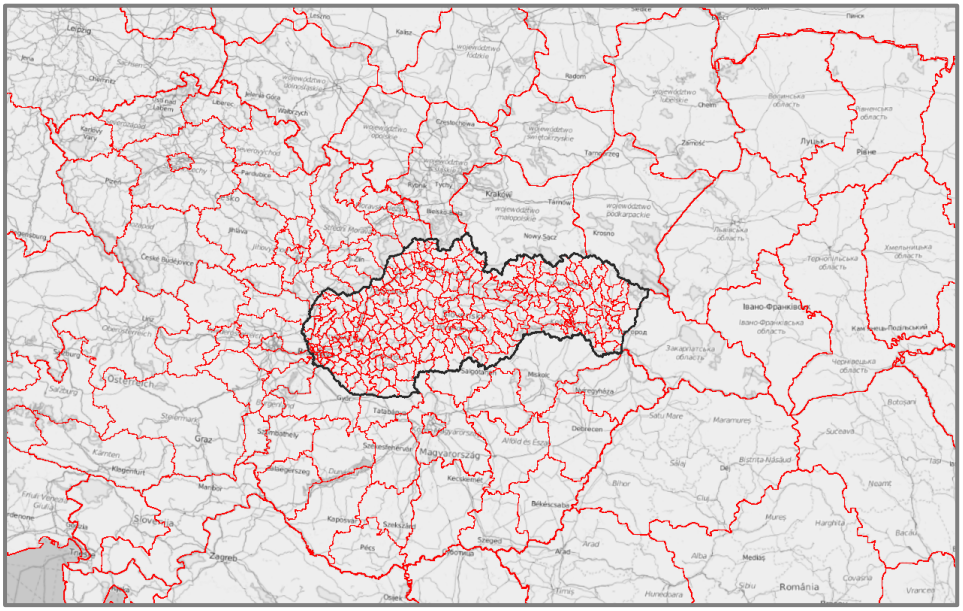
The benefits of selected measures were assessed using a multimodal transport model created in the PTV Visum environment for MTCRD SR.

Given the preparation method of the transport model and its outputs, only road and rail transport data could be used. Aviation and inland water transport modes could not be used for assessment purposes.

A network categorised by road type into motorways, expressways, 1st, 2nd and 3rd class roads, and local roads for larger cities is available for road transport. The European road network primarily consists of motorways and expressways. The rail network comprises all rail lines in Slovakia and major lines of international significance in the rest of Europe. Railways are further categorized by the number of tracks and traction. In the model, public transport comprises bus lines categorized into urban (Bratislava and Košice), regional, long-distance and international lines, and rail lines categorized into passenger, express and higher-category trains.

In terms of the zonal division, the model comprises a total of 462 transport zones, of which 305 are in Slovakia and the remaining 157 zones are in neighbouring countries, the rest of Europe and other continents.

Figure 6 Categorisation into transport zones in Slovakia and neighbouring countries (source: Transport Model of the SR)



Following the transport model review, measures whose benefits can be verified using the model were selected from the list of measures. Rail and road infrastructure measures were included. If direct alternatives for a particular measure existed (in terms of multimodality), all meaningful combinations were assessed. An overview of measures, including their alternatives (measure OPC9) is presented in the table below.

Table 21 List of modelable measures

Measure ID	Measure name
OPŽ4	Modernisation of the Žilina - Košice - Čierna nad Tisou backbone line
OPŽ5	Modernisation of the Kúty state border - Bratislava - Štúrovo/Komárno state border corridor
OPC5	Completion of the west-east priority axis (the Rhine-Danube Corridor, Czech and Slovak branch)
OPC6	Completion of the north-south connection with Poland and the Czech Republic
OPC7	Completion of the north-south connection in eastern Slovakia
OPC8	Completion of the west-east road axis in central Slovakia
OPC9a	Completion of the north-south road axis in central Slovakia (Zvolen – Ružomberok R1 branch)
OPC9b	Completion of the north-south road axis in central Slovakia (Žiar n. Hronom - Martin R3 branch)
OPC9c	Completion of the north-south road axis in central Slovakia (both branches)
OPC10	Road network development in the Bratislava agglomeration
OPC12	Modernisation and development of the other motorway and expressway network if justified

The so-called BAU 2030 scenario comprising all required structures (under construction, a high degree of preparation) was used as the basic state of the model.

The scenario is based on several pillars and phenomena and their anticipated changes, primarily:

- Expected development of the transport network;
- Anticipated demographic and socio-economic development in Slovakia;
- Expected economic growth of Slovakia in the EU and the neighbouring countries and changes in the structure of economic sectors and the corresponding goods;
- Expected development of energy prices;
- Expected changes in legislation and taxes;

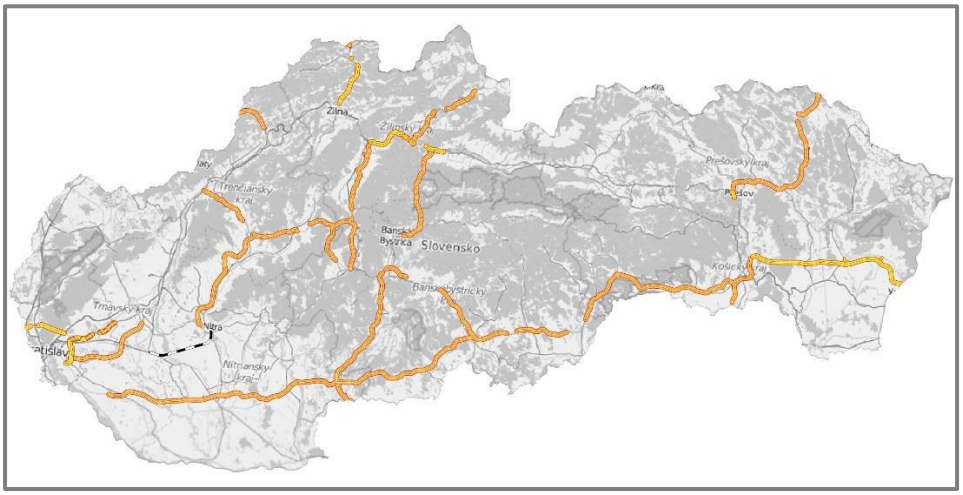
- Variants of charges for the use of transport infrastructure (parking, road network, railway) and the development of fares in public passenger transport; and
- Anticipated impact of a change in the charging of road infrastructure on the Slovak transport market.

The used demographic parameters are based on the data of the Institute for Forecasting of the Slovak Academy of Sciences, the macroeconomic data come from the European Commission and the Statistical Office of the Slovak Republic, and the transport infrastructure data are based on the documents of the Ministry of Transport, Construction and Regional Development of the Slovak Republic and foreign data come from the European Commission (see the transport model documentation).

The BAU 2030 scenario was then modified by measures. The 2130 state contains all tested measures and is an ideal state for the transport sector in terms of infrastructure and all services provided in line with the relevant demand. This state was created to enable comparison with other states in which only one particular measure is emphasised. Such a comparison enables the identification of the benefit of a given measure in the context of all other measures.

Individual scenarios were created using Scenario Management of the PTV Visum software in which the BAU 2030 scenario was used as a base version and transport structure projects or entire measures were modelled as its modifications.

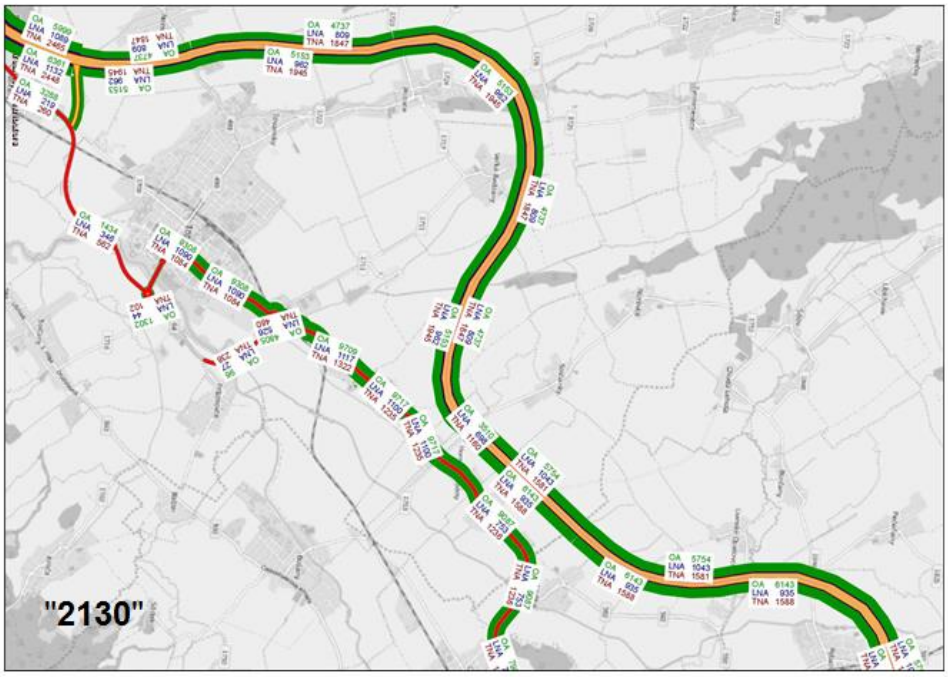
Figure 7 Situation of all modelled construction measures (source: Transport Model of the SR)



In contrast to the original model, only the transport supply (transport network, its parameters and public transport lines) was modified. The remaining functional model components, particularly the calculation sequence and parameters, were retained to keep the model functional. Road measures comprise roads and modifications, ie road structures – new motorway and expressway sections. Rail measures include changes to the rail connection supply – an increase in the number of connections and a reduction of travel time on reconstructed rail sections.

