TRANSPORT MARKET STUDY

2018

Amber Rail Freight Corridor

PL - SK - HU - SI

Client

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GLOSSARY/ABBREVIATIONS

Glossary/ abbreviations	Definition
AB	Allocation Body
AGTC	European Agreement on Important International Combined Transport Lines and Related Installations
AT	Republic of Austria
BCh	Беларуская чыгунка (Belarusian Railway – national railway company)
BSC	Balanced scorecard (BSC) is a visual tool used to measure the effectiveness of an activity against the strategic plans of a company. Balanced scorecards are often used during strategic planning to make sure the company's efforts are aligned with overall strategy and vision.
BY	Belarus
CFR	Compania Naţională de Căi Ferate (Manager of infrastructure in Romania)
CNC	The Core Network Corridors
C-OSS	Corridor One Stop Shop A joint body designated or set up by the RFC organizations for applicants to request and to receive answers, in a single place and in a single operation, regarding infrastructure capacity for freight trains crossing at least one border along the Freight Corridor (EU Regulation No. 913/ 2010, Art. 13).
CZ	Czech Republic
DB Netz	DB Netz AG (German railway infrastructure manager company)
DE	Federal Republic of Germany
EC	European Commission
ERTMS	European Railway Traffic Management System ERTMS is a major industrial project being implemented by the European Union, which will serve to make rail transport safer and more competitive. It is made up of all the train-borne, trackside and lineside equipment necessary for supervising and controlling, in real-time, train operation according to the traffic conditions based on the appropriate Level of Application.
ETCS	European Train Control System This component of ERTMS guarantees a common standard that enables trains to cross national borders and enhances safety. It is a signalling and control system designed to replace the several incompatible safety

	systems currently used by European railways. As a subset of ERTMS, it provides a level of protection against overspeed and overrun depending upon the capability of the line side infrastructure.
EU	European Union
GCI	The Global Competitiveness Index
GDP	Gross Domestic Product
GYSEV	GYSEV Raaberbahn (Austrian – Hungarian railway company)
HDI	Human Development Index
HR	Croatia
HU	Hungary
HŽ	Hrvatske Željeznice (Croatian Railways)
IEF	Index of Economy Freedom
IM	Infrastructure Manager
INF TSI	Infrastructure - Technical specification for interoperability relating to the infrastructure subsystem of the rail system in the European Union Commission reugulation (EU) No 1299/2014 of 18 November 2014 on the technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union.
IT	Italy
ITT	Intermodal transport terminal rail-road, rail-water
LG	Lietuvos geležinkeliai (Railway Infrastructure Directorate of SC "Lithuanian Railways")
LT	Lithuania
MÁV Zrt.	Magyar Államvasutak (Hungarian State railways)
N/A	Not Available
ÖBB INFRA	Österreichische Bundesbahnen (The Austrian Federal Railways)
PaPs	Pre- Arranged Paths
PCS	The Path Coordination System (PCS) is an international path request coordination system for path applicants, e.g. Railway Undertakings (RUs), Infrastructure Managers (IMs) and Allocation Bodies (ABs). The internet-based application optimises international path coordination by ensuring that path requests and path offers are harmonised by all involved parties.

PLK	Polskie Linie Kolejowe (Infrastructure manager in Poland)
RC	Reserve Capacity
RFI	Rete Ferroviaria Italiana (Italian railways manager of infrastructure)
RNE	Rail Net Europe
RO	Romania
RS	Serbia
RU	Railway Undertaking
RUS	Russian Federation
RŽD	Российские железные дороги (Russian Railways)
SI	Slovenia
SK	Slovak Republic
SŽ-I	Slovenske Železnice - Infrastruktura (Infrastructure manager in Slovenia)
SŽDC	Správa železniční dopravní cesty (Manager of infrastructure in Czech Republic)
TAF TSI	Telematics application for freight service – Technical specification for interoperability relating to the telematics applications for freight subsystem of the rail system in the European Union Commission regulation (EU) No 1305/2014 of 11 December 2014 on the technical specification for interoperability relating to the telematics applications for freight subsystem of the rail system in the European Union
TAP TSI	Telematics application for passenger service – Technical specification for interoperability relating to the subsystem ´telematics applications for passenger services´ of the trans-European rail system Commission Regulation (EU) No 527/2016 amending Commission Regulation (EU) No 454/2011
TEN-T	The Trans-European Transport Network (TEN-T) is a European Commission policy directed towards the implementation and development of a Europe-wide network of roads, railway lines, inland waterways, maritime shipping routes, ports, airports and rail-road terminals.

TEU	TEU - Twenty- foot Equivalent Unit (a measure used for capacity in container transportation)
TMS	Transport market study
UA	Ukraine
UŽ	Укрзалізниця (Ukrainian Railways)
VPE	Vasúti Pályakapacitás-elosztó Kft. (Rail Capacity Allocation Body)
ŽS	Železnice Srbije (Serbian Railways)
ŽSR	Železnice Slovenskej republiky (Infrastructure manager in Slovakia)

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INTRODUCTION

The current economic development in EU countries has an impact on continuous increase in demand for transport services. The continuous increase in demand for transport services results from a higher consumption of EU population and a higher production of manufacturing enterprises. The demand is directly influenced also by the need to transport the final products and the intermediate products from Asia to Europe and vice versa. Several European companies cooperate with the companies in Asia and their trading income, level of innovations and social benefits depend on their cooperation. This demand then creates an offer that results in a market for transport services. There are many offers from several modes of transport in this market where each mode of transport has its advantages and disadvantages for the transport process, the customer, the society and the environment.

Rail freight is considered to be the most environmentally friendly mode of transport of goods, with an important role in the freight transport market. It contributes to the development of human society and combines economic and social progress while respecting the environment. Due to exogenous (e.g. entry of competition in road and air transport, technological innovations oriented to other modes of transport, change in transport requirements) and endogenous (e.g. inefficiency, overemployment, low level of innovations and modernization, technological lag) factors, rail freight lost the competitiveness in the transport services market resulting in decrease in the transport performances of rail sector. At the same time a shift of transport performances to other more environmentally demanding modes of transport has occurred. This shift leads to a higher production of the negative external costs of transport and need for higher state subsidies to the transport infrastructure from public funds. This unfavourable state has to be addressed by individual states and EU.

EU, to promote the competitiveness of rail freight transport, in particular in the field of infrastructure quality, safety, time and administrative effectiveness, international cooperation, has established the European Rail Freight Corridors. The establishment of the European Rail Freight Corridors should bring, in particular, better, more complete, more reliable and less expensive services to railway undertakings. Such services of the single European railway infrastructure consequently contribute to the better services of the railway undertakings providing freight services. Increased commercial activity, reliable, fast, safe and cost competitive service lead to a shift of transport performances from more environmentally demanding modes of transport to rail freight transport. In addition to its environmental advantage, rail freight transport can provide more reliable, safer, less expensive and faster transport service in case of harmonizing the transport and technological processes in comparison with other modes of transport. The shift of transport

performances to rail leads to overall decrease in social costs (infrastructure owner costs, carrier costs and negative external costs of transport) generated by transport.

Increasing requirements on quality and availability of rail freight service led to intention to establish the new European rail freight corridor Amber. The corridor establishment brings the connection between Adriatic seaports in the Republic of Slovenia and inland ports on the Danube and terminals in Hungary and the Slovak Republic and Poland, but it brings also the perspective of railway transport development with Serbia and the improvement of the railway transport in Europe – Asia direction. The perspective, quality and efficiency of the new corridor need to be assessed and subsequently, based on the assessment, to take measures to increase competitiveness and growth of the overall efficiency of the corridor. The proposed strategy is developed based on acquisition, processing and subsequent evaluation of technical, technological, transport and economic indicators obtained from various sources.

Based on the above mentioned facts, it is necessary to elaborate a Transport Market Study (TMS) for the Amber RFC which will evaluate the objective current situation, the perspectives and the effectiveness of the corridor. At the same time, it is necessary to propose the strategic measures leading to a higher effectiveness of the corridor based on the evaluations of individual parts of the study.

1 OBJECTIVE OF TRANSPORT MARKET STUDY

The establishment of European rail freight corridors at EU level should contribute to the shift of transport performances from more environmentally demanding transport modes to less environmentally demanding rail freight transport, decreasing of non-investment state subsidies to the railway infrastructure, promoting investment state subsidies in the railway infrastructure, ensuring good economic conditions for railway undertakings and meeting the needs of customers. These corridors ensure, in particular, equal, non-discriminatory and easier conditions of access to the whole railway infrastructure of individual Member States for all railway undertakings. Harmonisation and synergy between particular railway infrastructures contribute to better quality, more available, more comprehensive and cost-effective services provided to railway undertakings. Cost effective services motivate railway undertakings to higher acquisition activity, thus more suitable modal split will be ensured for the whole society.

The chapter is aimed at the interpretation of basic objectives and effects of establishing the eleventh European rail freight corridor. At the same time, the chapter defines the main objective of TMS and the resulting partial objectives.

1.1 Aspects of establishing the Amber RFC

The main objectives of establishing the rail freight corridors, defined by the European Commission (hereinafter referred to as EC) are:

1. Strengthening competitiveness of rail freight transport compared with other modes of transport.
2. Effective modal split with an emphasis on environmentally friendly rail freight transport.
3. Coordination of investment in more qualitative railway infrastructure with possibility of financial support from EU funds.
4. Harmonisation and synergy between national rail systems.
5. Strengthening cooperation in allocation of railway infrastructure capacity to international freight trains between single infrastructure managers.
6. Conformity with existing objectives of other specific RFC corridors.

The establishment of the Amber RFC is to lead to the fulfilment of the partial objectives that can be summarized in the following points:

1. General growth of transit rail freight performances.
2. General growth of international rail freight performances (import, export).

3. General growth of intermodal transport performances.
4. Improve the interconnection of the main intermodal transport terminals in the Member States and allow for direct freight routes across the eastern part of the Alps.
5. Facilitate the interconnection between the Adriatic Sea Port in the Republic of Slovenia and the inland ports on the Danube in Hungary and the Slovak Republic.
6. Promote the railway transport development with Serbia.
7. Improve, potentially, the railway transport across EU Eastern border and on the land bridge between Europe and Asia.
8. Connection to the sea ports in the Republic of Poland.
9. Better services of infrastructure managers provided to railway undertakings.
10. Better services provided by railway undertakings to customers.
11. Shift of transport performances from environmentally demanding modes to rail freight – change in modal split in favour of rail freight.
12. Increase in reliability and decrease in transport time.
13. Decrease in railway undertaking costs.

In addition to the partial objectives mentioned above, the establishment of the Amber RFC also brings particular benefits to railway undertakings and terminals:

1. Making an offer of capacity on the whole route within the corridor in one place.
2. Overview concerning the railway infrastructure capacity included in the corridor, including the capacity provided with priority (the management board shall promote coordination of priority rules relating to capacity allocation on the freight corridor).
3. Better services in terms of transit time, regularity, reliability and information.
4. Strengthening customer approach.
5. Information on investment projects in railway infrastructure between railway administrations.
6. Reduction of operating restrictions.
7. Harmonization of infrastructure technical and transport parameters.
8. Harmonization of track possessions between individual railway infrastructure managers.
9. Possibility of improving the infrastructure included in the corridor, including connecting lines to terminals.
10. Eliminate bottlenecks.

11. Chance to strengthen priority rules in operative traffic control for freight trains carrying out transport performances on the corridor.
12. Possibility to express the opinion of railway undertakings on the quality of infrastructure manager services and the Amber RFC.

The defined objectives and benefits of the Amber RFC establishment are, in particular, to increase the competitiveness of rail freight services compared with other modes of freight transport, especially road goods transport. The benefits are better, more reliable and more available rail freight services and the reduction of operating and technological costs of railway undertakings. The fulfilment of corridor's objectives requires the cooperation of all stakeholders – transport policy (state, government), ministries concerned, infrastructure managers, intermodal operators, carriers and external suppliers of the railway sector.

1.2 Structure of TMS objectives

The main objective of TMS: is to provide a clear understanding of the current conditions of the multimodal freight market along the Corridor together with short and long term freight traffic forecast consequent to the implementation of the corridor at the beginning of year 2019, and also to propose a measurement of the expected modal shift from road to rail. Based on the elaboration of the transport market study, evaluate the current state, perspective, prognosis and opportunities of the new corridor. In accordance with the findings of these analyses, propose a strategy which will lead to the development of the Amber RFC and provision quality services of the EU railway systems.

The TMS main objective justification: To fulfil the main objectives of establishing the new European rail freight corridor Amber, mentioned in subchapter 1.1, it is necessary to examine and evaluate the current state of the transport and technical situation within the countries participating in the Amber RFC. The establishment of each rail freight corridor requires, based on an analysis of current state, the development of strategic direction in order to fulfil the basic objectives.

In order to achieve the TMS main objective of the Amber RFC, the following structure was set:

1. Introduction to issues.
2. Objectives of the transport market study.
3. Methodology of the study.
4. Corridor characteristics – legislative structure, corridor structure, graphical representation of the corridor in individual countries, technical parameters of corridor lines, capacity analysis,

comprehensive basic comparison of RFC infrastructures, description of EU TEN-T corridor concerned, summary of obtained data.

5. Analysis of economic indicators – GDP analysis and prognosis, purchasing power parity, human development index, index of competitiveness of economies, index of economic freedom, analysis of significant industrial areas, summary of obtained data.
6. Analysis of transport indicators – analysis of investment and non-investment subsidies, analysis of selected economic indicators of transport infrastructure, analysis of intended investment in transport infrastructure, analysis of transport performances (train km, gross tkm, number of trains) on corridor lines and on the whole network, modal split, summary of obtained data.
7. Prognosis of transport performances: pessimistic, realistic and optimistic scenarios, results of prognosis.
8. Comparative analysis of rail and road freight transport within the corridor.
9. Analysis of strategic opportunities of the corridor – possibilities of cooperation with other corridors, transport opportunities from countries outside the EU.
10. Last mile: overview of sidings, intermodal terminals, ports, loading and unloading facilities.
11. Socio-economic benefits of the corridor.
12. SWOT analysis – draft of strategy based on SWOT.
13. Draft of marketing strategy – external environment analysis, internal environment analysis, draft of marketing strategy.
14. Strategic map of the corridor.
15. Conclusion and recommendations.

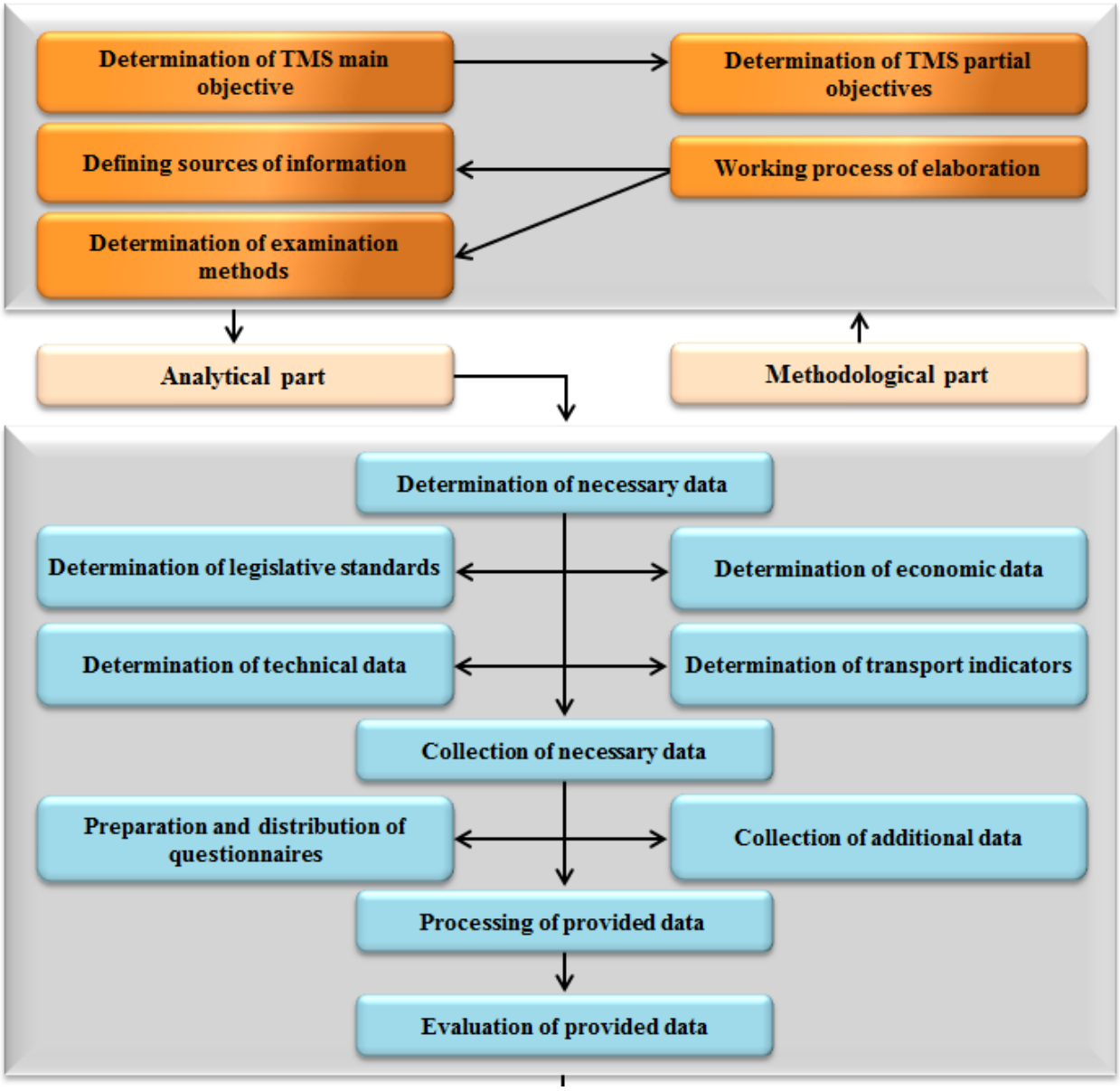
The processing of all these partial objectives is necessary to fulfil the main objective of the TMS of the new rail freight corridor Amber.

2 METODOLOGY OF WORK AND METHODS OF INVESTIGATION

The chapter in the first part graphically represents the selected working process of elaborating the TMS of the Amber RFC. Subsequently, the chapter provides sources of information necessary for elaborating the primary and secondary objectives. Based on the working process, the used methods necessary for elaborating the particular partial objectives of TMS are listed in the chapter.

2.1 Working process of TMS elaboration

For the elaboration of TMS, based on determining the main objective and resulting partial objectives, the methodological working process, shown in Fig. 1, was chosen.



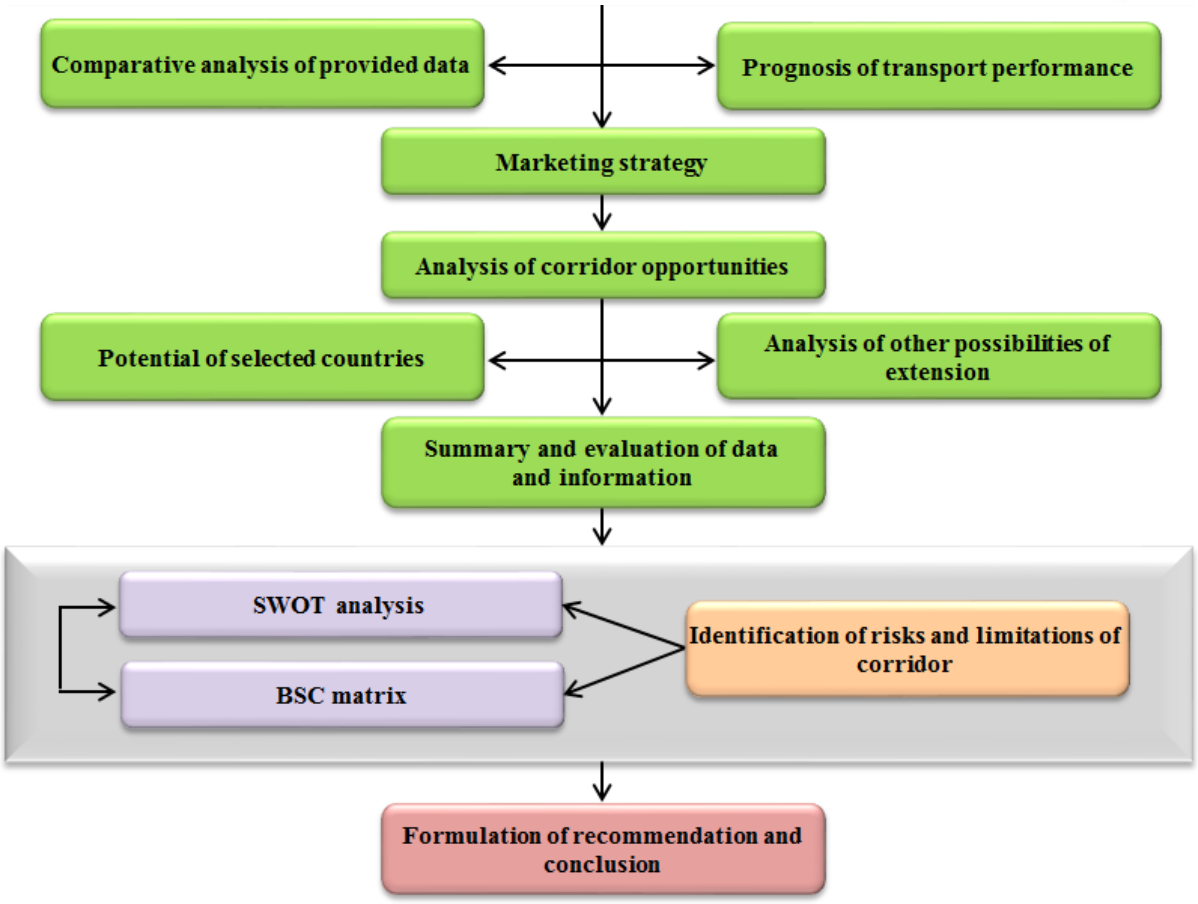


Figure 1: *Graphical representation of methodical working process of TMS*

(Source: ŽSR, VVÚŽ)

2.2 Baselines for the TMS elaboration

The elaboration of all TMS tasks, listed in subchapter 1.2, requires the analysis and processing of various technical, capacity and economic indicators. This requires a wide range of statistical and analytical information stemming from several sources:

- EU legislation, modifications and standards of the member states of corridor,
- annual reports of infrastructure managers and allocation bodies of corridor member states,
- network statements of infrastructure managers and allocation bodies of corridor member states,
- traffic and transport performances provided by corridor infrastructure managers,
- traffic and transport performances from statistical offices of corridor member states,
- data of Eurostat,
- data of International Monetary Fund,
- data of Organization for Economic Cooperation and Development,

- data of World Bank,
- economic indicators provided by statistical offices of corridor member states,
- reports and studies of TEN-T Core Network Corridors,
- other available economic, traffic and transport information necessary for study elaboration,
- data from questionnaires sent to infrastructure managers,
- Manual Update of the Handbook on External Costs of Transport“ (final report for the European Commission - 2014),
- sector publications (articles, reports, press releases, etc. with relevance for RFC corridors),
- scientific literature.

The statistical and analytical data require for elaborating the individual parts of TMS of the Amber RFC, with which it was possible to elaborate the individual parts of the study and then to propose the optimal strategy, are shown in Table 1.

Table 1: Statistical and analytical indicators monitored in TMS

Scope	Indicator
Technical parameters	Maximum length of train, class of line, signalling equipment, electrification system, loading gauge, average speed of train, speed limits, profile
Transport performances	Development of transport performances on corridor lines (national transport and international transport) Development of transport performances on all lines of member state (national transport and international transport)
General indicators	Population, industry (the most important industry areas in countries of Amber RFC), transport infrastructure
Macroeconomic indicators	GDP development and prognosis in member states, GDP per capita in purchasing power parity, Human development index, Index of competitiveness of economies, Index of economic freedom
Microeconomic indicators	Level of infrastructure charges for type trains Transit time
Modal Split	Development of modal split between individual modes of transport (freight and passenger transport on national territories)
Capacity analysis	Development of transport capacity utilization of individual lines Development of transport capacity utilization of individual corridor lines
Other indicators	Investment, technical and technological measures, proposal of extension of lines and terminals, etc.
Corridor indicators	Corridor benefits and opportunities

2.3 Methods used in TMS elaboration

The individual partial objectives of TMS of the Amber RFC were worked out using the following methods:

- method of investigating written sources used for selecting appropriate literature for processing the theoretical and legislative part of TMS,
- method of scientific abstraction – in examining the basic theoretical and legislative basis for establishment of the European freight corridors,
- method of information gathering and processing – used for information collection and its subsequent processing,
- benchmarking – in comparison of some transport and technical statistical data,
- method of analysis – in processing and searching required transport and technical statistical data,
- method of graphic representation – used for graphic and visual layout of acquired and processed statistical data and other results of the study,
- method of comparative analysis – comparison in analytical part,
- method of synthesis – for summarizing information and data obtained,
- method of induction and deduction – used in all parts of TMS, in creating logical judgements based on theoretical, legislative and empirical knowledge,
- brainstorming – consultations with practitioners,
- methods of statistical analysis – used in searching and processing required transport, technical and economical statistical data,
- prognostic method – used in development of TMS prognostic scenarios.

3 CHARACTERISTICS OF AMBER RAIL FREIGHT CORRIDOR

The third part of TMS is aimed at the precise technical characteristics of the Amber RFC. The first part defines the legislative aspects of the establishment of the corridor in question. Consequently, the corridor routing in the individual railway infrastructures of the member states is graphically represented. An important part of the chapter is a description of technical parameters of the lines included in the corridor.

3.1 Legislative aspects of Amber RFC establishment

The Amber rail freight corridor No 11 is being established based on Commission Implementing Decision (EU) no. 2017/177 of 31 January 2017, that was issued of the basis of "Letter of Intent" as request of 4 Ministries competent for Rail Transport of Hungary, Republic of Poland, Slovak Republic and Republic of Slovenia.

The establishment of Amber rail freight corridor is on the compliance with Article 5 of Regulation (EU) No 913/2010 of the European Parliament and of the Council of 22 September 2010 concerning a European rail network for competitive freight. This Regulation lays down rules for the establishment and organisation of international rail freight corridors with a view to the development of a European rail network for competitive freight.

The implementation of international RFCs forming a European rail network for competitive freight is conducted in a manner consistent with the trans-European Transport Network (TEN-T) according to Regulation (EU) No 1315/2013 of the European Parliament and of the council of 11 December 2013 on Union guidelines for the development of the Trans-European Transport Network and repealing Decision No 661/2010/EU.

In order to speed up TEN-T investments and strengthening public and private sector financing, while increasing legal certainty and respecting the principle of technological neutrality, REGULATION (EU) No 1316/2013 of the European Parliament and of the council decision of 11 December 2013 establishing the instrument of Connecting Europe and amending Regulation (EU) No (EC) No 913/2010 and repealing Regulations (EC) 680/2007 and (EC) no. 67/2010.

All the above mentioned legal acts are in line with Directive 2012/34/ EU of the European Parliament and of the Council of 21 November 2012 on the establishment of a single European railway area.

In order to establish and support the European railway network as regards freight transport, some technical and operational initiatives have been launched. These are, for example:

- development of interoperability through the technical specification of interoperability relating to the infrastructure subsystem of the rail system in European Union (INF TSI),
- development of interoperability through the technical specification of interoperability relating to Traffic Operation and Management (TOM TSI) and TSI relating to Telematics Applications for Freight Services (TAF TSI), and Telematics Applications for Passenger Services (TAP TSI).

3.2 Amber RFC governance structure

For proper functioning of the European rail freight corridors, control and management mechanisms in the form of bodies have been introduced for each corridor. At the same time, the coordination of established bodies contributes to meeting the basic objectives of RFC corridors and responds to the challenges of effective daily operation and the provision of the best possible services to customers.

RFC bodies:

Executive Board – made up of representatives of the authorities of the Member States concerned.

Management Board – made up of the representatives of the infrastructure managers and Allocation Body

Railway Advisory Group (RAG) – made up of railway undertakings interested in the use of the freight corridor.

Terminal Advisory Group (TAG) – made up of managers and owners of the terminals of the freight corridor including, sea and inland waterway ports.

Corridor One Stop Shop (C-OSS) – will be established by the corridor launching according to Commission Implementing Regulation No 2017/177 of 31 January 2017.

Amber RFC Working Groups:

- Traffic management, Train Performance and Operations,
- Marketing,
- Timetable and One Stop Shop,
- Temporary Capacity restrictions,
- Infrastructure, Interoperability and ERTMS,

- Legal Task Force.

Organizational support, coordination of activities and review of documents elaborated by Working Groups are provided by the Coordination Group. Administrative part is ensured by the RFC Secretariat.

Figure 2: *Organizational structure of Amber RFC*

(Source: marketing Amber)

Excerpt of the tasks of Executive Board:

- is responsible for defining the corridor main objectives, supervises and takes measures,
- determines the framework for infrastructure capacity allocation within the corridor,
- approves documents and plans elaborated by the Management Board,
- periodically analyses the corridor implementation plan,
- submits to the European Commission a report on the results of executing the implementation plan every two years starting from the corridor establishment.

Excerpt of the tasks of Management Board:

- fulfilment of all Management Board tasks defined in Regulation (EU) No 913/2010,
- determination of the legal form of the Amber RFC,
- fulfilment of other tasks defined by decisions of the Management Board and Internal rules and procedures of the corridor,
- ensuring organisational, technical and operational conditions to make the Amber RFC operational on time,
- management of whole Amber RFC organizational structure,
- seeking good co-operation with the Executive Board of the Amber RFC, with the Advisory Groups and customers of the corridor and with the management boards of other RFCs.

The Management Board monitors the performance and quality of rail freight services within the corridor and once a year publishes the results on the web site of the corridor together with the results of the satisfaction survey of corridor users. In order to ensure a non-discriminatory access to railway infrastructure and fair economic competition it cooperates with regulatory bodies of member states, at the same time it performs the task of the Regulatory Body.

Main tasks of Corridor One Stop Shop (C-OSS): the C-OSS is the only body where applicants may request and receive infrastructure capacity for international freight trains on Amber RFC. The handling of the requests takes place in a single place and a single operation. The C-OSS is responsible for performing the handling of capacity requests for international freight trains and for the publication and allocation decision with regard to requests for PaPs and RC (Reserve Capacity) on behalf of the IMs / ABs concerned.

RFC Amber routing: Koper – Ljubljana/Zalaszentiván – Sopron/Csorna/(Hungarian-Serbian border) – Kelebia – Budapest – Komárom – Leopoldov/Rajka – Bratislava – Žilina – Katowice/Kraków – Warszawa/Łuków – Terespol – (Polish-Belorusian border) as the principal route for the Amber rail freight corridor.

Member states: Poland, Slovakia, Hungary, Slovenia

Deadline for making Amber RFC operational: by 30.01.2019

Seat of Corridor One Stop Shop (C-OSS): Poland

3.3 RFC graphical representation of proposed routing

The routing of the Amber RFC is based on the document Letter of intent concerning the establishment of the Amber Rail Freight Corridor No 11 by the Ministries competent for Rail Transport and subsequently on Commission implementing decision (EU) 2017/177 of 31 January 2017. The graphical representation of the proposed routing according to given documents is shown in the following Figure.

Figure 3: *Graphical representation of Amber RFC routing*
(Source: ŽSR, VVÚŽ)

For more detailed representation, the graphical representation of the proposed routing within the railway infrastructure of individual participated countries is shown in Fig. 4 - Fig. 7.

Figure 4: *Graphical representation of Amber RFC routes on PKP PLK network*

(Source: ŽSR, VVÚŽ)

Figure 5: *Graphical representation of Amber RFC routes on ŽSR network*

(Source: ŽSR, VVÚŽ)

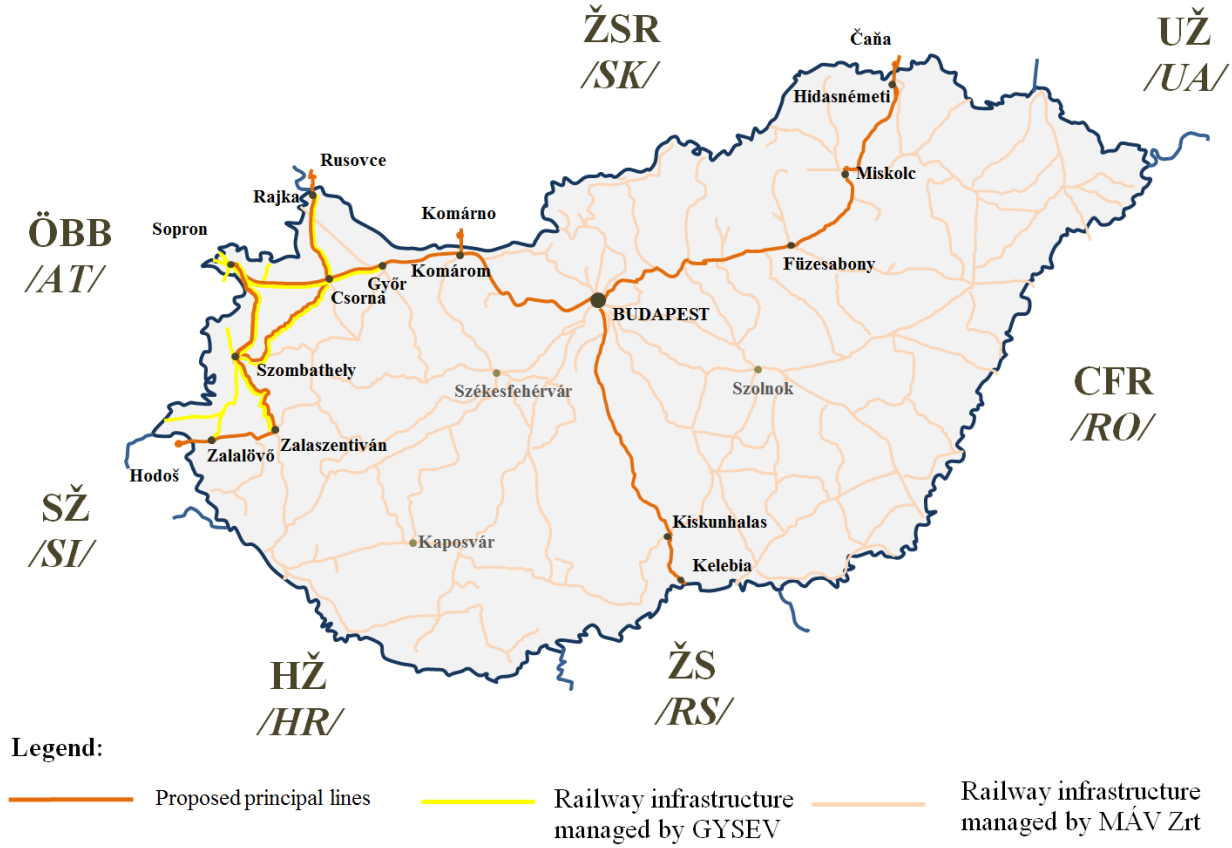


Figure 6: *Graphical representation of Amber RFC routes on MÁV and GYSEV network*

(Source: ŽSR, VVÚŽ)

Figure 7: *Graphical representation of Amber RFC routes on SŽ-I network*

(Source: ŽSR, VVÚŽ)

4 ECONOMIC ANALYSIS

The chapter is focused on the characterization and the subsequent analysis of selected economic indicators that influence the demand for transport services. An important part is the graphical analysis of important industrial areas located in the territories of countries under consideration.

4.1 Basic general characteristics of the countries of the Amber RFC

The aim of the subchapter is to provide basic general data on all countries participating in the Amber RFC.

Republic of Poland

Capital: Warsaw

Area: 312 679 km² (69th place in the world) of which water 8 220 km² (3,07 %)

Population: 38 116 000, census in 2017

Official language: Polish

Administrative division: 16 regions, 373 counties

Currency: Polish zloty =100 groshes (PLN)

Neighbouring countries: the Slovak Republic, the Republic of Lithuania, the Russian Federation, the Czech Republic, the Federal Republic of Germany, the Republic of Belarus, Ukraine.

Geographical location: Central Europe

Figure 8 is a graphical representation of the geographical location of the Republic of Poland with marked borders and significant cities. The geographical location of the country is particularly advantageous from the transport point of view in the direction from the Baltic Sea and the eastern part of Europe. The area of country, industry and tourism directly create increased demands for quality, safe, reliable and available transport services.

Figure 8: *Geographical representation of the Republic of Poland*

(Source: ŽSR, VVÚŽ)

Slovak Republic

Capital: Bratislava

Area: 49 036 km² (127th place in the world) of which water 931 km² (1.9 %)

Population: 5 435 343, estimate 2016

Official language: Slovak

Administrative division: 8 self-governing regions, 79 districts

Currency: Euro = 100 cents (EUR)

Neighbouring countries: the Czech Republic, the Republic of Poland, the Republic of Austria, Hungary, Ukraine.

Geographical location: Central Europe

Figure 9 is a graphical representation of the geographical location of the Slovak Republic with marked borders and significant cities. By its location, the country creates the appropriate conditions for rail transit traffic, mainly in the direction east (Asia) – west (Western Europe). The geographical location and available transport infrastructure in the country directly contribute to the direction of foreign investment that creates demand for transport services.

Figure 9: *Geographical representation of the Slovak Republic*

(Source: ŽSR, VVÚŽ)

Hungary

Capital: Budapest

Area: 93 030 km² (108th place in the world) of which water 1 685 km² (~ 2 %)

Population: 9 830 485, estimate 2016

Official language: Hungarian

Administrative division: 7 regions, 19 counties and Budapest

Currency: Hungarian Forint = 100 fillér (HUF)

Neighbouring countries: the Republic of Austria, the Slovak Republic, Romania, the Republic of Serbia, the Republic of Croatia, the Republic of Slovenia, Ukraine.

Geographical location: Central Europe

Figure 10 is a graphical representation of the geographical location of Hungary with marked borders and some of significant cities. By its location, the country creates the appropriate conditions for rail transit traffic, mainly in the direction south – west and north of Europe. The transport infrastructure of Hungary has the potential to realize a significant part of transportations from countries outside the EU and the Republic of Turkey to the countries of Western Europe.

Figure 10: *Geographical representation of Hungary*

(Source: ŽSR, VVÚŽ)

Republic of Slovenia

Capital: Ljubljana

Area: 20 273 km² (154th place in the world) of which water 122 km² (0,7 %)

Population: 2 065 895, estimate 2016

Official language: Slovenian

Administrative division: 212 municipalities (občine)

Currency: Euro = 100 cents (EUR)

Neighbouring countries: the Republic of Austria, Hungary, the Republic of Croatia, the Republic of Italy

Geographical location: Central Europe

Figure 11 is a graphical representation of the geographical location of the Republic of Slovenia with marked borders and significant cities. The Republic of Slovenia is one of the important gateways for the goods incoming from Asia to Europe. The requirements for the continuation of the transport of goods from Asia continuously increase and create great opportunities for rail freight transport.

Figure 11: *Geographical representation of the Republic of Slovenia*

(Source: ŽSR, VVÚŽ)

4.2 Economic indicators

Within the economic indicators, the indicators: GDP, GDP per capita in purchasing power parity and HDI, GCI, IEF indices for the individual countries of Amber RFC, are analysed in the following sections. At the same time, the analysed indicators are briefly characterized.

GDP – Gross domestic product

Gross Domestic Product (GDP) is defined as the value of all final products and services produced by all units of the national accounting of the monitored territory over the given period. Within the above GDP indicator, the following table shows GDP growth rate in % for the individual states included in the Amber RFC, including the forecast for 2018 - 2020.

Table 2: Real GDP growth rate and prognosis in %

Description	Real GDP growth rate (%)								Prognosis of GDP (%)		
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Poland	3,6	5,0	1,6	1,4	3,3	3,8	2,9	4,2	*3,8*	*3,4*	*3,6*
Slovakia	5,0	2,8	1,7	1,5	2,8	3,9	3,3	3,3	*3,8*	*4,0*	*4,0*
Hungary	0,7	1,7	-1,6	2,1	4,2	3,4	2,2	3,7	*3,6*	*3,1*	*3,1*
Slovenia	1,2	0,6	-2,7	-1,1	3,0	2,3	3,1	4,7	*4,0*	*3,3*	*3,2*

Source: Eurostat

From the above-mentioned analysis of GDP growth rate, we can confirm the slowdown in economic growth in 2012 and 2013 in all analysed countries. GDP growth revival has been recorded since 2014. The GDP growth rate forecasts a positive growth trend above 3 % in 2018 as well as in 2019 and 2020 for all monitored countries.

GDP per capita in purchasing power parity

Table 3 shows the trend of index of GDP per capita in purchasing power parity in relation to the average of EU 28 that is equal to 100 for the period 2010 – 2016. If the index of a country is higher than 100, the level of GDP per capita in the country under consideration is higher than EU average and vice versa. The basic data are expressed in purchasing power parity, i.e. common currency that eliminates differences in price levels between countries allowing meaningful volume comparisons of GDP between countries.

Table 3: GDP per capita in purchasing power standards

Description	GDP per capita in Purchasing Power Standards (PPS)						
Year	2010	2011	2012	2013	2014	2015	2016
EU28	100	100	100	100	100	100	100
Poland	62	65	67	67	67	68	68
Slovakia	74	75	76	77	77	77	77
Hungary	65	66	66	67	68	68	67
Slovenia	83	83	82	82	82	82	83

Source: Eurostat

The highest index of GDP per capita in PPS among member states of the Amber RFC reached Slovenia at the level 83 in 2016. The Republic of Poland recorded a steady trend in 2012 – 2014 and then increased degree in the period 2015 – 2016. In Hungary, there was a slight decline in 2016 at the level 67 compared to the previous year. GDP per capita in PPS on the territory of the Slovak Republic is stable since 2013. A steady trend of GDP per capita in purchasing power parity confirms price stability in the analysed countries.

IEF – Index of Economy Freedom

This index belongs to indicators aimed at measuring the economic freedom in relation to the overall performance of the economy. More than 50 world institutions are involved in the creation of the index, which analyse the indicators in the areas of impact of state interventions in the economy, the protection of property rights, the interventions in conditions of entry into business. Based on the long-term monitoring of this index, it is confirmed that countries with a higher level of economic freedom achieve higher performance of the economy, higher GDP growth rates and higher GDP per capita compared to countries with low level of economic freedom. The scale of values of index of economic freedom creates the Heritage Foundation, which covers 180 countries in the world with scores from 0 to 100, with 100 being the highest value of the economic freedom index.

GCI – The Global Competitiveness Index

According to the Global Competitiveness Index, it is possible to express how the quality of business environment contributes to increasing the performance of economy and it is assessed according to four basic areas. These areas include economic growth, government efficiency, business environment efficiency, infrastructure efficiency. The World Economic Forum Global Competitiveness Index assesses 137 countries in the world with scores ranging from 1 to 7, with 7 being the highest value of the global competitiveness index.

HDI – Human Development Index

The index is currently used most often to compare the level of human development. It is considered to be the most comprehensive indicator of quality of life. The Human Development Index assesses health and life expectancy, education and living standards. The index is also used by the United Nations Development Programme (UNPD). It is assessed within 188 countries ranging from 0 to 1, with the value of human development index being higher.

Table 4 analyses the above-described IEF, GCI, HDI indicators separately for each country of the Amber RFC.

Table 4: Overview of analysed indexes in countries of Amber RFC

Index (Year)	IEF (2017)		GCI (2017 – 2018)		HDI (2015)	
Country	**score**	**Rank/180**	**score**	**Rank/137**	**score**	**Rank/188**
Poland	68,3	45	4,59	39	0,855	36
Slovakia	65,7	57	4,33	59	0,845	40
Hungary	65,8	56	4,33	60	0,836	43
Slovenia	59,2	97	4,48	48	0,890	25

Source: The Heritage Foundation, World Economic Forum, United Nations Development Programme

From the mentioned values of Economic Freedom Index and Global Competitiveness Index, the Republic of Poland achieved the best rating among the analysed countries. Poland ranked in 45th place in comparison with the Economic Freedom Index values and in 39th place in comparison of values of the Global Competitiveness Index. The best ranking within the Human Development Index among countries was achieved by Slovenia which ranked in 25th place in 2015. Overall, based on the date in Table 4, it is possible to confirm sufficiently appropriate macro environment in all analysed countries for investment, business and innovations which contribute to the economic development and subsequent demand for transport services. The results also confirm the competitiveness of the economies of the analysed countries towards the other evaluated countries of the world.

ETI – Enabling Trade Index

The index is created by the World Economic Forum in cooperation with the World Bank and various national institutions which ensure the completion of necessary data. The index is made up of four sub-indexes:

- Market access,
- Border administration,
- Transport and communications infrastructure,
- Business Environment.

Each of these sub-indexes is divided into pillars ranging from 1 to 7, composed of basic indicators (55 in total) as well as indicators that are specific for given range. There are 136 countries in ranking, where the countries with the ranking closest to 7 are ranked the best. The rank of the best ranked countries goes upwards from 1 to the worst ranked countries up to 136.

Table 5: Overview of ETI index and individual sub-indexes for Amber RFC countries

Country	Rank/136 (2016)	Score	Subindex scores			
			Market Access	Border Administration	Transport and communications Infrastructure	Business Environment
Poland	**31**	**5,0**	5,0	5,7	4,6	4,5
Slovakia	**34**	**4,9**	4,9	5,6	4,6	4,6
Hungary	**38**	**4,9**	4,9	5,7	4,5	4,5
Slovenia	**32**	**5,0**	5,0	5,8	4,6	4,5

Source: World Economic Forum, World Bank, National statistics office

Based on the ETI index, we can confirm the above-average ranking of countries in terms of enabling business activities, while at the same time the above-average value of sub-index in the area of transport and communications infrastructure has been demonstrated. Appropriate measures of EU, individual member states in the field of transport infrastructure and transport infrastructure managers will again be reflected in ranking of analysed countries, whereby the overall value of ETI index will be increased.

Table 6 analyses the share of GDP within primary, secondary and tertiary spheres of the national economy for the period 2010 – 2016 for the countries of the Amber RFC.

Table 6: Analysis of GDP share

Country	Item/ Year	2010	2012	2014	2015	2016
Poland	Agriculture, value added (% of GDP)	2,9	3,0	2,9	2,5	2,7
	Industry, value added (% of GDP)	33,2	33,6	33,2	34,1	33,7
	Services, etc., value added (% of GDP)	63,9	63,4	63,9	63,4	63,6
Slovakia	Agriculture, value added (% of GDP)	2,8	3,5	4,4	3,8	3,7
	Industry, value added (% of GDP)	35,2	35,4	34,6	34,5	34,8
	Services, etc., value added (% of GDP)	62,0	61,1	61,0	61,7	61,5
Hungary	Agriculture, value added (% of GDP)	3,5	4,6	4,7	4,4	4,4
	Industry, value added (% of GDP)	29,9	30,0	30,6	31,7	30,5
	Services, etc., value added (% of GDP)	66,6	65,4	64,7	63,9	65,1
Slovenia	Agriculture, value added (% of GDP)	2,0	2,0	2,3	2,3	2,2
	Industry, value added (% of GDP)	30,6	31,7	32,8	32,6	32,3
	Services, etc., value added (% of GDP)	67,4	66,3	64,9	65,1	65,5

Source: The World Bank, Data

On the basis of the data analysed in Table 6, we can confirm the high share of the tertiary sphere of the national economy in the total GDP of the surveyed countries. The data document the high development of countries and the potential for sustainable development, as the tertiary sphere of the national economy is less harmful to the environment.

4.3 Industry

The transport services market is different in the individual countries. Differences are mainly influenced by the geographical location of the country, by the deployment of industrial and logistics centers as well as the main sectors of the economy.

The most important industries in the Republic of Poland:

Extractive industries – rich sources of mineral resources, black coal, brown coal, oil and natural gas, lead, zinc, copper, rock salt.

Metallurgical industry – rolled material and sheets for cars, processing of copper, zinc, lead.

Mechanical engineering and automotive industry – means of transport, cars, especially for export, railway sets and sea vessels.

Chemical industry, pharmaceutical industry and food industry.

Figure 12 illustrates the most important industrial areas in the Republic of Poland.

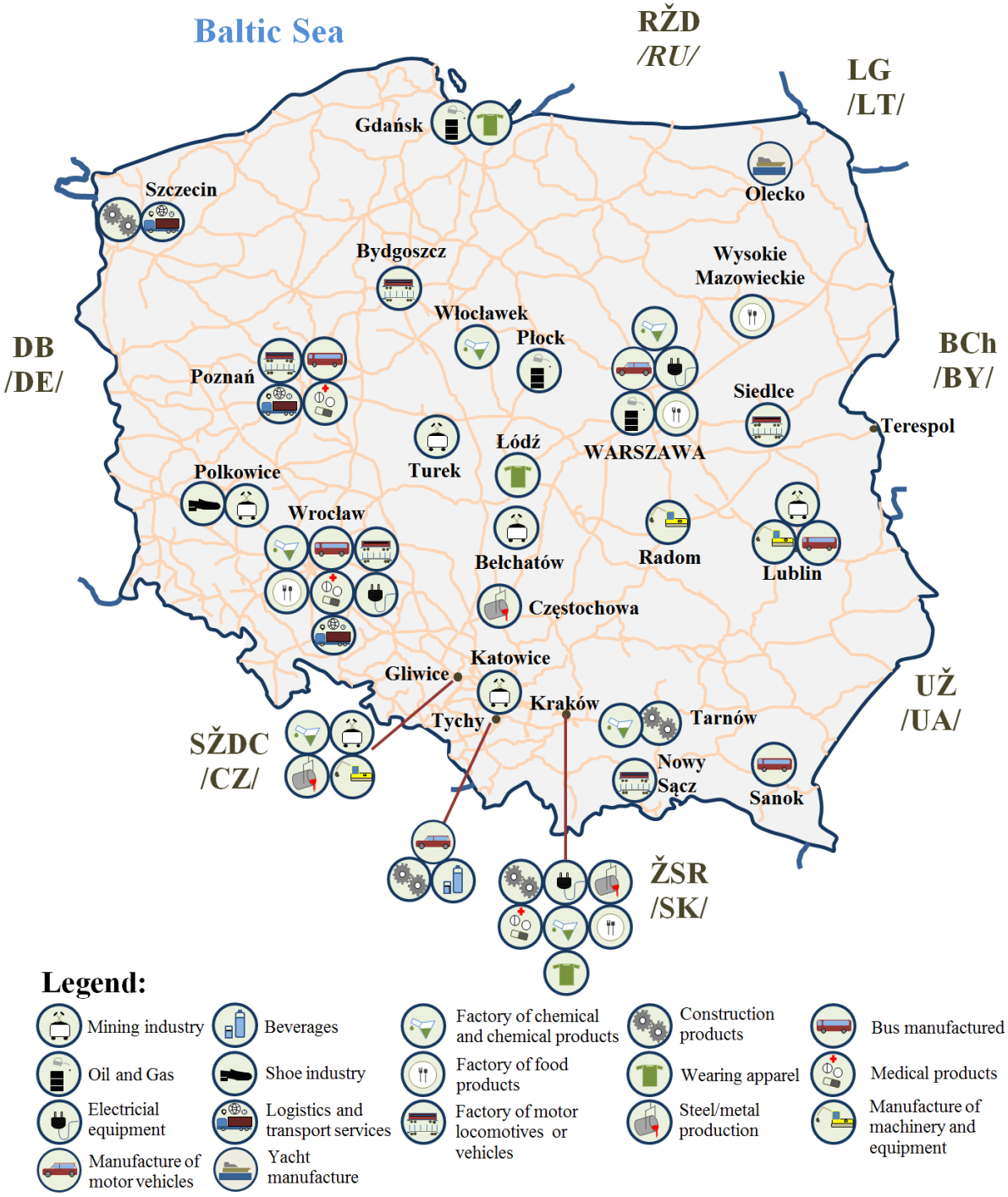


Figure 12: *The most important industrial areas in the Republic of Poland (Source: General information on industry in Poland)*

The most important industries in the Slovak Republic:

Metallurgical industry – rolled material and sheets for automobiles, pipe and tube production.

Mechanical engineering – manufacturing of bearings, automobile components.

Automotive industry – four car factories.

Electrotechnical industry – manufacturing of screens, televisions, home appliances.

Tourism – especially the area of the High and Low Tatras, Bratislava, national parks.

Chemical industry and food industry.

Figure 13 illustrates the most important industrial areas in the Slovak Republic.