Figure 8 Example of road modifications – R8 Topoľčany - Rybany, 2030 (source: Transport Model of the SR)

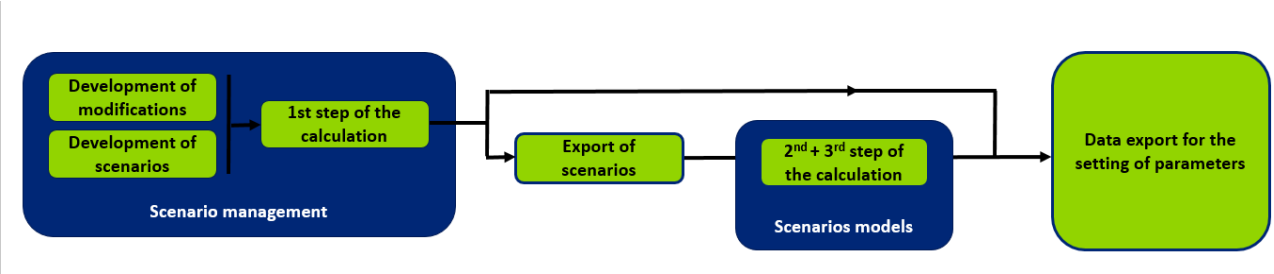
Figure 9 Example of road modifications – R8 Topoľčany - Rybany, 2130 (source: Transport Model of the SR)



Note: The above figures only illustrate the performed transport infrastructure modifications in the transport model. The routing of given sections is only illustrative.

The PTV Visum environment was used to create modifications and group them into scenarios, which were subsequently counted using the sequence of procedures acquired from model makers as follows. A calculation procedure provided by model makers was applied to modified scenarios in three steps. The first step was the calculation of the length of roads (no change compared with BAU 2030), the distribution of roads and modal split. Transport relations matrices and/or external matrices for allocations to the network were calculated in the second and third step. Allocations to the network are carried out in two steps taking into account different calculation algorithm settings for internal and external matrices.

Figure 10 Calculation procedure scheme (source: own)



Data was exported from the calculated scenarios – network-wide parameters for the comparison of scenarios and other specific parameters. To assess measures, various parameters were always compared for the scenarios "2130" and "2130 without measures". First, a set of network-wide parameters was created. Their values serve for universal comparison applicable to all measures. Next, measure-specific parameters are compared to supplement the network-wide values. They are matrices of travel times between major settlements, which are significantly affected by a specific measure.

The overview below describes which transport model outputs were used as criteria for the defined assessment categories.

- Transport accessibility – the number of favourably affected roads and the amount of time saved on such roads, which jointly constitute accessibility improvement potential, were assessed in this criterion. The affected relations were identified based on changes to travel times between major towns/cities with and without an implemented measure.
- Competitiveness of transport modes – a change in the PPT modal split (number of roads) at the network-wide level was a criterion.
- Transport supply – the transport supply quality was assessed using the Level of Service parameter on 1st, 2nd and 3rd class roads based on the HCM. Specifically, D and worse grade network decrease was assessed.
- Traffic safety – the road traffic safety parameter was derived from changes in performance in vehicle-kilometres.
- Environment – similar to safety, a positive environmental impact was derived from changes in performance in vehicle-kilometres. For rail transport measures, the traction type (electric x motor) was taken into account.

Assessment parameters and scales corresponded to the parameters of measures assessed by experts. The table below presents the limit values of the scale (1-5) for individual model outputs, including their pertinence to assessment parameters. The scales were primarily determined on a straight-line basis using intervals derived from measures of the greatest benefit.

Table 22 Limit values of rating scales for modelable measures

Limit values						
Scale	Transport accessibility		Competitiveness of transport modes	Transport supply	Safety and environment	
	Saved time (h)	Number of favourably affected roads	Increase in the number of PPT roads	Decrease in D-F grade on 1st, 2nd and 3rd class roads	Change in performance on roads (vehicle - kilometres)	Change in performance on rails (vehicle - kilometres)
1	0	1000	0	-10.64%	0	0
2	2351	3000	2676	-19.55%	-1.86%	0.47%
3	4441	5000	5352	-28.47%	-3.72%	0.93%
4	6530	10000	8027	-37.39%	-5.57%	1.40%
5	-	-	-	-	-	-

Given the nature and limits of the transport model of the SR, the impacts on the financial sustainability of operation and on freight transport could not be assessed. The assessment of these parameters for modelable measures was taken from the expert assessment (see below).

6.2.3 Expert Assessment

The assessment was carried out using the basic principles of the Delphi method (assessment by a panel of independent experts), which is, inter alia, used to forecast changes in hard to accurately predict parameters.

In this way, all measures in the seven defined categories were assessed using the 1 - 5 scale to reflect the positive impact of the given measure (eg reduced travel times, increased use of rail compared with ICT, reduced impacts on the environment and population, etc).

Twenty-six experts from MTCRD SR, academia, representatives of regions, towns, cities, and competent organisations were addressed for these purposes.

They consisted of:

- Representatives of state transport authorities (9);
- Representatives of the largest Slovak cities and towns (3);
- Representatives of self-governing regions (8);
- Representatives of civic environmental associations (2);
- Representatives of umbrella groups for transport sector organisations (1);
- Representatives of research organisations (1); and
- Representatives of academia (2).

Each of the addressed representatives is professionally active in the transport sector, or actively involved with transport professionally. The assessments of completed questionnaires were aggregated and combined with the assessments of infrastructure measures from the transport model to create a single list of all measures across transport modes, including their assessment in seven categories.

6.2.4 Environmental Assessment and Selection of Alternative Modal Measures

Environmental assessment of measures involved the assessment of their impacts, risks and opportunities for eleven environmental components (see Chapter 6.2.1).

The rating scale was as follows:

5	Significant positive impacts or opportunities of the measure
4	Positive impacts or opportunities of the measure
3	Positive and negative impacts of the measure
2	Negative impacts or risks of the measure
1	Significant negative impacts or risks of the measure
N/A	The measure has no link to this environmental component

For comparison purposes, the measures were rated in one aggregate category according to the following table:

5	The measure has very beneficial environmental impacts with no or little negative impacts
4	The measure has mostly beneficial environmental impacts
3	The measure has positive and negative environmental impacts The measure is environmentally neutral
2	The measure has negative impacts on some environmental components
1	The measure is problematic in terms of environmental impact with significant negative impacts

Measures rated 4 or 5 may have a negative impact on an environmental component, but their positive impacts prevails. On the other hand, measures rated 1 or 2 may have a positive impact on an environmental element, but their negative are not negligible, ie significant.

Measures in public passenger transport and rail transport with more positive and less negative environmental impacts were preferred in the selection. Road measures usually have positive and negative impacts; sometimes they have slightly more negative impacts and risks. Aviation measures tend to have negative environmental impacts. According to current knowledge, infrastructure measures in water transport have the greatest risk potential, ie potentially greatest negative impacts (mainly depending on the selected technical solution), in particular on surface water and groundwater.

Measures with prevailing negative impacts should be implemented only if it is impossible to achieve objectives by positive or neutral measures; negative impacts should be mitigated as much as possible at the project level.

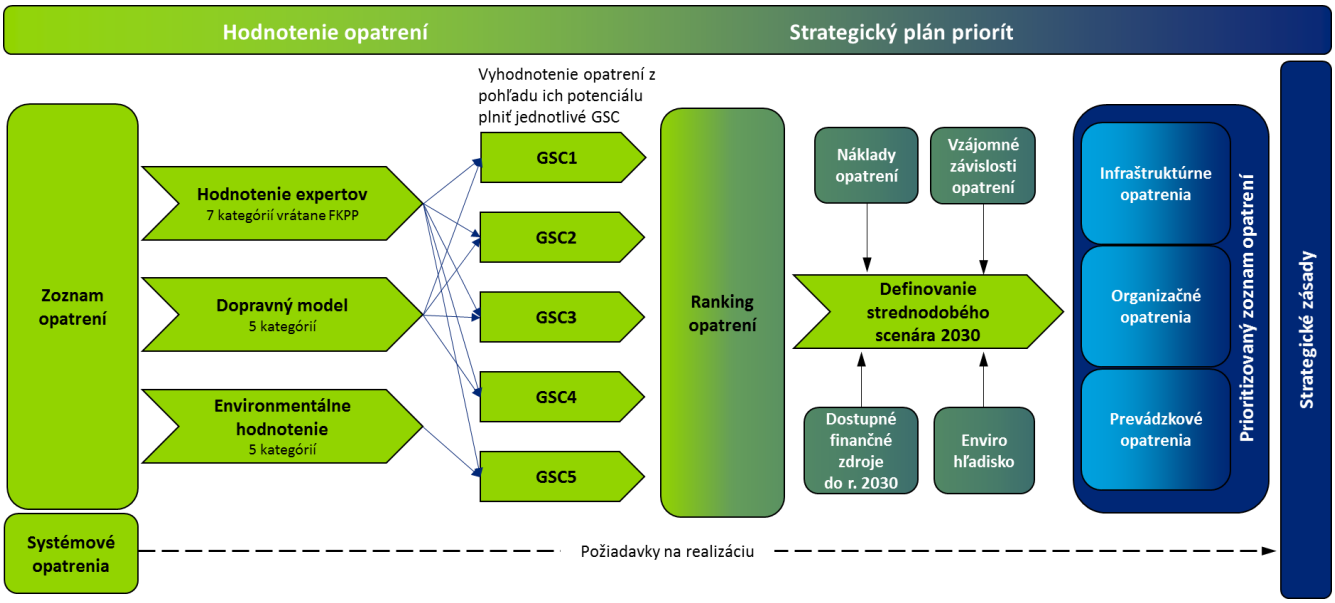
6.3 Assessment of Measures in Relation to Strategic Global Objectives

The overall assessment of the measures determined the potential of these measures to achieve the defined strategic global objectives. The assessment criteria of previous assessments (expert assessment, assessment based on the transport model and environmental assessment) that best define the relevant strategic global objective were identified for each strategic global objective. A ranking of all measures in terms of their potential to contribute to achieving individual objectives was created from the results of the assessment of measures in the given criteria and their aggregation. As a result, five separate rankings of measures were prepared for all five strategic global objectives.

The overall assessment of the measures is the arithmetic mean of the five assessments representing the potential of each measure to contribute to the relevant strategic global objective.

The comparison of the final assessment results was used to prepare the final ranking of measures.

Figure 1 Illustration of assessment of measures in connection with strategic global objectives



The methodology for the overall assessment of measures was as follows:

1) Identification of the criteria for each strategic global objective assessed during the primary assessment of the measures (expert assessment, assessment based on the transport model and environmental assessment) which can be used to assess a measure's contribution contributing to the relevant strategic global objective.

Table 23 Assessment criteria identified for each strategic global objective

Strategic Global Objective (GSC)	Assessment Based on the Transport Model	Expert Assessment	SEA Assessment
GSC1 Providing equivalent access to settlements and industrial zones to support economic growth and social inclusion in all Slovak regions (national and European scale) via non-discriminatory access to transport infrastructure and services	• Transport accessibility • Transport supply • Competitiveness of transport modes • Impact on freight transport	• Transport accessibility • Transport supply • Competitiveness of transport modes	N/A
GSC2 Sustainable development of the transport system in the Slovak Republic with an emphasis on the generation and effective use of funds in relation to the real needs of users	• Financial sustainability • Financial demands	• Financial sustainability • Financial demands	N/A
GSC3 Increase the competitiveness of passenger and freight transport (vs. road transport) by setting operational, organisational and infrastructural parameters leading to an efficient integrated multimodal transport system supporting the economic and social needs of the Slovak Republic. Increase the quality of transport planning in the Slovak Republic by defining the optimal target value of modal split in the Slovak Republic and specification of steps and tools to achieve it.	• Competitiveness of transport modes	• Competitiveness of transport modes	N/A
GSC4 Improved safety and security of transport, leading to sustainable safe mobility on safe infrastructure, introduction of new technologies/processes using preventive and control mechanisms	• Traffic safety	• Traffic safety	N/A

GSC5 Reduced negative environmental and negative socioeconomic transport impacts (including climate change) as a result of environmental monitoring, effective infrastructure planning/implementation and a reduced number of conventionally-fuelled vehicles, and use of alternative fuels	• Environment (20% of the criterion value)	• Environment (20% of the criterion value)	• Overall SEA assessment (60% of the value)

2) Assignment of a value resulting from the assessment of a measure in terms of each criterion. This value is the aggregate result of the values from the primary assessments of the relevant measures (expert assessment, assessment based on the transport model and environmental assessment).
3) Assessment of each measure in terms of its potential to contribute to the relevant strategic global objective. The value is the arithmetic mean of the primary assessments of the measure in terms of the relevant criteria.
4) Ranking of all measures based on the calculated value of its potential to contribute to the relevant strategic global objective and an identification of measures with the greatest potential.
5) Overall assessment of measures based on the aggregated results of assessments in terms of their potential to contribute to individual strategic global objectives. The aggregation is a calculation of the arithmetic mean of these five assessments.
6) Preparation of the final ranking of measures based on a comparison of the results of the general assessment of the measures.

A ranking of the measures in terms of their potential to contribute to each strategic global objective and the final ranking of the measures is given in the table below.

Table 24 Ranking of measures in terms of their potential to contribute to the relevant strategic global objective and ranking of measures

Measure ID	GSC1		GSC2		GSC3		GSC4		GSC5		Overall Assessment	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
OPC 01	2.37	32	2.61	30	2.16	30	2.47	23	2.62	25	2.45	**30**
OPC 02	2.48	28	3.50	7	2.47	25	3.63	2	3.16	20	3.05	**17**
OPC 03	2.38	31	2.39	37	2.21	28	3.00	12	2.49	28	2.49	**27**
OPC 04	2.91	15	2.58	32	2.79	22	3.11	8	3.54	15	2.98	**19**
OPC 05	3.94	2	3.42	10	1.20	33	1.20	36	2.28	31	2.41	**31**
OPC 06	3.25	9	3.47	9	1.20	33	1.20	36	1.68	35	2.16	**36**
OPC 07	2.69	22	3.31	15	1.20	33	2.40	24	2.76	22	2.47	**28**
OPC 08	3.91	3	3.31	16	1.20	33	6.01	1	3.60	13	3.61	**7**
OPC 09	4.59	1	3.56	5	4.21	7	3.61	3	2.64	24	3.72	**3**
OPC 10	2.31	34	3.50	7	1.20	33	1.20	36	1.68	35	1.98	**38**
OPC 11	3.50	6	3.38	12	4.22	5	3.50	4	3.80	10	3.68	**4**
OPC 12	2.84	16	3.14	18	1.20	33	2.40	24	2.76	22	2.47	**29**
OPL 01	2.24	35	2.69	28	2.17	29	1.94	32	2.00	34	2.21	**34**
OPL 02	2.71	21	3.03	21	2.67	23	2.33	27	2.02	33	2.55	**26**
OPV 01	2.39	30	3.16	17	3.13	20	2.75	19	1.58	37	2.60	**25**
OPV 02	1.97	36	2.34	38	2.13	31	2.81	17	2.45	30	2.34	**32**
OPV 03	2.37	33	3.53	6	2.94	21	2.50	22	2.18	32	2.70	**24**
OPV 04	1.69	38	2.44	35	2.31	26	1.50	35	2.48	29	2.08	**37**
OPV 05	2.58	24	2.47	33	2.31	26	2.38	26	1.45	38	2.24	**33**
OPVO 01	3.58	4	2.68	29	4.28	3	3.17	7	4.49	2	3.64	**6**
OPVO 02	2.78	20	2.41	36	3.47	17	2.25	29	3.36	19	2.85	**22**
OPVO 03	2.79	18	3.38	12	4.22	5	3.50	4	4.40	4	3.66	**5**
OPVO 04	2.54	26	2.46	34	3.31	18	2.94	13	4.51	1	3.15	**15**
OPVO 05	3.03	14	2.76	26	3.78	12	2.89	14	4.24	6	3.34	**11**
OPVO 06	2.46	29	2.91	22	3.56	16	2.11	31	3.82	9	2.97	**20**
OPVO 07	2.82	17	2.88	23	3.76	13	2.71	20	3.85	7	3.20	**14**
OPVO 08	2.79	18	3.35	14	3.72	14	3.06	9	4.44	3	3.47	**10**
OPŽ 01	3.09	13	3.84	2	3.94	9	3.18	6	3.74	12	3.56	**9**
OPŽ 02	3.17	12	2.72	27	4.06	8	2.53	21	3.60	14	3.21	**13**
OPŽ 03	3.21	11	2.60	31	3.94	9	1.82	33	3.39	16	2.99	**18**
OPŽ 04	3.49	7	3.97	1	6.01	1	3.01	10	2.88	21	3.87	**2**
OPŽ 05	3.26	8	3.75	3	6.01	1	3.01	10	3.84	8	3.97	**1**
OPŽ 06	3.25	10	2.81	25	3.71	15	2.24	30	3.36	18	3.07	**16**
OPŽ 07	3.53	5	3.72	4	4.24	4	2.76	18	3.76	11	3.60	**8**
OPŽ 08	2.65	23	2.84	24	3.24	19	2.29	28	3.39	16	2.88	**21**
OPŽ 09	2.50	27	3.06	20	3.88	11	2.82	15	4.27	5	3.31	**12**
OPŽ 10	2.56	25	3.41	11	2.65	24	2.82	15	2.58	26	2.80	**23**
OPŽ 11	1.69	37	3.09	19	1.94	32	1.53	34	2.55	27	2.16	**35**

6.3.1 Financial Framework for the 2014-2030 Period

The list of measures resulting from the above assessment was put into a financial framework for the period for which the strategy is defined, ie 2030. In terms of resources and funds required to implement the measures, the financial framework can be identified by the following procedure.

Table 25 Indicative financial framework (available funds) for 2014-2030.