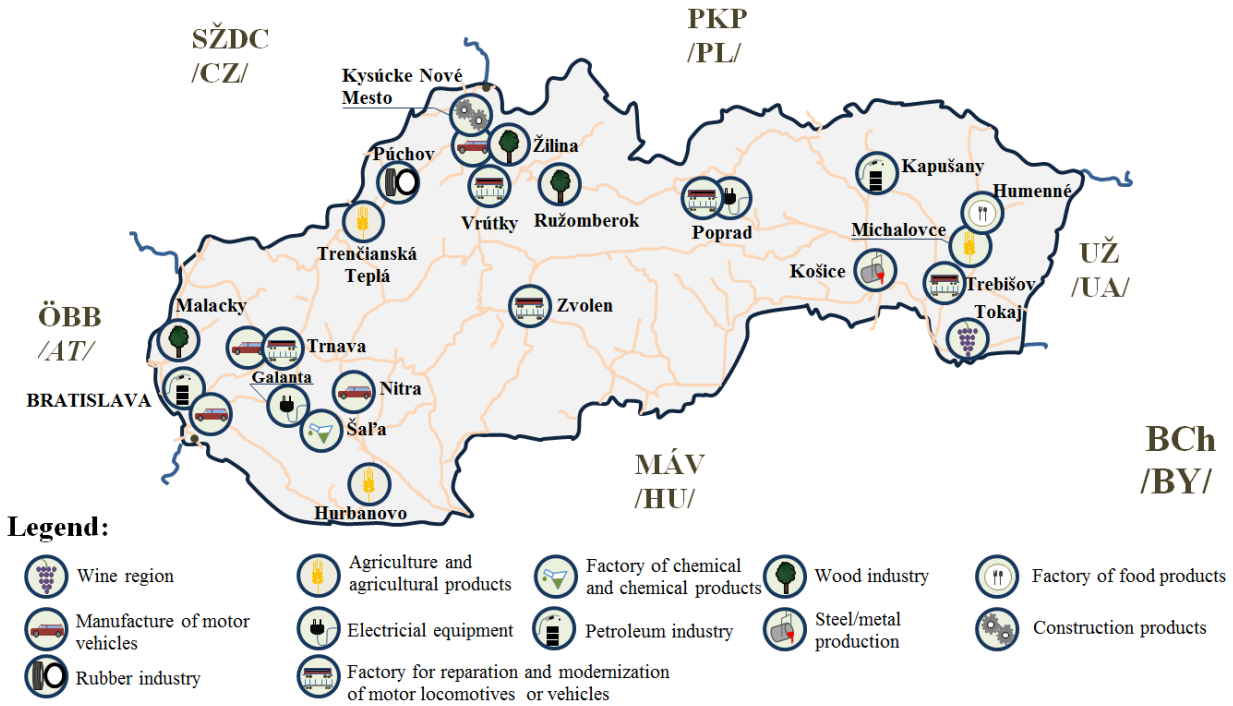


Figure 13: *The most important industrial areas in the Slovak Republic*

(Source: General information on industry in Slovakia)

The most important industries in Hungary:

Mechanical engineering – mainly production of means of transport.

Chemical industry – mainly petroleum processing.

Textile production – especially furriery and work clothes.

Tourism – especially the area around Balaton, Budapest.

Food and agriculture – major exporter of meat, poultry, cereals and wines.

Figure 14 illustrates the most important industrial areas in Hungary.

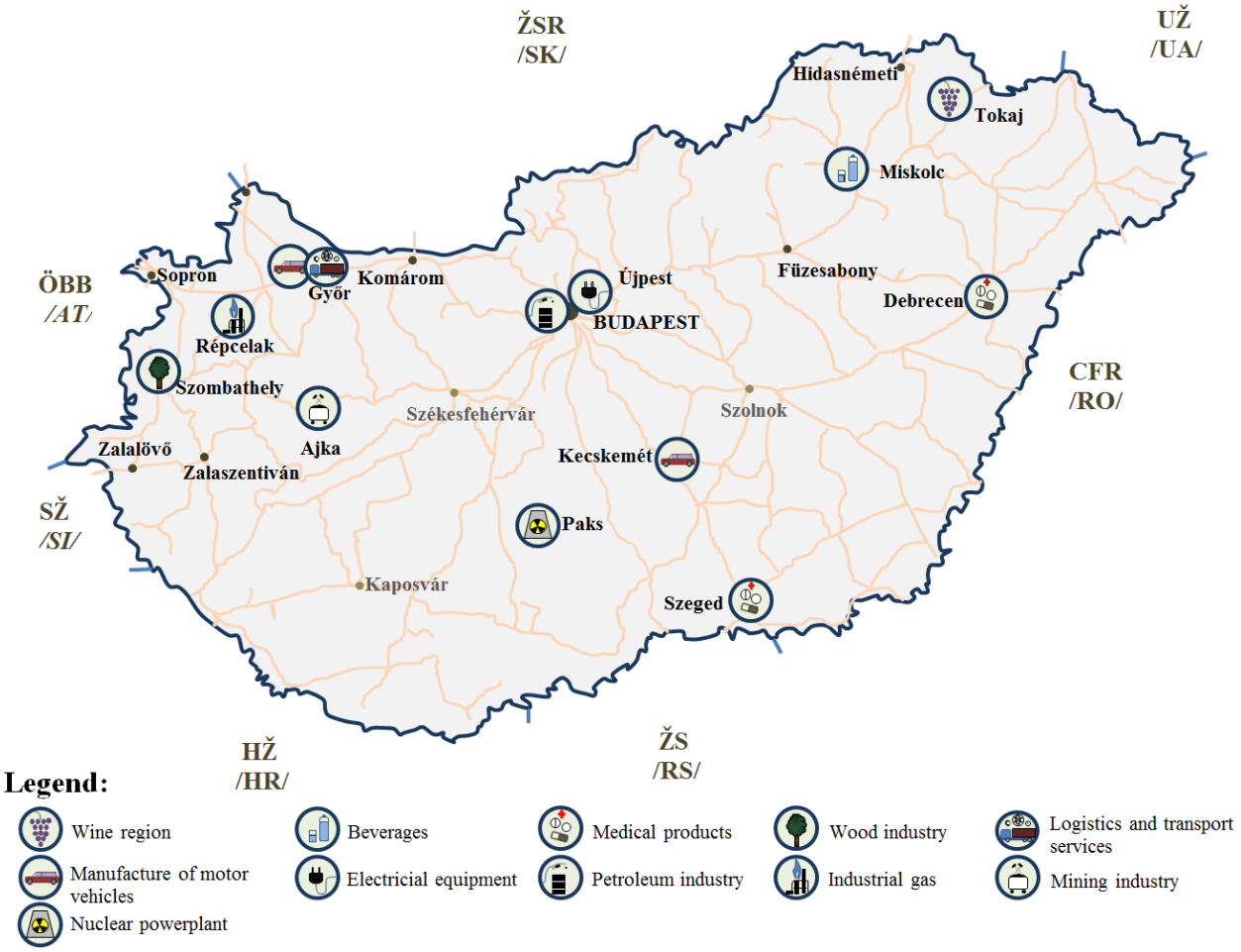


Figure 14: *The most important industrial areas in Hungary*

(Source: General information on industry in Hungary)

The most important industries in the Republic of Slovenia:

Mining industry – ferrous ores and metals, and other mining(lead and zin ores) and quarrying products.

Metallurgical industry – non-ferrous metals.

Mechanical engineering – means of transport, tools, home appliances.

Textile and pharmaceutical industries.

Furniture industry – important export goods of the country.

Tourism – especially in seaside areas.

Figure 15 illustrates the most important industrial areas in the Republic of Slovenia.

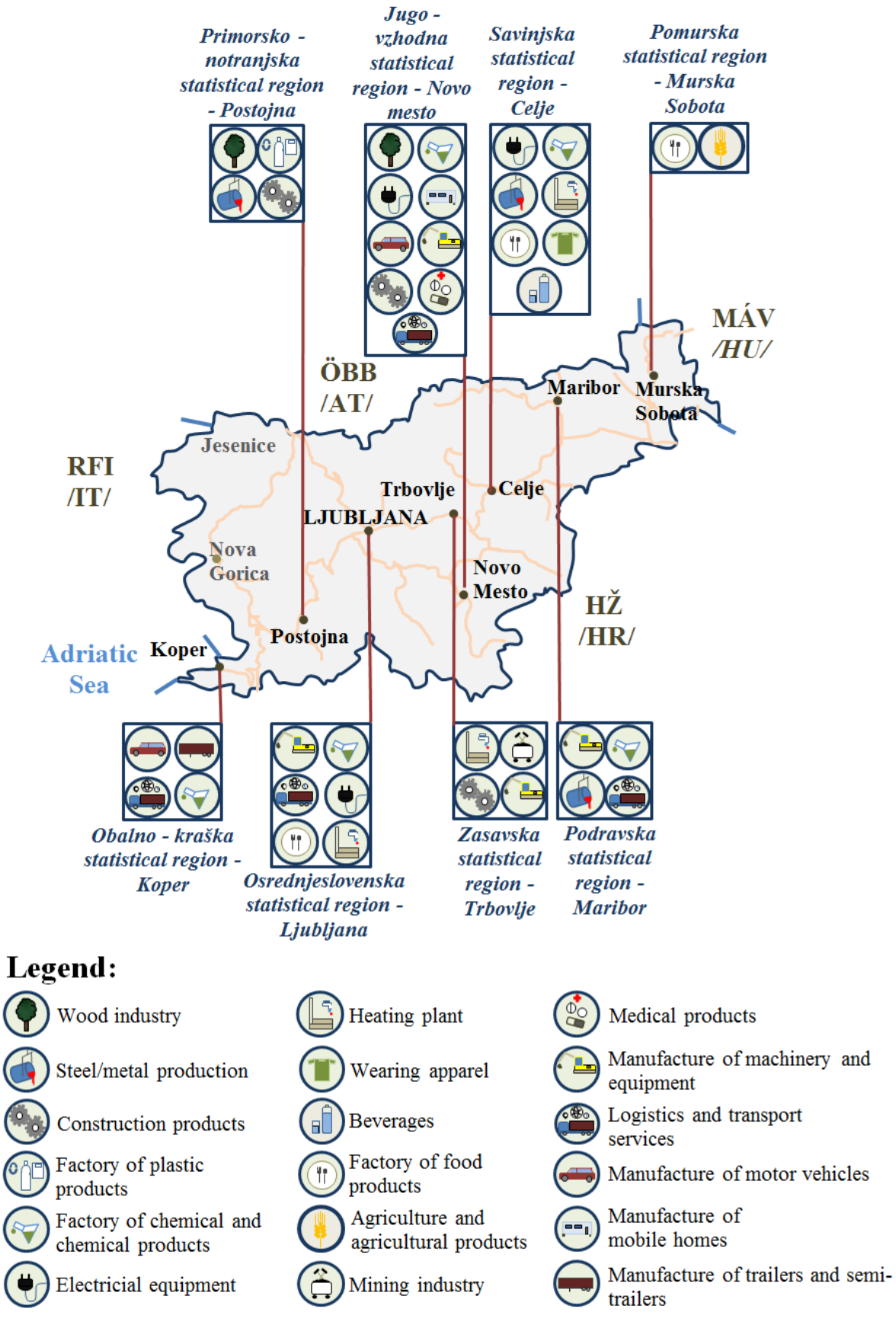


Figure 15: *The most important industrial areas in the Republic of Slovenia*

(Source: SURS – Statistical office of Republic of Slovenia)

4.4 Results and summary of the findings of Chapter 4

On the basis of the collected and evaluated main statistical economic data in the Amber RFC countries, it is possible to conclude:

- positive economic development in the Amber RFC countries: it can be assumed based on the trend of positive GDP development in Table 2. The GDP development in the Amber RFC countries is assumed at the level of 3.1 – 4.0 %, which is more than the estimated average of GDP development in EU (2.8 – 2.9 %). Positive economic development can also be expected on the basis of the advantageous location of the Amber RFC countries within the analysed indices (Tables 4 and 5),
- increase in living standards of the population: it is assumed based on the Amber RFC countries ranking in the Human Development Index. At the same time, the positive trend of GDP development (expected based on the analysis in Table 2), the amount of foreign investments and the increase in a share of science and research in GDP contribute to increase in living standard,
- increase in industrial production: influenced by the attractive position of the Amber RFC countries within the international indices analysed in Tables 4 and 5. Industry structure, history, skilled labour force, geographic position and infrastructure of the Amber corridor countries also have a significant impact on industrial growth. These factors motivate foreign investors to direct their investment activities to the Amber RFC countries,
- increase in demand for services: the positive economic development in the Amber RFC countries (shown in Tables 2 and 3) takes a share in the consumption of services, as the purchasing power and consumer behaviour of the population are increased. This fact is confirmed in Germany and USA where an increase in demand for services due to the economic development – transition from secondary to tertiary national economy – was recorded,
- construction of industrial and logistics centres and intermodal transport terminals: results from the need to transport intermediate products, final products as well as foreign direct investment and greening transport. Increase in quality and extension of logistics services require the completion of new centres. The construction is also influenced by the attractive position of the Amber RFC countries within the Enabling Trade Index. The final products from the Amber RFC countries are worldwide distributed (e.g. production of cars in Hungary, Slovakia and Poland). Also, there is the need to distribute goods from Asia primarily by intermodal transport (e.g. goods distributed to the Amber RFC countries and other EU members from the Port of Koper in Slovenia),

- increase in demand for transport services: influenced by the positive economic development and the position of the Amber RFC countries according to the analysed indices (analysis in Tables 3, 4 and 5 – above-average position of the Amber RFC countries), the change in consumer behaviour, the population movement resulting from a higher purchasing power, higher production of final products, the need to transport intermediate products to the factories (in particular automotive, machine and metallurgical industries),
- requirements of a higher level of transport services, e.g. reliability, safety, shorter transport times, etc.: the economy in the Amber RFC countries forms primarily a secondary economic sphere (production and assembly of final products; electrical engineering, machine, metallurgical and automotive industries; Figures 12-15). This sphere requires reliable, flexible and safe transport services that are directly related to the production and logistics processes. Without the provision of high-quality transport services, the needs of customers (manufacturing companies, consumers, suppliers) cannot be satisfactory met, which could threaten the competitiveness of the business environment of the Amber RFC countries,
- pressure on transport ecology: the economic growth directly affects the consumer needs of the population, thereby the transport performances in goods and passenger road transport are still increased. The increase in these performances increases the production of negative external costs. Reduction of negative external costs (e.g. CO2 production) is planned by the European Commission in the next period through the legislative measures (e.g. a Regulation of the European Parliament and of the Council setting emission performance standards for new passenger cars and for new light commercial vehicles as part of the Union's integrated approach to reduce CO2 emissions from light-duty vehicles and amending Regulation (EC) No 715/2007),
- more financial resources for the transport sector: GDP growth (data in Table 2) in the Amber RFC countries will be reflected in the revenues to the state budgets in a positive way. Increase in public revenues positively influences the possibilities of state investments. Due to constantly increasing demand for high-quality transport services and better public revenues, it will be possible to assign more financial means for the transport sector.

The economic analysis carried out for the Amber RFC countries has shown sufficient potential for rail freight services. The economic growth puts increased demands on logistics and transport processes. The population mobility, purchasing power and environmental awareness, which significantly affect the demand for ecological rail transport services, are constantly increasing.

5 ANALYSIS OF TRANSPORT AND TRAFFIC INDICATORS

The first part of the chapter analyses the achieved level in the process of liberalization of the rail transport services market and the European Railway Performance Index. Consequently, an analysis of the transport infrastructure of the countries of the Amber RFC is carried out and graphical representation of other corridors passing through the surveyed countries can be found in Figures 19 - 22. The analysis of transport performances and selected transport indicators, which are the basis for the development of the Amber RFC strategy, are an important part of the chapter. The presented data create a comprehensive realistic view of the state of the railway system in individual countries.

5.1 Liberalization of rail transport services market

The market opening rate of rail transport services in EU countries was expressed by means of the liberalization index issued by IBM Germany in 2011. The index provides qualified data on the legislative and practical possibilities for the entry of new railway undertakings into the rail transport services market. The index also points to barriers and shortcomings to the entry of new railway undertakings into the rail transport services market in individual EU countries. The index was also calculated for Switzerland and Norway. The liberalization index is calculated fairly, therefore it provides a detailed view of the liberalization process in the analysed countries. The liberalization index examines, in particular, the view of new entering railway undertakings by answering questions:

- What are the legal bases for external railway undertakings in the target country?
- What are the opportunities and barriers to entry to the rail market?
- What is the dynamic and strong competition on the rail transport services market?

The liberalization index is based on data from two types of indicators:

1. LEX indicator – shares 20 % in the overall result of the index. It examines the organization of the rail sector, in particular the vertical separation of the infrastructure manager and the railway undertakings. An important criterion is a degree of market access control and power of market institutions. The most important part of LEX consists of the assessment and the resulting strength of the regulatory authorities of the analysed countries. Thematic areas examined in LEX:

- access to the railway market on the basis of Directive No 91/440, as amended by Directive 2001/12,
- national legislation,
- organizational classification of railway undertakings operating in the market under consideration,

- regulatory body.

2. ACCESS indicator – shares 80 % in the overall result of the index. It is focused on the analysis of conditional and complete barriers to access of new railway undertakings to the railway market. ACCESS thematic areas:

- conditions for obtaining the license and the safety certificate,
- access mode,
- access to the railway network,
- information barriers,
- system of charging for rail infrastructure and service facilities,
- access to service facilities.

The ACCESS indicator also evaluates the extent to which liberalization of the rail transport services market shares in the modal split and the development of the number of railway undertakings. In particular, the shift in transport performances in favour of rail transport is being monitored. The indicator separately assesses the segments of freight, suburban and long distance rail passenger transport. All analysed and examined areas of the liberalization index are scored and then counted, taking into account the ratios of individual countries:

- over 800 points advanced state,
- from 600 to 799 opening up the market as planned,
- from 300 to 599 points delayed state.

Figure 16 shows the liberalization index for passenger and freight rail transport in EU countries, Switzerland and Norway, issued by IBM Germany in 2011.

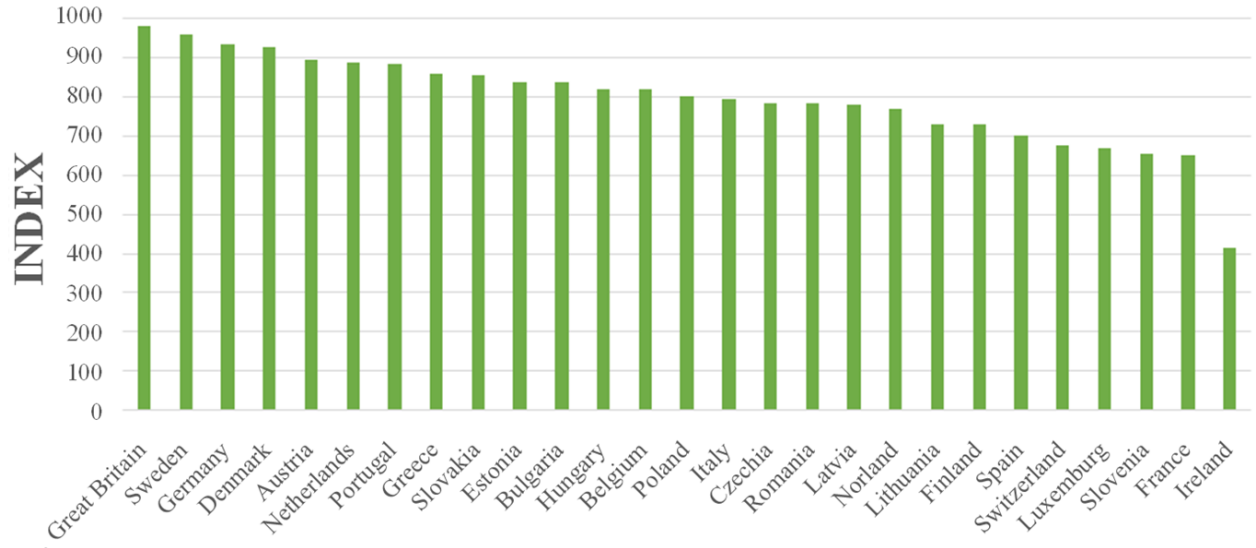


Figure 16: *Liberalization index for passenger and freight rail transport, 2011*

(Source: IBM Germany, 2011)

IBM Germany Liberalization Index, 2011 is currently the most up-to-date and the most objective tool to demonstrate the achieved level of liberalization process of rail transport services market in the evaluated countries. Figure 16 demonstrates the divergence in the level of rail transport market liberalization in EU countries due to the different implementation of EU legislative measures in the national legislation of the member states. The rail markets of the Polish, Slovak and Hungarian Republics have reached an advanced state in the market opening process. In evaluation, the Republic of Slovenia has reached the state – opening the market as planned. On the basis of the facts, we can confirm the appropriate conditions for doing business in the rail transport sector and providing transport services of the railway system in the Amber RFC countries. Based on the knowledge and experience, we can confirm the increasing level of the liberalization process in EU countries as well as in the Amber RFC countries.

5.2 The European Railway Performance Index

Data on the Railway Performance Index were obtained from the website: https://www.bcg.com/publications/2017/transportation-travel-tourism-2017-european-railway-performance-index.aspx. Elaboration and evaluation of the study „The European Railway Performance Index" were carried out by the Boston Consulting Group.

BCG's 2017 European Railway Performance Index (RPI) report provides insights for stakeholders seeking to answer this question. The RPI enables the most comprehensive benchmarking of European railway operations by considering the three critical components of railway performance: intensity of use, quality of service, and safety. The 2017 RPI report follows from the first two editions, published in 2012 and 2015. Over the five-year period covered by the three RPI studies, countries have generally remained within the same performance tiers.

Safety and quality of service (especially punctuality) are the most important factors underlying changes in a system's performance. Countries experiencing a decrease in overall performance typically have seen a decrease in their safety rating, while those with improving performance have usually experienced an increase in their quality of service rating.

The RPI measures the performance of railway systems in three dimensions for both passenger and freight traffic:

- Intensity of Use: To what extent is rail transport used by passengers and freight companies?
- Quality of Service: Are the trains punctual and fast, and is rail travel -affordable?
- Safety: Does the railway system adhere to the highest safety standards?

The analysis was confined to these dimensions to create an indicator that is comprehensive yet easy to understand. Each dimension comprises at least two subdimensions, and all were given

equal weight. The data were rescaled to represent a score of 0 to 10 for each subdimension. To create the index, the -ratings for each dimension and subdimension based on their weighting were combined.

The index's simplicity results in three methodological biases:

- Passenger performance is overweighted relative to freight performance because reliable information about the quality of service for freight operators - especially in terms of price and punctuality is unavailable. Consequently, the RPI for a particular country may not necessarily reflect high quality in the country's freight services.
- Large countries are favoured relative to smaller countries because the quality-of-service dimension takes into account the share of high-speed-rail travelers. That is significant because high-speed travel is more common in countries with railway networks that cover long distances.
- Countries in which consumers have low purchasing power are favoured - relative to those in which purchasing power is higher, because average fares were not adjusted on the basis of purchasing power parity (PPP). Never-theless, a PPP adjustment would have only a small impact on countries' - rankings, since it would mainly reinforce differences between tiers.

The following figure shows each country's performance, overall and for each of the three dimensions, as weighted in accordance with the methodology. The exhibit also shows each country's RPI ranking in 2012 and 2015, for comparison.

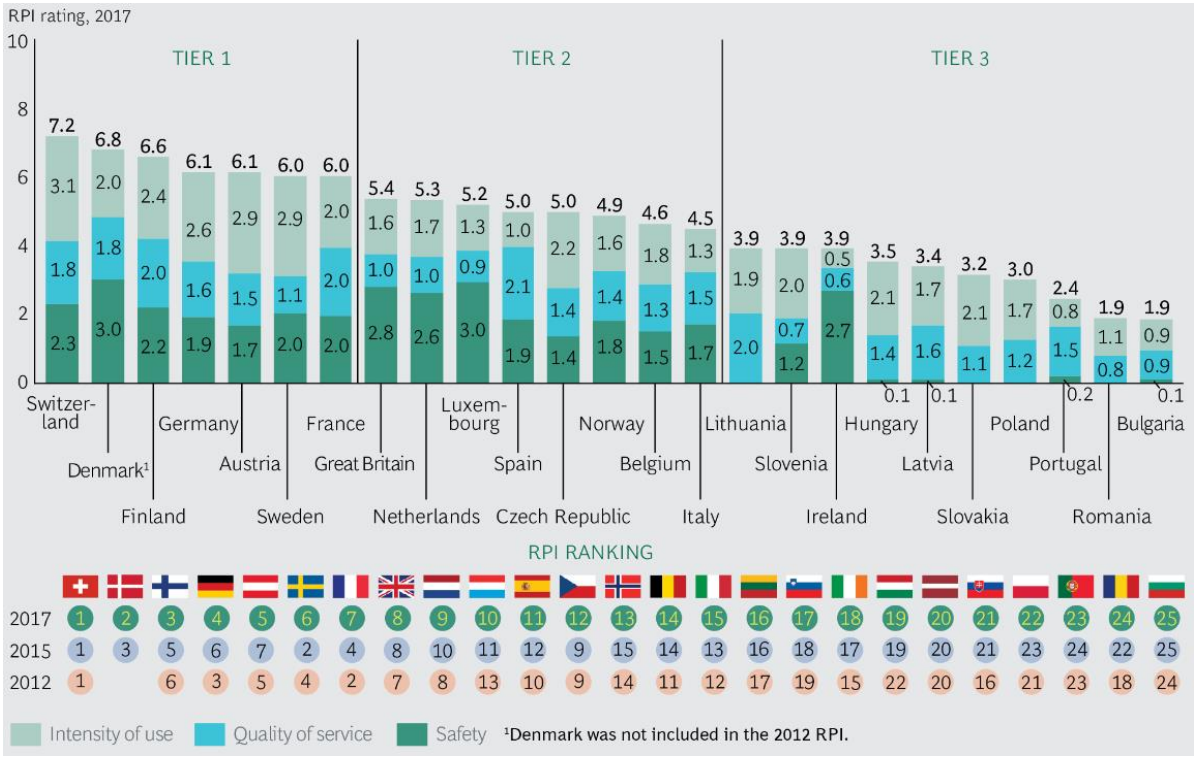


Figure 17: *RPI ranking in 2017*
(Source: the Boston Consulting Group)

Tier One - the railways in tier one perform well in at least two dimensions, although the results were not uniform.

Tier Two - countries in tier two have high-performing railway systems overall. The similarity among their RPI ratings, however, obscures a wide range of results among the three dimensions. The highest-ranked systems have high safety scores, but low scores for quality and intensity of use.

Tier Three - the railway systems in almost all the tier three countries have poor safety ratings. One exception is Ireland: its safety rating is among the highest in the index. Slovenia, Hungary, and Slovakia are rated very good for intensity of use, while Lithuania, Latvia, and Poland are close behind with ratings of good. Portugal, Romania, and Bulgaria in addition to Ireland have poor ratings for intensity of use.

Changes in safety and quality have the greatest impact. Safety and quality of service (especially punctuality) appear to be the most important factors underlying changes in a system's performance. There were only small variations in intensity of use from year to year, and these have little impact on overall performance. A decrease in safety is typically the factor responsible for an overall decrease in performance. Countries with improving performance usually experience an increase in their quality of service rating.

The growth of the railway system effectiveness was also recorded in the countries which spend higher investments (investment and non-investment subsidies) in the railway system. Overall, as in 2012 and 2015, this year's study shows a correlation between public cost and a given railway system's performance level as measured by the RPI (Figure 18). In addition, it reveals differences in the value that countries receive in return for their public cost. Denmark, Finland, France, Germany, the Netherlands, Sweden, and Switzerland capture relatively high value for their money. These countries outperform relative to the average ratio of performance to cost for all countries. In contrast, Luxembourg, Belgium, Latvia, Slovakia, Portugal, Romania, and Bulgaria get relatively low value for their money.

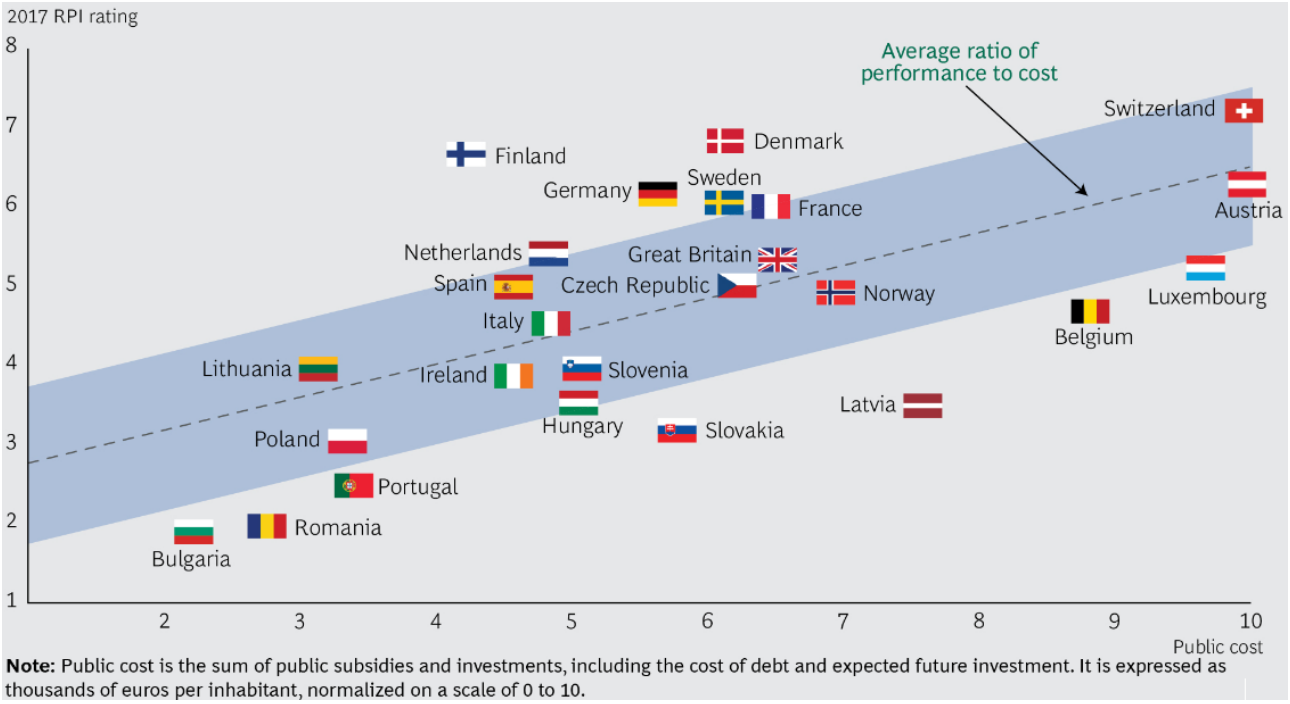


Figure 18: *Correlation between public cost and a given railway system's performance level (Source: the Boston Consulting Group)*

The analysis not only confirmed the correlation between public cost and performance, but also found that it applies over time. Countries that recently increased their public cost have been rewarded with the highest performance improvements (this is especially true for Finland). During the same period, stagnating levels of public cost in France and Great Britain, and decreasing levels in Italy and Sweden, have coincided with the incipient trend of declining performance.

Based on the results of RPI, it is necessary to ensure:

- at least to keep the level of financial resources allocated to the railway system in the countries with increasing performance,
- adapt the legislation and the transport policy of countries with a lower RPI in favour of the railway system (e.g. reduction of charges, support of intermodal transport, internalization of part of negative external costs of transport),
- increase investment and non-investment subsidies in the railway system in the countries with decrease in performance level (e.g. modernization of lines, electrification, eliminating bottlenecks),
- take measures to increase the safety and reliability of rail transport (e.g. modernization of signalling equipment, support of new IT technologies, increase of penalties for railway safety intruders, take interoperability measures),
- ensure a more efficient maintenance and management of rail transport in the countries with decrease in performance level (use innovations in the field of railway infrastructure

diagnostics, efficient management of internal processes, use of new equipment for railway infrastructure management).

5.3 Analysis of transport infrastructure of the Amber RFC countries

The sustainable economic development of the country depends, inter alia, on the quality, density and development of transport infrastructure as a tool necessary for the movement of goods and people. Each country manages and invests in the development and construction of its transport infrastructure. A high-quality and accessible transport infrastructure contributes to the overall development of the national economy. Tables 7-9 show an analysis of the development of rail and road infrastructure of the Amber RFC countries.

Table 7: Length of operated railway lines in km

Country	1995	2000	2005	2010	2012	2013	2014	2015
Poland	23 986	22 560	19 507	19 702	19 617	18 959	18 942	18 510
Slovakia	3 665	3 662	3 658	3 622	3 631	3 631	3 627	3 626
Hungary	7 714	8 005	7 950	7 893	7 877	7 898	7 892	7 894
Slovenia	1 201	1 201	1 228	1 228	1 209	1209	1 209	1 209

Source: Annual reports of the relevant ministries

Table 8: Total length of motorways in km

Country	1995	2000	2005	2010	2012	2013	2014	2015
Poland	246	358	552	857	1 365	1 482	1 556	1 559
Slovakia	198	296	328	416	419	420	420	463
Hungary	335	448	859	1 477	1 515	1 767	1 782	1 884
Slovenia	293	427	569	771	769	770	770	773

Source: Annual reports of the relevant ministries

Table 9: Length of other roads in km

Country	1995	2000	2005	2010	2012	2013	2014	2015
Poland	372 233	372 725	381 463	406 122	412 035	413 530	415 470	419 636
Slovakia	17 670	17 442	43 417	42 910	42 948	42 943	42 938	42 951
Hungary	29 738	29 533	N/A	198 090	200 426	203 309	204 057	202 998
Slovenia	N/A	37 976	37 916	38 303	38 216	38 104	38 114	38 124

Source: Annual reports of the relevant ministries

Based on the statistical data in Tables 7-9, we can confirm the decline in the length of railway infrastructure in the monitored period in Poland and Slovakia. On the contrary, the increase in the length of the transport infrastructure is recorded on motorways. The most significant increase is recorded in the Republic of Poland. The trend of motorway construction is mainly influenced by performances in individual motoring and road goods transport.

Tables 10 and 11 provide an analysis of the development of expenditures on railway and road infrastructure maintenance in the Amber RFC countries.

Table 10: Expenditures on railway infrastructure maintenance (mill. EUR – current prices)

Country	1995	2000	2005	2010	2012	2013	2014	2015
Poland	584,8	59,4	82,3	212,8	307,3	387,1	614,2	578,6
Slovakia	60,0	70,9	90,6	120,4	80,6	60,9	70,5	110,5
Hungary	137,8	78,6	233,9	439,5	434,9	418,3	490,1	473,1
Slovenia	N/A	7,0	7,0	68,0	87,0	71,0	101,0	110,0

Source: Annual reports of the relevant ministries

Table 11: Expenditures on road infrastructure maintenance (mill. EUR – current prices)

Country	1995	2000	2005	2010	2012	2013	2014	2015
Poland	286,4	448,6	1 263,5	2 636,5	428,0	438,1	383,1	415,4
Slovakia	24,6	66,6	100,3	174,7	192,6	203,6	181,2	201,0
Hungary	96,8	106,8	283,4	328,5	295,9	370,3	272,8	282,1
Slovenia	53,0	79,0	99,0	137,0	120,0	123,0	113,0	126,0

Source: Annual reports of the relevant ministries

The demonstrated overall long-term trend in the growth of expenditures on the analysed transport infrastructure maintenance in the monitored period is mainly influenced by an increase in transport performances, aging of transport infrastructure and, in some cases, by neglected diagnostics which has a preventive role in transport infrastructure maintenance. Maintenance costs of transport infrastructure will continue to increase as a trend of increase in transport performances of rail and road transport is expected. The increasing trend of transport performances is influenced by the long-term economic development of the Amber RFC countries as shown in Chapter 4. The expenditures on maintenance will also be affected by the technical and technological parameters of the new and upgraded transport infrastructure that meets the conditions of a quality and safe transport infrastructure.

Figures 19-22 graphically represent the passing railway corridors for the Amber RFC countries.

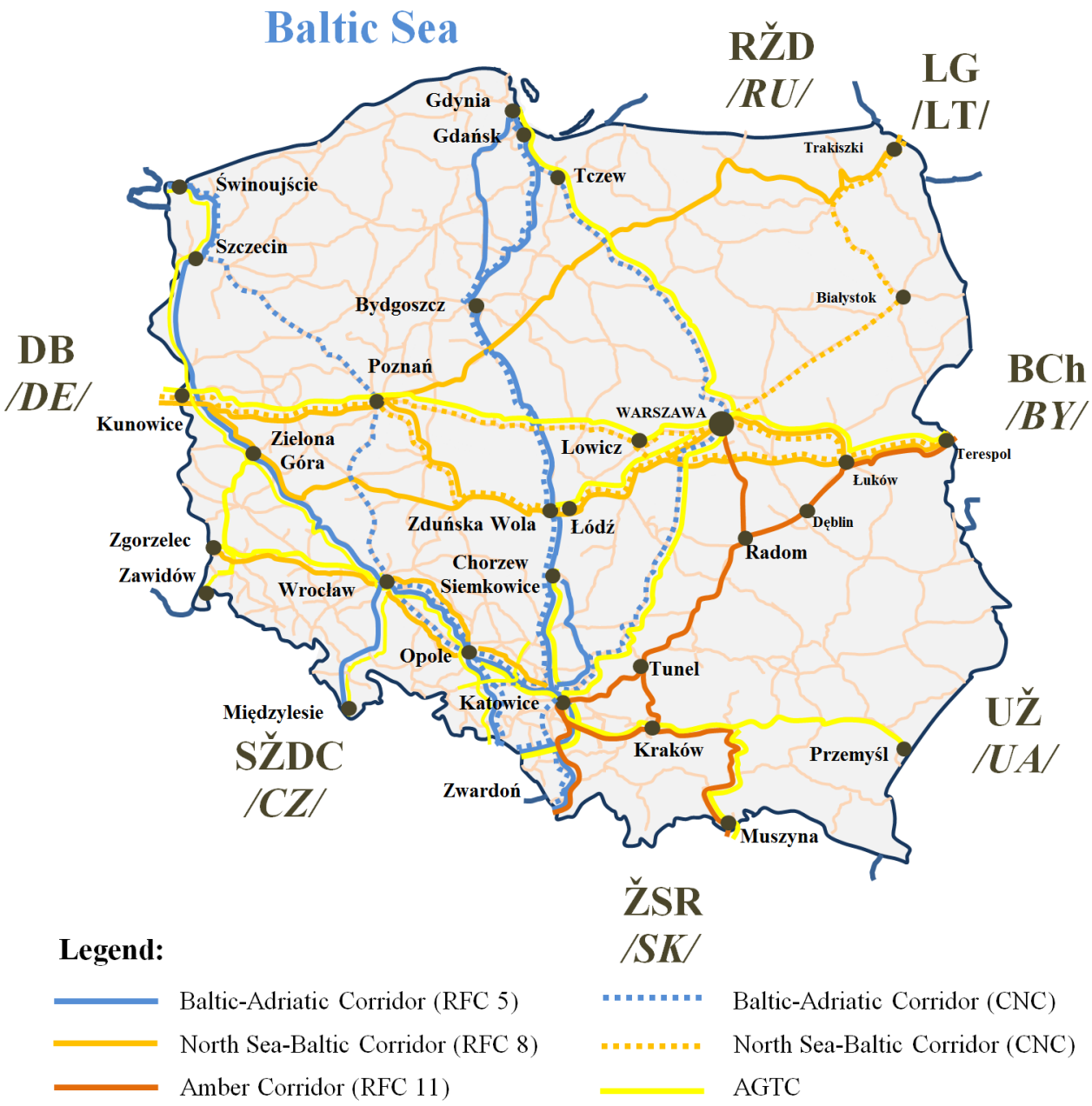


Figure 19: *Railway corridors of the Republic of Poland*

(Source: ŽSR, VVÚŽ)

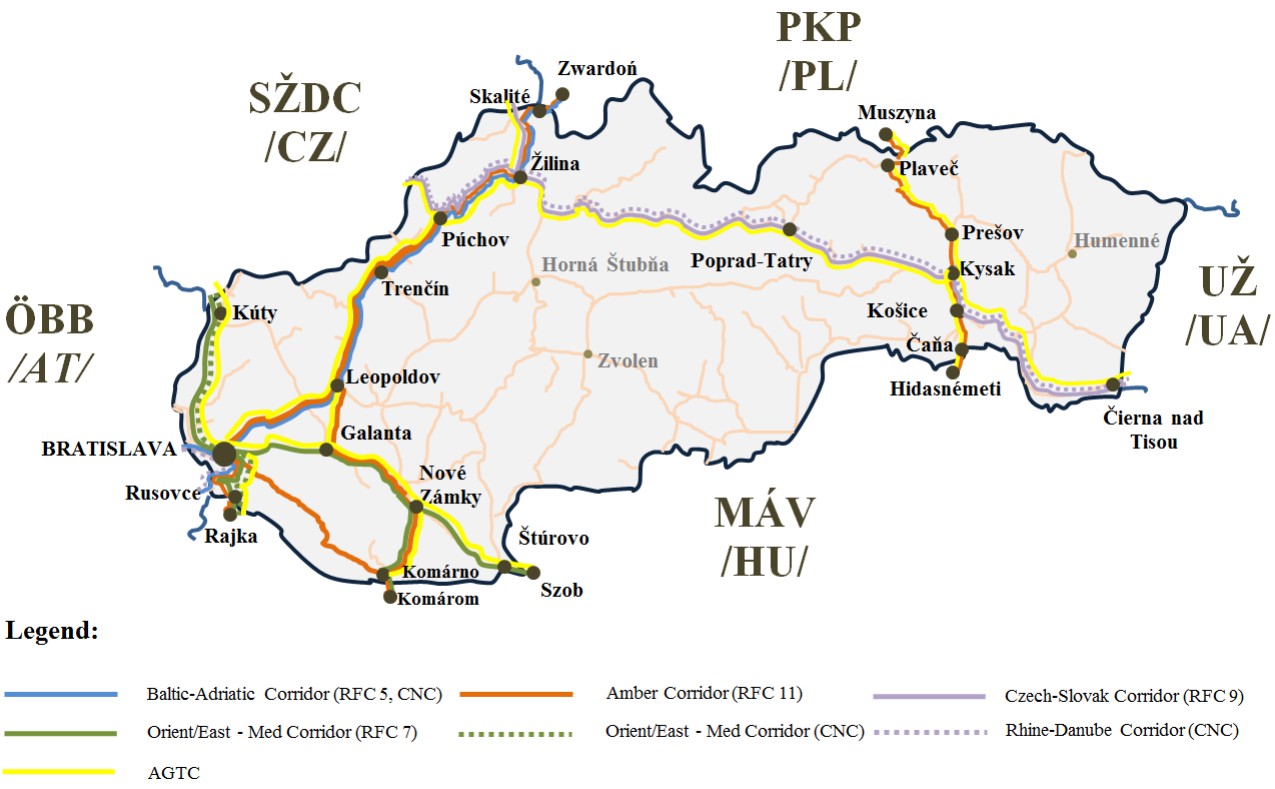


Figure 20: *Railway corridors of the Slovak Republic*

(Source: ŽSR, VVÚŽ)

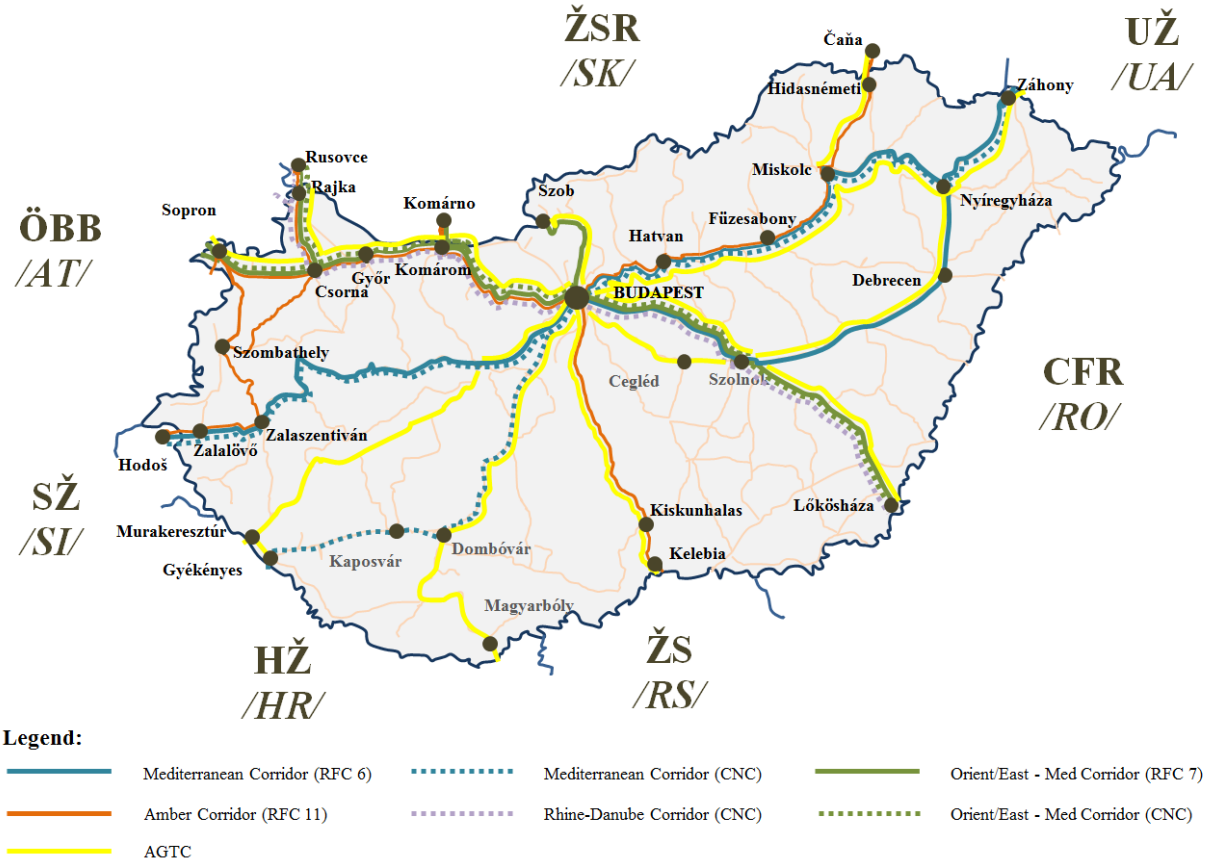


Figure 21: *Railway corridors of Hungary*

(Source: ŽSR, VVÚŽ)

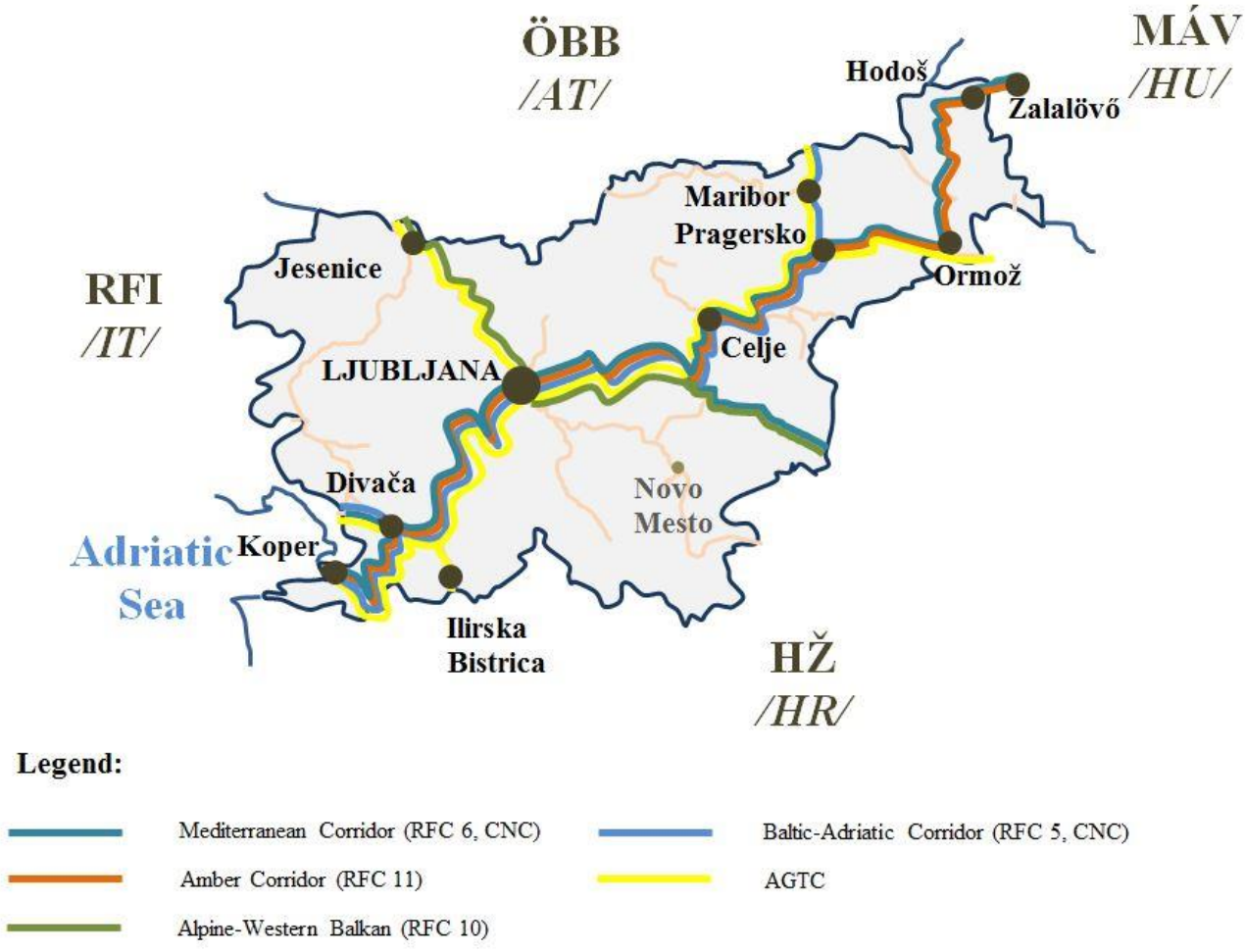


Figure 22: *Railway corridors of the Republic of Slovenia*

(Source: ŽSR, VVÚŽ)

Table 12 provides an analysis of the most important airports, container terminals, sea and inland waterways ports located in the Amber RFC countries.

Table 12: Analysis of air and water transport infrastructure

Country	Airport	Sea port	Container terminal - Port	Inland waterways port
Poland	Warsaw Kraków Gdańsk Katowice Wrocław Poznań Rzeszów Szczecin Bydgoszcz Łódź Lublin Zielona Góra Radom Olsztyn	Szczecin Świnoujście Kolobrzeg Darlowo Wladyslawowo Elblag	Gdańsk Gdynia	Kraków Warsaw Włocławek Bydgoszcz Gliwice Opole Wrocław Głogów Nowa Sól Szczecin Poznań Konin
Slovakia	Bratislava Košice Žilina Sliač Poprad Piešťany	-	-	Bratislava Komárno Štúrovo
Hungary	Budapest Debrecen Győr Pécs-Pogány Fertőszentmiklós Nyíregyháza Siófok Szeged Sármellék	-	-	Győr Komárom Budapest Százhalombatta Dunaújváros Paks Fadd-Dombori Baja Mohács
Slovenia	Ljubljana Maribor Portorož	Piran Izola	Koper	-

Source: maps of TEN-T

5.4 Rail transport analysis

The subchapter is aimed at the analysis of the most important rail data that are necessary to determine the Amber RFC routing and draft of its strategic direction. The data also serve as a basis for drafting the measures to promote rail freight transport. The subchapter also contains a modal split analysis.

5.4.1 Poland

All data contained in the subchapter was provided by PLK. An important indicator from the point of view of infrastructure managers is the development of transport performances in rail

passenger and freight transport. The transport performances demonstrate the utilization of railway infrastructure over time. On the basis of the above mentioned, Table 13 analyses the development of total transport performances in the Republic of Poland in the period 2013 – 2016. At the same time, Table 14 contains an analysis of the development of number of railway undertakings providing railway infrastructure services in the Republic of Poland.

Table 13: Analysis of transport performances on PLK lines

Mode of transport	Carrier	Transport performance/Year	2013	2014	2015	2016
Passenger transport	National carrier*	train-km in thous.	43 140	39 481	46 940	58 292
		gross tkm in mill.	21 445	16 161	18 459	21 576
	Private carrier	train-km in thous.	92 925	92 106	93 388	96 843
		gross tkm in mill.	16 740	15 497	15 359	16 335
	Total	**train-km in thous.**	**136 065**	**131 587**	**140 328**	**155 135**
		gross tkm in mill.	**38 185**	**31 658**	**33 818**	**37 911**
Freight transport	National carrier*	train-km in thous.	45 814	44 491	42 653	39 461
		gross tkm in mill.	64 445	63 573	62 730	56 748
	Private carrier	train-km in thous.	25 711	26 883	28 589	30 862
		gross tkm in mill.	34 427	35 565	38 302	42 620
	Total	**train-km in thous.**	**71 525**	**71 374**	**71 242**	**70 323**
		gross tkm in mill.	**98 872**	**99 138**	**101 032**	**99 368**

**As 'national' we assumed the incumbent railway undertaking from PKP Group*

Table 14: Structure of rail carriers with valid access agreement

Number of carriers with valid access agreement/Year		2013	2014	2015	2016
Passenger carrier	national	1	1	1	1
	private	13	14	14	15
Freight carrier	national	1	1	1	1
	private	61	67	68	69
Total	national	2	2	2	2
	private	74	81	82	84

The analysis of transport performances in the Republic of Poland has shown their gradual increase in rail passenger transport (Total: train-km) and freight transport (Total: gross tkm, 2013 compared to 2016). The increase in passenger transport performances is more important than in rail freight. In rail freight transport there is a significant decrease in performances of the national carrier (train-km, gross tkm). At the same time, there is a gradual increase in the number of private carriers which has been positively shown in increase in the transport performances. The noticed increase in transport performances is mainly influenced by international transit rail transport.