Period	Funding Source	Infrastructural and Operational Activities	Total [EUR bil.]
2014 - 2023	EU funds	a) Operational Programme Integrated Infrastructure 2014-2020	1.37
		b) Connecting Europe Facility (CEF)	0.12
		c) Integrated Regional Operational Programme (IROP)	0.42
	State budget and entities' own funds	d) State co-financing of OPII, CEF and IROP (co-financing 15% of NFC, ineligible expenditure, expenditure exceeding the financial gap)	1.00
		e) Funds for operation and maintenance in individual transport modes (2014-2023)	12.07
		f) A public transport service contract with REGIOJET	0.08
		g) Toll revenues for NDS	1.99
	Total for 2014-2023		**17.04**
2024 - 2030	**Estimate for 2024-2030**		**14.32**
Total for 2014-2030			**31.36**

The indicative financial framework for 2014-2030 is the sum of EU contributions, funds from the MTCRD SR's budget or own funds of the beneficiaries for the defined period. Estimates of the financial framework are based on the current budgets and grants for different transport modes and do not reflect possible future increases due to price indexation or decisions on the reallocation of EU funds. The financial framework is indicative and was prepared based on JASPERS guidance. It is primarily intended to estimate financial requirements and create a realistic scenario for implementation of the strategy's measures.

EU funds

EU contributions include:

a) Total allocation without national co-funding under the **Operational Programme Integrated Infrastructure 2014-2020** (except for priority axes dedicated to the information society and technical assistance). The costs of projects implemented in phases as per EP and Council Regulation (EU) No. 1303/2013 – projects of motorways, expressways and 1st class roads, and all undisputed construction in accordance with the BAU 2030 scenario in the transport model – were subtracted from this allocation.

b) Allocation of the **Connecting Europe Facility 2014-2023**.
The costs in accordance with the BAU 2030 scenario in the transport model were subtracted from this allocation.

c) Allocation from the **Integrated Regional Operational Programme 2014-2020**, particularly Priority Axis 1 Safe and Environmentally-Friendly Transport in Regions.

State budget and own funds of entities

State funds comprise the following:

d) **State co-financing (15% co-financing, payment of ineligible expenditure and expenditure exceeding the financial gap)** for projects financed from the Operational Programme Integrated Infrastructure 2014 – 2020, the Connecting Europe Facility (CEF), and the Integrated Regional Operational Programme 2014 – 2020, (Priority axis 1: Safe and environmentally-friendly regional transport); the amount of the national co-financing

was determined based on experience from previous programming periods and an indicative list of projects identifying revenue-generating projects.

e) Funds of entities (state administration, local and regional self-government and their sub-entities with an ownership interest) **for operation and maintenance of individual transport modes:**

- Road infrastructure (NDS, SSC, self-governing regions for 2nd class roads; for 2nd class roads also Bratislava and Košice);
- Railway infrastructure (ŽSR, ZSSK, ZSSK CARGO);
- Water transport infrastructure (ARVD, VP);
- Civil aviation infrastructure (Bratislava, Košice, Poprad, Žilina, Piešťany and Sliač airports);

f) A grant for REGIOJET under a public transport service contract for the operation of rail passenger transport;

g) Road infrastructure revenues (electronic toll collection and motorway vignettes) net of the costs of an independent expert, commissions for motorway vignette sellers, bank fees, operation of fleet cards and total payments and/or an increase in payables to the electronic toll system provider, and an expected 3% annual increase in revenues is also taken into account.

Total funds earmarked for transport in 2014 – 2020 do not include:

- Long-term and short-term loans
  - (NDS draws two loans of approx. EUR 498 million and EUR 60 million for 2007 – 2022. Other major entities operating in the transport sector, ie ŽSR, ZSSK and ZSSK CARGO, also use loans extensively to fund their activities and the acquisition of new infrastructure).
  - The total estimated amount of loans expected to be drawn by entities, such as NDS, ŽSR, ZSSK and ZSSK CARGO, is approx. EUR 0.5 bil. (depending on the impacts on the public finance deficit) in 2023 – 2030).
- Grants to towns and cities to cover operating costs and/or losses incurred by their transport undertakings;
- Motor vehicle tax collection; and
- Emergency funds.

It is expected approx. EUR 17.04 bil. for 2014 – 2023 could be allocated to the transport sector if current trends continue. This amount does not include the costs of funding structures under construction financed from OPII (estimated costs of approx. EUR 2.7 bil.) and PPP projects (approx. EUR 1.49 bil.) as they are not covered by the measures of this category.

The amount of available funds in the transport sector for 2024 – 2030 is expected to be similar to the amount for 2014 – 2023. Thus, the amount of available funds for 2024 – 2030 is adjusted using the duration coefficient (the period is three years shorter than 2014 – 2023). It is necessary to point out that this scenario depends on obtaining EU funds of a similar amount and the same aid intensity level.

The availability of funds in the transport sector for 2014 – 2030 is provisionally estimated at EUR 31.36 bil. for strategy purposes. It is necessary to stress again that this estimate is indicative and subject to updates during the preparation of the financial plan for strategy and the public administration budget.

6.4 Selection of Measures

The final ranking of measures was set based on their potential to contribute to the defined visions and strategic objectives. The potential of measures was assessed based on their positive impact on key assessed parameters relating to transport and the environment.

Table 26 Final ranking of measures based on the overall assessment (potential to meet global strategic objectives)

Ranking	Measure ID	Measure Name
1	OPŽ 05	Modernisation of the Kúty state border - Bratislava - Štúrovo/Komárno state border corridor
2	OPŽ 04	Modernisation of the Žilina - Košice - Čierna nad Tisou backbone line
3	OPC 09	Completion of the northern road axis in central Slovakia
4	OPC 11	Development of the other 1st and 2nd class road network
5	OPVO 03	Renew vehicle fleet to ensure appropriate quality
6	OPVO 01	Preference of public passenger transport in urbanised areas
7	OPC 08	Completion of the west-east road axis in central Slovakia
8	OPŽ 07	Modernisation, capacity increase and ensuring of interoperability of a wider Bratislava hub – capacity increase and modernisation of selected lines as required by the transport service plan: Bratislava hub and branches leading to Kittsee, Rajka and Komárno
9	OPŽ 01	Completion of the modernisation of the main TEN-T lines in a high degree of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – Marchegg
10	OPVO 08	Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses
11	OPVO 05	Construction of park-and-ride facilities near railway stations and terminals
12	OPŽ 09	Improve conditions for combined transport and operation of complete freight transport sets and support the interoperability of freight transport vehicles (organisation, infrastructure and vehicles)
13	OPŽ 02	Prepare operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050
14	OPVO 07	Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness
15	OPVO 04	Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists
16	OPŽ 06	Prepare and implement the Target 2030 Timetable – modify the interval and number of connections on connecting lines for the Žilina - Košice and Kúty state border - Štúrovo/Komárno state border corridor and make the associated infrastructure changes on such lines
17	OPC 02	Changes in principles and road infrastructure administration and maintenance
18	OPŽ 03	Completion of Target 2020 Timetable implementation
19	OPC 04	Conceptual ITS development
20	OPVO 06	Revitalisation of railway stations and stops to improve the travel culture and quality
21	OPŽ 08	Ensuring interoperability and adequate capacity on other core TEN-T lines: Púchov - Horní Lideč
22	OPVO 02	Establishment of the national transport authority and public transport integration
23	OPŽ10	Centralisation of operation management
24	OPV 03	Modernise public ports in Slovakia and ensure regular maintenance
25	OPV 01	Implement technical measures to ensure the required parameters of the ship route of the Danube waterway
26	OPL 02	Modernisation and construction of civil aviation infrastructure to ensure national and regional economic development and increase the quality of services provided as part of natural and special-purpose mobility
27	OPC 03	Modernisation of service stations in the motorway and expressway network
28	OPC 07	Completion of the north-south connection in eastern Slovakia
29	OPC12	Modernisation and development of the other motorway and expressway network
30	OPC 01	Implement a new road network concept
31	OPC 05	Completion of the west-east priority axis (the Rhine-Danube Corridor, Czech and Slovak branch)
32	OPV 02	Introduce extended river information services
33	OPV 05	Cooperate with the watercourse administrator to maintain waterways and shipping structures on the monitored Slovak waterways at the year-round navigability level
34	OPL 01	Optimisation of the system of airports operated by airport companies to ensure functional and effective planning of aviation development
35	OPŽ11	Rationalisation of operation on other lines taking into account the operational passenger transport concept
36	OPC 06	Completion of the north-south connection with Poland and the Czech Republic
37	OPV 04	Settle property relations at public ports
38	OPC10	Road network development in the Bratislava agglomeration

Note: The above ranking of measures envisages the construction of all the undisputable structures – under construction, or in a high degree of preparation (the BAU 2030 scenario in the transport model)

However, the objectives of transport development defined for the period up to 2030 can be achieved using the measures that are feasible in terms of available funds and time.

Financial demands were estimated for each assessed measure based on the expected costs of each project under the relevant measure. The measure implementation date was also determined based on estimated implementation dates of the relevant projects.

Note:

Two measures OPV1 (Implementation of technical measures to create the required parameters on the Danube shipping route) and OPV5 (Cooperation with the watercourse administrator to maintain waterways and shipping structures on the monitored Slovak waterways at the year-round navigability level) were identified in the strategic environmental assessment process to have potential negative environmental impacts. The assessment revealed potential negative impacts of these measures on protected areas, NATURA 2000, biodiversity, and surface and ground water, and identified no significant environmental benefits.

As the strategic assessment covers measures rather than specific projects, which require a deeper knowledge of technical, environmental, socioeconomic and transport characteristics of the given projects, the specific environmental impacts of projects may be assessed more positively after the implementation of the relevant mitigating and/or compensatory measures.

6.5 Development Strategy

In connection with the above methodological procedure, ie the assessment of measures in terms of their positive impact on the assessed key parameters related to transport and the environment (see Chapter 6.2) and the subsequent assessment of measures based on their potential to meet the defined global strategic objectives (see Chapter 6.3), basic requirements for the implementation of systemic, infrastructure, operating and organisational measures are defined below as key strategic principles.

6.5.1 Basic Requirements for the Implementation of Systemic Measures

The systemic measures stated in Chapter 5.1 are sector-wide measures responding to cross-sectional sector issues. They are issues that must be addressed in all transport subsectors and their resolution is a basic prerequisite for meeting the strategy objectives.

The nature of systemic measures implies that their implementation is associated with the amending of legislation, setting of procedure, etc. Strategic sub-conclusions are defined to determine basic measure implementation parameters. For measures, which also have an implementation component, specific projects and entities responsible for their implementation need to be defined in the implementation plan.

In line with the above, strategic principles reflecting the related analyses outputs and setting basic requirements for the implementation of systemic measures applicable to the transport sector as a whole are specified. However, the strategic principles must be appropriately applied at the level of the MTCRD SR and its subordinate organisations, and also at the region and town/city level.

6.5.1.1 Setting the principles of sustainable transport sector financing

The strategic principles for the setting of the principles of sustainable transport sector financing are as follows:

STRATEGIC PRINCIPLE 1

Sustainable transport sector financing is a key precondition for sustainable transport sector development. The initial step is the preparation of a detailed plan for sustainable transport system financing taking into account existing and new financing possibilities (using structured financing principles).

STRATEGIC PRINCIPLE 2

The priority objective of sustainable transport sector financing is to set parameters for the sustainability of the existing transport infrastructure. This means securing funds for the operation, maintenance and repairs (including the elimination of the existing internal maintenance debt of the transport sector), while stabilising national funds. New investment construction must not interfere with this requirement, even if it results in its lower pace.

STRATEGIC PRINCIPLE 3

Revenues from payments for the use of transport infrastructure should be distributed to administrator entities for maintenance and repair of this infrastructure. The secondary criterion should be the targeted distribution of potential surpluses to amortise the internal maintenance debt.

STRATEGIC PRINCIPLE 4

Given the budgetary possibilities of the Slovak Republic and the investment needs associated with the development of transport infrastructure included in the TEN-T network, co-financing must be obtained from the EU for the next period.

6.5.1.2 Periodic Preparation and Implementation of Transport Infrastructure Maintenance Plans

The strategic principles related to the periodic preparation and implementation of transport infrastructure maintenance plans are as follows:

STRATEGIC PRINCIPLE 5

Given growing transport demand, insufficient maintenance in previous years and the resulting infrastructure degradation, detailed repair and maintenance plans must be prepared for all transport modes. In addition to standard financial requirements set for operation and maintenance based on the relevant technical conditions, these plans must also contain the disintegration of financial needs related to the amortisation of internal maintenance debt.

STRATEGIC PRINCIPLE 6

Maintenance plans must be one of the inputs to the preparation of sustainable transport sector financing plans. Compliance with the approved maintenance plans and their financial allocations must be thoroughly regulated by legislation.

6.5.1.3 Preparation and Implementation Process of Development Projects, Including Related Activities

The strategic principles related to the preparation and implementation of development activities are as follows:

STRATEGIC PRINCIPLE 7

1. Conceptual preparation

Project plan preparation should follow certain order and standards to define the best solution for the implementation. Equally important is streamlining and improving of the quality of project preparation, which consist of following steps:

- 1.1 Forecasts, surveys;
- 1.2 Conceptual studies (studies of possibilities and opportunities) – variants;
- 1.3 Feasibility studies (FS), including the selection of an appropriate route taking into account environmental and health protection, protected areas and Natura 2000 areas;;
- 1.4 Preparation of changes in land use plans and the assessment of their cumulative environmental impacts using the strategic assessment pursuant to Article 4 (1) of Act No. 24/2006 Coll.;
- 1.5 Land-use technical study, supporting documentation for the building plan

2. Investment preparation – documentation preparation
   - 2.1 Building plan documentation for the selected variant;
   - 2.2 Documentation for the environmental impact assessment of a structure (EIA);
   - 2.3 Documentation for the land use decision;
   - 2.4 Documentation for the building permit;
3. Investment implementation – construction
   - 3.1 Documentation for construction, contractor selection;
   - 3.2 Construction;
   - 3.3 Actual construction documentation.

The need for all of the above steps to be taken in cooperation with competent authorities and the related documentation to be prepared should be assessed on a systematic level – some steps can be merged in order to improve and optimise the permitting procedure. Various additional forecasts and surveys may be supplemented in more complex cases. The preparation of infrastructure projects requires the selection of routes taking into account protected areas, Natura 2000 areas and valuable landscape elements and the assessment of the routing at the land use plan level using the SEA process.

Transport infrastructure contracts must be awarded in compliance with environmentally-friendly public procurement principles. The preparation and construction process requires waste production minimisation, environmentally-friendly waste management, recycling and reuse and special and hazardous waste production minimisation. The promotion of waste reduction by the construction and operation of transport infrastructure and service infrastructure of water and air transport should be a priority. Material intensity should be reduced and/or waste reuse and recycling in the construction, modernisation, operation and maintenance of transport infrastructure should be prioritised.

STRATEGIC PRINCIPLE 8

In connection with strategic principle 7, it is necessary to define project categories/types with the required extent of the documentation in the conceptual preparation phase. A failure to meet the extent and time requirements for the conceptual preparation would disable the transition to the investment preparation phase. The set requirements for the extent and sequence of conceptual preparation steps, and the recommended methodology for their processing, must be stipulated in the relevant regulations associated with this matter.

6.5.1.4 Supplementation and Ongoing Maintenance of Subsector Databases

The strategic principles related to the supplementation and ongoing maintenance of subsector databases are as follows:

STRATEGIC PRINCIPLE 9

Given the lack of input data enabling detailed transport sector development planning, processes must be set by which the necessary databases will be adequately secured, maintained and updated.

STRATEGIC PRINCIPLE 10

A database list necessary for effective management, function optimisation and development planning must be compiled for each transport subsector. In line with such lists, comprehensive collection, evaluation, update and archiving plans will be prepared for such data, including details of individual data items and their attributes. The acquired inputs will be included in the Plan for the Supplementation, Maintenance and Update of Transport Sector Databases and the Creation of the Central Transport, Economic and Financial Database.

STRATEGIC PRINCIPLE 11

The obligation to collect, incorporate, regularly update and archive the data sets defined by strategic principle 10 or the Plan for the Supplementation, Maintenance and Update of Transport Sector Databases and the Creation of the Central Transport, Economic and Financial Database must be stipulated in the internal regulations of the concerned entities and organisations.

6.5.1.5 Improvement of Functionalities and Administration of the Multimodal Transport Model of the Slovak Republic

The strategic principles related to the improvement of functionalities and the administration of the multimodal transport model of the Slovak Republic are as follows:

STRATEGIC PRINCIPLE 12

The strategic transport model of the Slovak Republic and its quality and/or the informative capability is directly dependent on the extent and quality of input data. Therefore, it is necessary to compile a comprehensive list of input data requirements for transport model purposes and include them in the Supplementation, Maintenance and Update Plan for Transport Sector Databases in line with strategic principle 10.

STRATEGIC PRINCIPLE 13

Given the data requirements related to transport model updates and modifications, cross-sectoral cooperation is required to guarantee that non-transport sector data is obtained (demographic data, economic indicators, etc). Access to public and private sector data is required for passenger and freight transport.

STRATEGIC PRINCIPLE 14

The strategic transport model of the Slovak Republic must be regularly updated to ensure it is usable. The frequency of such updates must be set in line with and be an integral part of the Supplementation, Maintenance and Update Plan for Transport Sector Databases.

STRATEGIC PRINCIPLE 15

Future transport model modifications require the full integration of all passenger and freight transport modes into a single common transport model.

6.5.1.6 Regular Updates of Strategic and Development Documents

The strategic principles related to regular updates of strategic and development documents are as follows:

STRATEGIC PRINCIPLE 16

In connection with periodic updates and maintenance of transport subsector databases, all key strategic and development documents must be regularly assessed and updated. The updates primarily apply to:

- Transport Strategy Implementation Plan until 2030;
- Transport infrastructure financing plans;
- Transport infrastructure maintenance plans;
- Supplementation, Maintenance and Update Plan for Transport Sector Databases;
- Monitoring reports on transport impacts on the environment and population;
- Safety audits of transport infrastructure;
- Strategic transport model of the SR;

And other documents, which must be listed for these purposes across the transport sector.

STRATEGIC PRINCIPLE 17

For each document included in the list compiled under strategic principle 16, the frequency of updates must be set in accordance with database updates. Entities and their organisational units responsible for document updates and archiving must also be clearly specified.