The analysis of rail transport in the Republic of Poland requires, for the needs of its benefits for the Amber RFC, the processing of additional data. By reason of presenting and maintaining the

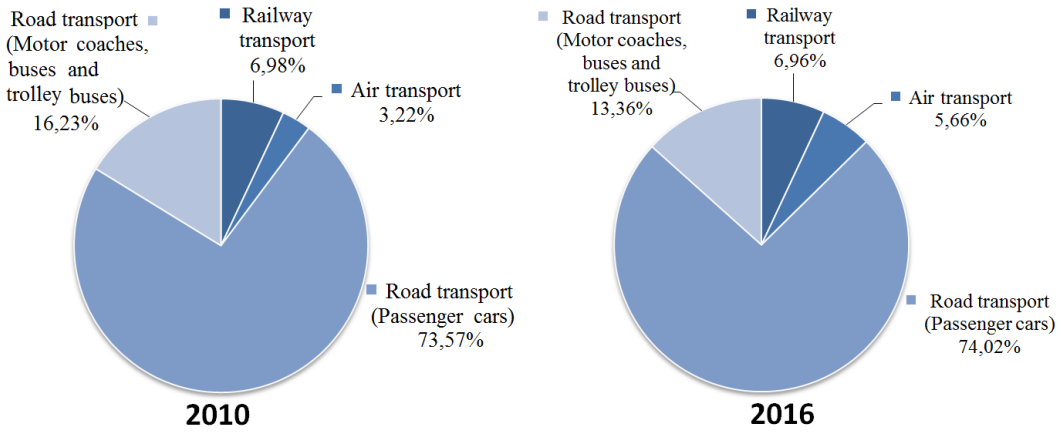
transparency and integrity of rail transport data in the Republic of Poland, the analysis of other data is carried out in Appendix A in the .xls format. The individual sheets in the Appendix contain the following data:

- technical parameters of the potential lines for the Amber RFC,
- analysis of transport base in the whole country,
- analysis of planned investments in transport infrastructure,
- analysis of charges,
- analysis of transport performances in rail passenger and freight transport on the potential lines of the Amber RFC,
- analysis of average running times on the potential lines of the Amber RFC.

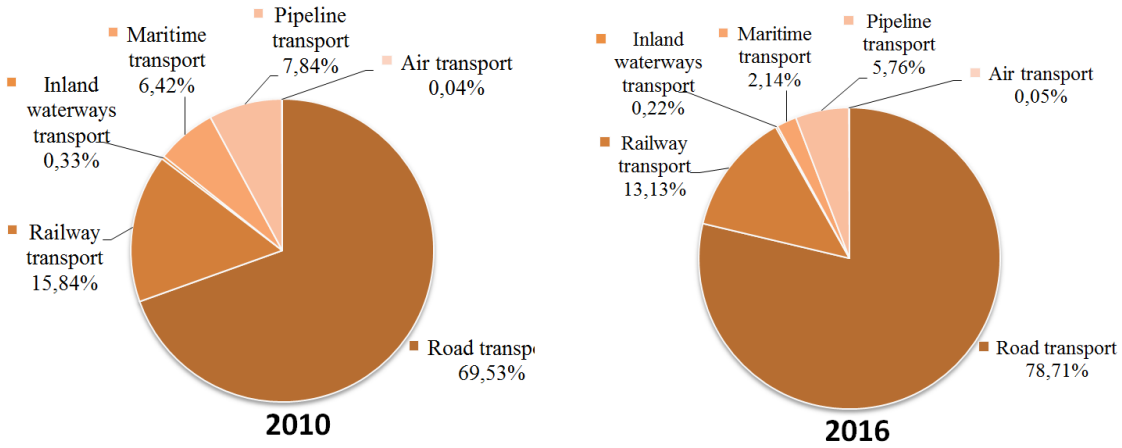
Appendix B contains the supplementary data concerning analysis of investment subsidies in the Republic of Poland.

Based on these analyses, it will be possible to decide on the inclusion of the individual lines in the Amber RFC. The results of analyses will be used to formulate the conclusions resulting from the Chapter 5. Consequently, the draft of strategy will be based on the summary results.

The graphs 1 and 2 show a graphical comparison of the modal split in the Republic of Poland in passenger transport in 2010 compared to 2016 and in freight transport in 2010 compared to 2016. The comparison is made in the band of 6 years giving a sufficient time span of the market response to the changes of modal split following the adoption of measures to support rail transport within the EU.



Graph 1: Comparison of modal split in passenger transport in Poland (Source: Statistics Poland /www.stat.gov.pl/, Transport – activity results in 2016)



Graph 2: Comparison of modal split in freight transport in Poland
(Source: Statistics Poland /www.stat.gov.pl/, Transport – activity results in 2016)

Based on the comparison of modal split in the Republic of Poland, we can confirm the decrease in share of the transport performances in rail transport system in favour of road goods transport and individual motoring due to large investments in road infrastructure.

5.4.2 Slovakia

All data contained in the subchapter were provided by ŽSR. An important indicator from the point of view of infrastructure managers is the development of transport performances in rail passenger and freight transport. The transport performances demonstrate the utilization of railway infrastructure over time. Based on the above mentioned, the analysis of total transport performances in the Slovak Republic in the period 2013-2016 is carried out in Table 15. At the same time, Table 16 contains an analysis of the development of number of railway undertakings providing railway infrastructure services in the Slovak Republic.

Table 15: Analysis of transport performances on ŽSR lines

Mode of transport	Carrier	Transport performance/Year	2013	2014	2015	2016
Passenger transport	National carrier	train-km in thous.	30 356	30 724	31 801	31 438
		gross tkm in mill.	8 371	8 556	9 373	9 264
	Private carrier	train-km in thous.	1 215	1 351	2 789	3 170
		gross tkm in mill.	136	190	803	1 089
	Total	**train-km in thous.**	**31 570**	**32 075**	**34 590**	**34 608**
		gross tkm in mill.	**8 508**	**8 746**	**10 176**	**10 352**
Freight transport	National carrier	train-km in thous.	11 557	11 240	11 436	11 367
		gross tkm in mill.	15 256	15 186	15 210	15 149
	Private carrier	train-km in thous.	2 518	2 979	3 237	3 739
		gross tkm in mill.	2 376	2 795	3 243	3 766
	Total	**train-km in thous.**	**14 075**	**14 219**	**14 673**	**15 106**
		gross tkm in mill.	**17 632**	**17 981**	**18 453**	**18 915**

Table 16: Structure of rail carriers with valid access agreement

Number of carriers with valid access agreement/Year		2013	2014	2015	2016
Passenger carrier	national	1	1	1	1
	private	1	4	5	5
Freight carrier	national	1	1	1	1
	private	42	43	43	41
Passenger and freight carrier	national	1	1	1	1
	private	0	0	2	3

The analysis of transport performances in the Slovak Republic showed a successive increase in rail passenger transport (Total: train-km, gross tkm) and freight transport (Total: train-km, gross tkm). In rail freight transport, there is a slight decrease in performances of the national carrier (train-km, gross tkm: 2013 compared to 2016). The recorded increase in transport performances in rail freight transport is influenced by, in particular, international transit rail transport and the situation in the metallurgical industry and mechanical engineering in SR. Within the development of the number of carriers, there was recorded a slight decrease in 2016 compared to 2015 and 2014.

The analysis of rail transport in the Slovak Republic requires, for the needs of its benefits for the Amber RFC, the processing of additional data. By reason of presenting and maintaining the transparency and integrity of rail transport data in the Slovak Republic, the analysis of other data is carried out in Appendix A in the .xls format. The individual sheets in the Appendix contain the following data:

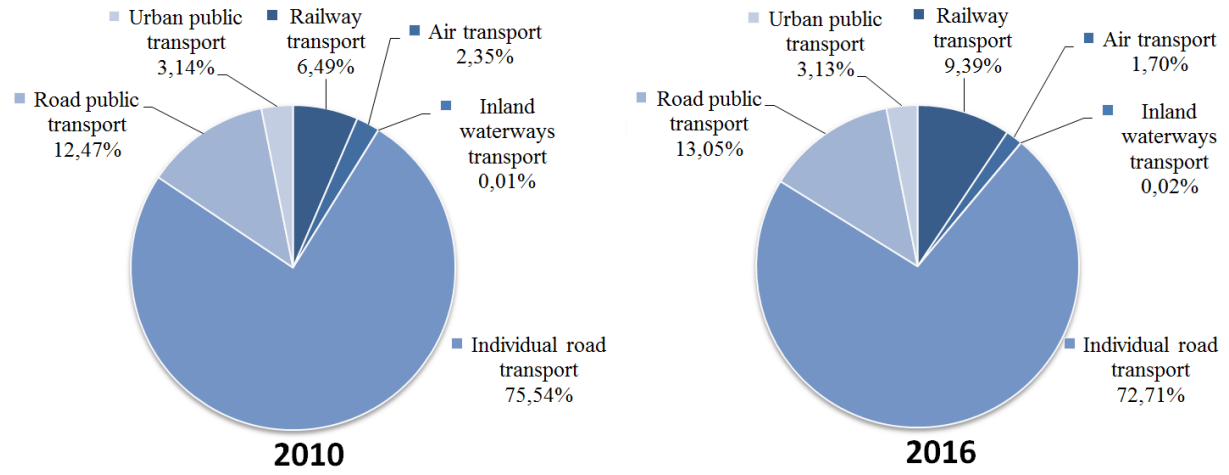
- technical parameters of the potential lines for the Amber RFC,
- analysis of transport performances in rail passenger and freight transport on the potential lines of the Amber RFC,
- analysis of average running times on the potential lines of the Amber RFC.

Supplementary data of rail transport analysis in the Slovak Republic are listed in Appendix C which contains the following data:

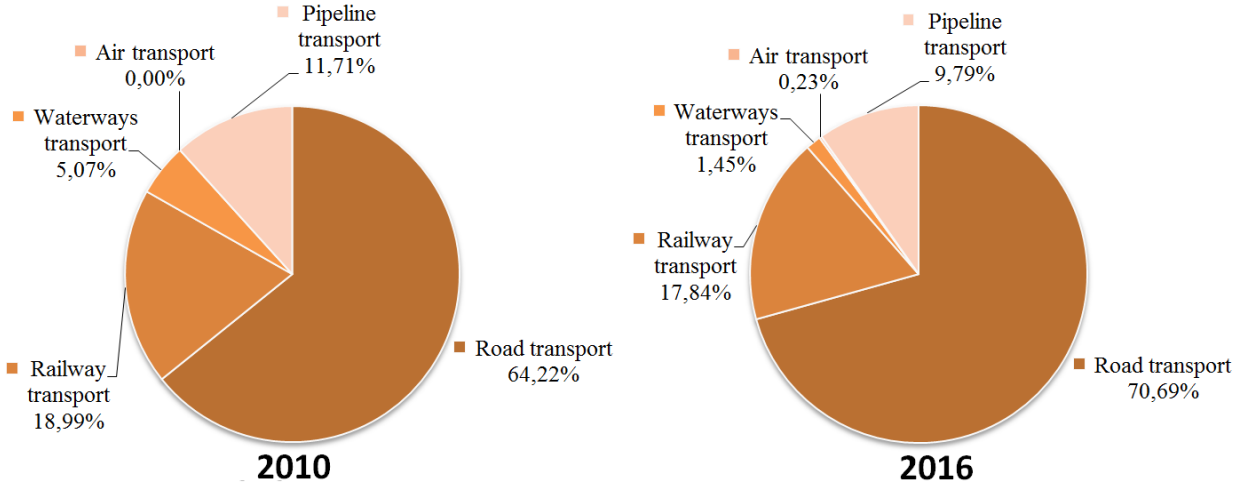
- analysis of line capacity utilization,
- analysis of average revenues,
- investments in railway infrastructure,
- average charges for railway infrastructure – rail freight transport.

Based on these analyses, it will be possible to decide on the inclusion of individual lines in the Amber RFC. The results of the analyses will be used to formulate the conclusions resulting from the Chapter 5. Consequently, the draft of strategy will be based on the summary results.

The graphs 3 and 4 show a graphical comparison of the modal split in the Slovak Republic in passenger transport in 2010 compared to 2016 and in freight transport in 2010 compared to 2016. The comparison is made in the band of 6 years giving a sufficient time span of the market response to the changes of modal split following the adoption of measures to support rail transport within the EU.



Graph 3: Comparison of modal split in passenger transport in Slovakia
(Source: Statistical office of the SR /www.statistics.sk/,EC - Statistical pocketbook 2017)



Graph 4: Comparison of modal split in freight transport in Slovakia
(Source: Statistical office of the SR /www.statistics.sk/)

Based on the modal split comparison in the Slovak Republic, we can confirm the decrease in the share of transport performances in rail freight transport in favour of road goods transport. In passenger transport system, an increase in the share of transport performances in favour of rail passenger transport was recorded, particularly to the disadvantage of individual motoring.

5.4.3 Hungary

All data contained in the subchapter were provided by GYSEV Zrt, MÁV Zrt. and VPE. Tables 17 and 18 analyse the development of total transport performances in Hungary in the period 2013 – 2016. At the same time, Table 19 contains an analysis of the development of the number of railway undertakings providing railway infrastructure services in Hungary.

Table 17: Analysis of transport performances on GYSEV lines

Mode of transport	Carrier	Transport performance/Year	2013	2014	2015	2016
Passenger transport	National carrier	train-km in thous.	5 017,7	4 935,0	4 974,6	5 163,4
		gross tkm in mill.	979,3	928,1	889,1	886,6
	Private carrier	train-km in thous.	0,9	0,9	0,8	0,3
		gross tkm in mill.	0,4	0,2	0,5	0,2
	Total	**train-km in thous.**	5 018,6	4 935,9	4 975,4	5 163,8
		gross tkm in mill.	979,7	928,4	889,6	886,8
Freight transport	National carrier	train-km in thous.	0,0	0,0	0,0	0,0
		gross tkm in mill.	0,0	0,0	0,0	0,0
	Private carrier	train-km in thous.	1 028,7	981,7	919,2	913,9
		gross tkm in mill.	1 066,9	999,1	916,4	904,1
	Total	**train-km in thous.**	1 028,7	981,7	919,2	913,9
		gross tkm in mill.	1 066,9	999,1	916,4	904,1

On GYSEV infrastructure a gradual increase in rail freight transport performances (train-km, gross tkm) can be realised especially on the lines of the North-South axis of GYSEV's infrastructure of the RFC since the full electrification of lines Csorna – Szombathely – Zalaszentiván took place and freight trains of Metrans from Dunajska Streda Terminal come via GYSEV infrastructure. Increasing tendency can be shown on the field of rail passenger transport (Total: gross tkm).

Table 18: Analysis of transport performances on MÁV Zrt. lines

Mode of transport	Carrier	Transport performance/Year	2013	2014	2015	2016
Passenger transport	National carrier	train-km in thous.	73 846	76 478	76 775	77 020
		gross tkm in mill.	18 056	17 847	17 262	17 124
	Private carrier	train-km in thous.	9	22	17	15
		gross tkm in mill.	4	9	7	7
	Total	**train-km in thous.**	73 855	76 500	76 792	77 035
		gross tkm in mill.	18 060	17 856	17 269	17 131
Freight transport	National carrier	train-km in thous.	0	0	0	0
		gross tkm in mill.	0	0	0	0
	Private carrier	train-km in thous.	17 414	17 024	17 142	16 842
		gross tkm in mill.	19 723	20 817	20 904	20 785
	Total	**train-km in thous.**	17 414	17 024	17 142	16 842
		gross tkm in mill.	19 723	20 817	20 904	20 785

The analysis of transport performances carried out on MÁV Zrt. infrastructure showed an overall trend of the increase in transport performances in rail passenger transport (Total: train-km). An overall increase in transport performances is recorded in rail freight transport (Total: gross tkm, 2013 compared to 2016).

Table 19: Structure of rail carriers with valid access agreement

Number of carriers with valid access agreement/Year		2013	2014	2015	2016	2017
Passenger carrier	national	2	2	2	2	2
	private	1	1	2	2	2
Freight carrier	national	0	0	0	0	0
	private	34	34	39	41	43
Passenger and freight carrier	national	2	2	2	2	2
	private	35	35	41	43	45

The analysis of the development of the number of active providers of transport services in Hungary showed a gradual increase. An increase in the number of transport service providers is a sign of sufficient transport opportunities in rail transport in Hungary, particularly in transit traffic. Such an increase will positively affect the quality of railway services and the subsequent increase in transport performances.

The analysis of rail transport in Hungary requires, for the needs of its benefits for the Amber RFC, the processing of additional data. Due to presenting and maintaining the transparency and integrity of rail transport data in Hungary, the analysis of other data is carried out in Appendix A in the .xls format. The individual sheets in Appendix for the Hungarian railway infrastructure contain the following data:

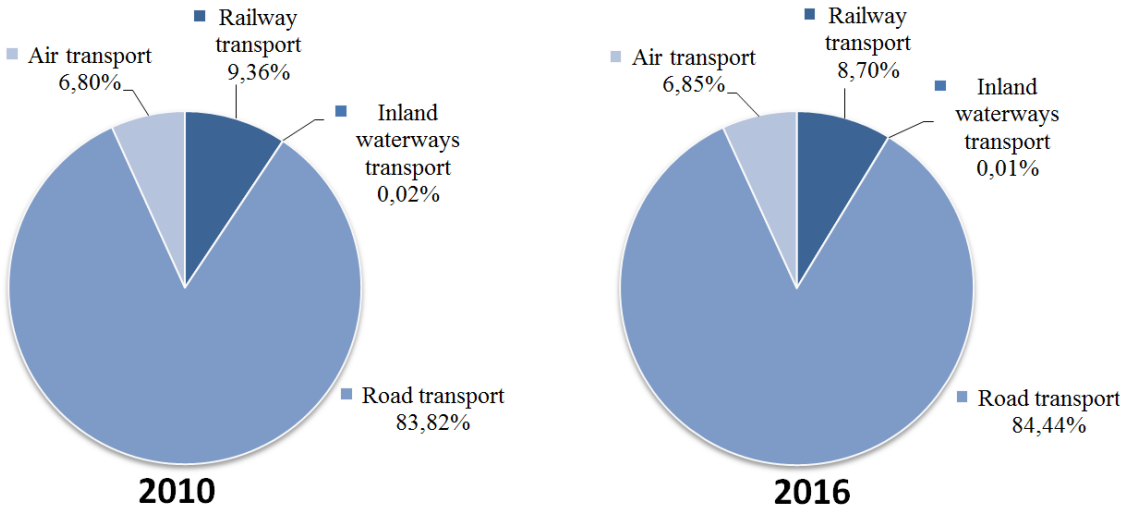
- technical parameters of the potential lines for the Amber RFC,
- analysis of transport performances in rail passenger and freight transport on the potential lines of the Amber RFC,
- analysis of planned investments in transport infrastructure,
- analysis of charges,
- analysis of average running times between border stations.

Supplementary data of rail transport analysis in Hungary are listed in Appendix D which contains the following data:

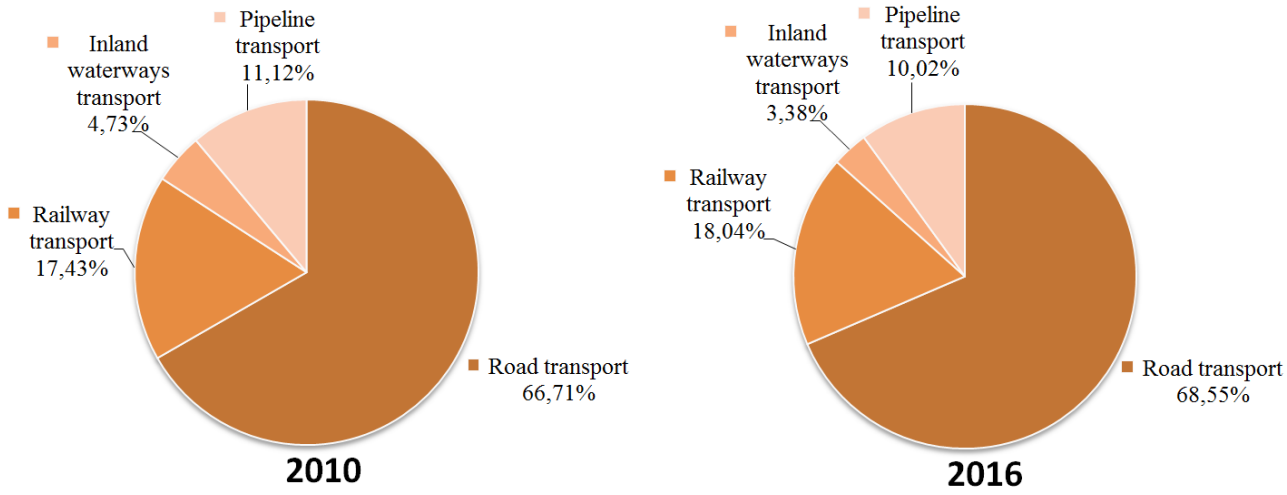
- analysis of investment subsidies focused on railway infrastructure,
- analysis of non-investment subsidies,
- analysis of selected economic indicators of transport infrastructure – GYSEV,
- analysis of selected economic indicators of transport infrastructure – MÁV Zrt.

Based on these analyses, it will be possible to decide on the inclusion of the individual lines in the Amber RFC. The results of analyses will be used to formulate the conclusions resulting from Chapter 5. Consequently, the strategy draft will be based on the summary results.

Graphs 5 and 6 show a graphical comparison of modal split in Hungary in 2016 compared to 2010 in passenger transport and in 2016 compared to 2010 in freight transport. The comparison is made in the band of 6 years giving a sufficient time span of the market response to the changes of modal split following the adoption of measures to support rail transport within the EU.



Graph 5: Comparison of modal split in passenger transport in Hungary (Source: Hungarian Central Statistical Office /www.ksh.hu/)



Graph 6: Comparison of modal split in freight transport in Hungary (Source: Hungarian Central Statistical Office /www.ksh.hu/, Eurostat, EC – Statistical pocketbook 2017)

Based on the modal split comparison in Hungary, we can confirm a decrease in share of transport performances in rail passenger transport in favour of road transport. In the freight transport system, an increase in share of transport performances in favour of rail freight transport was recorded, especially on the RFC Amber's infrastructure, mainly thanks to the continuous modernisation measures of the infrastructure managers concerned. An increase was also recorded in road goods transport.

5.4.4 Slovenia

All data contained in the subchapter were provided by SŽ-I. Table 20 gives an analysis of the development of total transport performances in the Republic of Slovenia in the period 2013 – 2017. At the same time, Table 21 contains an analysis of the development of the number of railway undertakings providing railway infrastructure services in the Republic of Slovenia.

Table 20: Analysis of transport performances on SŽ-I lines

Mode of transport	Carrier	Transport performance/Year	2013	2014	2015	2016	2017
Passenger transport	National carrier	train-km in thous.	10 586	10 130	10 402	9 562	10 290
		gross tkm in mill.	1 491	1 389	1 288	1 364	1 424
	Private carrier	train-km in thous.	0,0	0,0	0,0	0,0	0,0
		gross tkm in mill.	0,0	0,0	0,0	0,0	0,0
	Total	**train-km in thous.**	**10 586**	**10 130**	**10 402**	**9 562**	**10 290**
		gross tkm in mill.	**1 491**	**1 389**	**1 288**	**1 364**	**1 424,0**
Freight transport	National carrier	train-km in thous.	8 351	8 874	9 696	8 766	9 494,0
		gross tkm in mill.	7 096	7 653	8 422	8 423	9 074,0
	Private carrier	train-km in thous.	638,4	630,5	569,7	735,3	1 433,6
		gross tkm in mill.	547,7	571,6	543,2	674,2	1 303,1
	Total	**train-km in thous.**	**8 989,4**	**9 504,5**	**10 265,7**	**9 501,3**	**10 927,6**
		gross tkm in mill.	**7 643,7**	**8 224,6**	**8 965,2**	**9 097,2**	**10 377,1**

Table 21: Structure of rail carriers with valid access agreement

Number of carriers with valid access agreement/Year		2013	2014	2015	2016	2017
Passenger carrier	national	1	1	1	1	1
	private	0	0	0	0	0
Freight carrier	national	1	1	1	1	1
	private	2	2	3	3	3
Passenger and freight carrier	national	0	0	0	0	0
	private	0	0	0	0	0

The analysis of the development of transport performances on SŽ-I lines showed an increase in rail freight transport performances (Total: train-km, 2013 compared to 2017) in the overall course. A significant increase in rail freight transport performances is recorded at the gross tkm indicator. In rail passenger transport there is an increase in the gross tkm indicator (Total: 2015 – 2017) as the offered capacity of passenger trains increases. On the other hand, there is a decrease in transport performances in the train-km indicator (Total: 2013 compared to 2017). The analysis of the number of railway undertakings providing rail services showed the lowest number of providers from among the countries of the Amber RFC.

The analysis of rail transport in the Republic of Slovenia requires, for the needs of its benefits for the Amber RFC, the processing of additional data. Due to presenting and maintaining the transparency and integrity of rail transport data in the Republic of Slovenia, the analysis of other

data is carried out in Appendix A in the .xls format. The individual sheets in Appendix A for the Slovenian railway infrastructure contain the following data:

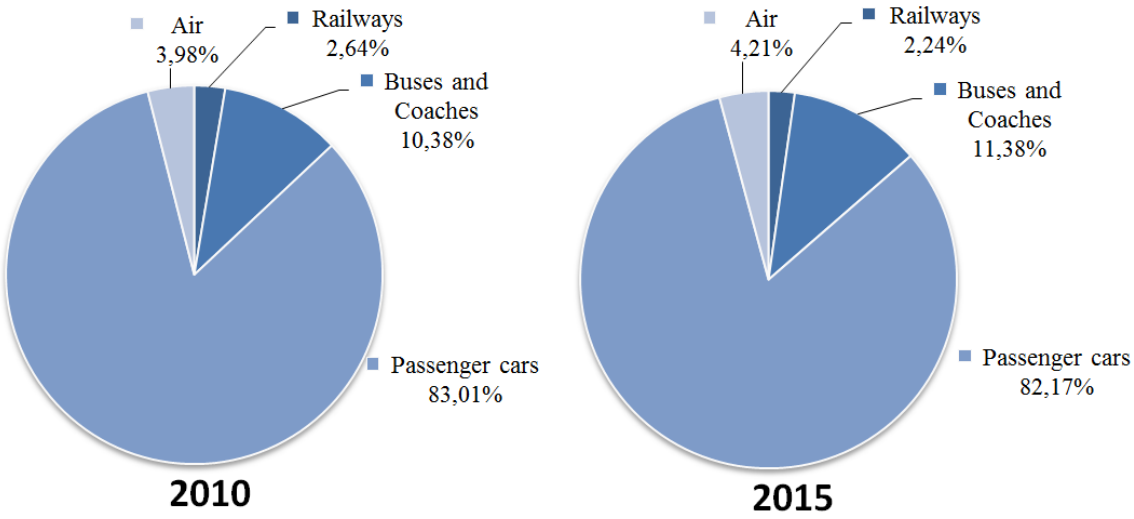
- technical parameters of the potential lines for belonging to the Amber RFC,
- analysis of transport performances in rail passenger and freight transport on the potential lines belonging of the Amber RFC,
- analysis of planned investments in transport infrastructure,
- analysis of charges,
- analysis of average running times between border stations.

Supplementary data of rail transport analysis in the Republic of Slovenia are listed in Appendix E which contains the following data:

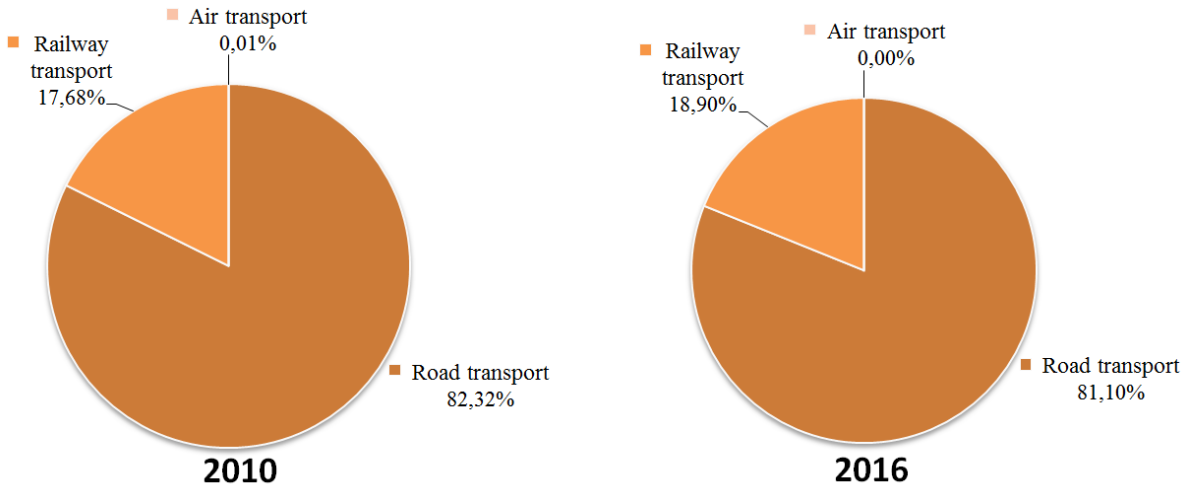
- statistical average of capacity utilization,
- analysis of investment subsidies focused on railway infrastructure,
- infrastructure access charges.

The results of analyses will be used to formulate the conclusions resulting from Chapter 5. Consequently, the strategy draft will be based on the summary results.

Graphs 7 and 8 show a graphical comparison of modal split in the Republic of Slovenia in 2015 compared to 2010 in passenger transport and in 2016 compared to 2010 in freight transport. The comparison is made in the band of 6 years giving a sufficient time span of the market response to the changes of modal split following the adoption of measures to support rail transport within the EU.



Graph 7: Comparison of modal split in passenger transport in Slovenia (Source: Republika Slovenija –Statistični Urad /www.stat.si/, Eurostat, EC – Statistical pocketbook 2017)



Graph 8: Comparison of modal split in freight transport in Slovenia
(Source: Republika Slovenija –Statistični Urad /www.stat.si/, Eurostat)

Based on the modal split comparison in the Republic of Slovenia there is a decrease in share of transport performances in rail passenger transport. At the same time, there is a slight decrease in performances in individual motoring. In the freight transport system, an increase in share of transport performances in favour of rail freight transport to the disadvantage of road goods transport was recorded.

5.5 Analysis of transport indicators of the Amber RFC countries

The potential of rail freight transport is influenced by goods flows, particularly at international level. The goods flows between neighbouring countries create demand for transport services and rail freight transport is more time-efficient, cost-efficient and socially-efficient than other modes of transport. At medium and long distances, the efficiency is currently demonstrated also in single wagon load transport. Therefore, it is necessary to examine the transport potential between the individual countries of the Amber RFC and then between the neighbouring countries of the established corridor. The results of the analysis are necessary for the formulation of strategic objectives and tasks of the Amber RFC as well as for the identification of the transport potential of international rail transport between EU countries. The analysis of transport potential from countries outside the EU for the Amber RFC is addressed in Chapter 8.

Table 22 analyses the import and export of goods from/to the Republic of Poland, expressed in euro, between the Amber RFC countries and the EU countries. Subsequently, the analysis of the import and export of goods from/to the Republic of Poland, expressed in tonnes, between the Amber RFC countries and the EU countries, is carried out in Table 23.

Table 22: Import and Export value from/to Poland in mill. €

Country/ Year	2010	2012	2014	2015	2016
Import value from Poland in mill. €					
Total EU 28 countries	**89 694**	**104 896**	**120 193**	**135 797**	**143 344**
Slovakia	2 672	3 410	3 804	4 217	4 432
Hungary	3 472	3 424	4 079	4 528	4 632
Slovenia	418	477	547	623	696
Total Amber RFC countries	**6 562**	**7 310**	**8 429**	**9 369**	**9 761**
Export value to Poland in mill. €					
Total EU 28 countries	**99 810**	**113 135**	**127 018**	**138 017**	**142 928**
Slovakia	3 650	5 238	5 515	5 797	5 400
Hungary	2 646	3 069	3 262	3 476	3 907
Slovenia	806	810	977	1 115	1 124
Total Amber RFC countries	**7 102**	**9 117**	**9 754**	**10 387**	**10 431**

Source: European Commission - Trade – EU Trade Helpdesk – Statistics

Table 23: Import and export quantity from/to Poland in 1000 t

Country/ Year	2010	2012	2014	2015	2016
Import quantity from Poland in 1000 t					
Total EU 28 countries	**63 018**	**66 935**	**78 083**	**82 889**	**85 918**
Slovakia	2 763	2 519	3 362	3 520	3 910
Hungary	1 348	1 419	1 678	2 098	2 289
Slovenia	185	187	213	235	268
Total Amber RFC countries	**4 296**	**4 125**	**5 253**	**5 853**	**6 466**
Export quantity to Poland in 1000 t					
Total EU 28 countries	**63 809**	**67 053**	**70 232**	**70 844**	**72 922**
Slovakia	3 803	4 296	4 596	4 438	4 621
Hungary	1 520	1 787	1 861	1 749	2 065
Slovenia	279	300	327	308	332
Total Amber RFC countries	**5 603**	**6 383**	**6 784**	**6 495**	**7 018**

Source: European Commission - Trade – EU Trade Helpdesk – Statistics

The analysis of the transport flows in Tables 22 and 23 showed the increase in transport indicators in all monitored indicators and countries. On the basis of the trend of economic growth, the same trend can be assumed in the years 2018 – 2021. By this, the sufficient transport potential for rail freight transport within the European transport market has been shown within the Republic of Poland.

As the transport performance indicator in tonnes is more significant for the needs of evaluation of rail freight potential, Figure 23 illustrates the goods flows between the neighbouring countries of the Republic of Poland for 2016, including the percentage share.

Figure 23: *Graphical representation of import and export of goods in tonnes – Republic of Poland*

Table 24 analyses the import and export of goods from/to the Slovak Republic, expressed in euro, between the Amber RFC countries and the EU countries. Subsequently, the analysis of import and export of goods from/to the Slovak Republic, expressed in tonnes, between the Amber RFC countries and the EU countries is carried out in Table 25.

Table 24: Import and export value from/ to Slovakia in mill. €

Country/ Year	2010	2012	2014	2015	2016
Import value from Slovakia in mill. €					
Total EU 28 countries	**38 606**	**47 988**	**49 770**	**53 003**	**55 798**
Poland	3 446	4 400	4 469	4 611	4 857
Hungary	2 749	4 166	4 258	4 346	4 516
Slovenia	313	347	324	351	411
Total Amber RFC countries	**6 509**	**8 914**	**9 051**	**9 308**	**9 784**
Export value to Slovakia in mill. €					
Total EU 28 countries	**37 019**	**45 703**	**48 166**	**53 321**	**53 633**
Poland	3 258	3 745	4 202	4 611	4 509
Hungary	3 842	4 792	4 196	4 551	4 624
Slovenia	726	834	1 106	1 349	1 024
Total Amber RFC countries	**7 826**	**9 370**	**9 504**	**10 510**	**10 157**

Source: European Commission - Trade – EU Trade Helpdesk – Statistics

Table 25: Import and export quantity from/ to Slovakia in 1000 t

Country/ Year	2010	2012	2014	2015	2016
Import quantity from Slovakia in 1000 t					
Total EU 28 countries	**28 075**	**28 690**	**30 131**	**31 354**	**32 540**
Poland	3 886	4 558	4 208	3 776	4 156
Hungary	2 934	3 348	4 131	4 668	5 080
Slovenia	230	257	220	248	273
Total Amber RFC countries	**7 050**	**8 164**	**8 559**	**8 692**	**9 510**
Export quantity to Slovakia in 1000 t					
Total EU 28 countries	**22 386**	**23 706**	**24 589**	**27 543**	**27 435**
Poland	3 430	3 136	3 687	4 018	4 125
Hungary	3 293	3 706	3 072	3 381	3 464
Slovenia	431	489	467	631	594
Total Amber RFC countries	**7 155**	**7 331**	**7 226**	**8 030**	**8 184**

Source: European Commission - Trade – EU Trade Helpdesk – Statistics

The analysis of transport flows in Tables 24 and 25 showed, in overall comparison, increase in transport indicators with a slight fluctuating decrease. However, the increase is recorded at the indicator of transported tonnes within the Amber RFC countries. On the basis of the trend of economic growth, the upward trend in the years 2018 – 2021 can be assumed for both indicators examined. By this, the sufficient transport potential for the rail freight transport within the European transport market has been shown within the Slovak Republic and thus sufficient transport potential for the use of the Amber RFC services.

Since the transport performance indicator in tonnes is more significant for the needs of the evaluation of rail freight potential, Figure 24 shows the goods flows between the neighbouring countries of the Slovak Republic for 2016, including the percentage share.

Figure 24: *Graphical representation of import and export of goods in tonnes – Slovak Republic*

In order to assess the Amber RFC transport potential, the analysis of import and export of goods from/to Hungary, expressed in euro, between the Amber RFC countries and the EU countries is carried out in Table 26. Subsequently, the analysis of import and export of goods from/to the

Hungary, expressed in tonnes, between the Amber RFC countries and the EU countries is carried out in Table 27.

Table 26: Import and export value from/ to Hungary in mill. €

Country/ Year	2010	2012	2014	2015	2016
Import value from Hungary in mill. €					
Total EU 28 countries	**51 901**	**57 255**	**61 557**	**67 424**	**69 991**
Poland	2 379	2 766	2 871	2 943	3 349
Slovakia	3 433	3 969	3 766	4 185	4 195
Slovenia	805	1 000	1 031	1 014	1 012
Total Amber RFC countries	**6 617**	**7 735**	**7 668**	**8 142**	**8 556**
Export value to Hungary in mill. €					
Total EU 28 countries	**44 005**	**50 604**	**58 338**	**63 368**	**64 935**
Poland	3 406	3 488	4 359	4 774	4 810
Slovakia	3 364	4 524	4 074	3 881	4 001
Slovenia	914	929	1 186	1 255	1 312
Total Amber RFC countries	**7 684**	**8 941**	**9 619**	**9 910**	**10 123**

Source: European Commission - Trade – EU Trade Helpdesk – Statistics

Table 27: Import and export quantity from/ to Hungary in 1000 t

Country/ Year	2010	2012	2014	2015	2016
Import quantity from Hungary in 1000 t					
Total EU 28 countries	**27 624**	**29 863**	**30 220**	**31 419**	**32 243**
Poland	1 425	1 632	1 674	1 622	1 905
Slovakia	2 781	2 953	2 647	2 998	3 189
Slovenia	1 020	1 256	1 013	1 060	1 106
Total Amber RFC countries	**5 226**	**5 841**	**5 333**	**5 681**	**6 199**
Export quantity to Hungary in 1000 t					
Total EU 28 countries	**22 198**	**22 763**	**26 181**	**26 410**	**27 446**
Poland	1 583	1 582	1 910	2 235	2 509
Slovakia	3 153	4 118	4 832	4 814	5 148
Slovenia	865	679	812	922	1 083
Total Amber RFC countries	**5 601**	**6 379**	**7 555**	**7 971**	**8 740**

Source: European Commission - Trade – EU Trade Helpdesk – Statistics

The analysis of transport flows in Tables 26 and 27 confirmed, in overall comparison, increase in the transport indicators only slightly fluctuating. On the basis of the economic growth trend, the upward trend in the years 2018 – 2021 can be assumed for both indicators examined. The total increase in transport flows in tonnes is recorded between the EU countries and Hungary, with more significant increase in goods transport recorded between Hungary and the Amber RFC countries. Moreover, the increase in value of transported goods is shown. On the basis of the facts, the sufficient transport potential for rail freight transport within the European transport market is

shown in case of Hungary and, therefore, the sufficient transport potential for the use of the Amber RFC services, too.

Since the transport performance indicator in tonnes is more significant for the needs of rail freight transport, Figure 25 shows the goods flows between the neighbouring countries of Hungary for 2016, including the percentage share.

Figure 25: *Graphical representation of import and export of goods in tonnes – Hungary*

To determine the transport potential, Table 28 analyses the import and export of goods from/to the Republic of Slovenia, expressed in euro, between the Amber RFC countries and the EU countries. Subsequently, the analysis of import and export of goods from/to the Republic of

Slovenia, expressed in tonnes, between the Amber RFC countries and the EU countries is carried out in Table 29.

Table 28: Import and export value from/ to Slovenia in mill. €

Country/ Year	2010	2012	2014	2015	2016
Import value from Slovenia in mill. €					
Total EU 28 countries	**14 176**	**16 390**	**19 064**	**20 055**	**20 777**
Poland	646	665	788	864	839
Slovakia	544	685	1 205	1 304	1 031
Hungary	654	794	1 040	1 124	1 225
Total Amber RFC countries	**1 844**	**2 144**	**3 032**	**3 292**	**3 095**
Export value to Slovenia in mill. €					
Total EU 28 countries	**15 796**	**17 211**	**18 067**	**18 999**	**19 823**
Poland	425	471	572	628	683
Slovakia	359	468	481	479	469
Hungary	755	921	931	898	966
Total Amber RFC countries	**1 538**	**1 860**	**1 984**	**2 005**	**2 118**

Source: European Commission - Trade – EU Trade Helpdesk – Statistics

Table 29: Import and export quantity from/ to Slovenia in 1000 t

Country/ Year	2010	2012	2014	2015	2016
Import quantity from Slovenia in 1000 t					
Total EU 28 countries	**10 490**	**11 566**	**12 807**	**13 542**	**14 242**
Poland	249	288	321	278	280
Slovakia	250	394	500	487	457
Hungary	499	560	683	819	960
Total Amber RFC countries	**998**	**1 241**	**1 505**	**1 584**	**1 697**
Export quantity to Slovenia in 1000 t					
Total EU 28 countries	**12 766**	**13 557**	**14 539**	**15 236**	**16 175**
Poland	213	207	280	271	285
Slovakia	248	270	281	247	323
Hungary	995	1 115	1 013	1 022	1 002
Total Amber RFC countries	**1 456**	**1 592**	**1 573**	**1 539**	**1 610**

Source: European Commission - Trade – EU Trade Helpdesk – Statistics

Based on the findings from Tables 28 and 29, we can confirm the upward trend in transport performances between the Amber RFC countries and the Republic of Slovenia. Moreover, the increase in transport performances between the EU countries and the Republic of Slovenia is confirmed for both transport indicators in overall course. Based on the expected economic growth trend, the upward trend in the years 2018 – 2021 can be assumed for both indicators. The analysis showed increase in the value of goods transported. The analysis carried out confirms the sufficient

transport potential for rail freight transport within the European transport market and, therefore, sufficient transport potential for the use of the Amber RFC services in the Republic of Slovenia, too. Within transport capacities, there is sufficient potential for transport between the Republic of Slovenia and the other countries of the Amber RFC, particularly in intermodal transport and single wagon load transport.

As the transport performance indicator in tonnes is more significant for the needs of evaluation of rail freight potential, Figure 26 illustrates the goods flows between the neighbouring countries of the Republic of Slovenia for 2016, including the percentage share.

Figure 26: *Graphical representation of import and export of goods in tonnes – Republic of Slovenia*

The following figure shows all registered transport flows between the Amber RFC countries and all EU countries in tonnes for the year 2016.

Figure 27: *Graphical representation of import and export of goods in tonnes - summary*

5.6 Analysis of intermodal transport terminals

The basic objectives of the transport policy of the Amber RFC countries include reducing greenhouse gas emissions and finding ways to reduce the environmental burden of transport. One way to meet these objectives is the intermodal transport. The intermodal transport is efficient, safe, reliable and cost-competitive. The provision of intermodal transport services requires, inter alia, adequate location of intermodal transport terminals and sufficient transport infrastructure (appropriate connection of terminals to road and rail infrastructure) and advanced technical equipment (wagons, unit loads and loading units).

Analysis in subchapter 5.6. was carried out on the basis of the information listed and received from the KombiConsult 2018 comprehensive source at www.intermodal-terminals.eu. This source does not contain information about all terminals from the list provided by the individual Infrastructure Managers.

Poland

The following figure shows the location of intermodal transport terminals on the territory of the Republic of Poland. The terminals marked in green colour are located on the basic network of the Amber RFC.

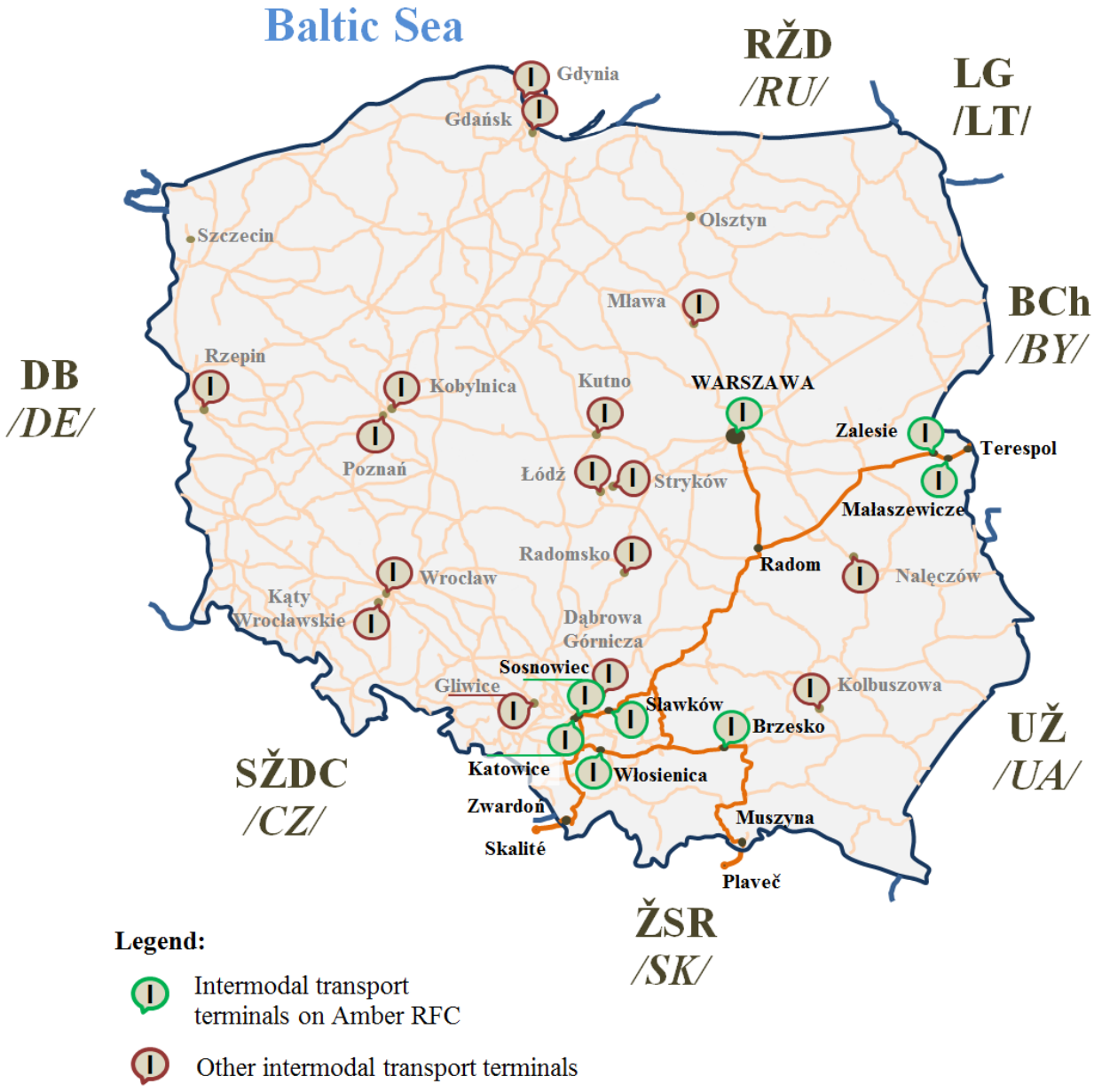


Figure 28: *Terminals located on the territory of the Republic of Poland*

(Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu)

Operators of intermodal transport terminals within the basic network of the Amber RFC:

- Małaszewicze Kontenerowa: PKP Cargo Centrum Logisticzne Małaszewicze sp. Z o. o.,

- EUROPORT Małaszewicze Duże: EUROSPORT Sp. z o.o.,
- Terminal przeładunkowy Wólka (Zalesie): PKP - Cargo Connect Sp. z o.o.,
- Transgaz S.A., Zalesie: Transgaz S.A. Terminal Gazów,
- Containerterminal Warszawa: Cargosped Sp. Z o.o.,
- Warszawa Główna Towarowa- Container Terminal: Spedcont,
- Terminal Kontenerowy Warszawa: PKP Cargo Connect Sp. z o.o.,
- Loconi Intermodal Terminal Kontenerowy Warszawa: Loconi Intermodal S.A.,
- Polzug Terminal Kontenerowy Pruszków: POLZUG Intermodal Polska Sp. z o.o.,
- Euroterminal Sławków: Euroterminal Sławków Ltd,
- Brzeski terminal kontenerowy: Karpiel sp. Z o. o.,
- Terminal kontenerowy Włosienica: Baltic Rail AS,
- Terminal Sosnowiec Południowy: Spedcont.

Tables 30 gives basic information on intermodal transport terminals located on the basic network of the Amber RFC.

Table 30: Basic information on intermodal transport terminals in the Republic of Poland

Intermodal transport terminals on Amber RFC	Connectivity*			Area (m^2)	Storage Capacity
	Road	Rail	Water		
Małaszewicze Terminal Kontenerowy				40 000	1 632 TEU
EUROPORT Małaszewicze Duże				86 000	1 300 TEU
Terminal przeładunkowy Wólka (Zalesie)				57 000	N/A
Transgaz S.A., Zalesie				N/A	1 000 m^3
Containerterminal Warszawa				24 000	1 200 TEU
Warszawa Główna Toworowa- Container Terminal				18 600	1 000 TEU
Terminal Kontenerowy Warszawa				30 000	N/A
Loconi Intermodal Terminal Kontenerowy Warszawa				68 000	2 000 TEU
Polzug Terminal Kontenerowy Pruszków				44 600	1 500 TEU
Euroterminal Sławków				93 000	3 500 TEU
Brzeski terminal kontenerowy				100 000	5 000 TEU
Terminal kontenerowy Włosienica				100 000	780 TEU
Terminal Sosnowiec Południowy				N/A	N/A

Note: **YES/**NO***

Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu, www.utk.gov.pl

Continuation of Table 30:

Intermodal transport terminals on Amber RFC	Number of tracks / Usable length of tracks (m)		Gantry cranes (number)	Reach stacker (number)
	1 520 mm	1 435 mm		
Małaszewicze Terminal Kontenerowy	2/1 766	2/1 746	3	2
EUROPORT Małaszewicze Duże	-/1 300	-/1 300	N/A	N/A
Terminal przeładunkowy Wólka (Zalesie)	-/2 254	-/3 104	N/A	N/A
Transgaz S.A., Zalesie	-	N/A	N/A	N/A
Containerterminal Warszawa	-	1/320	0	3
Warszawa Główna Towarowa - Container Terminal	-	2/715	2	0
Terminal Kontenerowy Warszawa	-	-/3 680	N/A	N/A
Loconi Intermodal Terminal Kontenerowy Warszawa	-	2/1 040	0	3
Polzug Terminal Kontenerowy Pruszków		-/650	0	8
Euroterminal Sławków	-/17 521	-/24 256	1	4
Brzeski terminal kontenerowy	-	6/3 200	0	1
Terminal kontenerowy Włosienica	-	1/400	0	1
Terminal Sosnowiec Południowy	-	N/A	N/A	N/A

Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu, www.utk.gov.pl

Slovakia

The following figure shows the location of intermodal transport terminals on the territory of the Slovak Republic. The terminals marked in green colour are located on the basic network of the Amber RFC.