6.5.1.7 Regular Monitoring of Noise and Air Quality and Implementation of Measures Reducing Negative Environmental Impacts of Transport

The strategic principles related to the regular monitoring of noise and air quality and the implementation of measures reducing negative environmental impacts of transport are as follows:

STRATEGIC PRINCIPLE 18

An effective implementation of measures with potential environmental impacts requires uniform rules and parameters to be set for regular noise and air quality monitoring, vertebrate road and rail mortality monitoring, animal migration corridor mapping, collision avoidance measures and measures enabling migration on the existing infrastructure (ecoducts, wide and dry passageways under bridges, amphibian fencing and barriers, including passageways). Such rules must be set in line with standards regulating the given matter. The obligation to carry out regular environmental monitoring must be stipulated in legislation and consistently enforced.

STRATEGIC PRINCIPLE 19

The outputs of environmental monitoring carried out in line with strategic principle 18 will provide the basis for the proposal of and implementation of technical measures (noise barriers, bypasses, etc) and will be attached to each technical design as part of the EIA process.

STRATEGIC PRINCIPLE 20

After the preparation of the National Political Framework for the Implementation of Infrastructure for Alternative Fuels and Common Technical Specifications, its requirements must be reflected and the technical parameters defined when planning new or reconstructing and renewing the existing transport infrastructure. Support will also be needed for the commercial sector to ensure the equipping of the current energy transport infrastructure with alternative fuel infrastructure. Therefore, in addition to support measures, Directive 2014/94/EU of the European Parliament and of the Council on the deployment of alternative fuels infrastructure and the European Strategy for Low-Emission Mobility must be implemented, and the meeting of its partial goals to meet the emission targets in 2050 continuously monitored.

6.5.1.8 Regular Safety Audits and Implementation of Measures Improving Transport Safety

The strategic principles related to regular safety audits and the implementation of measures improving transport safety are as follows:

STRATEGIC PRINCIPLE 21

To meet the transport safety objectives of the European Commission, regular transport infrastructure safety audits will be required and the resulting remedial actions must be undertaken. Audits must be carried out in accordance with international methodologies allowing the comparison of results across EU Member States (eg the EuroRAP methodology for road infrastructure). The obligation to carry out regular infrastructure safety audits must be stipulated in legislation and consistently enforced.

STRATEGIC PRINCIPLE 22

As part of transport infrastructure is classified as critical infrastructure and transport infrastructure is often the target of terrorist attacks, safety parameters will be required as regards operation and security. The latest international rail transport and civil aviation standards must be adopted.

6.5.2 Infrastructure Development Strategy

The output of the strategic assessment of infrastructure measures is given below according to the result of their final assessment (potential to meet the global strategic objectives) in line with the above-stated methodological procedure (Chapter 6.3). The set of all infrastructure measures across transport modes is presented to demonstrate the significance of proposed infrastructure measures. In determining their significance, infrastructure measures were assessed as a whole (ie as a set of specific projects), which does not mean that the selected projects under the measures with a lower overall assessment cannot be implemented as priority projects.

The above-stated output directly impacts the creation of strategic principles related to transport infrastructure described below and is one of the inputs for the strategy implementation plan.

The values of potential benefits of individual measures are directly affected by numerous factors, which must be taken into account in the implementation of this strategy. For example, it is the ratio of the total length of measures to the length of unfinished sections, which affects its relative benefit rate, the length of measure sections as such, etc.

As a result, the assessment does not constitute the overall strategic significance of the measure. The BAU 2030 scenario with all essential structures (under construction, a high degree of preparation) was used as a basis in the assessment based on the transport model**.** This fact also affects the potential benefit of the measures.

Table 27 Strategic assessment output – benefit of infrastructure measures (the assessment considers the state of the infrastructure after completion of projects under construction and with a high degree of preparation) in terms of their potential to meet the defined global strategic objectives

Measure ID	Measure name	Assessment
OPŽ 05	Modernisation of Kúty state border - Bratislava - Štúrovo/Komárno state border corridor	3.97
OPŽ 04	Modernisation of the core Žilina - Košice - Čierna nad Tisou line	3.87
OPC 09	Completion of the north-south road axis in central Slovakia	3.86
OPC11	Development of the other 1st and 2nd class road network	3.68
OPVO 01	Preference of public passenger transport in urbanised areas	3.64
OPC 08	Completion of the west-east road axis in central Slovakia	3.61
OPŽ 07	Modernisation, capacity increase and ensuring of interoperability of a wider Bratislava hub – capacity increase and modernisation of selected lines as required by the transport service plan: Bratislava hub and branches leading to Kittsee, Rajka and Komárno	3.60
OPŽ 01	Completion of the modernisation of the main TEN-T lines in a high degree of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – Marchegg	3.56
OPVO 08	Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses	3.47
OPVO 05	Construction of park-and-ride facilities near railway stations and terminals	3.34
OPVO 07	Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness	3.20
OPVO 04	Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists	3.15
OPC 04	Conceptual ITS development	2.98
OPVO 06	Revitalisation of railway stations and stops to improve the travel culture and quality	2.97
OPŽ 08	Ensuring interoperability and adequate capacity on other core TEN-T lines: Púchov - Horní Lideč	2.88
OPV 03	Modernise public ports in Slovakia and ensure regular maintenance	2.70
OPV 01	Implement technical measures to ensure the required parameters of the ship route of the Danube waterway	2.60
OPL 02	Modernisation and construction of civil aviation infrastructure to ensure national and regional economic development and increase the quality of services provided as part of natural and special-purpose mobility	2.55
OPC 03	Modernisation of service stations in the motorway and expressway network	2.49
OPC 07	Completion of the north-south connection in eastern Slovakia	2.47
OPC12	Modernisation and development of the other motorway and expressway network	2.47
OPC 05	Completion of the west-east priority axis (the Rhine-Danube Corridor, Czech and Slovak branch)	2.41
OPC 06	Completion of the north-south connection with Poland and the Czech Republic	2.16
OPC10	Road network development in the Bratislava agglomeration	1.98

The above-stated outputs provide a basis for defining multimodal strategic principles in transport infrastructure and preparing the related implementation plan.

STRATEGIC PRINCIPLE 23

Given the significant investment and operating requirements to ensure capacity and sustainable infrastructure of the Slovak transport sector, funds must be spent using all effective planning principles to maximise their benefits. This approach should be applied to ensuring the national and international passenger and freight transport accessibility of the Slovak Republic.

STRATEGIC PRINCIPLE 24

Given the TEN-T infrastructure completion deadlines set by the EC, preparation and implementation must be a priority. Priorities should be set in the light of the above-stated assessment outputs, their potential benefits and effectiveness. Technical design parameters are required to meet TEN-T infrastructure requirements and real needs.

STRATEGIC PRINCIPLE 25

The focus of medium-term transport infrastructure development must be public passenger transport, which will overlap with rail and road infrastructure. In this respect, an optimal target value for the modal split in the Slovak Republic as part of the transport policy must be defined, and determine the tools and steps necessary to achieve the target value. The transport induction and contribution of each transport infrastructure project to the modal split change in favour of more appropriate transport modes in terms of the environment and economy must be assessed where feasible and practicable.
It is important for passenger long-distance and freight transport to focus primarily on the modernisation completion and capacity increase of significant rail corridors and the development of capacity road infrastructure supported by intelligent transport system technology.

STRATEGIC PRINCIPLE 26

Passenger and freight transport multimodality promotion must be a significant aspect of the implementation of development infrastructure projects. Road and rail infrastructure development must promote these transport modes and prepare conditions supporting effective investments in inland water transport and civil aviation measures.

Strategic assessment outputs are broken down by transport mode. The potential to meet strategic objectives is an input into the preparation of an implementation plan which, inter alia, takes into account the following aspects: preparedness, unfinished construction of individual measures and their potential economic efficiency.

6.5.2.1 Outputs of the Strategic Assessment of Road Infrastructure

The table below presents the outputs of the strategic assessment of road infrastructure.

Table 28 Outputs of the strategic assessment of road infrastructure (the assessment considers the state of the infrastructure after completion of projects under construction and with a high degree of preparation)

Measure ID	Measure name	Assessment
OPC 09	Completion of the north-south road axis in central Slovakia	3.86
OPC11	Development of the other 1st and 2nd class road network	3.68
OPC 08	Completion of the west-east road axis in central Slovakia	3.61
OPC 04	Conceptual ITS development	2.98
OPC 03	Modernisation of service stations in the motorway and expressway network	2.49
OPC 07	Completion of the north-south connection in eastern Slovakia	2.47
OPC12	Modernisation and development of the other motorway and expressway network	2.47
OPC 05	Completion of the west-east priority axis (the Rhine-Danube Corridor, Czech and Slovak branch)	2.41
OPC 06	Completion of the north-south connection with Poland and the Czech Republic	2.16
OPC10	Road network development in the Bratislava agglomeration	1.98

The table contains the outputs of the strategic assessment of transport infrastructure using maximum design parameters of road measures in all sections.

Given projected demand, it is appropriate to consider revising the width of selected sections, and modify them in response to the national road traffic census, which takes place every five years. The total length of such sections listed in the table below is 403 km.

Table 29 Planned motorway and expressway sections with potential revision of the width in the projected period, depending on traffic intensities

Measure	Routing	Section name
Completion of the west-east priority axis (the Rhine-Danube Corridor, Czech and Slovak branch)	R6 + D1 – completion of Žilina – Košice, Košice – UA border	D1 Pozdišovce - SK/UA border
		D1 Michalovce, feeder road
		R6 Púchov - Mestečko
		R6 Mestečko - SK/CZ border
Completion of the north-south connection with Poland and the Czech Republic	D3 + R5 PL border - Žilina; D1 junction	R5 SK/CZ border - Svrčinovec
Completion of the north-south connection in eastern Slovakia	R4 HU border - Košice, R2 Košice, D1 Košice-Prešov, R4 Prešov - Poland	R4 SK/PL border - Hunkovce
		R4 Hunkovce - Ladomirová
		R4 Svidník – Rakovčík
		R4 Rakovčík (bypass of Šarišský Štiavnik) – Radoma
		R4 Radoma – Giraltovce
		R4 Giraltovce (bypass of Giraltovce) – Kuková
		R4 Kuková – Lipníky
Completion of the west-east road axis in central Slovakia	R2 Trenčín – Žiar n. Hronom – Lučenec - Košice	R2 Pravotice - Dolné Vestenice
		R2 Nováky - Žiar nad Hronom, north
		R2 Lovinobaňa - Ožďany, west (part Lovinobaňa - Lučenec)
		R2 Ožďany, east - Zacharovce
		R2 Zacharovce - Bátka
		R2 Bátka - Figa, west
		R2 Tornaľa - Gombasek
		R2 Gombasek - Rožňava
		R2 Rožňava - Jablonov nad Turňou
		R2 Jabloňov nad Turnou - Včeláre
		R2 Včeláre - Moldava nad Bodvou
		R2 Moldava nad Bodvou - Košice, Šaca
Completion of the north-south road axis in central Slovakia	R3 HU border – Zvolen, R1 Zvolen – Ružomberok, D1 Ružomberok-Hubová, R3 Hubová – PL border	R3 Tvrdošín – Nižná
		R3 Oravský Podzámok - Dolný Kubín
		R3 Dolný Kubín - D1
	R3 HU border – Zvolen, R1 Zvolen – Žiar n. Hronom east, R3 Žiar n. Hronom east - Martin, D1 Martin - Hubová, R3 Hubová – PL border	R3 Rakovo - Horná Štubňa, north
		R3 Horná Štubňa, south - Šášovské Podhradie
		R3 Zvolen – Šahy
Modernisation and development of the other motorway and expressway network	R7 Bratislava - Lučenec	R7 Dunajská Streda - Nové Zámky
		R7 Nové Zámky – Čaka
		R7 Čaka - Veľký Krtíš
		R7 Veľký Krtíš - Lučenec

A change in the design parameters of the above-stated sections will result in an estimated saving of approx. EUR 8 billion in the investment costs of individual measures. Operation and maintenance costs to be incurred over 30 years will be reduced analogically by approx. EUR 750 million.

The order in Table 28 is due to large differences in the potential to meet strategic objectives. In addition to the potential to meet strategic objectives, other conditions of their implementation must also be realistically considered.

The above-stated outputs are linked with the following strategic principles for road transport infrastructure development:

STRATEGIC PRINCIPLE 27

Due to the considerable benefits of most of the above-stated infrastructure measures and significant differences in their potential to meet strategic objectives, measures should be divided into subgroups (based on the transport logic, unfinished construction, state of preparation, etc) when making decisions on the preparation and construction of individual structures, and measures with higher potential to meet strategic objectives must be prioritised, as they constitute better value for money.

STRATEGIC PRINCIPLE 28

The preparation of ITS development and implementation plans must be a priority of project preparation in this area. In line with this plan, road transport infrastructure development must be accompanied with the implementation of intelligent transport system technology as it is cost effective and has significant potential benefits.
Given the current extent and use of the transport network, motorways and expressways, and 1st class roads must be equipped with ITS technology.
ITS information must be centrally processed, obtained and distributed via the National Traffic Information System.

STRATEGIC PRINCIPLE 29

The construction of new and the modernisation of existing service stations must form an integral part of the construction, repairs and reconstruction of the motorway and expressway network. Constructions and reconstructions must be carried out in line with the Concept of Service Station Distribution on Motorways and Expressways in Slovakia.

STRATEGIC PRINCIPLE 30

1st and 2nd class roads not included in the TEN-T network must be modernised and have adequate capacity and safety parameters. Examples of such 1st class roads include I/10, I/51, I/64, I/66, I/68, I/74, I/75 and I/79. In line with Strategic Principle 28, modernisation must include equipping roads with ITS technology.

6.5.2.2 Outputs of the Strategic Assessment of Rail Infrastructure

The table below presents the outputs of the strategic assessment of rail infrastructure.

Table 30 Outputs of the strategic assessment of rail infrastructure (the assessment considers the state of the infrastructure after completion of projects under construction and with a high degree of preparation)

Measure ID	Measure name	Assessment
OPŽ 05	Modernisation of Kúty state border - Bratislava - Štúrovo/Komárno state border corridor	3.97
OPŽ 04	Modernisation of the core Žilina - Košice - Čierna nad Tisou line	3.87
OPŽ 07	Modernisation, capacity increase and ensuring of interoperability of a wider Bratislava hub – capacity increase and modernisation of selected lines as required by the transport service plan: Bratislava hub and branches leading to Kittsee, Rajka and Komárno	3.60
OPŽ 01	Completion of the modernisation of the main TEN-T lines in a high degree of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – Marchegg	3.56
OPŽ 08	Ensuring interoperability and adequate capacity on other core TEN-T lines: Púchov - Horní Lideč	2.88

The above-stated outputs are linked with the following strategic principles for rail transport infrastructure development:

STRATEGIC PRINCIPLE 31

Due to the considerable benefits of most of the above-stated infrastructure measures and significant differences in their potential to meet strategic objectives, the priorities of purchasers of public transport services and commercial

operators of passenger and freight rail transport must also be taken into account when making decisions on the preparation and construction of individual structures.

STRATEGIC PRINCIPLE 32

It is necessary to prioritise modifications/modernisation of rails with which a long-term carrier contracting possibility is prospectively associated. These facts must be reflected in the operational concept to minimise long-term traffic interruptions due to transport infrastructure modifications.
Prioritisation to meet interoperability requirements must also reflect the significance of individual lines and the international commitments of the Slovak Republic.

STRATEGIC PRINCIPLE 33

Available funds should be found, inter alia, by the rationalisation of operations and the related restructuring of the rail transport network in the Slovak Republic, while maintaining the quality of transport services provided in the given region. Strategic principles 34 – 36 and 41 – 44 must also be respected.

6.5.2.3 Outputs of the Strategic Assessment of Public Passenger Transport Infrastructure

The table below presents the outputs of the strategic assessment of public passenger transport infrastructure.

Table 31 Outputs of the strategic assessment of PPT infrastructure (the assessment considers the state of the infrastructure after completion of projects under construction and with high degree of preparation)

Measure ID	Measure name	Assessment
OPVO 01	Preference of public passenger transport in urbanised areas	3.64
OPVO 08	Modernisation and construction of tram and trolleybus lines and the related maintenance base and infrastructure for low-emission buses and electric buses	3.47
OPVO 05	Construction of park-and-ride facilities near railway stations and terminals	3.34
OPVO 07	Ensuring high-quality terminals, interchange hubs and integrated stops with minimum barriers and maximum compactness and effectiveness	3.20
OPVO 04	Modifications to public areas in towns and cities and construction of new infrastructure for pedestrians and cyclists	3.15
OPVO 06	Revitalisation of railway stations and stops to improve the travel culture and quality	2.97

The above-stated outputs are linked with the following strategic principles for public passenger transport infrastructure development:

STRATEGIC PRINCIPLE 34

Given the ever-increasing demand for passenger transport, it is essential, in relation to the operational sustainability of the Slovak transport system, to consistently focus on public passenger transport infrastructure development. Infrastructure quality and the related services affects their attractiveness to the general public.

STRATEGIC PRINCIPLE 35

Public passenger transport infrastructure development must be coordinated at all levels – urban, regional and long-distance transport. The coordination of services on the boundary of individual levels is another precondition for acceptability.

STRATEGIC PRINCIPLE 36

The implementation of the above-stated strategic priorities at individual levels must be effected in line with Sustainable Mobility Plan outputs and coordinated by the transport authority/authorities.

6.5.2.4 Outputs of the Strategic Assessment of Water Infrastructure

The table below presents the outputs of the strategic assessment of water infrastructure.

Table 32 Outputs of the strategic assessment of water infrastructure (the assessment considers the state of the infrastructure after completion of projects under construction and with high degree of preparation)

Measure ID	Measure name	Assessment
OPV 03	Modernise public ports in Slovakia and maintain them regularly	2.70
OPV 01	Implement technical measures to ensure the required parameters of the ship route of the Danube waterway	2.60

The above-stated outputs are linked with the following strategic principles for water transport infrastructure development:

STRATEGIC PRINCIPLE 37

Water transport infrastructure support is a vital prerequisite for the development of multimodal freight transport. However, measures must be implemented taking into account future demand in close coordination with the associated rail and road infrastructure development. Water transport objectives and measures must be implemented in accordance with the environmental objectives of the Water Plan of the Slovak Republic, and/or the Water Framework Directive. Given the significant potential negative impacts of water transport projects, implementation must be preceded by a detailed feasibility study to assess the impact of the introduction of the Water Plan of the Slovak Republic and/or Water Framework Directive objectives and propose measures to eliminate or minimise negative impacts on water quality and water management.