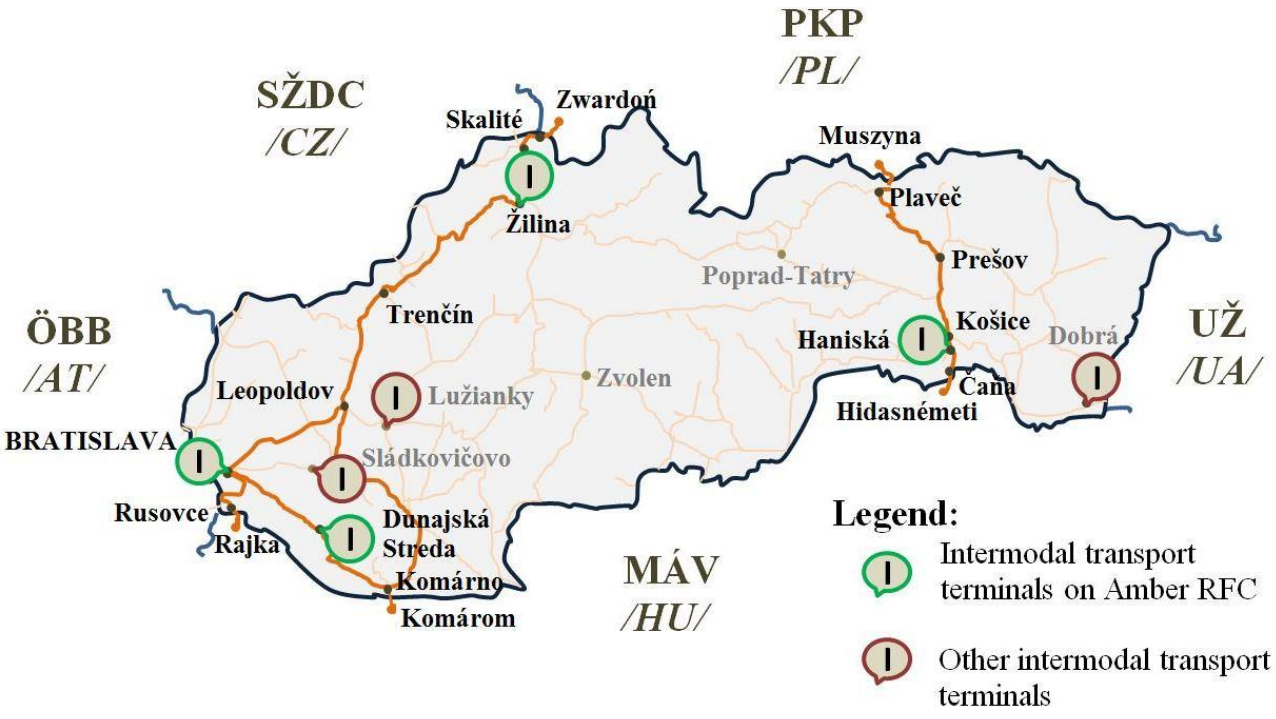


Figure 29: *Terminal located on the territory of the Slovak Republic*

(Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu)

Operators of intermodal transport terminals within the basic network of the Amber RFC:

- Terminal Košice – Haniska pri Košiciach: Metrans Danubia, a. s.,
- Terminal Žilina: Rail Cargo Operator,
- Terminal Žilina-Teplička,
- Bratislava ÚNS: Rail Cargo Operator,
- Bratislava Pálenisko: SPaP, a. s.,
- Rail Hub Terminal Dunajská Streda: Metrans (Danubia) a. s.

Table 31 gives the basic information on intermodal transport terminals located on the basic network of the Amber RFC.

Table 31: Basic information on intermodal transport terminals in the Slovak Republic

Intermodal transport terminals on Amber RFC	Connectivity*			Area (m^2)	Storage Capacity (TEU)
	Road	Rail	Water		
Terminal Košice				25 000	3 000
Terminal Žilina				16 000	N/A
Bratislava ÚNS				34 500	N/A
Bratislava Pálenisko				24 000	1 400
Rail Hub Terminal Dunajská Streda				280 000	25 000

Note: **YES/NO*

Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu

Continuation of Table 31:

Intermodal transport terminals on Amber RFC	Number of tracks	Usable length of tracks (m)	Gantry cranes (number)	Reach stacker (number)
Terminal Košice	2	300	2	2
Terminal Žilina	4	1 520	0	3
Bratislava ÚNS	3	912	1	1
Bratislava Pálenisko	2	450	3	3
Rail Hub Terminal Dunajská Streda	9	5 450	4	6

Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu

Hungary

The following figure shows the location of intermodal transport terminals on the territory of Hungary. The terminals marked in green colour are located on the basic network of the Amber RFC.

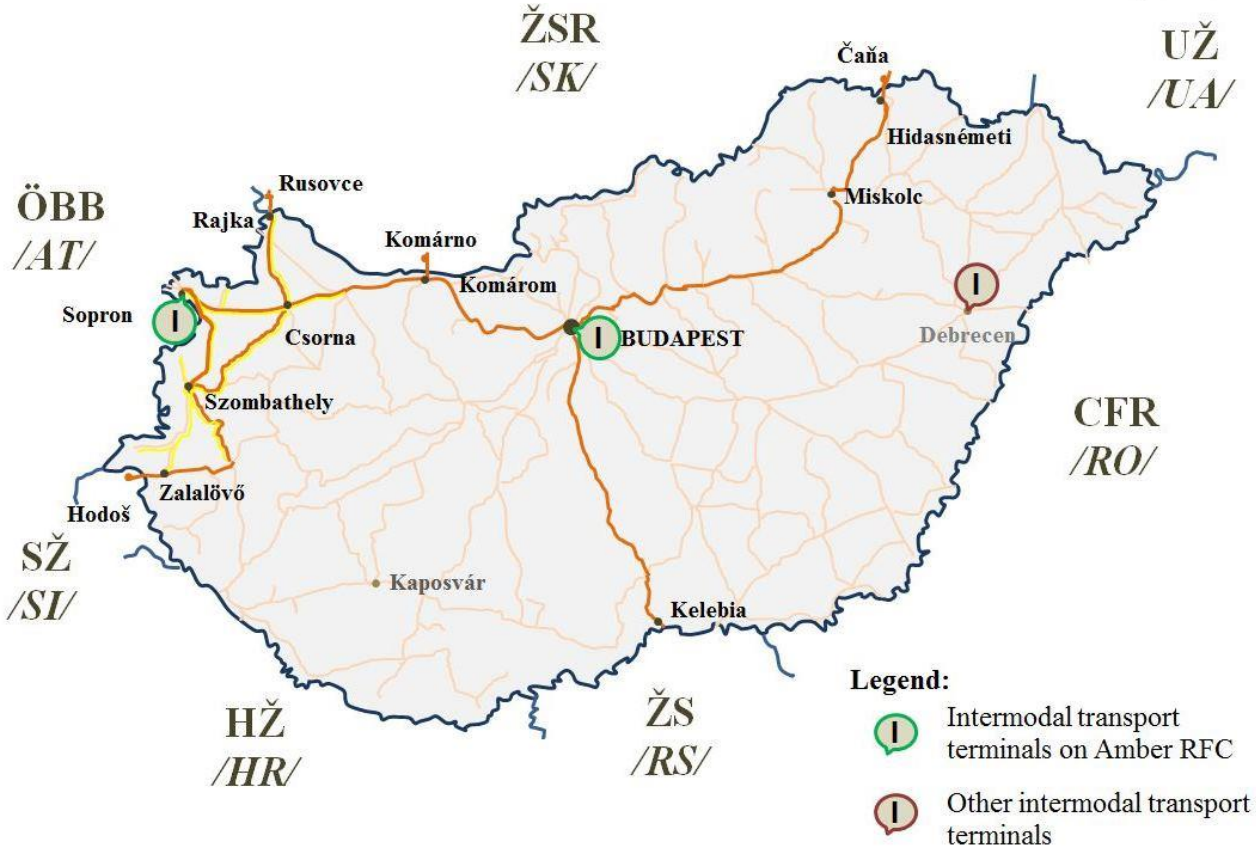


Figure 30: *Terminals located on the territory of Hungary*

(Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu)

Operators of intermodal transport terminals within the basic network of the Amber RFC:

- Sopron Container Terminal: GYSEV Cargo Zrt.,
- Kombiterminál Törökbálint: Törökbálint Container Terminal Kft.,
- Budapest BILK: Budapest BILK Co. Ltd.,
- Mahart Container Center, Budapest: MAHART Container Center Ltd.

Table 32 gives the basic information on intermodal transport terminals located on the basic network of the Amber RFC.

Table 32: Basic information on intermodal transport terminals in Hungary

Intermodal transport terminals on Amber RFC	Connectivity*			Area (m^2)	Storage Capacity (TEU)
	Road	Rail	Water		
Sopron container terminal				40 500	1 500
Kombiterminál Törökbálint				35 000	6 000
Budapest BILK				223 000	220 000
Mahart Container Center, Budapest				105 000	5 800

Note: **YES/**NO***

Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu

Continuation of Table 32:

Intermodal transport terminals on Amber RFC	Number of tracks (m)	Usable length of tracks (m)	Gantry cranes (number)	Reach stacker (number)
Sopron container terminal	6	1 960	2	2
Kombiterminál Törökbálint	3	600	N/A	3
Budapest BILK	11	6 800	2	8
Mahart Container Center, Budapest	5	2 120	N/A	9

Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu

Slovenia

The following figure shows the location of intermodal transport terminals on the territory of Slovenia. The terminals marked in green colour are located on the basic network of the Amber RFC.

Figure 31: *Terminals located on the territory of Slovenia*
(Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu)

Operators of intermodal transport terminals within the basic network of the Amber RFC:

- Koper Luka KT: Luka Koper D.D – Port of Koper PLC,
- Ljubljana Moste: Slovenske železnice - Tovorni promet, d.o.o.,
- Celje: Slovenske železnice - Tovorni promet, d.o.o.

Table 33 gives the basic information on intermodal transport terminals located on the basic network of the Amber RFC.

Table 33: Basic information on intermodal transport terminals in Slovenia

Intermodal transport terminals on Amber RFC	Connectivity*			Area (m^2)	Storage Capacity (TEU)
	Road	Rail	Water		
Koper Luka KT				270 000	19 130
Ljubljana Moste				99 250	1 270
Celje				6 500	80

Note: **YES/**NO***

Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu

Continuation of Table 33:

Intermodal transport terminals on Amber RFC	Number of tracks (m)/	Usable length of tracks (m)	Gantry cranes (number)	Reach stacker (number)
Koper Luka KT	9	4 640	3	8
Ljubljana Moste	4	2 000	1	2
Celje	20	5 000	0	1

Source: Internet domains of individual terminals, KombiConsult 2018, www.intermodal-terminals.eu

Analysis of intermodal transport terminals within the Amber RFC countries showed:

- appropriate location of terminals within the Amber RFC rail network,
- significant part of intermodal transport terminals located in the Amber RFC countries is connected with the Amber RFC infrastructure,
- potential of increase in the transport performances of intermodal transport trains on the Amber RFC lines,
- sufficient technical base of intermodal transport terminals,
- sufficient capacity to handle TEU,
- perspective of cooperation between the Amber RFC and intermodal transport terminals.

5.7 Results and summary of the findings of Chapter 5

Based on the data presented in the individual subchapters of the fifth part of TMS, we can state determine:

- realised process of liberalization of rail transport services market in the Amber RFC countries: confirmed by Liberalization Index (Figure 16),
- potential for cooperation between RFCs network: results from the geographic connection of individual RFC corridors, some common line sections and strategic objectives of the corridors,
- general overall increase in rail freight transport performances in the Amber RFC countries: shown by the analysis of transport performances in the individual countries of the Amber RFC,
- general overall increase in rail passenger transport performances in the Amber RFC countries: shown by the analysis of transport performances in the individual countries of the Amber RFC and increasing demand of passengers influenced by a higher quality of services, a higher offer of transport services, poor technical condition of road infrastructure and congestions,
- general increase in rail freight transport performances on the lines considered to be included in the Amber RFC in the Polish, Slovak and Slovenian Republics: shown by the analysis of transport performances in rail freight transport on the lines to be included in the Amber RFC. Increase in performances will be affected by the Amber RFC services, its strategic routing, increasing quality of transport services (influenced by the liberalization process) and economic development (described in Chapter 4),
- general increase in rail passenger transport performances on the lines considered to be included in the Amber RFC in the Polish, Slovak and Slovenian Republics: shown by the analysis of transport performances in rail passenger transport on the lines to be included in the Amber RFC. Increase in performances will be affected by the increasing quality of transport services (influenced by the liberalization process) and economic development (described in Chapter 4),
- change of modal split in favour of rail freight transport in Hungary and the Republic of Slovenia (road transport increased in Republic of Poland, Slovak republic and Hungary): affected by higher quality of transport services, RFC corridor services, investments in the railway system and higher demand (higher demand for rail freight services results also from the conclusions of Chapter 4),
- change of modal split in favour of rail passenger transport in the Slovak Republic (road transport increase in the Republic of Poland and Hungary): affected by higher quality of

transport services, higher offer of transport services, investments in the railway system and higher demand (higher demand for rail passenger services results also from the conclusions of Chapter 4),

- intention of all Amber RFC infrastructure managers and ministries involved to invest in the lines considered for the Amber RFC: results from the transport policy of individual countries, the EU's objectives in the development and modernization of the European rail network and operational needs (increase in transport performances, cost reduction, shortening of travel time),
- general reduction of the railway infrastructure charges for rail freight services: on the basis of the implementation of Directive 2012/34/EU of the European Parliament and of the Council establishing a single European railway area, and the harmonization of transport infrastructure charging,
- overall increase of providers of rail transport services: can be assumed based on the analysis of development of number of carriers in the Amber RFC countries, at the same time, it is affected by the achieved level of the liberalization process (Figure 16) and the higher interest in business in railway transport. An increase in business interest is due to higher demand and the results of the economic analysis carried out in Chapter 4,
- transport potential for the Amber RFC services between the Amber RFC countries and the EU countries: due to the increasing trade between the Amber RFC countries and the other EU member states, graphically shown in Figure 27,
- growth in demand for transport services within the Amber RFC countries: due to the increasing trade between the Amber RFC countries, graphically shown in Figures 23-26,
- potential for the development of intermodal transport: affected by the location of intermodal transport terminals within the Amber RFC, the higher quality of services provided, the system measures of the EU and member states designed to support intermodal transport, the investments of intermodal operators, the growth of transport requirements from the Port of Koper to Central and Western Europe,
- potential for the development of single wagon load transport in international traffic: increasing number of business entities, dense railway network of the Amber RFC countries, the construction of new sidings, measures to support sidings by the countries.

On the basis of the facts listed, the strategic tools and measures to support rail freight services, to support the growth in demand for rail services and the Amber RFC services will be proposed in the final chapter of the TMS.

6 PROGNOSIS OF TRANSPORT PERFORMANCE DEVELOPMENT

Several aspects affecting infrastructure, quality of services and external costs result from transport performances. Therefore, it is necessary to know the development of transport performances in order to form the objectives and the subsequent strategy of the Amber RFC. The development of transport performances is assumed on the basis of the prognosis that includes three scenarios for the Amber RFC: realistic, optimistic and pessimistic.

Forecasting deals with prediction of the future development of organization, society, economy, transport, environment, etc. The aim is to get an idea of the future state which is based on rational ways of prediction. The forecasts obtained are of great importance for strategic management, risk management and planning.

Forecasting has connection with:

- planning,
- targeting,
- organizing,
- decision-making.

Forecast creation process:

1. Problem formulation.
2. Formulation and definition of necessary information and data.
3. Data collection.
4. Data reduction and condensation.
5. Forecast model creation.
6. Forecast generation using the selected algorithm and using GDP.
7. Forecast evaluation.

Bases for forecast:

1. Model used for forecast: AAA algorithm with exponential alignment.
2. Confidence interval: 95 %.
3. Time span of forecast: 2019 – 2026 (8 years).
4. Examined indicator: transport performances in rail passenger and freight traffic.
5. Input data: provided by individual infrastructure managers, annual reports.
6. Presentation of results:
   - in tabular form for each scenario separately,
   - overall comparison of individual forecast scenarios in the form of graph.
7. It is a long-term forecast in terms of time.

8. Forecast was created using an appropriate forecasting software.

Forecast risks:

1. Economic cycle – recession, period of crisis during forecasted period.
2. Inaccuracy of provided data.
3. Insufficient interval of data provided.
4. Low level of investment in railway infrastructure – inadequate state of railway infrastructure required by customers (e.g. capacity, frequent possessions).
5. Change in transport infrastructure charging – increase in rail charges and decrease in charges for other modes of transport.
6. Significant shift of transport performances to other modes of transport.

The forecast was elaborated based on the available information on rail transport performances and using the AAA algorithm. It calculates or predicts a future value based on existing (historical) values by using the AAA version of the Exponential Smoothing algorithm. The predicted value is a continuation of the historical values in the specified target date, which should be a continuation of the timeline. This prognosis method does not take into account e.g. major changes in the infrastructure (e.g. new construction of lines, changes of infrastructure parameters, such as longer trains, etc.) nor major changes in the competition between modes. You can use this function to predict future sales, transport performances, inventory requirements, or consumer trends.

Arguments used within the forecast:

Target date Required. The data point for which you want to predict a value. Target date can be date/time or numeric – the period 2019-2026.

Values Required. Values are the historical values, for which you want to forecast the next points – transport performances of passenger and freight trains (gross tkm, train-km) on the railway infrastructure of the Amber RFC countries (2015-2017), forecast of GDP development in individual corridor member states (in %, the period 2019-2026, forecast of the European Commission and the European Central Bank).

Timeline Required. The independent array or range of numeric data. The dates in the timeline must have a consistent step between them and can't be zero – the period 2015-2017.

Seasonality Optional. A numeric value. The default value of 1 means program detects seasonality automatically for the forecast and uses positive, whole numbers for the length of the seasonal pattern. 0 indicates no seasonality, meaning the prediction will be linear – the used value 1 based on which the algorithm calculated seasonality.

Table description:

Table 34 – realistic scenario, prognosis of the development of total transport performances of rail system in individual countries and on lines included in the Amber RFC.

Table 35 – optimistic scenario, prognosis of the development of total transport performances of rail system in individual countries and on lines included in the Amber RFC.

Table 36 – pessimistic scenario, prognosis of the development of total transport performances of rail system in individual countries and on lines included in the Amber RFC.

The difference between the individual prognosis scenarios is due to setting the input parameters of deviation and sensitivity for individual scenarios. For processing the prognosis, the mean degree of deviation was selected at the level of 5 points – most frequently used for traffic forecasting. Subsequently, the software and algorithm used calculated the outputs for individual prognosis scenarios, listed in Tables 34, 35 and 36.

Table 34: Prognosis – Realistic scenario

IM	Mode of transport	Scope	Transport performance/ Year	2019	2020	2021	2022	2023	2024	2025	2026
PLK	Passenger transport	total	train-km in thous.	170 740	177 667	184 594	191 521	198 448	205 375	212 302	219 229
			gross tkm in mill.	41 606	43 050	44 494	45 939	47 383	48 828	50 272	51 716
		on RFC	train-km in thous.	14 572	14 854	15 136	15 418	15 699	15 981	16 263	16 545
			gross tkm in mill.	3 978	4 093	4 208	4 323	4 438	4 552	4 667	4 782
	Freight transport	total	train-km in thous.	83 443	85 572	87 701	89 830	91 959	94 088	96 217	98 345
			gross tkm in mill.	119 977	123 705	127 433	131 160	134 888	138 616	142 344	146 071
		on RFC	train-km in thous.	9 495	9 906	10 318	10 729	11 141	11 553	11 964	12 376
			gross tkm in mill.	14 013	14 699	15 384	16 070	16 756	17 442	18 128	18 813
ŽSR	Passenger transport	total	train-km in thous.	37 205	38 377	39 549	40 721	41 892	43 064	43 064	45 408
			gross tkm in mill.	11 590	12 297	13 004	13 710	14 417	15 124	15 831	15 830
		on RFC	train-km in thous.	11 654	12 050	12 446	12 842	13 238	13 633	14 029	14 425
			gross tkm in mill.	4 429	4 682	4 934	5 187	5 439	5 691	5 944	6 196
	Freight transport	total	train-km in thous.	15 908	16 277	16 646	17 015	17 384	17 753	18 122	18 491
			gross tkm in mill.	19 922	20 369	20 815	21 262	21 709	22 155	22 602	23 049
		on RFC	train-km in thous.	5 480	5 785	6 090	6 395	6 701	7 006	7 311	7 616
			gross tkm in mill.	6 488	6 844	7 201	7 557	7 914	8 270	8 627	8 983
MAV Zrt. + GYSEV	Passenger transport	total	train-km in thous.	85 850	86 883	87 915	88 948	89 981	91 014	92 047	93 080
			gross tkm in mill.	18 111	18 264	18 571	18 826	19 212	19 736	19 998	20 157
		on RFC	train-km in thous.	22 216	22 684	23 098	23 415	23 821	24 189	24 608	24 891
			gross tkm in mill.	5 212	5 424	5 616	5 931	6 187	6 442	6 887	7 184
	Freight transport	total	train-km in thous.	18 086	18 234	18 621	19 148	19 823	20 184	20 531	21 038
			gross tkm in mill.	22 707	23 158	23 800	24 485	25 012	25 354	25 700	26 053
		on RFC	train-km in thous.	7 752	7 952	8 255	8 878	9 101	9 601	10 015	10 858
			gross tkm in mill.	9 235	10 158	10 800	11 425	11 980	12 357	12 977	13 324
SŽ-I	Passenger transport	total	train-km in thous.	9 695	9 393	9 121	8 962	8 797	8 536	8 342	8 123
			gross tkm in mill.	1 324	1 278	1 232	1 203	1 197	1 176	1 141	1 109
		on RFC	train-km in thous.	6 895	6 939	6 982	7 026	7 070	7 114	7 158	7 202
			gross tkm in mill.	746	713	701	697	683	675	669	654
	Freight transport	total	train-km in thous.	10 279	10 486	10 693	10 900	11 108	11 315	11 522	11 730
			gross tkm in mill.	9 970	10 485	10 999	11 514	12 029	12 543	13 058	13 572
		on RFC	train-km in thous.	8 093	8 404	8 716	9 027	9 339	9 650	9 962	10 273
			gross tkm in mill.	8 067	8 444	8 822	9 199	9 577	9 955	10 332	10 710
Total	Passenger transport	total	**train-km in thous.**	**303 490**	**312 320**	**321 179**	**330 152**	**339 118**	**347 989**	**355 755**	**365 840**
			gross tkm in mill.	**72 631**	**74 889**	**77 301**	**79 678**	**82 209**	**84 864**	**87 242**	**88 812**
		on RFC	**train-km in thous.**	**55 337**	**56 527**	**57 662**	**58 701**	**59 828**	**60 917**	**62 058**	**63 063**
			gross tkm in mill.	**14 365**	**14 912**	**15 459**	**16 138**	**16 747**	**17 360**	**18 167**	**18 816**
	Freight transport	total	**train-km in thous.**	**127 716**	**130 569**	**133 661**	**136 893**	**140 274**	**143 340**	**146 392**	**149 604**
			gross tkm in mill.	**172 576**	**177 717**	**183 047**	**188 421**	**193 638**	**198 668**	**203 704**	**208 745**
		on RFC	**train-km in thous.**	**30 820**	**32 047**	**33 379**	**35 029**	**36 282**	**37 810**	**39 252**	**41 123**
			gross tkm in mill.	**37 803**	**40 145**	**42 207**	**44 251**	**46 227**	**48 024**	**50 064**	**51 830**

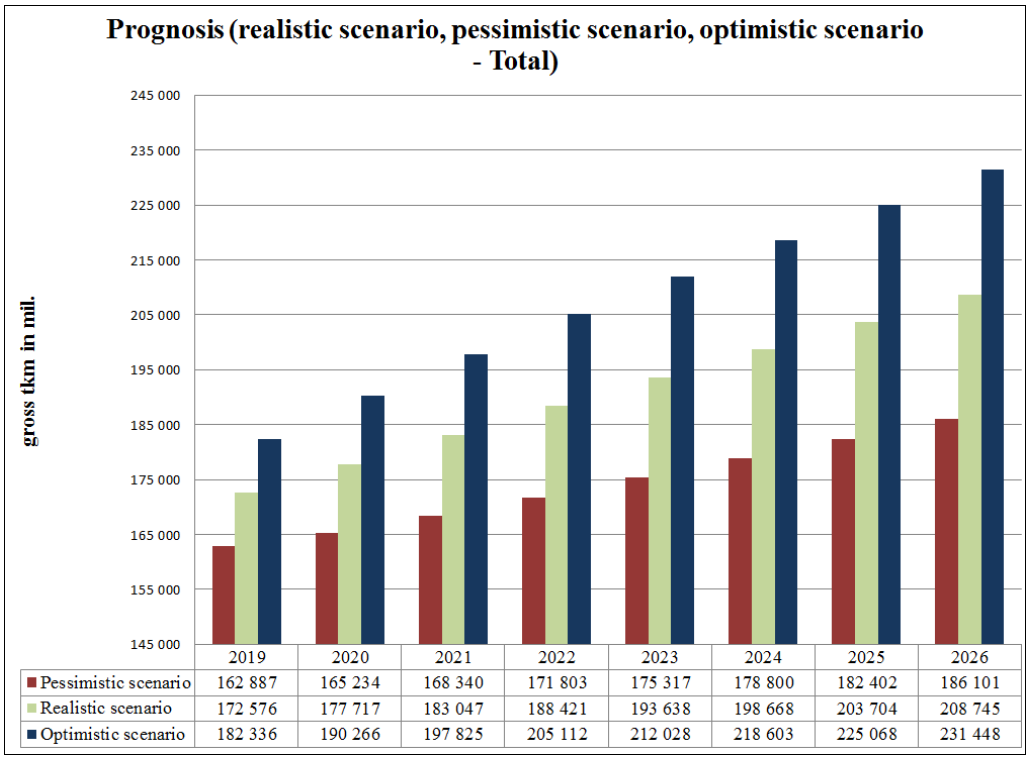
Table 35: Prognosis – Optimistic scenario

IM	Mode of transport	Scope	Transport performance/Year	2019	2020	2021	2022	2023	2024	2025	2026
PLK	Passenger transport	total	train-km in thous.	181 941	190 196	198 327	206 365	214 329	222 234	230 088	237 900
			gross tkm in mill.	48 355	51 491	54 344	57 023	59 580	62 046	64 441	66 779
		on RFC	train-km in thous.	15 919	16 538	17 101	17 629	18 133	18 619	19 090	19 550
			gross tkm in mill.	4 656	5 006	5 307	5 581	5 838	6 082	6 315	6 542
	Freight transport	total	train-km in thous.	88 977	93 021	96 668	100 096	103 379	106 558	109 657	112 693
			gross tkm in mill.	127 925	134 402	140 310	145 903	151 288	156 523	161 645	166 674
		on RFC	train-km in thous.	10 358	10 769	11 181	11 593	12 004	12 416	12 828	13 239
			gross tkm in mill.	15 327	16 013	16 699	17 384	18 070	18 756	19 442	20 128
ŽSR	Passenger transport	total	train-km in thous.	39 005	40 200	41 394	42 589	43 784	44 979	46 173	47 368
			gross tkm in mill.	12 410	13 131	13 851	14 572	15 292	16 013	16 734	17 454
		on RFC	train-km in thous.	12 427	12 831	13 234	13 638	14 042	14 445	14 849	15 252
			gross tkm in mill.	4 791	5 048	5 305	5 563	5 820	6 077	6 335	6 592
	Freight transport	total	train-km in thous.	16 450	16 834	17 217	17 600	17 983	18 366	18 748	19 131
			gross tkm in mill.	20 400	20 858	21 317	21 775	22 233	22 691	23 149	23 607
		on RFC	train-km in thous.	5 754	6 070	6 386	6 703	7 019	7 334	7 650	7 966
			gross tkm in mill.	6 767	7 135	7 503	7 871	8 239	8 607	8 975	9 343
MAV Zrt. + GYSEV	Passenger transport	total	train-km in thous.	90 143	91 227	92 311	93 395	94 480	95 565	96 649	97 734
			gross tkm in mill.	18 745	18 903	19 221	19 485	19 884	20 427	20 698	20 862
		on RFC	train-km in thous.	23 327	23 818	24 253	24 586	25 012	25 398	25 838	26 136
			gross tkm in mill.	5 394	5 614	5 813	6 139	6 404	6 667	7 128	7 435
	Freight transport	total	train-km in thous.	18 990	19 146	19 552	20 105	20 814	21 193	21 558	22 090
			gross tkm in mill.	23 502	23 969	24 633	25 342	25 887	26 241	26 600	26 965
		on RFC	train-km in thous.	8 140	8 350	8 668	9 322	9 556	10 081	10 516	11 401
			gross tkm in mill.	9 697	10 666	11 340	11 996	12 579	12 975	13 626	13 990
SŽ - I	Passenger transport	total	train-km in thous.	10 241	10 187	10 063	9 899	9 821	9 934	10 164	10 289
			gross tkm in mill.	1 477	1 434	1 406	1 384	1 372	1 389	1 426	1 483
		on RFC	train-km in thous.	7 324	7 378	7 432	7 486	7 539	7 592	7 645	7 698
			gross tkm in mill.	846	804	796	783	792	813	839	852
	Freight transport	total	train-km in thous.	11 437	11 678	11 919	12 159	12 398	12 637	12 875	13 113
			gross tkm in mill.	10 510	11 037	11 565	12 092	12 620	13 147	13 675	14 202
		on RFC	train-km in thous.	8 635	8 952	9 270	9 587	9 905	10 223	10 540	10 858
			gross tkm in mill.	8 486	8 871	9 256	9 641	10 026	10 411	10 796	11 180
Total	Passenger transport	total	**train-km in thous.**	**321 330**	**331 810**	**342 094**	**352 248**	**362 414**	**372 711**	**383 074**	**393 291**
			gross tkm in mill.	**80 987**	**84 960**	**88 822**	**92 464**	**96 128**	**99 875**	**103 299**	**106 578**
		on RFC	**train-km in thous.**	**58 997**	**60 566**	**62 020**	**63 339**	**64 726**	**66 054**	**67 423**	**68 636**
			gross tkm in mill.	**15 688**	**16 472**	**17 221**	**18 066**	**18 853**	**19 639**	**20 618**	**21 421**
	Freight transport	total	**train-km in thous.**	**135 855**	**140 679**	**145 356**	**149 960**	**154 574**	**158 754**	**162 838**	**167 027**
			gross tkm in mill.	**182 336**	**190 266**	**197 825**	**205 112**	**212 028**	**218 603**	**225 068**	**231 448**
		on RFC	**train-km in thous.**	**32 886**	**34 141**	**35 505**	**37 205**	**38 484**	**40 054**	**41 533**	**43 464**
			gross tkm in mill.	**40 277**	**42 685**	**44 798**	**46 893**	**48 914**	**50 749**	**52 839**	**54 641**

Table 36: Prognosis – Pessimistic scenario

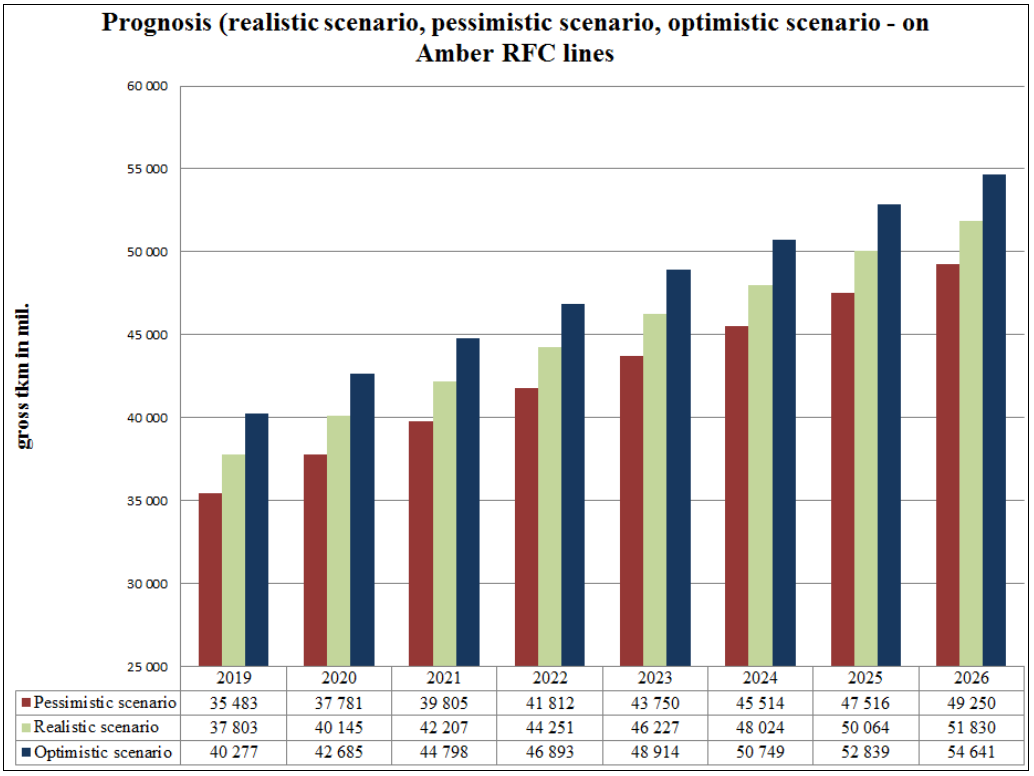
IM	Mode of transport	Scope	Transport performance/Year	2019	2020	2021	2022	2023	2024	2025	2026
PLK	Passenger transport	total	train-km in thous.	159 538	165 138	170 861	176 677	182 567	188 517	194 517	200 559
			gross tkm in mill.	34 856	34 609	34 644	34 855	35 187	35 609	36 103	36 654
		on RFC	train-km in thous.	13 225	13 170	13 170	13 206	13 266	13 344	13 436	13 539
			gross tkm in mill.	3 299	3 179	3 108	3 064	3 037	3 023	3 019	3 023
	Freight transport	total	train-km in thous.	77 909	78 122	78 733	79 564	80 539	81 617	82 776	83 998
			gross tkm in mill.	112 030	113 007	114 555	116 418	118 489	120 708	123 043	125 468
		on RFC	train-km in thous.	8 631	9 043	9 455	9 866	10 278	10 690	11 101	11 513
			gross tkm in mill.	12 699	13 385	14 070	14 756	15 442	16 128	16 813	17 499
ŽSR	Passenger transport	total	train-km in thous.	35 095	36 232	37 370	38 508	39 646	40 783	41 921	43 059
			gross tkm in mill.	10 686	11 372	12 058	12 744	13 431	14 117	14 803	15 489
		on RFC	train-km in thous.	10 794	11 178	11 562	11 947	12 331	12 715	13 100	13 484
			gross tkm in mill.	4 038	4 283	4 528	4 773	5 018	5 263	5 508	5 754
	Freight transport	total	train-km in thous.	15 223	15 574	15 926	16 278	16 630	16 981	17 333	17 686
			gross tkm in mill.	19 254	19 685	20 117	20 548	20 979	21 410	21 841	22 273
		on RFC	train-km in thous.	5 161	5 452	5 743	6 035	6 326	6 618	6 910	7 202
			gross tkm in mill.	6 153	6 494	6 836	7 178	7 520	7 862	8 204	8 546
MAV Zrt. + GYSEV	Passenger transport	total	train-km in thous.	84 133	85 145	86 157	87 169	88 181	89 194	90 206	91 218
			gross tkm in mill.	17 749	17 899	18 200	18 449	18 828	19 341	19 598	19 754
		on RFC	train-km in thous.	21 772	22 230	22 636	22 947	23 345	23 705	24 116	24 393
			gross tkm in mill.	5 108	5 316	5 504	5 812	6 063	6 313	6 749	7 040
	Freight transport	total	train-km in thous.	17 634	17 778	18 155	18 669	19 327	19 679	20 018	20 512
			gross tkm in mill.	22 253	22 695	23 324	23 995	24 512	24 847	25 186	25 532
		on RFC	train-km in thous.	7 558	7 753	8 049	8 656	8 873	9 361	9 765	10 587
			gross tkm in mill.	9 050	9 955	10 584	11 197	11 740	12 110	12 717	13 058
SŽ - I	Passenger transport	total	train-km in thous.	8 964	8 840	8 726	8 576	8 398	8 297	8 164	7 964
			gross tkm in mill.	1 164	1 135	1 101	1 094	1063	1048	1016	984
		on RFC	train-km in thous.	6 412	6 446	6 480	6 514	6 548	6 583	6 617	6 652
			gross tkm in mill.	642	631	619	603	587	571	549	536
	Freight transport	total	train-km in thous.	9 066	9 238	9 412	9 586	9 761	9 936	10 111	10 287
			gross tkm in mill.	9 350	9 847	10 344	10 841	11 338	11 835	12 332	12 828
		on RFC	train-km in thous.	7 490	7 793	8 095	8 398	8 700	9 002	9 305	9 607
			gross tkm in mill.	7 581	7 948	8 315	8 681	9 048	9 414	9 781	10 147
Total	Passenger transport	total	**train-km in thous.**	**287 730**	**295 355**	**303 114**	**310 930**	**318 792**	**326 790**	**334 808**	**342 800**
			gross tkm in mill.	**64 454**	**65 014**	**66 003**	**67 142**	**68 508**	**70 115**	**71 520**	**72 881**
		on RFC	**train-km in thous.**	**52 203**	**53 024**	**53 848**	**54 614**	**55 489**	**56 347**	**57 268**	**58 068**
			gross tkm in mill.	**13 087**	**13 409**	**13 759**	**14 252**	**14 705**	**15 170**	**15 826**	**16 353**
	Freight transport	total	**train-km in thous.**	**119 831**	**120 713**	**122 227**	**124 097**	**126 257**	**128 214**	**130 238**	**132 483**
			gross tkm in mill.	**162 887**	**165 234**	**168 340**	**171 803**	**175 317**	**178 800**	**182 402**	**186 101**
		on RFC	**train-km in thous.**	**28 841**	**30 041**	**31 341**	**32 955**	**34 177**	**35 671**	**37 081**	**38 908**
			gross tkm in mill.	**35 483**	**37 781**	**39 805**	**41 812**	**43 750**	**45 514**	**47 516**	**49 250**

Graph 9 for graphical comparison shows the overall prognosis of the development of rail freight transport performances in the Amber RFC countries for all scenarios. Subsequently, graph 10 for graphical comparison shows the overall development of rail freight transport performances forecasted on the lines included in the Amber RFC for all scenarios.



	2019	2020	2021	2022	2023	2024	2025	2026
Pessimistic scenario	162 887	165 234	168 340	171 803	175 317	178 800	182 402	186 101
Realistic scenario	172 576	177 717	183 047	188 421	193 638	198 668	203 704	208 745
Optimistic scenario	182 336	190 266	197 825	205 112	212 028	218 603	225 068	231 448

Graph 9: Comparison of prognosis scenarios of total freight transport performances



	2019	2020	2021	2022	2023	2024	2025	2026
Pessimistic scenario	35 483	37 781	39 805	41 812	43 750	45 514	47 516	49 250
Realistic scenario	37 803	40 145	42 207	44 251	46 227	48 024	50 064	51 830
Optimistic scenario	40 277	42 685	44 798	46 893	48 914	50 749	52 839	54 641

Graph 10: Comparison of prognosis scenarios of freight transport performances on the Amber RFC lines

Based on the graphical representation of the prognosis of the development of total rail freight transport performances, we can conclude in both comparisons the forecasted linear increase in transport performances in all scenarios. The prognosis shows a more significant difference between the pessimistic and the realistic scenario, mainly influenced by the risks of the forecast model and the input data.

Based on the findings from the forecast, we can conclude:

- increase in transport performances in rail freight transport system,
- higher increase in rail freight transport performances on the lines included in the Amber RFC,
- general increase in rail passenger transport performances (total: gross tkm, train-km),
- increase in transport performances and resulting savings in negative social costs generated by transport,
- increased demands on capacity and technical parameters of lines included in the Amber RFC,
- requirements for modernization, reconstruction and optimization of the Amber RFC railway infrastructure and related rail, road, water and intermodal infrastructure,
- higher quality of communication and information technologies required,
- pressure on higher reliability of the rail system,
- requirement to meet the technical specifications for interoperability in rail passenger and freight transport,
- increase in international rail freight transport performances by approximately 3 – 6 % per year,
- pressure on the harmonisation of charges between rail and road freight transport,
- development of transport performances below the pessimistic scenario in the event of a significant impact of defined forecast risks.

7 ANALYSIS OF PORT OF KOPER IN THE REPUBLIC OF SLOVENIA

The Port of Koper lies in the Republic of Slovenia, in the northern part of the Adriatic Sea. Due to its exceptional location, it connects the Central and Eastern Europe with the Mediterranean. It is currently one of the most important seaports in the Southern Europe. It is also an important intermodal centre connected to the Trans-European Transport Network.

Vision until 2030: the Port of Koper (Luka Koper) wants to be the leading operator of port services between the seaports in the Southern Europe and the global provider of logistics solutions for the region of Central and Eastern Europe.

Mission: provide a reliable port system, development and support of global logistics solutions to the heart of Europe according to the demands of the economy and the most demanding clients.

Basic objectives resulting from the vision and mission:

- Flexible, modern and competitive port provider,
- Reliable and efficient contractor of quality port services,
- A successful business system of long-term stability,
- Promoter of complete logistics solutions,
- Optimal use of a single track railway: on average 82 freight trains per day, i.e. 14.2 million tonnes of cargo by rail,
- Diligent institutionalised stakeholder of sustainable development.

Due to its location, the Port of Koper is connected to the following major European transport networks and corridors:

1. CNC corridors:
   - Baltic – Adriatic Corridor,
   - Mediterranean Corridor.
2. Rail Freight Corridors (RFCs) :
   - **RFC 5 (Baltic – Adriatic):** Gdynia – Katowice – Ostrava / Žilina – Bratislava / Vienna / Klagenfurt – Udine – Venice / Trieste/ Bologna / Ravenna / Graz – Maribor – Ljubljana – **Koper** / Trieste,
   - **RFC 6 (Mediterranean):** Almería – Valencia / Madrid – Zaragoza / Barcelona – Marseille – Lyon – Turin – Milan – Verona – Padua / Venice – Trieste / **Koper** – Ljubljana – Budapest – Zahony (Hungarian – Ukrainian border),

- **RFC 10 (Alpine-Western Balkan):** Salzburg – Villach – Ljubljana –/ Wels/Linz – Graz – Maribor – Zagreb – Vinkovci/Vukovar – Tovarnik – Beograd – Sofia – Svilengrad (Bulgarian-Turkish border),
- **RFC 11 (Amber): Koper** – Ljubljana/Zalaszentivan – Sopron/Csorna/(Hungarian – Serbian border) – Kelebia – Budapest – Komárom – Leopoldov/Rajka – Bratislava – Žilina – Katowice/Kraków – Warszawa/Łuków – Terespol – (Polish – Belarusian border)

3. Transport networks according to the European agreement on important international combined transport lines and related installations.

7.1 Basic information about the Port of Koper

The Port of Koper is managed and developed by Luka Koper d. d., a public limited company (in 2016 there were 886 employees). It is responsible for maintaining the high level of shipping and cargo traffic operations in the Port of Koper. The services are available day and night, 365 days a year. The Port of Koper includes 12 terminals with a total quay length of 3 300 meters designed for handling and storing the part load consignments, oversize loads, containers, RO-RO technology, cars and dry bulk and liquid cargoes.

The Port of Koper is part of the North Adriatic Ports Association (NAPA), which also includes the ports of Trieste, Venice, Ravenna and Rijeka. The combination of these ports represents the most inexpensive waterway connecting the Europe with the Far East (http://www.portsofnapa.com/about-napa). It is a multimodal gateway created for major European markets. The Association also deals with coordinated planning of road, rail and maritime infrastructures as well as harmonization of regulations and procedures in the field of port services provision.

The Port of Koper, with its significant position in the Southern Europe, is the member of the following international organization:

1. ESPO (The European Sea Ports Organisation) represents the port authorities, port associations and port administrations of the seaports of 23 Member States of the European Union and Norway at EU political level.
2. MedCruise (The Association of Mediterranean Cruise ports) has 72 members representing more than 100 Mediterranean ports, including the area of the Black Sea, the Red Sea and the Near Atlantic, as well as 32 associated members representing other associations.
3. FEPORT (The Federation of European Private Port Companies and Terminals) was established in 1993 and represents the interests of a large variety of terminal operators and stevedoring companies performing operation in the ports. It currently includes more than 400 terminals in the seaports of the European Union and more than 1200 companies.

Basic technical characteristics of the Port of Koper:

Total port area:	2 800 000 m^2
Enclosed warehousing area:	247 000 m^2
Covered storage area:	76 000 m^2
Open storage area:	900 000 m^2
Pier total length:	3 300 m
Maximum sea depth:	18 m

Basic technical characteristics of the container terminal:

Total terminal area:	270 000 m^2
Stacking area:	180 000 m^2
Pier length:	596 m
Railway tracks (number x length in m):	5 x 700 m, 2 x 270 m, 2 x 300 m
Storage capacity – marine terminal:	19 130 TEU
Storage capacity – empty containers:	9 547 TEU
Equipment	**Lift capacity (ton)**
3 STS panamax cranes	40 (40 feet)/ 45 (2 x 20 feet) under spreader
4 STS post-panamax cranes	51 (40 feet)/ 65 (2 x 20 feet) under spreader
4 STS Super post-panamax cranes	51 (40 feet)/ 65 (2 x 20 feet) under spreader
22 Rubber – Tyred G/C (storage area)	40 t
3 Rail Mounted Gantries (railway)	40 t
12 Reach Stackers	42 – 45 t
8 ECH – empty container handler	7 – 9 t

The basic port activity is carried out at specialised terminals, which are technically and organisationally suitable for handling and warehousing of specific cargo groups. The port has a railway and road connection, production facilities, workshops, garages and other necessary complementary facilities.

In addition to basic services, the additional services are provided in the port (e.g. stripping and stuffing of containers, dewaxing and waxing of vehicles, mechanical, painting and body repair services, bananas palletization, wood protection against mould and pests etc.).

The Port of Koper has 12 specialized terminals:

- Container Terminal
- Car and Ro-Ro terminal
- General cargo terminal
- Reefer terminal
- Timber terminal
- Dry bulk terminal
- Silo terminal
- Alumina terminal
- Iron ore and coal terminal
- Liquid cargoes terminal
- Livestock terminal
- Cruise terminal

The following figure shows the structure of the Port of Koper. The white line indicates the main road infrastructure and the black line indicates the railway infrastructure network.

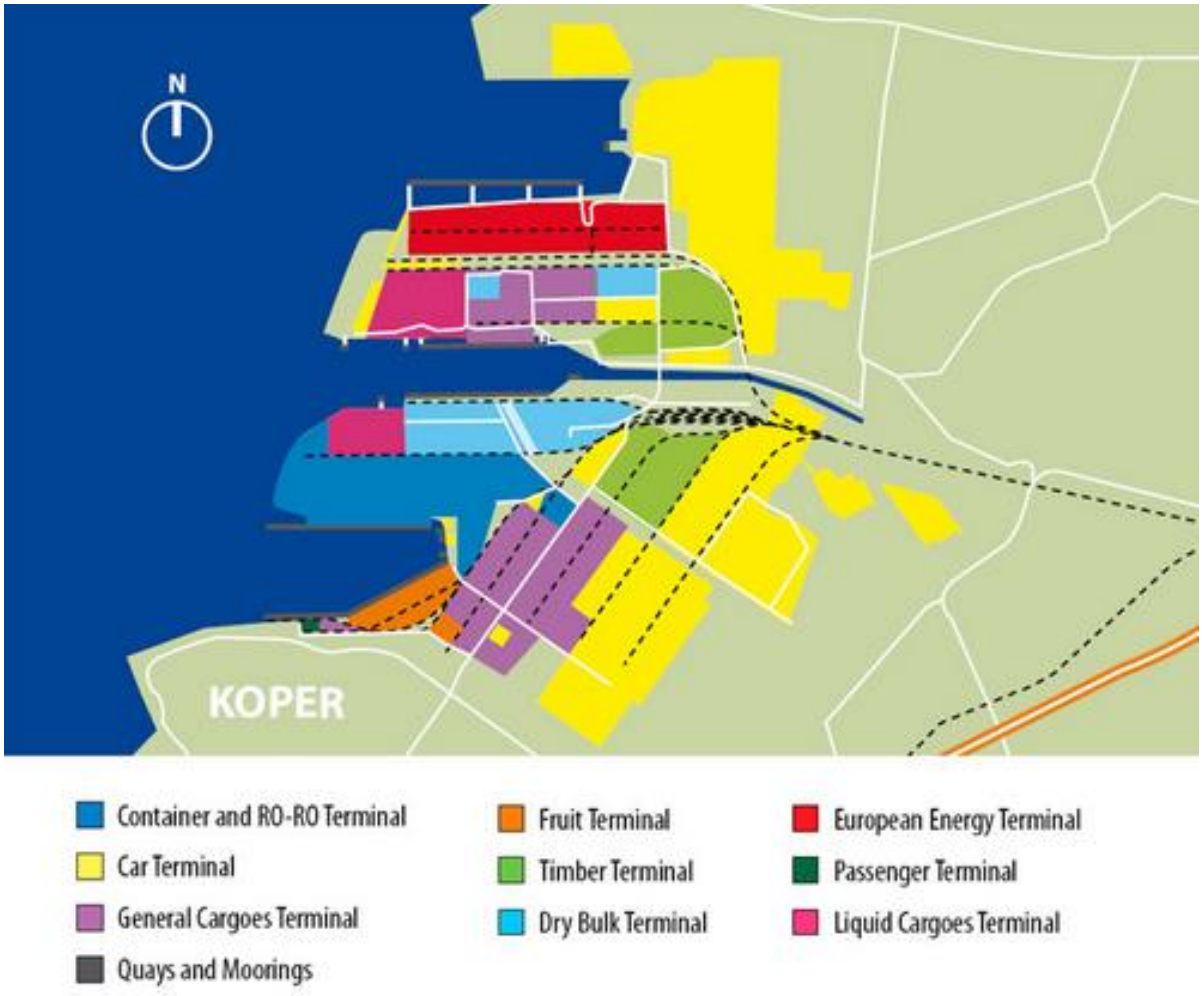


Figure 32: *Individual terminals and their location within the Port of Koper*
(Source: *http://www.portsofnapa.com/port-of-koper)*

The railway infrastructure within the Port of Koper ensures the efficiency and broad possibilities of transporting all goods handled in all twelve terminals of the port. The infrastructure also provides necessary transport services for Central and Eastern Europe.

The following table shows the individual scheduled routes including their frequency from the Port of Koper.

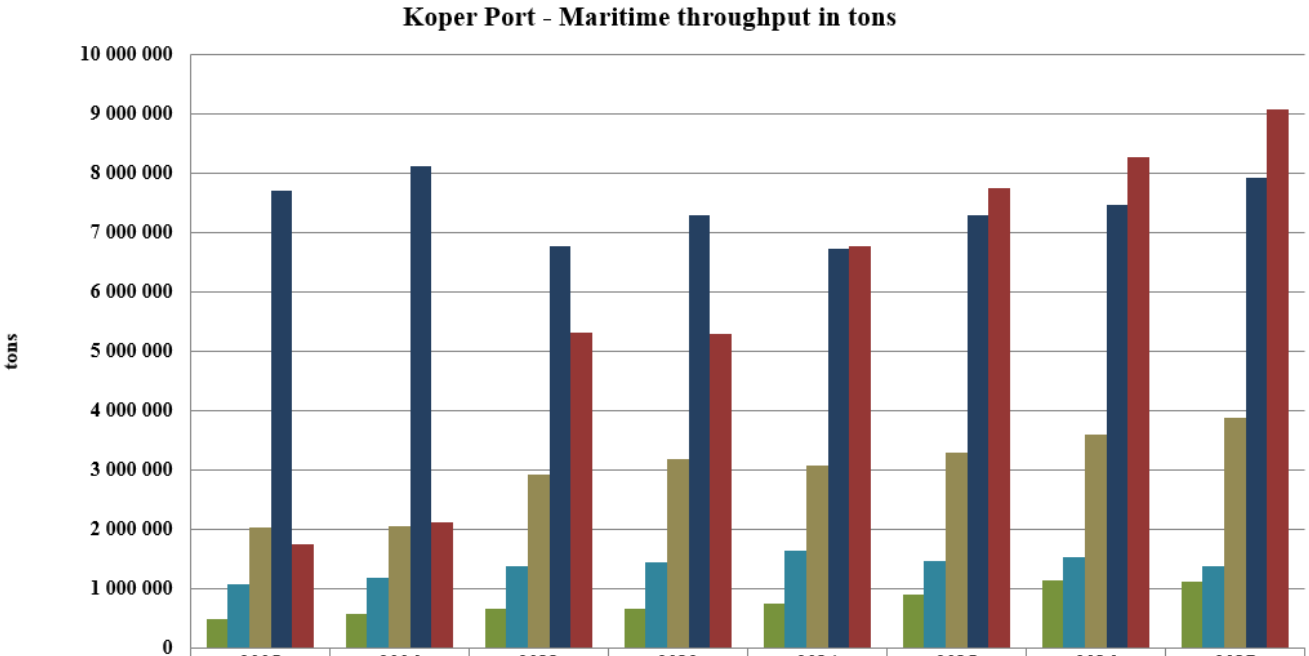
Table 37: Overview of scheduled routes from Port of Koper

Country	Route	Frequency
Austria	Koper – Graz (Adria Transport)	10 x weekly
	Koper – Villach – antenna to Viena, Linz, Salzburg, Wolfurt (RCO/ Adria Kombi)	up to 5 trains/ week
	Koper – Enns (Metrans)	2 x weekly (via Ybbs – Krems)
Hungary	Koper – Budapest BILK (Adria Kombi)	7 trains weekly
	Koper – Budapest Mahart (Metrans)	Up to 14 trains/ week
	Koper – Budapest Törökbálint (Integrail)	3 trains/ week
	Koper – Budapest Mahart (Integrail)	2 x weekly
	Koper – Budapest Mahart (EP Cargo)	2 x weekly
Slovakia	Koper – Bratislava (Adria Kombi)	4 trains/ week
	Koper – Dunajská Streda – various destinations (Metrans)	Up to 14 trains/ week
	Koper – Žilina –KIA (Metrans)	Up to 7 trains/ week
Czech republic	Koper – Dobra u Fridku Mystku (Adria Kombi – dedicated)	4 trains/ week
	Koper – Ostrava (Metrans)	2 x weekly
	Koper – Paskov (AWT dedicated)	1 x weekly
	Koper – Dunajska Streda – Zlin – Prague (Metrans – via Dunajska Streda	Daily
Poland	Koper – Wroclaw (Siechnice) – Ostrava – Koper (Baltic Rail)	2 trains/ week
Germany	Koper – Ljubljana – München (Adria Kombi)	5 trains/ week
	Koper - München (Adria Kombi)	3 x weekly (direct service)
Slovenia	Koper – Ljubljana – Celje – Maribor (Adria Kombi)	2 trains/ day
Bulgaria	Koper – Sofia (Adria Kombi)	Spot train
Romania	Koper – Arad (Adria Transport)	1 train/ week
Italy	Koper – Padova (Adria Kombi dedicated)	1 train/ week
Serbia	Koper – Novi Sad (via Budapest) (Adria Kombi/ Transagent d.o.o.)	Weekly service
	Koper – Ljubljana – Beograd (Adria Kombi)	2 x weekly
Croatia	Koper – Ljubljana – Zagreb (Adria Kombi)	2 x weekly

Source: www.luka-kp.si

7.2 Analysis of the Port of Koper throughput

The significant location and the technical and technological facilities of the Port of Koper have a favourable effect on the demand for the services provided. The interest in the services of the Port of Koper by the transport operators can be determined using the analysis of the reached throughput. Based on the need to determine the demand for the port services provided and demonstrate strategic importance for the Amber corridor, the following graph analyses the throughput reached in the Port of Koper in the period 2005 – 2017. The analysis is focused on the throughput of goods handled in tons.

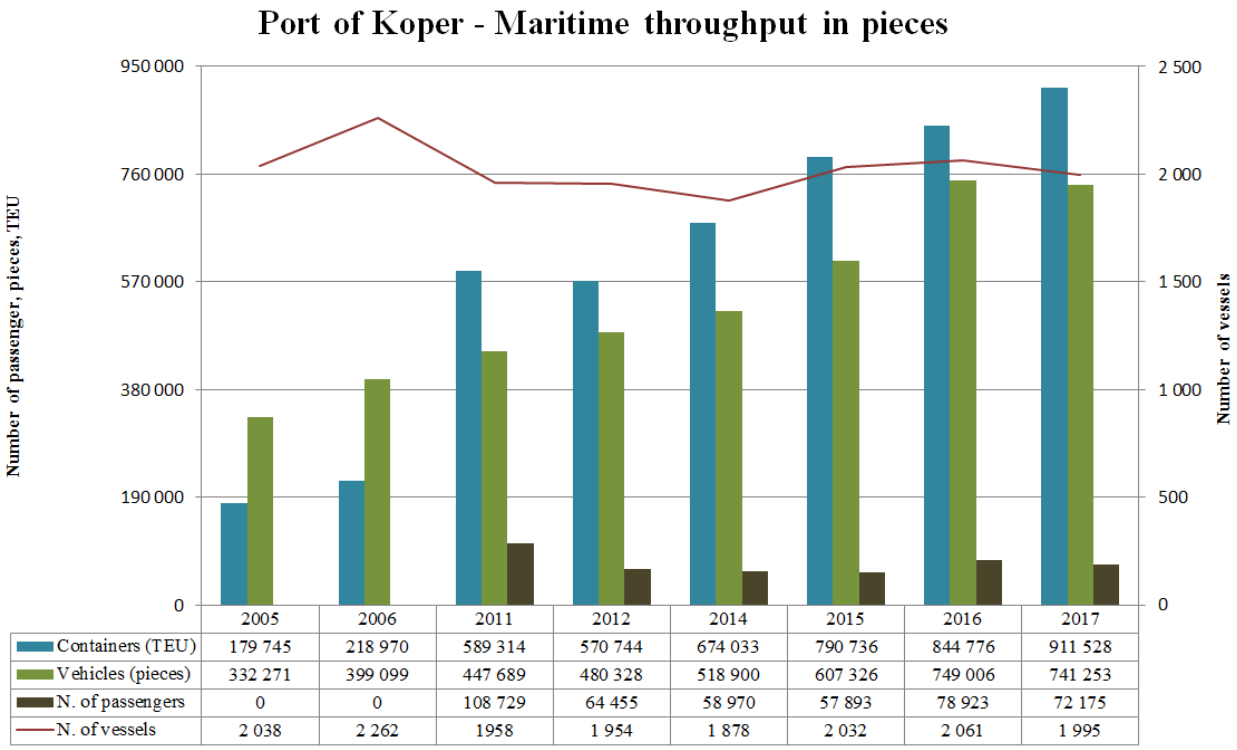


	2005	2006	2011	2012	2014	2015	2016	2017
Vehicles	483 426	570 214	665 878	674 692	763 621	902 168	1 139 559	1 123 779
General cargo	1 087 303	1 180 924	1 383 354	1 438 833	1 643 552	1 475 076	1 534 204	1 377 702
Liquid bulk cargo	2 030 570	2 052 321	2 922 891	3 194 636	3 073 620	3 297 225	3 592 947	3 876 535
Dry bulk cargo	7 702 234	8 106 467	6 769 845	7 280 490	6 724 354	7 295 426	7 469 514	7 917 542
Containers	1 762 569	2 120 807	5 309 346	5 292 047	6 760 204	7 741 976	8 274 429	9 071 413

Graph 11: Overview of achieved throughputs in tons in Port of Koper
(Source: Annual reports of Luka Koper, Port of Koper)

The analysis showed the overall increase in throughput over the analysed period. In total, 23 366 959 tons of goods were handled in 2017 (by 6% more than in 2016) which represents an increase of 78.84 % in comparison with 2005. During 2014 – 2017 there was an increase in all monitored goods except for General cargo, where a fluctuating trend was recorded. The most significant increase among the surveyed goods was achieved in the container transport. In 2017, container throughput accounted for 38.8 % of total throughput, while in 2005, it accounted for only 13.5 %. Based on these facts, we can deduce potential for increase in container transport in the coming years.

The following graph shows the progress of the reached throughput in number of pieces, TEU, and passengers in the period 2005 - 2017.



	2005	2006	2011	2012	2014	2015	2016	2017
Containers (TEU)	179 745	218 970	589 314	570 744	674 033	790 736	844 776	911 528
Vehicles (pieces)	332 271	399 099	447 689	480 328	518 900	607 326	749 006	741 253
N. of passengers	0	0	108 729	64 455	58 970	57 893	78 923	72 175
N. of vessels	2 038	2 262	1958	1 954	1 878	2 032	2 061	1 995

Graph 12: Overview of reached throughput in quantified amount in the Port of Koper (Source: Annual reports of Luka Koper, Port of Koper)

Based on the figures in the graph, we can confirm an increase of throughput in the number of containers and vehicles. On the contrary, the number of passengers has a decreasing trend and the number of vessels has a fluctuating trend. In 2017, 911 528 TEU were handled in the Port of Koper, which is by 731 783 TEU more than in 2005. With the throughput of TEU the Port of Koper is now classified as the first in the Adriatic region. In the case of the number of pieces of vehicles handled, there is increase by 123.1 % in 2017 compared to 2005.

Investments are necessary to maintain the current state and the subsequent development of the Port of Koper within the competitive fight. The following table shows the development of investments in real estate, machinery and equipment in the Port of Koper.

Table 38: Investment development in Port of Koper in 2012 - 2016

Year	2012	2013	2014	2015	2016
Luka Koper, d. d.	17 768 219	14 522 369	28 485 811	36 871 798	60 313 916
Luka Koper Group TOTAL	18 639 095	14 825 864	29 958 975	37 402 753	61 781 064

Source: Annual Report of Luka Koper

Investments have a generally increasing trend. The Luka Koper,d.d. made investments in the amount of EUR 60 313 916 EUR in 2016, what is by 23 442 118 EUR more than in the previous year. In 2016, Luka Koper, d.d. invested EUR 18.1 million in the ordered 12 new high-capacity

cranes. From the point of view of increasing competitiveness and capacity, it is the most effective valuation of investment resources with planning for the future. Within the container terminal, the funds have been invested in the new RMG technology that allows simultaneous handling of five train sets as well as the use of cranes for large container handling (capacity 20 000 TEU). By 2020, the capacity of the container terminal is planned to increase to 1.3 million TEU per year.

The important facts and opportunities for the Amber corridor:

- nearly two thirds of the cargo arrives to and leaves the port by rail,
- the Hungarian railway operating company Integrail will establish a new container block train connection between the Port of Koper container terminal and the Budapest Mahart Container Center terminal. The service runs from 15 March 2018 through two trains a week.
- the Slovenian railway operator Adria Kombi introduced a new direct railway service between Luka Koper Container Terminal and DUSS-Terminal München-Riem. The service runs from March 6, 2018 three times per week in both directions. The Germany represent an important market for the Port of Koper, from the fruit and vegetable supplies from the Mediterranean countries to the transport of Volkswagen vehicles. The Bavaria is one of the most developed and the export-oriented Germany regions that represent a big potential for the Port of Koper.
- in September, 2017, the Czech railway operator, EP Logistics started a new direct block train connection between Luka Koper Container Terminal to Budapest Mahart Terminal.

On the basis of the presented facts about the Port of Koper, which concerned the location, division, technical and technological equipment and demand for its services, we can confirm its strategic importance for the Amber corridor. The port is an important gateway especially for the goods transported in TEU from Asia to the European hinterland, mainly to Central and Eastern Europe. This creates the possibilities to get transportations for the Amber corridor, as an increase in the intermodal transport performances can be expected in the next period. The development of the port, its services and the resulting demand from transport operators create a perspective for effective and efficient cooperation between the Port of Koper and the Amber corridor. Within the cooperation, it will be possible to provide better intermodal transport and logistics services, which will lead to higher rail freight performances. The transportations for the automotive and machine industries are a great opportunity for cooperation between the Port of Koper and the Amber corridor. An increased need for transport of mineral resources, mainly gasses and iron ore is expected in the future. This implies the need for the necessary cooperation (strategic partnership) between the Port of Koper and the Amber corridor, which can also contribute to an increase in the port throughput and its overall development and position.

8 TRANSPORT POTENTIAL OF SELECTED COUNTRIES

Worldwide growth in international trade, including trade between EU countries and selected countries, directly creates demand for transport services. Continuously increasing demand for transport services, particularly in the international transport of goods, creates a number of possibilities for the provision of rail transport services. The opportunity to acquire a significant share in the transport market is mainly due to the requirements for long and medium distance transport in international transport. Many suppliers from selected countries currently prefer and require the high quality, reliable and cost-effective transport services. For the described reasons and the geographical routing of the Amber RFC, it is necessary to examine the transport potential of the selected countries, on the basis of which the measures for support of rail freight services can be identified. An examination of the transport potential is carried out for the following countries:

- China,
- Russia,
- Belarus,
- Serbia,
- Turkey,
- Ukraine

The selection of countries was based on the geographical location of the Amber RFC, the current trade in international trend and possible cooperation between countries.

Table 39 contains a summary of the basic data on selected analysed countries.

Table 39: Overview of basic information on countries under consideration

Country	China	Russia	Belarus	Serbia	Turkey	Ukraine
Population (2016)	1 379 000 000	144 342 396	9 507 120	7 057 412	79 512 426	45 004 645
Area (km^2)	9 596 961	17 075 200	207 595	88 361	783 356	603 628
Length of operated railway lines (km)	121 000	86 000	5 470	3 809	12 532	21 640
Length of motorway (km)	136 000	806	-	782	2 289	199
Road length (km)	4 696 300	1 396 000	86 900	44 637	426 906	169 496

Source: Eurostat, National statistics office

The economic growth directly affects the production of final products and services in individual countries. This production consequently creates demand for transport services which is important for the provision of rail transport services. Table 40 therefore analyses the GDP development in the analysed countries in the period 2010 – 2016.

Table 40: Analysis of GDP development in individual countries under consideration

Country	Measure/ Year	2010	2012	2014	2015	2016
China	GDP growth (annual %)	10,6	7,8	7,3	6,9	6,7
	GDP (current US $) in trillion	6,101	8,561	10,482	11,065	11,199
Russia	GDP growth (annual %)	4,5	3,6	0,7	-2,8	-0,2
	GDP (current US $) in trillion	1,525	2,210	2,064	1,366	1,283
Belarus	Real GDP growth rate-volume	7,8	1,7	1,7	-3,8	-2,6
	GDP in million EUR, current prices*	-	-	-	-	-
Serbia	Real GDP growth rate-volume	0,6	-1,0	-1,8	0,8	2,8
	GDP in million EUR, current prices*	29 766	31 683	33 319	33 491	34 617
Turkey	GDP growth (annual %)	8,5	4,8	5,2	6,1	3,2
	GDP (current US $) in billion	771,877	873,982	934,168	859,794	863,712
Ukraine	GDP growth (annual %)	4,2	0,2	-6,5	-9,8	2,3
	GDP (current US $) in billion	136,013	175,781	133,503	91,031	93,27

**GDP and main components (output, expenditure and income)*
Source: Eurostat, World Bank national accounts data, OECD National Accounts data files

The GDP analysis in Table 40 showed an upward trend in the countries concerned, except Russia and Ukraine. The highest GDP was recorded in the China and Russia, while the lowest in Serbia. The GDP growth rate was highest in China and Turkey. The lowest growth rate was recorded in Belarus and Russia. Based on the analysis carried out, it is possible to assume the GDP growth in individual countries with different growth rates, with possible negative development, too.

Table 41 analyses the import and export of goods in total value (in euros) to/from the EU countries and specifically from/to the Amber RFC countries and from/to selected countries in the period 2010 – 2016.

Table 41: Import and export value from/ to the EU in mill. €

Country	Country/ Year	2010	2012	2014	2015	2016
Import value from the EU in mill. €						
China	Total EU 28 countries	283 931	292 122	302 518	350 847	344 915
	Total Amber RFC countries	16 443	16 794	18 978	22 416	23 837
Russia	Total EU 28 countries	162 079	215 131	182 384	136 388	118 892
	Total Amber RFC countries	23 817	34 334	27 672	19 590	15 551
Turkey	Total EU 28 countries	43 062	48 822	54 415	61 663	66 765
	Total Amber RFC countries	2 471	2 809	3 415	4 290	4 355
Belarus	Total EU 28 countries	2 672	4 619	3 444	3 725	2 948
	Total Amber RFC countries	175	225	203	233	227
Serbia	Total EU 28 countries	4 349	5 053	7 110	7 879	8 739
	Total Amber RFC countries	988	1 125	1 406	1 584	1 920
Ukraine	Total EU 28 countries	11 547	14 647	13 734	12 844	13 159
	Total Amber RFC countries	2 489	3 779	3 496	3 018	3 377
Export value to the EU in mill. €						
China	Total EU 28 countries	113 454	144 227	164 623	170 357	169 664
	Total Amber RFC countries	3 488	4 279	4 681	4 395	4 741
Russia	Total EU 28 countries	86 308	123 469	103 225	73 745	72 338
	Total Amber RFC countries	10 311	14 078	12 335	9 011	8 879
Turkey	Total EU 28 countries	61 929	75 491	74 719	78 962	77 890
	Total Amber RFC countries	4 205	4 722	4 662	5 429	5 434
Belarus	Total EU 28 countries	6 631	7 847	7 458	5 704	4 983
	Total Amber RFC countries	305	309	339	267	230
Serbia	Total EU 28 countries	7 881	9 660	10 357	11 155	11 664
	Total Amber RFC countries	2 225	2 750	3 136	3 206	3 424
Ukraine	Total EU 28 countries	17 413	23 866	16 988	14 033	16 565
	Total Amber RFC countries	5 034	6 647	5 282	4 713	5 369

Source: European Commission – Trade – EU Trade Helpdesk – Statistics

The analysis carried out in Table 41 showed the value increase in import of goods from China, Turkey, Serbia, Ukraine to the EU countries and the Amber RFC countries. On the contrary, the decrease in import was recorded from Russia and Belarus. This negative trend is highly influenced by EU sanctions against Russia. Export of goods from the Amber RFC countries and the EU countries to the analysed countries showed a directional inequality. The highest export was made to the China, while the lowest one to Belarus.

Table 42 analyses the import and export of goods in total weight (in tonnes) to/from the EU countries and specifically from/to the Amber RFC countries and from/to analysed countries in the period 2010 –2010 – 2016.

Table 42: Import and export quantity from/to the EU in 1000 t

Country	Country/ Year	2010	2012	2014	2015	2016
Import quantity from the EU in 1000 t						
China	Total EU 28 countries	54 040	49 275	59 161	59 311	59 571
	Total Amber RFC countries	2 666	2 816	3 606	3 550	4 081
Russia	Total EU 28 countries	402 496	393 610	403 956	404 071	425 812
	Total Amber RFC countries	61 072	59 410	57 737	54 833	54 939
Turkey	Total EU 28 countries	24 363	22 451	24 885	27 239	29 738
	Total Amber RFC countries	968	1 097	1 244	1 373	1 421
Belarus	Total EU 28 countries	8 749	10 889	10 805	12 900	13 148
	Total Amber RFC countries	321	284	267	401	604
Serbia	Total EU 28 countries	5 261	4 505	5 636	6 012	7 516
	Total Amber RFC countries	1 145	918	1 492	1 353	1 839
Ukraine	Total EU 28 countries	46 407	51 882	56 513	54 656	54 975
	Total Amber RFC countries	15 172	16 478	16 829	15 764	16 468
Export quantity to the EU in 1000 t						
China	Total EU 28 countries	33 228	40 892	43 338	46 142	49 407
	Total Amber RFC countries	654	766	1 026	1 103	1 254
Russia	Total EU 28 countries	24 436	29 325	24 928	16 649	15 115
	Total Amber RFC countries	3 341	4 301	3 949	2 397	2 170
Turkey	Total EU 28 countries	39 523	45 715	47 050	44 839	46 874
	Total Amber RFC countries	1 754	1 677	1 504	1 369	1 846
Belarus	Total EU 28 countries	2 484	3 040	3 297	3 350	3 034
	Total Amber RFC countries	87	84	79	60	57
Serbia	Total EU 28 countries	5 444	5 480	5 627	6 821	6 796
	Total Amber RFC countries	2 017	1 606	1 891	2 012	2 336
Ukraine	Total EU 28 countries	7 990	9 771	8 896	9 504	9 492
	Total Amber RFC countries	3 167	3 982	4 049	4 720	4 859

Source: European Commission – Trade – EU Trade Helpdesk – Statistics

The transport performance analysis in Table 42 showed an increase in import of goods from all selected analysed countries to the EU countries and the Amber RFC countries. At the same time, a significant share of import of goods within the Amber RFC countries was showed. The most important importers of goods are Russia, China and Ukraine. Export of goods from the Amber RFC countries and the EU countries to the analysed countries showed a directional inequality. The highest export was achieved to the China and Turkey, while the lowest one to Belarus.

The development of indicators in Tables 41 and 42 is highly influenced by the political, trade and economic relations of all parties concerned. As a result of economic growth in most countries surveyed, we can assume an increase in import of goods and an increase in demand for international transport services.

On the basis of the analysis carried out in Tables 40-42, it can be concluded:

- economic growth in most of selected countries: shown by the analysis of the economic development of individual examined countries and the growth of international trade, the expected GDP growth in China is at 6 % and Turkey at 3 %,
- increase in number of goods transported from/to the EU 28 countries (including a share of the Amber RFC countries) from the selected countries: results from the analysis of trade between the Amber RFC countries and the selected countries. The analysis showed general growth in imports and exports of goods within the selected countries, e.g. the increase in imports from Turkey to the Amber RFC countries from 968 000 tons in 2010 to 1 421 000 tons in 2016.
- increase in demand for transport services from China, Ukraine and Russia: affected by the trade between the Amber RFC countries and the selected countries, economic development of selected countries and consumption of the Amber RFC countries (higher consumption results from the economic analysis carried out in Chapter 4),
- growth of international trade of the Amber RFC countries with Serbia,
- sufficient increase in demand for transport services from Serbia: confirmed by the growth of trade, imports of 1 839 000 tons of goods from Serbia in 2016 to the Amber RFC countries and exports of 2 336 000 tons goods from the Amber RFC countries to Serbia,
- pressure on fast, reliable and safe transport of goods from the selected countries to the Amber RFC countries as well as the EU countries: affected by the higher value of the goods transported, pressure on keeping the agreed arrival times, motivation of shift of transport performances from water to rail freight transport,
- sufficient potential for international rail transport from/to the selected countries from the EU 28 countries (including a share of the Amber RFC countries): confirmed by the gradual increase in number of goods transported within the selected countries and the EU countries,
- strategic importance of the Amber RFC for transportations East Asia – Central Europe: results from the geographical routing of the Amber RFC and technical condition of the railway lines,
- lowest transport potential for the Amber RFC can be expected from/to Belarus: shown by the results of import and export analysis with Belarus showing the lowest number from the selected countries,
- import of goods to the EU countries from the analysed countries has a generally increasing trend and such a trend can be expected also in the future, based on the GDP development in the analysed countries..

For the Amber RFC, the sufficient possibilities of new transport opportunities within the analysed countries are being created. New transport opportunities, that would be suitable for the

transport by rail, can be expected in Serbia, Ukraine, Turkey and Russia. Within these countries, the opportunities for international cooperation and the subsequent provision of comprehensive transport services are created, in particular through intermodal transport and transport of bulk substrates, gases and oil. Based on the development of transport flows, a directional inequality can be assumed.

Within acquisition the transportations and significant position of rail freight transport on the international transport services market, high quality railway infrastructure, available, reliable and cost-attractive services and technological undemandingness of transport of goods are necessary. In particular, it is necessary to take measures to reduce the technological lost times at the border crossings with selected countries resulting from the legislation and technical parameters of lines and rolling stock. It is important to eliminate the bottlenecks at border crossings.

9 AMBER RFC GRAPHICAL REPRESENTATION

All analysed data, from which the results and conclusions presented in the previous Chapter were subsequently defined, were necessary to define exactly the Amber RFC routing and to divide all proposed lines into the principal, diversionary and connecting lines of the established corridor. The results of the draft for the precise routing of the established Amber RFC and the technical parameters of the lines are given in the continuation of Chapter 9.

The subchapter contains a graphical representation of all lines (principal, diversionary, connecting) which will included in the Amber RFC in individual member states of the corridor. In the following figure, routing of the whole Amber RFC is shown for overall geographic overview of the corridor routing within the railway infrastructure of the member states.

Figure 33: *Preliminary graphical representation of Amber RFC routing (Source: ŽSR, VVÚŽ)*

Republic of Poland

The initial routing of the principal line of the Amber RFC corridor in the Republic of Poland is at the Terespol border crossing with the Republic of Belarus in the direction Łuków – Dęblin – Radom. For connection of the capital of the Republic of Poland – Warszawa with the principal line, the connection Radom - Warszawa is being considered and at the same time with the diversionary

line Dęblin – Tłuszcz – Warszawa. From the railway station Radom, the principal line continues to the railway station Tunel where it is branched in the direction Tunel – Mysłowice Brzezinka – Oświęcim and Tunel – Podłęże. The line section Podłęże – Oświęcim creates again the connection of these branched routes. The rail connection with the Slovak Republic for the needs of the Amber RFC is through the border crossings Zwardoń (PL) – Skalité (SK) and Muszyna (PL) – Plaveč (SK). The connection to the railway border crossing Zwardoń – Skalité is through the principal line from the direction Oświęcim. The connection to the railway border crossing Muszyna – Plaveč is through the principal line in branching Kraków - Podłęże - Tarnów – Nowy Sącz. Construction of a new line Tymbark – Podłęże is planned and, once completed, it will become part of the principal line. The graphical representation of the Amber RFC routing on the territory of the Republic of Poland is shown in Fig. 34.

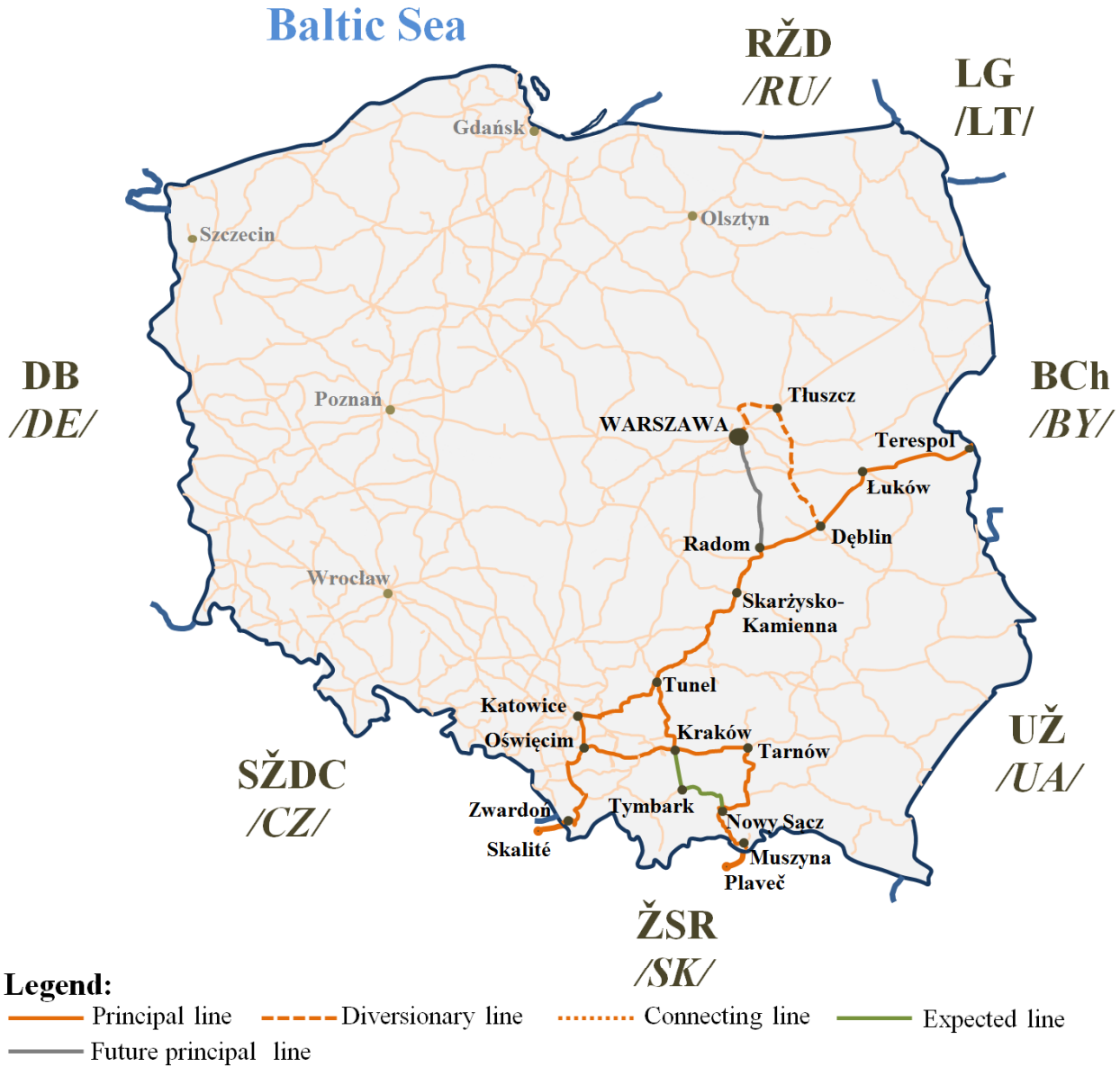


Figure 34: *Graphical representation of Amber RFC routes on PKP PLK network*

(Source: ŽSR, VVÚŽ)

Slovak Republic

The continuation of the Amber RFC on the territory of the Slovak Republic is realized in two branches through the railway border crossings Muszyna (PL) – Plaveč (SK) and Zwardoń (PL) – Skalité (SK). From the railway border crossing Plaveč, the principal line continues in transit in the direction north - south in the direction Prešov – Kysak – Košice – Čaňa št. hr. (SR) – Hidasnémeti (HU) to Hungary. The corridor is connected from the transport point of Košice to Hungary also via an diversionary line in the direction of Košice – Michaľany – Slovenské Nové Mesto – Sátoraljaújhely. Another proposed principal line passes through the border crossing Zwardoń – Skalité and continues Žilina – Trenčín – Leopoldov where the principal line is branched into the following branches:

- Leopoldov – Bratislava – Bratislava-Petržalka – Rusovce (SK) – Rajka (HU),
- Leopoldov – Galanta – Nové Zámky/ – Komárno (SK) – Komárom (HU),
  – Nové Zámky/ - Štúrovo (SK) – Szob (HU).

For technological and operative reasons, these branches are connected by the connecting line Bratislava – Dunajská Streda – Komárno. Note: When it comes to terminals, generally all terminals along designated lines should become designated to the corridor as well, except if a terminal does not have any relevance for the traffic in the corridor or where a private terminal decides not to take part in a corridor. The feeder lines from/to the terminals are designated as 'connecting lines'. The graphical representation of the Amber RFC routing on the territory of the Slovak Republic is shown in Fig. 35.

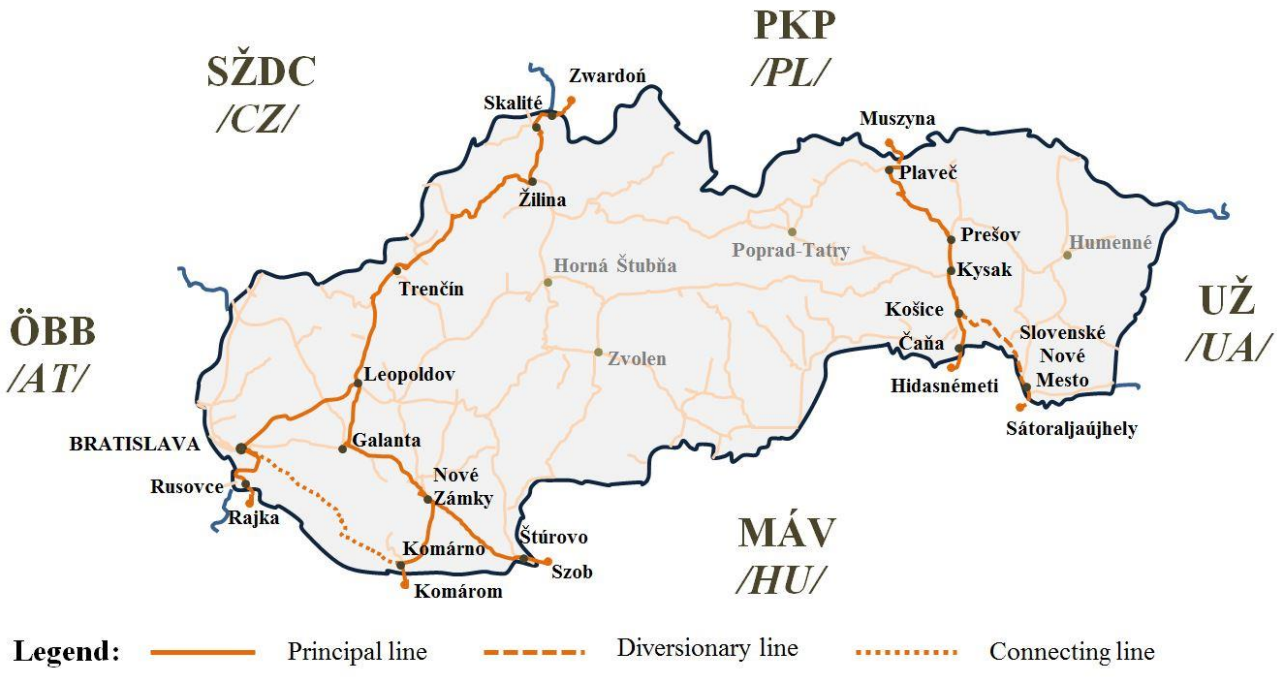


Figure 35: *Graphical representation of Amber RFC routes on ŽSR network*

(Source: ŽSR, VVÚŽ)

Hungary

The capital of Hungary – Budapest is located on the principal line as the important connection point of the lines from the Slovak Republic in the subsequent continuation of the corridor principal line to the Republic of Slovenia where this principal line provides the connection with the Balkan area through the Republic of Serbia through the railway border crossing Kelebia. Based on the transport potential and demand from carriers, the route Hatvan – Kelebia was designed and subsequently incorporated within the Amber RFC as the principal line in routing Hatvan – Szolnok – Cegléd – Kinskunfélegyháza – Kiskunhalas – Kelebia The direction of the principal line from the border crossing Čaňa (SK) – Hidasnémeti (HU) is through the transport node Miskolc leading to Budapest through the railway station Füzesabony. Miskolc is also connected with the Slovak Republic by a diversionary line from direction of Slovenské Nové Mesto (SK) – Sátoraljaújhely (HU) – Mezőzombor – Miskolc. The further connection of Budapest with the Republic of Slovakia is through the border crossings Štúrovo (SK) – Szob (HU), Komárno (SK) – Komárom (HU) and Rusovce (SK) – Rajka (HU) which are located on the principal line. These border crossings continue in the direction Csorna – Szombathely – Zalaszentiván – Zalalövő and then continue to the Republic of Slovenia through the border crossing station Hodoš on the Slovenian side. From both Csorna and Szombathely branches of the principal line continues to Sopron. The graphical representation of the Amber RFC routing on the territory of Hungary is shown in Fig. 36. GYSEV lines are indicated in yellow.

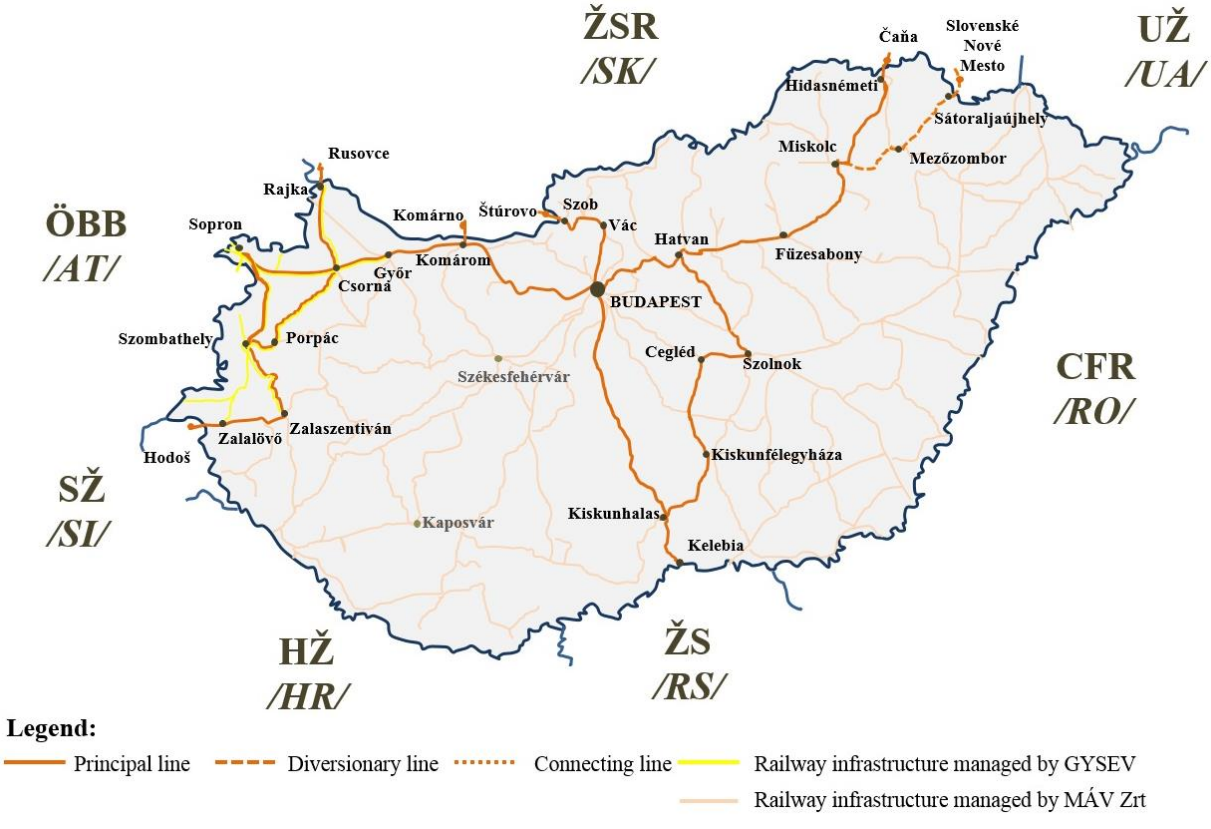


Figure 36: *Graphical representation of Amber RFC routes on MÁV and GYSEV network (Source: ŽSR, VVÚŽ)*

All track sections on the route Hidasnémeti s. b. – Budapest are to be classified as the principal lines of the Amber RFC. Justification: the route is a direct continuation of the principal lines from the Republic of Poland and the Slovak Republic; individual track sections on the route meet the technical requirements for the principal line (electrification, maximum train length, traffic density of the line); the classification of the lines creates better opportunities for investments in their modernization; potential of higher transport performances due to better corridor services; there are several transport possibilities on the eastern corridor route, e.g. from the Port of Koper, transport of final products from the factory in Haniska near Košice, goods transport from Asia to Hungary, etc.

Republic of Slovenia

The principal line on the territory of the Republic of Slovenia passes in the direction southwest and is directed at Zalalövő (HU) – Hodoš (SI) – Pragersko – Celje – Ljubljana – Divača – Koper. The connecting lines to the principal line are directed at Velenje – Celje and Novo Mesto – Ljubljana. The graphical representation of Amber RFC on the territory of Slovenia is shown in Fig. 37.

Figure 37: *Graphical representation of Amber RFC routes on SŽ-I network (Source: ŽSR, VVÚŽ)*

9.1 Technical parameters of Amber RFC

For a rapid and graphic-visual representation of the technical parameters of the lines included in RFC Amber, the particular railway lines and terminals in the given countries are shown using the following signs:

Description of stations:

Border station of neighbouring country on the principal line

Border station of neighbouring country on the diversionary line

Station lying on a principal line (selected station)

Station lying on a diversionary line (selected station)

Station lying on a connecting line (selected station)

Type of line:

Corridor double-track line

Corridor single-track line

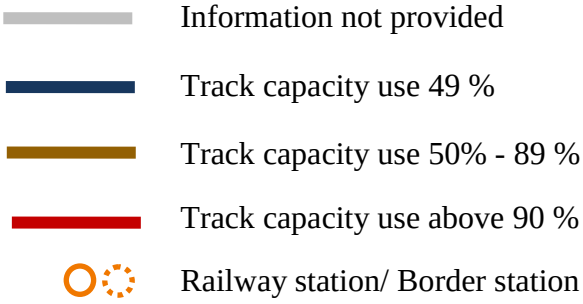
3 KV DC

15 KV AC (16 2/3 Hz)

25 KV AC (50 Hz)

Non-electrified

Description of capacity utilization schemes:



Information not provided

Track capacity use 49 %

Track capacity use 50% - 89 %

Track capacity use above 90 %

Railway station/ Border station

Intermodal freight mode:

9, G2, G

Intermodal freight code (P/C)

1	P/C 50/370
2	P/C 70/390
3	P/C 70/400
4	P/C 80/400
5	P/C 80/401
6	P/C 82/412
7	P/C 90/410
8	P/C 99/429
9	P/C C21/C340

9, G2, G

Interoperational gauge

G1	Interoperational gauge G1
G2	Interoperational gauge G2
0B	PpB/0-SM
1B	PpB/1-SM
1C	PpC/1-SM
2C	PpC/2-SM

9, G2, G

ERTMS equipment

G	GSM-R
E	ETCS
Z	Zugfunk

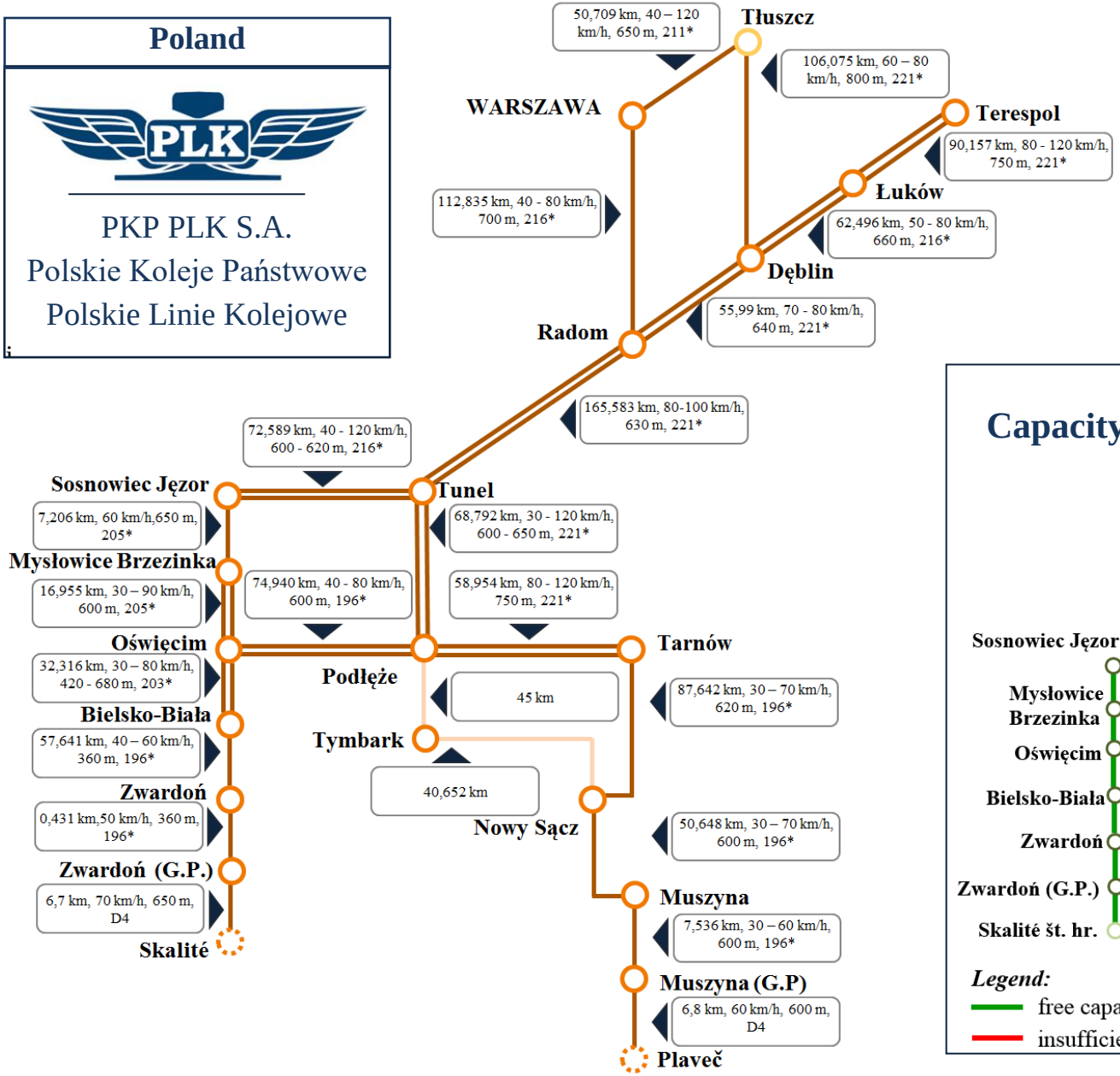
Description of technical parameters of line:

10 km, 120 km/h, 700 m, D4 Distance**,** maximum speed, maximum length of train, axle load

Technical data of the lines are listed in Appendix A

Poland

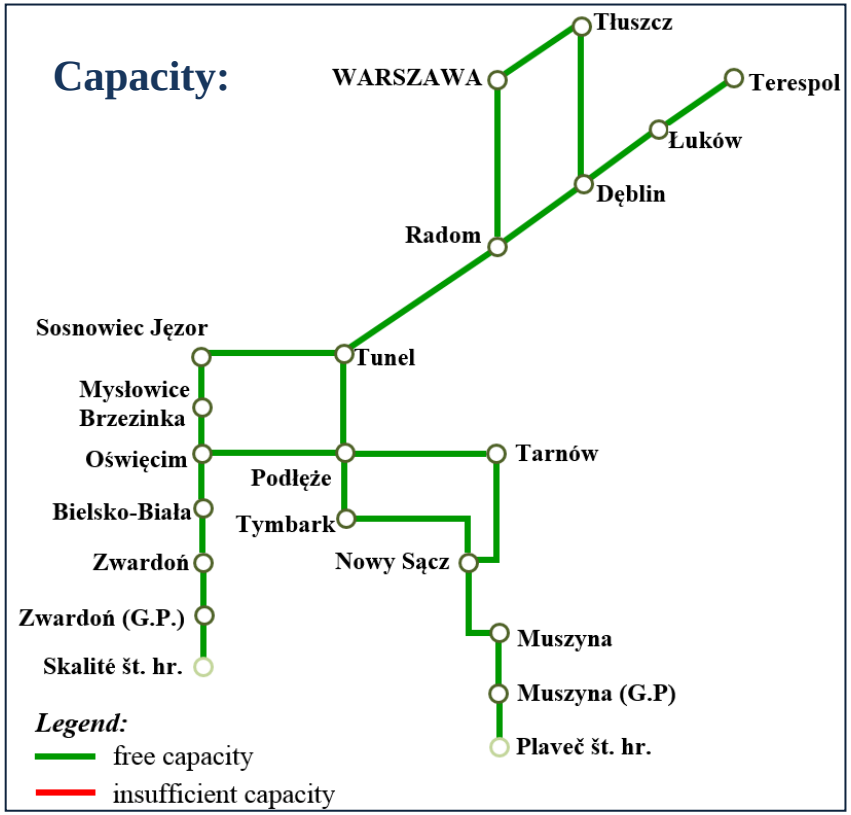
PKP PLK S.A.
Polskie Koleje Państwowe
Polskie Linie Kolejowe



Note:

Expected line: Nowy Sącz - Tymbark - Podłęże

* Line category regarding axle load source: member of Amber RFC from Poland

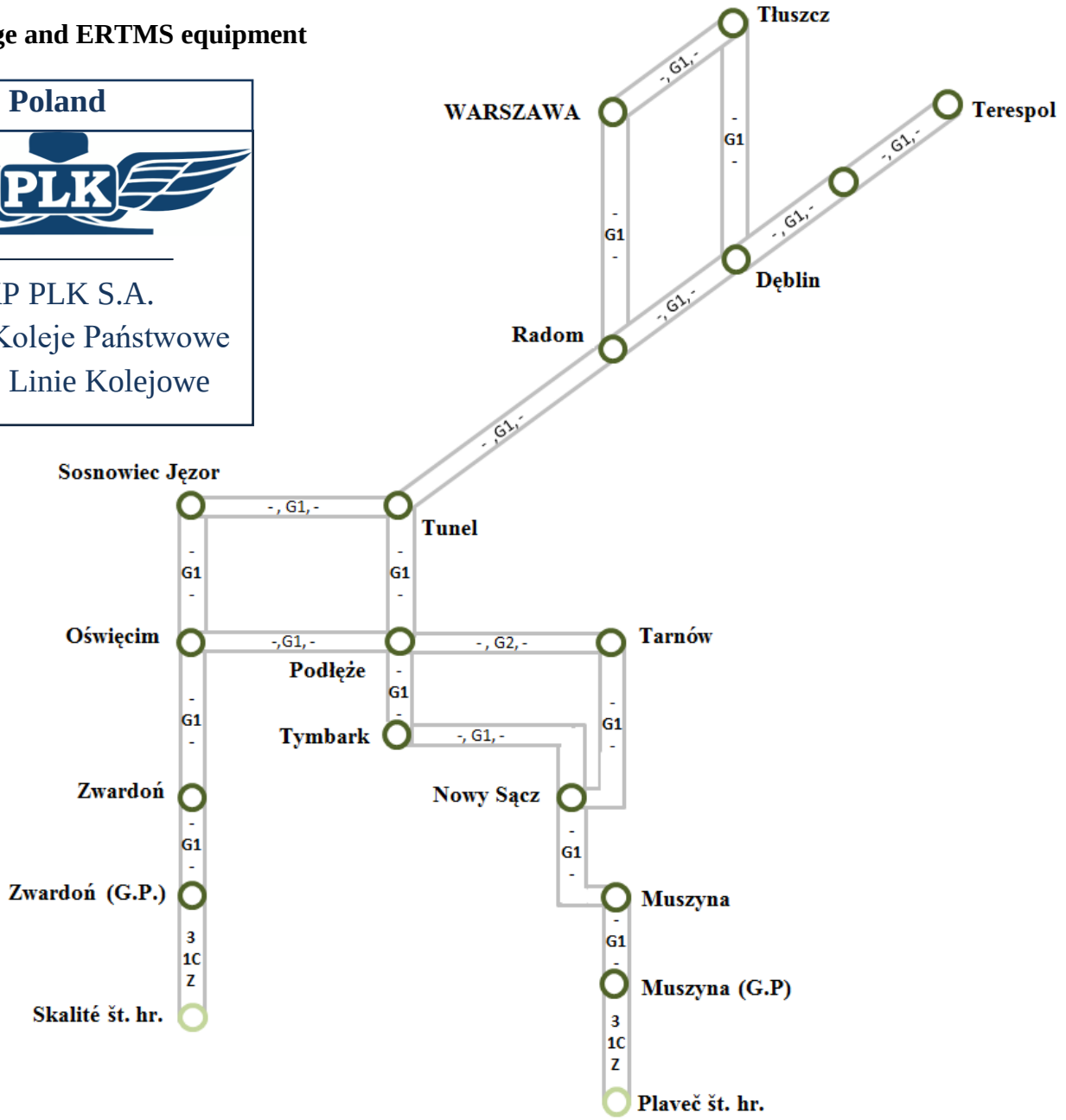


Loading gauge and ERTMS equipment

Poland

PKP PLK S.A.
Polskie Koleje Państwowe
Polskie Linie Kolejowe

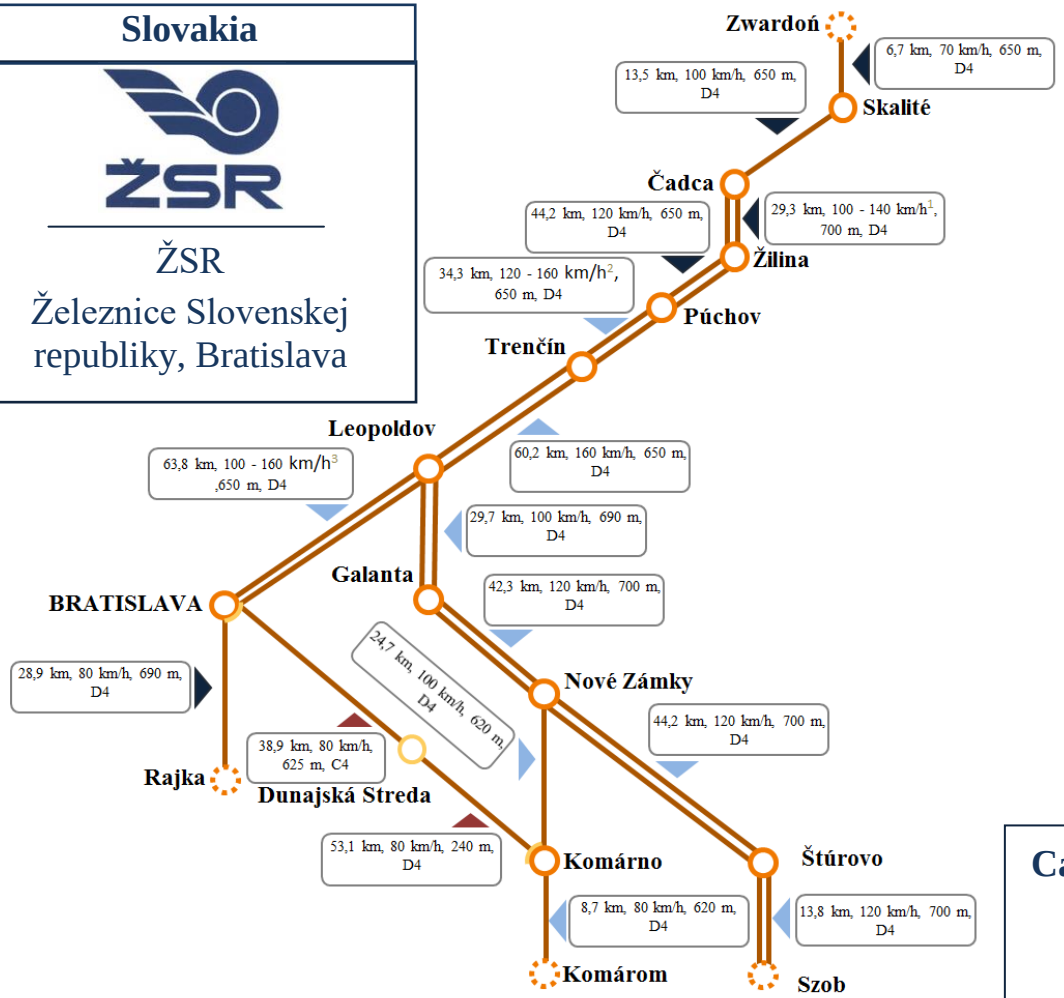
;