STRATEGIC PRINCIPLE 38

A major priority of water infrastructure development is to ensure the required navigability parameters of the ship route of the Danube waterway and the modernisation of prospective public ports for freight transport. The two measures should be implemented so that they are completed at approximately the same time.

6.5.2.5 Outputs of the Strategic Assessment of Civil Aviation Infrastructure

The table below presents the outputs of the strategic assessment of civil aviation infrastructure.

Table 23 Outputs of the strategic assessment of civil aviation infrastructure ((the assessment considers the state of the infrastructure after completion of projects under construction and with high degree of preparation)

Measure ID	Measure name	Assessment
OPL 02	Modernisation and construction of civil aviation infrastructure to boost national and regional economic development and increase the quality of services provided as part of natural and special-purpose mobility	2.55

The above-stated outputs are linked with the following strategic principles for civil aviation infrastructure development:

STRATEGIC PRINCIPLE 39

Civil aviation is an important part of passenger and freight transport especially in terms of the cross-border accessibility of the Slovak Republic. It is essential to respond to the growing number of competitors in the industry by modernising infrastructure and the provided services and ensuring appropriate information support.

STRATEGIC PRINCIPLE 40

Aviation infrastructure accessibility to other transport modes must be a basic priority to strengthen multimodality in passenger and freight long-distance cross-border transport.

6.5.3 Organisation and Operation Development Strategy

As for infrastructure, the output of the strategic assessment of modal specific organisational and operational measures extending multimodal systemic measures, which is arranged according to their potential to meet the defined global strategic objectives. In determining their significance, organisational and operational measures were assessed as a whole (ie as a set of specific projects). This does not mean selected projects under the measures with a lower overall assessment cannot be implemented as priority projects.

Table 34 Outputs of the strategic assessment of operations

Measure ID	Measure name	Assessment
OPVO 03	Renew vehicle fleet to ensure appropriate quality	3.66
OPŽ 02	Prepare operational passenger rail transport concept (as part of the national operational public transport concept) and its implementation plan up to 2030 with an outlook to 2050	3.21
OPŽ 06	Prepare and implement the Target 2030 Timetable – modify the interval and number of connections on connecting lines for the Žilina - Košice and Kúty state border - Štúrovo/Komárno state border corridor and make the associated infrastructure changes on such lines	3.07
OPŽ 03	Completion of Target 2020 Timetable implementation	2.99
OPŽ10	Centralisation of operation management	2.80
OPŽ11	Rationalisation of operation on other lines taking into account the operational passenger transport concept	2.16

Table 35 Outputs of the strategic assessment of organisation

Measure ID	Measure name	Assessment
OPŽ 09	Improve conditions for combined transport and operation of complete freight transport sets and support the interoperability of freight transport vehicles (organisation, infrastructure and vehicles)	3.31
OPC 02	Changes in principles and road infrastructure administration and maintenance	3.05
OPVO 02	Establishment of the national transport authority and public transport integration	2.85
OPC 01	Implement a new road network concept	2.45
OPV 05	Cooperate with the watercourse administrator to maintain waterways and shipping structures on the monitored Slovak waterways at the year-round navigability level	2.24
OPL 01	Optimisation of the system of airports operated by airport companies to ensure functional and effective planning of aviation development	2.21
OPV 04	Settle property relations at public ports	2.08

Most of the modal-specific organisational and operational measures are strongly linked (see Chapter 5.5) with infrastructure measures, and/or positively intensify their impacts on the functioning of the Slovak transport system.

The value of their benefit potential supports the significance of strategic principles 3 and 4 and confirms a close link of the operational and infrastructure component of the transport system in terms of its output function. They are complementary measures and thus must be implemented in a concurrent and coordinated manner.

The following conclusions arise from these facts and outputs of the strategic assessment.

STRATEGIC PRINCIPLE 41

Transport system planning and development should be undertaken comprehensively and the implementation of organisation and operation measures should be systemically linked with infrastructure measures.

STRATEGIC PRINCIPLE 42

The preparation and implementation of a new operational concept and a target timetable by 2030, and the implementation of a target timetable by 2020, is the principal operational priority of rail transport in Slovakia.

STRATEGIC PRINCIPLE 43

The effective and sustainable development of road infrastructure must be accompanied by organisational changes to the principles of road infrastructure administration and maintenance. Changes are needed to the financing of competent organisations (see systemic measures), the technical background and the related operational competences.

STRATEGIC PRINCIPLE 44

Multimodal transport infrastructure development must be accompanied by organisational and operational changes. A national transport authority must be established for passenger transport (one- or multilevel) and its activities. Freight transport multimodality must be supported by improving its operation and organisation and by supporting the construction of multimodal public logistics centres.
The common denominator is the need for organisational changes to optimise the transport networks of individual modes in terms of the scope, functionality, accessibility and serviceability.

7 Conclusion

The draft Strategic Transport Development Plan of the Slovak Republic up to 2030 is based on the current knowledge of the transport sector in terms of organisation, operations, infrastructure, etc. In line with European trends and the commitments of the Slovak Republic, a target vision has been proposed, the accomplishment of which will minimise problems as regards effective transport sector development. This will foster economic growth and social integration of the Slovak Republic in the European Economic Area and improve the quality of life.

This document drew on the outputs of phase I of the transport strategy preparation and developed comprehensively and systemically. The analytical part includes new data and information inputs referred to during phase I and are key for the implementation of stage II of the transport strategy preparation. A similar situation applied to the principles of its preparation where generally applicable principles of strategic development document preparation were strictly followed.

The analytical part identified transport sector issues in key areas and the strategic (design) part was revised and developed. Emphasis was placed on transparent linkage between strategy levels, a clear linkage between the analytical and design part, and the clear definition of guidelines for the subsequent preparation of the strategy implementation plan.

The implementation plan will include the definition of projects and activities to fulfil the target vision as a financial plan in line with the set strategic transport sector development principles. An important aspect of plan preparation is a direct link to the needs and possibilities of the Slovak Republic to ensure its feasibility.

Slovak transport sector development is a long-term and continuous activity entailing an increase in economic performance, economic growth and closer integration of the Slovak Republic in global economic structures. A consistent implementation of individual steps and strategic principles of this document directly affects the accomplishment of the set vision at the given time, and the effectiveness of this process as a whole. The resulting consequences will affect current and future generations. Planning process continuity is also key using regular updates of significant strategic and development documents and the analytical capacities and performance of the necessary MTCRD SR expert units activities must be created or strengthened. This will improve the quality of the transport policy impact assessment and strategic decision-making.

8 List of Abbreviations

Abbreviation	Meaning
AGN	European Agreement on Main Inland Waterways of International Importance
AGR	European Agreement on Main International Traffic Arteries
ASD	Automatic traffic counters
B+R	Bike and Ride
CEF	Connecting Europe Facility
CEPK	Central Register of Roads
CNG	Compressed natural gas
D	Motorways
DSP	Building permit documentation
DUR	Land use decision documentation
ECDIS	Electronic chart display and information system
EK	European Commission
ERTMS	European Railway Traffic Management System
EC	European Community
ETCS	European Train Control System
EU	European Union
GSM-R	Global System for Mobile Communications – Railway
GVD	Train timetable
HCM	Highway Capacity Manual
PT	Public transport
GDP	Gross domestic product
ICT	Individual car transport
ITS	Intelligent Transport Systems
JRS	Single reference network
KNL	Black spots
K+R	Kiss and Ride
LRIT	Long Range Identification and Tracking
MTCRD SR	Ministry of Transport, Construction and Regional Development of the Slovak Republic
UPT	Urban public transport
ME SR	Ministry of Environment of the Slovak Republic
NDIC	National Traffic Information System
NDS	Národná diaľničná spoločnosť, a.s. (National Motorway Company)
NTIS	National Traffic Information System

Abbreviation	Meaning
NUTS	Nomenclature of territorial units for statistics
P+R	Park and Ride
REX	Regional express train
RFC	Rail Freight Corridor
RIS	River Information Services
RWY	RunWay
SEA	Strategic environmental assessment
SESAR	Single European Sky ATM Research
SGC	Strategic global objective
SR	Slovak Republic
SSN	SafeSeaNet
MAMC	Motorway administration and maintenance centre
EAMC	Expressway administration and maintenance centre
SSC	Slovenská správa ciest (Slovak Road Administration)
SVD	System of locks
SVP	Slovenský vodohospodársky podnik (Slovak Water Management Company)
SO SR	Statistical Office of the Slovak Republic
TEM	Trans-European Motorway
TEN-T	Trans-European Transport Network
TEU	Twenty Foot Equivalent Unit
ITT	Intermodal transport terminal
TWY	Taxiway
PPT	Public passenger transport
HTU	Higher territorial unit
VÚD	Výskumný ústav dopravný, a.s.
ZSSK	Železničná spoločnosť Slovensko, a.s.
ZSSK CARGO	Železničná spoločnosť Cargo Slovakia, a.s.