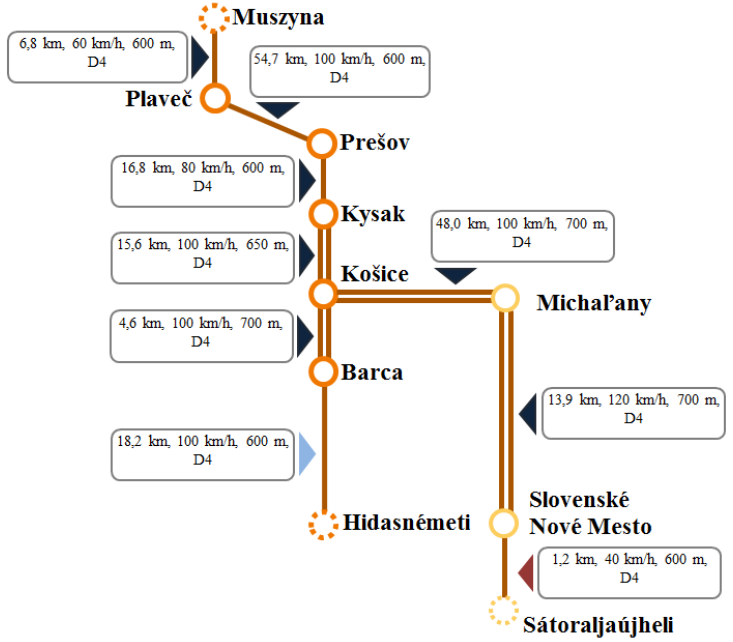


Slovakia

ŽSR

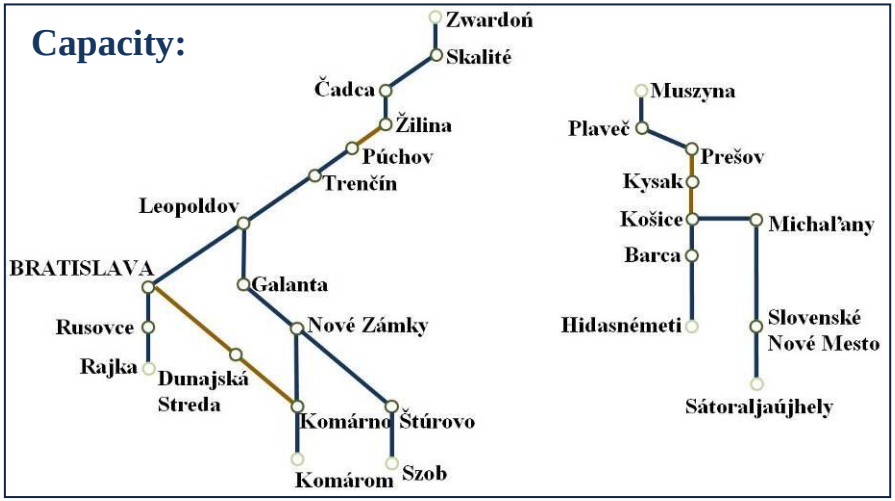
Železnice Slovenskej republiky, Bratislava





Note:
Different maximum speed (km/h) in the section:
[1]Žilina – Krásno nad Kysucou: 19,3 km, 140 km/h
Krásno nad Kysucou – Čadca: 10 km, 100 km/h
[2]Púchov – Trenčianska Teplá: 26,8 km, 160 km/h
Trenčianska Teplá – Trenčín: 7,5 km, 120 km/h
[3]Bratislava hl. St. – Bratislava Rača: 7,4 km, 100 km/h

Capacity:



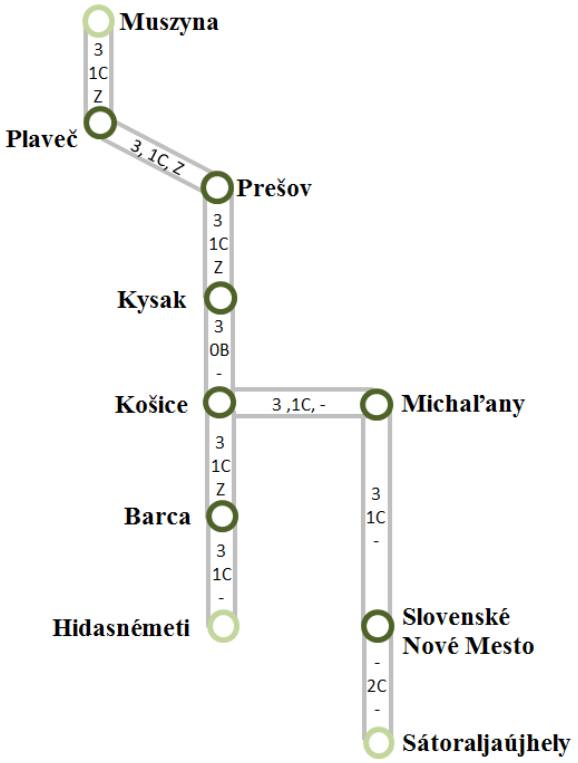
Loading gauge and ERTMS equipment

Slovakia

ŽSR

Železnice Slovenskej republiky, Bratislava

:

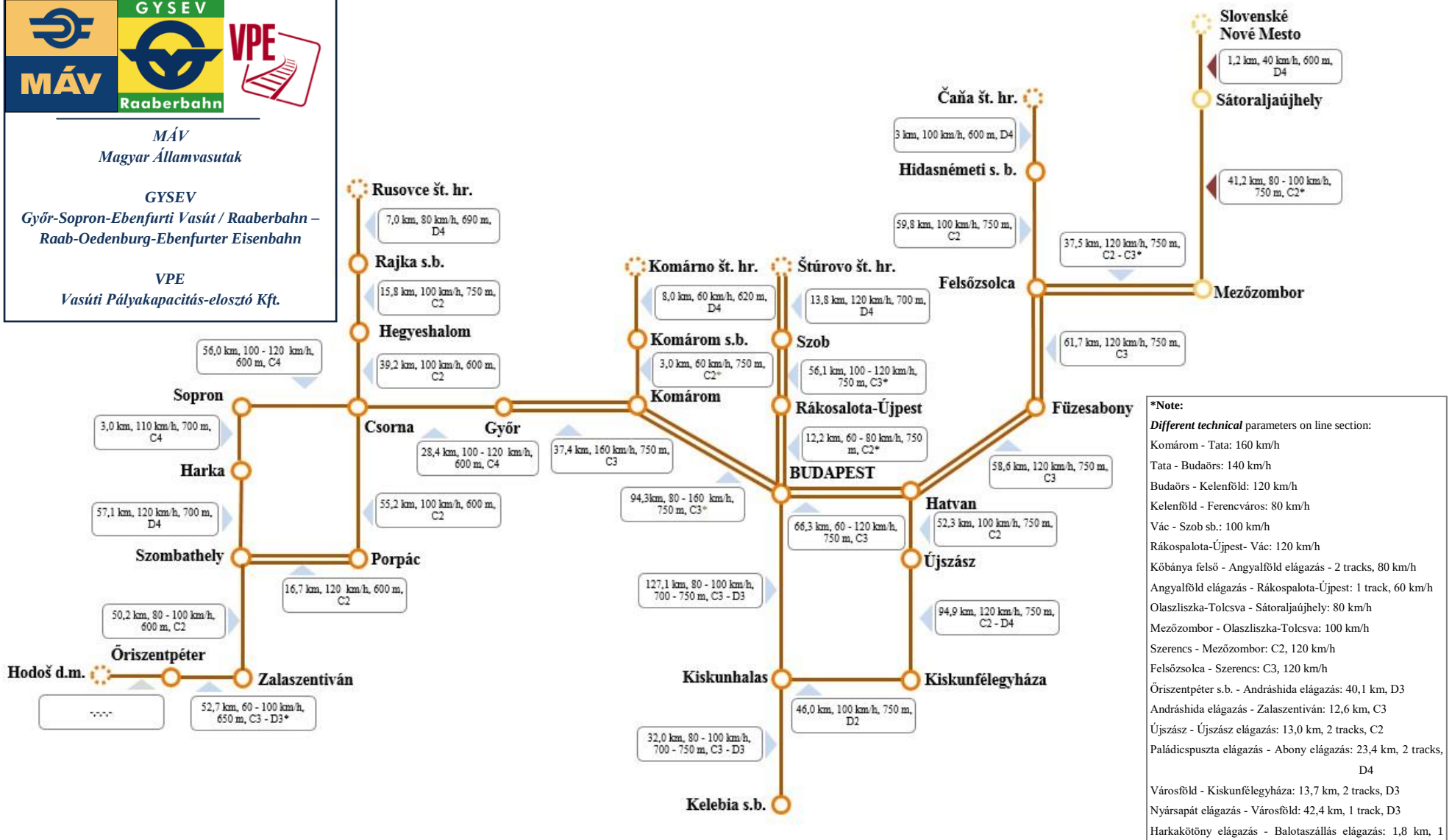


Hungary

MÁV
Magyar Államvasutak

GYSEV
Győr-Sopron-Ebenfurti Vasút / Raaberbahn – Raab-Oedenburg-Ebenfurter Eisenbahn

VPE
Vasúti Pályakapacitás-elosztó Kft.



***Note:**

Different technical parameters on line section:

Komárom - Tata: 160 km/h

Tata - Budaörs: 140 km/h

Budaörs - Kelenföld: 120 km/h

Kelenföld - Ferencváros: 80 km/h

Vác - Szob sb.: 100 km/h

Rákospalota-Újpest- Vác: 120 km/h

Kőbánya felső - Angyalföld elágazás - 2 tracks, 80 km/h

Angyalföld elágazás - Rákospalota-Újpest: 1 track, 60 km/h

Olaszliszka-Tolcsva - Sátoraljaújhely: 80 km/h

Mezőzombor - Olaszliszka-Tolcsva: 100 km/h

Szerencs - Mezőzombor: C2, 120 km/h

Felsőzsolca - Szerencs: C3, 120 km/h

Őriszentpéter s.b. - Andráshida elágazás: 40,1 km, D3

Andráshida elágazás - Zalaszentiván: 12,6 km, C3

Újszász - Újszász elágazás: 13,0 km, 2 tracks, C2

Paládicspuszta elágazás - Abony elágazás: 23,4 km, 2 tracks, D4

Városföld - Kiskunfélegyháza: 13,7 km, 2 tracks, D3

Nyársapát elágazás - Városföld: 42,4 km, 1 track, D3

Harkakötöny elágazás - Balotaszállás elágazás: 1,8 km, 1 track, C2, 700 m., 40 km/h

Loading gauge and ERTMS equipment

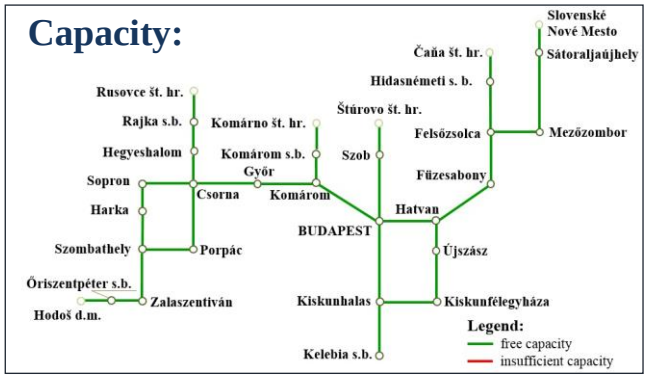
Hungary

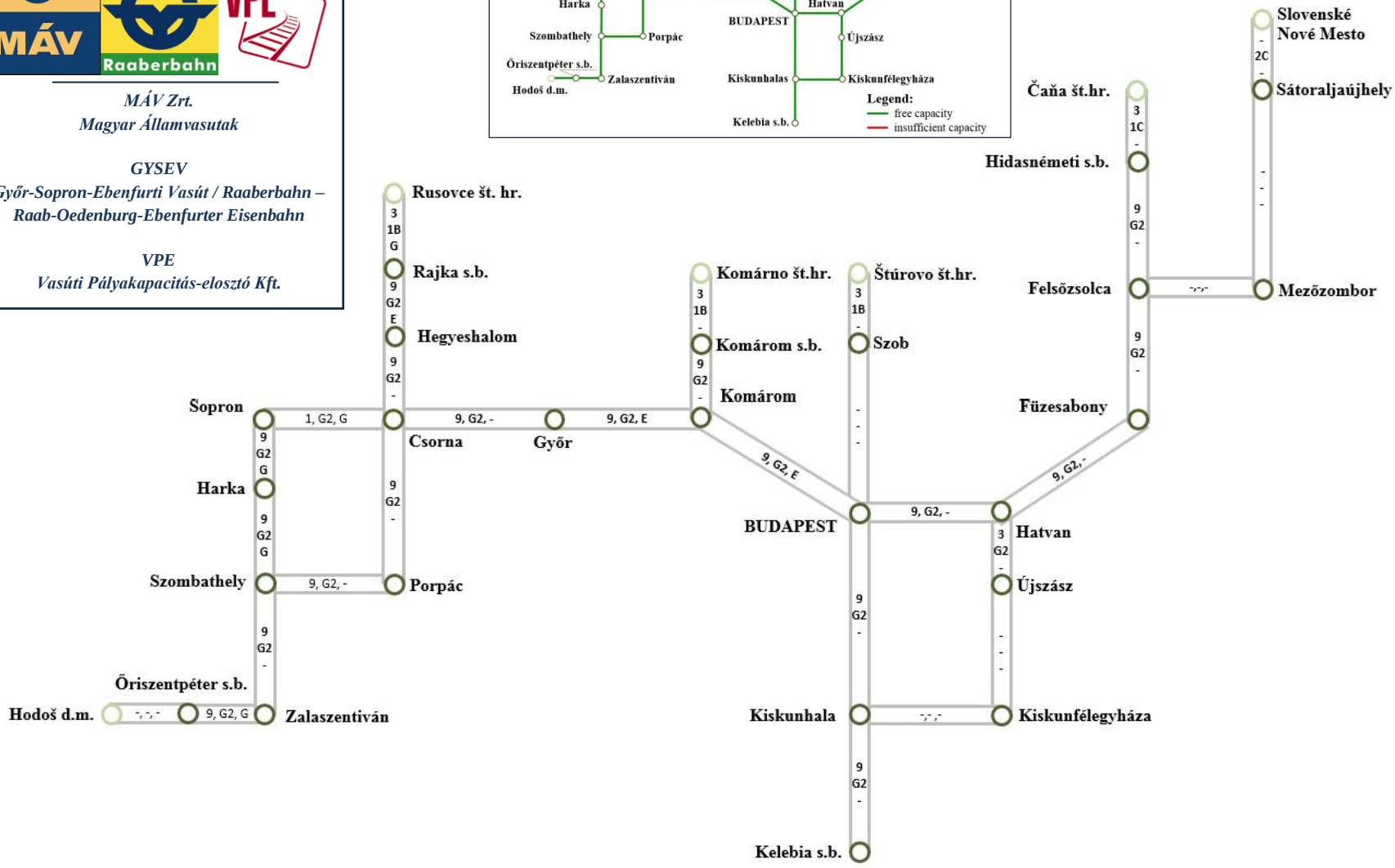
MÁV Zrt.
Magyar Államvasutak

GYSEV
Győr-Sopron-Ebenfurti Vasút / Raaberbahn – Raab-Oedenburg-Ebenfurter Eisenbahn

VPE
Vasúti Pályakapacitás-elosztó Kft.

Capacity:

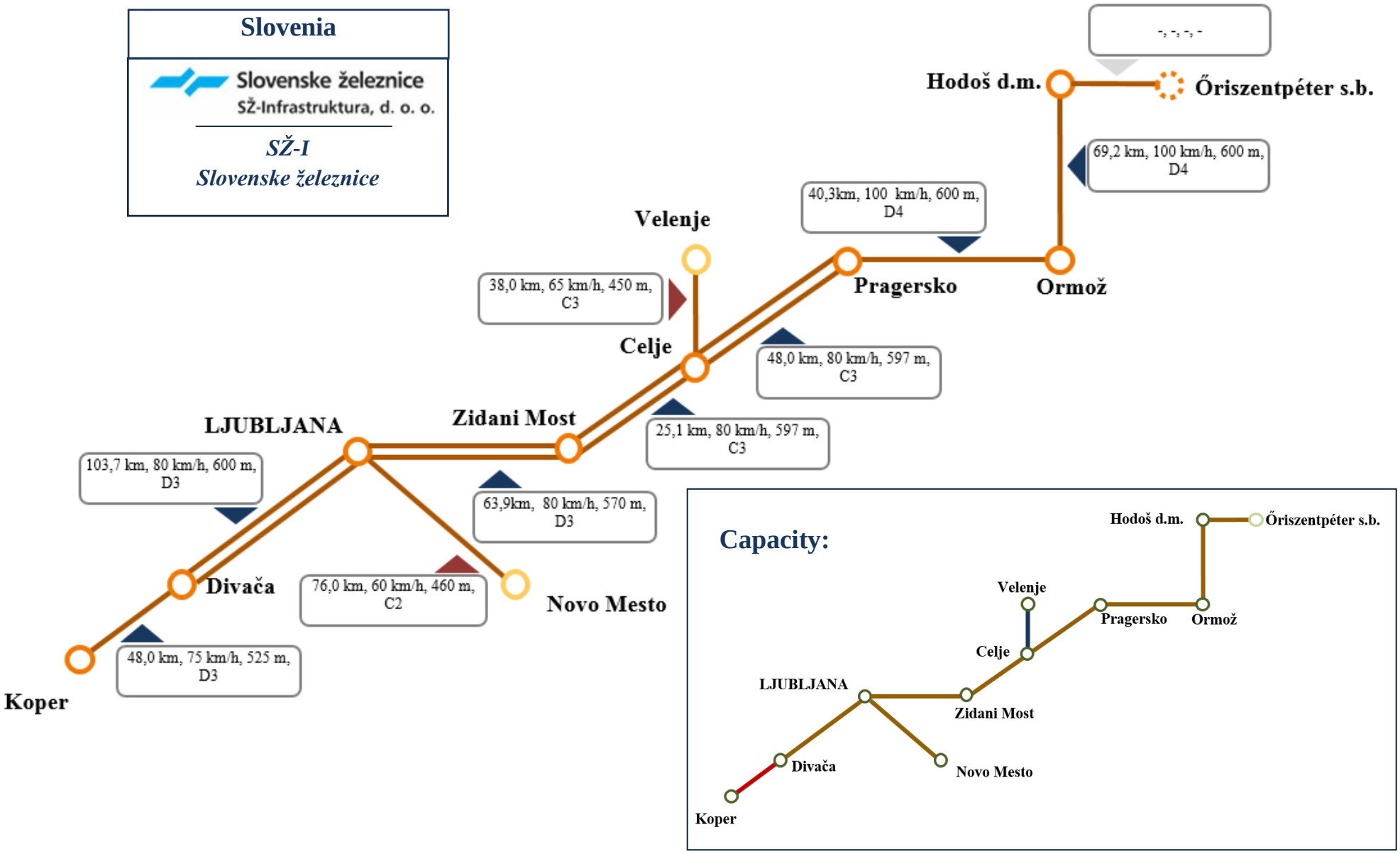




Slovenia

Slovenske železnice
SŽ-Infrastruktura, d. o. o.

SŽ-I
Slovenske železnice

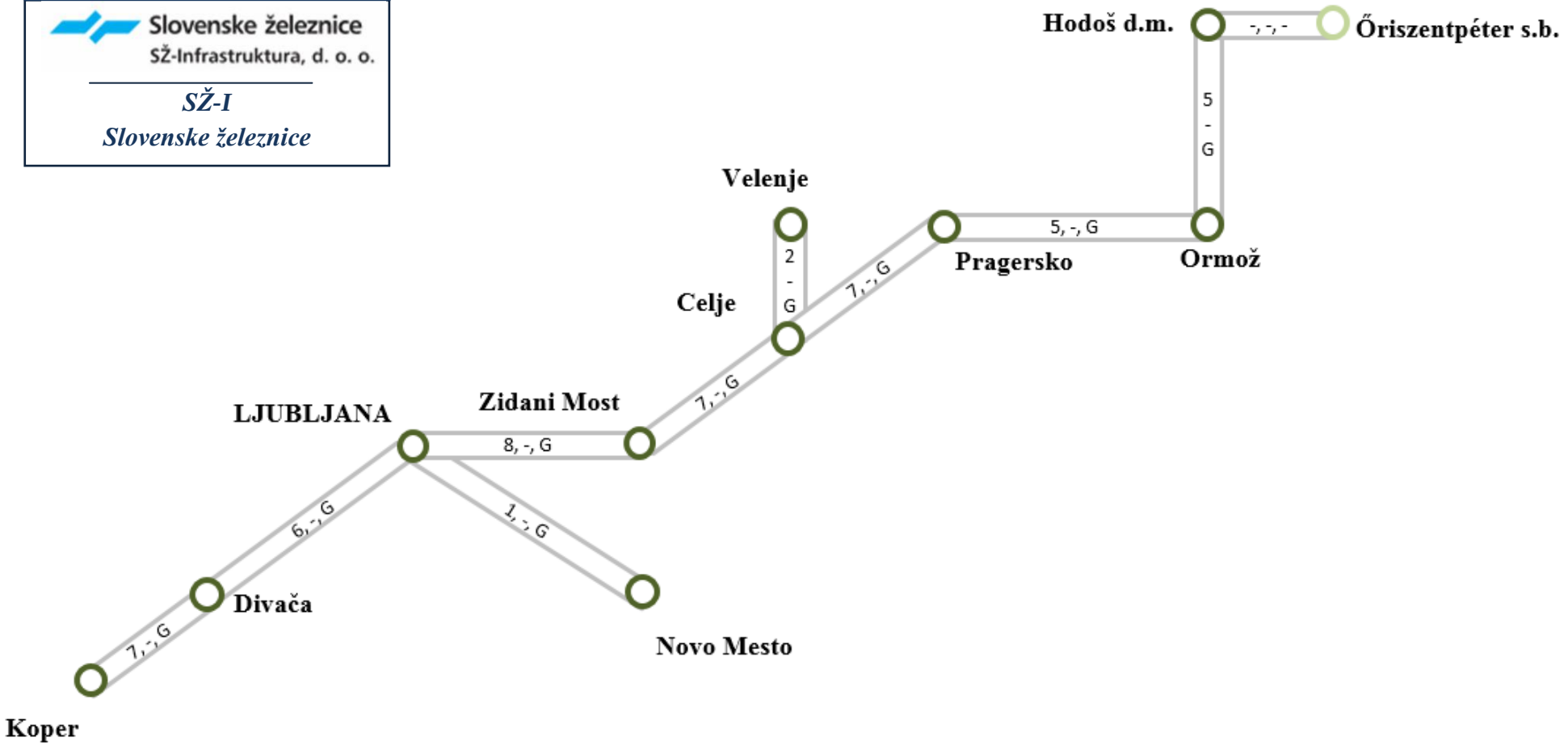


Loading gauge and ERTMS equipment

Slovenia

Slovenske železnice
SŽ-Infrastruktura, d. o. o.

SŽ-I
Slovenske železnice



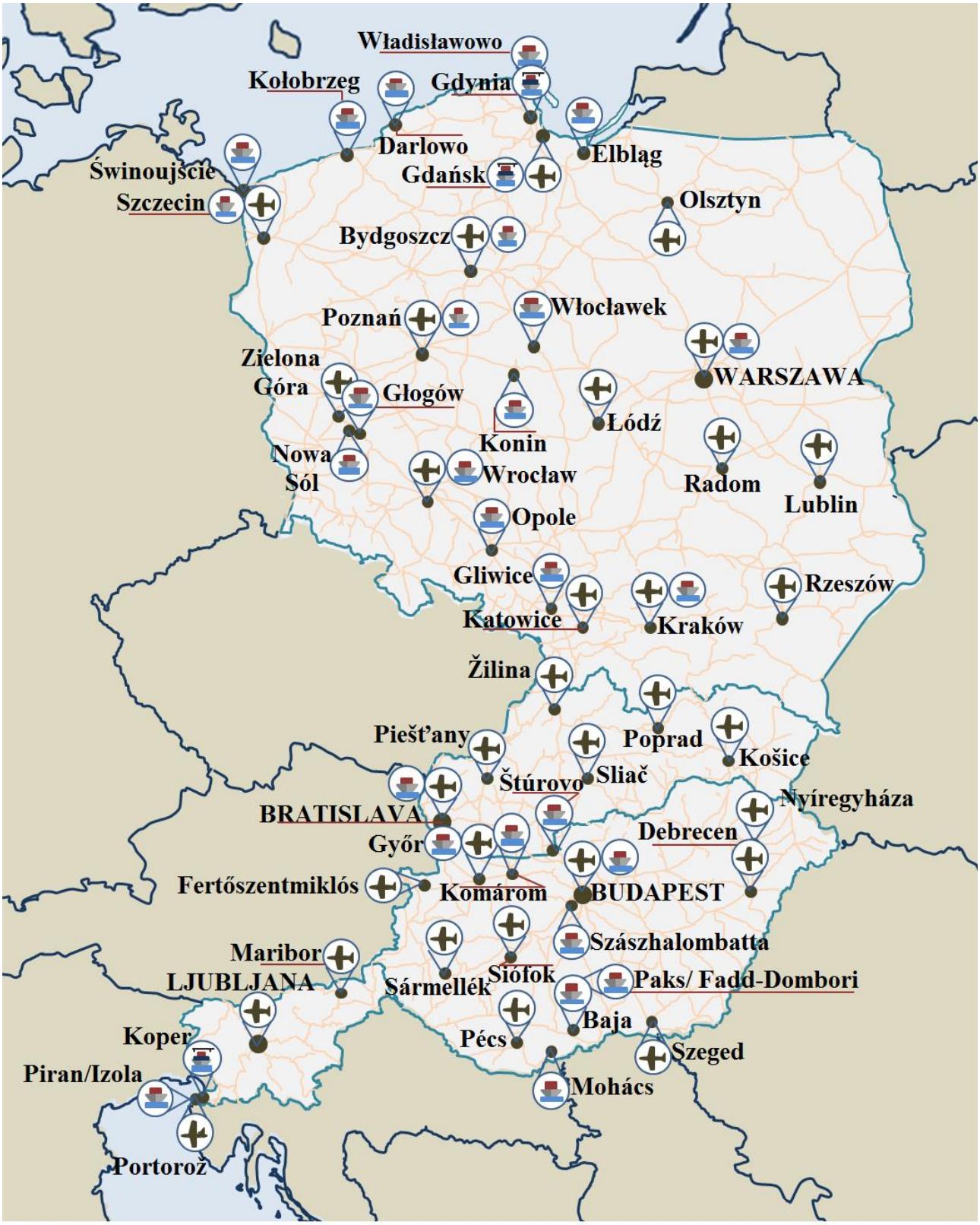
The rail freight services are directly linked to the marshalling yard services (in particular wagon loads) and intermodal terminal services (in particular loading, unloading, transhipment and administration as regards the transport units of intermodal transport). The graphical representation of the location of marshalling yards and intermodal terminals on the lines included in the Amber RFC is shown in Fig. 38.

Figure 38: *Graphical representation of Marshalling yards and Intermodal terminals on Amber RFC (Source: ŽSR, VVÚŽ)*

Figure 39 shows the position of rail border crossings with countries outside the EU. Subsequently, Figure 40 shows the position of major ports and airports located in the territory of the Amber RFC countries.

Figure 39: *Rail border crossings – with countries outside the EU*

(Source: ŽSR, VVÚŽ)



Legend:

Airport

Sea port/ Inland waterways port

Sea port with container terminal

Figure 40: *Position of ports and airports*
(Source: ŽSR, VVÚŽ)

Table 43 contains a list of significant transport points located in the territory of the Amber RFC countries and lines.

Table 43: Traffic points of Amber RFC

Node name	*ITT	Marshalling yard	Other services
Poland	Terminal kontenerowy Warszawa Główna Towarowa Loconi Intermodal Terminal Kontenerowy Warszawa	Warszawa Główna Towarowa Warszawa Praga	
	EUROTERMINAL Sławków	Jaworzno Szczakowa	
	Brzeski Terminal Kontenerowy/ KARPIEL Brzesko		
		Tarnów Filia	
		Kraków Nowa Huta	
	PKP Cargo Centrum Logistyczne Małaszewicze EUROPORT Małaszewicze Terminal przeładunkowy Wólka/Tradetrans Tranzgaz	Małaszewicze/Cargotor	
		Oświęcim	
	Terminal Sosnowiec Południowy		
		Czechowice Dziedzice	
		Dęblin	
Slovak Republic	Bratislava SPaP, ÚNS	Bratislava východ	
	Žilina	Žilina-Teplička	
Hungary			Őriszentpéter/loading place
			Andráshida/loading place Zalalövő/loading place
			Zalaegerszeg/scale & refuelling & loading place
			Zalaszentiván/loading place
	Sopron Intermodal Terminal	Sopron marshalling yard	
	Győr ÁTI Depo	Győr-Rendező	Győr-Rendező/scale & loading place Győrszentiván/loading place Nagyszentjános/loading place Ács/loading place
	Komárom-Rendező		Komárom/refuelling & loading place Komárom-Rendező/scale & loading place Almásfüzitő/loading place Tata/loading place
			Tatabánya/loading place Bicske/loading place Herceghalom/loading place Biatorbágy/loading place Budaörs/loading place
	Budapest Szabadkikötő Logisztikai Zrt.	Ferencváros	Ferencváros/scale & refuelling & loading place Soroksári út rendező/scale & loading place
	BILK	Soroksári út rendező	Soroksár/loading place

Hungary			Dunaharaszti /loading place Taksony/loading place Délegyháza/loading place Kiskunlacháza/loading place Dömsöd/loading place Kunszentmiklós-Tass/loading place
			Bösztör/loading place Szabadszállás/loading place Fülöpszállás/loading place Csengőd/loading place Kiskőrös/scale & loading place Soltvadkert/loading place Kiskunhalas/scale & refuelling;
			Balotaszállás/loading place Kisszállás/loading place Kelebia/scale & loading place
			Rákos/scale & loading place
		Hatvan-Rendező	Isaszeg/loading place Gödöllő/loading place Aszód/loading place Hatvan/refuelling & loading place Hatvan-Rendező/scale
			Hort-Csány/loading place Vámosgyörk/loading place
			Kál-Kápolna/loading place Füzesabony/scale & refuelling & loading place
		Miskolc-Rendező	Mezőkövesd/loading place Mezőkeresztes-Mezőnyárád/loading place Nyékládháza/loading place Miskolc-Tiszai/loading place Miskolc-Rendező/scale & refuelling Miskolc-Gömöri/loading place
			Felsőzsolca/loading place
			Hidasnémeti/loading place
Slovenia	Ljubljana Moste	Ljubljana Zalog	
	Port of Koper Koper	Koper tovorna	
	Celje tovorna	Celje tovorna	
			Gorenje Velenje
			Revoz Novo mesto

Source: Member from countries of Amber RFC

9.2 Basic information on Małaszewicze dry port

The Małaszewicze dry port, located close to Terespol railway station, which is extensively used in international connections running via the nearby PL/BY border crossing of Terespol-Brest, operates on the Core Network Corridor North Sea-Baltic, Rail Freight Corridor North Sea-Baltic and Amber Rail Freight Corridor. It is a special place because of the EU border and customs border. Here lies the junction point between CIM and SMGS communication systems and 1435 mm and 1520 mm railway gauges. The difference of the gauges determines the transshipment of goods at the terminals in the area of the dry port. Małaszewicze is the biggest dry port at the eastern border of EU, it is a railway gate leading to European markets. Crucial transshipment terminals located in Małaszewicze, including a container terminal, are managed by PKP CARGO Group

Key technical specifications of the terminals of PKP CARGO Group

Total area:	1 237 000 m2
Outdoor storage area – the yard:	134 694 m2
Closed storage area:	5 300 m2
Roofed area:	3 000 m2
Storage capacity:	2 000 TEU
Transshipment capacity:	10 057 500 tonnnes per year
Container terminal:	120 000 TEU per year
Railway tracks (usable):	14 112 m (1520 mm)
	18 952 m (1435 mm)
Dual gauge railway tracks:	670 m (1435 + 1520 mm)

Equipment

Gantry cranes:	12 units
Rubber tire gantry cranes:	1 unit
Rubber tire digger:	16 units
Rubber tire loader:	5 units
Reach stackers:	3 units
Bucket elevators:	4 units

Plug in points for refrigerated containers

Forklifts with loading capacity of 1,6 to 4,5 t

Transshipment terminals

Transshipment activity is run on specialized terminals prepared technically and organizationally for transshipping and storing defined types of cargo. PKP CARGO Groups has at its disposal 7 transshipment terminals:

Table 44: Transshipment terminals of PKP CARGO Group in Małaszewicze

Transshipment point	Cargo type
Container Terminal[1]	20”, 30”, 40”, 45” containers, HC, semitrailers
Terminal in Kowalewo[1]	cargo on pallets, big bag cargo, bundles, bags, bulk cargo (grain, pellet)
Terminal in Podsędków[1]	coal, wood, woodchips
Terminal in Raniewo[1]	coal, wood, woodchips
Universal Terminal[1]	coal, wood, woodchips, ore, metals, unit goods (machines, vehicles etc.)
Terminal in Wólka[2]	coal, wood, woodchips, fertilizers, chemicals, steel products
Terminal in Zaborze[2]	coal, wood, woodchips, fertilizers, chemicals, steel products

Source: PKP Cargo Group

[1] *run by PKP CARGO Centrum Logystyczne Malaszewicze*
[2] *run by PKP Cargo CONNECT*

The scheme below presents the layout of PKP CARGO Group transshipment terminals in the area of the Małaszewicze dry port.

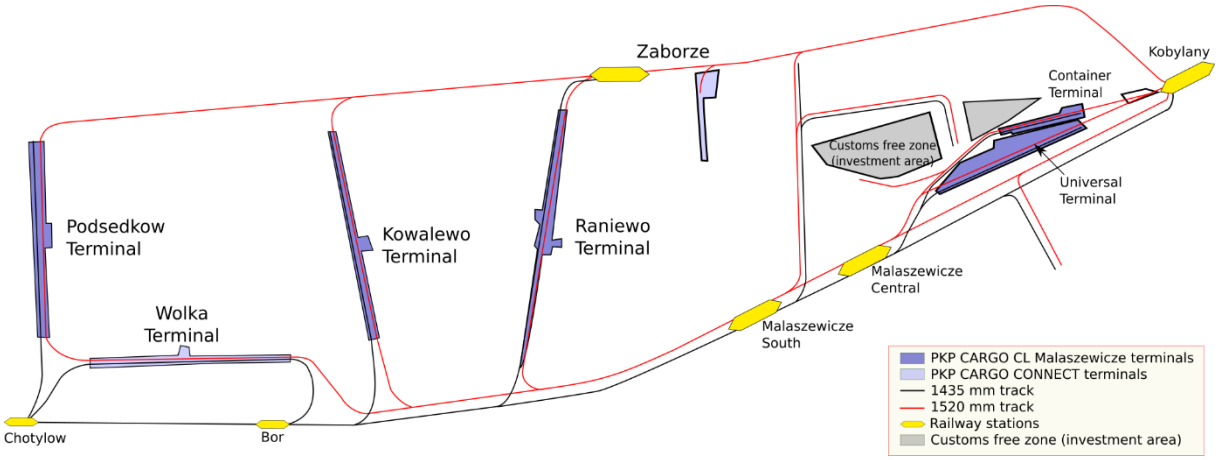


Figure 41: *Layout of PKP CARGO Group transshipment terminals and railway stations in Małaszewicze*
(Source: PKP Cargo)

It should be also mentioned that apart from the above mentioned key terminals there are also other transshipment points and terminals in the area of the dry port.

Małaszewicze dry port – a bridge connecting China and Europe

Over a few recent years there has been noticed a substantial change in the cargo turnover in Małaszewicze which is due to launching freight transport from China and making railway transport a part of the vast concept of the New Silk Road (One Belt One Road). The increasing importance of the railway transport is a result of an advantageous relation of price to time of transport and punctuality.

The vital factor having a direct influence on the cargo turnover operations between China and Europe transported by rail is the transport time. A freight train form China arrives to Europe in 11-14 days, while e.g. sea transport takes 40-50 days. These times respectively affects the possibility of a quick cargo delivery to the customers, including flexible shaping of „door-to-door" deliveries.

The fact, that the trains heading for Europe are crossing only two customs borders, i.e. the one between China and the area of Eurasian union and the next one between Eurasian union and EU customs area is an additional advantage for using the services of Małaszewicze container terminal by entrepreneurs, which also relatively decreases the amount of customs formalities related to the transport. Moreover, there is a customs-free zone functioning in the area of the Małaszewicze dry port, where cargo can be stored without the obligation to pay tax and customs charges. There is no storage time limit.

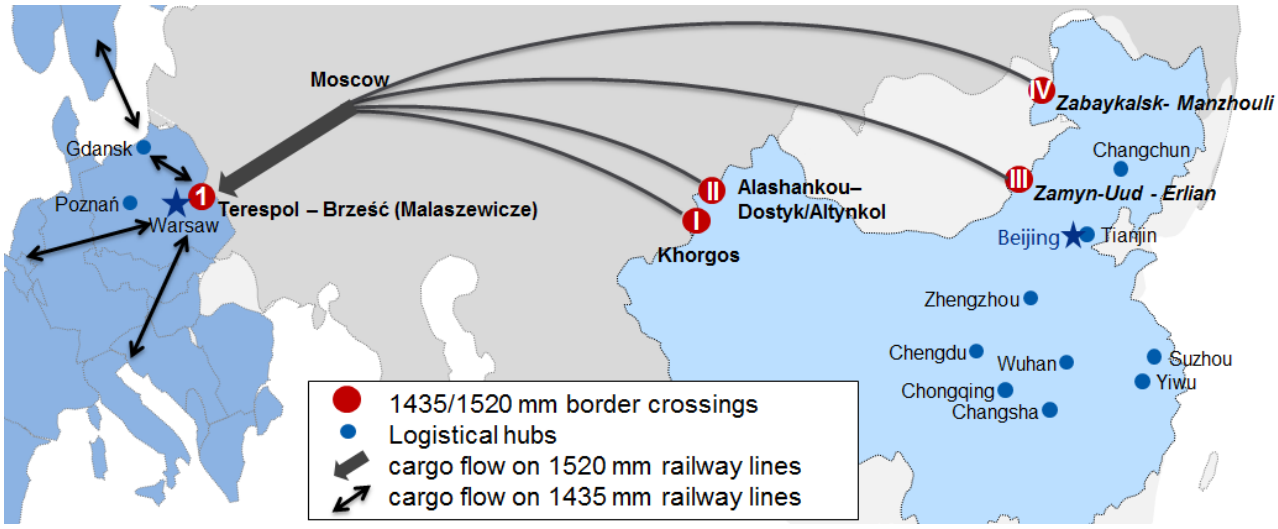


Figure 42: *Key China-Europe rail freight transport directions and border crossings (Source: PKP Cargo)*

The dry port in Małaszewicze is a land bridge connecting Europe with China. Its special location creates possibilities of bringing together the concepts of Amber Corridor and the New Silk Road. This way the goal of transport mode diversification between China and Europe would be reached. The application of land transport, mainly rail or combined sea-land transport, for the cargo transported from Asia fits the EU transport policy concept of developing sustainable transport systems.

9.3 Summary basic comparison of RFC infrastructure

The European RFC corridors have been designed primarily on the basis of direction of the main transport flows of goods within the EU and the whole Europe in order to increase the attractiveness, reliability and efficiency of the rail system, taking utmost account of the customer

requirements. Each corridor has its specific role and strategic routing adapted to the transport requirements of the customers. In Table 45, a basic comparison of the infrastructure of the European RFC corridors is made for clarity and Figure 43 shows map of European RFC by Rail Net Europe.

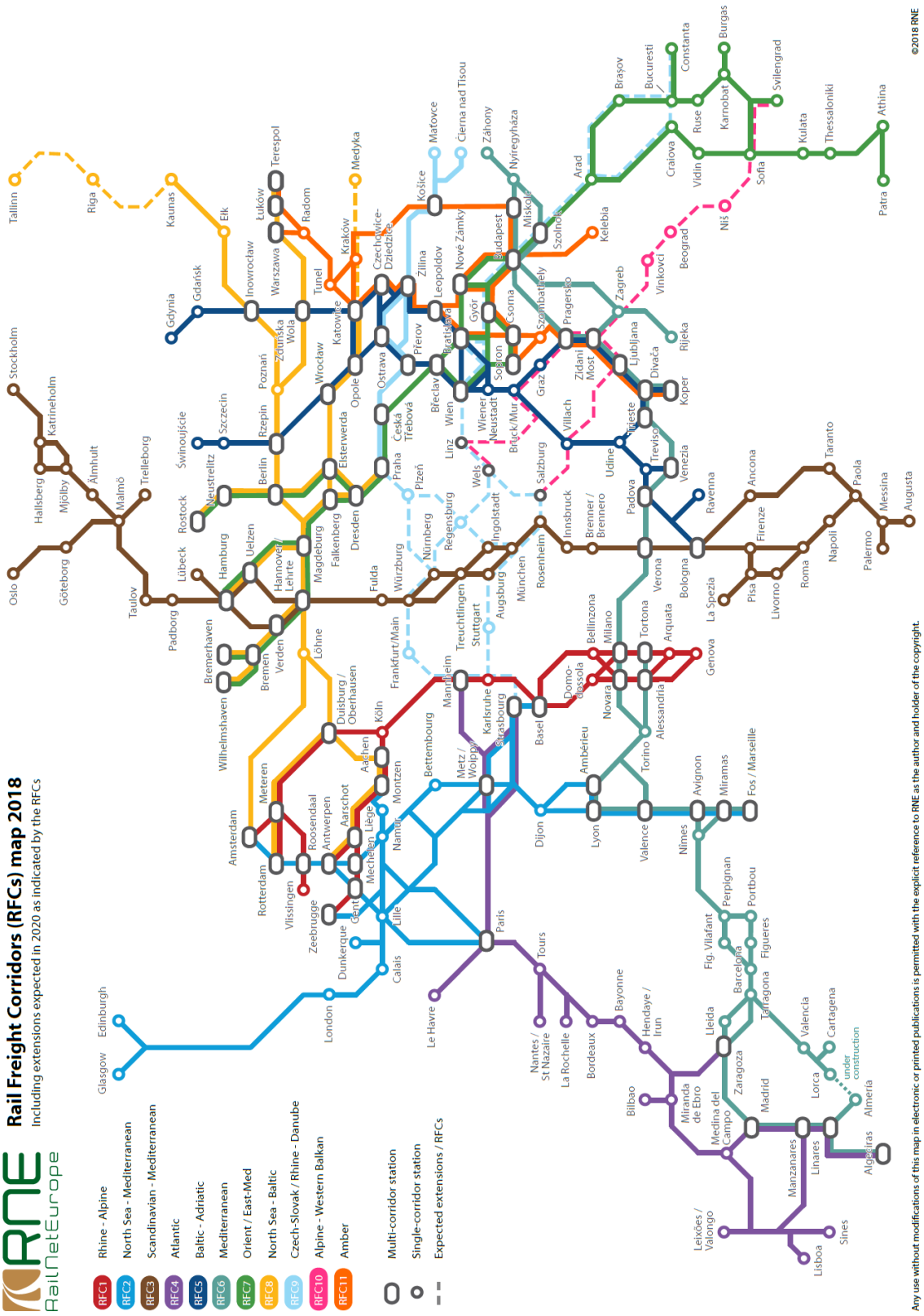


Figure 43: *Graphical representation of corridors Rail Net Europe (Source: Rail Net Europe)*

Table 45: Basic parameters of RFC corridors

Corridor name	Number of countries	Length of lines in km	Seaport	Inland port	*ITT
RFC 1 (Rhine - Alpine)	5	3 900	6	6	100
RFC 2 (North Sea - Mediterranean)	6	5 300	19	12	98
RFC 3 (ScanMed)	5	7 527	13	2	66
RFC 4 (Atlantic)	3	6 200	15	4	52
RFC 5 (Baltic - Adriatic)	6	4 825	8	3	84
RFC 6 (Mediterranean)	6	7 000	9	4	90
RFC 7 (Orient/East - Med)	8	7 700	8	16	30
RFC 8 (North Sea - Baltic)	5	6 045	6	13	171
RFC 9 (Czech - Slovak)	2	970	0	2	12
RFC 10 (Alpine -Western Balkans)	5	N/A	N/A	N/A	N/A
RFC 11 (Amber)	4	aprox. 3 400	1	2	25

Source: Annual reports of RFC corridors

**ITT- Intermodal transport terminal*

The European Amber RFC will have the second smallest length of railway lines compared to the other European RFC corridors. This fact, however, does not change the strategic importance of its routing. The Amber RFC routing will contribute especially to support of transport from/to Port of Koper and transport from/to Belarus and the Republic of Serbia. At the same time, the routing allows an effective connection with the lines of international importance in individual member states. The small length of the lines included in the Amber RFC creates the most suitable conditions for coordination of possessions, ordering of transport routes and direction of investment activities leading to the provision of high quality and available services of the railway system.

9.4 Result and summary of the findings of Chapter 9

Based on the presented data in the particular subchapters of the eighth part of the TMS we can conclude the following facts:

- all principal lines are electrified – environmental benefit, lower costs of carriers,
- most of the other lines (alternative and diversionary line) are electrified – environmental benefit, lower costs of carriers,
- different electric power supply systems – need for harmonization = subsequently, reduction of requirements for transport companies and negative effects of DC traction system,
- all lines have 1 435 mm gauge – it is not necessary to change gauge during transport,
- infrastructure included in the corridor has sufficient free capacity for increase in rail freight transport performances affected by the Amber RFC services except the line Divača and Koper. The utilization of this line is 98% because there are 82 trains/day on this single-track line,

- most included railway lines do not reach the required demands for running long trains (750 m),
- some principal railway lines included do not reach the highest level of axle load – need for reconstruction/modernization,
- the Slovak Republic has all principal lines at the highest level of axle load,
- need for complete the ERTMS (European Rail Traffic Management System) on the principal corridor lines – complying with the interoperability requirements,
- routing creates the transport potential for international rail freight transport in the south – north/east direction,
- routing creates the transport potential for international rail freight transport in the direction of countries outside the EU – EU/the Amber RFC countries,
- possible connection of broad-gauge line in the Republic of Poland with the main corridor route in the Republic of Poland,
- routing improves connection of intermodal transport terminals in the member states concerned and provides direct routing for intermodal consignments from the Port of Koper,
- facilitates transport connection between the Adriatic sea port in the Republic of Slovenia and inland waterway ports on the Danube in Hungary and the Slovak Republic,
- supports the development of rail transport with the Republic of Serbia,
- potentially improves rail transport across the EU eastern border and on the land bridge between Europe and Asia.

From the overall point of view, the proposed routing, division of particular lines, including the technical parameters of the lines are satisfying and fulfilling the conditions for providing the high-quality rail freight services. Routing creates the suitable conditions for modal split change in favour of rail freight transport in the individual countries of the Amber RFC. The establishment of the Amber RFC, based on the submitted proposal, will contribute to the EU strategic objectives in the field of effective modal split and to reduction of negative external transport costs.

10 LAST MILE

The rail freight transport is the most advantageous in the process of transport of bulk substrates from the economic and time point of view. Also, the lowest amount of negative external costs of transport is produced in this transport. Most often it is the transport of bulk substrates, gases, liquids, chemicals, cars, coiled sheet, etc. Rail freight transport has also had a significant position in the process of transport of single consignments. Endogenous and exogenous impacts have led to a long-term decrease in rail system performances in the process of transport of single consignments. A graduating international trade, showed in the previous parts of TMS between the Amber RFC countries, the EU countries and countries outside the EU, brings many opportunities for transportations having the character of single consignments. At present, there is an upward trend in the individual needs of manufacturing and trading companies demanding specific goods, which has a nature of transport of single consignments. This is due to marketing strategies aimed at individual requirements of customers. It is often the transport of goods by 1 – 8 road trains over 12 tons/day. These transportations are required by, in particular, the small and medium-sized enterprises and commercial companies.

At present and in the future, based on global direction, market liberalization, international trade activities and economic development, we can expect:

- construction of small and medium-sized production sites within the EU countries and Asia,
- construction of new logistic centres, central and distribution warehouses, large business houses,
- increase in demand for transport services for the transport of goods in international transport between production sites and logistics infrastructure,
- increase in demand for quality of transport services, particularly in terms of reliability and safety,
- need for a sufficient technical base necessary for transport of single consignments,
- pressure on reducing the negative external costs generated by increased demands for the transport of goods.

These facts create a sufficient transport potential which can largely take over the railway system. However, the use of existing rail freight transport opportunities requires a sufficient technical base that meets the technical and technological requirements on high quality, reliable, safe, available and flexible transport services. It is also an infrastructure that creates the necessary

direct connection between consignors and railway undertakings. Between this stable and mobile infrastructure, we can include:

- railway sidings,
- side and front loading ramps,
- specially assigned tracks for loading and unloading of goods,
- reinforced handling surfaces (loading, unloading, movement of handling equipment, depot, etc.),
- storage areas and buildings,
- storage sidings serving for the needs of consignor,
- necessary handling equipment,
- smaller local shunting yards, indicated as transfer stations, for train formation in the vicinity of above-mentioned sites, if their primary purpose is to enable the collection and delivery of wagons/trains to such specific sites,
- local rail tracks or connecting lines leading from and to the loading facilities.

The following Figure illustrates the elements of the Last Mile and relevant Last Mile infrastructure used by HaCon.

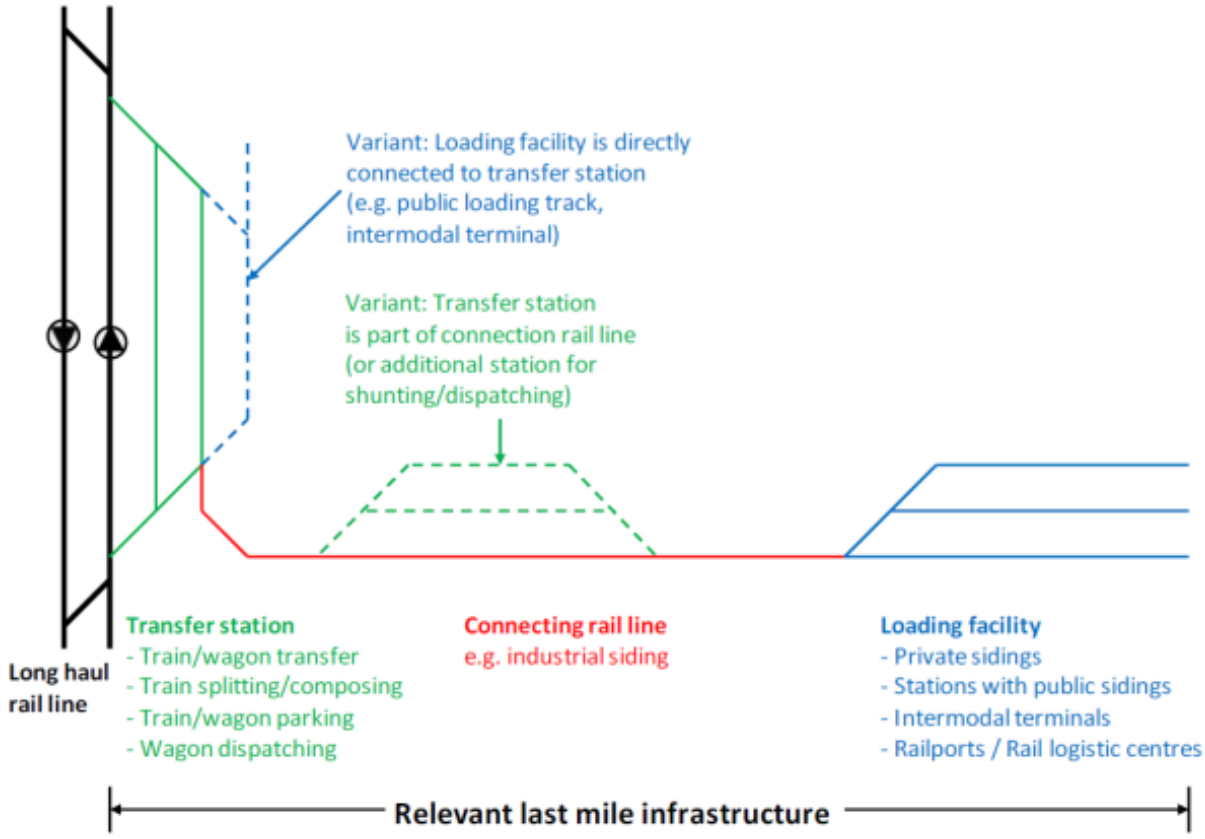


Figure 44: *Components of „last mile infrastructure“*
(Source: HaCon)

Types of last-mile infrastructure:

- Private sidings,
- Stations with public sidings,
- Intermodal terminals,
- Railports.

One main intention to establish railports was to substitute private and public sidings which were no longer served by rail. Thus, they are principally open for everybody and for all types of cargo. They do not only provide pure transhipment but also additional services like storage, consignment or road pre-/end-haulage. An example of typical railport configuration and logistics services used by DB Schenker Rail is shown in Figure 45.

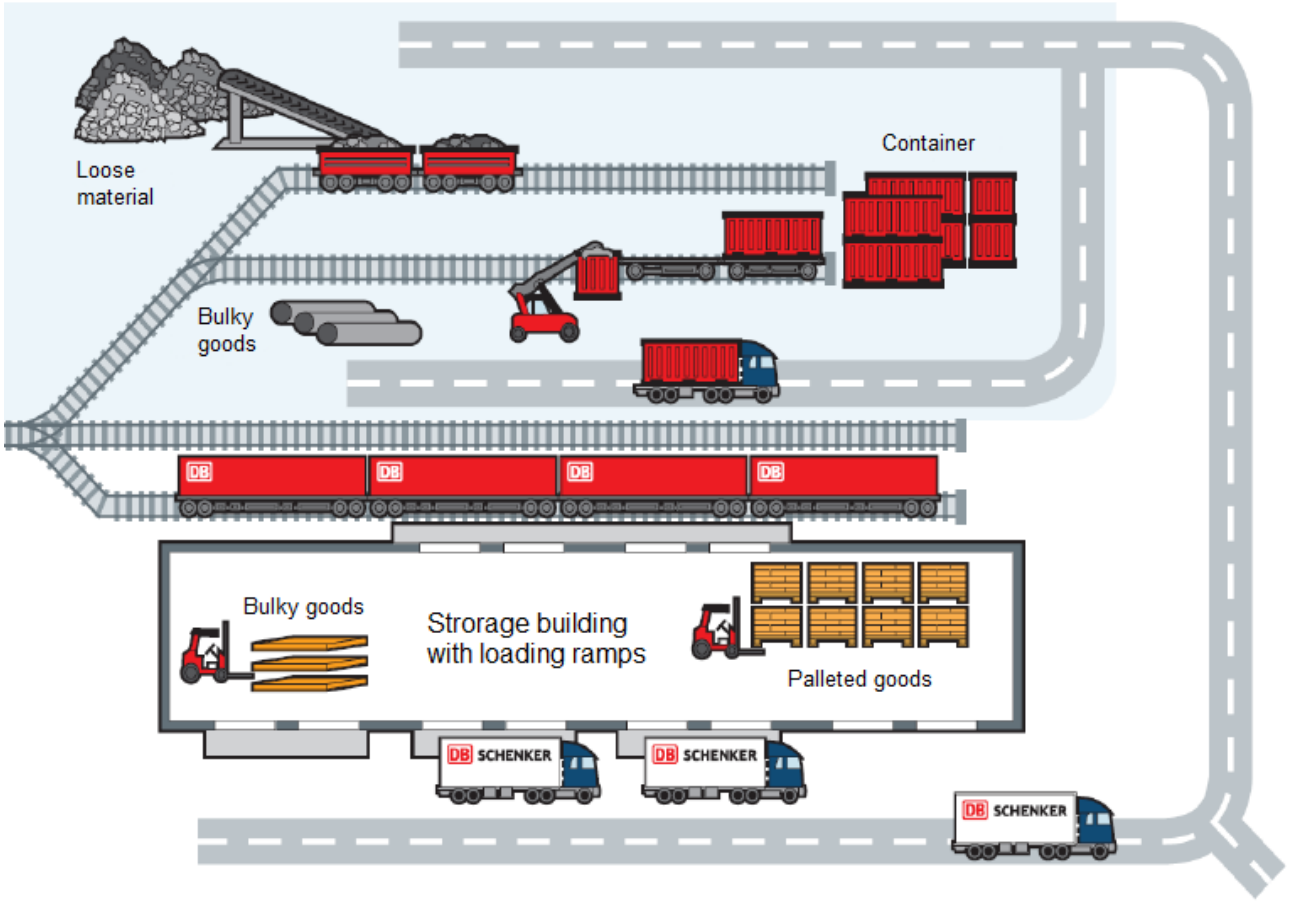


Figure 45: *Typical railport configuration and logistics services*
(Source: DB Schenker Rail)

The generated demand for transport services within the requirements for single consignments (or part-load consignments) provides several opportunities for rail freight transport services. However, the specific elements of these transports require high quality and available infrastructure. One of the elements of this infrastructure is the above mentioned last mile infrastructure the operation and building of which is necessary for the competitiveness of rail freight transport to

other modes of transport. High quality and available last mile infrastructure has a positive impact on the quality of rail system services and thus contributes to its competitiveness and customers' interest. However, for the use of Last mile infrastructure, it is necessary a participation of railway undertakings that are able to use this infrastructure within their business activities and creation of services. Operation, building, propagation and provision of services within Last mile require a sufficient investment and non-investment support from the state and competent government authorities. Support is necessary also from the legislative point of view to promote a shift of transport performances from more environmentally demanding modes of transport to environmentally friendly rail freight transport. Support of Last mile infrastructure and services can be ensured also from enviro resorts and funds, regional government budgets and harmonization of railway infrastructure charging.

In order to better meet the requirements of international transport customers, especially in the process of transport of single consignments and strong position of road goods transport, it is very important that reliable and transparent information services are provided within the rail freight transport in the short term. Insufficient access to information on Last mile infrastructure is a significant obstacle for rail freight transport in effective planning, especially in cross-border transport. Based on this need, the web portal within the whole EU with GIS functions has been developed which is capable to present in a transparent way all important information for various types of Last mile infrastructure. The current version of the portal is running on the internet domain *„www.railfreightlocations.eu"*. GYSEV has participated as a pilot region in the elaboration of this information portal. The web page enables to search according to more detailed criteria, zooming the map or direct selection from the list. By selecting the endpoint on the map, the available detailed information on the relevant part of the Last mile infrastructure is displayed. Detailed information on the relevant part of the Last mile infrastructure illustrated by the satellite image currently includes:

- basic data: type of Last mile infrastructure, address, specific data, opening hours, etc.,
- railway infrastructure technical parameters,
- availability of modes of transport provided,
- availability of services provided,
- links to websites that can be another source of information.

The list of the Last mile for the Amber RFC is listed in Appendix F.

The data in Appendix F show the need to extend and subsequently precise of the Last mile infrastructure for the Amber RFC. This step is necessary for provision of required transport services and increase in rail system performances in the process of transport of single consignments.

11 COMPARATIVE ANALYSIS OF RAIL AND ROAD FREIGHT TRANSPORT WITHIN THE AMBER RFC

The comparative analysis serves for comparison of the transport time and charges within the transport routes on the selected railway routes of the Amber RFC with comparable routes of road transport. The comparison of these two indicators will provide information on charge and time competitiveness of international rail freight transport on the Amber RFC lines.

Input assumptions of comparative analysis:

- 4 model transport routes,
- observing a mandatory rest according to the European Agreement concerning work of crews of vehicles engaged in international road transport and restrictions on running time,
- average speed in international road goods transport,
- average speed of trains in international rail freight transport within the Amber RFC lines,
- average railway infrastructure charges and road goods transport charges on the lines of the Amber RFC and the relevant road network,
- distances in kilometres of individual model routes.

Table 46 provides a comparative analysis of the average running time between international rail and road freight transport for proposed model transport routes.

Table 46: Comparative analysis of average running times

Route	km in road transport	km in rail transport	Average transport time by truck	Average transport time by rail
Koper – Košice	870	955	24 h 15 min	19 h 06 min
Terespol - Budapest	799	976	23 h 04 min	19 h 30 min
Warszawa - Miskolc	585	692	10 h 30 min.	13 h 48 min
Żywiec - Maribor	589	657	10 h 34 min.	13 h 06 min

The comparative analysis of average running time in Table 46 carried out on the model transport routes showed a shorter technological time of transport in international road goods transport on the routes Warszawa – Miskolc and Żiwiec - Maribor. A shorter technological time of transport in favour of rail transport was achieved on the routes Koper – Košice and Terespol – Budapest. The analysis showed that the total technological times of transport in rail freight transport approach the technological times of transport in road goods transport, especially in case of block train technology. The effects of services and fulfilment of the Amber RFC vision and mission will contribute to time competitiveness of international rail freight transport and at the same time, the established corridor will create the suitable conditions for high quality, reliable and safe services of the rail system. For effective use of rail freight transport, it is necessary to remain in removing

barriers that hinder faster transport in international rail transport. The process of interoperability of the rail system within the EU countries helps remove barriers, too. In case of transport of bulk substrates, the rail freight transport can be considered to be competitive in the total transport time as the road infrastructure does not have sufficient capacities for the individual transport of bulk substrates.

Table 47 provides a comparative analysis of transport infrastructure charges between rail and road freight transport for proposed model transport routes. The charge is calculated for road freight vehicle with a total weight of 40 t and weight of goods of 22 t, for freight train with a total weight 1 500 t and weight of goods of 1 000 t. The analysis does not include any supplementary charges in road and rail transport.

Table 47: Comparative analysis of charges

Route	Road freight transport			Rail freight transport		
	charge 40 t vehicle	charge in €/km	charge in €/km/tonne	charge 1 500 t train	charge in €/km	charge in €/km/tonne
Koper – Košice	244,12	0,2806	0,0128	1886,4	1,975	0,0020
Terespol - Budapest	76,5	0,0957	0,0044	3406,24	3,490	0,0035
Warszawa - Miskolc	31,9	0,0545	0,0025	2130,41	3,079	0,0031
Żywiec - Maribor	126,9	0,2154	0,0098	1648,46	2,509	0,0025

The comparative analysis of charge burden in Table 47 showed higher charges per 1 km of route for rail freight. However, charge comparison per one tonne of goods transported/ route km showed a lower charge burden for international rail freight. At the same time, most of road infrastructure is charged in the model calculation, while road infrastructure is often not charged on the whole transport section. Lower charges in rail freight per one tonne of goods transported occur only in case of larger amount of goods transported as the charges in road freight transport are less dependent on weight. With a decrease in the amount of goods, the charges per tonne of goods in rail transport are significantly increasing. The positive result of the analysis was influenced by EU and national measures. The main measures were the liberalization of transport infrastructure charges and the reduction of charges based on marginal costs. The calculation showed sufficient competitiveness of charges in international rail freight transport against road freight transport when goods are transported in block trains.

The Figure below shows a comparison of some challenges rail freight transport faces compared to road freight transport.

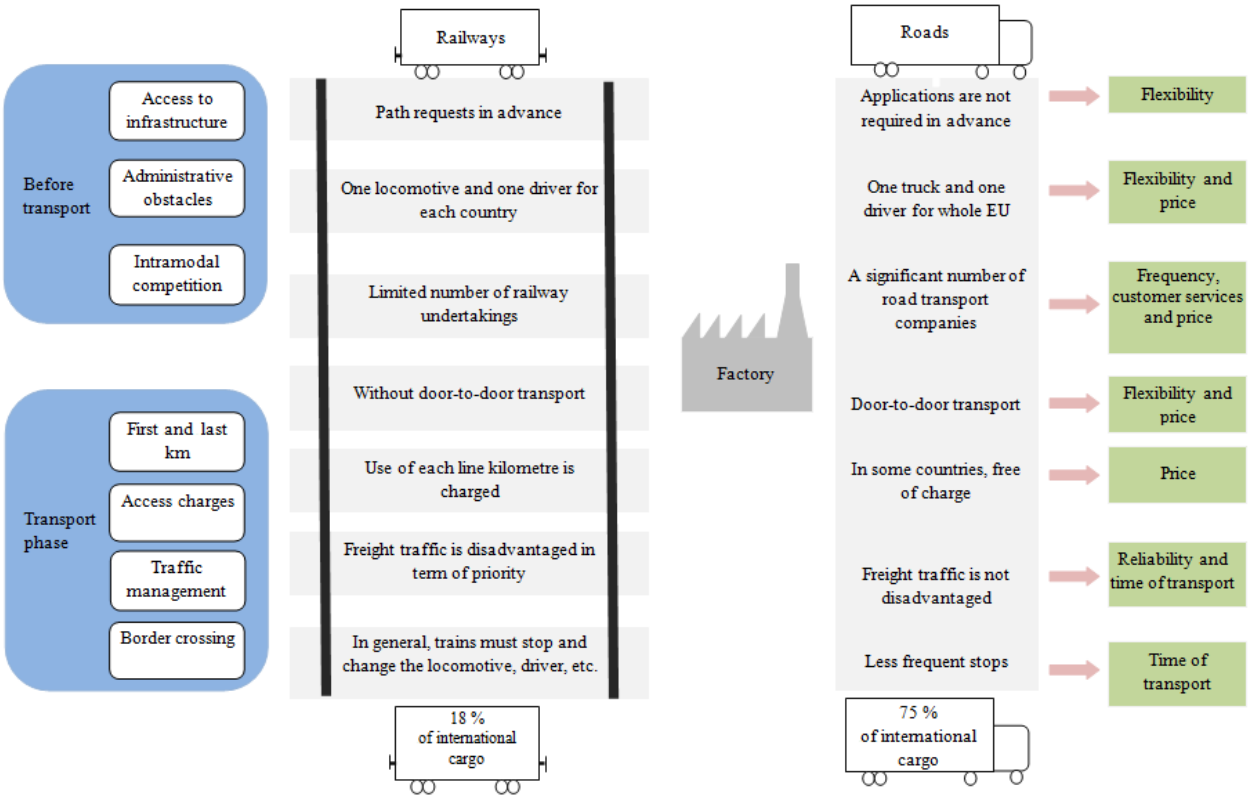


Figure 46: *Comparison of challenges of rail freight to road transport (Source: European Court of Auditors)*

11.1 Socio-economic benefits of the Amber RFC establishment

The Amber RFC establishment itself will have the following socio-economic benefits:

1. Reduction of air pollution costs:
   - negative effects on human health,
   - losses on agricultural production,
   - damage to materials,
   - impacts on biodiversity and ecosystems.
2. Reduction of greenhouse gas emissions:
   - sea level rise,
   - effects of energy use,
   - impacts on agriculture,
   - effects on water supply,
   - impacts on health,
   - impacts on ecosystems and biodiversity,
   - extreme weather conditions,

- disasters, that is, disaster risk

3. Reduction of unwanted noise emissions and consequent negative consequences.

4. Reduction of traffic accidents:

- material damages,
- administrative costs,
- treatment costs,
- losses on production or on human capital,
- risk value.

5. Reduction of congestion.

6. Reduction of water pollution risk.

7. Reduction of vibrations and consequent negative consequences.

8. Reduction of land use and vegetation.

9. Improving quality of rail system services.

10. Reduction of running times and train delays in international rail freight transport.

11. Higher level of information exchange between infrastructure managers and carriers.

12. Cost reduction for transport companies.

13. Price competitiveness against other modes of transport.

14. Improving fluency and reliability of international rail freight transport.

15. Growth of rail system revenues.

16. Decrease in road infrastructure maintenance costs.

17. Increase of infrastructure manager revenues.

18. Decrease in non-investment subsidies in railway infrastructure from public sources.

19. Increase in investment subsidies in railway infrastructure modernization.

20. Ensuring a sustainable development of the Amber RFC countries and the EU countries.

12 SWOT ANALYSIS OF AMBER RFC

The Amber RFC will put into operation on 30.01.2019. In order to determine its direction and development, it is important to make the most objective assessment of the current inputs of the internal and external environments by which it is affected. The several methods and tools deal with the strategic planning of which SWOT analysis was selected for the purpose of selecting the strategic direction of the Amber RFC.

12.1 Characteristics of SWOT analysis process

Method of SWOT analysis consists in identifying the internal environment of the studied subject using its strengths and weaknesses and in identifying the impact of external environment using opportunities and threats, Based on recognized results a review of internal and external environment analysis will be obtained, while the most appropriate strategy for the studied subject will be made up based on given scores. Elaboration SWOT analysis is conditioned by completion of collection and subsequent evaluation of all available data collected. Then, the created basis of SWOT analysis is qualitatively and quantitatively assessed by independent experts and stakeholders, in this case by individual members of Amber RFC. Without assessment of several experts and stakeholders, SWOT analysis has only subjective character of its maker and it is inconsistent for the adoption of strategic direction and decision-making.

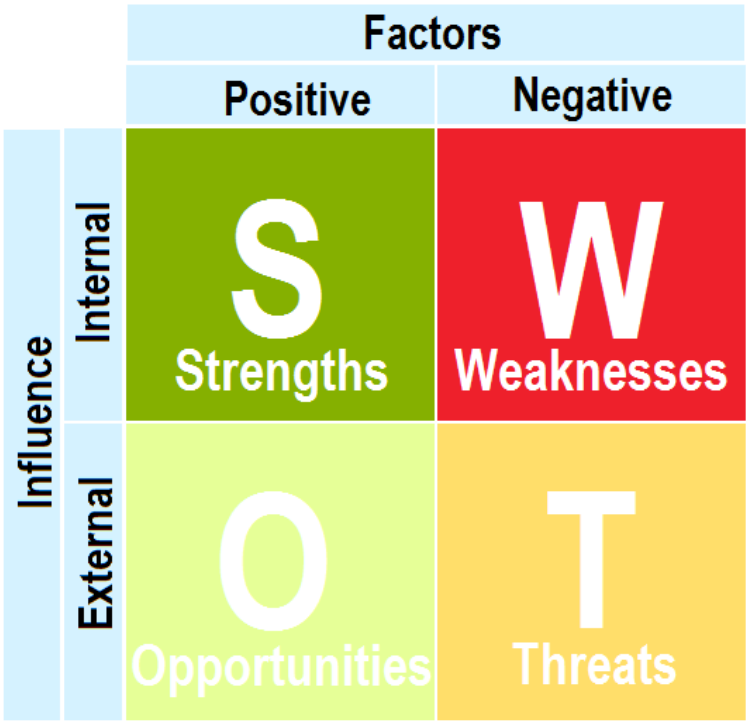


Figure 47: *Theoretical graphical representation of SWOT analysis*

Internal environment analysis S-W

The goal of the internal environment analysis is to identify the main strengths and weaknesses of the studied subject. Following their analysis, the quantitative scores are assigned to their qualitative importance. It is necessary, as priority, to build the strategy on the recognized strengths through which competitive advantage is achieved. In case the assessed subject has insignificant and negligible strengths, its strategy is to be aimed at reducing the value of weaknesses which may be a potential threat for the subject.

Among the most influential strengths we can include:

- such strengths which are specific for the studied subject and it is difficult to implement them for other subjects,
- tradition of a particular subject,
- qualified personnel,
- positive image of the subject perceived by customers via annual satisfaction surveys,
- product quality or service quality,
- developing research and development, etc.

On the other hand, the subject's weaknesses are characterized as critical factors which should be minimized to the lowest possible level. Among the weaknesses we can include:

- high prices that do not correspond to the product/service quality,
- negative image perceived by customers,
- poor organization and organizational skills of management,
- insufficient adaption of service portfolio to market needs, etc.

External environment analysis O – T

Finding the possibilities for new opportunities is one of the main reasons of the external environment analysis. The market opportunities are defined by three possibilities:

- Enforcing on the market with entirely new product/service (general possibility not directly applicable to Amber RFC).
- Enforcing on the market with existing product/service in innovative way.
- Enforcing on the market with scarce product/service.

Since the opportunities may have different forms on the market, the subject has to ensure their early and correct identification in the methodology of SWOT analysis elaboration. Among the opportunities we can include:

- streamline business processes in the market using available technologies,
- maximum use of offered infrastructure capacities and public resources,
- product innovation using state of the art technologies and customisation according to customer needs,
- drawing subsidies, etc.

The threats (risks) are the opposite of opportunities in the external environment that may have adverse effects on the direction of the studied subject and its development. Among the threats that may affect the company we include, in particular:

- legislative changes or lack of adequate legislative measures,
- lack of harmonised measures in the necessary procedures,
- political, economic, social, cultural, environmental and demographic changes,
- embargoes, tariffs, sanctions.
- new entrants into the market under consideration,
- management of overlapping sections, etc.

12.2 SWOT analysis of Amber RFC

The following four tables give strengths, weaknesses, opportunities and threats of internal and external environment of Amber RFC. In tables, there are assigned importance to each indicator and scores achieved (resulting importance for individual parts of SWOT analysis is an average value of importance assigned by individual parties of SWOT). These two figures are then multiplied, while their product determines the final evaluation of indicator. The data presented in the tables are the resulting average values obtained from the infrastructure managers affected by the Amber RFC, the TMS elaborator and the academic environment.

Explanation of Prioritization

Strengths and weaknesses:

- Importance. Importance shows how important a strength or a weakness is for the organization as some strengths (weaknesses) might be more important than others. A number from 0.01

(not important) to 0.99 (very important) should be assigned to each strength and weakness. The sum of all weights should equal 1.0,

- Rating. A score from 1 to 6 is given to each factor to indicate whether it is a major (6) or a minor (1) strength for the organization. The same rating should be assigned to the weaknesses where -1 would mean a minor weakness and -6 a major weakness,
- Score. Score is a result of importance multiplied by rating. It allows prioritizing the strengths and weaknesses. You should rely on your most important strengths and try to convert or defend your weakest parts of the organization.

Opportunities and threats:

- Importance. It shows to what extent the external factor might impact the business. Again, the numbers from 0.01 (no impact) to 0.99 (very high impact) should be assigned to each item. The sum of all weights should equal 1.0,
- Probability. Probability of occurrence is showing how likely the opportunity or threat will have any impact on business. It should be rated from 1 (low probability) to 6 (high probability). (For Threats -1 (low probability) to -6 (high probability)),
- Score. Importance multiplied by probability will give a score by which you'll be able to prioritize opportunities and threats. Pay attention to the factors having the highest score and ignore the factors that will not likely affect your business.

Table 48: Strengths of Amber RFC

S (Strengths)	Importance	Rating	Score
Interconnection of railway infrastructure within the countries included in Amber RFC	0,07	5	0,35
Railway system reliability	0,08	5	0,41
Available information on technical specification of corridor railway lines	0,04	5	0,18
Access to the important seaport Koper in the Republic of Slovenia	0,10	5	0,51
Thanks to the corridor strategic location and routing, good connection with other RFC corridors is guaranteed	0,08	5	0,41
Existing cooperation between individual infrastructure managers within Amber RFC countries	0,08	5	0,40
Railway infrastructure safety	0,10	6	0,54
Good technical conditions of railway infrastructure	0,08	5	0,41
Available free capacity	0,07	5	0,39
Connection by rail with countries outside the EU through BY/PL (Brest/Terespol) railway border crossing	0,10	6	0,60
Flexibility of railway infrastructure (e.g. suitable alternative routes)	0,05	6	0,28
Schengen area	0,03	6	0,21
Procurement of railway infrastructure capacity from one place C-OSS	0,05	4	0,19
Connection of railway transport with terminals within Amber RFC	0,06	5	0,31
TOTAL	**1**	**-**	**5,19**

Table 49: Weaknesses of Amber RFC

W (Weaknesses)	Importance	Rating	Score
Insufficient implementation of TEN-T infrastructure minimum standards	0,09	-4	-0,38
Enforcement of various interests of infrastructure managers of member states	0,12	-3	-0,34
Traffic restrictions related to possession causing temporary capacity constraint	0,17	-5	-0,78
Reducing the quality of rail freight services provided within Amber RFC	0,14	-3	-0,42
Poor technical condition in some sections of railway lines	0,15	-5	-0,69
Bottlenecks of capacity utilization	0,10	-5	-0,44
Insufficient technical parameters of railway infrastructure – requirements for modernization	0,11	-5	-0,57
Long waiting times at border crossings	0,13	-4	-0,50
TOTAL	**1**	**-**	**-4,11**

Table 50: Opportunities set for SWOT analysis of Amber RFC

O (Opportunities)	Importance	Probability	Score
Trend of using more environmentally friendly mode of transport (opportunity for rail transport)	0,08	4	0,35
Complete modernization of railway lines which limit the increase of line capacity	0,12	4	0,51
Investment of railway undertakings in sidings and siding operation	0,08	4	0,34
Increase in costs of road goods transport, e.g. toll charges	0,10	5	0,47
Increase in impact of transport policy of individual countries in favour of rail	0,10	5	0,47
Favourable economic growth of countries included in Amber RFC resulting in increase of import / export	0,12	5	0,56
Improving mutual cooperation between RFC corridors	0,06	5	0,30
Potential for corridor extension to the north of the Republic of Poland towards seaports	0,08	4	0,32
Connection of major economic active regions within the Amber RFC	0,09	4	0,38
Investment and modernization (e.g. construction of new line, double-tracking, station upgrade-signalling equipment, etc.)	0,08	3	0,23
Connection between inland ports on the Danube in Hungary and Slovakia	0,05	4	0,21
Connection with the lines in the Czech Republic	0,03	5	0,17
TOTAL	**1**	**-**	**4,32**

Table 51: Threats set for SWOT analysis of Amber RFC

T (Threats)	Importance	Probability	Score
Building logistic centres without connection to railway infrastructure	0,06	-3	-0,17
Lack of qualified personnel in operation	0,08	-4	-0,37
Insufficient coordination in infrastructure development work	0,09	-4	-0,37
Reducing transport volumes of international freight trains	0,10	-4	-0,34
Tendency of transport policy of individual countries to rail transport disadvantage	0,06	-3	-0,16
Unfavourable economic development within Amber RFC countries	0,07	-3	-0,21
Reducing investment subsidies for rail transport	0,07	-4	-0,30
Reducing non-investment subsidies for rail transport	0,06	-3	-0,19
Higher transport time compared to road goods transport	0,10	-5	-0,44
Lower flexibility compared to road goods transport	0,10	-5	-0,46
Insufficient coverage of railway corridor routes to cover customer needs	0,11	-5	-0,57
Stagnation (unsolved problems) in the field of maintenance and modernization	0,10	-2	-0,25
TOTAL	**1**	**-**	**-3,82**

12.3 Resulting SWOT strategy of the Amber RFC

The quantitative scores were assigned to strengths, weaknesses, opportunities and threats (risks) in SWOT analysis for the Amber RFC. Quantified assessment of internal and external environment analysis needs to be put in comparison of vectors from which we find a particular position which represents model strategy for the Amber RFC.

Based on determining the resultant vector it is possible to determine a strategy:

- offensive,
- defensive,
- union: in case of the Amber RFC, this strategy cannot be applied,
- exit: in case of the Amber RFC, the strategy cannot be applied.

Using quantified evaluation of internal and external environment it was found by comparison of vectors: ***Offensive strategy,*** as model strategy for the Amber RFC. Graphical representation of matrix of model strategies with initial strategy for the Amber RFC is shown in diagram below.

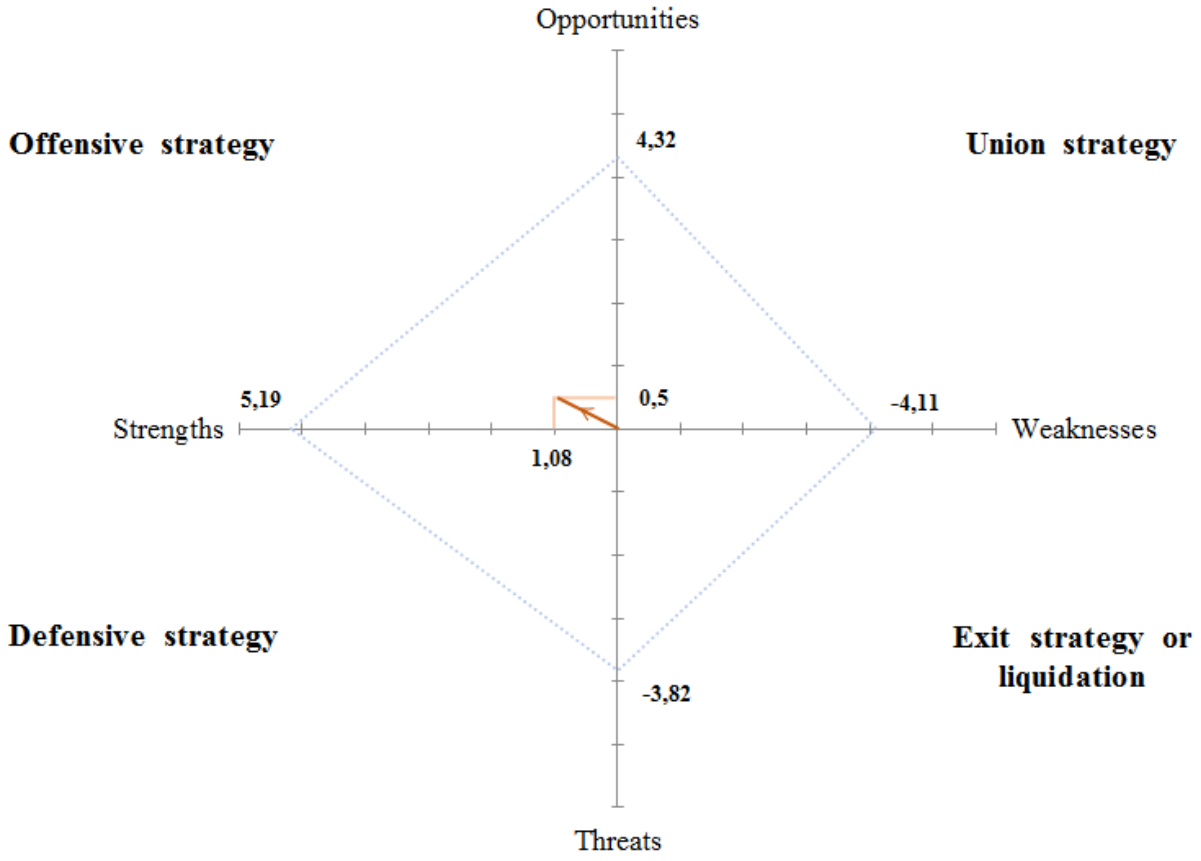


Figure 48: *Matrix of model strategies for the Amber RFC*

**Note: vector routing is the result of the difference between Opportunities and Threats, as well as the difference between Strengths and Weaknesses*

Offensive strategy is considered to be the most attractive strategic alternative. It can be used by an entity whose position is ideal with the predominant strengths over the weaknesses. Such an entity is able to use its strengths to realize the opportunities offered by the external environment. However, an entity must monitor its weaknesses and avoid defined risks. Based on the resultant strategy, it is necessary to take the following measures for the Amber RFC:

- increase the reliability of rail system services,
- developing the high-quality and available services of C-OSS,
- developing the cooperation with other RFC corridors,
- support for intermodal transport services,
- reducing the charges for local service trains,
- in operative transport management, to proceed to prioritize international freight trains,
- quality, flexible, reliable and cost-effective services of Koper seaport,
- close cooperation between infrastructure managers,

- coordination of investment projects in railway infrastructure within the Amber RFC lines,
- increased awareness of the corridor, its services and perspectives,
- exchange of information concerning operation, control and possessions,
- measures to reduce the technological times of operations for transport of goods from/to counties outside the EU,
- providing the best resources, e.g. human, IT,
- investment in interoperability,
- exclusive or dominant access to the most capable suppliers of MB Amber RFC.

The above mentioned measures result from the strategy and its characteristics. However, the Amber RFC itself cannot influence all measures mentioned. Therefore, it is necessary that the subjects, that can affect the individual measures, deal with the suggested measures (e.g. the ministries concerned, infrastructure managers, governments of individual countries, EC). The proposed strategic measures resulting from the SWOT analysis results are proposed to be implemented through the method “Attacks on competitive advantages” which is implemented with the aim to take over the market share of weaker competitors or reduce the competitive advantage of strong rivals. The attack is conducted by various methods, e.g. price reduction, effective advertising, marketing communication mix, new services, etc.

13 STRATEGIC MAP OF AMBER RFC

In order to fulfil the basic objectives of the Amber RFC, it is necessary to set out the strategic steps for their fulfilment. One of the appropriate methods for creating strategic processes is the Balanced Score Card – BSC. BSC is a complex strategic method that looks at the subject under consideration through four perspectives and their mutual relationships. It is a financial, customer, process, learning and growth perspective. BSC is based on the vision and strategy of the object under consideration and on that basis for each perspective the mission and strategic objectives, to which certain metrics and their target values are assigned, will be determined. All perspectives are logically connected and linked and this method, therefore, provides a complex view of the object under consideration and its performance.

Amber RFC main visions are:

- growth of rail freight transport performances,
- fulfilling the EU transport objectives and reducing the negative external costs of transport,
- strengthening rail freight position within the individual member states of the Amber RFC,
- expand cooperation with rail carriers as well as between IM,
- strengthening and developing the cooperation between RFC corridors,
- maintaining and developing the rail freight services,
- developing the services concerning free capacity allocation,
- fulfilling the basic objectives of the liberalization of rail freight services market.

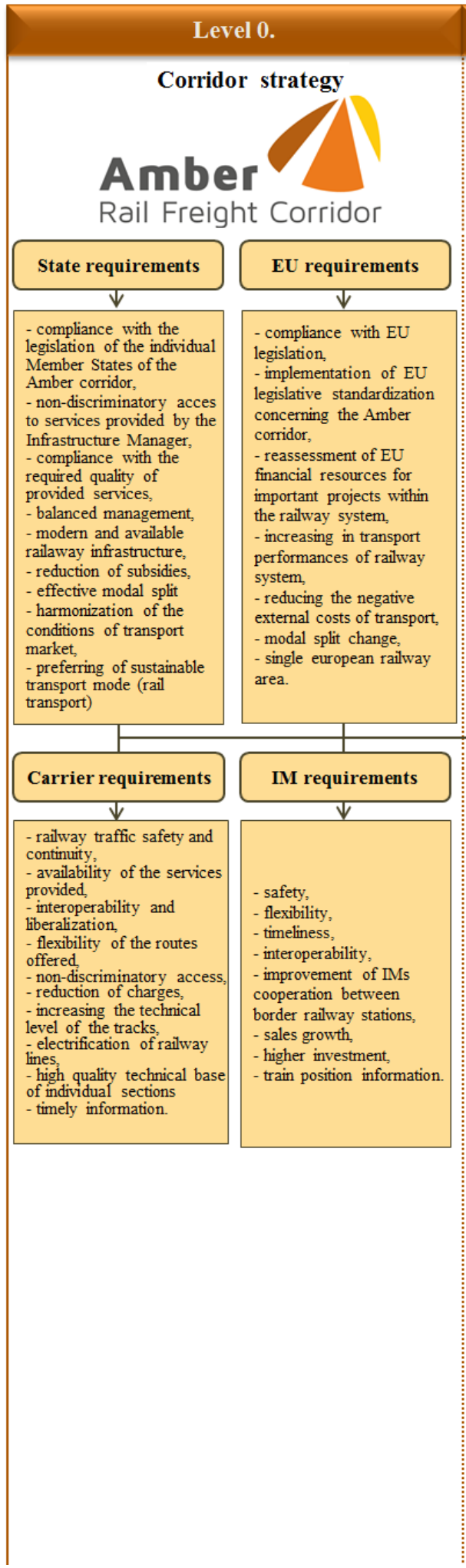
Amber RFC mission consists particularly in:

- providing and improving the rail freight services (cooperation between IM, provision of important information on access to railway infrastructure, cooperation on sidings, etc.),
- creating a positive perception of rail freight transport and the Amber RFC (participations in various events, etc.),
- development and modernization of railway infrastructure,
- participation in transport policy development within the individual countries of the Amber RFC as well as at the EU level,
- promoting the development of rail freight transport as an environmentally friendly and perspective mode of transport compared to road transport,

- decreasing the transport performances of more environmentally demanding modes of transport,
- available non-discriminatory access to railway infrastructure and its capacity,
- effective transport of goods from/to EU, form/to countries outside the EU,
- reducing public spending,
- high satisfaction of all customers of the Amber RFC.

The following figure shows the BSC strategic map for the Amber corridor. The strategic map is based on the vision and mission of the Amber RFC and its four perspectives.

Figure 49: *Map Balanced Score Card of Amber RFC*



Level 2. Balanced Scorecard Perspectives	Level 3. Operational strategic objectives	Level Implementation Plan Concept IPC	Parameter
Customer perspective	Communication with customers and integrating the needs into Amber corridor proccesses	External and internal communication	Operative, as needed
Acquiring customers	Enhanced attention of partner´s relationships with major rail carriers	Creating and directing relations obtained through the questionary and contact meetings	Positive customer rating
	Provision of partial and introductory price reductions for new customer Acquisition activity (setting up of transport and tariff conditions system)	Increase in share of new customers	Increase in transport performances (statistical record of transport preformancesf)
Obtaining a stable position	Using the strengths of the Amber corridor in relation to competitiors	Increase in market share	SWOT analysis, analysis of performances, modal split
	Obtaining and maintaining the positive perception of Amber corridor	Customer satisfaction questionary (understanding customer requirements)	Positive evaluation (% reduce the number of complaints
	Enforcement of interests of Amber coridor within the EU	Setting of planed annual objectives	Percentual fulfilment of plan
Maximum capacity utilization of railway infrastructure	IMs cooperation in process of annual timetable compilation	Designation of competent IM members for train timetable generation	Reduce of stoppages
	Effective operational solutions for possession works	Carrier awareness and time cooperation at possession works	Possessions plan, changes plan
	Effective capacity utilization	Fulfilment of train timetable with freight trains	Determination of % fulfilment of train timetable and % utilization of provided capacity
Financial perspective	Cost reduction while quality level observance and system of maintenance	Analysis of possibilities in compliance with current conditions of maintenance personnels	Evaluation of analysis in several variants
Maintenance efficiency increasing with the aim to reduce costs within the Amber corridor	Cost optimization by increasing the process effectiveness for railway infrastructure maintenance	Determination of technological processes and their optimization and analysis of their possible reduction	Time savings of optimized processes (efficiency coeficient = change of qulility/change of costs)
	Improving the system and processes of railway infrastructure diagnostic	Comparision of regular diagnostic with the diagnostic according to operational needs	Ratio between individual diagnostics, cost analysis
Possibilities of unification of charges and charging model	Elaboration of study of uniform charging possibilities	Study of uniform charging metodology	Operative time definitions for solving the problem and satisfaction of all parties (comparison of amount of charge per train-km, gross ton-km)
	Expresion of individual Amber corridor members towards the charging system, as well as possible proposals	Work consultations and meetings focused on charging problems and possible charging proposals	Operational periodical meetings with subsequent report relating to achieved results and progress
Cost optimization of individual member states infrastructure	Analyzing cost optimization with a view to streamlining processes	Realization an analysis to evaluate and assignment specific costs for their further processing	Operational evaluation of results
	Using inovative strategic tools of cost reduction	Using tools to obtain objective evaluation (Activity Based Control e.t.c.) , Activity Based Costing, Activity Based Management	By adopting decision and setting deadlines (comparing the impact of fixed and variable costs)
Member state and EU investments in railway infrastructure	Effective use of investment subsidies from EU funds to railway infrastructure	Active involvement into modernization projects and EU funds aimed at the rail infrastructure modernization	Plan for the railway infrastructure modernization; The share of upgraded infrastructure to the original condition, the share of accepted and submitted projects
	Investment subsidies obtained from state budget funds within the member states of Amber corridor	Establishing the modernization plan in coordination with state authorities in the field of finance administration and transport policy of the state	Increasing the share of modernized railway infrastructure; Increasing the share of investment subsidies
	Non-investment subsidies obtained from public resources within the member states of Amber corridor	Covering the costs of maintenance, management, organization and repair the lines includied in the Amber corridor	Balanced management; observing the quality of service provision

Continue of Figure 49:

Level 0.

Corridor strategy

Amber Rail Freight Corridor

State requirements

- compliance with the legislation of the individual Member States of the Amber corridor,
- non-discriminatory acces to services provided by the Infrastructure Manager,
- compliance with the required quality of provided services,
- balanced management,
- modern and available railaway infrastructure,
- reduction of subsidies,
- effective modal split
- harmonization of the conditions of transport market,
- preferring of sustainable transport mode (rail transport)

EU requirements

- compliance with EU legislation,
- implementation of EU legislative standardization concerning the Amber corridor,
- reassessment of EU financial resources for important projects within the railway system,
- increasing in transport performances of railway system,
- reducing the negative external costs of transport,
- modal split change,
- single european railway area.

Carrier requirements

- railway traffic safety and continuity,
- availability of the services provided,
- interoperability and liberalization,
- flexibility of the routes offered,
- non-discriminatory access,
- reduction of charges,
- increasing the technical level of the tracks,
- electrification of railway lines,
- high quality technical base of individual sections
- timely information.

IM requirements

- safety,
- flexibility,
- timeliness,
- interoperability,
- improvement of IMs cooperation between border railway stations,
- sales growth,
- higher investment,
- train position information.

Level 1.

RFC 11 Vision

RFC 11 Mission

RCF 11 corridor basic strategic objectives
- development of a wider cooperation between particular IM,
- competitiveness of rail freight transport,
- flexibility,
- modernization of railway infrastructure,
- cost reduction of the rail system,
- increase publicity and awareness of the rail freight corridor,
- participation in the development of transport policy at the national and EU level,
- accessible and non-dicriminatory access to railway infrastructure,
- public expenditures reduction.

Top indicators - KPI
- bilaterál and multilateral agreements between individual IMs
- annual reports and seminars,
- fulfilment of train timetable and use of offered capacity,
- modal split of freight transport,
- investment subsidies of corridor Amber member states to railway infrastructure,
- statement of economic indicators of the corridor Amber,
- monitoring of human resources qualifications,
- statement of traffic and transport performances on the Amber corridor compared with pre-corridor data

Level 2. Balanced Scorecard Perspectives	Level 3. Operational strategic objectives	Level Implementation Plan Concept: IPC	Parameter
Process perspective	Implementation of system to identify possible threats and opportunities	Considering software for this purpose or providing methodological processes for that purpose	If necessary, assess ment of identified threats/ opportunities to incurred threats / opportunities Tool utilization: FMEA (Risk assessment by RPN), Ishikawa
Using strategic tools for identification threats and opportunities	Timely and flexible solutions at posible threats/opportunities	Using management strategic tools and methods	Personel potential with features of operational management in possible threats/opportunities (shifting monitoring competencies, monitoring of individual risks)
	Analysis of identified indicators and evaluation of their impacts on the Amber corridor	Analysis if current available indicators	Operative and regular control of designated indicators (comparison of RPN - occurence reduction, detection and prevention analysis)
Implementation of legislation and cooperation in its developement	Monitoring of current legislation standards	Ensuring notification of current legislative standards	Impact examination of current legislative standards by internal/ external auditor
	Updating and implementing of legislative standards into the internal process	According to the working structure, competencies and responsibilities for updating legislation are determined	According to specified date
	Providing information based on Amber corridor operation to competent institutions (disclosure of relevant information)	Annual reports with standard statistical information and information provided to competent authorities	Periodically and as needed
Active approach to streamline technological processes	Quality assurance of service provided on Amber corridor	Fulfilment of train timetable, control of process procedures	Required % fulfilment of train timetable, penalties for non-compliance and proposals for corrective actions
	Synchronization of technological process setting up within technological conditions of individual Amber corridor states	Creating necessary requirements pattern and technical conditions	Setting the date
Perspective of learning and growth	Acces to specialized publications and periodical meetings with representatives of rail freight carriers	Ensuring the collection of professional publications, ensuring access to quality standards	Periodical issues
Monitoring current trends in freight transport and strategic management and planing trends in favor of rail freight transport	Closer cooperation between IMs	Form of informative channel between individual IMs, or periodic meetings for that purpose	Purposeful meeting; System familization of competent employees
	Closer cooperation between RFC corridors	Meetings of high-level representatives of corridors or representatives from individual corridor structures	Purposive periodic meeting
Targeted human resource education	System of general and vocational education of employees	Career growth model, including employee motivation system (employee involvement)	Determination of % of the number of employees with increase professional level, including dadlines
	Increasing the level of technical and technological equipment associated with employee training	Planning for reneval including software equipment as well as assigning funds	According to specified date, the share of obsolete and new equipment
	Maintaining qualified level of employees	Periodic internal/external exams,development training	Level of results achieved, Human resource management - employee redeployment (reducing unwanted emploee turnover)
Cooperation with professional and scientific institutions	Contributing by technical publications on current state and visions of Amber corridor	Technical articles	Determination of minimum annual number of articles , Feedback-evaluation of articles
	Representation of corridor in professional conferences and educational institutions by competent emploees	Participation at professional conference s and educational institutions	Terms of free conferences on the given issues (comparison of the number of presentations in individual years)
	Incorporating research institutes to find inovative opportunities of Amber corridor development	Analysis of current state and using strategic tools and methods, finding the most appropriate direction	Periodic informative report according to number of agreed analyses

Figure 50: *Map Balanced Score Card of Amber RFC*

14 AMBER RFC MARKETING STRATEGY

The draft for strategic direction of the Amber RFC is contained in chapters 12 and 13. In addition to the drafts in the above mentioned chapters, it is necessary to propose a marketing strategy which main task will be, in the first phase of the Amber RFC operation, its propagation. The chapter deals with a draft of marketing strategy in the field of propagation – marketing communication mix.

The Amber RFC is a provider of services that are characterized by:

- immateriality,
- inseparability,
- heterogeneity,
- impossibility of ownership,
- responsibility,
- longevity.

The draft of marketing communication will include:

- vision,
- mission,
- branding strategy.

The marketing strategy draft itself requires knowledge of the external and internal environment influencing on the Amber RFC. The external environment will be analysed based on the PEST (political, economic, socio-cultural and technological) analysis. The internal environment will then be examined using Porter's Five Forces of Competitive Analysis.

A) PEST analysis (external environment):

1. Political and legislative impact:

- European Union, European Commission,
- current legislation of the member states on business, transport, tax policy, labour law, sanctions, technical conditions,
- individual interests of the member states and the European Union in the field of transport policy, transport business, technical conditions,
- legislation of countries outside the EU (Ukraine, Belarus, Serbia, Turkey, China),
- international cooperation of the EU countries with countries outside the EU,
- international and internal customs legislation,
- intentions in foreign investment of individual EU countries, the Amber RFC countries, the USA, etc.,

- measures in the field of protection of national producers on the part of EU member states and the European Union,
- international law and its principles.

2. Economic impacts:

- economic development of the corridor member states,
- economic development of other EU countries,
- economic development of Serbia, Ukraine, Belarus, China and Turkey,
- economic development of the Czech Republic,
- development of unemployment in the Amber RFC member states and other EU member states,
- amount of investment allocated to the railway infrastructure development in the Amber RFC countries,
- amount of investment allocated to the development of other transport infrastructure in the Amber RFC countries,
- development of international trade,
- development of demand for international goods transport services,
- financial condition of the Amber RFC infrastructure managers,
- financial condition of infrastructure managers of the Amber RFC neighbouring countries.

3. Socio-cultural impacts:

- awareness of the population of the needs of greening transport,
- awareness of producers and forwarders of the needs of greening transport,
- population growth in the Amber RFC member states – higher demands on services and consumption,
- population decline in the Amber RFC member states – lower consumption,
- population growth in other EU member states – higher demands on services and consumption,
- population decline in other EU member states – lower consumption,
- change of purchasing behaviour of the population – preferring national products versus favouring substitutes made outside the home country.

4. Technological and technical impacts:

- modification of railway infrastructure technical standards,
- modification of technical standards of other modes of transport,
- interoperability of rail system,
- development in the field of railway signalling safety technology,
- development of rail transport means,
- development of transport means of other modes of transport,

- change of technological processes at border crossings,
- development of IT for data exchange in the field of transport services and transport operation,
- pressure on reducing the infrastructure technical restrictions,
- need of transport infrastructure modernization.

5. Environmental impacts:

- pressure on reducing the greenhouse gas emissions,
- reducing the transport accidents and associated pollution of natural resources,
- pressure on increasing the energy consumption from renewable energy sources,
- pressure on reducing the energy consumption from fossil fuels.

B) Porter's Five Forces of Competitive Analysis (internal environment):

1. Existing, current competitors:

- road freight transport,
- air freight transport,
- maritime freight transport in the direction of goods from/to China,
- RFC 5 corridor,
- road infrastructure managers in the Amber RFC member states,
- Gdańsk + Gdynia and Trieste seaports.

2. Substitution products:

- road network,
- road freight services,
- air freight services (e.g. consignments transported by intermodal transport: electronics, spare parts, etc.),
- multimodal transport services without the use of rail transport,
- maritime freight services in the direction of goods from/to China,
- allocation of international routes individually through infrastructure managers.

3. Suppliers of:

- energies,
- telecommunication and internet services,
- professional studies, surveys and analyses,
- IT and SW equipment,
- support services in the field of rail operation,
- repair services,
- materials of railway superstructure and substructure,
- construction companies carried out the modernization, reconstruction, repair, maintenance and renewal of railway infrastructure,

- office and administrative supplies.

4. Potential competitors:

- road freight transport over 12 tonnes,
- road freight transport up to 3,5 tonnes,
- road freight transport from 3,5 to 12 tonnes,
- air freight transport,
- maritime freight transport in the direction of goods from/to China,
- RFC 5 corridor.

5. Stakeholders:

- railway undertakings,
- intermodal operators.

These analyses serve for a draft of vision, mission and use of communication mix tools.

The vision is a starting point of the strategic management process and represents a set of specific ideals and priorities of the entity. It is an image of its successful future based on the fundamental values or the philosophy with which the goals and plans of the entity are connected. The vision gives an answer to the question: how will the entity look in the future. The vision must be clearly formulated, realistic and well communicable. The basis of each vision is the result to be achieved in the customer's interest. The specific content of the vision then depends on the entity itself and the sector in which the subject operates. Three basic objectives of vision:

- express the general direction,
- motivate people to move right,
- quickly and effectively coordinate efforts of people.

Draft of the Amber RFC vision: Provision of effective, available and flexible services for corridor users on the up-to-date, interoperable and safe railway infrastructure in order to increase the overall attractiveness of rail services and thus to contribute to an increase in rail freight transport performances and subsequent fulfilment of environmental objectives of the EU and the whole human population.

Well formulated mission can be a useful tool for strategy formulation, but also for day-to-day management decisions. The entity's mission presents not only the intention of entity existence itself, but also, towards other entities of market, the standards of behaviour of the whole organization, and, last but not least, the values respected by entity. The mission has the following functions:

- expresses the basic strategic intention of the owners and top management of the organization,

- has an external information character towards the public and stakeholders, suppliers, customers, interest groups, etc.,
- has an internal information character as the basic standard of management and employees behaviour.

Draft of the Amber corridor mission: Continuously build quality services for transport of goods, environment and public resources. Provide quality, available and non-discriminatory services to all corridor users and cooperate effectively with terminals. Cooperate with EU authorities, corridor member states authorities, intermodal operators and other RFC corridors. Create full-value mutual business relationships with major suppliers. Contribute to railway infrastructure development in line with customer needs and creation of competitive environment in the European and international transport system.

Brand Amber RFC – is a promise to the customer to provide specific benefits that are related to the product. Brand is name, title, sign, expression or their combination. Its purpose is to distinguish the product or service of one provider or group of providers from competitors. Brand is not created only by a logo, a visual style, a specific product, but also services and service associated with the main product, company and its image and brand communication.

Requirements: Amber RFC brand evaluation

- short, appropriate graphic processing - fulfilled,
- simply rememberable – fulfilled,
- easily identifiable - fulfilled,
- original, overtime - fulfilled,
- not inspiring negative associations - fulfilled,
- registered and legislatively protected – not fulfilled, need to supplement,
- applicable internationally - fulfilled.

The name of the corridor, including its logo, is recommended to be used in all documents dealing with the issue of the corridor and the RFC corridors, international rail freight transport, legislation, correspondence, commercial relation and marketing communication. The logo and name meet the conditions for the given type of propagation and clearly identify the surveyed corridor. Colours fit to its basic name – the Amber RFC.

The following table contains a draft for the use of marketing communication tools for the Amber RFC based on its main objectives and services provided. At the same time, the marketing communication strategy is designed based on the analysis of external and internal environment of the Amber RFC.

Table 52: Draft for marketing communication application

Point	Use	Application
Advertising	yes	Leaflets, brochures, emails sent to railway undertakings, intermodal operators and forwarders
Sales support	no	-
On-line sales	yes	Through the C-OSS office, propagation of C-OSS on websites of infrastructure managers
Public relations	yes	Through email, social networks, discussion forums
Sponsorship	no	-
On-line marketing communication	yes	Through email, social networks, discussion forums, website, EC websites, websites of infrastructure managers
Guerrilla marketing	no	-
Product placement	yes	-
Content marketing	yes	Through email, social networks, discussion forums
Experiential marketing	yes	Propagation by scientific and professional articles dealing with transport of goods, transport, ecology, savings in social transport
Green marketing	yes	Environmental benefits published at website, in studies, TMS, promotional products, conferences

15 CONCLUSIONS AND RECOMMENDATIONS

The aim of the presented transport market study was a comprehensive assessment of transport, traffic, technological and social effectiveness of the Amber RFC. Consequently, on the basis of verified and consistent knowledge available, propose the strategy for the establishment of the Amber RFC. The strategic recommendation itself for the Amber RFC is listed in Chapter 12, while Chapter 13 contains a draft of strategic map for the surveyed corridor. The international rail freight corridor Amber will be established on 30.01.2019 and it should ensure, in particular, coordination between the various parties concerned, more effective transport management, increase awareness and overall quality of rail system services, non-discriminatory access to infrastructure, increase in transport performances, support shift of transport performances from more environmentally demanding modes of transport to rail freight transport as well as improve continuity of transport across member states, focusing on sufficient priorization of rail freight transport.

On the basis of the economic, transport, traffic and technical analyses carried out, the comparison of modal split and other important qualitative and quantitative transport indicators, we can conclude that the establishment of the Amber RFC is, from socio-economic point of view, justified and necessary for the development of international rail freight services. The socio-economic benefits of the Amber RFC establishment are presented in subchapter 11.1.

The basic routing of the Amber RFC was determined by Commission Implementing Decision (EU) No 2017/177 of 31 January 2017. Another objective of the study was the assessment of the given basic routing according to the Implementing Decision, where the individual routes are divided by importance (TMS results: Koper – Ljubljana- Zalaszentiván/ -Sopron – Csorna/ - Rajka –Bratislava – Leopoldov – Žilina - Katowice/ -Komárom – Budapest/ -Komárom -Budapest – Kelebia (Hungarian-Serbian border)/ -Budapest- Vác – Nové Zámky – Leopoldov/ Budapest- Mezőzombor- Hidasnémeti- Košice- Plaveč – Muszyna- Nowy Sącz /-Tymbark –Podłęże/-Tarnów – Podłęże/ -Podłęże- Tunel- Dęblin- Terespol – (Polish-Belorusian border). A draft of exact routing and technical parameters of the individual lines is contained in Chapter 9. The routing draft itself is based on the research and analysis of the available statistical data.

The routing and geographical location of the Amber RFC provide a sufficient transport potential within the corridor countries, the EU countries as well as new transport opportunities from/to the Serbia and other countries outside the EU examined. In the TMS the routing creates the suitable conditions for corridor extension which is conditioned, in particular, by transport requirements. The analyses of assessing the transport opportunities showed an increase in demand

for transport services, particularly in international trade, with an upward trend in the following period. The research showed the competitiveness of international rail freight services on the Amber RFC lines at the time of transport and charging, compared to road freight transport. However, it is necessary to support services for single wagon load transport which are, inter alia, influenced by the Last mile infrastructure. The average speed of international freight trains will increase due to the Amber RFC services which will contribute to the attractiveness of the rail system services. Based on the routing, the Amber RFC can be included in the EU strategic transport infrastructure. Proven economic development in the examined countries as well as the forecast of transport performance development showed an increase in transport performance after the corridor establishment. The corridor establishment will contribute to meeting the EU transport policy objectives and creating the single European railway area necessary to modal split change. The modal split change will greatly contribute to decrease in social transport costs. At the same time, the sustainable development of the EU countries will be ensured.

Based on the comprehensive results of the presented transport market study, in order to ensure the further development of the single European railway area, fulfilling the EU and the Amber RFC objectives in the field of transport policy, we recommend to:

- provide services planned by the Amber RFC: drafting the international timetable, provision of capacity, one contact point,
- designate the Amber RFC infrastructure based on the results in Chapter 9: classification of individual lines was carried out based on the analysis of transport performances, geographic location, technical parameters of the lines and traffic flows,
- adopt a strategy draft based on the results of the SWOT analysis: since SWOT analysis is a tool for finding strategic direction,
- proceed to measures proposed in the SWOT analysis: the measures proposed in SWOT analysis are based on the current state and should contribute to the fulfilment of the basic objectives of the Amber RFC,
- as part of the strategy, proceed on the basis of the BSC strategic map: the draft of strategic map is based on the current state and the fulfilment of the individual parts of BSC will lead to meet the individual objectives of the Amber RFC (vision, mission, strategic objectives),
- take measures relating to marketing: marketing proposals should contribute to the promotion of the Amber RFC and its basic services,
- create a corridor website and an interactive corridor map: at least to provide the basic information on the Amber RFC, corridor routing, technical characteristics of the lines and corridor services.

Based on the TMS's comprehensive results, in order to further development of the Amber RFC and the fulfilment of its strategic objectives resulting from the corridor mission and vision, we propose the following measures:

- ensure proper and effective maintenance of railway infrastructure included in the Amber RFC – individual infrastructure managers,
- ensure proper and effective transport management, coordination of possessions – individual infrastructure managers of the Amber RFC,
- adaptation of transport management rules to the needs of rail freight transport – individual infrastructure managers of the Amber RFC,
- in ensure proper transport management and capacity allocation,
- increase number and quality of international rail freight capacities - C-OSS office: due to low free capacity on some line sections of the Amber RFC lines,
- increase and adapt the investment resources in modernization of the basic and connecting transport infrastructure within the corridor – Member States,
- start active cooperation with other RFC – the Amber RFC, individual infrastructure managers,
- cooperate permanently and effectively with intermodal operators, railway undertakings and carriers – the Amber RFC,
- complete the information on the Last mile infrastructure of the Amber RFC and take measures for its modernization, reconstruction and support – the Amber RFC, infrastructure managers, countries,
- elaborating a draft of interactive questionnaire available on the Amber RFC internet domain to obtain effective and quick feedback and specification for a particular customer and his/her needs – the Amber RFC and RNE,
- continuously improve the quality of marketing activity, especially marketing communication – the Amber RFC, infrastructure managers, carriers and intermodal operators,
- as appropriate, cooperation with scientific and educational institutions to address strategy and strategic management – the Amber RFC,
- regular evaluation of fulfilment of the Amber RFC main objectives.

Proposal of measures for support of the Amber RFC development and fulfilment of its strategic objectives resulting from its mission and vision in the technical field:

- unification of the traction system within the Amber RFC principal lines (elaborating the analysis and possible implementation and investment plan),

- improving the technical parameters of the principal lines to increase the level of axle load and maximum train length according to TEN-T and AGTC requirements,
- reduce the technological time of consignment dispatch from/to countries outside the EU: change of legislation, transport requirements, harmonization of transport and technical regulations,
- improve the exchange of information between infrastructure managers and railway undertakings.

At EU and international level, to support green rail freight transport, we propose to take the following measures:

- internalisation of negative external costs of transport – the European Parliament and the Council, the European Commission, individual member states,
- extend the network of local and regional intermodal transport terminals and small Marshalling yards that can provide high quality and competitive intermodal transport services – individual member states, the EU,
- initiative and reconsideration of the possibility of harmonizing the rail infrastructure charging model within the lines included in the RFC corridors – individual member state, the EU,
- proceed to reduce transport infrastructure charges for local service trains, siding trains, trains serving terminals – individual infrastructure managers, individual member states based on liberalization charging principles.

These recommendations and suggestions are based on the results of the TMS and empirical knowledge of the professional public, university staff, staff of the infrastructure managers and carriers. The suggestions are intended to ensure a higher quality of railway system services and, in particular, international rail freight services. A well-set and distributed service will contribute to higher demand for rail freight services, effective modal split, savings in negative external costs of transport and sustainable development. This will contribute to fulfilling the vision and mission of the Amber RFC and thus meeting the EU's transport objectives.

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Appendix H – Maximum gradient on the Amber RFC lines

Appendix B

Supplementary data - Poland

The following table provides an analysis of investments in railway and road infrastructure in the Republic of Poland in the period 2014 – 2017.

Table 1: Analysis of investment subsidies in Poland

State expenditures-whole infrastructure	2014	2015	2016	2017
Investment subsidies in mill. PLN (1 EUR = 4,144 PLN)				
rail	75,98	25,20	4 932,59	5 750,28
road	9 405,46	11 488,17	15 731,41	19 002,74

Source: member of corridor from Poland

Appendix C

Supplementary data - Slovakia

Table 1 contains an analysis of the average utilization of maximum capacity offered on ŽSR lines in the period 2013 – 2017.

Table 1: Analysis of line capacity utilization

Description /Year	2013	2014	2015	2016	2017
Average share of (in %) use of maximum offered capacity on all corridor lines	27,08	28,95	32,88	35,00	34,22
Average share of (in %) use of maximum offered capacity on regional lines	29,21	29,91	29,95	29,17	28,88
Average share of (in %) use of maximum offered capacity on potential lines of Amber RFC	25,89	28,34	32,35	33,48	32,97

From the data in Table 1, we can confirm sufficiently free capacity for international trains, certified trains and trains using European rail freight corridors. Sufficiently free capacity is currently demonstrated also on the lines that have potential to be included in the Amber RFC.

Table 2 provides an analysis of average revenues for the use of railway infrastructure for rail passenger and freight transport on the lines that have the potential to be included in the Amber RFC. At the same time, Table 2 contains the list of the planned investment within these lines.

Table 2: Analysis of average revenues

Indicators/Year	2013	2014	2015	2016	2017
Average amount of revenues (EUR) from carriers per 1 km of track to be included in corridor for freight transport	17 842	18 881	20 099	21 642	16 856
Average amount of revenues (EUR) from carriers per 1 km of track to be included in corridor for passenger transport	22 231	22 786	25 691	25 106	18 874

Table 3: Investments in railway infrastructure

Expected investments	Impact of investment	Expected investment amount (EUR)	Expected investment time span
Modernization of corridor st. border ČR/SR – Čadca – Krásno nad Kysucou, section Čadca – st. border ČR/SR, 3rd construction	Modernization of existing double-track railway line which is a part of the TEN-T network and the European railway corridor no VI. The length of section is 4,904 km	83 211 776	2019/2021
Modernization of corridor st. border ČR/SR – Čadca – Krásno nad Kysucou, section Čadca – Krásno nad Kysucou (out of) 1st and 2nd construction	Modernization of existing double-track railway line which is a part of the TEN-T network and the European railway corridor no VI. The length of section is 9,4 km	220 000 000	2021/2023
Modernization of the railway line Púchov - Žilina, for the line speed up to 160 km/h	Modernization of the line Púchov – Žilina, for the line speed up to 160 km/h Stage I (Púchov - Považská Teplá)	392 720 001	2016/2020
Completion of Žilina – Teplička marshalling yard and following railway infrastructure at Žilina node, realization	Modernization of the railway node Žilina is necessary prerequisite for the full development of a transit railway corridor in the north – south direction meeting the requirements of TSI – technical specifications for interoperability of conventional rail systems in Europe.	390 723 415	2019/2022

Table 4: Average charges for railway infrastructure – rail freight transport

Line section	Charges (€)		
	Transport of containers	Transport of chemicals	Transport of standard goods
	Access charges for intermodal train (ca. 40x40´containers 600 m, 1200 t,)	Access charges for block train (ca.500 m, 1800 t, chemicals)	Access charges for single loading wagons (ca.500 m, 1500 t,)
114 B Čadca - Zwardoń PL	72,58	91,43	82,01
106 D Žilina–Čadca–Mosty u Jablunkova (only to Čadca)	117,27	145,81	131,54
107 A Muzsyna PL – Plaveč – Kysak	232,74	304,34	268,54
109 B Hidasnémeti HU – Čaňa – Barca	51,72	68,76	60,24
105 A Košice – Kraľovany (len po Kysak)	116,79	131,6	124,2
D Barca St 1 – Košice nákl.stanica (koľ.101)	66,75	70,12	68,44
106 A Kraľovany – Žilina - Púchov (od Žilina zriaď. stanica)	167,32	209,51	188,42
105 A Púchov - Bratislava hlavná stanica	475,86	624,69	550,27
128 A Leopoldov – Galanta	123,22	150,89	137,06
120A Szob HU – Štúrovo – Bratislava hl.st. (od Nových Zámkov)	284,95	370,91	327,93
120 B Komárom HU – Komárno – Nové Zámky	119,56	151,09	135,32
124 A Komárno – Bratislava-Nové Mesto	252,94	324,89	288,91

Appendix D

Supplementary data - Hungary

Tables 1 and 3 give an overview of the investment and non-investment subsidies in railway infrastructure of Hungary in the period 2013 – 2017.

Table 1: Analysis of investment subsidies focused on railway infrastructure

On the lines listed in Appendix A Sheet MÁV Zrt. GYSEV VPE 1 (name of section, railway station, etc.)	Investment subsidies in mill. €				
	2013	2014	2015	2016	2017+
MÁV Zrt.					
Győr - Ferencváros	0,86	2,51	0,85	2,55	1,13
Őriszentpéter s.b. - Zalaszentiván	0,32	1,36	0,85	2,04	0,00
Kőbánya felső - Felsőzsolca	1,22	2,56	2,41	4,06	1,3
Felsőzsolca - Hidasnémeti s.b.	0,00	0,06	0,1	0,34	0,00
Ferencváros - Kelebia s.b.	0,54	0,43	3,31	0,39	0,13
Hatvan - Újszász	0,35	0,68	0,49	0,68	0,83
Újszász - Újszász elágazás	0,01	0,01	0,35	0,00	0,06
Újszász elágazás - Paládicspuszta elágazás	0,00	0,00	0,11	0,00	0,02
Paládicspuszta elágazás - Abony elágazás	0,03	0,06	0,16	0,04	0,02
Abony elágazás - Nyársapát elágazás	0,03	0,00	0,00	0,00	0,00
Nyársapát (incl.)- Városföld (excl.)	0,11	0,36	0,12	0,33	0,24
Városföld (incl.) - Kiskunfélegyháza (excl.)	0,07	0,16	0,05	0,16	0,17
Kiskunfélegyháza (excl.) - Harkakötöny elágazás (excl.)	0,10	0,01	0,01	0,17	0,06
Other	78,62	72,58	76,6	71,17	53,14
TOTAL	**82,26**	**80,78**	**85,41**	**81,93**	**57,10**
GYSEV					
Rajka s.b. - Hegyeshalom	0	0,177	2,578	0	0
Sopron - Győr	0	1,472	0,306	0	0
Hegyeshalom - Porpác	0,637	4,672	39,503	0	0
Porpác – Szombathely	0	0	0,224	0	0
Szombathely - Zalaszentiván	0	0,07	1,591	48,245	0
TOTAL	**0,637**	**6,391**	**44,202**	**48,245**	**0**

Table 2: Analysis of non-investment subsidies

Non-investment subsidies in mill. EUR	2013	2014	2015	2016	2017
MÁV Zrt.	138,40	140,93	149,38	145,76	128,71
GYSEV	5,036	9,269	17,627	N/A	N/A

Tables 3 and 4 contain data on the selected economic and charge indicators of railway infrastructure, separately for GYSEV and MÁV Zrt.

Table 3: Analysis of selected economic indicators of transport infrastructure – GYSEV

Indicators/Year	2013	2014	2015	2016	2017
Average amount of revenues (EUR) from carriers per 1 km of track to be included in corridor for freight transport	15 645	15 870	13 429	11 035	12 911
Average amount of revenues (EUR) from carriers per 1 km of track to be included in corridor for passenger transport	42 034	32 988	34 211	32 263	33 864
Average operational cost (EUR) per 1 km of corridor lines	90 107	91 948	91 282	87 811	94 224
Average operational cost (EUR) per 1 km of other lines	19 839	19 161	19 559	19 074	20 190
Average non-investment subsidy from public resources (EUR) per 1 km of railway infrastructure	23 012	22 753	23 860	25 107	29 171

Table 4: Analysis of selected economic indicators of transport infrastructure – MÁV Zrt.

Indicators/Year	2013	2014	2015	2016	2017
Average amount of revenues (EUR) from carriers per 1 km of track to be included in corridor for freight transport	62 287	62 620	66 434	65 858	53 483
Average amount of revenues (EUR) from carriers per 1 km of track to be included in corridor for passenger transport	131 948	129 382	135 792	139 740	103 057
Average operational cost (EUR) per 1 km of corridor lines	122 873,2	122 953	129 438	130 645	128 137
Average operational cost (EUR) per 1 km of other lines	31 775,5	29 920,2	33 483,1	29 327,9	35 916,16
Average non-investment subsidy from public resources (EUR) per 1 km of railway infrastructure	19 100	19 449	20 615	20 116	17 762

Appendix E

Supplementary data - Slovenia

The following table gives an analysis of capacity utilization of SŽ-I lines in the period 2013 – 2017.

Table 1: Statistical average of capacity utilization

Description/Year	2013	2014	2015	2016	2017
Average share (in %) of use of offered maximum capacity on corridor lines	69,15	69,15	70,58	70,58	74,29
Average share (in %) of use of offered maximum capacity on regional lines	52,25	52,58	53,72	53,72	55,86
Average share (in %) of use of offered maximum capacity on lines considered in the Amber RFC	65,17	65,17	66,00	66,00	69,34

The analysis of statistical capacity utilization showed a gradual increase in utilization of available line capacity on the corridor lines and lines considered for the Amber RFC. The utilization of the line between Divača and Koper is 98% because there are 82 trains/day on this single-track line. At the moment this line doesn't have enough free capacity for foreseen increase in transport performances at Amber RFC. Studies for the construction of the second track on the line Koper – Divača are on going and the upgrade of the line between Divača and Koper is an absolute priority.

Table 2: Analysis of investment subsidies focused on railway infrastructure

On the lines of the Amber RFC	Investment subsidies in mill. €			
	2013	2014	2015	2016
Infrastructure maintenance*	59,69	77,12	64,56	52,89
Modernization of railway crossings*	0,40	0,77	0,13	0
GSMR*	3,83	50,47	86,39	0
ECTS* (corr D)	9,46	13,62	19,48	0
Maintenance works for public benefit*	23,98	0,94	2,16	0
Anti-noise barriers*	0,04	0,41	0,69	0
Interventions / interventions projects*	0,64	0,40	0,47	0
New railway line Koper - Divača	2,38	1,87	1,62	0
Upgrading of railway line Pragersko - Hodoš	66,64	144,22	160,87	0
Upgrading of line section Pragersko - Ptuj	0,02	0,01	0	0
Upgrading of line section Poljčane - Pragersko	1,51	6,01	19,39	0
Investment measures - upgrading Koper - Divača	46,68	29,90	38,05	0
Upgrading of line section Dolga gora - Poljčane	2,00	0	26,53	0
Upgrading of line section Zidani most - Celje	0	3,43	2,59	0
On other lines				
Infrastructure maintenance*	0	0	0	12,41
New railway line Trst - Divača	0,33	1,31	1,58	0
Modernisation of Kočevje railway line	7,32	1,59	0,07	0
New railway line Ljubljana - Kranj - Jesenice	0,33	0,37	0,8	0

*Ministry of finance of Republic of Slovenia: Explanation of the annual accounts of the SI budgets for year

The analysis of investment in railway infrastructure in the Republic of Slovenia, given in Table 2, showed a significant share of investment directed to the lines to be included in the Amber RFC. Investments directed to railway infrastructure directly affect the quality of rail transport services provided. Therefore, the correct allocation of investment sources to individual railway infrastructure projects is important. This fact applies to all countries of the Amber RFC.

Table 3 contains an analysis of the development of revenues from charges for the use of SŽ-I rail infrastructure in the period 2013 – 2016.

Table 3: Infrastructure access charges

Year	In €
2013*	9 128 258,98
2014*	9 624 400,08
2015*	9 973 046,49
2016**	9 029 756,00

*source Annual report of Public Agency of the Republic of Slovenia for Railway Transport (AŽP) for 2013 -2015

**at 31st of July 2016 the AŽP finished with the calculation of infrastructure charges and SŽ-Infrastruktura started at 1st of August 2017 with access fee charging

Appendix F

List of the Last mile of the Amber RFC

Republic of Poland

Object	Type of equipment	Address of equipment	Contact details
Area of Małaszewicze / Terespol			
PKP Cargo Centrum Logistyczne Małaszewicze	Intermodal transport terminal	ul. Kolejarzy 22B 21-540 Małaszewicze Poland	PKP CARGO Centrum Logistyczne Małaszewicze sp. z o.o. T +48 83 343 75 63 F +48 83 343 75 63 sekretariat@clmalaszewicze.pl www.clmalaszewicze.pl
EUROPORT Małaszewicze Duże	Intermodal transport terminal	ul. Warszawska 1C, 21 540 Małaszewicze Duże Poland	EUROPORT Małaszewicze Duże T + (+48) 83 343 89 59 T +48 83 375 03 40 biuro@cleuroport.pl www.cleuroport.pl
Terminal przeladunkowy Wólka	Intermodal transport terminal	21 512 Zalesie Poland	Terminal przeladunkowy Wólka T + 48 22 534 04 13 T +48 83 375 04 49 info@pkpcc.comsk wolka@tradetrans.pl www.tradetrans.eu
Transgaz S.A.	Intermodal transport terminal	21 512 Zalesie Poland	Transgaz S.A T +48 83 374-15-37, 374-15-38 T +48 600 078 499 transgaz@transgaz.pl www.transgaz.pl
Area of Warszawa			
Terminal Kontenerowy Warszawa – PKP Cargo Connect Sp. z o.o.	Intermodal transport terminal	ul. Marywilska 39 03 328 Warszawa Poland	PKP Cargo Connect Sp. z o.o. T +48 22 534 04 13 info@pkpcc.coml www.tradetrans.eu
Loconi Intermodal Terminal Kontenerowy Warszawa	Intermodal transport terminal	ul. Jagiellońska 88 00 992 Warszawa Poland	Loconi intermodal Terminal, Warszawa T +48 58 354 71 58 T +48 50 21 77 722; T +48 51 57 70 348 loconi@loconi.pl depot.waw@loconi.pl www.loconi.pl
Polzug Terminal Kontenerowy Pruszków	Intermodal transport terminal	ul. Skorupki 5 00 546 Warszawa Poland	Polzug Terminal Kontenerowy Pruszków T +48 22 33 63 400 warszawa.info@polzug.pl www.polzug.de
Terminal Kontenerowy Warszawa Główna Towarowa SPEDCONT Sp. z o.o.	Intermodal transport terminal	ul. J. Ordona 2a 01-237 Warszawa Poland	Spedcont Ireneusz Marczak T + 48 22 836 81 31 T + 48 42 613 74 23 tkwarszawa@spedcont.pl www.spedcont.pl bok@spedcont.pl
Area of Katowice			

Terminal Kontenerowy Gliwice - PKP CARGO CONNECT Sp. z o.o.	Intermodal transport terminal	ul. Władysława Reymonta 32 44 100 Gliwice Poland	Terminal Kontenerowy Gliwice - PKP CARGO CONNECT T +48 32 23 18 877 info@pkpcc.com e.sobczyk@pkpcc.com
Terminal Sosnowiec Poludniowy (Spedycja Polska Spedcont Sp. z o.o.)	Intermodal transport terminal	ul. Kościelna 60 41-200 Sosnowiec Poland	Spedcont Krzysztof Ptak T +48 42 613 74 23 F +48 32 293 30 63 tksosnowiec@spedcont.pl bok@spedcont.pl www.spedcont.pl
Euroterminal Sławków	Intermodal transport terminal	CHL Groniec 41-260 Sławków Poland	Euroterminal Sławków T +48 32 71 42 400 T +48 32 714 24 54 info@euterminal.pl www.euterminal.pl
Polzug Terminal Dąbrowa Górnicza	Intermodal transport terminal	ul. Koksownicza 6 42 523 Dąbrowa Górnicza Poland	Polzug Terminal Dąbrowa Górnicza. T +48 32 792 70 91 T +48 32 75 01 570 dabrowa.terminal@polzug.pl www.polzug.de
PCC Intermodal - Terminal PCC Gliwice	Intermodal transport terminal	Portowa 28 44 100 Gliwice Poland	PCC Intermodal S.A. Terminal T + 48 32 30 18 471 depot@ppc.eu www.pccintermodal.pl
Brzeski Terminal Kontenerowy – Karpiel sp. z o.o.	Intermodal transport terminal	ul. Przemysłowa 6 32 800 Brzesko Poland	Brzeski Terminal Kontenerowy – Karpiel T +48 14 68 45 050 T +48 784 497 327 biuro@karpiel.info.pl info@karpiel.info.pl www.karpiel.info.pl
Terminal kontenerowy Włosienica	Intermodal transport terminal	ul. Długa 1 32 642 Włosienica Poland	Terminal kontenerowy Włosienica T + 48 33 84 29 001 T + 48 53 79 99 735 railpolska@railpolska.pl mariusz.bialek@railpolska.pl www.balticrail.com www.railpolska.pl
PCC INTERMODAL - Terminal Kolbuszowa	Intermodal transport terminal	ul. Ks Ludwika Ruczki 3C 36 100 Kolbuszowa Poland	PCC INTERMODAL T +48 58 58 58 200 info.intermodal@pcc.eu terminal.debica@pcc.eu
Lubelski Terminal Kontenerowy	Intermodal transport terminal	Drzewce 1 24 150 Nałęczów Poland	Lubelski Terminal Kontenerowy T +48 60 24 74 641 biuro@ltk-intermodal.pl Darek@ltk-intermodal.pl
Erontrans Terminal Kontenerowy w Radomsku	Intermodal transport terminal	ul. Młodzowska 3 97 500 Radomsko Poland	Erontrans Terminal Kontenerowy T +48 58 773 93 00 erontrans@erontrans.pl
Loconi Intermodal S.A. Terminal Kontenerowy Radomsko	Intermodal transport terminal	ul. Kraszewskiego 36 97 500 Radomsko Poland	Loconi Intermodal S.A T +48 502 177 614 loconi@loconi.pl depot.rad@loconi.pl

Erontrans Terminal Kontenerowy w Strykowie	Intermodal transport terminal	ul. Batorego 27 95 010 Stryków Poland	Erontrans Terminal Kontenerowy T +48 58 773 93 00 erontrans@erontrans.pl
Terminal Kontenerowy Łódź Chojny	Intermodal transport terminal	ul. Śląska 3A 93 155 Łódź Poland	Terminal Kontenerowy Łódź Chojny T +48 502 177 614 loconi@loconi.pl depot.lcj@loconi.pl
SPEDCONT Terminal Kontenerowy Łódź Olechów	Intermodal transport terminal	ul. Tomaszowska 60 93 235 Łódź Poland	SPEDCONT Terminal T +48 42 613 74 23 bok@spedcont.pl sekretariat@spedcont.pl

Slovak Republic

Object	Type of equipment	Address of equipment	Contact details
Bratislava			
Bratislava Palenisko	Intermodal transport terminal	Pribinova 24 82109 Bratislava Slovakia	SPaP a.s. T +421 2 58271 111, F +421 2 58271 114 spap@spap.sk www.spap.sk
Bratislava UNS/ Slovnaft	Terminal	Vlečka Slovnaft, a.s. Vlčie hrdlo 1 824 12 Bratislava Slovakia	Slovnaft a.s., Bratislava Ing. Ján Čerepán jan.cerepan@slovnaft.sk
UKV Terminal Bratislava ÚNS	Intermodal transport terminal	Lúčna ul. 12 82109 Bratislava Slovakia	Rail Cargo Operator - CSKD s.r.o. František Papuga T +421 903 744 857 F +421 903 744 857 papuga@intrans.sk www.railcargo.com
Bratislava východ	Marshalling yard		www.zsr.sk
Devínska Nova Ves	Marshalling yard		www.zsr.sk
Dunajská Streda	Intermodal transport terminal	Povodská 18 92901 Dunajská Streda Slovakia	Metrans (Danubia) a.s. Mr. Jiri Samek T +420 267 293 102 samek@metrans.cz www.metrans.eu
Nové Zámky	Marshalling yard		www.zsr.sk
Komárno zr.st.	Marshalling yard		www.zsr.sk
Štúrovo	Marshalling yard		www.zsr.sk
Terminál Žilina	Intermodal transport terminal	Bratislavská cesta 60 010 01 Žilina Slovakia	Rail Cargo Austria AG Fagan Miroslav T +421-903-507-205 fagan@intrans.sk www.railcargo.com/de
Terminál Košice	Intermodal transport terminal	Areál prekladisko Haniska 040 66 Košice Slovakia	Metrans (Danubia) a.s. Jiri Samek T +420 267 293 102 samek@metrans.cz www.metrans.eu

Hungary

Object	Type of equipment	Address of equipment	Contact details
Sopron			
Sopron Terminal	Intermodal transport terminal	Ipar krt. 21 9400 Sopron Hungary	Gysev Cargo Zrt Tóth Péter T 0036 99 577161 F 0036 99 577334 toth.peter@gysevcargo.hu www.gysevcargo.hu
Railport Sopron	Railport/Rail logistic centre	Sopron Hungary	DB Schenker Rail dbschenker.hafas.de
Logistics Service Centre Sopron	Railport/Rail logistic centre	Ipar körút 219400 Sopron Hungary	GysevCargo László Cseh T +36(99)517 267 or 427, F +36(99)517 314 cseh.laszlo@gysevcargo.hu www.gysevcargo.hu
Győr			
Terminal ÁTI Győr	Intermodal transport terminal	Kandó K. u. 17 9025 Győr Hungary	ÁTI DEPO ZRt., T +36 96 512 991 www.atidepot.hu
Port of Győr-Gőnyű	Intermodal transport terminal	Kikötö 1 H-9011 Györ-Károlyháza Hungary	Kikötö Zrt. Mr. Ákos Pintér T +36 96 544 200 F +36 96 544 204 pinterportofgyor.hu
Railport Győr	Railport/Rail logistic centre	Győr Hungary	DB Schenker Rail dbschenker.hafas.de
Győr	Marshalling yard		-
Hegyeshalom	Marshalling yard		-
Komárom	Marshalling yard		-
Miskolc	Marshalling yard		-
Budapest			
Budapest Szabadkikötő	Terminal	Weiss Manfréd út 5-7 H-1211 Budapest Hungary	T +36 1 278 3102 F + 36 1 276 3978 info@bszl.hu
Budapest BILK	Intermodal transport terminal	Európa útca. 4 1239 Budapest Hungary	BILK Kombiterminal Co. Ltd. Mr. Istvan Huszti T +36 1 289 6000 F +36 1 289 6060 bilkkombi@bilkkombi.hu www.railcargobilk.hu
Ferencváros	Marshalling yard		-

Republic of Slovenia

Object	Type of equipment	Address of equipment	Contact details
Luka Koper – Port of Koper	Intermodal transport terminal	Luka Koper d.d. Vojkovo nabrežje 6501 Koper Slovenia	Luka Koper d.d. Andrej Cah T +386 5 6656 905 Andrej.cah@luka-kp.si www.luka-kp.si
Ljubljana			
Ljubljana Container Terminal	Intermodal transport terminal	Letališka 14 1000 Ljubljana	Slovenske železnice - SŽ-TP d.o.o. Robert Gaber Roman Bricelj

		Slovenia	T +00386 1 29 13136, 12620 F +386 1 29 12 619 robert.gaber@slo-zeleznice.si roman.bricelj@slo-zeleznice.si www.slo-zeleznice.si/en
Ljubljana Zalog	Marshalling yard		Slovenske železnice - SŽ-TP d.o.o. www.slo-zeleznice.si/en
Maribor	Land Terminal Marshalling yard	Vodovodna ul.34 2000 Maribor Slovenia	Slovenske železnice - SŽ-TP d.o.o. Robert Gaber T +00386 1 29 13136 F +386 1 29 12 619 robert.gaber@slo-zeleznice.si www.slo-zeleznice.si/en
Celje	Land Terminal Marshalling yard	Kidričeva ulica 34 3000 Celje Slovenia	Slovenske železnice - SŽ-TP d.o.o. Robert Gaber T +00386 1 29 13136 F +386 1 29 12 619 robert.gaber@slo-zeleznice.si www.slo-zeleznice.si/en
Sežana	Private Terminal	Partizanska cesta 79 6210 Sežana Slovenia	Adria terminali, d.o.o. Aleš Miklavec T 00 386 5 731 22 01 ales.miklavec@luka-kp.si http://www.adria-terminali.si/
Novo mesto	Private Terminal	Belokranjska 4 8000 Novo mesto Slovenia	Revoz, podjetje za proizvodnjo in komercializacijo avtomobilov Novo mesto, d.d (shortened Revoz, d.d.) Janez Rom T 00 386 7 331 50 00 janez.rom@renault.com http://www.revoz.si/en/
Velenje	Private Terminal	Partizanska 12 3320 Velenje Slovenia	Gorenje, gospodinjski aparati, d.d. (shortened Gorenje, d.d.) Slavica Papinutti T 00 386 3 899 10 00 slavica.papinutti@gorenje.com http://www.gorenje.co.uk/

Appendix G

Modal split

a. Comparison of modal split in passenger transport in Poland

Year	Railway transport		Air transport		Road transport (Passenger cars)		Road transport (Motor coaches, buses and trolley buses)		Total mill. pkm
	mill. pkm	%	mill. pkm	%	mill. pkm	%	mill. pkm	%	
2010	17 921	**6,98**	8 273	**3,22**	188 810	**73,57**	41 651	**16,23**	256 655,00
2012	17 826	**6,90**	11 864	**4,59**	189 324	**73,26**	39 419	**15,25**	258 433,00
2014	16 015	**6,02**	13 811	**5,19**	197 032	**74,07**	39 158	**14,72**	266 016,00
2015	17 367	**6,46**	13 486	**5,01**	200 570	**74,56**	37 580	**13,97**	269 003,00
2016	19 175	**6,96**	15 591	**5,66**	203 783	**74,02**	36 774	**13,36**	275 323,00

Source: Statistics Poland /www.stat.gov.pl/, Transport – activity results in 2016

b. Comparison of modal split in freight transport in Poland

Year	Railway transport		Road transport		Inland waterways transport		Maritime transport		Pipeline transport		Air transport		Total mill. tkm
	mill. tkm	%	mill. tkm	%	mill. tkm	%	mill. tkm	%	mill. tkm	%	mill. tkm	%	
2010	48 795	**15,8**	214 204	**69,5**	1 030	**0,3**	19 773	**6,4**	24 157	**7,8**	114	**0,04**	308 073
2012	48 903	**15,0**	233 310	**71,6**	815	**0,3**	20 299	**6,2**	22 325	**6,9**	123	**0,04**	325 775
2014	50 073	**14,4**	262 860	**75,5**	779	**0,2**	13 621	**3,9**	20 543	**5,9**	146	**0,04**	348 022
2015	50 603	**14,0**	273 107	**75,7**	2 187	**0,6**	12 739	**3,5**	21 843	**6,1**	156	**0,04**	360 635
2016	50 650	**13,1**	303 560	**78,7**	832	**0,2**	8 242	**2,1**	22 204	**5,8**	190	**0,05**	385 678

Source: Statistics Poland /www.stat.gov.pl/, Transport – activity results in 2016

c. Comparison of modal split in passenger transport in Slovakia

Year	Railway transport		Air transport		Inland waterways transport		Individual road transport		Road public transport		Urban public transport		Total mill. pkm
	mill. pkm	%	mill. pkm	%	mill. pkm	%	mill. pkm	%	mill. pkm	%	mill. pkm	%	
2010	2309	**6,49**	835	**2,35**	3	**0,01**	26 879	**75,54**	4 436	**12,47**	1 119	**3,14**	35 581
2012	2500	**6,93**	939	**2,60**	4	**0,01**	26 900	**74,59**	4 584	**12,71**	1 137	**3,15**	36 064
2014	2583	**7,11**	895	**2,46**	11	**0,03**	27 251	**74,97**	4 495	**12,37**	1 115	**3,07**	36 350
2015	3411	**9,08**	978	**2,60**	13	**0,03**	27 531	**73,32**	4 499	**11,98**	1 119	**2,98**	37 551
2016	3595	**9,39**	651	**1,70**	8	**0,02**	27 836	**72,71**	4 996	**13,05**	1 197	**3,13**	38 283

Source: Statistical office of the SR /www.statistics.sk/,EC - Statistical pocketbook 2017

d. Comparison of modal split in freight transport in Slovakia

Year	Road transport		Railway transport		Waterways transport		Air transport		Pipeline transport		Total mill. tkm
	mill. tkm	%	mill. tkm	%	mill. tkm	%	mill. tkm	%	mill. tkm	%	
2010	27 411	**64,22**	8 105	**18,99**	2166	**5,07**	0,008	**0,00**	5000	**11,71**	42 682,01
2012	29 504	**69,63**	7 591	**17,91**	1078	**2,54**	0,008	**0,00**	4200	**9,91**	42 373,01
2014	31 304	**69,03**	8 829	**19,47**	684	**1,51**	31,597	**0,07**	4500	**9,92**	45 348,60
2015	33 525	**70,22**	8 439	**17,68**	674	**1,41**	106,833	**0,22**	5 000	**10,47**	47 744,83
2016	36 106	**70,69**	9 111	**17,84**	740	**1,45**	117,981	**0,23**	5000	**9,79**	51 074,98

Source: Statistical office of the SR /www.statistics.sk/

e. Comparison of modal split in passenger transport in Hungary

Rok	Railway transport		Inland waterways transport		Road transport		Air transport		Total mill. pkm
	mill. pkm	%	mill. pkm	%	mill. pkm	%	mill. pkm	%	
2010	7 692	**9,36**	14	**0,02**	68 845	**83,82**	5 586	**6,80**	82 137
2012	7 806	**9,83**	11	**0,01**	68 661	**86,46**	2 934	**3,69**	79 412
2014	7 738	**9,41**	9	**0,01**	70 163	**85,32**	4 323	**5,26**	82 233
2015	7 609	**8,98**	9	**0,01**	72 221	**85,25**	4 875	**5,75**	84 714
2016	7 653	**8,70**	10	**0,01**	74 300	**84,44**	6 032	**6,85**	87 995

Source: Hungarian Central Statistical Office /www.ksh.hu/

f. Comparison of modal split in freight transport in Hungary

Year	Road transport		Railway transport		Inland waterways transport		Pipeline transport		Total mill. tkm
	mill. tkm	%	mill. tkm	%	mill. tkm	%	mill. tkm	%	
2010	33 721	**66,71**	8 809	**17,43**	2 393	**4,73**	5623	**11,12**	50 546
2012	33 735	**66,47**	9 230	**18,19**	1 982	**3,91**	5802	**11,43**	50 749
2014	37 517	**67,86**	10 158	**18,37**	1 811	**3,28**	5801	**10,49**	55 287
2015	38 352	**69,11**	10 010	**18,04**	1 824	**3,29**	5 305	**9,56**	55 491
2016	40 006	**68,55**	10 528	**18,04**	1 975	**3,38**	5850	**10,02**	58 359

Source: Hungarian Central Statistical Office /www.ksh.hu/, Eurostat, EC – Statistical pocketbook 2017

g. Comparison of modal split in passenger transport in Slovenia

Year	Passenger cars		Buses and Coaches		Railways		Tram and Metro		Total mill. pkm
	mill. pkm	%	mill. pkm	%	mill. pkm	%	mill. pkm	%	
2010	25 600	**83,0**	3 200	**10,4**	813	**2,6**	1 226	**3,98**	30 839,00
2012	25300	**83,5**	3 200	**10,6**	742	**2,4**	1 060	**3,50**	30 302,00
2014	25600	**82,9**	3 400	**11,0**	697	**2,3**	1 179	**3,82**	30 876,00
2015	26 000	**82,2**	3 600	**11,4**	709	**2,2**	1 332	**4,21**	31 641,00

Source: Republika Slovenija –Statistični Urad /www.stat.si/, Eurostat, EC – Statistical pocketbook 2017

h. Comparison of modal split in freight transport in Slovenia

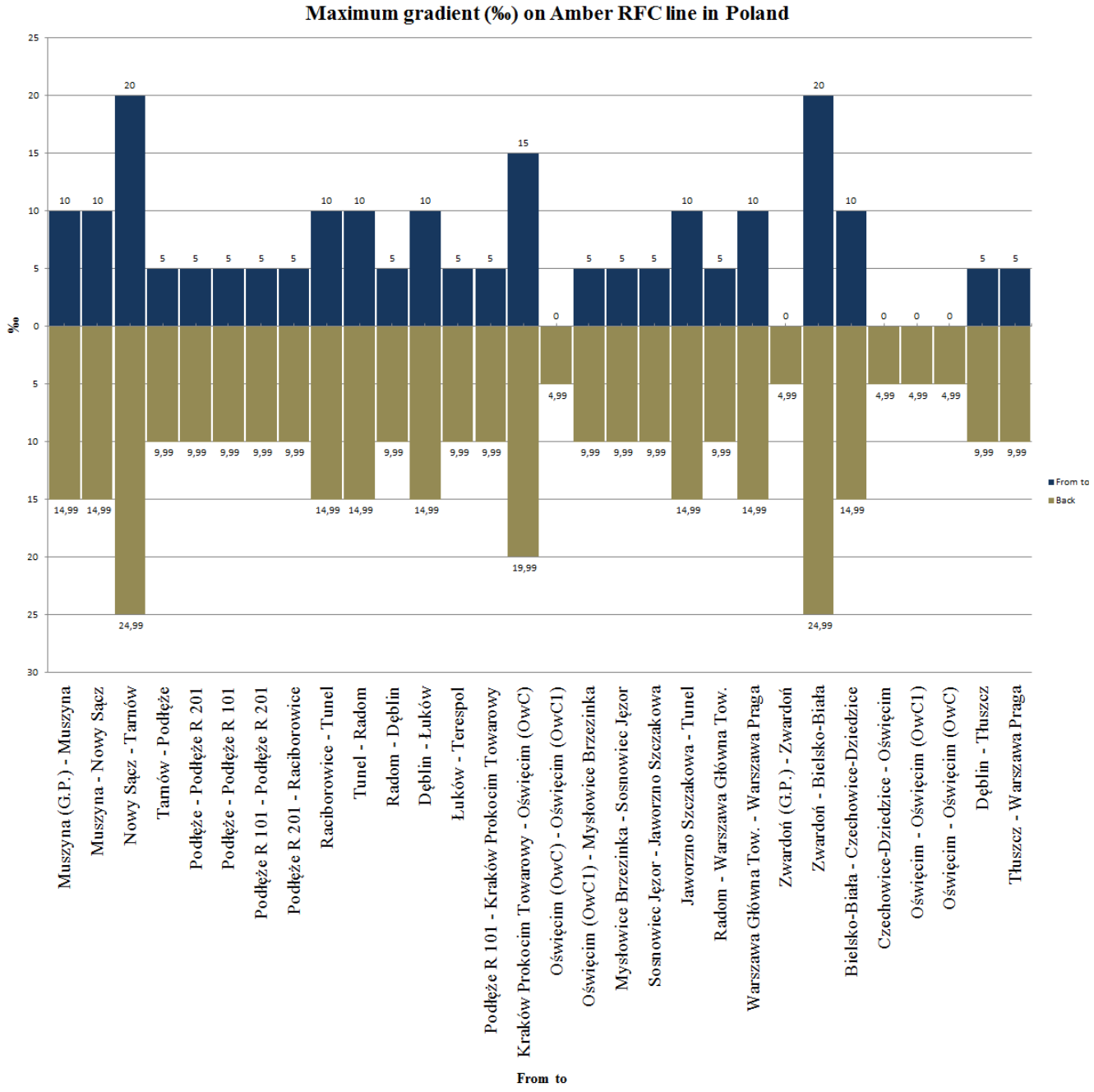
Year	Road transport		Railway transport		Air transport		Total mill. tkm
	mill. tkm	%	mill. tkm	%	mill. tkm	%	
2010	15 931	**82,32**	3421	**17,68**	1,5	**0,01**	19 353,5
2012	15 888	**82,07**	3470	**17,92**	1,1	**0,01**	19 359,1
2014	16 273	**79,83**	4110	**20,16**	1,1	**0,01**	20 384,1
2015	17 909	**81,09**	4175	**18,90**	1	**0,00**	22 088,1
2016	18 707	**81,10**	4360	**18,89**	0,9	**0,00**	23 075,1

Source: Republika Slovenija –Statistični Urad /www.stat.si/, Eurostat

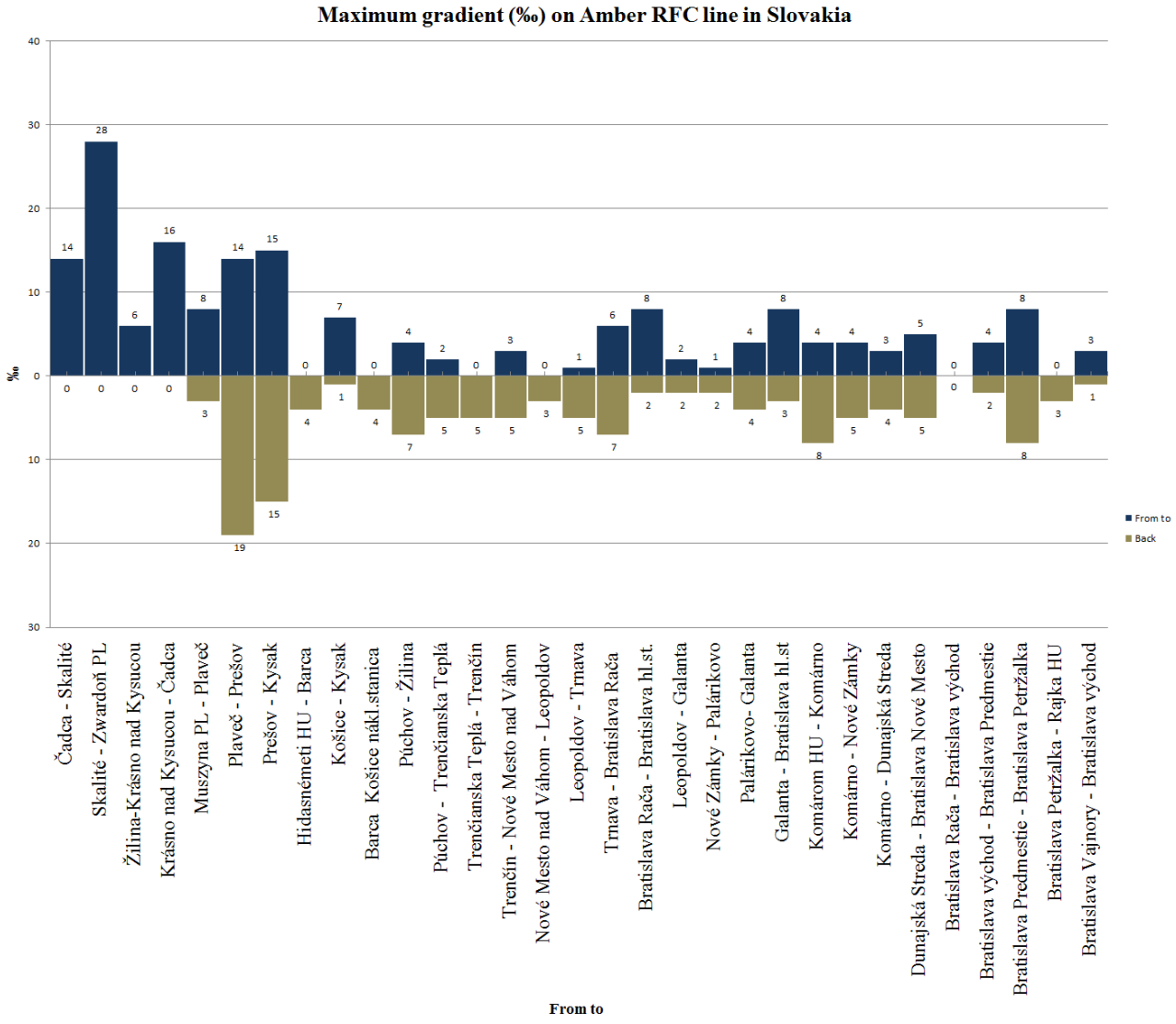
Appendix H

Maximum gradient on the Amber RFC lines

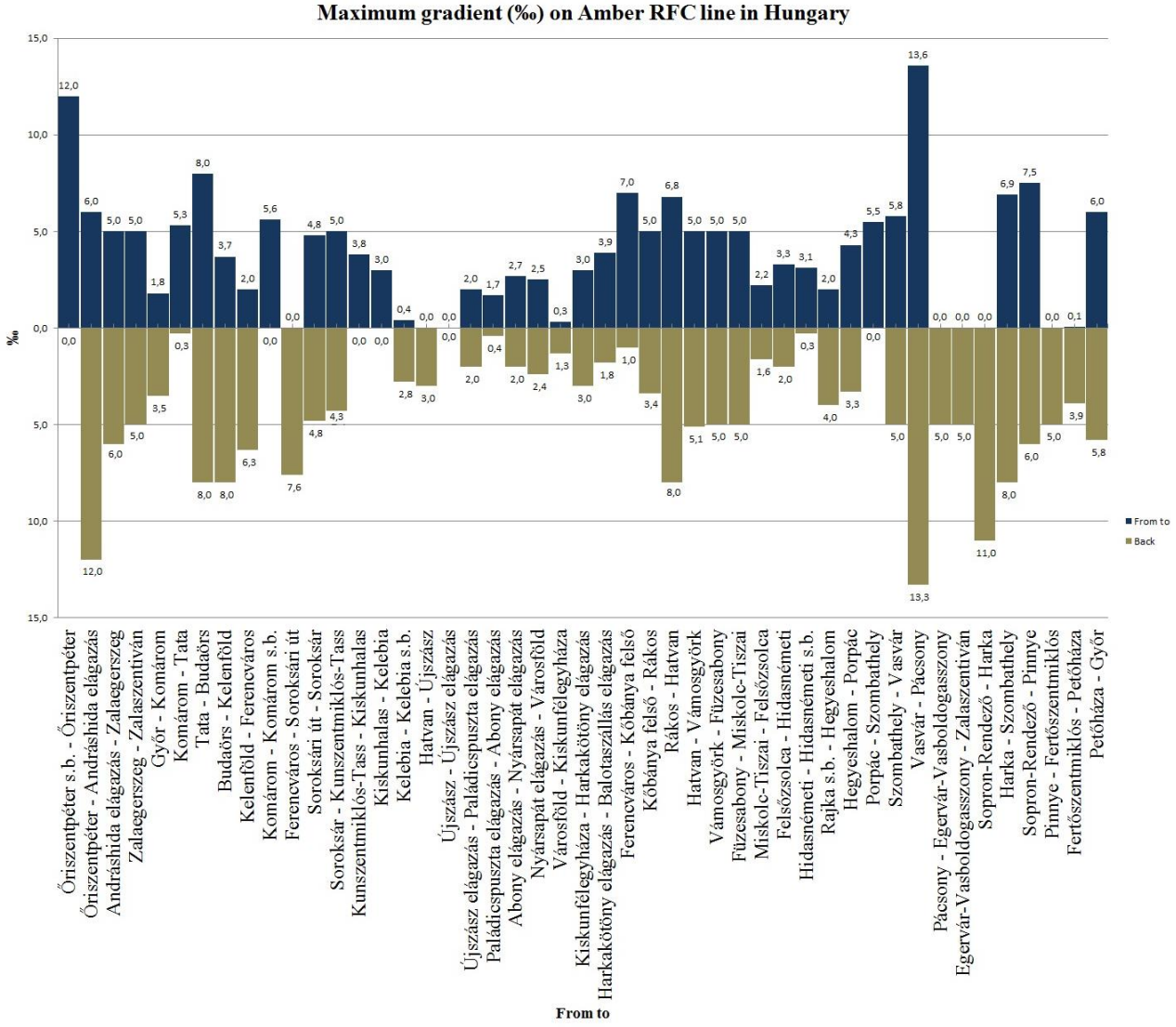
Gradient in Poland



Gradient in Slovakia



Gradient in Hungary



Gradient in Slovenia